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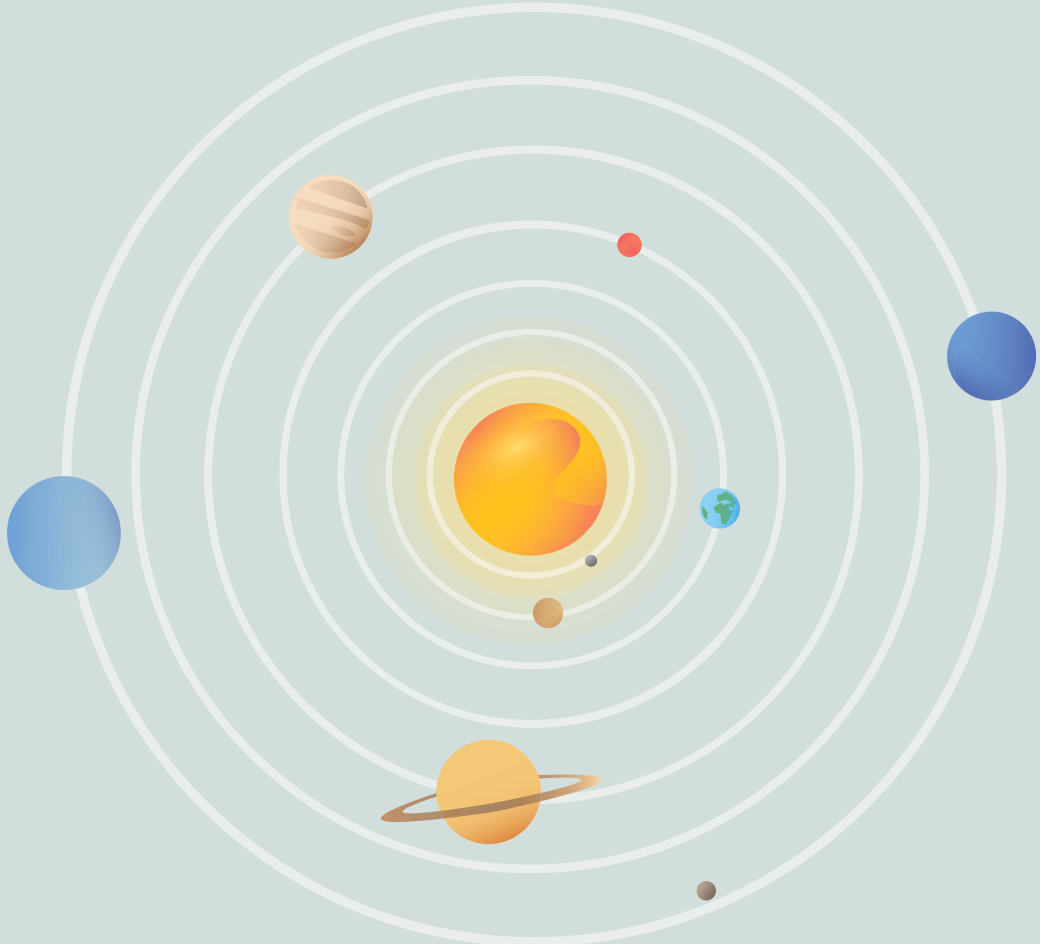
TEXAS
ELEMENTARY LITERACY PROGRAM

ENGLISH



Grade 3

Unit 7 | Teacher Guide

Astronomy: Our Solar System and Beyond

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Teacher Guide

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Introduction

ASTRONOMY : OUR SOLAR SYSTEM AND BEYOND

This introduction includes the necessary background information to teach the *Astronomy: Our Solar System and Beyond* unit. This unit contains 19 daily lessons, plus three Pausing Point days that may be used for differentiated instruction. Each lesson will require a total of 120 minutes. Lessons 18 and 19 contain a Performance Task Assessment.

As noted, three days are intended to be used as Pausing Point days. These Pausing Points are embedded into the instruction at appropriate points, with the first one after Lesson 5, the second after Lesson 12, and the third after Lesson 19. You may choose to continue to the next lesson and schedule the first Pausing Point day for another day in the unit sequence. Pausing Points can be used to focus on content understanding, writing, spelling, grammar, morphology skills, or fluency.

SKILLS

Reading

The nonfiction Reader for Unit 7, *What's in Our Universe?*, consists of selections describing the sun, the eight planets, our moon, asteroids, comets, meteors, galaxies, stars, and important figures in the history of space exploration, including Nicolaus Copernicus and Mae Jemison. Students will be given opportunities throughout the unit to demonstrate their understanding about astronomy and develop reading fluency.

Spelling

During this unit's spelling exercises, students will review words with spelling patterns /j/, /n/, /ae/, /k/, and /s/. In Lessons 1–5, students will review words with spelling patterns of /j/ spelled 'g', 'j', 'ge', 'dge', and 'dg'. For Lessons 6–10, students will review words with spelling patterns of /n/ spelled 'n', 'nn', 'kn', and 'gn'. Finally, in Lessons 11–15, students will review words with spelling patterns of /ae/, /k/, /s/, /j/, and /n/. Students will have two or three Challenge Words and one Content word added to each spelling list.

You will also continue to teach dictionary skills. As this unit progresses, students should become proficient in the application of guide words.

Grammar

In grammar, students will review the conjunctions *and* and *because* and be introduced to the conjunctions *so* and *or*. Students will continue their study of cause and effect, understanding that the conjunction *because* announces the cause and the conjunction *so* announces the effect. Students will also recognize that the conjunctions *and* and *or* are opposites, as the conjunction *and* includes topics, ideas, or things in sentences, whereas the conjunction *or* excludes topics, ideas, or things in sentences. They will be introduced to the correct punctuation needed for presenting items in a series in a sentence and will review the use of quotation marks in dialogue. Students will be introduced to singular and plural possessive nouns.

Morphology

During the morphology portion of the lessons, students will study the common suffixes –*ful* and –*less*. Students will also review the suffixes –*ous*, –*ive*, and –*ly*. Students will continue to practice using their knowledge of how these suffixes change the meaning and part of speech of these words. Students have done sufficient word work to be able to apply what they have learned as they encounter unfamiliar words in text and content.

KNOWLEDGE: WHY ASTRONOMY IS IMPORTANT

This unit will build upon what students have already learned about astronomy and introduces them to new information about this science. Through reading and listening to Read-Alouds, students will learn more about our solar system, our galaxy, other galaxies, and the universe. Students will study the concept of gravity and its effects on Earth and in other places in space. A foundation of knowledge will be laid for more in-depth study in later grades of topics such as matter, light-years, and black holes. Students will learn the difference between a hypothesis and a theory and hear about key people and events involved in the study and exploration of outer space.

This unit also provides opportunities for students to build content knowledge and draw connections to social studies and science subject areas but does not explicitly teach the Texas Essential Knowledge and Skills standards for Social Studies and Science. At times throughout the unit, you may wish to build on class discussions to support students in making cross-curricular connections to the strands of Science, Technology, Society, and Social Studies Skills from the social studies discipline and Earth and Space, Force, Motion, and Energy, and Scientific Investigation and Reasoning from the science discipline.

Special Note: Lessons **2, 7,** and **13** contain content that covers most scientists' estimates of the age of stars and galaxies and the historical debates around Copernicus's theory that the planets orbited the sun. This content may conflict with some students' beliefs about the origins and age of the universe. Please contact your administrator to determine the best approach for teaching the content in these lessons.

Prior Knowledge

Students who have received instruction in the program in Grades 1 and 2 will be familiar with some of the information concerning our solar system, sun, and planet Earth—especially the reason for the seasons. For students who have not received prior instruction in the program, introductory knowledge is addressed at the beginning of each unit.

Astronomy: Space Exploration (Grade 1)

- Explain that the sun, moon, and stars are located in outer space
- Classify the sun as a star and explain that the sun is a source of energy, light, and heat
- Identify Earth as a planet and our home
- Identify Earth's rotation or spin as the cause of day and night
- Explain that other parts of the world experience nighttime while we have daytime
- Explain that Earth orbits the sun
- Describe stars as hot, distant, and made of gas
- Explain that astronomers study the moon and stars using telescopes
- Explain what a constellation is and identify the Big Dipper and the North Star
- Identify the four phases of the moon: new, crescent, half, full
- State that the moon orbits the earth
- Explain that astronauts travel to outer space
- Describe the landing on the moon by American astronauts and the importance of the first trip to the moon
- Explain that our solar system includes the sun and the planets that orbit it
- Identify that there are eight planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune
- Classify Pluto as a dwarf planet

Cycles in Nature: Clouds to Raindrops (Grade 2)

- Recognize that Earth orbits the sun
- Explain that it takes one year for Earth to orbit the sun
- Explain that a cycle is a sequence of events that repeats itself again and again
- Describe the seasonal cycle: spring, summer, autumn (fall), winter
- Identify that the tilt of Earth's axis in relation to the sun causes the seasons
- Recognize that most of Earth's surface is covered by water
- Identify the three states of matter in which water exists: solid, liquid, gas

WRITING

Students have many opportunities to write in a variety of ways and for different purposes. The formal writing piece for the *Astronomy: Our Solar System and Beyond* unit is a multiday informative writing project that describes a day in the life of an astronaut on the International Space Station. This project is also the final unit assessment. Students will gather information, take and organize notes, and use the writing process to plan, draft, revise, edit, and publish the final piece. The writing piece can be done with or without the use of technology, but having students use computers to research, write, and publish their informative writing is highly recommended.

Everyday writing opportunities come in many forms, including short and extended responses requiring evidence from the text. Students will write reflections about what they've learned and give opinions. Students will also use graphic organizers to gather and categorize information from reading or from the Read-Aloud, or to plan for writing. Many lessons provide opportunities for students to collaborate, share ideas, and give feedback on their writing.

PERFORMANCE TASKS AND ASSESSMENTS

The Primary Focus objectives in each lesson are carefully structured and sequenced throughout the unit to help build student understanding. Additionally, formative assessments are provided to help keep track of students' progress toward objectives and standards. These can be found in the Student Activity Book and are referenced in every lesson.

The unit assessment for this *Astronomy: Our Solar System and Beyond* unit is an informative writing project that spans Lessons 17–19. In this task, students will be asked to write about a day in the life of an astronaut on the International Space Station. Students will use multiple sources to gather information and then plan, draft, revise, edit, and publish their final version. This project gives teachers the opportunity to evaluate students' abilities to read and gather important information and then synthesize that information into a specific writing task. Teachers use the provided rubric to evaluate and score the finished work.

Fluency may be assessed informally throughout the unit, but an optional Fluency Assessment is provided in Lesson 17.

FLUENCY SUPPLEMENT

A separate component, the Fluency Supplement, is available on the program's digital components site. This component was created to accompany materials for Grade 3. It consists of selections from a variety of genres, including poetry, folklore, and fables. These selections provide additional opportunities for students to practice reading with fluency and expression (prosody). For more information on implementation, please consult the supplement.

INSTRUCTIONAL COMPONENTS

Teacher Resources

There are 10 Image Cards in your kit that include pictures to augment instruction of the *Astronomy: Our Solar System and Beyond* unit.

At the back of this Teacher Guide, you will find a section titled "Teacher Resources." In this section, you will find the following:

- Glossary
- Activity Book Answer Key

Digital Resources

In the Advance Preparation section of each lesson, you will be directed to prepare and project images associated with the Read-Aloud portion of the lesson. These can be found on the program's digital components site.

ACADEMIC AND CORE VOCABULARY

Lesson 1

- atmosphere
- axis
- hemisphere
- universe
- eclipse
- planet
- orbit
- solar system
- rotate
- tilted

Lesson 2

- eclipse
- celestial bodies
- core
- debris
- meteoroids
- satellites
- terrain

Lesson 3

- naked eye
- probe
- frigid
- greenhouse
- NASA
- polar

Lesson 4

- gas giant
- hydrogen

Lesson 5

- asteroids
- comets
- meteor
- asteroid belt
- Halley's comet
- meteorite

Lesson 6

- galaxy
- astronomer
- billion
- Milky Way Galaxy
- Andromeda Galaxy

Lesson 7

- astronomical
- atoms
- cluster
- fuse
- irregular
- light-years
- spiral

Lesson 8

- constellation
- Ursa Major
- Ursa Minor
- Polaris
- ladle
- magnetic
- navigate
- orient
- orienteering

Lesson 9

- module
- probes
- reusable
- spacecraft
- triumph

Lesson 10

- observatory
- launch
- Hubble Telescope
- astronaut
- manned
- Apollo 11
- gravity
- attraction

Lesson 11

- black hole
- force
- gravitational pull
- gravity
- matter
- tides

Lesson 13

- calculations
- diurnal
- geocentric
- heliocentric
- hypothesis
- logical
- opposed

Lesson 15

- space shuttle
- shuttle
- booster rocket
- especially
- unmanned

Lesson 16

- aeronautics
- applications
- engineering
- pursue
- refugees
- tragedy
- African-American studies
- chemical engineering
- Peace Corps
- health care
- Endeavour

Lesson 17

- international

LESSON

1

The Sun, Earth, and Our Solar System

PRIMARY FOCUS OF LESSON

Core Connections

Students will identify objects in our solar system. **TEKS 3.6.E**

Speaking and Listening

Students will listen to an informational text introducing them to the solar system and sequence the steps of a solar and lunar eclipse.

TEKS 3.1.A; TEKS 3.7.B; TEKS 3.7.D; TEKS 3.7.F

Reading

Students will read and answer comprehension questions about the sun, Earth, and our solar system. **TEKS 3.7.C**

Language

Students will write words using spelling patterns and rules for words with the /j/ sound. **TEKS 3.2.B.iv**

FORMATIVE ASSESSMENT

Activity Page 1.1	**A Solar Eclipse** Sequence the events of a solar eclipse. **TEKS 3.7.B; TEKS 3.7.D; TEKS 3.7.F**
Activity Page 1.2	**A Lunar Eclipse** Sequence the events of a lunar eclipse. **TEKS 3.7.B; TEKS 3.7.D; TEKS 3.7.F**

TEKS 3.6.E Make connections to personal experiences, ideas in other texts, and society; **TEKS 3.1.A** Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.D** Retell and paraphrase texts in ways that maintain meaning and logical order; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.2.B.iv** Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

LESSON AT A GLANCE

	Grouping	Time	Materials
Core Connections (5 min.)			
Introducing the Unit: Astronomy: Our Solar System and Beyond	Whole Group	5 min.	
Speaking and Listening (50 min.)			
Introducing the Read-Aloud	Whole Group	5 min.	❏ Digital Flip Book: U7.L1.1–U7.L1.10 ❏ Image Card C.U7.L1.1 ❏ Activity Pages 1.1, 1.2 ❏ large envelope or reproduction of an envelope on board or chart paper ❏ globe (optional) ❏ light source (optional)
Read-Aloud: "Our Planet Earth"	Whole Group	20 min.	
Discussing the Read-Aloud	Whole Group	10 min.	
Sequencing Solar and Lunar Eclipses	Independent	10 min.	
Word Work: *Universe*	Whole Group/ Partner	5 min.	
Reading (45 min.)			
Introducing the Reading	Whole Group	10 min.	❏ *What's in Our Universe?* ❏ Activity Page 1.3
Independent Reading: "The Sun, Earth, and Our Solar System"	Whole Group	25 min.	
Comprehension Questions	Partner	10 min.	
Language (20 min.)			
Spelling: /j/ Sound	Whole Group	20 min.	❏ Individual Code Chart ❏ Spelling Chart (Digital Projections)
Take-Home Material			
Take-Home Letter: Spelling Words			❏ Activity Pages 1.4, 1.5, 1.6
The Sun, Earth, and Our Solar System			
Take-Home Letter: The Solar System			

ADVANCE PREPARATION

Speaking and Listening

- Prepare to project the following digital images during the Read-Aloud: U7.L1.1–U7.L1.10.
- Have a large envelope or prepare a reproduction of an envelope on board or chart paper.
- Have a globe and a bright light source available. (optional).

Reading

Note: The image on page 5 of the Reader includes Pluto. Remind students that Pluto was once considered the ninth planet in the solar system but is now classified as a dwarf planet.

Language

- On chart paper, create the following chart or project Digital Projection DP.U7.L1.1.

'g' > /j/	'j' > /j/	'ge' > /j/	'dge' > /j/	'dg '> /j/

Universal Access

- Display vocabulary words in the classroom during and after instruction to reinforce word meaning.
- Display Image Cards in the classroom during and after instruction to reinforce ideas.
- Demonstrate the concepts of *rotation, eclipse, daytime, nighttime,* and *seasons* using models such as a globe and bright light source.

Start Lesson

Lesson 1: The Sun, Earth, and Our Solar System

Core Connections

5M

Primary Focus: Students will identify objects in our solar system. **TEKS 3.6.E**

INTRODUCING THE UNIT: ASTRONOMY: OUR SOLAR SYSTEM AND BEYOND

- Ask students to name all the objects they know about in the solar system. Write their responses on a white board or chart paper.

Lesson 1: The Sun, Earth, and Our Solar System

Speaking and Listening

50M

Primary Focus: Students will listen to an informational text introducing them to the solar system and sequence the steps of a solar and lunar eclipse.

TEKS 3.1.A; TEKS 3.7.B; TEKS 3.7.D; TEKS 3.7.F

VOCABULARY: "OUR PLANET EARTH"

- The following are core vocabulary words used in this lesson. Preview the words with the students before the lesson. Students are not expected to be able to use these words immediately, but with repeated exposure throughout the lessons they will acquire a good understanding of most of the words. Students may also keep a "unit dictionary" notebook along with definitions, sentences, and/or other writing exercises using these vocabulary words.

atmosphere, a blanket of gas surrounding a planet

axis, real or imaginary line through the center of an object

eclipse, an event that occurs when one object in outer space blocks the sunlight reaching another object (**eclipses**)

hemisphere, half of the sphere of Earth

universe, all objects and matter in space including Earth and beyond

TEKS 3.6.E Make connections to personal experiences, ideas in other texts, and society; **TEKS 3.1.A** Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.D** Retell and paraphrase texts in ways that maintain meaning and logical order; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate.

Vocabulary Chart for "Our Planet Earth"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	atmosphere axis hemisphere universe eclipse	
Multiple-Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE READ-ALOUD (5 MIN.)

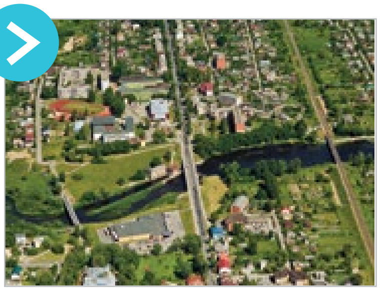
- Prepare to project the following digital images on the program's digital components site during the Read-Aloud: U7.L1.1–U7.L1.10.

  Projection Images U7.L1.1–U7.L1.10.

- Tell students that over the next few weeks they will be learning about outer space and the study of outer space called *astronomy*, and they will be gathering information about space.
- Ask students to repeat the word *astronomy* with you. Explain that *astro–* is a word part that came from the ancient Greek word root *astron* that means "star," and that astronomy includes the study of stars.
- Tell students that astronomy also includes the study of all objects in space and that these are sometimes referred to as celestial bodies, which are fancy ways of saying natural objects in the sky. Ask students, "If astronomy is the study of the stars and other objects in outer space, what do you think a person who studies astronomy is called?" Tell students that *astronomers* are scientists who study all of the objects in outer space and that most of what we know about outer space we have learned from the observations, measurements, and thinking of astronomers.
- Tell students that during this class they will often hear the word *solar* used. Ask students to repeat the word *solar* with you. Explain that *sol* is Latin for "the sun" and that *solar* means "related to the sun." Ask students what phrases that include the word *solar* are familiar to them.
- Tell students that they will also be hearing the word *lunar*. Ask students if they remember from Grade 1 *Astronomy: Space Exploration* what the word *lunar* means. (related to the moon)

- Explain that *lunar* comes from the Latin word *luna*, or moon. Many words used in astronomy come from the ancient Greeks and Romans. Learning to look for and decode Greek and Latin roots can help a reader understand scientific terms. The roots *sol*, *luna*, and *astro* appear in many English words. For example, what is an *astronaut*? (someone who travels to the stars) What is a *solarium*? (a sunroom) What is a *lunar month*? (the time between full moons, about 29 days)

READ-ALOUD: "OUR PLANET EARTH" (20 MIN.) TEKS 3.1.A



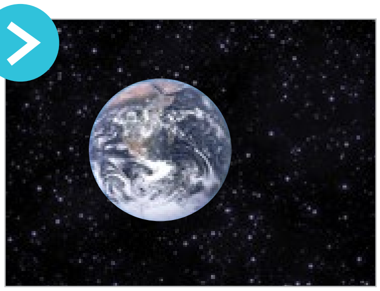
Show Image U7.L1.1
Aerial View of a Place on Earth

If you traveled to another country and someone asked, "Where in the world is your school located?" you might answer by giving the school's address. Its address explains where your school is located on planet Earth.

- Write the information below on a large envelope or on the board as students give the answers.

  What information would we need to give to someone who wanted to write a letter to our class?

  » Our school's name:
  Our school's number and street:
  Our town or city:
  Our state and ZIP code:
  Our country:



Show Image U7.L1.2
View of Earth

A mail carrier could find our school and deliver this envelope from anywhere in the world!

Support

Explain that *extraterrestrial* comes from two words: *extra*, meaning "outside" or "beyond," and *terrestrial*, meaning "having to do with Earth."

But let's pretend you traveled far, far away to a distant place in outer space, and an extraterrestrial being asked, "Where in the universe is your school located?" How would you answer that question? You would need to give someone who lives far away from Earth more information as part of your school's address—a "space address" that explains where your school is located on a map of the universe.

The first part of your space address that you would add to the envelope is your planet: Earth.

Add "Planet Earth" after the country on the envelope or board.

You might think you already know everything there is to know about Earth—after all, you've lived here your entire life! But what do we really mean when we say we live on a planet? The word *planet* means "wanderer," a name ancient Romans gave to objects in the sky that appeared to wander on a different path than the stars did. As astronomers have continued to observe and study space with more powerful tools and learn more, they kept thinking about and discussing the exact definition of a planet. Scientists today classify a planet as having five important qualities:

- A planet is a sphere or nearly round object in space that has a large mass.
- A planet travels (or wanders) in a path—called an orbit—around a star.
- A planet has cleared out most other objects from its path as it orbits around the sun.
- A planet is mostly made of rock or gas or a combination of both.
- A planet does not make its own light, but it shines in the sky because it reflects the light of the star it orbits.

Show Image U7.L1.3
Earth with the Sun Beyond

Planet Earth is made of rock and orbits a star you already know by name. Can you guess it? Earth's star

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments.

is the sun! The sun (like all stars) is an enormous mass of incredibly hot gas. It creates a huge amount of energy in the form of light and heat. Earth is one of eight planets that orbit the sun.

Image Card C.U7.L1.1

Sun

- Show Image Card C.U7.L1.1

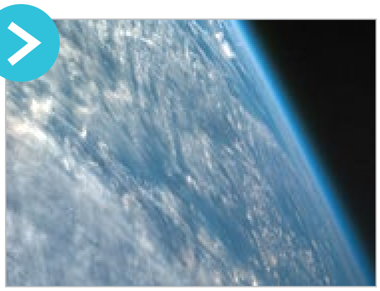
  You should remember talking about the sun in our Light and Sound unit. What else do you remember about the sun?

  » Answers vary but may include: The sun sends visible and invisible light waves; all living things need the sun to survive; etc.

Actually, Earth is the third planet away from the sun—93 million miles away, to be exact! That's a long way! If you drove from Earth to the sun in a car going 60 miles an hour—or about the speed you might travel on a highway—it would take you almost 177 years to get there (and that's without stopping to stretch!).

Most living things on Earth need heat and light from the sun to survive. Ninety three million miles may seem far from the sun, but it's actually the perfect distance for human, animal, and plant life on Earth to exist. If the sun were closer to Earth, it would be too hot—so hot that Earth's water would boil away. If the sun were farther away, it would be too cold—so cold that all Earth's water would freeze completely. As it is, Earth's position in our planetary system is just right for life. In fact, Earth is the only place in our sun's system of planets—or in the entire universe—where we know life exists.

Tell students that astronomers have discovered other stars that have planetary systems similar to ours, but we still know very little about them because they are so far away.



Show Image U7.L1.4
Earth's Atmosphere as Seen from Space

Another reason life can exist on Earth is because of Earth's atmosphere. An atmosphere is a covering or

Support

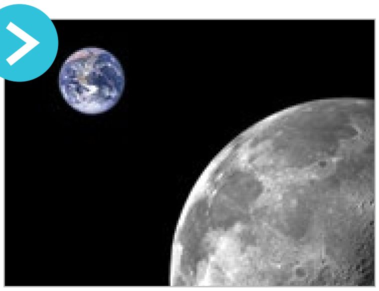
Explain that *diffuses* means "scatters."

"envelope" of gases that surrounds a planet. Earth's atmosphere traps the sun's heat, keeping it near the surface of Earth. This keeps Earth from getting too cold.

Earth's atmosphere is all around us. Take a deep breath and hold it.

You have just breathed in some of the atmosphere! Now breathe out. Your breath has just added something to the atmosphere! Besides providing the air we breathe, the atmosphere also protects Earth. Have you ever put on a jacket to keep from getting sunburned when you go outside? Earth's atmosphere is like a jacket for Earth, blocking some of the sun's harmful light rays from reaching Earth's surface. Earth's atmosphere also diffuses some of the sun's light. This is what makes the sky look blue.

In images of Earth as seen from space, it's easy to see the blue of Earth's oceans. Water covers about 70 percent of planet Earth—that's a lot more than half the surface of Earth! Earth's water is essential to support plant and animal life as we know it.



Show Image U7.L1.5
View of Earth from the Moon

One moon orbits Earth many miles beyond Earth's atmosphere. Earth's moon is by far our closest neighbor in space, but it is still far away. Have you heard the line in the classic Mother Goose rhyme that said, "The cow jumped over the moon"?

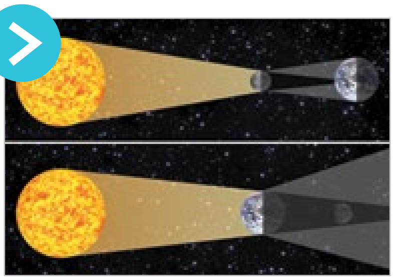
Well, that was one high-jumping cow! The moon is about 239,000 miles away from Earth. So if the cow "jumped" from Earth to the moon going 60 miles per hour, it would get there in about 166 days! That would be one mighty jump for a cow!

You have seen the different phases of the moon as its shape changes during a month's time. As the moon orbits Earth, we see different amounts of sunlight reflected from the moon's surface.

Challenge

Why isn't the moon visible every night that there are no clouds?

» The moon orbits Earth once each month, so viewing it depends on its position in its orbit and where the viewer is on Earth.



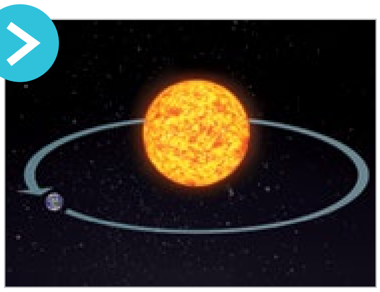
Show Image U7.L1.6
Solar Eclipse, Lunar Eclipse

Sometimes the moon, Earth, and sun line up so that one of them is hidden from view. This is known as an eclipse. A solar eclipse happens when the moon comes between the sun and Earth, hiding the sun so some people on Earth can't see it. A lunar eclipse is when Earth comes between the sun and the moon. When this happens, people on Earth see Earth's shadow on the moon, making the moon appear dark or even seem to disappear. But the moon doesn't really disappear—it's just hidden for a short time in Earth's shadow.

Challenge

Explain why some people on Earth can see an eclipse and why some people cannot.

» It depends on where you are on Earth in relation to the alignment of the sun, moon, and Earth.



Show Image U7.L1.7
Earth's Elliptical Orbit around the Sun

Planet Earth moves in two ways. The first we've already talked about: it travels in a nearly circular path—or orbit—around the sun. The actual path of Earth's orbit is not a perfect circle. It is just a little longer in one direction than in the other. The name for this type of nearly circular path is an ellipse.

- Ask students to draw an ellipse on a scrap of paper. Have several students describe what it looks like. Draw an ellipse on the board so they can compare their drawings to yours.

Support

Have students "draw" the shape of an ellipse in the air before drawing it on paper.

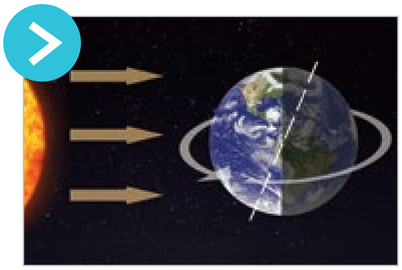
An orbit that is shaped like an ellipse is described as an elliptical orbit. It takes Earth 365 and ¼ days to orbit the sun one time—so Earth's year is 365 days. The amount of time it takes a planet to orbit the sun one time is called its planetary year. But what about that extra ¼ day? Why don't we count it? Actually, we do count it; we just don't count it every year. Instead, we add up this extra ¼ day for four years in a row to make one full day.

On the board, write the following as you say it aloud: ¼ + ¼ + ¼ + ¼ = one day.

Then in the fourth year, we add that extra day to the end of February, so once every four years it has 29 days instead of its usual 28. We call this year with the extra day a "leap year" because everything "leaps" ahead by one day.

Do you know if this year is a leap year? How do you know? (The February calendar would have 29 days.)

How many total days will be in a leap year? (366)



Show Image U7.L1.8
Daytime and Nighttime on Earth

The second way planets in our solar system move is by spinning as they orbit the sun. Have you ever spread your arms wide and twirled yourself around until you were so dizzy you could hardly stand up?

- Tell students to stand up and slowly spin in place.

  Can you feel the axis, or centerline, of your body around which you spin?

  » Yes.

  What parts of your body rotate, or spin, around your axis?

  » answers vary

- Tell students to sit down.

Maybe you have played with a spinning top or have seen an ice-skater spin quickly around and around on one foot. This is what it means to rotate. But when a planet rotates, it doesn't twirl around on feet like you do—it spins around an imaginary line that goes from its North Pole to its South Pole, right through its center. This imaginary line is called the planet's axis.

- Use a globe to demonstrate the rotation of Earth on its axis and to show how this causes day and night. Be sure to spin the globe toward the east as you turn it.

One day is the amount of time it takes for a planet to rotate one time around its axis. A day on Earth is 24 hours. These 24 hours are divided into daytime and nighttime. As Earth rotates, half of Earth faces the sun and receives the sun's light. It is daytime on this side of Earth. But at that same moment, the opposite half of Earth is facing away from the sun. This side of Earth is not receiving any of the sun's light, so it is dark there. It is in the Earth's shadow. It is nighttime.

- You may also demonstrate this by having a bright light source (representing the sun) and turning down the rest of the lights in the room. Turn the globe slowly and point out how different points on the earth go through "day" and "night."

We don't feel Earth spinning. From our viewpoint it looks like the sun is moving and Earth is not. After all, doesn't the sun appear to "rise" every morning in the east and "set" every evening in the west? This daily motion of the sun from east to west might make it seem like the sun is moving around Earth, but it's not. You are moving around the sun! Or really, Earth is. In the morning, the part of Earth you are standing on is turning away from darkness and rotating to face the sun.

When the sun is up at its highest point in the sky, Earth has rotated so you are fully facing the sun. In the evening, Earth turns away from the sun and it becomes dark again. Why is it dark? Because you are in the shadow of Earth! It is night and you go to bed. But as you sleep, Earth keeps rotating on its axis, and before you know it, your side of the world will have turned to face the sun again. You and the part of Earth on which you live will have once again moved out of Earth's shadow. And you'll know that one rotation of Earth—one day—will have ended. And another one will be just beginning!

Days turn into months, and months turn into seasons. Let's take a class poll to find out what season is the favorite.

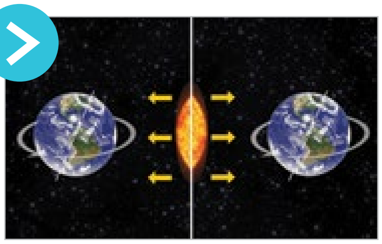
- Keep an informal count as you ask the questions below. Share results with the students.
    - Raise your hand if your favorite season is fall.
    - Raise your hand if your favorite season is winter.
    - Raise your hand if your favorite season is spring.
    - Raise your hand if your favorite season is summer.

You might know what your favorite season is, but do you know what causes the seasons? It's the combination of the two motions of Earth that we've been talking about: Earth's orbit around the sun, and Earth's rotation on its tilted axis.

Check for Understanding

Ask students to do a "thumbs up" for true or "thumbs down" for false to the following statements:

- The sun orbits around the planets. (down)
- The moon orbits around the sun. (down)
- Earth spins on its axis. (up)
- Another word for *spins* is *rotates*. (up)
- An elliptical orbit means that the orbit is shaped like a perfect circle. (down)
- Earth moves in two ways. (up)



Show Image U7.L1.9
Summer and Winter Seasons and the Tilt of Planet Earth

Remember, an axis is the imaginary line that goes through the center of a planet from its North Pole to its South Pole and then points out into space in both directions. But a planet's axis doesn't always point straight "up and down" like the axis of a spinning top. Many planets—including Earth—have an axis that is tilted a little to the side. This tilt is the key to understanding Earth's seasons.

Point to the axis as the globe is turning and point out that the axis is not straight up and down, but is tilted.

Because Earth is tilted, there is a time of year during Earth's orbit around the sun that the North Pole—and therefore, the whole Northern Hemisphere—is tilted a little bit toward the sun. This tilt gives the Northern Hemisphere longer periods of daylight, and shorter periods of nighttime darkness. Longer periods of daylight give the sun more time to warm Earth, so it gets hotter. The tilt of Earth's axis also makes the sun in the Northern Hemisphere appear higher in the sky at noon. When the sun is higher in the sky, its rays hit Earth more directly, at less of an angle. The more directly the sun hits the Northern Hemisphere, the better job it does of heating that part of Earth. So it is the tilt of Earth—which causes longer periods of daylight—and a high noontime sun that make summer happen.

While it is summer in the Northern Hemisphere, let's see what is happening in the Southern Hemisphere. Why is it winter on this part of Earth? The reason is, again, the tilt of Earth. When the Northern Hemisphere is tilted toward the sun, the Southern Hemisphere is tilted away from the sun. This causes the Southern Hemisphere to have shorter periods of daylight and the sun to appear lower in the sky at noon. Shorter periods of daylight give the sun less time to warm Earth, so it is cooler. And when the sun is lower in the sky, its rays hit Earth at more of an angle, or a slant. This angle makes

Support

Show the Northern Hemisphere on the globe and name some countries located there.

Support

Show the Southern Hemisphere on the globe and name some countries located there.

Support

Use the globe and a light source to demonstrate how each pole tilts toward the sun at different times in Earth's orbit.

Challenge

If it's spring in Australia, what season is it in the United States?

the sun have to heat a larger area of Earth with the same amount of energy—and this means the sun does not feel as warm. The rays of sunlight are less direct and less intense. It is colder. It is winter.

As Earth continues its orbit around the sun, the axis of Earth always stays pointed in the same direction. So when Earth reaches the opposite side of the sun, the South Pole (instead of the North Pole) is now tilted toward the sun. This means that the Southern Hemisphere has summer and the Northern Hemisphere has winter. The seasons in the Northern and Southern Hemispheres are always opposite each other. This is because only one of them at a time is tilted toward the sun.

Show the tilt of Earth on the image. The arrows represent the light from the sun. The image on the left shows summer in the Northern Hemisphere and the image on the right shows winter in the Northern Hemisphere.

Show Image U7.L1.10
Aerial View: Planet Earth

So now you know the first part of your "space address"—your school is on planet Earth, and planet Earth is part of your space address. So now you have more information that you would need to answer an extraterrestrial being that might ask where your school is located in the universe! In the upcoming lessons, you'll learn more about your "space address."

Point to this part of the address written on the envelope.

DISCUSSING THE READ-ALOUD (10 MIN.)

1. **Literal.** What kind of space object is our sun?

    » a star

2. **Literal.** Why is it classified this way?

    » It is a huge, distant mass of fiery gas that gives off constant light and heat.

3. **Literal.** What kind of space object is Earth?

    » Earth is a planet. It is a sphere in space that has a large mass; it orbits around a star, our sun; it has cleared most other objects from its path around the sun; it is made mostly of rocks and gas; it does not make its own light.

4. **Literal.** Describe the ways in which Earth moves in space.

    » Earth travels around the sun in an elliptical orbit; Earth rotates, or spins, on its axis.

- *Think-Pair-Share:* Have students turn to their neighbors to discuss the following questions before sharing:

5. **Literal.** What characteristics make Earth "just right" for life on the planet?

    » Earth is the third planet from the sun and gets just the right amount of heat and light; Earth is just the right temperature; it has an atmosphere that protects life from harmful sunlight and helps hold heat to a steady temperature; it has water.

6. **Evaluative.** Why does it seem like the sun rises and sets?

    » The sun appears to rise and set because Earth is spinning on its axis as it orbits the sun.

SEQUENCING SOLAR AND LUNAR ECLIPSES (10 MIN.)

- Have students turn to Activity Pages 1.1 and 1.2.

Projection Image U7.L1.6

- Review solar and lunar eclipses with students.
- Tell the students to sequence the steps that explain a solar and lunar eclipse. Write the number "1" next to the first step, "2" next to the second, and so on.
- On the back of the activity sheet, have students write a short paragraph about either a solar eclipse or a lunar eclipse in their own words. Tell them to use time order words such as *first, second, next, then,* etc.
- Tell students to use core vocabulary words such as *orbit, eclipse, lunar, solar,* and *shadow*.
- Collect Activity Pages 1.1 and 1.2.

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Speaking

Beginning
Ask students simple yes or no questions (e.g., "Is Earth a planet because it's made of rocks and gas?").

Intermediate
Have students provide the domain words when asked definition questions (e.g., "What is the word for the type of orbit that Earth makes around the sun?").

Advanced/Advanced High
Encourage students to answer questions using complete sentences and domain vocabulary.

ELPS 1.E; ELPS 3.F

Activity Pages 1.1 and 1.2

Support

Have students work with a partner on Activity Pages 1.1 and 1.2.

WORD WORK: UNIVERSE (5 MIN.)

1. In the Read-Aloud you heard "Where in the universe is your school?"
2. Say the word *universe* with me.
3. The universe is everything in space, including Earth, our solar system, and all of the stars and other space objects that exist.
4. Scientists have only explored a very small part of the universe; they do not know how big the universe is, but they know there is a great deal more to explore.
5. You know that planets, moons, and stars exist in the universe. What other objects do you think exist in the universe? Be sure to use the word *universe* when you tell about it. Ask two or three students. If necessary, guide and/or rephrase the students' responses to make complete sentences: ". . . exist in our universe" or "I heard that our universe contains . . . "
6. What's the word we've been talking about? What part of speech is *universe*?
   - Use a Sharing activity for follow-up.
7. Directions: Turn to your partner and take turns sharing a question you have about our universe. Then I will call on one or two of you to share your partner's question with the class. Be sure to use the word *universe* in a complete sentence as you share.

Lesson 1: The Sun, Earth, and Our Solar System

Reading

45M

Primary Focus: Students will read and answer comprehension questions about the sun, Earth, and our solar system. **TEKS 3.7.C**

VOCABULARY: "THE SUN, EARTH, AND OUR SOLAR SYSTEM"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.

TEKS 3.7.C Use text evidence to support an appropriate response.

planet, a round object in space that orbits a star (**planets**)

orbit, the curved path something in space takes around another object in space (**orbiting**)

solar system, the sun, other bodies like asteroids and meteors, and planets that orbit the sun

rotate, to turn about on an axis or a center (**rotating, rotates, rotation**)

tilted, slanted or tipped to one side

Vocabulary Chart for "The Sun, Earth, and Our Solar System"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	planet solar system	orbit rotate tilted
Multiple-Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE READING (10 MIN.)

Reader

- Make sure that you and your students each have a copy of *What's In Our Universe?*
- Read the title of the Reader to students and discuss the meaning of the word *universe*.
- Have students read through the table of contents on their own. Ask if they already know something about some of the chapters.
- Have students turn to the first page of the chapter.

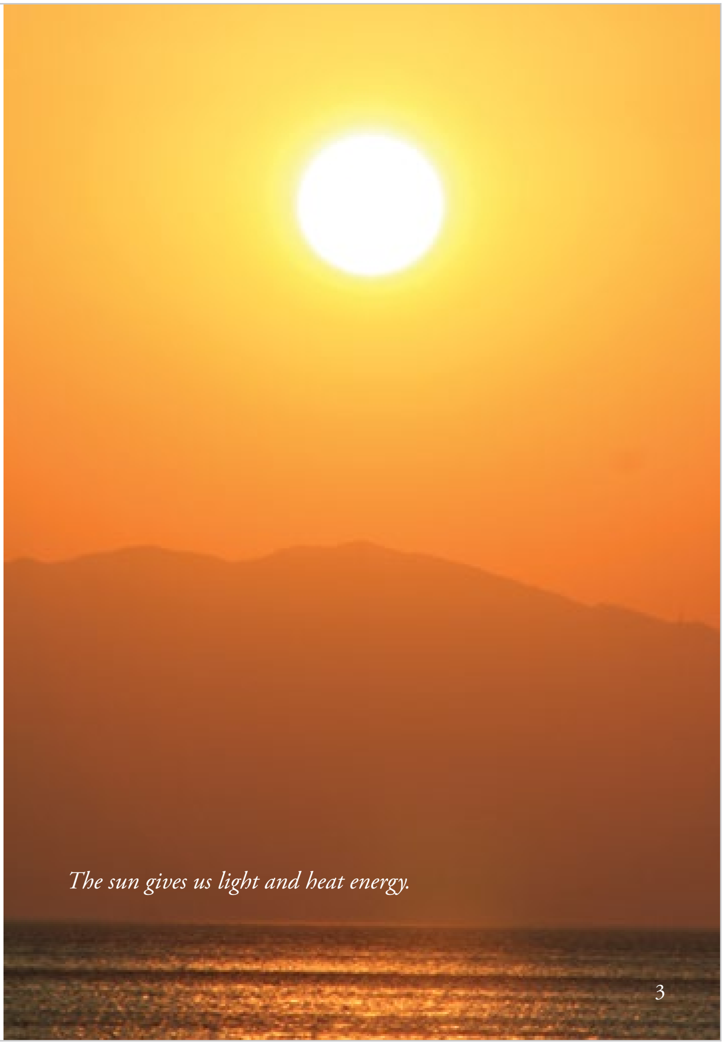
Chapter 1

The Sun, Earth, and Our Solar System

Look up in the sky at noon. What do you see? If it is not cloudy, you will see the sun shining brightly in the sky.

The sun provides energy—both light and heat energy. The sun's light and heat give life to plants and animals. Without the sun, Earth would be freezing cold. Have you ever wondered what the sun is made of or why it gives off so much light and heat?

2



The sun gives us light and heat energy.

3

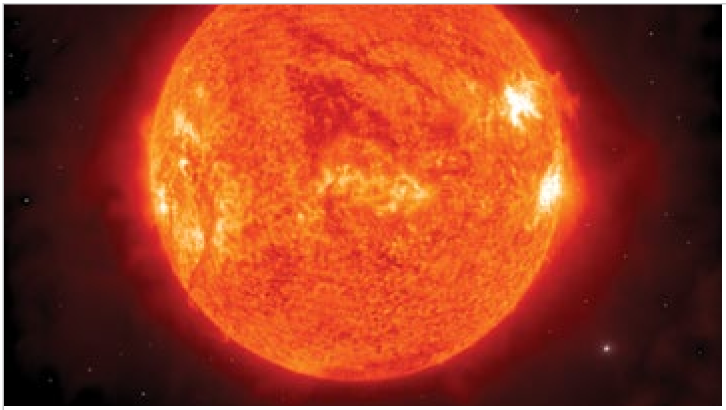
INDEPENDENT READING: "THE SUN, EARTH, AND OUR SOLAR SYSTEM" (25 MIN.)

Pages 2–3

- Direct students' attention to the image on **page 3** and read the caption aloud as a class. Ask students to predict how the sun gives us light and heat energy.
- Tell students to read **pages 2–4** to themselves to find the answer to the question: "What is the sun made up of, and how does that keep us warm?"

Support

Read the sentence with the information aloud and ask students to find the key words to help answer the question.



A close-up of the sun

You may be surprised to know that the sun is a star. It is in fact the closest star to Earth. It is made up of different, hot gases. How hot? A hot summer day on Earth is 100 degrees. On the sun, it is 10,000 degrees! The sun stays that hot all the time! The sun's gases create the light and heat energy it gives off.

Long ago, people believed that the sun moved around Earth. This seemed to make sense. Each morning at the start of the day, the sun rose in the east. At the end of the day, the sun set in the west—exactly opposite from where it had come up. To explain this change, people said the sun moved around Earth. But now we know that this is not what really happens. The sun does not move around Earth. It is Earth that moves around the sun!

4

The sun is in the center of a group of eight **planets**. All of these **planets**, including Earth, circle, or **orbit**, around the sun. The sun, **planets**, and other objects in space that **orbit** the sun are called the **solar system**. The word *solar* has the Latin root word *sol*, which means "the sun." Everything in the **solar system** relates to the sun.

***Planets orbiting** the sun*

5

Pages 4–5

- When students have finished reading, restate the question and ask students to answer.
  - » The sun is made up of different, hot gases that create the light and heat energy it gives off.

  Does the sun move around Earth, or does Earth move around the sun?

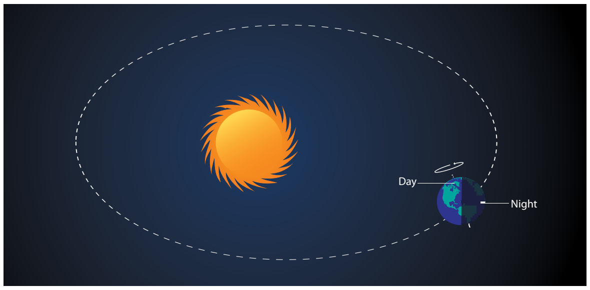
  - » Earth moves around the sun.

  What sentence or sentences from the text tells us this information?

  - » A volunteer reads the answer aloud.
- Point students' attention to the images on **page 5**.
- Say to students, "I wonder why we would have a picture of the sun and planets circling it. Let's read **page 5** to find out."
- When students have finished reading, restate the question and ask students to answer.
  - » The sun is in the center of a group of eight planets that orbit it

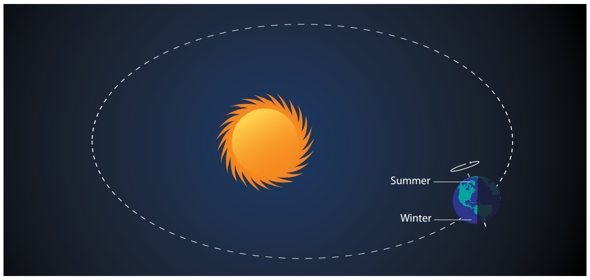
Our **planet**, Earth, moves in two ways. We have just learned that Earth circles around the sun. It takes about 365 days, which is one year, for Earth to **orbit** the sun.

Earth also moves by spinning, or **rotating**, on its **axis**. It is this spinning that makes day and night on Earth and the motion of the sun across the sky from sunrise to sunset. It takes one day for Earth to make one complete **rotation** on its **axis**. As Earth **rotates** and spins, different parts of it face the sun. When the part facing the sun gets sunlight, it is daytime on that side of Earth. The part that faces away from the sun gets no sunlight. So, on that side of Earth, it is nighttime. Did you know that when it is daytime where we live, it is nighttime on the other side of Earth?



*Earth spins on its **axis**. On the side of Earth facing the sun, it is daytime. On the side facing away from the sun, it is nighttime.*

6



*When Earth is **tilted** on its **axis** towards the sun, it is spring and summer. When Earth is **tilted** on its **axis** away from the sun, it is fall and winter.*

When Earth **rotates** on its **axis**, it is **tilted**. At certain times of the year, one part of Earth is **tilted** toward the sun. The sunlight is more direct and it feels hotter. For people living on this part of Earth, it is summer. For people living on the part of Earth **tilted** away from the sun, there is less sunlight and it is winter. So, when it is summertime for us, there are people living on other parts of Earth where it is winter! So, the fact that Earth is **tilted** on its **axis** is what creates the seasons of the year.

7

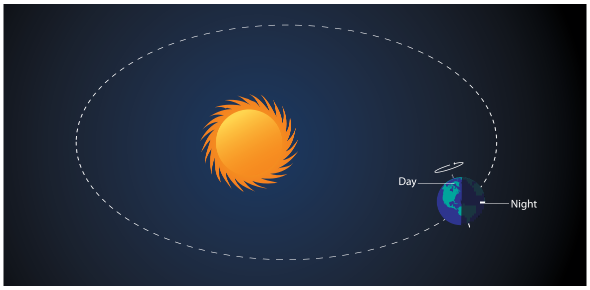
Page 6

- Turn to **page 6** and point out the image on that page showing Earth moving.
- Ask students to read **page 6** to themselves to find the answer to the question: "What are the two ways Earth moves?"
- When students have finished reading, restate the question and ask students to answer.
    - » It circles around the sun and it spins on its axis.
- Ask students, "How do you know your answer is correct?"
    - » Students should be able to read the sentences that reference the answer.

  "How does the rotation of Earth relate to day and night?"
    - » When the part of Earth facing the sun gets sunlight, it is daytime, and when the part of Earth facing away from the sun gets no sunlight, it's nighttime.

Our **planet**, Earth, moves in two ways. We have just learned that Earth circles around the sun. It takes about 365 days, which is one year, for Earth to **orbit** the sun.

Earth also moves by spinning, or **rotating**, on its **axis**. It is this spinning that makes day and night on Earth and the motion of the sun across the sky from sunrise to sunset. It takes one day for Earth to make one complete **rotation** on its **axis**. As Earth **rotates** and spins, different parts of it face the sun. When the part facing the sun gets sunlight, it is daytime on that side of Earth. The part that faces away from the sun gets no sunlight. So, on that side of Earth, it is nighttime. Did you know that when it is daytime where we live, it is nighttime on the other side of Earth?



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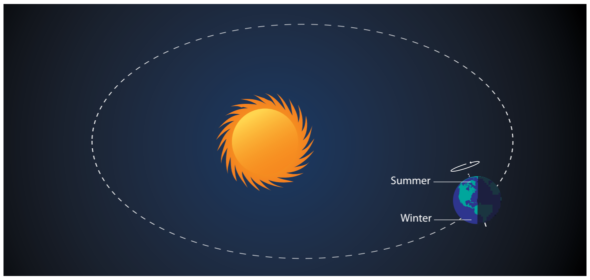
6



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7

Page 7

- Turn to **page 7** and point out the image on that page showing Earth moving, which shows summer and winter. Make sure to explicitly point out to students the tilt of Earth toward the sun that causes summer and winter in the image.
- Ask students to read **page 7** to themselves to find the answer to the question: "How does Earth's tilt produce seasons?"
- When students have finished reading, restate the question and ask students to answer.
  - » When one part of Earth is tilted toward the sun, the sunlight is more direct and feels hotter; it is summer. When a part of Earth is tilted away from the sun, the sunlight is less direct; it is winter.
- "What evidence in the text supports your answer?"
  - » Students should be able to read the sentences that prove the answer.

Support

Read the sentence with the information aloud and ask students to find the key words to help answer the question.

Support

Pull a small group together to reread text and find answers to comprehension questions.

Challenge

Have students complete Activity 1.3 independently.

Activity Page 1.3

ENGLISH LANGUAGE LEARNERS

Reading
Reading/Viewing Closely

Beginning
Read the multiple choice distractor questions aloud and ask students to say whether each is true or false (e.g., "The sun provides electrical and wind energy. True or false?").

Intermediate
Pair a student with a partner who can support the student in rereading the text, if necessary, and answering the questions.

Advanced/Advanced High
Encourage students to show their thinking by providing where in the text they find their answers.

ELPS 1.E; ELPS 4.F

COMPREHENSION QUESTIONS (10 MIN.)

- Divide students into partners to complete Activity Page 1.3. Circulate among the groups to provide guidance, support, and informal assessment.

Lesson 1: The Sun, Earth, and Our Solar System

Language

20M

Primary Focus: Students will write words using spelling patterns and rules for words with the /j/ sound. **TEKS 3.2.B.iv**

SPELLING (20 MIN.)

Introduce Spelling Words

- Tell students that this week they will review the spellings of /j/.
- Write the words on the board, pronouncing each word as you write it.

1. jellyfish	12. jewel
2. germy	13. bridging
3. digest	14. dodge
4. fringe	15. average
5. nudging	16. fudge
6. ridge	17. giraffe
7. exchange	**Challenge Word:** *answer*
8. eject	**Challenge Word:** *great*
9. budget	**Challenge Word:** *grate*
10. lodging	**Content Word:** *Jupiter*
11. gymnasium	

- Go back through the list of words, having students read the words and tell you what letters to circle for the sound /j/.
- Explain to students that the Challenge Words *great* and *grate* are homophones, meaning they sound the same but have different meanings. Homophones may

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

or may not be spelled the same. Great and grate have the same /ae/ sound and have different meanings. *Great* means "terrific," and *grate* means "to shred."

- Tell students that their Content Word for the week is *Jupiter*, and they'll be learning more about Jupiter in the upcoming unit.
- Draw the following chart or use the previously prepared Digital Projection DP.U7.L1.1.

Projection DP.U7.L1.1

'g' > /j/	'j' > /j/	'ge' > /j/	'dge' > /j/	'dg' > /j/

- Ask students to refer to the spellings for /j/ on the **Individual Code Chart**. Point out that there are five spellings for /j/.
- Ask students which spelling is most frequently used. ('g' > /j/)
- Ask students to tell you which words to list under the 'g' > /j/ header. Briefly explain the meaning of each word.
- Continue through the columns until all words have been listed under the appropriate /j/ header. Briefly explain the meaning of each word.

'g' > /j/	'j' > /j/	'ge' > /j/	'dge' > /j/	'dg' > /j/
my [germy]	jellyfish	fringe	ridge	nudging
digest	eject	exchange	dodge	budget
gymnasium	jewel	average	fudge	lodging
giraffe	Jupiter			bridging

ENGLISH LANGUAGE LEARNERS

Language
Foundational Literacy Skills

Beginning
Use an echo reading strategy by reading the word and having students repeat the words.

Intermediate
Have students act or draw out the word meanings.

Advanced/Advanced High
Have students create their own sentences for the words.

ELPS 1.C; ELPS 1.E; ELPS 2.A

- Practice the words as follows during the remaining time: Call on a student to read any word on the table. Then, have the student use the word in a meaningful sentence. After the student says the sentence, have them ask the class: "Does the sentence make sense?" If the class says, "Yes," then the student puts a check mark in front of the word and calls on another student to come to the front and take a turn. If the class says, "No," have the student try again or call on another student to come to the front and use the word in a meaningful sentence. This continues until all of the words are used or time has run out.
- Tell students this table will remain on display until the assessment so that students may refer to it during the week.

WRAP-UP

- Tell students they will take home Activity Page 1.4 with this week's spelling words to share with a family member.

End Lesson

Lesson 1: The Sun, Earth, and Our Solar System

Take-Home Material

- Have students take home Activity Pages 1.4 and 1.6 to share and 1.5 to read to a family member to practice fluency.

Activity Pages 1.4–1.6

LESSON

2

Our Solar System, Part 1

PRIMARY FOCUS OF LESSON

Reading

Students will read and answer comprehension questions about the moon. TEKS 3.6.G; TEKS 3.7.C

Speaking and Listening

Students will compare and contrast a video and a text Read-Aloud about the solar system. TEKS 3.1.A; TEKS 3.7.B

Students will recognize and discuss text features such as diagrams and digital text features such as videos and animations. TEKS 3.9.F

Language

Students will use the conjunction *so* to understand cause and effect and combine sentences. TEKS 3.11.D.viii

FORMATIVE ASSESSMENT

Activity Page 2.1	**The Moon** Answer questions using evidence in the text. TEKS 3.7.C
Activity Page 2.2	**Compare and Contrast** Compare a video and a text on the same topic. TEKS 3.1.A; TEKS 3.7.B

TEKS 3.6.G Evaluate details read to determine key ideas; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.1.A** Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.9.F** Recognize characteristics of multimodal and digital texts; **TEKS 3.11.D.viii** Edit drafts using standard English conventions, including: coordinating conjunctions to form compound subjects, predicates, and sentences.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (40 min.)			
Introducing the Reading	Whole Group	5 min.	❏ *What's In Our Universe?* ❏ Activity Page 2.1
Small Group Reading: "The Moon"	Small Group	20 min.	
Comprehension Questions	Independent	15 min.	
Speaking and Listening (60 min.)			
Viewing the Video	Whole Group	10 min.	❏ Digital Flip Book: U7.L2.1–U7.L2.11 ❏ large envelope with "space address" from Lesson 1 ❏ Activity Page 2.2 ❏ Video "Our World: "What Is a Solar System?" ❏ yardstick (optional) ❏ lemon or lemon-sized object (optional) ❏ small marble (optional) ❏ Image Cards C.U7.L2.1, C.U7.L2.2
Introducing the Read-Aloud	Whole Group	10 min.	
Read-Aloud: "Our Solar System, Part I"	Whole Group	20 min.	
Discussing the Read-Aloud	Whole Group	5 min.	
Compare and Contrast Video and Read-Aloud	Partner	15 min.	
Language (20 min.)			
Grammar: Conjunction *so*	Small Group	20 min.	❏ Activity Page 2.3 ❏ index cards or sentence strips
Take-Home Material			
"The Moon"			❏ Activity Pages 2.4, 2.5
Practice Conjunction *so*			

ADVANCE PREPARATION

Speaking and Listening

- Prepare to project the following digital images during the Read-Aloud: U7.L2.1–U7.L2.11.
- Prepare to display Image Cards C.U7.L2.1 and C.U7.L2.2
- Prepare to project video, "Our World: What Is the Solar System?"

Language

- If you previously prepared a conjunctions poster, add a fourth bullet for the conjunction *so.*

  Conjunctions

  Conjunctions are words that connect other words or groups of words.

  - The **conjunction *and*** connects words or groups of words. It means "plus," "along with," or "also."
  - The **conjunction *but*** is used to connect groups of words. It signals that "something different," such as a different idea, will come after *but*.
  - The **conjunction *because*** is used to mean "for this reason" and signals the answer to a "why" question. It signals the cause of something.
  - The **conjunction *so*** means "then this happened" and signals the effect in a cause and effect sentence.
- Write the following sentences on the board or chart paper.
  - Because it was snowing, school was canceled.
  - It was snowing, so school was canceled.

- Write the following sentences on separate index cards or sentence strips:
    - #1 Ron loves strawberries.
    - #1 He eats them whenever he can.
    - #2 Dan read the story three times.
    - #2 He remembered all the details.
    - #3 Molly's brother jumped out and scared her.
    - #3 She screamed, "Help!"
    - #4 My dad got a new job.
    - #4 We had to move to a new city.
    - #5 My older sister got married.
    - #5 She changed her last name.
    - #6 The knives in the drawer were sharp.
    - #6 I didn't play with them.

Universal Access

- Ask students to recall times when they've observed the moon and have them describe their experiences.
- Display vocabulary words in the classroom during and after instruction to reinforce word meaning.
- Display Image Cards in the classroom during and after instruction to reinforce ideas.
- Create partners and small groups strategically in advance.

Start Lesson

Lesson 2: Our Solar System, Part 1

Reading

40M

Primary Focus: Students will read and answer comprehension questions about the moon. **TEKS 3.6.G; TEKS 3.7.C**

VOCABULARY: "THE MOON"

- The following vocabulary word is used in this lesson. Preview the word with the students before the lesson and refer back to it at appropriate times. The word also appears in the glossary in the back of the Student Reader.

eclipse, the blocking of the light from the sun by another celestial body (eclipses)

Vocabulary Chart for "The Moon"

Type	Tier 3 Domain-Specific Words	Tier 2 General Academic Words
Vocabulary	eclipse	
Multiple-Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE READING (5 MIN.)

Activity Page 2.1

- Make sure that you and your students each have a copy of *What's In Our Universe?*
- Decide which students will be working with you in a small group for guided reading and which students will be reading with a partner and completing Activity Page 2.1 independently.
- Tell students that today they'll be reading about the moon in a small group or with partners.
- Gather the small group together and make sure the other students have their reading partner and Activity Page 2.1.
- Tell the partners to take turns reading paragraphs aloud, and then they will work on Activity Page 2.1 on their own.

TEKS 3.6.G Evaluate details read to determine key ideas; **TEKS 3.7.C** Use text evidence to support an appropriate response.

Chapter

2 The Moon

Look up in the sky at night. What do you see? If it is not cloudy, you may be able to see the moon.

When you see the moon at night, it might look white. It might look gray or silver. Sometimes, it seems to shine and glow. But the moon does not give off light the way the sun does. The moon is a ball of rock that gives off no light of its own. It simply reflects light from the sun. That means light from the sun hits the moon and bounces off.

Our moon is easily visible on most clear nights.

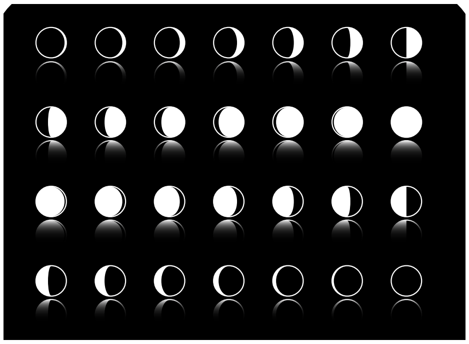
8 9

SMALL GROUP READING: "THE MOON" (20 MIN.)

Pages 8–9

- Read the title of the chapter together as a group, "The Moon."
- Point students' attention to the image on **page 9** and read the caption aloud as a group.
- Ask students to predict why the moon is only visible on most clear nights.
- Tell students to read **pages 8–9** to themselves to find the answer to these questions: "How can we see the moon at night? Does the moon give off its own light?"
- When students have finished reading, restate the questions and ask students to answer.
    - » It is a ball of rock that gives off no light of its own, but rather reflects light from the sun.

You already know that Earth **orbits** around the sun. But did you know that the moon **orbits** around Earth? It takes just about one month for the moon to completely circle Earth. If you look up at the night sky each night of the month, you may think that the size and shape of the moon is changing. However, the size and shape are not really changing. The moon is still a round ball. It looks different at different times of the month because of the way the light from the sun is reflected and how much of the moon we can see from Earth.

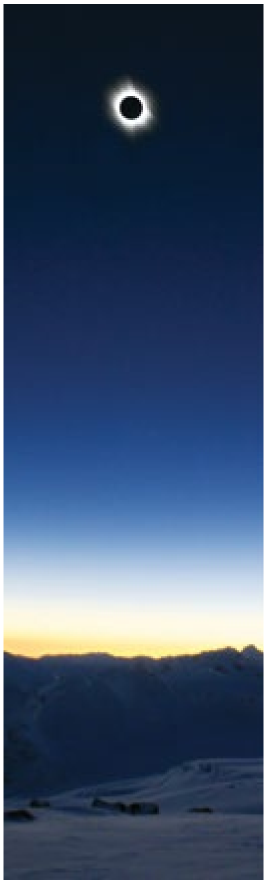


This chart shows the phases of the moon. It shows what you might see if you looked at the moon each night for a month. You can read the chart just like you would read a book. Start at the top and go from left to right. When you finish reading the first row, go on to the next one. You can see how the moon seems to change during the month.

10

The way that Earth, the moon, and the sun move can also make other interesting things to look at in the sky. When Earth, the moon, and the sun all move together in a direct line, something called an **eclipse** can take place.

We can see two kinds of **eclipses** from Earth. One kind happens when the moon gets in between the sun and Earth. When that happens, we can't see the sun for a while. At least, we can't see part of it. We call this a solar **eclipse** or an **eclipse** of the sun.



*During an **eclipse** of the sun, the moon moves between Earth and sun and blocks out the sun.*

11

Pages 10 and 11

- Have students turn to the image on **page 10** and brainstorm why the moon looks as though it's changing size and shape.

  "Why does the moon seem to change in size and shape as a month goes by?"

  » It looks different at different times of the month because of the way the light from the sun is reflected and how much we can see from Earth.

- Ask students to read the sentence or sentences that provide(s) this answer.
- Point students' attention to the image on page 11. Read the caption together as group or have a student read it aloud.
- Say to students, "I wonder why the moon looks like it has a halo around it. Let's read page 11 to find out."
- When students have finished reading, restate the question and ask students to answer.

  » The moon is between the sun and Earth so we can only see the part of the sun that the moon hasn't blocked out.

The other kind of **eclipse**, called a lunar **eclipse**, also involves the sun, the moon, and Earth. It takes place when the moon passes behind Earth and into its shadow. In the image on the next page, you can see that a shadow covers part of the moon. It is Earth's shadow that you see. Earth has blocked out the sun and left part of the moon in darkness.

Eclipses do not happen often because the sun, Earth, and the moon all have to line up just right. Solar **eclipses** can only be seen from a narrow strip of Earth at a time. While they happen once or twice a year, it is very, very rare to see one. **Eclipses** of the moon happen more often, several times each year. They can be seen from half of Earth at a time, so are more often visible.

Whether or not you can see an **eclipse** depends on where you are on Earth. You must never look directly at a solar **eclipse**. The sun is very bright and could burn your eyes. But, it is safe to look at an **eclipse** of the moon. If an **eclipse** is predicted, it is usually big news, so you will likely hear about it.

12

*The moon during a lunar **eclipse***

13

Pages 12–13

- Turn to pages 12–13 and point out the image showing a lunar eclipse.
- Ask students to read page 12 to themselves to find the answer to the question: "Why does part of the moon have a shadow on it?"
    - » It is an image of a lunar eclipse, which means that the moon passed behind Earth into its shadow.

  What evidence can you find in the text to support your answer?

    - » Students should be able to read the sentences that prove the answer.

  "Why is it unsafe to look at a solar eclipse?"

    - » The sun is very bright and could burn the eyes.

  "How do you know your answer is correct?"

    - » Students should be able to read the sentences that prove the answer.

ENGLISH LANGUAGE LEARNERS

Reading
Reading/Viewing Closely

Beginning
Have students draw pictures to show their ideas.

Intermediate
Have students work with a partner to complete the activity.

Advanced/Advanced High
Provide students with support if needed.

ELPS 4.F

COMPREHENSION QUESTIONS (15 MIN.)

- Have students complete Activity Page 2.1 independently.
- Collect Activity Page 2.1.

Lesson 2: Our Solar System, Part 1

Speaking and Listening

60M

Primary Focus: Students will compare and contrast a video and a text Read-Aloud about the solar system. **TEKS 3.1.A; TEKS 3.7.B**

Students will recognize and discuss text features such as diagrams and digital text features such as videos and animations. **TEKS 3.9.F**

VIEWING VIDEO (10 MIN.)

- Prepare to project the video: "Our World: What Is the Solar System?", available on NASA's website.
- Tell students to turn to Activity Page 2.2.
- Go over the graphic organizer and explain that they will be keeping notes both during the video and during the Read-Aloud so they can compare and contrast.
- Play the video.
- Briefly have students share some information they wrote in the graphic organizer.

Support

Provide support in completing Activity Page 2.1 by rereading relevant parts of the text and guiding students to find the key words in the sentence(s).

Challenge

Draw a picture or diagram to help explain why lunar eclipses can be seen by half the people on Earth at a time.

Activity Page 2.2

VOCABULARY: "OUR SOLAR SYSTEM, PART I"

- The following are core vocabulary words used in this lesson. Preview the words with the students before the lesson. Students are not expected to be able to use these words immediately, but with repeated exposure throughout the lessons they will acquire a good understanding of most of the words. Students may also keep a "unit dictionary" notebook along with definitions, sentences, and/or other writing exercises using these vocabulary words.

celestial bodies, any objects, including planets, moons, stars, comets, or meteors, which can be found in outer space.

core, the central inside part of a celestial body, other objects, or ideas

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.9.F** Recognize characteristics of multimodal and digital texts.

debris, bits and pieces of leftover dust and rocks

meteoroids, small pieces of metal or rock that travel through the solar system and that are much smaller than an asteroid

satellites, natural or man-made objects that orbit around another planet or other celestial objects

terrain, the surface of the land and its features

Vocabulary Chart for "Our Solar System, Part I"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	celestial bodies meteoroids satellites	core debris terrain
Multiple-Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE READ-ALOUD (10 MIN.)

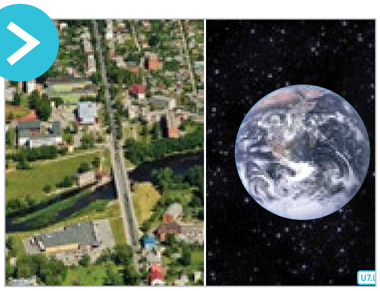
- Prepare to project the following digital images on the program's digital components site during the Read-Aloud: U7.L2.1–U7.L2.11.

Projection U7.L2.1–U7.L2.11.

- Ask students if they remember what *astro*– means (star). Ask students what other words they know that have the word part *astro*– and ask if they know what those words mean.
  - » Answers may vary but may include *astronomer*, *astrology*, *astrolabe*, etc.
- Ask students if they can name the five characteristics that determine whether a celestial body is a planet:
  - It is a sphere in shape and has a large mass.
  - It orbits around a star in an elliptical path.
  - It has cleared most other objects from its path.
  - It is made mostly of rock and gas, or a combination.
  - It does not make its own light.

READ-ALOUD: "OUR SOLAR SYSTEM, PART I" (20 MIN.)

- Remind students to use Activity Page 2.2 to take notes as you read. Remind students that taking notes means writing down key words and phrases, not complete sentences.
- Tell students that the images they'll see will show the planets "not to scale," meaning that because of the extremely large size of the sun and planets and the vast distances between the largest planets, it is too difficult to show them accurately in a picture or diagram.
- Demonstrate the size differences by holding up a yardstick and saying that if the yardstick's length equaled the width of the sun, Neptune would be the size of a small lemon and there would be two miles between them. Ask students how big they think Earth would be. Show them the marble and tell them that it would be about that size in relation to Neptune and the sun. Tell them that if we shrank down Neptune and Earth to fit onto a piece of paper, we wouldn't even be able to see them!

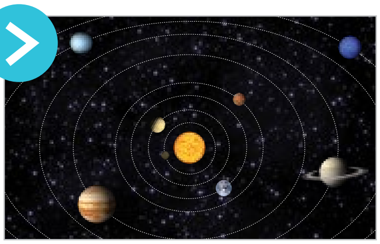


Show Image U7.L2.1
Aerial View: Planet Earth

Imagine traveling to a faraway world and encountering an extraterrestrial being that asked, "Where in the universe is your school?" Who remembers how you would describe your school's "space address"? You could confidently state part of your space address as the following:

- Our school's name:
- Our school's number and street:
- Our town or city:
- Our state and ZIP code:
- Our country:
- Our planet: Planet Earth

You already know a lot about your planet, Earth. But if the extraterrestrial life-form went on to ask, "So where, exactly, is planet Earth?" you would need to be able to include the next part of your "space address"—your planetary system.



Show Image U7.L2.2
Our Solar System

A planetary system is a group of objects in space that have come together to form a neighborhood—a very big, "spacious" neighborhood! (Get it, space-ious? A little interplanetary humor there!) All planetary systems have a star at the center and a collection of planets and other smaller objects that orbit around it. We call the planetary system that we are part of, our solar system. The shape of Earth's solar system looks a lot like a "bull's-eye" target. The sun is the "bull's-eye" at the center, and the orbits of the eight planets are similar to the rings around it.

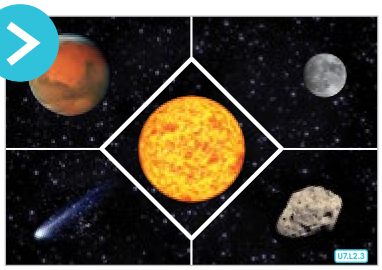
Add "Our Solar System" to the envelope under Our Planet.

Ask: What does this diagram help you understand about Earth's place in the solar system? *(Answers may include that Earth is the third planet from the sun.)* How does a video help you understand information differently than a diagram does? *(Videos can show the way things move.)* **TEKS 3.9.F**

Astronomers know for certain about several hundred other planetary systems, but most astronomers believe there may be billions of other planetary systems in the universe besides our own. It is believed that our solar system formed a very long time ago from a huge cloud of gas and dust. Just how long ago did it form? A really long time ago! Many scientists think our solar system is about four and a half billion years old!

- Remind students to add new information to their notes on Activity Page 2.2. Ask a few students to share what notes they made.

TEKS 3.9.F Recognize characteristics of multimodal and digital texts.



Show Image U7.L2.3
The Sun and Objects Found in Our Solar System

You can think of our solar system as a gigantic neighborhood in space. But instead of being made up of houses or apartments like the neighborhood you might live in, our solar system is made up of the sun and the celestial bodies that orbit around it. Besides the sun, it includes other interesting things like planets and their moons, dwarf planets, satellites, asteroids, meteoroids, and comets.

Our solar system is huge—so huge that some of the objects in it are billions of miles away from each other!

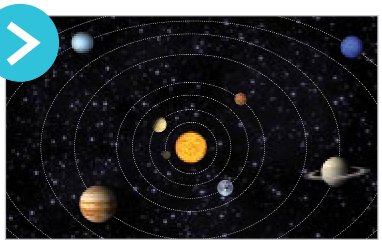
As you have heard, the sun is the center of this neighborhood we call our solar system. Our sun is a star—a gigantic, unbelievably hot mass of gas that makes light and heat for everything that orbits around it. The sun is so gigantic that Earth could easily fit inside it—more than one million times!

Point to the sun in the image. How is this an example of an image that is not to scale? (*The sun is much larger in relation to many other objects shown here.*)

Support

Provide some of the key words and phrases for students to write in their notes.

- Remind students to add more information to their notes and ask a few students to share.



Show Image U7.L2.4
Our Solar System

There are eight planets in our solar system. The planet Mercury is the closest to the sun, followed by Venus, Earth, Mars, Jupiter, Saturn, Uranus (/yoor*ə*nəs/), and Neptune. One easy way to remember the order of the planets is to remember this sentence or mnemonic device: **M**any **V**ery **E**nergetic **M**ermaids **J**ust **S**wam **U**nder **N**eptune.

You may wish to write this sentence on the board or on chart paper. Have students practice the sentence a few times.

Ask students if they've heard a different sentence to help remember the planets. (*"My Very Educated Mother Just Served Us Noodles" is very common.*)

Besides these eight major planets, there are also a number of smaller planet-like objects in our solar system, classified as dwarf planets. Pluto is the most famous dwarf planet, because it was considered to be a major planet until 2006, when astronomers discovered other small, planet-like objects in our solar system. Many astronomers from all over the world met to discuss a new definition of what makes a planet. Why did Pluto get demoted, or reduced in rank, from planet to dwarf planet? Astronomers have agreed that a planet has to be able to clear its orbit of most other objects such as asteroids and other space debris (/də*brē/). Because it is so small, Pluto hasn't cleared these leftover pieces of rock and dust from its orbit yet. Pluto is now classified as a dwarf planet.

Planets don't make their own light like stars do. When you look up and see a planet shining steadily in the night sky, it is shining because the planet is reflecting the sun's light—not because it's making its own. If the light you see appears to be twinkling, this is a star, not a planet.

Each of the eight planets in our solar system receives light and heat from the sun as it travels in its own special path—or orbit—around the sun. The orbits of the eight planets get larger and larger the farther away from the sun they are. Mercury's orbit is the smallest because it is closest to the sun; Neptune's orbit is the largest because that planet is the farthest away.

Check for Understanding

Which planet has the largest orbit? Mars or Venus?

» Mars

Earth or Jupiter?

» Jupiter

Neptune or Mercury?

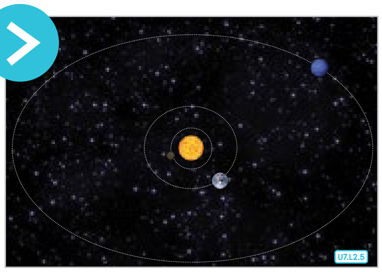
» Neptune

Earth or Venus?

» Earth

Many, but not all, of the planets have their own natural satellites, or moons, that orbit around them. Like Earth's moon, these moons travel around a planet at the same time that the planet orbits the sun. It is the light from our sun shining out into the solar system and being reflected back to us that enables astronomers to see a planet and its moons. Even though Earth has only one moon, some of the planets have many. In fact, one of Jupiter's moons, Ganymede (/gan*ə*mēd/), is larger than the planet Mercury!

- Have students share some of their notes.



Show Image U7.L2.5
Orbits of Mercury, Earth, and Neptune

The amount of time it takes a planet to travel once completely around the sun in its orbit is called a planetary year.

How long is Earth's planetary year? (*365 ¼ days*)

Point to Mercury's orbit on the image as you read.

Planets closer to the sun have shorter planetary years than planets that are farther away. Mercury's orbit is the fastest of all eight planets, taking only 88 Earth days to complete its planetary year.

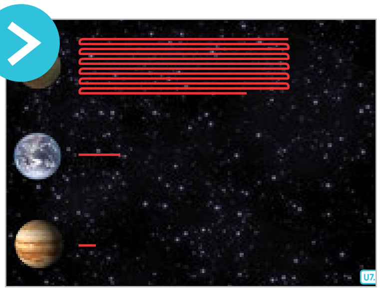
Point to Neptune's orbit as you read.

But Neptune takes 165 Earth years to go once around the sun! So a 100-year-old grandmother on Earth wouldn't even be 1 planetary year old if she lived on Neptune!

Since Neptune's discovery in 1846, Neptune has made just over one trip around the sun.

Point to Image Card C.U7.L2.1.

1. Who can describe what this bar graph of Mercury, Earth, and Neptune shows?
   » The bar graph shows the comparison of the planetary year of each of the planets, with Mercury having the shortest and Neptune the longest.

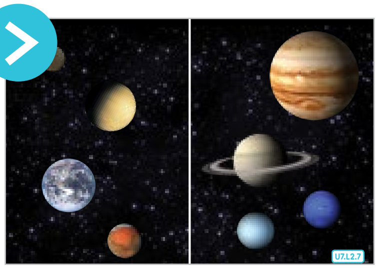


Show Image U7.L2.6
Day Length on Mercury, Earth, and Jupiter

Besides orbiting the sun, each of the eight planets in our solar system also rotates on its own axis. Remember, an axis is the imaginary line that goes from a planet's North Pole through its South Pole, right through its center. One day on a planet is the time it takes the planet to rotate one full time on its axis. Other planets have shorter and longer days than Earth.

How long does it take Earth to rotate once on its axis? (*24 hours*)

One day on Mercury takes about 58 Earth days, because Mercury rotates on its axis very slowly. Jupiter's rotation is much faster, clocking in at about 1 Jupiter day for every 10 Earth hours.



Show Image U7.L2.7
The Inner Rocky Planets; the Outer Gas Giants

What words can you think of to describe these planets? (*Answers vary*.) What are some similarities and differences you can see? (*Answers vary*.)

Although the eight planets in our solar system have a lot in common, they are also very different. Many astronomers believe that all eight planets have a solid core, or rocky center. But the first four planets, those closest to the sun—Mercury, Venus, Earth, and Mars—are small

Show Image Card C.U7.L2.1

Planetary Years

Challenge

Have students calculate their ages if they lived on Mercury. The formula is the number of days they have been alive (age x 365) divided by 88.

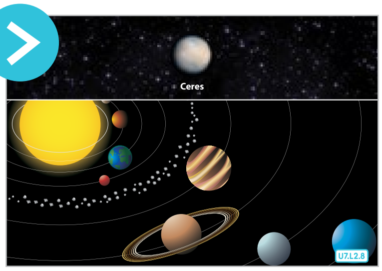
in comparison to the other four and have a solid, rocky terrain, or land surface, that you could walk on if you visited them.

The four planets farthest away from the sun—Jupiter, Saturn, Uranus, and Neptune—are called “gas giants.” Why? Because they are mostly made of gas, so you couldn’t walk on their surfaces if you visited because there is no solid surface, or terrain, to walk on. The gas giants are also huge! Jupiter is so huge that more than 1,300 Earths could fit inside of it!

Most of the eight planets have moons. Mercury and Venus are the only two planets in our solar system that do not have any moons. Moons are satellites, or smaller objects that orbit around a larger planet. Earth’s one moon is considered to be a satellite because it orbits around Earth.

Tell students that the moon is a natural satellite. Humans have created artificial satellites that have been placed in orbit around Earth to aid in communication and research. Say, “Some of you may receive television, phone, or computer signals from a man-made satellite.”

- Ask several students to share what new information they added to their notes.



Show Image U7.L2.8
Ceres and the Asteroid Belt

Besides the sun, the eight major planets, their moons, and dwarf planets, there are also other “neighbors” that help make up the neighborhood we call our solar system. These include asteroids, meteoroids, and comets. An asteroid is a space rock that does not have an atmosphere.

“Who can describe what an atmosphere is?” (*an invisible, protective blanket of air around Earth and other celestial objects*)

An asteroid is too small to be classified as a planet because it does not have enough mass or substance to clear other objects and debris from its orbit around the sun, and it is not round. Most asteroids in our solar system—thousands of them—are located in orbit between Mars and Jupiter in a ring called "the asteroid belt." The largest known object in the asteroid belt is Ceres (/sir*¯ez/), which is about as large around as the state of Montana is wide! Ceres, once classified as an asteroid, is now classified as a dwarf planet because it is spherical in shape. Because it has not cleared most other objects from its orbit, Ceres is not classified as a planet. Most asteroids are much smaller than Ceres. Many scientists believe that asteroids are material that was left over from the birth of our solar system.

- Ask students what new information they added to their notes.

Show Image U7.L2.9
A Meteoroid and a Shooting Star

One of our neighbors in our solar system has three different names: meteoroid, meteor, and meteorite, depending on where you find it. Meteoroids are space debris made of rock or metal that range in size from tiny pebbles to large boulders. Many scientists believe they may have broken off from other objects in our solar system, such as asteroids. They are called meteoroids when they are orbiting the sun in space, but once they enter Earth's atmosphere they are called meteors. Meteors are also known as "shooting stars" because they leave a bright streak or line of light that "shoots" through the sky. This streak of light is caused when the meteor burns up on its downward journey through Earth's atmosphere.

"Which object in the image is a meteoroid?" (*the one on the left*)

"Which is a meteor?" (*the one on the right*)

"Explain how you know." (*The one on the left is a meteoroid because it is still orbiting in space. The one on the right has entered Earth's atmosphere and is now called a meteor*.)

Most meteors are small enough that they burn up completely before reaching Earth, but sometimes the larger ones make it to the surface. Meteors that reach the surface of Earth are called meteorites. Sometimes very large meteorites leave large craters, or pits, on the surface of Earth.

Show Image Card C.U7.L2.2

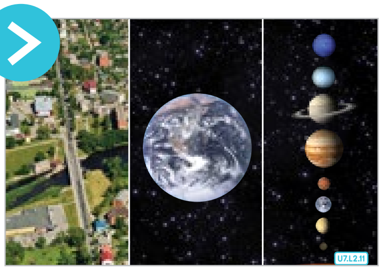
Meteorite Crater

Point to Image Card C.U7.L2.2 (Meteorite Crater)."Notice how small the buildings along the rim of this meteorite crater in Arizona appear compared to the size of the crater."

Show Image U7.L2.10
Comet in Night Sky as Seen from Earth

Did you know there are snowballs in space? It's true! They are called comets. Actually, a comet is a chunk of ice, dust, and gas that orbits the sun in a long, stretched-out circle. A comet begins in the outer reaches of the solar system, and occasionally its orbit brings it in close to the sun. As a comet approaches the sun, part of its ice evaporates, making it glow and form a bright "tail" that trails behind it—sometimes for millions of miles! Comets shine like this because sunlight reflects off tiny particles of dust that are in the comet's tail. Halley's (/hal*ēz/ or /hā*lēz/)] comet is a very famous comet that was discovered by English astronomer Edmond Halley. He was the first to realize that it was the same celestial body that returned to Earth's skies every 76 years. In the year 1705, he correctly predicted that the comet would return in the year 1758. The comet was then named Halley's comet in his honor. It was last seen from Earth in 1986.

Ask students if they can calculate the date when Halley's comet will appear again. (*2062*)



Show Image U7.L2.11
Aerial View: Planet Earth; Our Solar System

So, you now know that you can describe our solar system as a very large neighborhood in space. It's made up of many interesting neighbors, including the sun, eight planets, their moons, dwarf planets, asteroids, meteors, and comets. Our solar system is only one of many planetary systems in the universe. And it's a great place in the universe to live!

DISCUSSING THE READ-ALOUD (5 MIN.)

- Tell students they may use the notes they were taking on Activity Page 2.2 to help answer the questions.

1. **Literal.** What is our solar system?
   » It is the sun and all the objects in orbit around the sun.
2. **Literal.** Besides the sun, what kinds of objects can be found in the solar system?
   » planets, moons, dwarf planets, asteroids, comets, meteoroids, space debris
3. **Literal.** Which four planets form a group closest to the sun?
   » Mercury, Venus, Earth, Mars
4. **Literal.** What characteristics do they share?
   » They all have a core, a rocky terrain, and are much smaller than the other planets.
5. **Literal.** Which planets are next in sequence after Mars?
   » Jupiter, Saturn, Uranus, Neptune
6. **Literal.** What characteristics do they share?
   » They are very large, have an inner core, are far from the sun, and are called gas giants.
7. **Literal.** Where are Ceres and the asteroid belt located?
   » between Mars and Jupiter

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Listening Actively

Beginning
Ask students simple yes or no questions (e.g., "Did the video talk about the sun being the center of the solar system?").

Intermediate
Allow students to work with a partner to find the key information in the notes and write the paragraph.

Advanced/Advanced High
Encourage students to use complete sentences and domain vocabulary.

ELPS 1.E; ELPS 2.D

Support

Pull a small group together to help identify the key ideas in both the video and the Read-Aloud, and then provide sentence prompts such as, "Both the video and the story talked about ______."

Challenge

Have students write a paragraph about the differences between the video and the story.

COMPARE AND CONTRAST (15 MIN.)

- Have students work with a partner for a few minutes to compare the notes they took during the video and the Read-Aloud. Allow students to add more notes if they wish.
- Independently, have students go through the notes and circle the information that both the video and the Read-Aloud had in common.
- Tell students to find the three most important pieces of information that they had in common and draw a star next to each.
- Tell students to write a short paragraph describing the most important information in both the video and the Read-Aloud.

Lesson 2: Our Solar System, Part 1

Language

20M

GRAMMAR: CONJUNCTION SO (20 MIN.)

Primary Focus: Students will use the conjunction *so* to understand cause and effect and combine sentences. **TEKS 3.11.D.viii**

Introduce the Conjunction *so*

- Draw students' attention to the conjunctions poster and read it with them.

Conjunctions

Conjunctions are words that connect other words or groups of words.

- The **conjunction *and*** connects words or groups of words. It means "plus," "along with," or "also."
- The **conjunction *but*** is used to connect groups of words. It signals that "something different," such as a different idea, will come after *but*.
- The **conjunction *because*** is used to mean "for this reason" and signals the answer to a "why" question. It signals the cause of something.
- The **conjunction *so*** means "then this happened" and signals the effect in a cause and effect sentence.

TEKS 3.11.D.viii Edit drafts using standard English conventions, including: coordinating conjunctions to form compound subjects, predicates, and sentences.

- Remind students that conjunctions join words or groups of words.
- Review the meaning of the conjunction *because*.
- Remind students that in sentences that show cause and effect, the cause is signaled by the conjunction *because*.
- Point to the sentences you wrote on the board in advance and read the first sentence.

1. Because it was snowing, school was canceled.

- Remind students that the cause is the event that happens first in time regardless of its order in a sentence. The cause is signaled by the word *because*. The effect is the event that happens second.
- Remind students that we mark a word as a conjunction by drawing two lines under it.
- Ask students which simple sentence (It was snowing. School was canceled.) is the cause and which is the effect.
- Write *Cause* and *Effect* over top of the two parts of the sentence on the board.

Cause Effect

1. Because it was snowing, school was canceled.

- Tell students that today they will learn a new conjunction that signals the effect.
- Tell students that the new conjunction is *so*.
- Read the sentence on the conjunctions poster about the conjunction *so*. (The conjunction *so* is used to signal "then this happened," or the effect.)
- Read the second sentence you wrote on the board in advance.

2. It was snowing, so school was canceled.

- Orally replace the word *so* with "then this happened." [It was snowing (then this happened) school was canceled.]
- Ask students which simple sentence (It was snowing. School was canceled.) is the cause and which is the effect.

Activity Page 2.3

ENGLISH LANGUAGE LEARNERS

Grammar
Connecting Ideas

Beginning
Provide 1:1 support for students to complete Activity Page 2.3.

Intermediate
Allow students to work with a partner to complete Activity Page 2.3.

Advanced/Advanced High
Encourage students to write in complete sentences with correct capitalization and punctuation.

ELPS 5.F

Support

Provide additional examples of cause and effect sentences and model combining the sentences with the conjunction *so*.

Challenge

Have students write their own cause and effect sentences, using the conjunction *so*.

- Write *Cause* and *Effect* over top of the two parts of the sentence on the board.

Cause	Effect
2. It was snowing, so	school was canceled.

- Point out to students that it had to be snowing first for school to be canceled.
- Point out that the conjunction *so* signals the effect.
- Ask students, "What is the effect of it snowing?" Have them answer in a complete sentence.
    - » It was snowing, so school was canceled.
- Divide the students into small groups of four to five students each (six groups).
- Give each group two of the index cards or sentence strips you previously prepared, making sure the numbers match (Two #1's, Two #2's, etc.).
- Tell the groups to read their sentences and decide which one is the cause and which one is the effect.
- Tell the groups to combine their two sentences using the conjunction *so* and read the sentence aloud.
- If time permits, have groups share out loud.
- Have students complete Activity Page 2.3 in their groups.

End Lesson

Lesson 2: Our Solar System, Part 1

Take-Home Material

- Have students take home Activity Page 2.4 to read to a family member to practice fluency and Activity Page 2.5 to complete.

Activity Pages 2.4 and 2.5

LESSON

3

The Planets Closest to the Sun

PRIMARY FOCUS OF LESSON

Speaking and Listening

Students will listen to and discuss informational text about the planets in our solar system. **TEKS 3.1.A; TEKS 3.6.G; TEKS 3.7.B**

Reading

Students will read informational text about the inner planets and make connections between key ideas in paragraphs. **TEKS 3.6.C; TEKS 3.7.C**

Writing

Students will write a summary statement of paragraphs in an informational text about the inner planets. **TEKS 3.6.G; TEKS 3.7.B**

Language

Students will write words using spelling patterns and rules for words with the /j/ sound. **TEKS 3.2.B.iv**

FORMATIVE ASSESSMENT

Activity Page 3.1	**Key Ideas in Paragraphs** Students will write a summary statement connecting paragraphs in a text. **TEKS 3.6.G; TEKS 3.7.B**

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.6.C** Make and correct or confirm predictions using text features, characteristics of genre, and structures; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.2.B.iv** Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

LESSON AT A GLANCE

	Grouping	Time	Materials
Speaking and Listening (45 min.)			
Introducing the Read-Aloud	Whole Group	10 min.	❏ Digital Flip Book: U7.L3.1–U7.L3.11 ❏ 11x11x11 math unit cube model (optional) ❏ blank paper or writing journal
Read-Aloud: "Our Solar System, Part 2"	Whole Group	20 min.	
Discussing the Read-Aloud	Whole Group	5 min.	
Think-Write-Share	Partner	5 min.	
Word Work: *Frigid*	Whole Group	5 min.	
Reading (35 min.)			
Introducing the Chapter	Whole Group	10 min.	❏ *What's in Our Universe?* ❏ Activity Page 3.1
Small Group and Partner Reading: "The Planets Closest to the Sun"	Small Group/ Partner	25 min.	
Writing (20 min.)			
Connecting the Key Ideas	Independent	20 min.	
Language (20 min.)			
Spelling: /j/ sound: Blank Busters	Independent	20 min.	❏ Activity Page 3.2
Take-Home Material			
Reading: "The Planets Closest to the Sun: Mercury, Venus, Earth, and Mars"			❏ Activity Pages 3.3, 3.4
Questions from Reading			

ADVANCE PREPARATION

Speaking and Listening

- Prepare to project the following Digital images on the program's digital components site during the Read-Aloud: U7.L3.1–U7.L3.11.
- Prepare an 11x11x11 math unit cube model (optional).

Universal Access

- Display vocabulary words in the classroom during and after instruction to reinforce word meaning.
- Provide 1:1 or small group support.

Start Lesson

Lesson 3: The Planets Closest to the Sun

Speaking and Listening

45M

Primary Focus: Students will listen to and discuss informational text about the planets in our solar system **TEKS 3.1.A; TEKS 3.6.G; TEKS 3.7.B**

VOCABULARY: "OUR SOLAR SYSTEM, PART 2"

- The following are core vocabulary words used in this lesson. Preview the words with the students before the lesson. Students are not expected to be able to use these words immediately, but with repeated exposure throughout the lessons they will acquire a good understanding of most of the words. Students may also keep a "unit dictionary" notebook along with definitions, sentences, and/or other writing exercises using these vocabulary words.

frigid, extremely cold

greenhouse, a building with a transparent glass or plastic roof and walls made to trap in heat from the sun and grow plants all year round

NASA, an acronym for the National Aeronautics and Space Administration; an organization in the United States that directs space travel and research

polar, related to the pole of a planet or the area surrounding it

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text.

Vocabulary Chart for "Our Solar System, Part 2" Read-Aloud		
Type	**Tier 3 Domain-Specific Words**	**Tier 2 General Academic Words**
Vocabulary	NASA	frigid greenhouse polar
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

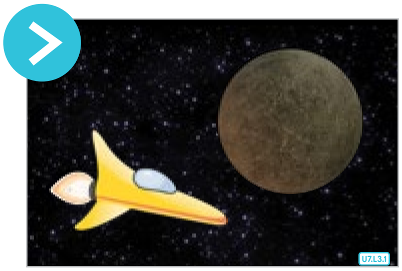
INTRODUCING THE READ-ALOUD (10 MIN.)

- Prepare to project the following Digital images on the program's digital components site during the Read-Aloud: U7.L3.1–U7.L3.11.
- Review with students what they've learned so far about the solar system.

1. How many planets are in our solar system?
   - » eight
2. Name the eight planets in order from the sun
   - » Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune
3. What other celestial bodies can be found in our solar system besides the sun and its planets?
   - » dwarf planets, comets, asteroids, meteoroids, moons, debris
4. What is the atmosphere of a planet and how does it affect the planet?
   - » It is a blanket of gas that surrounds the planet. It holds heat and keeps the planet at a steadier temperature.

- Tell students to listen carefully to find out which planets in our solar system other than Earth have an atmosphere and how the atmosphere affects the characteristics of the planet.

READ-ALOUD: "OUR SOLAR SYSTEM, PART 2" (20 MIN.)



Show Image U7.L3.1
Mercury

Would you like to take an out-of-this-world trip? Over the next few days, we are going to go on an exciting tour of space in our very own classroom "spaceship."

We'll start by traveling to the planet that is closest to the sun: Mercury.

As we approach the planet, you will see many craters on its surface, the result of hundreds of meteoroids hitting the planet. You will probably notice right away how small it is compared to our planet Earth. At one-third the diameter of Earth, Mercury is the smallest planet in our solar system.

Where can we see the diameter of Mercury? (*Ask a volunteer to point it out on the image*). It's the distance from one side to the other across the middle of the planet.

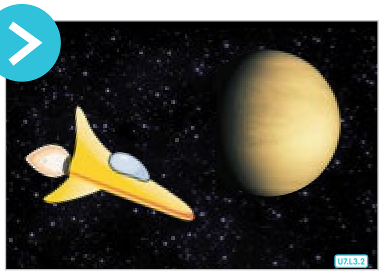
It's certainly hot here. Our spaceship is reading the surface temperature as being 750 degrees Fahrenheit!

Who knows the boiling point of water? *(212 degrees Fahrenheit)*

The side of Mercury that is facing the sun is very hot, but the side of the planet that is facing away from the sun—the dark side of Mercury—is frigid, dropping to negative 300 degrees Fahrenheit. You might have guessed that Mercury gets very hot during the day because it is so close to the sun. But why does it get so cold at night? It's because Mercury has no real atmosphere, even though there are occasionally a few gas particles around the planet. Without a real atmosphere, there is nothing to trap the sun's heat to make it stay warm on the side of the planet that is not facing the sun. The smallest planet in our solar system, Mercury makes its orbit very quickly around the sun.

From yesterday's Read-Aloud, who remembers how long it takes for Mercury to travel around the sun? *(88 days)*

Even though Mercury's year is short, it rotates very slowly on its axis, so its days are very long. One day on Mercury takes about 58 Earth days! How would you like to have the sun set and have it stay dark for about a month's worth of Earth days before the sun rises again? Now let's head for the second planet from the sun in our solar system—Venus!



Show Image U7.L3.2
Venus

The first thing you will notice about Venus is that, besides being Earth's closest neighbor, it is practically the same size as Earth. Like Earth, Venus also has an atmosphere. But unlike Earth, the atmosphere of Venus is made up of very thick gases, including lots of carbon dioxide.

Explain that carbon dioxide is one of the gases that people and animals on Earth breathe out and that plants take in.

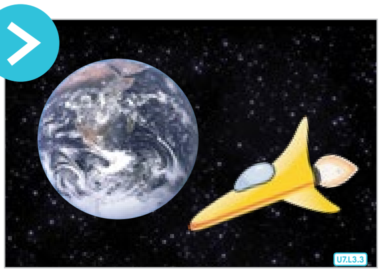
Venus's thick, cloudy atmosphere is also very dense, with 90 times the pressure or heaviness of Earth's atmosphere.

Venus is actually hotter than Mercury—more than 850 degrees Fahrenheit! Venus is the hottest planet in our solar system. The reason it is hotter than Mercury is that Venus's atmosphere creates a "greenhouse effect," which means its dense atmosphere acts like a thick blanket, trapping the sun's heat at the surface of the planet. This causes the planet's surface temperature to rise because the heat can't easily escape into space.

Who remembers what a greenhouse is? (*a building with a transparent glass or plastic roof and walls made to trap in heat from the sun and grow plants all year round*)

Support

Explain that *dense* means "very compact, having many things (like particles) close together."



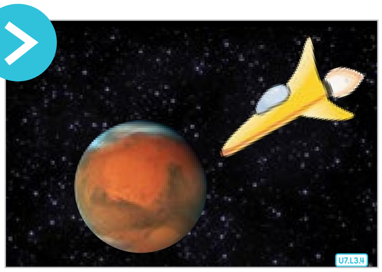
Show Image U7.L3.3
Earth

The next stop on our tour of our solar system is home sweet home: Earth, the third planet from the sun. From way out here in space, it looks different from all of the other planets. Planet Earth appears as a swirl of blue, white, and green thanks to our water-filled oceans, the clouds of our atmosphere, and the green of the plants growing on our planet. It looks bright and glowing and alive. We live on a very beautiful planet!

What were the characteristics of Earth that we heard about in Lesson 1 that make it "just right"? (*Its placement as third from the sun means the temperature, atmosphere, and presence of water are just right to support life*).

Challenge

Mars actually has two types of ice at its polar caps. One is permanently frozen water ice. What is the other type of ice that melts in Martian summer? (carbon dioxide ice, or dry ice)



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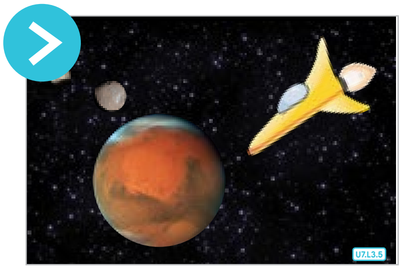
Mars

Let's zoom past Earth and head toward the fourth planet from the sun in our solar system—the red planet, Mars. Mars is the last of the four rocky planets in our solar system. As soon as you see it, you know why it's called the "red planet"—because it really is reddish! The red color is caused by the presence of rust in the surface rocks. Even though Mars is only half the size of Earth, it still takes about 24 hours for it to rotate on its axis. So a day on Mars is nearly the same length as a day on Earth.

Like Earth, the red planet has an atmosphere—and even polar ice caps made of frozen water. But the thing that may really catch your eye as we get closer is our solar system's tallest volcano, Olympus Mons, which is three times as high as Mount Everest—Earth's tallest mountain! That's right—Mars has the tallest volcano in our entire solar system, much larger than any here on planet Earth.

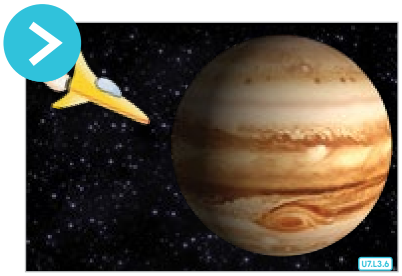


Show Image U7.L3.5
Mars and Its Moons

As we prepare to leave the Martian orbit, we will pass by its two moons, Phobos [foe- bos] and Deimos [dye- mos]. The planet Mars was named for the Roman god of war—Mars—who was called Ares [air-eez] by the ancient Greeks. Phobos and Deimos were Ares' two sons.

Check for Understanding

Have students raise their hands if the following planets you have discussed so far have an atmosphere: Mercury (no), Venus (yes), Earth (yes), Mars (yes).



Show Image U7.L3.6
Jupiter

We'll have to go through the asteroid belt to get from Mars to Jupiter, the fifth planet from the sun.

What objects can be found in the asteroid belt? (*thousands of asteroids and the dwarf planet Ceres*)

The distance between Mars and Jupiter is more than three times the distance we've traveled so far! Do you see Jupiter? There's no way you could miss it if you tried! Remember, Jupiter is the largest planet in our solar system, and it's absolutely gigantic. It's so big that more than 1,300 Earths could fit inside it.

If Earth were the size of a math unit cube, Jupiter would be the size of a cube made with 11 units on each side. (Show unit cube model—optional)

Did you know Jupiter has rings? Saturn is famous for its beautiful rings, but Jupiter has them, too. In fact, all four of the gas giants in our solar system—Jupiter, Saturn, Uranus, and Neptune—have rings, though the rings are not visible in many images you see of Jupiter, Uranus, and Neptune.

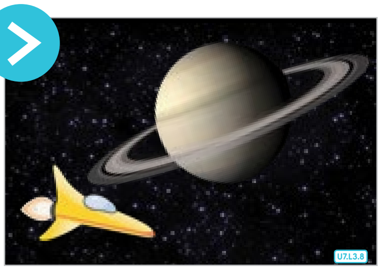
You may be wondering if we could land on the surface of Jupiter. Like the other gas giants, there's not a solid surface to land on—just hundreds of miles of gas, below which is a sea of liquid hydrogen. Besides, Jupiter's atmosphere is extremely cold, stormy, and windy. These storms are what give Jupiter that marbled appearance. Do you see that giant spot on its side? That's called the Great Red Spot, and it is a gigantic storm that's bigger than the entire Earth! There's no way we could land a spaceship there.

Show Image U7.L3.7
Some of Jupiter's Moons

Let's take a look at some of Jupiter's moons. Scientists have discovered more than 60 moons so far, so there are many to choose from! Here are four moons discovered years ago by Galileo Galilei, a scientist you will hear more about later. Their names are Callisto, Ganymede, Io [eye-oh], and Europa.

Point to moons as they are named clockwise, from top center.

Made of materials ranging from frozen ice to molten or melted rock, these natural satellites have amazing sights which include frozen oceans and volcanoes.

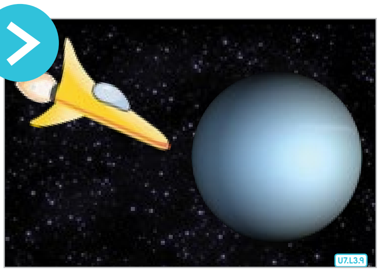


Show Image U7.L3.8
Saturn

The distance we must travel to get to the sixth planet from the sun in the solar system, Saturn, is about the same distance it took for us to get from Mars to Jupiter—it's far! Like Jupiter, Saturn is another gas giant, and its atmosphere has winds that are even stronger than hurricane winds on Earth. But what may take your breath away is the sight of the rings. They are absolutely beautiful! You might be surprised to learn that Saturn's rings aren't solid—they're made up of millions of pieces of rock and ice!

Astronomers believe that the debris in some of Saturn's rings is held in place by a combination of the pull from Saturn and the pull of some of Saturn's many moons. The moons that are believed to help hold some of Saturn's outermost rings in place are called "shepherd moons."

"Shepherd" comes from the word *sheepherder*. How are shepherd moons like sheepherders? (*They help to hold the rings in place, like a sheepherder holds sheep in place.*)



Show Image U7.L3.9
Uranus

It's time to head to the seventh planet from the sun in our solar system—Uranus. If you thought the trip between Jupiter and Saturn was far, then you may want to sit back and take a nap. The space between the planets gets bigger out here where the gas giants are. Uranus is about twice as far from the sun as Saturn is! No wonder astronomers didn't discover Uranus until after the telescope was invented! It's a long way away from Earth! It took the NASA spacecraft Voyager 2 12 years to get to Uranus from Earth.

What is NASA? (*an acronym for the National Aeronautics and Space Administration; an organization in the United States that directs space travel and research*)

As we approach Uranus, you may be wondering why it appears to be rolling on its side. The poles of Uranus are in a different position than the poles of other planets. Uranus's axis is tilted a lot more to its side than the other planets in our solar system. Many scientists think the axis became so far tilted during a collision that happened when the solar system was forming. Like the other gas giants, Uranus also has rings and moons, though the rings are not easy to see like Saturn's rings.

Show Image U7.L3.10
Neptune

Finally, we have arrived at the last planet—eighth from the sun in our solar system—Neptune.

Tell students that they may remember from The Ancient Rome unit that Neptune was the Roman god of the sea, similar to the Greek god Poseidon.

Even though astronomers knew a celestial object was there before they identified it, the planet Neptune was discovered fewer than 200 years ago, in 1846. It is the last of the four gas giants in our solar system. Neptune has two rings around it that are hard to see—many fewer than Saturn. Scientists don't know as much about Neptune as they do about some of the other planets. It's hard to study because it's so far away. Astronomers think Neptune has at least 13 moons. Like Jupiter, Saturn, and Uranus, Neptune doesn't have a solid surface to land on—making it a bad place for spaceship landings!

Check for Understanding

Have students raise their hands if the following planets have an atmosphere: Jupiter (yes), Saturn (yes), Uranus (yes), Neptune (yes).

Ask students to raise their hands if a spaceship could land on the surface of the following planets: Jupiter (no), Saturn (no), Uranus (no), Neptune (no).

Show Image U7.L3.11
Beyond Neptune

Let's look beyond the last planet, Neptune, farther out into space. Objects beyond our eight planets are called "trans-Neptunian." Here is where we find the dwarf planet Pluto.

Who recalls what makes Pluto unique? (*It used to be a planet but was reclassified in 2006 as a dwarf planet.*)

There are many other trans-Neptunian celestial bodies in our solar system even farther away than Pluto that astronomers are only beginning to discover. The distances in space between these objects are astronomical!

What do you think astronomical means? (*extremely large*)

Why do you think that the *word astronomical* came to mean extremely large? *(Answers vary, but should include that there are so many stars (astro) in the universe, that it would be impossible to count them all.)*

And beyond our solar system, there's a whole neighborhood of stars. And beyond that neighborhood of stars, there are billions of other neighborhoods of stars! Why, there's a whole universe out there just waiting for us to learn more about it!

DISCUSSING THE READ-ALOUD (5 MIN.)

1. **Literal.** Why is the dark side of Mercury so cold when the planet is so close to the sun?
   » It has no real atmosphere to trap in the heat from the sun.
2. **Literal.** What is the term we use to describe how the dense atmosphere of a planet can trap in heat from the sun?
   » the greenhouse effect
3. **Evaluative.** How are Earth and Venus similar?
   » They both have atmospheres dense enough to trap in heat, and they are similar in size.

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Speaking

Beginning
Ask students simple yes or no questions, i.e., "Would you like to learn more about Venus"?

Intermediate
Provide sentence frames for students, i.e., "I would like to learn more about ____ because ____".

Advanced/Advanced High
Encourage students to use complete sentences and domain vocabulary.

ELPS 1.E; ELPS 3.F

Support

Provide sentence frames or prompts.

Challenge

Have students write what they already know about a planet and what they would most like to learn more about.

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

4. **Evaluative.** How are they different?
   » Venus's atmosphere is much denser than Earth's; Venus is much hotter; there is no known life on Venus.
5. **Evaluative.** How are Saturn and Neptune similar?
   » They are both gas giants; both very far from the sun; and they both have rings and moons.
6. **Evaluative.** How are they different?
   » Saturn is much bigger than Neptune; Neptune was discovered much later; Saturn's rings are more visible.

THINK-WRITE-SHARE (5 MINS.)

- Have students write briefly on a blank piece of paper or in their writing journal about which planet they would most like to learn more about and why. After writing for three or four minutes, have them share briefly with a partner.

WORD WORK: FRIGID (5 MINS.)

1. In the Read-Aloud you heard, "The dark side of Mercury is frigid, dropping to negative 300 degrees Fahrenheit."
2. Say the word *frigid* with me.
3. *Frigid* means very cold.
4. Without our atmosphere, Earth would be extremely hot during the daylight hours and frigid during the nighttime hours.
5. Do you know of any places or things that are frigid? Be sure to use the word *frigid* when you tell about it. Ask two or three students. If necessary, guide and/or rephrase the students' responses to make complete sentences: "is frigid because . . . "
6. What's the word we've been talking about? What part of speech is the word *frigid*?

- Use a Synonyms and Antonyms activity for follow-up. Ask students, "What does *frigid* mean? What are some synonyms, or words that have a similar meaning?" Prompt students to provide words like *cold*, *freezing*, *chilly*, *wintry*, *icy*, etc. Then ask, "What are some words or phrases you know that are antonyms, or opposites, of *frigid*?" Prompt students to provide words and phrases like *hot, boiling, summery, tropical,* etc.

Lesson 3: The Planets Closest to the Sun

Reading

35M

Primary Focus: Students will read informational text about the inner planets and make connections between key ideas in paragraphs. **TEKS 3.6.C; TEKS 3.7.C**

VOCABULARY: "THE PLANETS CLOSEST TO THE SUN: MERCURY, VENUS, EARTH, AND MARS"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the student reader.

naked eye, with just your eyes, without the use of instruments

probe, a tool used to explore something, such as outer space (probes)

Vocabulary Chart for "The Planets Closest to the Sun: Mercury, Venus, Earth, and Mars"

Type	Tier 3 Domain-Specific Words	Tier 2 General Academic Words
Vocabulary		naked eye probe
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE CHAPTER (10 MIN.)

- Make sure that you and your students each have a copy of the "What's in Our Universe?"
- Decide which students will be working with you in a small group for guided reading, and which students will be reading with a partner.
- Tell students that today they'll be reading in a small group or with partners about the planets closest to the sun.
- Have students turn to the first page of the chapter.

SMALL GROUP AND PARTNER READING: "THE PLANETS CLOSEST TO THE SUN" (25 MIN.)

- Gather the small group together and make sure the other students have their reading partner.
- Tell the partners to take turns reading paragraphs aloud.

TEKS 3.6.C Make and correct or confirm predictions using text features, characteristics of genre, and structures;
TEKS 3.7.C Use text evidence to support an appropriate response.

Chapter 3

The Planets Closest to the Sun:

Mercury, Venus, Earth, and Mars

Our **planet** Earth is one of eight **planets** in our **solar system** that **orbit** around the sun. The other **planets** are Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune. People have been looking at the **planets** for thousands of years. People from Mesopotamia, the Greeks, Mayans, Incas, and Aztecs were all interested in the **planets**. They used just their **naked eye** to study the **planets**. Now, we have telescopes and other tools that help us get a better look at the **planets**.

A telescope

14 15

Pages 14–15

- Have a volunteer read the title of the chapter, "The Planets Closest to the Sun: Mercury, Venus, Earth, and Mars."
- Point students' attention to the image on **page 15** and read the caption aloud as a class.
- Ask students to predict what they think they might learn about things they could see with a telescope. **TEKS 3.6.C**
- Tell students to read pages **14–15** to themselves.

  "How did people look at the planets a long time ago compared to now?"

  » They used their naked eyes a long time ago, but today they use telescopes and other tools to get a better look.

Support

Reread relevant portions of the text to help students find key words that help answer the question.

TEKS 3.6.C Make and correct or confirm predictions using text features, characteristics of genre, and structures.

The four **planets** closest to the sun—Mercury, Venus, Earth, and Mars—are small **planets**. These **planets** have a rocky, or solid, surface.

Mercury and Venus are closer to the sun than Earth. The other **planets** are farther away.

Earth needs 365 days to make one **orbit** around the sun. That is the length of one year on Earth.

The closer a **planet** is to the sun, the less time it needs to make an **orbit** around the sun. Mercury is the closest **planet** to the sun. It needs just 88 days to make one **orbit**. Venus is the next closest to the sun. It needs just 225 days to make an **orbit**. The **planets** that are farther away take much longer. It takes Neptune 165 years to **orbit** the sun!

The sun and ***planets***

16

17

Pages 16–17

Contrast the length of time it takes for the three planets closest to the sun to orbit the sun.

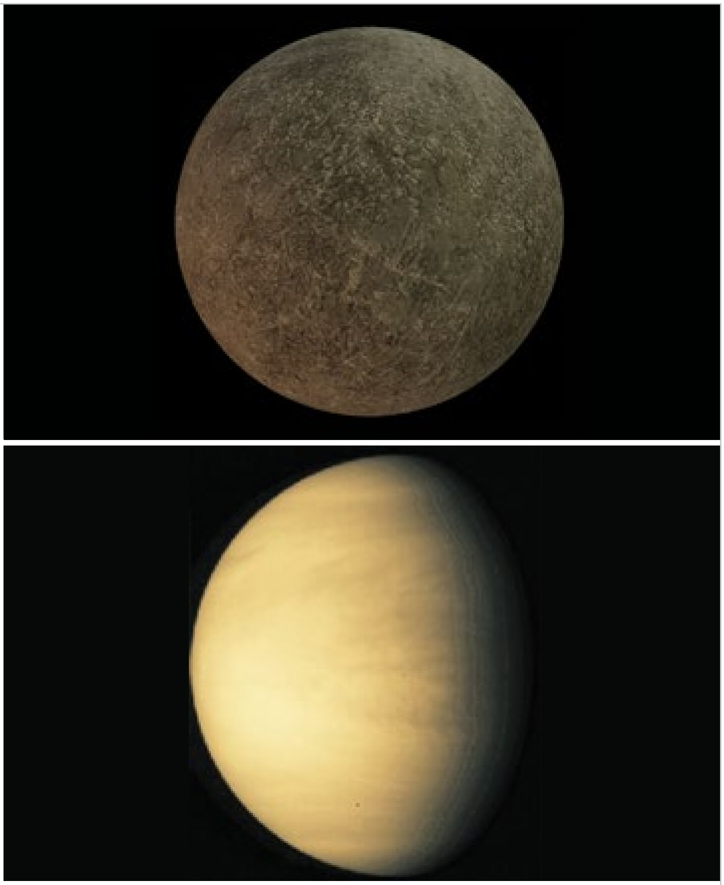
» Mercury takes 88 days, Venus takes 225 days, and Earth takes 365 days.

- Direct students' attention to the image and caption on page **17**.

Besides being closest to the sun, Mercury is the smallest of all the **planets**. The English name for the **planet** comes from the Romans. They named the **planet** after the Roman god Mercury. The Greek name for this same god is Hermes.

Venus is the second **planet** from the sun and is closest to Earth. This **planet** was named after the Roman goddess of love. For a long time, scientists thought that Venus might be a lot like Earth. After all, it is close to Earth. It is about the same size as Earth and it is covered with clouds, like Earth. But this idea turned out to be wrong, too. We know now that Venus and Earth are different in lots of ways.

Scientists had to change their ideas to fit the new facts. They have now concluded that Venus is much hotter than Earth. It would not be a good place for us to live or even visit.



Mercury (top) and Venus

18

19

Pages 18–19

- Point students' attention to the image on page **19**. Read the caption together as a class or have a student read it to the class.
- Say to students, "I wonder where these planets got their names and how they compare to Earth. Let's read **page 18** to find out."
- When students have finished reading, restate the question and ask students to answer. (from Roman gods and goddesses; Mercury is much smaller than Earth. Venus and Earth are close to each other, about the same size, and both are covered with clouds.)

Mars is the fourth **planet** from the sun. It is named after the Roman god of war. When you look at Mars in the night sky, it looks quite red. This is because the rocks on Mars contain rust.

Many space **probes** and robots have landed on Mars. They have taken photographs and also dug up rocks.

One **probe** that went to Mars not long ago found some ice. That was big news. Ice is frozen water. If there is water on Mars, there might be life. Some experts argue that nothing could live on Mars. They say it is too cold and too dry. Others think there might be life on Mars. They think there might be something alive down under the rocks. Still others think there might have been life on Mars at one time but there isn't any now.

Mars

20

21

Pages 20–21

- Point students' attention to the image of Mars on page **21**.
- Tell students to read **page 20** to themselves to find the answer to the question: "What could the discovery of ice on Mars mean?"
- When students have finished reading, restate the question and ask students to answer.
    - » Ice is frozen water so if there is water on Mars, there might be life on Mars.
- Ask students, "How do you know your answer is correct?"
    - » Students should be able to read the sentences that provide the answer.
- Ask students, "Why does Mars look red when you see it in the night sky?"
    - » The rocks on Mars contain rust, making it appear red.
- Have students check the predictions they made before reading the chapter about what they think they might learn about things they could see with a telescope.

ENGLISH LANGUAGE LEARNERS

Reading
Reading/Viewing Closely

Beginning
Ask yes and no questions, i.e., "Is Mars bigger than Earth?"

Intermediate
Model for students how to find the key ideas and details in the text.

Advanced/Advanced High
Provide support for students as needed.

ELPS 4.F; ELPS 4.I

Lesson 3: The Planets Closest to the Sun

Writing

20M

Primary Focus: Students will write a summary statement of paragraphs in an informational text about the inner planets. **TEKS 3.6.G; TEKS 3.7.B**

CONNECTING THE KEY IDEAS (20 MIN.)

- Bring the whole group back together.
- Have students turn to Activity Page 3.1.
- Tell students that today they'll be rereading the paragraphs in order to find the key ideas. Then, they'll connect those key ideas to write a summary statement.
- Go over the graphic organizer on Activity Page 3.1.
- Have students turn to page 20 in their Student Reader.
- On Activity Page 3.1, have students write "Mars" in the box labeled "Title."
- Read the first paragraph aloud and ask students if they can find the key idea. (Mars is covered with rocks that have rust in them, so it appears to be red)
- Have students write the following notes in the first of the three paragraph boxes: rocks, rust, red.
- Tell students to read the second paragraph to themselves and look for the key idea. Have them write notes for the second paragraph in the second box. Have a few volunteers share their notes. (Probes landed, photographs, dug up rocks)
- Have students read the third paragraph and write notes in the third box. Have a few volunteers share. (Ice found, could be life is there, could be life was there long ago)
- Tell students to look at the bottom of Activity Page 3.1. In the box at the bottom they will be using their notes from each of the paragraphs to write a summary statement that connects them all.
- Students will work independently.

WRAP-UP

- Collect Activity Page 3.1 when complete.

TEKS 3.6.G Evaluate details read to determine key ideas; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text.

Activity Page 3.1

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Provide sentence frames for students, i.e., "The first paragraph in the text about Mars says that the planet is covered with ____ that have ____ and that's why the planet is red."

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Encourage students to write their summary in complete sentences.

ELPS 5.F

Support

Provide writing prompts for students, i.e., "The first paragraph says that ____."

Challenge

Have students summarize the three paragraphs using just one sentence.

Lesson 3: The Planets Closest to the Sun

Language

20M

Primary Focus: Students will write words using spelling patterns and rules for words with the /j/ sound. **TEKS 3.2.B.iv**

SPELLING (20 MIN.)

Blank Busters

- Tell students that they will practice writing their spelling words for the week.
- Tell students to turn to Activity Page 3.2. Note for students that some sentences have two blanks.
- Point out to students that the spelling words are listed in the box on the page and on the board. Students may also have to add an appropriate suffix to have the sentence make sense: *–s*, *–ed*, *–ly*, or *–ing*.
- Ask students to read the statement in number 1 silently and fill in the blank. When students have completed number 1, call on one student to read number 1 aloud with the spelling word in the blank.
- Ask students if anyone had a different answer. Discuss the correct answer to be sure students understand why it is correct.
- Discuss the proper spelling of the word in the blank, referencing the table of this week's spelling words. Have students compare their spelling with the spelling in the table.
- Have students complete the rest of the sentence on their own.
    - If time permits, go over the answers as a class.

WRAP-UP

- Tell students they will take home Activity Pages 3.3 and 3.4 to read and complete the questions.

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

Activity Page 3.2

ENGLISH LANGUAGE LEARNERS

Language
Foundational Skills

Beginning
Read the sentence and provide a choice of three words to the student, i.e., "A stained and dirty kitchen sink is ____ than a clean one. Is the word *germy*, *germier*, or *germly*?"

Intermediate
Have students work with a partner to say the words with the different suffixes *–s*, *–ed*, *–ing*, *–er*, or *–ly* before completing the sentences.

Advanced/Advanced High
Encourage students to complete the activity independently.

ELPS 2.C; ELPS 4.F

Support

Go through the list of words and practice adding suffixes *–s*, *–ed*, *–ing*, *–er*, or *–ly* to each of the words. Have students write down the newly formed words and then use them as a word bank to complete Activity Page 3.2.

Challenge

Have students create their own sentences using the spelling words with appropriate suffixes *–s*, *–ed*, *–ing*, *–er*, or *–ly*.

End Lesson

Lesson 3: The Planets Closest to the Sun

Take-Home Material

Activity Pages 3.3 and 3.4

- Have students take home Activity Pages 3.3 and 3.4 to read and complete the questions.

LESSON

4

The Outer Planets

PRIMARY FOCUS OF LESSON

Reading

Students will read informational text about the outer planets in the solar system and make connections between key ideas in paragraphs.

TEKS 3.1.A; TEKS 3.6.G; TEKS 3.7.B

Writing

Students will compare and contrast texts about the inner and outer planets in the solar system. TEKS 3.6.E; TEKS 3.6.G; TEKS 3.12.B

Language

Students will add suffixes *–ful* and *–less* to change the meaning of words.

TEKS 3.2.A.vi; TEKS 3.3.C

FORMATIVE ASSESSMENT

Activity Page 4.1	**Key Ideas in Paragraphs** Write a summary statement connecting paragraphs in a text. TEKS 3.6.G; TEKS 3.7.B
Writing	**Comparing and Contrasting: Inner and Outer Planets** Compare and contrast two texts on the planets in our solar system. TEKS 3.6.G; TEKS 3.12.B

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.6.E** Make connections to personal experiences, ideas in other texts, and society; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft; **TEKS 3.2.A.vi** Demonstrate and apply phonetic knowledge by decoding words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants; **TEKS 3.3.C** Identify the meaning of and use words with affixes such as im- (into), non-, dis-, in- (not, non), pre-, -ness, -y, and -ful.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (55 min.)			
Introducing the Reading	Whole Group	10 min.	❏ *What's in Our Universe?* ❏ Activity Page 4.1
Small Group Reading: "The Outer Planets"	Small Group	25 min.	
Connecting Key Ideas	Small Group	20 min.	
Writing (40 min.)			
Compare and Contrast	Partner	20 min.	❏ *What's in Our Universe?* ❏ blank paper or chart paper ❏ writing paper ❏ Compare/Contrast (Digital Projections)
Writing: Compare and Contrast	Independent	20 min.	
Language (25 min.)			
Morphology: Suffixes -*ful* and -*less*	Whole Group	25 min.	❏ Activity Pages 4.2, 4.3
Take-Home Material			
Reading and Morphology			❏ Activity Pages 4.4, 4.5, 4.6

ADVANCE PREPARATION

Writing

- On chart paper, create the following chart or project Digital Projection DP.U7.L4.1

Compare	Contrast
Same	Different
Both	Unlike
Alike	But
Similar	Instead of
Compare to	In contrast to
Also	On the other hand
In the same way	However
Too	While

Universal Access

- Provide additional images of the planets from books, the Internet, etc.
- Create work partners strategically in advance of the lesson.
- Create small groups for reading strategically.
- Display vocabulary words in the classroom during and after instruction to reinforce word meaning.
- Provide 1:1 or small group support.

Start Lesson

Lesson 4: The Outer Planets

Reading

55M

Primary Focus: Students will read informational text about the outer planets in the solar system and make connections between key ideas in paragraphs.

TEKS 3.1.A; TEKS 3.6.G; TEKS 3.7.B

VOCABULARY: "THE OUTER PLANETS"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.

gas giant, one of the large outer planets, Jupiter, Saturn, Uranus, and Neptune, that are composed mainly of hydrogen gas

hydrogen, the most common gas in the universe, which is lighter than air and easily catches fire

Vocabulary Chart for "The Outer Planets: Jupiter, Saturn, Uranus, and Neptune"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	gas giant hydrogen	
Multiple Meaning vocabulary Words		
Sayings and Phrases		

INTRODUCING THE READING (10 MIN.)

- Make sure that you and your students each have a copy of the "What's in Our Universe?"
- Divide students into small groups of three to four students each.
- Decide which group of students will be reading with you in a group.
- Tell students that today they'll be reading in a small group. Remind them to follow rules of small group interaction and to take turns reading paragraphs aloud.

SMALL GROUP READING: "THE OUTER PLANETS" (25 MIN.)

- Pull together your small group for the following guided reading instruction.

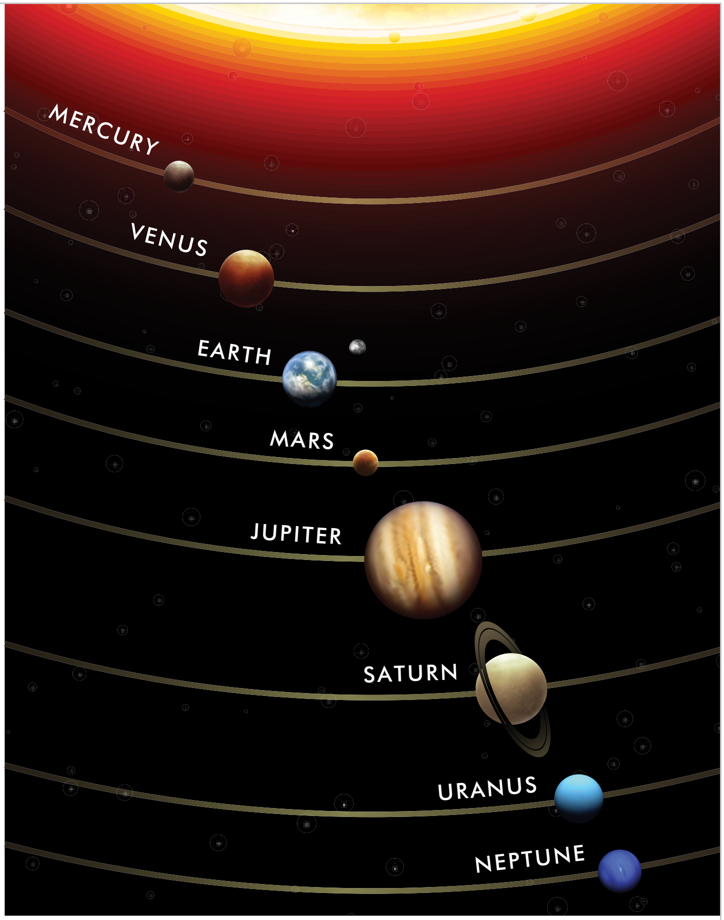
TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text.

Chapter 4

The Outer Planets: Jupiter, Saturn, Uranus, and Neptune

Do you remember the names of the four **planets** closest to the sun? If you said, "Mercury, Venus, Earth, and Mars," you are right! There are four more **planets** called the outer **planets**. So there are eight **planets** in all.

Jupiter is the very next **planet** after Mars. After Jupiter come Saturn, Uranus, and Neptune in that order. Neptune is the **planet** that is farthest from the sun. Uranus is difficult to see with the **naked eye** and Neptune is impossible to see without help. Neptune is only visible using a telescope.



*Our **solar system:** the sun and eight **planets***

22

23

Support

Take turns reading paragraphs with students: first the teacher, then the student.

Pages 22–24

- Have a volunteer read the title of the chapter, "The Outer Planets: Jupiter, Saturn, Uranus, and Neptune."
- Point students' attention to the image on page **23** and read the caption aloud.
- Have students read page **22** to themselves.
- Ask students to predict if the four outer planets differ from the first four planets.
- Call on students to read paragraphs on page **24** to find out how the four outer planets differ from the first four planets.
- When students have finished reading, restate the question and ask students to answer.
    - » Answers may vary.

"Why are the outer planets called gas giants?"

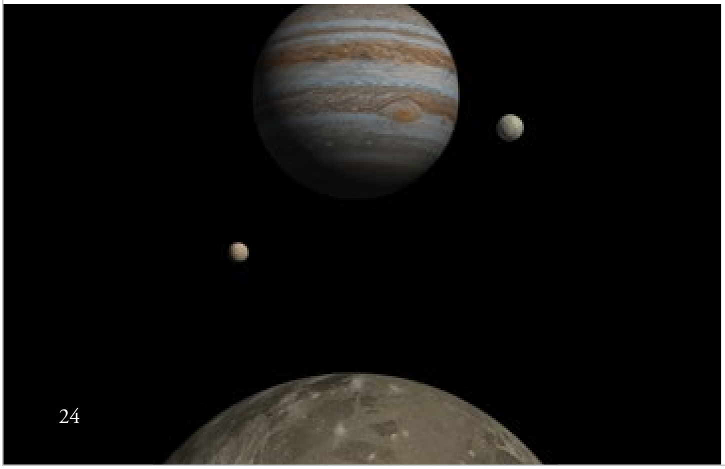
- » They are made up of gas and are very large.

The outer **planets** are very large and are mostly made of gas. Scientists often call these **planets gas giants**. Of all the **planets**, Jupiter is the largest: 1,300 Earths could fit inside Jupiter! It is made mostly of **hydrogen** gas, the most common gas in the universe.

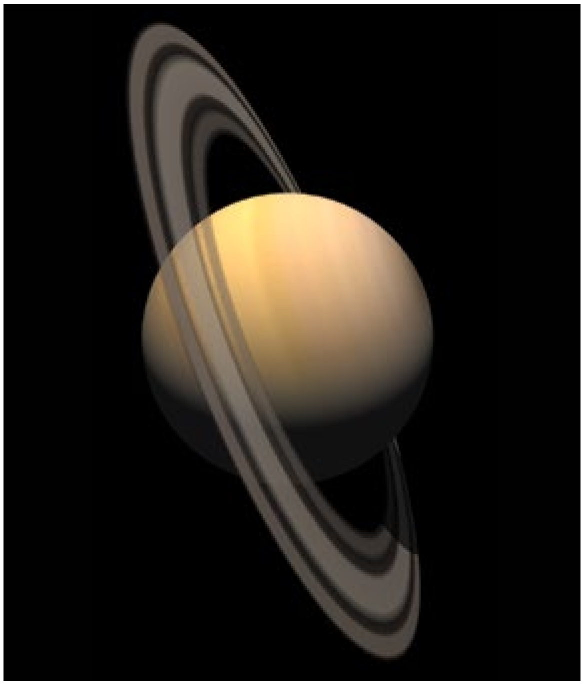
The gases on Jupiter seem to be blowing around. In the image of Jupiter on the next page, you can see the giant, red spot. It looks like an eye! Experts think it is a big wind storm, like a huge hurricane.

Jupiter also has 63 known moons that **orbit** it. Some of these moons are very large, even larger than Earth's moon.

Jupiter and some of its moons



24



Saturn and its rings

Saturn is known for its many large rings that **orbit** the **planet**. These rings are made of ice and dust. The ice reflects light and makes the rings glow. Saturn also has many moons that **orbit** it.

25

Pages 24–25

- Point students' attention to the image on **page 25**. Read the caption together or have a student read it to the class.
- Say to students, "I wonder what the rings around Saturn are made of. Let's read **page 25** to find out."
- When students have finished reading, restate the question and ask students to answer.
  - » The rings are made of ice and dust.

ENGLISH LANGUAGE LEARNERS

Reading
Foundational Skills

Beginning
Use an echo reading technique, reading the text aloud first, then having students rereading aloud.

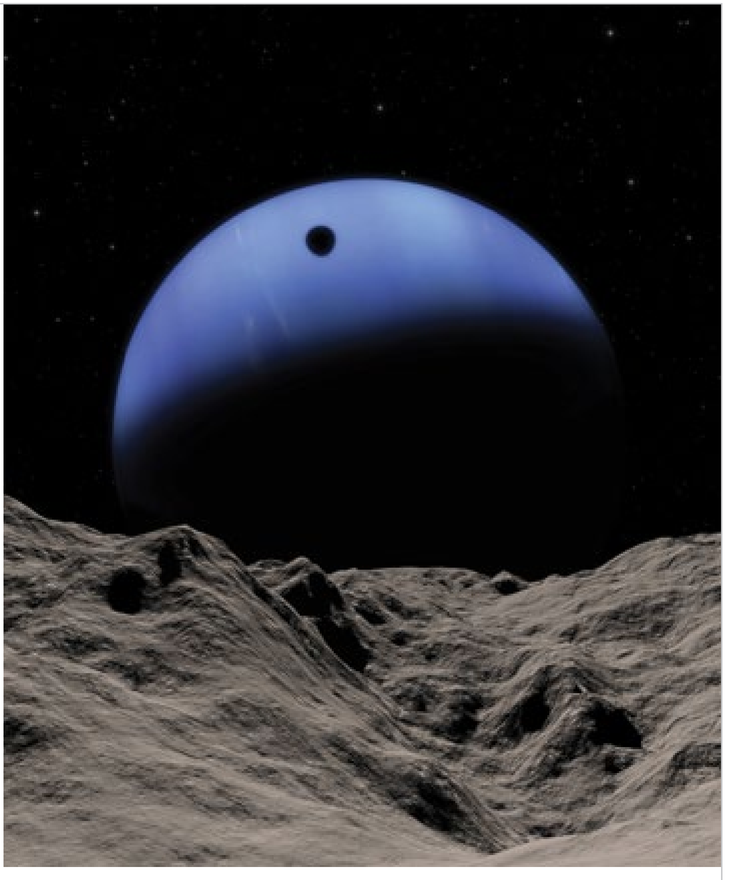
Intermediate
Use a choral reading technique.

Advanced/Advanced High
Encourage students to read aloud independently.

ELPS 4.G

The last two **planets** are Uranus and Neptune. These **planets** are the farthest from the sun so they are very cold. Uranus and Neptune also have rings, but they aren't easily seen like Saturn's. Both **planets** also have moons.

So now you know the names of all eight **planets**. Try asking the adults in your family how many **planets** there are. They may tell you that there are nine **planets**. When the adults in your family were in school, people said that there was a ninth **planet** called Pluto. But in 2006, scientists decided that Pluto did not have all of the characteristics needed to be classified as a **planet**. They removed Pluto's name from the list of **planets**, so now there are only eight **planets**.



This is Neptune as it might look if seen from one of its moons. The shadow of another moon makes a dark spot on the planet's surface.

26

27

Pages 26–27

- Tell students to read **page 26**.
- Ask students, "Why isn't Pluto considered a planet any longer?"
  - » Scientists decided that Pluto didn't have all the characteristics needed to be classified as a planet.
- Direct students' attention to the image and caption on **page 27**.

Check for Understanding

As a whole group, create a list of questions students still have after reading the selection.

CONNECTING THE KEY IDEAS (20 MIN.)

- Have students turn to Activity Page 4.1.
- Tell students that, like yesterday, they'll be rereading the paragraphs in order to find the key ideas. Then, they'll connect those key ideas to write a summary statement.
- Go over the graphic organizer on Activity Page 4.1.
- Have students turn to page 24 in their Student Reader.
- Tell students that they'll be working in their small groups to complete the graphic organizer for the key ideas of the paragraphs on page 24.
- Tell students that they will be writing the summary statement on their own.

WRAP-UP

- Have a few students share their summaries.
- Collect Activity Page 4.1 when complete.

Lesson 4: The Outer Planets

Writing

40M

Primary Focus: Students will compare and contrast texts about the inner and outer planets in the solar system. **TEKS 3.6.E; TEKS 3.6.G; TEKS 3.12.B**

COMPARE AND CONTRAST (20 MIN.)

- Make sure students have their Student Readers.
- Divide the class into partners.
- Provide blank paper or chart paper to each partner group.

TEKS 3.6.E Make connections to personal experiences, ideas in other texts, and society; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.

Activity Page 4.1

ENGLISH LANGUAGE LEARNERS

Reading
Writing

Beginning
Provide sentence frames for students (e.g., "The first paragraph in the text about Jupiter says that the planet is the ____ planet and is mostly made of ____.").

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Encourage students to write their summary in complete sentences.

ELPS 5.G

Support

Provide writing prompts for students (e.g., "The first paragraph says that ____.").

Challenge

Have students summarize the three paragraphs using just one sentence.

Compare and Contrast Writing

- Ask students if they remember what a Venn diagram is used for.
  - » to compare and contrast two things
- Draw a Venn diagram on the board as a model for students.
- Tell students to draw a Venn diagram on their blank paper or chart paper.
- Explain to students that they will be rereading Chapter 3 ("The Planets Closest to the Sun") and Chapter 4 ("The Outer Planets") to find out what is similar and what is different about the inner and outer planets.
- After students have been working for a while, have a few pairs share some of their similarities and differences.
- Allow students to add to their diagrams, if necessary.

WRITING: COMPARE AND CONTRAST (20 MIN.) TEKS 3.6.E; TEKS 3.12.B

- Pass out writing paper to students.
- Explain to students that they'll be turning to the notes in their Venn diagram to write an informative paragraph about the similarities and differences between the inner and outer planets.
- Ask students if they remember what kinds of words they might see in a compare and contrast text structure.
- On chart paper or on the board, create this chart, or use previously prepared chart DP.U7.L4.1.

Projection DP.U7.L4.1

Compare	Contrast
Same	Different
Both	Unlike
Alike	But
Similar	Instead of
Compare to	In contrast to
Also	On the other hand
In the same way	However
Too	While

- Go through the list with students. Brainstorm additional words to add to the chart.

TEKS 3.6.E Make connections to personal experiences, ideas in other texts, and society; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.

- Tell students that they will now write the informative paragraph. Tell them to make sure that they use compare and contrast words as well as academic vocabulary and domain words from the text.
- Remind students to use complete sentences, appropriate capitalization and punctuation, and to check their spelling, with a glossary or dictionary if necessary.

WRAP-UP

- If time permits, have students share their paragraphs with their partner.
- Collect Compare and Contrast writing.

Lesson 4: The Outer Planets

Language

25M

Primary Focus: Students will add suffixes –*ful* and –*less* to change the meaning of words. **TEKS 3.2.A.vi; TEKS 3.3.C**

MORPHOLOGY: SUFFIXES -FUL AND -LESS (25 MIN.) **TEKS 3.2.A.vi**

Introducing Suffixes –*ful* and –*less*

- Remind students that suffixes are added to the end of a root word.
- Tell students that the two suffixes they will study this week are –*ful* and –*less*.
- Also, tell students that the root words this week are nouns, and adding each suffix, –*ful* and –*less*, changes the words to adjectives.
- Write the suffixes on the board and point out that the suffix –*ful* is pronounced /fəl/ and the suffix –*less* is pronounced /les/.

Adding Suffix –ful

- Write the following words on the board: *hope, fear, pain, power.*
- Explain to students that –*ful* means "full of."
- Ask students if they recall what suffix they learned in an earlier unit that also means "full of." (–*ous*)
- Point out that the suffix –*ful* only has one letter 'l', while the word *full* has a double 'l'.

TEKS 3.2.A.vi Demonstrate and apply phonetic knowledge by decoding words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants; **TEKS 3.3.C** Identify the meaning of and use words with affixes such as im- (into), non-, dis-, in- (not, non), pre-, -ness, -y, and -ful.

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Provide sentence frames for students (e.g., "The inner planets are mostly made of rock ____, the outer planets are mostly made of hydrogen gas."). Have students provide the appropriate compare or contrast word.

Intermediate
Allow students to work with partners on writing.

Advanced/Advanced High
Encourage students to write in complete sentences using academic and domain vocabulary.

ELPS 1.E; ELPS 5.B

Support

Provide sentence frames or prompts (e.g., "____ and ____ are similar because ____.").

Challenge

Have students compare and contrast the sun, inner planets, and outer planets using a triple Venn diagram and then writing about all three.

ENGLISH LANGUAGE LEARNERS

Language
Foundational Skills

Beginning
Have students draw a picture of the word to remind them of the meaning. Then read the sentence aloud and have them provide the correct word to put into the blank Provide peer support as needed.

Intermediate
Have students write the meaning of the word to help them remember. Provide support as necessary.

Advanced/Advanced High
Provide support if necessary.

ELPS 1.C

Support

This activity is teacher-guided, so provide 1:1 support if necessary.

- Again, tell students that when the suffix –*ful* is added to a noun, the new word is an adjective.
- Write *care* or point to the word on the board. Briefly discuss the meaning of the word and then use it in a sentence.
    - » effort to do something correctly or safely; I handled the vase with care when I took it out of the box.
- Add the suffix –*ful* to care and have students read the suffix, read the new word, and then discuss the meaning of the new word.
    - » full of effort to do something correctly or safely
- Ask students to provide sentences using the word *careful*.
    - » Answers may vary.
- Ask students for synonyms of *careful*.
    - » cautious, attentive
- Continue in this manner for the remaining –*ful* words.

Adding Suffix –*less*

- Write the following words on the board again: *hope, fear, pain, power.*
- Explain to students that –*less* means "lacking."
- Also, explain that words with the suffix –*less* mean the opposite of words with the suffix –*ful* when they have the same root word.
- Ask students what another word for *opposite* is.
    - » antonym
- Again, tell students that when the suffix –*less* is added to a noun, the word becomes an adjective.
- Write *care* or point to the word on the board. Review the meaning and remind students of its use in a sentence. (effort to do something correctly or safely; I handled the vase with care when I took it out of the box.)
- Add the suffix –*less* to *care* and have students read the suffix, read the new word, and then discuss the meaning of the new word. (lacking effort to do something correctly or safely)

- Ask students to provide sentences using the word *careless*.
    - » Answers may vary.
- Ask students for synonyms of *careless*.
    - » inconsiderate, insensitive, thoughtless
- Continue in this manner for the remaining –*less* words, using the following chart as a guide.

Activity Pages 4.2 and 4.3

- Have students turn to Activity Pages 4.2 and 4.3 and complete as a teacher-guided activity.

WRAP-UP

- Tell students they will take home Activity Page 4.4 to complete at home.

End Lesson

Lesson 4: The Outer Planets

Take-Home Material

READING AND MORPHOLOGY

Activity Pages 4.4, 4.5 and 4.6

- Have students take home Activity Page 4.4 to complete.
- Have students take home Activity Page 4.5 to read to a family member and Activity Page 4.6 to complete.

LESSON

5

Asteroids, Comets, and Meteors

PRIMARY FOCUS OF LESSON

Language

Students will write words using spelling patterns and rules for the sound /j/. **TEKS 3.2.B.iv**

Reading

Students will read informational text to compare and contrast asteroids, comets, and meteors. **TEKS 3.1.D; TEKS 3.6.H; TEKS 3.7.E**

Writing

Students will differentiate between meteors, meteoroids, and meteorites. **TEKS 3.6.H; TEKS 3.12.B**

Language

Students will write sentences using the conjunction *so*. **TEKS 3.11.D.iv; TEKS 3.11.D.v; TEKS 3.11.D.viii**

FORMATIVE ASSESSMENT

Activity Page 5.1	**Spelling Assessment** Students will correctly spell words with the sound /j/. **TEKS 3.2.B.iv**
Activity Page 5.2	**Exit Ticket: Meteors, Meteoroids, and Meteorites** Students will differentiate between meteors, meteoroids, and meteorites. **TEKS 3.6.H; TEKS 3.7.E; TEKS 3.12.B**
Activity Page 5.3	**Building Sentences with Conjunction *So*** Students will build new sentences using the conjunction *so*. **TEKS 3.11.D.viii**

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns; **TEKS 3.1.D** Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.7.E** Interact with sources in meaningful ways such as note-taking, annotating, freewriting, or illustrating; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft; **TEKS 3.11.D** Edit drafts using standard English conventions, including: (iv) adjectives, including their comparative and superlative forms; (v) adverbs that convey time and adverbs that convey manner; (viii)coordinating conjunctions to form compound subjects, predicates, and sentences.

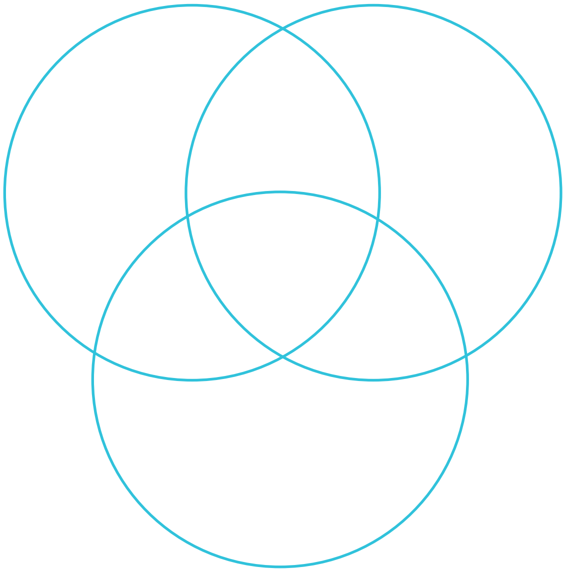
LESSON AT A GLANCE

	Grouping	Time	Materials
Language (15 min.)			
Spelling Assessment	Independent	15 min.	❏ Activity Page 5.1
Reading (65 min.)			
Introducing the Chapter	Whole Group	10 min.	❏ *What's in Our Universe?* ❏ blank paper ❏ index cards (optional) ❏ chart paper and markers
Whole Group Reading: "Asteroids, Comets, and Meteors"	Whole Group	20 min.	
Comparing and Contrasting	Partner/ Small Group	25 min.	
Sharing	Whole Group	10 min.	
Writing (20 min.)			
Comparing and Contrasting	Independent	20 min.	❏ Activity Page 5.2
Language (20 min.)			
Grammar: Conjunction *so*	Whole Group	20 min.	❏ Activity Page 5.3

ADVANCE PREPARATION

Reading

- Divide students into groups so that there is at least one group for asteroids, one for comets, and one for meteors. There will probably be more than one group for each, depending on how many students are in your class.
- Draw a triple Venn diagram on the board or on chart paper as a model.



Universal Access

- Provide additional images of the asteroids, comets, and meteors from books, the Internet, etc.
- Create work partners strategically in advance of the lesson.
- Display vocabulary words in the classroom during and after instruction to reinforce word meaning.
- Provide 1:1 or small group support when necessary.

Start Lesson

Lesson 5: Asteroids, Comets, and Meteors

Language

15M

Primary Focus: Students will write words using spelling patterns and rules for the sound /j/. **TEKS 3.2.B.iv**

SPELLING ASSESSMENT (15 MIN.)

Activity Page 5.1

- Have students turn to Activity Page 5.1 for the spelling assessment.
- Tell students that for this assessment, they will write their words under the header to which they belong. For example, if you call out the word *jack*, they would write that word under the header 'j' > /j/.
- Tell students that should a spelling word fit under more than one header, they should only write the word under one.
- Tell students that they may not have to use all the lines under each header.
- Using the chart below, call out the words using the following format: Say the word, use it in a sentence, and say the word once more.
- After you have called out all of the words including the Challenge Words and the Content Word, go back through the list slowly, reading each word just once more.

1. gymnasium	12. jewel
2. germy	13. bridging
3. digest	14. ridges
4. nudging	15. dodge
5. giraffe	16. fringe
6. exchange	17. fudge
7. eject	**Challenge Word:** *answer*
8. average	**Challenge Word:** *great*
9. budget	**Challenge Word:** *grate*
10. lodging	**Content Word:** *Jupiter*
11. jellyfish	

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

- Ask students to write the following sentences as you dictate them:

   1. Joan spilled cabbage stew on her new jacket.

   2. Jane planted a hedge around her garden.

- You may find it helpful to use the Spelling Analysis Chart found at the end of this lesson to analyze students' mistakes. This will help you understand any patterns that are beginning to develop, or that are persistent among individual students.

Lesson 5: Asteroids, Comets, and Meteors

Reading

65M

Primary Focus: Students will read informational text to compare and contrast asteroids, comets, and meteors. **TEKS 3.1.D; TEKS 3.6.H; TEKS 3.7.E**

VOCABULARY: "ASTEROIDS, COMETS, AND METEORS"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.

asteroid, a space rock, smaller than a planet that orbits the sun (asteroids)

comet, a frozen ball of dust and ice that travels through outer space (comets)

meteor, a piece of rock that burns very brightly when it enters the earth's atmosphere from space, also called a shooting star (meteors)

asteroid belt, an area between Mars and Jupiter where thousands of asteroids orbit around the sun in the shape of a belt

Halley's comet, a famous comet named for British scientist Edmund Halley that is visible from the earth with the naked eye every 76 years

meteorite, a meteor that does not fully burn up in Earth's atmosphere and falls to the earth

TEKS 3.1.D Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating.

Vocabulary Chart for "Asteroids, Comets, and Meteors"		
Type	**Tier 3 Domain-Specific Words**	**Tier 2 General Academic Words**
Vocabulary	asteroid comet meteor asteroid belt Halley's comet meteorite	
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE CHAPTER (10 MIN.)

- Make sure that you and your students each have a copy of the Reader
- Ask students to name all the objects that orbit the sun in our solar system.
    - » planets and their moons, asteroids, meteoroids, and comets
- Have students turn to the table of contents, locate the chapter and turn to the first page of the chapter.

Chapter 5

Asteroids, Comets, and Meteors

There are other objects that **orbit** the sun in the **solar system** besides the **planets**. Millions of space rocks called **asteroids** also **orbit** the sun. **Asteroids** are made of rock, metal, and sometimes ice. Many **asteroids** are found **orbiting** the sun between the **planets** Mars and Jupiter. They **cluster** together in a shape like a belt as they **orbit** the sun. This part of the **solar system** is called the **asteroid belt**.

*Top: An artist's image of an **asteroid belt** around a star*
*Bottom: An up-close image of an **asteroid** from our **solar system***

28 29

WHOLE GROUP READING: "ASTEROIDS, COMETS, AND METEORS" (20 MIN.)

Pages 28–29

- Read the title of the chapter together as a class, "Asteroids, Comets, and Meteors."
- Point students' attention to the image on page **29** and read the caption aloud as a class.
- Ask students to predict what an asteroid is made of.
- Tell students to read pages **28–29** to themselves to see if their prediction is correct. (Asteroids are made of rock, metal, and sometimes ice.)
- Ask, "What is the large group of asteroids called that is between Mars and Jupiter and why is it called that?"
    - » an asteroid belt because they cluster together in a shape like a belt

Support

Read page **28** aloud while students follow along.

Comets also **orbit** the sun. **Comets** are made mostly of ice and dust. When a **comet** gets close to the sun, the sun's heat causes some of the **comet** to change into a gas. This gas streams off the end of the **comet** like a tail.

The most famous **comet** is **Halley's Comet**. It is named for the British scientist Edmund Halley who first discovered it. **Halley's Comet** is visible from Earth with the **naked eye** every 76 years. It was last seen in 1986. Can you figure out when it will be seen again?

*A **comet** in the night sky*

30

31

Pages 30–31

- Point students' attention to the image on page **31**. Read the caption together as a class or have a student read it to the class.
- Ask students to read pages **30–31** to themselves to find the answer to the question: "What is a comet and what is it made of?"
- When students have finished reading, restate the question and ask students to answer.
  - » A comet is a ball made of ice and dust that streams gas off the end when it gets close to the sun.
- Ask students, "How often can we see Halley's comet?"
  - » every 76 years
- Have students figure out the answer to the question on page **30**.
  - » 2062

Challenge

Have students research other comets that visit Earth frequently.

Other kinds of space rocks called **meteoroids** are also found throughout the **solar system**. When a **meteoroid** enters Earth's **atmosphere**, we call it a **meteor**. Small pieces of the **meteor** burn brightly and look like a white trail across the sky when viewed from Earth. Sometimes people call this a "shooting star." Have you ever seen one? A **meteor** "shower" is when many **meteors** can be seen falling in the sky on the same night. Sometimes they last over several nights. It's an amazing space show!

If a **meteor** doesn't fully burn up in the **atmosphere**, it falls to Earth and can make a large hole called a crater. Pieces of a **meteor** found on the ground are **meteorites.**

32

*Top: An artist's drawing of a **meteor** shower at night*

*Bottom: **Meteor** Crater in Arizona formed when a **meteorite** hit Earth. Notice the road and buildings to the left of the crater. This crater is very big!*

33

Pages 32–33

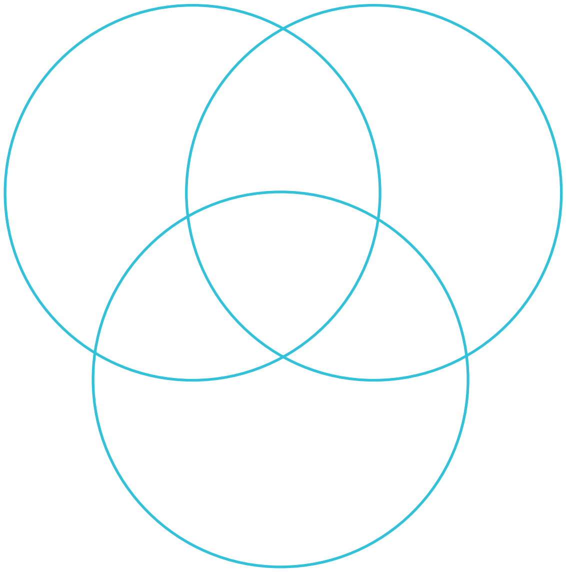
- Turn to page **33** and point out the images on the page showing a meteor shower and a crater.
- Ask students to read page **32** to themselves to find the answer to the question: "What is a meteor and how can it create a crater?"
- When students have finished reading, restate the question and ask students to answer.
    - » A meteor is a space rock that falls to Earth. Pieces of a meteor that hit Earth are called meteorites. Some are large enough that if they hit Earth, they can make a large hole, or crater.

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

COMPARING AND CONTRASTING (25 MIN.)

- Divide students into partners.
- Tell students that they will be assigned specific pages to reread and take notes on. Tell them they will either be rereading about asteroids, comets, or meteors.
- Tell them to write details and notes on a blank sheet of paper.
- Let students work with partners for about 10 minutes.
- Next, draw a triple Venn diagram on the board or use the previously prepared one.



- Explain how this diagram is used to compare and contrast three different things. Explain how each intersection works, including the center shape, which means that all three things share the same characteristics or facts.
- Tell students they will be creating a triple Venn diagram in small groups using the information they gathered with their partners.
- Regroup students so each group has an asteroid pair, a comet pair, and a meteor pair.
- Give each of these small groups a piece of chart paper and some markers.
- Tell students that they will use the notes that they took during their partner work to complete a triple Venn diagram.
- Allow students to work on their diagrams for about 10 minutes.

ENGLISH LANGUAGE LEARNERS

Reading
Reading and Viewing Closely

Beginning
Provide 1:1 support and prompting if needed while students are working with partners.

Intermediate
Pair students with partners who can help support fluent reading.

Advanced/Advanced High
Pair students with partners who have similar understanding levels.

ELPS 4.F

Activity Page 5.2

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Provide sentence frames for students; e.g., “Meteors, meteoroids, and meteorites are all made of ____.”

Intermediate
Allow students to work with partners on the Venn diagram before writing.

Advanced/Advanced High
Encourage students to write their paragraph in complete sentences, with correct spelling, capitalization, and punctuation.
ELPS 5.E.i

Support

Pull a small group together to complete a triple Venn diagram before the students begin to write their paragraphs.

Challenge

Have students use a triple Venn diagram to compare and contrast three celestial objects of their choice and write a paragraph describing what is similar and different about them.

SHARING (10 MIN.)

- Have small groups share their diagrams.

Check for Understanding

Circulate among the groups to make sure students are on track and are identifying the correct information to put in each of the portions of the graphic organizer.

Lesson 5: Asteroids, Comets, and Meteors

Writing

20M

Primary Focus: Students will differentiate between meteors, meteoroids, and meteorites. **TEKS 3.6.H; TEKS 3.12.B**

COMPARING AND CONTRASTING (20 MIN.)

- Have students turn to Activity Page 5.2.
- Tell students that they will be comparing and contrasting meteors, meteoroids, and meteorites in the same way they compared and contrasted asteroids, comets, and meteors.
- Tell students that they will be writing a paragraph about the similarities and differences between the three.
- Remind students to use comparing and contrasting words such as: *same*, *alike*, *similar*, *compare to*, *also*, *too*, *different*, *unlike*, *but*, *instead of*, *however*, etc. You can also display the chart from Lesson 4.
- Tell students that they may use the back of the page to draw a triple Venn diagram or any other type of graphic organizer they choose to help them before they begin writing.
- Remind students to use correct spelling, capitalization, and punctuation, and to use academic and content vocabulary words whenever possible.
- When students are finished, collect Activity Page 5.2.

TEKS 3.6.H Synthesize information to create new understanding; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.

Lesson 5: Asteroids, Comets, and Meteors

Language

20M

Primary Focus: Students will write sentences using the conjunction *so*.

TEKS 3.11.D.iv; TEKS 3.11.D.v; TEKS 3.11.D.viii

GRAMMAR: CONJUNCTION SO (20 MIN.)

Build Sentences with the Conjunction *so*

- Tell students that in their writing, their sentences should be detailed enough to be interesting to readers. Interesting and informative sentences include descriptive words and phrases.
- Remind them they have practiced writing, or building, more interesting and informative sentences by including adjectives, adverbs, and other interesting words in sentences.
- Remind students that adjectives describe nouns, and adverbs describe verbs.
- Write the following sentence on chart paper or the board, asking students to read the sentence aloud:

> The fish swam.

- Tell students that while this sentence is a complete sentence, it is not a very interesting sentence and does not provide much information.
- Continue by saying that you will show them how they can make a more interesting sentence by adding adjectives and adverbs.
- One way to make the sentence more interesting would be to add an adjective or two to describe the fish. Ask students to brainstorm words that could be used to describe the fish, prompting them to think of words to answer the question, "What did the fish look like?" Write down the suggested adjectives in a list on the board or chart paper. (Examples could be: *colorful*, *excited*, *dizzy*.)
- Another way to improve this sentence would be to add adverbs to describe the verb. Ask students to brainstorm words that could be used to answer the question, "How did the fish swim?" Write these adverbs in a separate list. (Examples could be: *in circles*, *slowly*, *quickly*.)

TEKS 3.11.D Edit drafts using standard English conventions, including: (iv)adjectives, including their comparative and superlative forms; (v) adverbs that convey time and adverbs that convey manner; (viii) coordinating conjunctions to form compound subjects, predicates, and sentences.

Activity Page 5.3

ENGLISH LANGUAGE LEARNERS

Grammar
Connecting Ideas

Beginning
Provide 1:1 support for students to complete Activity Page 5.3.

Intermediate
Allow students to work with a partner to complete Activity Page 5.3.

Advanced/Advanced High
Encourage students to write in complete sentences with correct capitalization and punctuation.

ELPS 5.E

Support

Provide 1:1 or small group support if necessary.

- Now, ask students to brainstorm words that could be used to answer the question, "When did the fish swim?" Write these adverbs and/or phrases in a separate list. (Examples could be: *in the afternoon*, *as we watched her*, *always*)
- Now, ask students to brainstorm words that could be used to answer the question, "Where did the fish swim?" Write these adverbs and/or phrases in a separate list. (Examples could be: *in her bowl*, *at school*, *in the fish tank*)
- Finally, ask students to brainstorm words that could be used to answer the question, "What happened because the fish swam?" (Examples could be: *she could be noticed*, *air from the water could enter her gills*, *she could explore the tank*, *children could watch her*)
- Remind students of cause and effect and the usage of the conjunction *so*. (The cause is the event that happens first, and the effect is the event that happens second in time. The conjunction *so* precedes the effect.) Write their ideas for how to use *so* on a separate list.
- Remind students that a simple sentence is needed to show the effect of an event.
- Examples of more interesting sentences could be:
  - The colorful, silly fish swam in circles so she could be noticed.
  - The dizzy, blue fish swam slowly in her bowl at school so children could watch her.
  - The excited, multi-colored fish swam in the afternoon so air from the water could enter her gills and she could breathe.
- Ask students to turn to Activity Page 5.3, explaining that they are to use the same process to make more interesting sentences with adjectives, adverbs, and the conjunction *so*.
- Collect Activity Page 5.3 when completed.

WRAP-UP

- If time permits, go over the answers to Activity Page 5.3 before collecting.

Spelling Analysis Chart

Name																				
1. gymnasium																				
2. germy																				
3. digest																				
4. nudging																				
5. giraffe																				
6. exchange																				
7. eject																				
8. average																				
9. budget																				
10. lodging																				
11. jellyfish																				
12. jewel																				
13. bridging																				
14. ridge																				
15. dodge																				
16. fringe																				
17. fudge																				
Challenge Word: answer																				
Challenge Word: great																				
Challenge Word: grate																				
Content Word: Jupiter																				

SPELLING ANALYSIS DIRECTIONS

Unit 7, Lesson 5

- Students are likely to make the following errors:
    - For ‘g’, students may write ‘j’, ‘ge’, ‘dge’, or ‘dg’.
    - For ‘j’, students may write ‘g’, ‘ge’, ‘dge’, or ‘dg’.
    - For ‘ge’, students may write ‘g’, ‘j’, ‘dge’, or ‘dg’.
    - For ‘dge’, students may write ‘g’, ‘j’, ‘ge’, or ‘dg’.
    - For ‘dg’, students may write ‘g’, ‘j’, ‘ge’, or ‘dge’.
- While the above student-error scenarios may occur, you should be aware that misspellings may be due to many other factors. You may find it helpful to record the actual spelling errors that the student makes in the analysis chart. For example:
    - Is the student consistently making errors on specific vowels? Which ones?
    - Is the student consistently making errors at the end of the words?
    - Is the student consistently making errors on particular beginning consonants?
- Did the student write words for each feature correctly?
- Also, examine the dictated sentences for errors in capitalization and punctuation.

Grade 3 | Unit 7

Pausing Point 1

Note to Teacher

So far in the Astronomy unit, students have been introduced to our solar system and the objects that inhabit it. It is recommended that you pause here and spend a day reviewing, reinforcing, or extending the material taught so far.

You may do the activities in any order or combination, using whole class or small groups to meet the needs of the students.

CORE CONTENT UP TO THIS PAUSING POINT

Students will:

- Identify our sun as a star and a constant source of heat and light
- Identify our planet Earth as the third planet form the sun and ideally suited for life
- Demonstrate how day and night are caused by Earth's rotation
- Explain why the sun seems to rise in the east and set in the west
- Explain what happens during solar and lunar eclipses
- Explain the reason for the seasons
- Describe the eight planets of our solar system and their sequence from the sun
- Describe our solar system as the sun and all of the smaller bodies that orbit it; e.g., the planets, moons, asteroids
- Describe the characteristics of a planet
- Explain that Pluto has been reclassified as a dwarf planet
- Describe the asteroid belt and its location in the solar system
- Compare and contrast asteroids, meteoroids, and comets

ACTIVITIES

Image Review

Materials: digital images from Lessons 1–5

- Project the digital images from any Read-Aloud again and have students retell the Read-Aloud using the images.

Greetings from Planet ______!

Materials: Student Readers, plain paper, markers, colored pencils or crayons

- Have students create a postcard from one of the eight planets. On the front they will draw a picture of the planet, and on the back of the postcard they will write a brief message to a friend or family member as if they were visiting the planet. The back should have space for the message and space for the address where they are sending the postcard. The address should include not only the regular address but the planet as well.

Poster Session

Materials: chart paper, markers

- Divide students into small groups. Let each group decide on a key idea or concept from their reading that can be visualized on a poster. Students can use words or pictures to describe the concept. When the posters are complete, hang them up around the room and allow students to walk around to view and discuss the posters.

Act It Out!

Materials: Digital Image U7.L1.6 Solar Eclipse; Lunar Eclipse

- Ask students to define the terms *solar eclipse* and *lunar eclipse*. Have three student volunteers participate in acting out a solar eclipse. Ask students which celestial bodies, or natural objects seen in space, are involved in a solar eclipse. (the moon, Earth, the sun) Appoint each student to act as one of these three celestial bodies. Project Image U7.L1.6 before having the volunteers act out a solar eclipse. Have student volunteers explain orally what happens during a solar eclipse. (The moon passes between the sun and Earth and blocks the sunlight from reaching Earth.) Next, have three volunteers act out a lunar eclipse. Have student volunteers explain orally what happens during a lunar eclipse. (Earth passes between the sun and the moon; it blocks the sun's light from reaching the moon; the moon is in Earth's shadow.)

Riddles 1

Materials: paper, pencil

- Have students create and exchange riddles to review everything they've learned about the solar system so far. For example, "I orbit the third planet from the sun. What am I?" (the moon)

Riddles 2

Materials: none

- Ask students riddles such as the following to review core content:
    - I provide all the heat and energy for the Earth. What am I? (the sun)
    - I am the fourth planet from the sun. What am I? (Mars)
    - I am made up of the sun, and all eight planets, including Earth, as well as other celestial bodies. What am I? (solar system)
    - I consist of thousands of asteroids that orbit the sun and lie between Mars and Jupiter. What am I? (the asteroid belt)
    - I occur when Earth's shadow darkens the face of the moon. What am I? (a lunar eclipse)
    - I have three different names, depending on where I am found. I am also known as a "shooting star" when I blaze through Earth's atmosphere. What am I? (a meteor, meteoroid, or meteorite)
    - I orbit a planet. I can be natural, like the moon, or made by humans. What am I? (a satellite)

Compare and Contrast

Materials: paper, pencil

- Have students compare and contrast two planets in our solar system by creating their own graphic organizer.

RAFT Writing

Materials: paper, pencil, whiteboard or chart paper

Students will complete a RAFT writing activity as described below.

Writing Prompt: Pluto was reclassified as a dwarf planet in 2006. Do you think it should be called a planet again?

- Go through the RAFT with students so they understand the task. Write the letters *RAFT* on the board. Explain to students:

R—**Role** of the writer. Who are you?

A—Who is the **audience**?

F—In what **format** are you writing? Letter? Diary? Newspaper article?

T—What **topic** are you writing about?

- Tell students to write the letters *RAFT* going down from the top of their paper and fill in each of the categories next to the letters.
- Alternately, provide some of the categories for the students. For example, for the letter 'F', write *letter* so the students know the format they will be writing in.

Planet Poetry TEKS 3.12.A

Materials: paper, pencil

- Have students create an acrostic poem using letters from one of the celestial bodies in our solar system. For example:

M—meteoroids

E—exploding

T—twinkle

E—elliptical

O—orbit

R—rocky

Students can also choose another word from the Astronomy unit or write a different type of poem.

Multiple-Meaning Word Activity: *Debris*

Materials: chart paper, chalkboard, or whiteboard; various images depicting meanings of *debris* (/də*brē/)

Note: You may wish to have students find, cut out, and mount pictures portraying the various meanings of the word *debris*—material from objects in space, leftover material from broken or destroyed things, and material that is thrown away.

TEKS 3.12.A Compose literary texts, including personal narratives and poetry, using genre characteristics and craft.

- In the Read-Aloud "Our Solar System, Part I" you heard, "Meteoroids are space debris made of rock or metal that range in size from tiny pebbles to large boulders." Using the context of this sentence as a clue, who can tell me what the word *debris* means? (Pause for students to share.) Here, *debris* means bits and pieces of leftover dust and rocks.
- Say the word *debris* (/də*brē/) with me.
- *Debris* also means something else. It is what remains when something is broken down or destroyed, such as buildings, cars, or trees, as in this sentence: "Debris covered the road after the mudslide."
- A third meaning for *debris* is something that is discarded or thrown away, such as litter or garbage, as in this sentence: "After the parade, there was debris scattered all over the sidewalks."
- One at a time, hold up the variety of pictures that show the different meanings of the word *debris*. As you show each one, call on students to form complete sentences to share. Remind them to be as descriptive as possible. Record the sentences on chart paper, a chalkboard, or a whiteboard.

Independent Reading

Materials: assortment of books about astronomy

- Have students read additional trade books about astronomy in your classroom or from the library. After reading, have the students write a book review that includes the following:
    - The title and author.
    - Why did you choose the book?
    - A brief summary.
    - Your favorite part.
    - What do you really want a reader to know about this book?
    - Would you recommend the book to others? Why?

LESSON

6

Galaxies and Stars

PRIMARY FOCUS OF LESSON

Reading

Students will gather key ideas and details from text and answer questions about galaxies and stars. **TEKS 3.6.G; TEKS 3.7.B; TEKS 3.7.E**

Writing

Students will respond to text about galaxies and stars in a variety of ways and for different purposes. **TEKS 3.6.B; TEKS 3.6.G; TEKS 3.7.B; TEKS 3.7.C; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A**

Language

Students will combine sentences using the conjunctions *and* and *or*.
TEKS 3.11.D.viii; TEKS 3.11.D.x

Students will write words using spelling patterns and rules for the sound /n/.
TEKS 3.2.B.iv

FORMATIVE ASSESSMENT

Activity Page 6.2	**Galaxies and Stars** Students will answer questions from the text about galaxies and stars. **TEKS 3.6.G; TEKS 3.7.B**
Activity Page 6.3	**Reading/Writing Choice Board** Students will respond to text through writing activities. **TEKS 3.6.B; TEKS 3.6.G; TEKS 3.7.B; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A**

TEKS 3.6.G Evaluate details read to determine key ideas; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating; **TEKS 3.6.B** Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; ii features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding; iii organizational patterns such as cause and effect and problem and solution; **TEKS 3.10.A** Explain the author's purpose and message within a text; **TEKS 3.11.D** Edit drafts using standard English conventions, including: (viii) coordinating conjunctions to form compound subjects, predicates, and sentences; (x) punctuation marks, including apostrophes in contractions and possessives and commas in compound sentences and items in a series; **TEKS 3.2.B.iv** Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (50 min.)			
Introducing the Chapter	Whole Group	10 min.	❏ *What's in Our Universe?* ❏ Activity Pages 6.1, 6.2
Partner Reading: "Galaxies and Stars"	Partner	25 min.	
Comprehension Questions	Independent	15 min.	
Writing (30 min.)			
Reading/Writing Choice Board	Independent	30 min.	❏ *What's in Our Universe?* ❏ Activity Page 6.3 ❏ writing paper
Language (40 min.)			
Grammar: Conjunction *or*	Whole Group	20 min.	❏ Activity Page 6.4
Spelling	Whole Group	20 min	❏ Individual Code Charts ❏ Spelling Chart (Digital Projections)
Take-Home Material			
Spelling: Take-Home Letter "Galaxies and Stars"			❏ Activity Pages 6.5, 6.6

ADVANCE PREPARATION

Language

- Prepare to display the previous chart prepared for conjunctions by adding the fifth bullet to the chart:

  Conjunctions

  Conjunctions are words that connect other words or groups of words.

  - The **conjunction *and*** connects words or groups of words. It means "plus, along with," or "also."
  - The **conjunction *but*** is used to connect groups of words. It signals that "something different," such as a different idea, will come after *but*.
  - The **conjunction *because*** is used to mean "for this reason" and signals the answer to a "why" question. It signals the cause of something.
  - The **conjunction *so*** means "then this happened" and signals the effect in a cause and effect sentence.
  - The **conjunction *or*** signals a choice, possibility, or alternative.

- Write the following sentences on the board:

  1. I will have carrots for a snack, and I will eat a sandwich for lunch.
  2. I will have carrots for a snack, or I will eat a sandwich for lunch.
  3. Uncle Fred watches TV on Sunday afternoons, and he reads the newspapers.
  4. Uncle Fred watches TV on Sunday afternoons, or he reads newspapers.

Spelling

- On chart paper, create the following chart or project Digital Projection DP.U7.L6.1.

'n' > /n/	'nn' > /n/	'kn' > /n/	'gn' > /n/

Universal Access

- Provide additional images of galaxies and stars from books, the Internet, etc.
- Create work partners strategically in advance of the lesson.
- Display vocabulary words in the classroom during and after instruction to reinforce word meaning.
- Provide 1:1 or small group support when necessary.

Start Lesson

Lesson 6: Galaxies and Stars

Reading

50M

Primary Focus: Students will gather key ideas and details from text and answer questions about galaxies and stars. **TEKS 3.6.G; TEKS 3.7.B; TEKS 3.7.E**

VOCABULARY: "GALAXIES AND STARS"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.
- Remind students that the Greek root *astro-* means "star" and *astronomy* is the study of stars, planets, and space. Say: Knowing those things, what do you think an *astronomer* is?

galaxy, a very large cluster of billions of stars, dust, and gas held together by gravity and separated from other star systems by a large amount of space (galaxies)

astronomer, a scientist who studies stars, planets, and outer space (astronomers)

billion, a very large number (billions)

Milky Way Galaxy, the galaxy that contains Earth and the solar system in which it lies

Andromeda Galaxy, the spiral galaxy that is closest to the Milky Way Galaxy

TEKS 3.6.G Evaluate details read to determine key ideas; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating.

Vocabulary Chart for "Galaxies and Stars"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	galaxy astronomer Milky Way Galaxy Andromeda Galaxy	billion
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE CHAPTER (10 MIN.)

- Make sure that you and your students each have a copy of the Student Reader.
- Ask students what they already know about galaxies and stars. You may wish to list their responses on the board or on chart paper, or create a KWL chart.
- Ask students to turn to the Table of Contents, locate the chapter, and then turn to the first page of the chapter.

PARTNER READING: "GALAXIES AND STARS" (25 MIN.)

- Divide the students into partners.
- Have students turn to Activity Page 6.1. Tell them they will be taking notes throughout the reading.

Activity Page 6.1

Chapter

6 Galaxies and Stars

Look up in the sky at night. What do you see besides the moon? If it is not cloudy, you may be able to see lots of stars glittering in the sky.

Remember that the sun is also a star. The stars in the night sky do not look like the sun. They do not look as big or as bright. But they are, in fact, very much alike. The stars in the night sky are big balls of hot gas, just like the sun.

So why don't they look the same? The night stars are much, much farther away from Earth than the sun. That is why they look like tiny specks of light. If we could get close to the stars, they would look bigger, brighter, and more like the sun. But the stars we see at night are so far away that no one from Earth has ever been able to get close to them.

Stars in the night sky

34

35

Pages 34–35

- Read the title of the chapter together as a group, "Galaxies and Stars."
- Point students' attention to the image on **page 35** and read the caption aloud as a group.
- Ask students to predict what they think the difference is between galaxies and stars.
- Tell students to read **pages 34–35** to themselves to find the answer to the question: "Our sun is a star, so why do the stars in the night sky look different from the sun?"
- When students have finished reading, restate the question and ask students to answer.
    - » The night stars are much, much farther away from Earth than the sun. If we could get close to the stars, they would look bigger, brighter, and more like the sun.

Scientists who study the stars and outer space are called **astronomers**. The Greek root word *astron* means star. The prefix *astro* is used in many other English words.

All stars are big balls of hot gas, but **astronomers** have discovered that stars differ in many ways. Stars can be different sizes and colors. Some stars are closer to Earth than others and some stars are hotter than others. Stars that are the hottest and closest to Earth appear brighter than other stars.

All stars are made of gases, but they can differ in size, color, and brightness.

36

37

Pages 36–37

"What have astronomers discovered about how stars differ from each other?"

» They can be different sizes and colors. Some are closer to Earth than others. Some are hotter than others. The hottest stars and the stars that are closest to Earth appear brighter.

- Direct students' attention to the image and caption on **page 37**.
- Tell students to work with their partners to fill out the boxes on Activity Page 6.1 for the pages they read. Tell them to write key ideas and notes from those pages in the text.

Astronomers also discovered that stars cluster together in large groups. A large group of stars that cluster together in one area is called a galaxy. There are billions and billions of stars in one galaxy. That's a lot of stars!

The galaxy to which our sun and solar system belong is called the Milky Way Galaxy. It has a spiral shape when viewed from space. From Earth, it looks like a "milky" band of white light.

38

*The **Milky Way** as it appears in the night sky*

39

ENGLISH LANGUAGE LEARNERS

Reading
Reading and Viewing Closely

Beginning
Read true and false questions aloud from Activity Page 6.2 and give additional support.

Intermediate
Pair students with partners to complete Activity Page 6.2.

Advanced/Advanced High
Encourage students to write in complete sentences for extended answer responses.

ELPS 4.F

Pages 38–39

- Say, "I wonder what the Milky Way Galaxy is." Tell students that the Milky Way Galaxy is the galaxy that contains Earth and the solar system in which it lies. Then say, "Let's read **page 38** to find out more about the Milky Way Galaxy."
- When students have finished reading, restate the question and ask students to share what they learned about the Milky Way Galaxy.
    - » It is the galaxy to which our sun and solar system belong. It looks like a "milky" band of white light when viewed from Earth and a spiral shape when viewed from space.

The nearest **spiral galaxy** to the **Milky Way Galaxy** is called the **Andromeda Galaxy**. It is **billions** and **billions** of miles from the **Milky Way Galaxy**. You have probably heard of a million before. A million is a huge number. So what's a **billion**? It's one thousand million! It is safe to say that the **Andromeda Galaxy** is a long, long, long way away! Even so, it is sometimes possible to see the **Andromeda Galaxy** at night.

Scientists think there are **billions** of **galaxies** in the universe. There's that number **billions** again. There are **billions** of stars in each **galaxy** and **billions** of **galaxies** in the universe—that is almost more than you can think about!

Andromeda Galaxy

40 41

Pages 40–41

- Tell students to read **page 40**.
- Say, "List facts about the Andromeda Galaxy."
  - » It is the nearest spiral galaxy to the Milky Way Galaxy. It is billions of miles away but still possible to see at night sometimes.

  Why is the word *billions* used to describe stars and galaxies?
  - » Billions is a very large number and there are almost more stars and galaxies in the universe than we can think about.
- Direct students' attention to the image and caption on **page 41**.
- Tell students to work with their partners to fill out the boxes on Activity Page 6.1 for the pages they read. Tell them to write key ideas and notes from those pages in the text.

Support

Pull a small group together to reread portions of the text and provide support in completing Activity Page 6.2.

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

Check for Understanding

Have several students share their notes from Activity Page 6.1.

Activity Page 6.2

COMPREHENSION QUESTIONS (15 MIN.)

- Have students turn to Activity Page 6.2 and complete it independently.

Lesson 6: Galaxies and Stars

Writing

30M

Primary Focus: Students will respond to text about galaxies and stars in a variety of ways and for different purposes.

TEKS 3.6.B; TEKS 3.6.G; TEKS 3.7.B; TEKS 3.7.C; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A

READING/WRITING CHOICE BOARD (30 MIN.)

- Have students turn to Activity Page 6.3.
- Tell students that they will have a choice of activities in responding to Chapter 6.
- Have students look at the Reading/Writing Choice Board.

Reading/Writing Choice Board

Directions: Select activities in three of the boxes below after you complete your reading. Write your responses on a separate sheet of paper, making sure to include the number of the activities you chose. When completing the activities, write in complete sentences using correct spelling, capitalization, and punctuation.

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding; (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.10.A** Explain the author's purpose and message within a text.

1. Create a graphic organizer and compare and contrast two ideas in the text. **TEKS 3.6.H**	2. What is the key idea of the text? List three details from the text that support the key idea. **TEKS 3.6.G; TEKS 3.9.D.i**	3. Write a sentence describing the author's purpose. **TEKS 3.10.A**
4. Write three questions you still have after reading the text. **TEKS 3.6.B**	5. Write a list of three new words you learned in the text, their definitions, and use them in a sentence. **TEKS 3.7.F**	6. Describe how one of the images in the chapter helps you to understand the text. **TEKS 3.9.D.ii**
7. Find three sentences that show comparing or contrasting. Write the sentences and underline the comparing and contrasting word or words. **TEKS 3.9.D.iii**	8. Write three new things you learned from the text. **TEKS 3.7.B**	9. Write a list of words the author uses to help the reader visualize the information. **TEKS 3.7.C**

- Read through the directions and through each of the activities to make sure students understand what they'll need to do.
- Tell them that they will need to choose three activities from the board.
- Remind them that they'll be writing their responses on a separate sheet of paper.
- When they've completed their activities, collect Activity Page 6.3 and their responses.
- Students will be using the Reading/Writing Choice board throughout the rest of the unit.

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as sections, tables, graphs, timelines, bullets, numbers, bold and italicized font to support understanding; (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.10.A** Explain the author's purpose and message within a text; **TEKS 3.11.D** Edit drafts using standard English conventions, including: (viii) coordinating conjunctions to form compound subjects, predicates, and sentences; (x) punctuation marks, including apostrophes in contractions and possessives and commas in compound sentences and items in a series.

Activity Page 6.3

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Modify choices to include writing lists, answering simple yes and no questions, or drawing and labeling pictures.

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Encourage students to write their responses in complete sentences, with correct spelling, capitalization, and punctuation.

ELPS 5.F

Challenge

Have students choose two activities from the Choice Board and create their own third activity.

Lesson 6: Galaxies and Stars

Language

40M

GRAMMAR: CONJUNCTION OR (20 MIN.)

Primary Focus: Students will combine sentences using the conjunctions *and* and *or*. TEKS 3.11.D.viii; TEKS 3.11.D.x

Introducing Conjunction *or* TEKS 3.11.D.viii

- Draw students' attention to the Conjunctions poster and read it with them.

  Conjunctions

  Conjunctions are words that connect other words or groups of words.

  The **conjunction *and*** connects words or groups of words. It means "plus, along with," or "also."

  - The **conjunction *but*** is used to connect groups of words. It signals that "something different," such as a different idea, will come after *but*.
  - The **conjunction *because*** is used to mean "for this reason" and signals the answer to a "why" question. It signals the cause of something.
  - The **conjunction *so*** means "then this happened" and signals the effect in a cause and effect sentence.
  - The **conjunction *or*** signals a choice, possibility, or alternative.
- Remind students the conjunction *and* means "plus," "along with," or "also."
- Tell students that today, they will learn a new conjunction that signals a choice, possibility, or alternative. This conjunction is *or*.
- Read the first two sentences you wrote on the board in advance.

  1. I will have carrots for a snack, and I will eat a sandwich for lunch.
  2. I will have carrots for a snack, or I will eat a sandwich for lunch.
- Point out that in these sentences, the words that are being joined are independent clauses, forming compound sentences.
- Point out that the difference between the two sentences is the conjunction, which changes the meaning of the entire sentence.

TEKS 3.11.D Edit drafts using standard English conventions, including: (viii) coordinating conjunctions to form compound subjects, predicates, and sentences; (x) punctuation marks, including apostrophes in contractions and possessives and commas in compound sentences and items in a series.

- Point out that in the first sentence, I will have carrots and a sandwich, but in the second sentence, I will have one but not both.
- Note for students that in a series (a group of listed items), if there are three items listed, you need two commas separating them. The items are all separated by commas and the last comma comes just before the conjunction. Point to the commas as you reread the sentences.
- Draw students' attention to the next set of sentences you wrote on the board in advance.

  1. Uncle Fred watches TV on Sunday afternoons, <u>and</u> he reads the newspapers.
  2. Uncle Fred watches TV on Sunday afternoons, <u>or</u> he reads newspapers.

- Point out that in these sentences, the words that are being joined are simple sentences, forming compound sentences.
- Point out that the conjunctions change the meanings of the sentences.
- In the first sentence, the conjunction *and* shows that Uncle Fred does both things.
- In the second sentence, Uncle Fred either watches TV on Sunday afternoons *or* he reads the newspaper. Both events do not happen, only one.
- Give students a few minutes to come up with their own compound sentences that use the conjunction *or*, showing a choice.
- Have a few students share their sentences aloud. Write their sentences on the board.
- Note for students that if there are three things in a series, two commas are needed (one between the first two items and the second before the conjunction *or*).
- Have students turn to Activity Page 6.4. Complete this as a teacher-guided activity.

SPELLING (20 MIN.)

Primary Focus: Students will write words using spelling patterns and rules for the sound /n/. **TEKS 3.2.B.iv**

Introduce Spelling Words

- Tell students that this week, they will review the spellings of /n/.
- As you introduce each of the spelling words, write it on the board, pronouncing each word as you write it.
- Go back through the list of words, having students read the words and tell you what letters to circle for /n/.

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

Activity Page 6.4

ENGLISH LANGUAGE LEARNERS

Language
Connecting Ideas

Beginning
Read sentences on Activity Page 6.4 aloud, allowing students to give one word answers; e.g., "and" and "or." Provide support for writing sentences.

Intermediate
Students can answer open-ended questions with a partner. Provide 1:1 support when needed.

Advanced/Advanced High
Provide support when needed.

ELPS 5.F

Support

Prompt students to use correct capitalization, punctuation, and verb tense when writing compound sentences. Provide 1:1 or small group support if necessary.

1. gnat	12. knowledge
2. skinny	13. channel
3. knotted	14. annoy
4. recently	15. gnarly
5. flannel	16. knuckle
6. knighted	17. campaign
7. nearby	**Challenge Word:** *very*
8. understand	**Challenge Word:** *vary*
9. design	**Challenge Word:** *enough*
10. knobby	**Content Word:** *astronomer*
11. manned	

- Point to the Challenge Words on the board. Explain to students that the Challenge Words *very/vary* and *enough* are also part of the spelling list and are words used very often. *Very/vary* do not follow the spelling patterns for this week, while *enough* does, as the 'n' is pronounced /n/.
- Explain to students that *very* and *vary* are homophones. Homophones sound alike but have different meanings. Homophones may or may not be spelled the same. *Very* and *vary* have the same sound /air/ and have different meanings. *Very* means "much" or "a lot" and *vary* means "to change something."
- Use the Challenge Words in sentences as examples for students: "It would help me *very* much if you would *vary* our camp activities today." "We have *enough* ice cream for everyone here to have a bowlful."
- Remind students that this week, they once again have a Content Word: *astronomer*.
- Draw the following chart or use the previously prepared Digital Projection DP.U7.L6.1.

Projection DP.U7.L6.1

'n' > /n/	'nn' > /n/	'kn' > /n/	'gn' > /n/

- Ask students to refer to the spellings for /n/ on the Individual Code Chart page 2. Point out that there are four spellings for /n/.
- Ask students which spelling is most frequently used. ('n' > /n/)
- Ask students to tell you which words to list under the 'n' > /n/ header. Briefly explain the meaning of each word.
- Continue through the columns until all words have been listed under the appropriate /n/ header. Briefly explain the meaning of each word.

'n' > /n/	'nn' > /n/	'kn' > /n/	'gn' > /n/
recently	skinny	knotted	gnat
nearby	flannel	knighted	design
understand	manned	knobby	gnarly
enough	channel	knowledge	campaign
astronomer	annoy	knuckle	

- Practice the words as follows during the remaining time: Call on a student to read any word on the table. Then have the student use the word in a meaningful sentence. After the student says the sentence, have them ask the class: "Does the sentence make sense?" If the class says yes, then the student puts a check mark in front of the word and calls on another student to come to the front and take a turn. If the class says no, have the student try again or call on another student to come to the front and use the word in a meaningful sentence. This continues until all of the words are used or time has run out.
- Tell students this table will remain on display until the assessment so that

students may refer to it during the week.

- Tell students they will take home Activity Page 6.5 with this week's spelling words to share with a family member.

End Lesson

Lesson 6: Galaxies and Stars

Take-Home Material

Activity Pages 6.5 and 6.6

- Have students take home Activity Page 6.5 to share with a family member.
- Have students take home Activity Page 6.6 to read to a family member.

LESSON

7 Compare and Contrast: Galaxies

PRIMARY FOCUS OF LESSON

Speaking and Listening

Students will listen to and read text about galaxies to find key ideas, details, words, and phrases. TEKS 3.1.A; TEKS 3.6.G; TEKS 3.7.E

Reading

Students will compare and contrast two texts on the same topic. TEKS 3.7.B

Language

Students will change the meaning of root words by adding suffixes –*ful* and –*less*. TEKS 3.2.A.vi; TEKS 3.3.C

FORMATIVE ASSESSMENT

Activity Page 7.2	**Compare and Contrast** Students will complete a graphic organizer comparing two texts about galaxies.

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.2.A.vi** Demonstrate and apply phonetic knowledge by decoding words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants; **TEKS 3.3.C** Identify the meaning of and use words with affixes such as im- (into), non-, dis-, in- (not, non), pre-, -ness, -y, and -ful.

LESSON AT A GLANCE

	Grouping	Time	Materials
Speaking and Listening (65 min.)			
Introducing the Read-Aloud	Whole Group	10 min.	❑ Activity Page 7.1 ❑ writing paper ❑ Digital Flip Book:U7.L7.1–U7.L7.9 ❑ highlighters or pens
Read-Aloud: “Galaxies”	Whole Group	40 min.	
Quick Write	Independent	5 min.	
Sharing Margin Notes	Partner	10 min.	
Reading (30 min.)			
Compare and Contrast Galaxies and Stars	Partner	15 min.	❑ “What’s in Our Universe?” ❑ Activity Page 7.2
Compare and Contrast Summary	Independent	15 min.	
Language (25 min.)			
Morphology: Suffixes -*ful* and -*less*	Whole Group	25 min.	❑ Activity Page 7.3
Take-Home Material			
Spelling: Dictionary Skills			❑ Activity Page 7.4
Reading: “Galaxies and Stars”			

ADVANCE PREPARATION

Reading

- You may wish to write on chart paper or on the board the following:

  CIRCLE key ideas, words, and phrases

  UNDERLINE words or phrases you do not understand

  WRITE thoughts, ideas, or questions in the margins

Speaking and Listening

- Prepare to project the following digital images during the Read-Aloud: U7.L7.1–U7.L7.9.

Language

- Write the following sentences on the board or chart paper for the morphology lesson:

1. The young child was off to the barber shop for the first time and was very afraid that his first haircut would be pain ______.
2. I made a care ______ mistake and spilled my grape juice on my favorite white shirt.
3. The power ______ storm included strong winds that knocked trees and power lines down.

Universal Access

- Provide additional images of galaxies and stars from books, the Internet, etc.
- Create work partners strategically in advance of the lesson.
- Display vocabulary words in the classroom during and after instruction to reinforce word meaning.
- Provide 1:1 or small group support when necessary.

Start Lesson

Lesson 7: Compare and Contrast: Galaxies

Speaking and Listening

65M

Primary Focus: Students will listen to and read text about galaxies to find key ideas, details, words, and phrases. **TEKS 3.1.A; TEKS 3.6.G; TEKS 3.7.E**

VOCABULARY: "GALAXIES"

- The following are core vocabulary words used in this lesson. Preview the words with the students before the lesson.
- Tell students that the vocabulary words are printed at the end of Activity Page 7.1 for their reference.

astronomical, really large; enormous in number, size, or distance

atoms, the tiny particles from which all substances are made

cluster, a number of things of the same kind that are together in a group

fuse, join together (**fusion**)

irregular, uneven; not regular in shape, size, or other characteristics

light-years, distance traveled by light over a period of years; a measure of length used in astronomy (**light-year**)

spiral, curved in shape; gradually winding around a center point

Vocabulary Chart for "Galaxies"

Type	Tier 3 Domain-Specific Words	Tier 2 General Academic Words
Vocabulary	light-years atoms	astronomical cluster fuse irregular spiral
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating.

Activity Page 7.1

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Listening Actively

Beginning
Allow students to work with partners when annotating text.

Intermediate
Provide 1:1 prompting and support when needed.

Advanced/Advanced High
Encourage students to work independently.

ELPS 2.I; ELPS 4.G; ELPS 4.I

Challenge

Allow students to read and annotate the text in small groups or independently.

INTRODUCING THE READ-ALOUD (10 MIN.)

TEKS 3.6.G; TEKS 3.7.E

- Have students turn to Activity Page 7.1.
- Tell students that today their Read-Aloud will be different because they will be silently reading along with you as you read the text aloud.
- Explain that while they are reading, they will be *annotating* their text.

1. Can anyone tell me what the word *annotate* means?

   » It means "to mark up" and "make notes in a text."

2. What do you think the root word in *annotate* is?

   » the word *note* or *notation*

- Tell students that they will be making notes right on their text.
- Show students the chart you made previously:

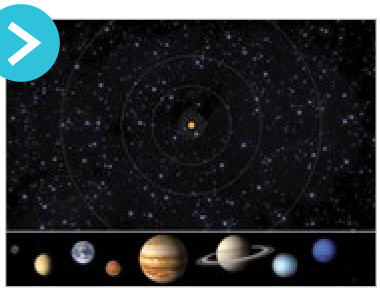
CIRCLE key ideas, words, and phrases.
UNDERLINE words or phrases you do not understand.
WRITE important thoughts, ideas, or questions in the margins.

- Go through the chart with students and tell them that these are the three items they will be annotating in their text.
- Distribute highlighters or pens.
- If you wish, the students can copy the annotation chart on the top of Activity Page 7.1 to remind them of what they are looking for.

READ-ALOUD: "GALAXIES" (40 MIN.)

- Ensure students have Activity Page 7.1 and a highlighter or pen.

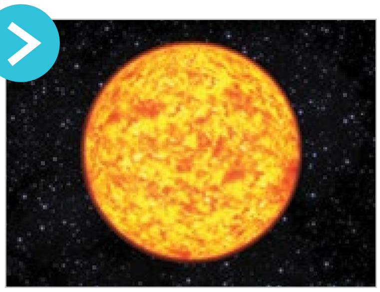
TEKS 3.6.G Evaluate details read to determine key ideas; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating.



Show Image U7.L7.1
The Planets of the Solar System

Isn't space amazing? The thing that may amaze you most is how much distance there is between the planets in our solar system. No wonder they call it space! Now that we have reached the edge of our solar system, do you want to see more closely what lies in the center? Before you can understand what lies beyond our solar system, you need to know a little more about what stars are. And the best place to start is with the star that lies at the center of our solar system that you see every day: our very own sun.

- Model for students how they should be annotating their text. Go through the text and give students examples of parts you would circle or underline. Tell students one thought that you might write in the margin would be "I wonder what stars are made of." Give students time to finish annotating this paragraph.



Show Image U7.L7.2
Our Sun, One of Billions of Stars

The sun is so much brighter and bigger than all the rest of the stars because we are so much closer to our star than we are to any other star. We only see our star, the sun, in the daytime because that's when we're facing it. And when the sun lights up our skies, it is so bright that we can't usually see any other stars in the daytime.

You can tell just by looking that there is no way a spaceship could land on the sun—it's a big mass of incredibly hot gas! There's no solid surface to land on. The sun, like all stars, is made mostly of a gas called hydrogen. Hydrogen atoms in the center of the sun crash into each other under intense heat and pressure. The hydrogen **atoms fuse**, Support

Circulate while students are finishing their annotation to see if they are marking items appropriately. Provide reminders and support as needed.

or join together, to form another gas called helium, and this **fusion** creates energy you can see and feel in the form of light and heat. So, hydrogen turning into helium produces vast amounts of energy and is what causes the sun to shine.

The amount of heat and light being produced by a star determines its color. The surface of our sun is about ten thousand degrees Fahrenheit, not nearly as hot as the inside of the star! Even though ten thousand degrees is really hot compared to boiling water, our sun is still only considered a medium-hot, yellow star. Some stars are even hotter and some are not as hot as our sun. In fact, our sun is not as hot as it used to be.

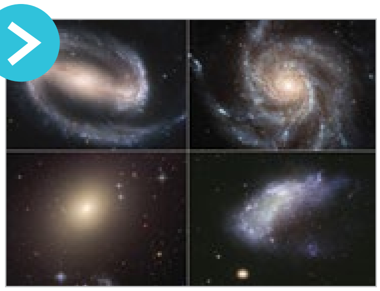
Ask students to stop for a moment to finish annotating what they've read so far. Provide a model for margin notes, if needed; e.g., "Do stars that are hotter than our sun look different?"

Scientists believe that all stars are made of more or less the same things: hydrogen, helium, and smaller amounts of other basic substances. But just because stars are made from huge amounts of hydrogen and helium doesn't mean that all stars are the same—they aren't. The amount of substance or mass that makes up each star can vary. And the substances that make up some stars are more packed together than in others.

Stars have different ages, too. Some stars in the universe were literally just born yesterday, and some—like the sun—are believed to be **billions** of years old. But our sun is not at the end of its life either; many scientists believe our sun still has **billions** of years yet to live! So stars can be very different from each other.

Our sun seems large to us, and it is. In fact, it's so large that more than one million Earths could fit inside it! That's a lot of Earths—and just one Earth is pretty big. But believe it or not, our sun is small compared to many other stars. There are stars in the universe that are 2,000 times as big as the sun! Our sun seems very bright to us, and it is. But there are stars that are more than four million times as bright! Even so, there are stars that are smaller than our sun and some that are less bright. So you see, stars can differ in size, mass, color, brightness, temperature, and age. But the one thing that most stars have in common is that they exist in groups called galaxies.

Allow students a few moments to finish annotating this portion of the text. Ask a few students to share some of their margin notes.



Show Image U7.L7.3
Galaxy Shapes

Do you remember how we defined our solar system as a neighborhood of planets, asteroids, and other objects in orbit around a star? Well, a galaxy is a **cluster** of many stars that orbit around together as an even bigger neighborhood—like a country. So, a galaxy is basically a gigantic country of stars. But all galaxies are not the same; they come in many shapes and sizes. Some galaxies are **spiral**.

Point to the two spiral galaxies.

Some galaxies are elliptical in shape.

Ask, "Who remembers what *elliptical* means?"(*Shaped like a slightly flattened circle*)

Still other galaxies are **irregular** in shape, with no particular pattern.

Point to the image in the lower right corner.

Show Image U7.L7.4
The Milky Way in Our Night Sky

The galaxy that our solar system is in is called the **Milky Way Galaxy**, which is a **spiral** galaxy. When you are standing on Earth you are in the **Milky Way Galaxy**. If you look up into the sky on a very clear, dark night away from the lights of a city, you can see a narrow band of thousands of stars going through the sky. When you look at this

Challenge

Tell students to make a list of their "wonderings" they wrote in the margins that could be used for future research activities.

cloudy-looking band, you are looking into the thickest, densest part of the **Milky Way**. The ancient Greeks called this band of stars the Milky Circle, and the ancient Romans called it the Milky Road. But guess what? When you stand outside of the Milky Way and look at it, it looks like a **spiral**.

Show Image U7.L7.5
Spiral-Shaped Galaxy Similar to the Milky Way

This is a view of a spiral galaxy like the **Milky Way**, looking down on it. Astronomers know what the Milky Way Galaxy looks like, but no person or spaceship has ever traveled outside of the Milky Way to take a picture of the whole galaxy. Scientists have figured out by using modern scientific instruments that the Milky Way is a **spiral** galaxy and looks very much like other **spiral** galaxies that we can take pictures of.

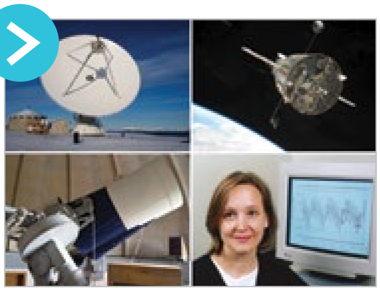
As you can see, this **spiral** galaxy has a bright center, or hub, of many bright stars with star-studded arms swirling out from it amid clouds of gas.

How many stars do you think are in one galaxy? A single galaxy usually contains between one **billion** and a few hundred **billion** stars. And that's not even counting any planets or other objects that may be in orbit around all of those **billions** of stars. In addition to **billions** of stars, galaxies also contain clouds of gas and pieces of dust, which can eventually come together to form new stars.

And don't forget—galaxies also include the space in between the stars that are in it. There is a huge amount of space in space! Stars in the Milky Way Galaxy can be 100,000 **light-years** away from each other, or they can be five **light-years** away from each other, but most are somewhere in-between.

A **light-year** is the distance that light travels in one year. Light travels at a speed of 186,282 miles per second. So one light-year is nearly six trillion miles! That's about 6,000 **billion** miles. And you thought a **billion** was big! Well, as you can see, stars in the same galaxy are very far away from each other. Those are **astronomical** distances!

Ask students to share some of the words or phrases they've underlined.



Show Image U7.L7.6
Gathering Information about Space

Astronomers use different kinds of powerful telescopes to see even more distant parts of the Milky Way Galaxy. Some of those telescopes are on Earth, and some are in orbit around Earth. And there are even a few telescopes zooming through our solar system.

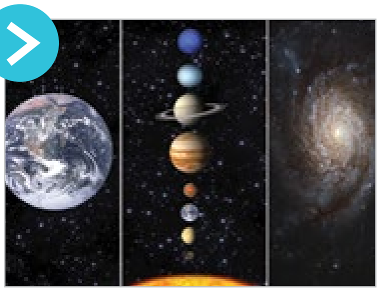
Astronomers share their observations, their photographs, and the data they have gathered with each other—and luckily, with us, too. Even with all of our powerful equipment, there are still things in the Milky Way Galaxy—and beyond it—that no one has ever seen. Sometimes there is something in the way, like a star or another galaxy, and some things are still too far away even for our most powerful telescopes. There are more stars and galaxies in the universe than we can imagine!

Ask students to share some of the key ideas, words, and phrases that they have circled.

Show Image U7.L7.7
The Andromeda Galaxy

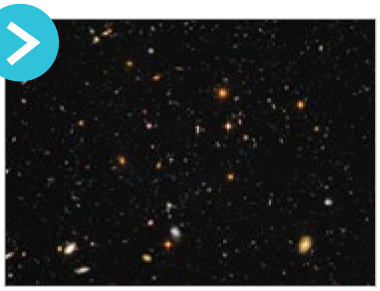
As you look out at the Milky Way, you may wonder about the other galaxies out there. One of the closest galaxies to our Milky Way Galaxy is called the

Andromeda (/an*drom*ə*də/) Galaxy. The Andromeda Galaxy is a **spiral** galaxy like our Milky Way. Even though Andromeda is the closest **spiral** galaxy to our galaxy, the Andromeda Galaxy is still very far away, and there is still much that remains unknown about it. Several other small **irregular** galaxies lie between the Milky Way Galaxy and the Andromeda Galaxy.



Show Image U7.L7.8
Planet Earth: Our Solar System, a Galaxy like the Milky Way Galaxy

Now you know a lot more about our school's "space address." We live on the planet Earth. Earth is the third planet from the sun in our solar system, one of four small, rocky planets. Our solar system is just one planetary system located in one of the **spiral** arms of the Milky Way Galaxy.



Show Image U7.L7.9
Distant Galaxies

You may be thinking about all of the other galaxies that exist besides our galaxy. There are **billions** of galaxies in the universe. Another **astronomical** number! "Wait," you may be thinking, "let me get this right.

"There are **billions** of galaxies . . . and all of them have billions of stars in them? Wow—that's so big I can't even get my mind around it!" The universe truly is an incredibly gigantic and vast place.

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

QUICK WRITE (5 MIN.)

Check for Understanding

Quick Write: Pass out writing paper to the students. Tell students that you will give them 3 minutes to write as much as they can remember about the Read-Aloud. Tell them to write quickly and not to worry about spelling.

SHARING MARGIN NOTES (10 MIN.)

- Divide students into pairs.
- Tell students to take turns sharing their margin notes with their partners.
- If time permits, ask each pair if they had similar margin notes and to share some of them with the class.

Lesson 7: Compare and Contrast: Galaxies

Reading

30M

Primary Focus: Students will compare and contrast two texts on the same topic. **TEKS 3.7.B**

COMPARE AND CONTRAST GALAXIES AND STARS (15 MIN.)

- Divide students into pairs.
- Tell students to take out their Student Readers and turn to Chapter 6, "Galaxies and Stars."
- Tell students to turn to Activity Page 7.2. Let them know that they can also refer to Activity Page 7.1.
- Tell students that they will use the T-Chart Organizer to compare and contrast galaxies and stars.

TEKS 3.7.B Write a response to a literary or informational text that demonstrates an understanding of a text.

Activity Page 7.2

ENGLISH LANGUAGE LEARNERS

Reading
Reading/Viewing Closely

Beginning
Provide 1:1 support or ask students yes and no questions; e.g., "Did both texts describe the Andromeda Galaxy?"

Intermediate
Allow students to circle the similarities and underline the differences on the graphic organizer or allow them to work with partners.

Advanced/Advanced High
Encourage students to write their summary independently and in complete sentences.

ELPS 4.G; ELPS 4.I

Support

Pull a small group together to reread portions of the texts to find and list the key similarities and differences.

Challenge

Have students complete the graphic organizer and summary independently.

COMPARE AND CONTRAST SUMMARY (15 MIN.)

- Tell students to use the information in the graphic organizer they completed with their partners to write a summary of the key similarities and differences between the two texts about galaxies.

Lesson 7: Compare and Contrast: Galaxies

Language

25M

MORPHOLOGY: SUFFIXES -FUL AND -LESS (25 MIN.)

Primary Focus: Students will change the meaning of root words by adding suffixes –*ful* and –*less*. **TEKS 3.2.A.vi; TEKS 3.3.C**

Practice Suffixes –*ful* and –*less* **TEKS 3.2.A.vi; TEKS 3.3.C**

- Remind students that the suffix –*ful* means "full of" and the suffix –*less* means "lacking." When these suffixes are added to nouns, the new words are adjectives.
- Also, remind students that when these suffixes are added to the same root word, the words have opposite meanings. (Example: *Careless* and *careful* are opposites.)
- Read aloud the first sentence that you prepared in advance:

1. The young child was off to the barber shop for the first time and was very afraid that his first haircut would be pain ______.

- Ask students, "Which word correctly completes the sentence, painful or painless?"
    - » painful
- Once students have given the correct answer, ask, "Why wouldn't the word *painless* make sense in this sentence?"
    - » *Painless* means "lacking pain," and a young child likely wouldn't be afraid of something without pain.
- Read aloud the second sentence that you prepared in advance:

TEKS 3.2.A.vi Demonstrate and apply phonetic knowledge by decoding words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants; **TEKS 3.3.C** Identify the meaning of and use words with affixes such as im- (into), non-, dis-, in- (not, non), pre-, -ness, -y, and -ful.

2. I made a care ______ mistake and spilled my grape juice on my favorite white shirt.

- Ask students, "Which word correctly completes the sentence, careful or careless?"
    - » careless
- Once students have given the correct answer, ask, "Why wouldn't the word *careful* make sense in this sentence?"
    - » *Careful* means "full of effort to do something correctly and safely," and a person would likely not make the mistake of spilling grape juice on a favorite shirt by doing something correctly and safely.
- Read aloud the third sentence that you prepared in advance:

3. The power ______ storm included strong winds that knocked trees and power lines down.

- Ask students, "Which word correctly completes the sentence, *powerful* or *powerless*?"
    - » powerful
- Once students have given the correct answer, ask, "Why wouldn't the word *powerless* make sense in this sentence?"
    - » *Powerless* means "lacking the strength or authority to do something," and a storm that knocks down trees and power lines is not lacking strength.
- Have students turn to Activity Page 7.3 and complete it as a teacher-guided activity.

End Lesson

Lesson 7: Compare and Contrast: Galaxies

Take-Home Material

- Have students take home Activity Page 7.4 to complete.

Activity Page 7.3

ENGLISH LANGUAGE LEARNERS

Language
Modifying to add details

Beginning
Read sentences on Activity Page 7.3 aloud, allowing students to give one-word answers; e.g., "*–ful* " and "*–less*." Allow students to provide oral answers.

Intermediate
Allow students to work with a partner.

Advanced/Advanced High
Encourage students to complete the activity independently.

ELPS 2.C

Activity Page 7.4

LESSON

8

Constellations and Stars

PRIMARY FOCUS OF LESSON

Reading

Students will read informational text about constellations and answer comprehension questions by finding evidence in the text. **TEKS 3.7.C**

Speaking and Listening

Students will listen to an informational text read aloud about constellations and stars and answer comprehension questions.

TEKS 3.1.A; TEKS 3.7.C

Students will analyze sound devices, stanzas, and imagery in a poem read aloud and then, in groups, write their own poems comparing stars to something on Earth. **TEKS 3.1.D; TEKS 3.6.H; TEKS 3.9.B; TEKS 3.10.D; TEKS 3.10.G**

Language

Students will show cause and effect by writing sentences using the conjunction *so*. **TEKS 3.11.D.viii**

FORMATIVE ASSESSMENT

Activity Page 8.1	**Constellations** Students will answer questions about constellations using evidence from the text. **TEKS 3.7.C**
Activity Page 8.3	**Practice Conjunction *so*** Students will create an effect to go with a cause by adding the conjunction *so* to make compound sentences. **TEKS 3.11.D.viii**

WRITING STUDIO

Writing Studio

If you are using Writing Studio, you may begin Unit 4, Lesson 1 after completing this lesson. If you have not done so already, you may wish to review the Writing Studio materials and their connection to this unit.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (45 min.)			
Introducing the Chapter	Whole Group	10 min.	❏ *What's in Our Universe?* ❏ Activity Page 8.1
Independent Reading: "Constellations"	Independent	20 min.	
Comprehension Questions	Independent	15 min.	
Speaking and Listening (55 min.)			
Introducing the Read-Aloud	Whole Group	5 min.	❏ Digital Flip Book: U7.L8.1–U7.L8.7 ❏ Image Cards C.U7.L.8.1, C.U7.L8.2 ❏ Activity Page 8.2 ❏ chart paper ❏ markers for small groups
Read-Aloud: "Stars and Constellations"	Whole Group	20 min.	
Discussing the Read-Aloud	Whole Group	5 min.	
Poem: "Escape at Bedtime"	Small Group	25 min.	
Language (20 min.)			
Grammar: Conjunction *so*	Independent	20 min.	❏ Activity Page 8.3
Take-Home Material			
Take-Home Letter			❏ Activity Page 8.4

TEKS 3.7.C Use text evidence to support an appropriate response; **TEKS 3.1.A** Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.1.D** Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.9.B** Explain rhyme scheme, sound devices, and structural elements such as stanzas in a variety of poems; **TEKS 3.10.D** Describe how the author's use of imagery, literal and figurative language such as simile, and sound devices such as onomatopoeia achieves specific purposes; **TEKS 3.10.G** Identify and explain the use of hyperbole; **TEKS 3.11.D.viii** Edit drafts using standard English conventions, including: coordinating conjunctions to form compound subjects, predicates, and sentences.

ADVANCE PREPARATION

Speaking and Listening

- Prepare to project the following digital images during the Read-Aloud: U7.L8.1–U7.L8.7.

Language

- Prepare to display the conjunctions chart:

  Conjunctions

  Conjunction are words that connect other words or groups of words.

  - The **Conjunction *and*** connects words or groups of words. It means "plus, along with," or "also."
  - The **Conjunction *but*** is used to connect groups of words. It signals that "something different," such as a different idea, will come after *but*.
  - The **Conjunction *because*** is used to mean "for this reason" and signals – the answer to a "why" question. It signals the cause of something.
  - The **Conjunction *so*** means "then this happened" and signals the effect in a cause and effect sentence.

- Prepare sentence strips with the following for use in the Grammar lesson.

1. The forecast said rain today.
2. Joseph took his umbrella with him.
3. Samantha's favorite sandwich is peanut butter and jelly.
4. Her mother packs it in her lunch almost every day.
5. The kitten is hungry.
6. She sits by her bowl and mews.
7. Because
8. so

Universal Access

- Ask students to share their experiences looking up at the stars at night. Ask students if there are stars or groups of stars that they recognize and can find night after night.
- Display vocabulary words in the classroom during and after instruction to reinforce word meaning.
- Provide 1:1 or small group support.
- Create small groups strategically.

Start Lesson

Lesson 8: Constellations and Stars

Reading

45M

Primary Focus: Students will read informational text about constellations and answer comprehension questions by finding evidence in the text. **TEKS 3.7.C**

VOCABULARY: "CONSTELLATIONS"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.

constellation, stars that form a pattern or shape that looks like things, such as a person, an object, or an animal, as seen from Earth (**constellations**)

Ursa Major, the constellation named by Ptolemy that is also called Big Bear; it includes the Big Dipper

Ursa Minor, the constellation made of seven stars named by Ptolemy that is also called the Little Bear; it is the Little Dipper

Polaris, the North Star; the brightest star at the end of the handle of Ursa Minor/Little Dipper that stays in the same place in the night sky all year long

TEKS 3.7.C Use text evidence to support an appropriate response.

ENGLISH LANGUAGE LEARNERS

Reading
Reading/Viewing Closely

Beginning
Ask questions that require one-word answers; e.g., "How many constellations can be seen in the night sky?"

Intermediate
Allow students a partner to read and work together to complete Activity Page 8.1.

Advanced/Advanced High
Encourage students to work independently.

ELPS 1.E; ELPS 4.F; ELPS 4.I

Support

Pull a small group together to provide guided reading support of the chapter. Model going back into the text to find answers to the questions.

Challenge

Have students research what constellations would be visible in the night sky at the current time of year and then create an observation log as to what constellations they can find.

Challenge

Have students write a paragraph explaining why some constellations are visible at night only in the summer or winter.

» It's because Earth revolves around the sun and also rotates on its axis.

Vocabulary Chart for "Constellations"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	constellation Ursa Major Ursa Minor Polaris	
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE CHAPTER (10 MIN.)

- Review with students what they remember about stars from the last lesson.
  - Our sun is the closest star.
  - Stars are made from hot gases, mostly hydrogen and helium.
  - Stars are different sizes.
  - Our sun is a medium-sized star.
  - Stars have different colors.
  - Our sun is a yellow star.
  - Stars are different ages.
  - A galaxy is a large collection of stars, dust, and gas held together by gravity.
  - We live in the Milky Way Galaxy.
  - The Milky Way Galaxy is shaped like a spiral.
  - Galaxies have many different shapes, like elliptical and irregular.
- Make sure that you and your students each have a copy of *What's in Our Universe?*
- Tell students that the title of today's chapter is "Constellations." Tell them that the chapter is about groups of stars that look as if they are forming a pattern or picture in the night sky.

- Tell students that they will be reading independently today.
- Have students turn to Activity Page 8.1. Explain that they will complete the activity page when they have finished reading.
- Have students turn to the first page of the chapter.

Activity Page 8.1

INDEPENDENT READING: "CONSTELLATIONS" (20 MIN.)

- Direct students to read Chapter 7, "Constellations," independently.

COMPREHENSION QUESTIONS (15 MIN.)

- Students will complete Activity Page 8.1 independently.

Lesson 8: Constellations and Stars

Speaking and Listening

55M

Primary Focus: Students will listen to an informational text read aloud about constellations and stars and answer comprehension questions.

TEKS 3.1.A; TEKS 3.7.C

Students will analyze sound devices, stanzas, and imagery in a poem read aloud and then, in groups, write their own poems comparing stars to something on Earth.

TEKS 3.1.D; TEKS 3.6.H; TEKS 3.9.B; TEKS 3.10.D; TEKS 3.10.G

VOCABULARY: "STARS AND CONSTELLATIONS"

- The following are core vocabulary words used in this lesson. Preview the words with the students before the lesson. Students are not expected to be able to use these words immediately, but with repeated exposure throughout the lessons they will acquire a good understanding of most of the words. Students may also keep a "unit dictionary" notebook along with definitions, sentences, and/or other writing exercises using these vocabulary words.

ladle, a spoon or dipper with a long handle and a cup-like end used for serving liquids

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.1.D** Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.9.B** Explain rhyme scheme, sound devices, and structural elements such as stanzas in a variety of poems; **TEKS 3.10.D** Describe how the author's use of imagery, literal and figurative language such as simile, and sound devices such as onomatopoeia achieves specific purposes; **TEKS 3.10.G** Identify and explain the use of hyperbole.

magnetic, exerting a strong attractive force

navigate, to find one's way

orient, to identify your position in relation to things around you

orienteering, a modern sporting competition in which participants orient their movements by compass or GPS (global positioning system) to accomplish a set of goals

Vocabulary Chart for "Stars and Constellations"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	orienteering	ladle magnetic navigate orient
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

Image Card C.U7.L8.1

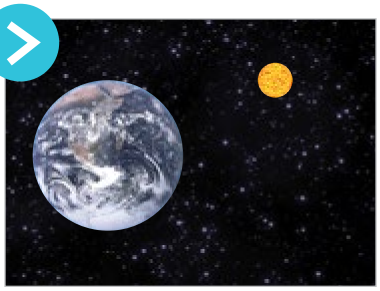
Orion and His Hunting Dogs

INTRODUCING THE READ-ALOUD (5 MIN.)

- Prepare to project the following digital images on the program's digital components site during the Read-Aloud: U7.L8.1–U7.L8.7.
- Ask students to recall what they learned about constellations from reading Chapter 7, "Constellations."
- Show students Image Card C.U7.L8.1 (Orion and His Hunting Dogs).
- Ask students if they see any shapes in this well-known group of stars and allow students to share ideas.
- Say to students: "Perhaps you have observed a very hot flame, maybe on a gas stove or a Bunsen burner, and noticed that different parts of the flame have different colors. The blue and white parts of the flame are much hotter than the yellow or red parts. This is the same for stars: blue and bluish-white stars are the hottest; white stars are very hot; yellow stars (like our sun) are medium hot; and red stars are the least hot."

- Tell students that this image has some interesting stars. Point out the large, white star, Sirius, and tell students that this is the very brightest star in our sky. Point to the reddish star and ask students if they have ever heard of the star Betelgeuse (/bēt*'l*jooz/). Tell students that this star is one of the brightest in our night sky because it is both very large and fairly close to us—in astronomical distances! Explain that Betelgeuse is red because it is not a very hot star anymore; Betelgeuse is a dying star that is starting to cool off. Tell students that astronomers predict that Betelgeuse will eventually explode and that it will be so hot and bright that we will be able to see it during the daytime. (Explain that stars become hotter again once they die and explode or implode.)
- Point out the bluish-white star. Tell students that this star is called Rigel (/rl*jəl/) and that it, too, is a very big star. Explain that because of its size and very hot temperature, it is one of our sky's brightest stars. Tell students that the blue star Bellatrix is one of the very hottest stars.

READ-ALOUD: "STARS AND CONSTELLATIONS" (20 MIN.)



Show Image U7.L8.1

It's time for us to head back home to planet Earth. From our home, we can see glimpses of space by looking up into the sky. After our journey, perhaps you won't see the stars as just little twinkling lights in the sky anymore. Now you know they are like our sun, the star that is the center of our solar system. You know that up close, stars are really massive powerhouses of super-hot gas.

Ask, "If mass is the amount of matter in an object, what does it mean for a star to be massive?" (*very large, taking up a large amount of space*)

Show Image U7.L8.2
Looking Up at the Night Sky

The next time you look up into the night sky, perhaps you will study the stars in a new way. They all look about the same size from where you stand on Earth, but you know they're not. They are different sizes. Some are brighter than others, and some are hotter than others. Maybe you once thought the stars in the sky were pretty close together, but after taking a ride in our special classroom spaceship, you remember that even though stars look close together in the sky, they are really very, very, very far apart. It's true that stars cluster together to form galaxies. Even when they are clustered together, most stars are still incredibly far apart from other stars in the same galaxy. And they are even farther apart from the stars of other galaxies. There's a lot of space in space!

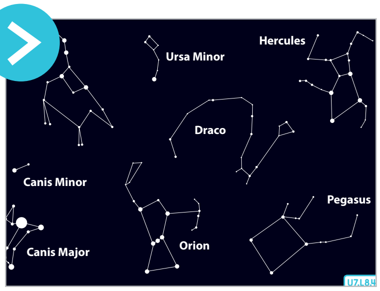
Show Image U7.L8.3
The Andromeda Galaxy

Look up at the sky and try to count the stars. There are a lot of them!

On a clear evening, depending on where you are, you can see many of the 2,000 or so stars that can be seen from Earth with the naked eye. All the stars you see are in our own Milky Way Galaxy. You can't see individual stars from other galaxies without the use of a telescope. But, looking between the stars of our galaxy, you may be able to see the distant Andromeda Galaxy if it's a very dark night and you know just where to look.

Ask students to recall what they learned about the Andromeda Galaxy (*closest to the Milky Way, spiral-shaped, very far away*)

For thousands and thousands and thousands of years, people have been looking up at the night sky—just like you. Human beings have tried to understand the location of the stars and predict their positions each night in the sky. In the grand scheme of the universe, it is human nature for us to try to understand why things are the way they are and where we fit in.



Show Image U7.L8.4
Night Sky Showing Constellations

Since ancient times, people have grouped the stars into patterns called constellations. Ancient civilizations saw these constellations as figures of people, animals, and objects. They played "connect the dots" with the stars by drawing imaginary lines between them to form pictures in the sky.

Ask students what constellations they already know. Answers will vary, but students who participated in the program in Grade 1 may be familiar with Scorpio and Taurus.

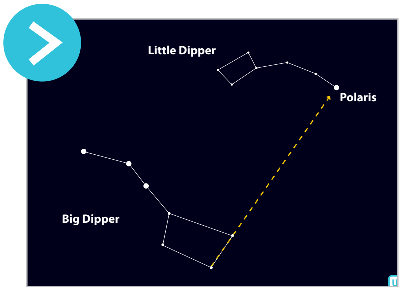
These pictures often told familiar mythological stories about heroes like the Greek hunter, Orion, who stands ready with his shield to fight a bull. They were about mythological animals like Pegasus, the beautiful winged horse. And they were about animals such as Canis Major and Canis Minor. *Canis* means "dog" in Latin and *major* means "greater."

If Canis Major is commonly known as the Great Dog, it's easy to see who might be following behind. In the stories about Orion the great hunter, these two constellations are Orion's faithful hunting dogs, forever following at the heels of their master as they move through the night sky.

The very brightest star in our sky, Sirius (/sir*ē*əs/), is in the constellation Canis Major and is often called the Dog Star. Sirius is a very large star compared to our sun and one of the closest stars to our solar system—only a little over eight and a half light-years away!

Show Image Card C.U7.L8.1 (Orion and His Hunting Dogs). Point to the stars as you say, "Here is Betelgeuse, which forms Orion's right shoulder, and bluish-white Rigel, which forms Orion's left foot. This bluish star in Orion's left shoulder is Bellatrix (/bəl*ā*trix/), a very hot young star.

People who live in Earth's Northern Hemisphere see a different set of constellations than people in Earth's Southern Hemisphere do. Only people in the Northern Hemisphere can see those constellations above Earth's North Pole. Only people in the Southern Hemisphere can see those above Earth's South Pole. However, the constellations above Earth's equator can be seen from both hemispheres. Maybe someday you'll cross the equator, travel to another part of the world, and experience the constellations of the night sky from another point of view!



Show Image U7.L8.5
Polaris and the Big and Little Dippers

Since ancient times, people have noticed that the stars in the sky and the familiar constellations move in a predictable and interesting way. All of the stars in the sky move in a circular pattern around one point.

Image Card C.U7.L8.2

Stars Circling Polaris

Show Image Card C.U7.L8.2 (Stars Circling Polaris). Say, "This time-lapse photograph was taken over a period of time during a dark night. Can someone point to the part of the sky around which all the other stars circle?

In the Northern Hemisphere, the half of planet Earth north of the equator, there is a star located very near that point in the sky that we call the North Star, or Polaris (/pō*lar*is/). Even though all the rest of the stars in the sky change their positions throughout the night, the North Star is always located almost directly north.

Knowing this has helped sailors and travelers in the Northern Hemisphere for thousands of years to orient themselves.

Long before modern navigational tools like compasses and GPS were invented, sailors relied on the star Polaris. Technology has advanced a great deal since those days, so much so that some people like to participate in a modern sporting competition known as orienteering where they use magnetic compasses and GPS to orient themselves and accomplish a task or goal. You might remember from an earlier

Support

Remind students that *orient* means "to use your knowledge of the stars to determine which directions are north, south, east and west."

Challenge

Ask students how ancient sailors would orient themselves during the day before compasses were invented.

» by noting the position of the sun in the sky lesson that the earth has a North Pole and a South Pole. These poles act like a magnet. A magnetic compass works because of the earth's magnetic field. A GPS is a modern device that uses man-made satellites orbiting the earth to find and tell your position on Earth.

Two patterns of stars you may already be familiar with that are visible in the Northern Hemisphere are the Big Dipper and the Little Dipper. Each one looks like a ladle in the sky. The Big Dipper and the Little Dipper are not the official names of the constellations themselves but are part of two very famous larger constellations. The Big Dipper is a group of stars that is part of the constellation Ursa Major, which means "Greater Bear" in Latin. The Little Dipper is a smaller group of stars that is part of the constellation Ursa Minor.

Ask a volunteer to point to the Big Dipper and the Little Dipper in the image.

Suppose it is a dark, starry night and you are trying to find your way through the countryside. You can look up into the night sky and find the Little Dipper. The last star on its handle is the brightest star in the constellation.

You just heard about this star named Polaris. It is called Polaris because it is almost directly above the earth's North Pole. Once you find Polaris, you can find north simply by facing this star. When you are facing north, your back is to the south. Your right side is to the east, and your left side is to the west. Now all you have to do is decide which direction to go!

Ask students if they know another name for Polaris. (*the North Star*)

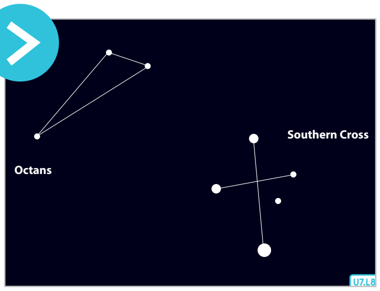
Sometimes the Big Dipper is easier to see than the Little Dipper. You can also use the Big Dipper to find the North Star.

Ask a volunteer to point to the stars in the image as you read the following two sentences.

Just line up the two stars, called the "Pointer Stars," opposite the handle of the Big Dipper's bowl and draw a line through them. The line points up out of the bowl of the Big Dipper right to the North Star on the tip of the Little Dipper's handle!

And if you've got the North Star—Polaris—to point you in the right direction, who needs a GPS? People have been using the stars to navigate, or find their way, for thousands of years. People who live in the Northern Hemisphere today can still see these and other constellations when they look up in the sky at night. The enslaved people who escaped before the time of the U.S. Civil War saw the ladle in the sky and sang a song telling them to "follow the drinking gourd" north to freedom.

Throughout history, people in different cultures have looked up at the Big Dipper and have seen other pictures besides the famous water dipper. In one Greek myth, or story, about Ursa Major, the jealous goddess Hera, wife of Zeus, turns a maiden named Callisto into a bear. Then, to protect Callisto the Bear, Zeus placed her in the sky as a constellation. An Arabian myth describes a coffin that is followed by three mourners. One Native American group saw a bear being followed by three hunters, one of them carrying the pan in which to cook the bear meat. The Norse people of northern Europe saw Odin's wagon.



Show Image U7.L8.6
Constellations of the Southern Hemisphere Skies

But what do you see if you live in the Southern Hemisphere? People who live south of the equator in places like Chile, South Africa, and Australia see a different set of constellations than people in the Northern Hemisphere in places like the United States, Canada, Norway, Turkey, and China. On the other side of the world, as they rotate around the South Pole, people look out into the stars of the Milky Way Galaxy from a different direction than people north of the equator do.

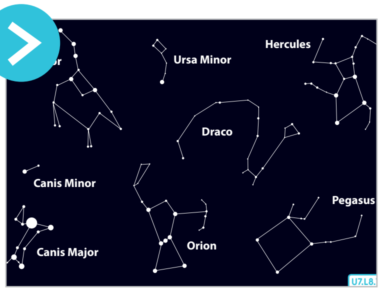
Use a globe and show how people who live in countries south of the equator would look out into a different part of the sky than people in the countries north of the equator.

You might be surprised to learn that there is no star directly over the South Pole! There is no South Star around which the rest of the stars circle. But there is a small constellation—named Octans—very close by that circles around the spot where a South Star would be, if it was there! Octans resembles an octant, an early instrument used for navigation.

Ask students why they think ancient people may have pictured an octant in this part of the sky. (*Both the constellation and the tool were used to help people navigate*.)

Not too far away is another constellation familiar to stargazers in the Southern Hemisphere—the Southern Cross.

Point to these constellations in the image.



Show Image U7.L8.7
Night Sky Showing Constellations

Let's review the constellations that we have been talking about.

Have students repeat the name of the constellation as you point to each one.

The constellations you've heard about today are just a few of the 88 constellations astronomers have identified in Earth's skies. Next time you have a chance to enjoy a dark starlit night, gaze up into the sky and see if you can find some familiar constellations. If not, have some fun and make up some constellations and stories of your own.

Maybe someday you'll cross the equator, travel to another part of the world, and experience the constellations of the night sky from another point of view!

DISCUSSING THE READ-ALOUD (5 MIN.)

1. **Literal.** What is a constellation?
    - » It is a group of stars in the night sky that appears to form a picture of an object, animal, or person. Constellations often have stories that explain how they came to be in the sky.

2. **Literal.** What do we call the star in the Northern Hemisphere that never seems to move?
    - » Polaris, the North Star
3. **Evaluative.** How does your point of view on Earth affect what you see in the sky?
    - » People in different hemispheres or parts of the world look out into space from different angles and see different constellations during the various seasons.
4. **Literal.** What are some characteristics of stars that you heard about in this Read-Aloud?
    - » Stars have different colors depending on how hot they are; stars are at different distances from Earth; some stars appear brighter than others depending on their size and distance from Earth.
5. **Evaluative.** What is the difference described in the Read-Aloud among blue, white, red, and yellow stars?
    - » Blue stars are the hottest, white stars are very hot, yellow stars are medium hot, and red stars are the least hot.

Think-Pair-Share

- I am going to ask you a question. I will give you a minute to think about it, and then I will ask you to turn to your neighbor and discuss the question. I'll call on several of you to share what you discussed with your partner.

6. **Evaluative.** Explorers and travelers have long used the stars to orient themselves, or to find out in which direction they are traveling. For example, people in the Southern Hemisphere use the Southern Cross to help guide them. Explain the sequence of steps people in the Northern Hemisphere use to find north with the help of the stars.
    - » First, find the Big Dipper because it is easy to see. Locate the two stars on the right side of the dipper. These are called the pointer stars; follow them upward until you reach a star. This is the end of the handle of the Little Dipper and it is also the North Star, or Polaris. It is always in the north.

Activity Page 8.2

POEM: "ESCAPE AT BEDTIME" (25 MIN.)

- Have students turn to Activity Page 8.2.
- Tell students that people are often inspired by the stars and constellations of the night sky to write poetry. Tell students they are going to hear a poem titled "Escape at Bedtime," written by Robert Louis Stevenson in the 1800s. Explain that the poem is about a child looking out the window at bedtime and marveling at the stars of the night sky. Tell students to listen for the comparisons the

poet makes about the number of stars in the sky and to listen for the names of celestial bodies and star patterns.

- Read "Escape at Bedtime" aloud while students follow along on Activity Page 8.2.

Escape at Bedtime

By Robert Louis Stevenson

The lights from the parlour and kitchen shone out
Through the blinds and the windows and bars;
And high overhead and all moving about,
There were thousands of millions of stars.
There ne'er were such thousands of leaves on a tree
Nor of people in church or the Park,
As the crowds of stars that looked down on me,
And that glittered and winked in the dark.

The Dog, and the Plough, and the Hunter, and all,
And the star of the sailor, and Mars,
These shone in the sky, and the pail by the wall
Would be half full of water and stars.
They saw me at last, and they chased me with cries,
And soon had me packed into bed;
But the glory kept shining and bright in my eyes,
And stars going round in my head.

- Ask students what the poet compares the number of stars in the night sky to.
  - » leaves on a tree, people in church or the park
- Ask students to describe these images. Are they crowded or empty? Are they moving or still? Are they friendly, unfriendly, or something else? Explain that **imagery** is a picture or impression a writer creates to help the reader understand an idea or a description. **TEKS 3.10.D**
- Ask students if they think these images are good comparisons.
- Ask students to share other ideas about comparisons.
- Ask students what sounds they notice in the poem. Does it rhyme? (yes) What is the rhyme scheme? (ABABCDCD) Which words make sounds that create the feeling of stars? (Answers may include *glittered, winked, shone, shining,*

TEKS 3.10.D Describe how the author's use of imagery, literal and figurative language such as simile, and sound devices such as onomatopoeia achieves specific purposes.

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Exchanging Information and Ideas

Beginning
Encourage students to provide single descriptive words or comparisons, e.g., "sand" (like many grains of sand) or "sparkling."

Intermediate
Encourage students to contribute descriptive words and phrases in the group; e.g., "sparkling dots of light."

Advanced/Advanced High
Encourage students to ask questions and add information to others' ideas, as well as contribute their own.

ELPS 3.B

Support

Provide 1:1 support or prompting as students work with their small groups.

bright, glory.) Why do these words sound like stars to you? (Sample answer: Words with long vowels such as *shone* suggest a steady, calm light. Words with shorter vowels, such as *glittered*, suggest the ways starlight can change.)

- Explain to students that some poems use hyperbole. Explain to students that a hyperbole is an exaggerated statement that is not meant to be taken literally.
- Read the sentence, "The man is as tall as a house" aloud to students.
- Tell students that the man is not actually tall as a house. The person speaking is exaggerating how tall the man is to show that he is really tall.
- Ask students to listen for the author's use of hyperbole as you reread the poem aloud.
- Ask students which line in the poem uses hyperbole. (There were thousands of millions of stars.) Why might the poet use this hyperbole in the poem? (The hyperbole helps to emphasize that the night sky is full of stars.)
- Divide the class into small groups of three to four students each. TEKS 3.9.B
- Distribute chart paper (or large blank paper) and markers to each group.
- Tell students that they will be doing a shared writing activity, and they will compose their own poem comparing stars in the sky to something on Earth.
- Remind students to follow the rules of group work and to make sure that all members' ideas are listened to and discussed.
- Point out that Stevenson's poem has two stanzas, or groups of lines, separated by a break. Many poets use stanza breaks to signal shifts in meaning, sound, or imagery, much as a new paragraph signals a shift in prose. Stevenson begins a new stanza and a new group of rhymes when he introduces each constellation. Not every poem has (or needs) a stanza break, but it can be a helpful way for poets to organize thoughts. TEKS 3.9.B; TEKS 3.10.D
- Explain to students that their poems can be any form they choose: rhyming, free verse, haiku, etc. Some of these forms use stanzas and rhymes, and some do not. Remind students to use vivid and descriptive words and images that will help paint the picture for the reader.
- Tell students to draft their poem on blank or scrap paper first, before making a final copy on the chart paper.
- Circulate as groups work, making sure that all members are contributing.
- When the students are finished, hang the poems around the room. If time permits, have each group share their poem with the class.

TEKS 3.9.B Explain rhyme scheme, sound devices, and structural elements such as stanzas in a variety of poems; **TEKS 3.10.D** Describe how the author's use of imagery, literal and figurative language such as simile, and sound devices such as onomatopoeia achieves specific purposes.

Lesson 8: Constellations and Stars

Language

20M

Primary Focus: Students will show cause and effect by writing sentences using the conjunction *so*. TEKS 3.11.D.viii

GRAMMAR: CONJUNCTION SO (20 MIN.)

TEKS 3.11.D.viii

Review Conjunction *So*

- Draw students' attention to the conjunctions chart you previously prepared and reread it with them.

  Conjunctions

  Conjunctions are words that connect other words or groups of words.

  The **conjunction *and*** connects words or groups of words. It means "plus, along with," or "also."

  - The **conjunction *but*** is used to connect groups of words. It signals that "something different," such as a different idea, will come after *but*.
  - The **conjunction *because*** is used to mean "for this reason" and signals the answer to a "why" question. It signals the <u>cause</u> of something.
  - The **conjunction *so*** means "then this happened" and signals the <u>effect</u> in a cause and effect sentence.
  - The **conjunction *or*** signals a choice, possibility, or alternative.

- Remind students of the difference between the conjunction *because* and the conjunction *so*.

  » *Because* signals the cause, while so signals the effect.

- Divide the class into six teams and give each team one of the sentence strips you prepared in advance. Do not pass out the strips with *Because* and *so* written on them.
- Have teams stand around the classroom, all facing toward the center.
- Have the six teams display their sentence strips so all can see them.
- Have students determine how the six teams could be joined to become three teams, by matching the sentence strips that go together.
- Have the six teams move around the room to become three teams.

TEKS 3.11.D.viii Edit drafts using standard English conventions, including: coordinating conjunctions to form compound subjects, predicates, and sentences.

Activity Page 8.3

ENGLISH LANGUAGE LEARNERS

Language
Connecting Ideas

Beginning
Provide 1:1 support for students to complete Activity Page 8.3.

Intermediate
Allow students to work with a partner to complete Activity Page 8.3.

Advanced/Advanced High
Remind students to write in complete sentences with correct capitalization and punctuation.

ELPS 2.C

Support

Create additional cause and effect sentences on sentence strips. Practice identifying the cause and the effect and then combining the sentences with the conjunction *so*.

Challenge

Have students create their own cause and effect sentences.

- Call up one team at a time and have them display their two sentences with the cause first and the effect second.
- Now, take the sentence strip you prepared that says *Because* and hold it in front of the first sentence. Have the class choral read the new sentence.

Note to Teacher: Sentences with the conjunction *because* are complex sentences. Sentences with the conjunction *so* are compound sentences. Students do not need to recognize complex sentences at this time. However, students should be familiar with compound sentences.

- Ask, "Why did I place the conjunction *Because* at the beginning of the sentence?"
    - » The conjunction *because* signals the cause.
    - ◦ Because the forecast said rain today, Joseph took his umbrella with him.
- Next, remove the sentence strip that says *Because* and insert the sentence strip that says *so* in between the two simple sentences. Have the class choral read the new compound sentence.
    - ◦ The forecast said rain today, so Joseph took his umbrella with him.
- Ask, "Why did I place the conjunction *so* between the two sentences and before the second sentence?"
    - » The conjunction *so* signals the effect.
- Repeat the process with the other two teams.
- Remind students that the conjunction *and* connects words or groups of words. It means "plus," "along with," or "also."
- Remind students that the conjunction *or* signals a choice, possibility, or alternative.

Check for Understanding

- Tell students you will read some sentences, leaving out the conjunction but humming in the place where it should go.
- Have students give a thumbs up if they would personally choose the conjunction *and* to be placed in the space and a thumbs down if they would personally choose the conjunction *or*.
- Give an example first: "I want cookies (HUM) chocolate ice cream." Students may choose either *and* (a thumbs up) or *or* (a thumbs down), depending on their preference. As both choices are correct, you may wish to hear why students chose one conjunction over the other.
- Examples for sentences to read could be:
    - » I like going to the movies (HUM) reading books.

» I am hungry for a plate of pancakes (HUM) a plate of scrambled eggs.

» My brother plays board games (HUM) watches TV on weekends.

» Do you want a new bicycle (HUM) a new wagon?

- If time permits, have students make up their own sentences to share with the class, using the format above.
- Have students turn to Activity Page 8.3 and complete it independently.

WRAP-UP

- If time permits, have students share some of their cause and effect sentences.
- Collect Activity Page 8.3.

End Lesson

Lesson 8: Constellations and Stars

Take-Home Material

- Have students take home Activity Page 8.4 Take-Home Letter to share with a family member.

Activity Page 8.4

LESSON

9

Space Exploration

PRIMARY FOCUS OF LESSON

Speaking and Listening

Students will make before and after responses to text read aloud about space exploration. **TEKS 3.1.A; TEKS 3.6.G**

Writing

Students will write an opinion about the future of space exploration.

TEKS 3.11.A; TEKS 3.12.C

Language

Students will write words with spelling /n/ and add the appropriate suffixes to make sense in sentences. **TEKS 3.2.B.iv; TEKS 3.2.B.vii**

FORMATIVE ASSESSMENT

Activity Page 9.1	**Anticipatory Guide** Students will make before and after responses to text read aloud about space exploration. **TEKS 3.6.G**
Activity Page 9.2	**Future of Space Travel: Opinion** Students will write an opinion about the future of space travel. **TEKS 3.12.C**

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.11.A** Plan a first draft by selecting a genre for a particular topic, purpose, and audience using a range of strategies such as brainstorming, freewriting, and mapping; **TEKS 3.12.C** Compose argumentative texts, including opinion essays, using genre characteristics and craft; **TEKS 3.2.B.iv** Demonstrate and apply spelling knowledge by spelling multisyllabic words with multiple sound-spelling patterns, (vii) spelling words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants.

LESSON AT A GLANCE

	Grouping	Time	Materials
Speaking and Listening (60 min.)			
Introducing the Read-Aloud	Whole Group	10 min.	❏ Digital Flip Book: U7.L9.1–U7.L9.8 ❏ Activity Page 9.1 ❏ Image Cards C.U7.L9.1–C.U7.L.9.5
Read-Aloud: "Space Exploration"	Whole Group	35 min.	
Discussing the Read-Aloud	Whole Group	5 min.	
Anticipatory Guide Summary	Independent	5 min.	
Word Work: *Triumph*	Whole Group	5 min.	
Writing (45 min.)			
Planning	Independent	10 min.	❏ Activity Page 9.2
Writing an Opinion	Independent	25 min.	
Sharing	Small Group	10 min.	
Language (15 min.)			
Spelling	Independent	15 min.	❏ Activity Page 9.3

ADVANCE PREPARATION

Speaking and Listening

- Prepare to project the following digital images on the program's digital components site during the Read-Aloud: U7.L9.1–U7.L9.8.

Universal Access

- Provide additional books, articles, and images of telescopes, spacecraft, astronauts, photos of historic space missions, etc.
- Provide 1:1 or small group support.
- Create small groups strategically.

Start Lesson

Lesson 9: Space Exploration

Speaking and Listening

60M

Primary Focus: Students will make before and after responses to text read aloud about space exploration. **TEKS 3.1.A; TEKS 3.6.G**

VOCABULARY: "SPACE EXPLORATION"

- The following are core vocabulary words used in this lesson. Preview the words with the students before the lesson. Students are not expected to be able to use these words immediately, but with repeated exposure throughout the lessons they will acquire a good understanding of most of the words. Students may also keep a "unit dictionary" notebook along with definitions, sentences, and/or other writing exercises using these vocabulary words.

module, a segment or section of a spacecraft designed to do a specific job

probes, unmanned spacecraft sent to explore space and gather information

reusable, able to be used again

spacecraft, a manned or unmanned vehicle designed to travel into space for research and exploration

triumph, a special achievement, success, accomplishment, or victory

Vocabulary Chart for "Space Exploration"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	module probes spacecraft	reusable triumph
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE READ-ALOUD (10 MIN.)

- Prepare to project the following digital images on the program's digital components site during the Read-Aloud: U7.L9.1–U7.L9.8.

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas.

Activity Page 9.1

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Listening Actively

Beginning
This activity allows for one-word answers, either true or false. Read statements aloud if necessary.

Intermediate
Allow students to work with a partner.

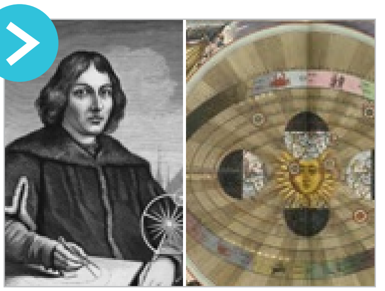
Advanced/Advanced High
Encourage students to work independently.

ELPS 4.D

- Tell students that using telescopes and other instruments are one way of learning about the universe. Another way is by space exploration.
- Tell students that space exploration depends on astronauts and various kinds of spacecraft to explore space in different ways.
- Ask students what type of spacecraft they already know about. (Answers will vary)
- Explain that the word *spacecraft* is both a singular and plural noun used to describe vessels that are sent into space; there can be one spacecraft or many spacecraft.

READ-ALOUD: "SPACE EXPLORATION" (35 MIN.)

- Have students turn to Activity Page 9.1.
- Explain that they'll be using this Anticipatory Guide before, during, and after the Read-Aloud.
- Explain to the students that the middle column contains statements about the reading that may be true or false.
- Model for students how to complete the first statement. Read the first statement aloud and then say, "Now I need to think about what I know already and decide whether I think the statement is true or false. I think this statement is true so I'm going to circle the 'T' next to the statement in the far left column."
- Tell students that they will go through the rest of the statements on their own and record either "T" or "F" in the far left column.
- When they have completed the task, tell students that they will be listening carefully to the Read-Aloud to learn more.



Show Image U7.L9.1
Nicolaus Copernicus and the Heliocentric View

Nicolaus Copernicus was a Polish astronomer, mathematician, and clergyman who was studying the night sky around the same time that Columbus arrived in America. Copernicus, with the help of other scientists before and after him, changed our understandings of astronomy when he discovered that the universe was not geocentric.

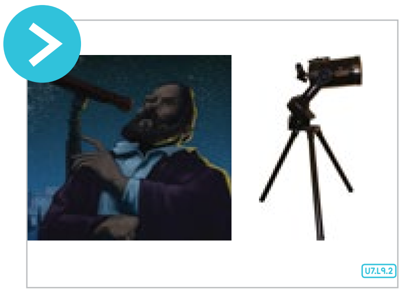
Ask students if they can use the parts of the word *geocentric* to figure out what it means. (Geo– *comes from the Greek word meaning* "*earth*"; –centric *means* "*central*" *or* "*centered*," *so* geocentric *means* "*earth-centered*.")

How were just a handful of people able to come up with an idea that changed the whole world? It's quite simple, really. Copernicus began by studying something he was really interested in: the night sky. His interest led him to make careful observations, to ask questions, to work hard, to study, to think logically to come up with new answers, and to build upon the work of other scientists before him. His willingness to ask questions—even when he had to stand alone with his ideas—led Copernicus to make an important scientific discovery—that our solar system is heliocentric, or sun-centered.

Ask students what context clues help us to understand the word part *helio–*. (*sun-centered*) Tell students that they will be learning more about Copernicus in an upcoming lesson.

All of science is based upon careful observations of the world, and a willingness to ask questions about it. Asking questions allows us to come up with new ideas. And new ideas lead to a better understanding about how the world works. That's what the process of science is all about. So, whenever you observe the world around you and ask questions about what you see, you should be proud of yourself because you are thinking like a scientist.

- Have students look back at Activity Page 9.1 and the first statement. Have a volunteer read the statement, "Our solar system is geocentric" aloud.
- Tell students to think about what they have just heard. Tell students to look at the column to the far right. Ask, "After hearing about Copernicus, do you think the statement is true or false?"
  - » false
- Tell students to circle their choice.



Show Image U7.L9.2
Galileo Looking through his Telescope; Modern Telescope

Not too many years after Copernicus died, the telescope was invented. Galileo was one of the

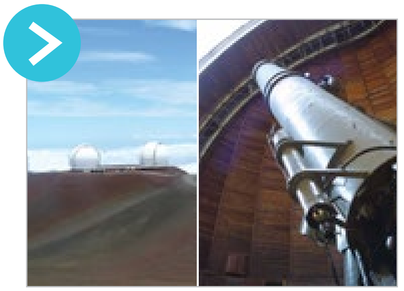
Support

Have students who need extra support work with a partner.

first astronomers to build and use a telescope. Very soon, many astronomers began using telescopes to take a closer look at the stars. This gave them new information, and so astronomers were able to learn even more about the universe and gather more evidence that supported Copernicus's heliocentric theory. As you heard earlier, astronomers discovered the planet Neptune fewer than 200 years ago, in 1846, when they were finally able to see it with a more powerful telescope. Astronomers continued building different types of and more powerful telescopes, which led to an even better understanding of space—and more questions about it, too! Discovering more objects similar in size to Pluto led scientists to ask again, "How should Pluto be classified?" With more information available, astronomers came up with a brand-new answer to that question.

Ask students to recall what they remember about Pluto and its new classification. (*It is now called a dwarf planet because it has not cleared the debris in its orbit*.)

- Tell students to go back to Activity Page 9.1 to read the next statement and mark it as true or false: "Neptune wasn't discovered until more powerful telescopes were invented."



Show Image U7.L9.3
Observatory; Large Telescope

Today, telescopes that astronomers use are usually located in areas far away from cities.

Ask students why they think telescopes are usually far away from cities. (*Cities have too many lights that interfere with viewing*.)

Ask students to recall what they remember about telescopes from the Light and Sound unit. (*Telescopes have lenses; the lenses are convex to make images larger*.)

Where there are cities, there is also a lot of light. And where there is a lot of light on Earth, it is harder to see the light of the stars. Light made by humans that hinders or blocks our view of the stars is called light pollution. Besides building telescopes far away from light pollution, astronomers also like to build telescopes on high mountains. You might think it's so the astronomers can get closer to the stars, but it's not really that much closer.

An observatory is a building designed especially for observing the stars, planets, and other space objects. Placing an observatory high on a mountain allows astronomers to get above as much of Earth's atmosphere as possible. And as the Earth's atmosphere thins out in higher places, astronomers can more clearly look at the light of the stars. A more powerful telescope was built for the Lowell Observatory in Arizona for the purpose of finding Pluto. Astronomers thought that Pluto existed before they ever saw it! There appeared to be something in space beyond Uranus and Neptune that was exerting a strong gravitational pull on these planets. Astronomers searched for 25 years before they finally discovered Pluto!

But there's another way that scientists are now able to place telescopes even higher than the highest mountain. Telescopes are launched into space. That's right! Scientists now use rockets to escape Earth's surface gravity. The power of rockets enables spacecraft to launch telescopes into space. Once beyond Earth's atmosphere, the telescopes can study the universe more closely and clearly than ever before. Some spacecraft are held in orbit around Earth by its gravity.

Other spacecraft have ventured beyond the reach of Earth's gravity to explore other parts of the solar system. Telescopes and cameras aboard the space probes Voyager 1 and Voyager 2 have spent the last 35 years gathering information about Jupiter, Saturn, Uranus, Neptune, and the outermost reaches of our solar system.

Tell students that there are many space probes, or unmanned spacecraft, exploring space and constantly taking pictures and making new discoveries.

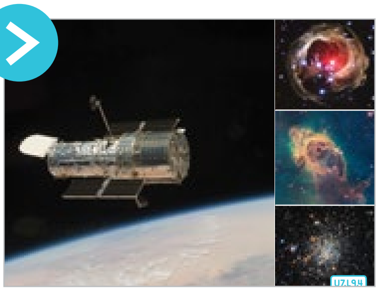
Support

Explain that gravity is the force of attraction between objects that have mass. Gravitational pull describes the attraction that objects of mass put on each other. Tell students that they'll be learning much more about gravity in another lesson.

Challenge

Have students research to find out if there are observatories close to where they live. In addition, some observatories provide live streams and recorded video on the Internet.

- Tell students to look at the next statement, "Observatories are built on mountains so they are closer to the stars." Tell them to circle true or false, based on what they learned.



Show Image U7.L9.4
Hubble Space Telescope; Images Taken from the Hubble

Telescopes that are launched into space are literally "out of this world"—and they are able to take pictures of the universe that are also "out of this world." The Hubble Space Telescope is the most famous telescope ever to be launched into space. It was carried into orbit by a space shuttle in 1990, and it now orbits about 350 miles above the surface of Earth.

Image Card C.U7.L9.1

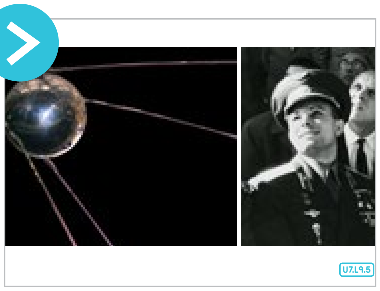
Space Shuttle

Show Image Card C.U7.L9.1 (Space Shuttle). Tell students that space shuttles are manned, winged spacecraft that carry supplies, astronauts, and equipment into space and then return to Earth to be used again. The last NASA space shuttle to fly was retired in 2011.

Because there is very little light pollution in orbit, and because Earth's atmosphere does not get in the way and cause distortion, this powerful telescope helps scientists see deeper into the universe than ever before. The Hubble Space Telescope has provided scientists with new information—and fantastic pictures—about our own solar system, distant stars, far-away galaxies, and other celestial bodies and occurrences.

New discoveries in science, such as the telescope, always lead to new questions. For most of human history, many of the questions and theories people had about space came from simply gazing up at the night sky. People could look up at the moon and the planets and the stars, but these celestial bodies were completely beyond reach. Once humans invented a way to fly in airplanes—which was only a little more than 100 years ago—the question soon became, "Can we fly beyond Earth's atmosphere, all the way into space?"

Tell students to read the next statement and mark true or false for "The Hubble Space Telescope orbits the solar system."



Show Image U7.L9.5
Sputnik 1; Yuri Gagarin

The exciting answer to that question was a loud—yes! In 1957, a group of countries, then called the Soviet Union, which included Russia, sent the first satellite made by humans into space. The satellite was called Sputnik 1, and it was an aluminum sphere that was only about the size of a beach ball. This small artificial satellite began a whole new revolution in space exploration.

Can you guess what scientists' next question was? It was this: "If we can send a satellite into space, can we also send a living being into space?" A month later, Russia sent a dog named Laika (/lī*kə/) into space. Laika was the first living being to ever go to space.

Show Image Card C.U7.L9.2 (Stamps Honoring Space Dog Laika). Note: Laika did not survive this mission; you may or may not wish to share this with students.

Image Card C.U7.L9.2

Stamps

After Laika's mission, several more dogs were successfully sent into space. Can you guess what the next question was? Right! "If we can send a dog into space, can we send a human into space?" In 1961, the Soviets again answered this question with a resounding, enthusiastic—yes!

The first human being to go into space was Soviet cosmonaut Yuri Gagarin aboard the spacecraft Vostok 1.

Tell students that *cosmonaut* is the Russian word for "astronaut."

Cosmonaut Yuri Gagarin orbited the globe in Vostok 1 for 108 minutes before returning to Earth.

- Tell students to read the next statement on Activity Page 9.1, "The first human being to go into space was Soviet cosmonaut Yuri Gagarin," and mark it as true or false.

Show Image U7.L9.6
Aldrin on the Moon; the Eagle Lunar Module

With this new triumph, or accomplishment, scientists asked a new question: "If we can send a human being into space, can we also send one to land on the moon?" What do you think the answer was?

A triumphant—yes! In 1969, the United States sent three astronauts into space—Neil Armstrong, Michael Collins, and Buzz Aldrin.

Image Card
C.U7.L9.3

Armstrong, Collins, and Aldrin

Show Image Card C.U7.L9.3 (Armstrong, Collins, and Aldrin)

These astronauts traveled to the moon in a spacecraft called Apollo 11, which had three sections. The lunar module, or section, of the Apollo 11 was named the Eagle, and it landed on the moon with Neil Armstrong and Buzz Aldrin aboard. Meanwhile, astronaut Michael Collins orbited the moon in the Apollo 11 command module, which was called the *Columbia*. A third service module provided power, oxygen, and water.

Image Card
C.U7.L9.4

Apollo 11

Show Image Card C.U7.L9.4 (Apollo 11) and point to each of the modules: service, command, and lunar. Ask, "Which of the modules do you think was the main one?" (*command module*)

On July 20, 1969, Neil Armstrong became the first human being ever to walk on the moon. Soon after his feet (which were inside his spacesuit) touched the surface, Neil Armstrong spoke these famous words:

"That's one small step for [a] man, one giant leap for mankind!"

There is some debate as to the actual words of this history-making quote. Armstrong says that he did say the *a* before the word *man*, but since the transmission was not completely clear, it was perceived and believed by most that he did not say the *a*, but instead said, “That’s one small step for man....” Recently, some experts who analyzed the recording of his famous quote and his speech patterns found evidence to support that he did say the *a* before *man*. In a biography written about Armstrong, he is quoted as saying, “I think that reasonable people will realize that I didn’t intentionally make an inane statement and that certainly the *a* was intended, because that’s the only way the statement makes any sense.”

Image Card
C.U7.L9.5

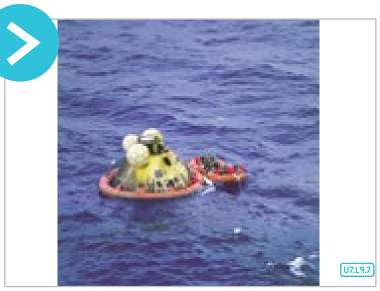
Aldrin on the Moon, Armstrong in the Reflection

Soon after Armstrong said these famous words, Buzz Aldrin joined him to walk on the surface, where they bounced and hopped to get around because of the moon’s low gravity. The astronauts had to plan their movements six or seven steps ahead because movement on the moon is different from movement on Earth. They also discovered that the fine moon soil was quite slippery.

Together, Armstrong and Aldrin collected about 48 pounds of moon rocks and brought them back to Earth to be studied. They took many photographs and performed experiments to learn about the moon.

Show Image Card C.U7.L9.5 (Aldrin on the Moon, Armstrong in the Reflection). Say, “This is Aldrin with Armstrong’s reflection in his helmet.”

- Tell students to read the next statement, “Astronaut Buzz Aldrin was the first man to walk on the moon,” and mark it true or false.



Show Image U7.L9.7
***Columbia* Touching Down in the Ocean**

Neil Armstrong and Buzz Aldrin rejoined pilot Michael Collins aboard Apollo 11’s *Columbia* where they lived while in space, and they all returned safely to Earth. Thanks to Earth’s gravity, the *Columbia* came back through Earth’s atmosphere and splashed down in the Pacific Ocean. There are lots of pictures of the

Columbia in magazines and on the Internet, and someday if you ever visit Washington, D.C., you can see the *Columbia* at the Smithsonian Air and Space Museum.

In the past, spacecraft like the Apollo 11 were only able to fly into space and back one time. They were not reusable. But with advances in technology, reusable spacecraft have been developed. Reusing the space shuttles has saved time, money, and valuable resources.

- Tell students to read the last statement on Activity Page 9.1, "The Apollo 11 space capsule was not a reusable spacecraft," and mark true or false.

Show Image U7.L9.8
Spacecraft

As scientists continue to explore space in the future, we will continue to better understand both space and the universe. And as we continue to learn more, you can be sure that there will be many new questions that will be asked. Maybe you'll be asking—and even answering—some of them!

DISCUSSING THE READ-ALOUD (5 MIN.)

1. **Evaluative.** Why are the Sputnik 1 and the Apollo 11 trips into space considered triumphs?
   » Sputnik 1 was the first satellite to be sent into space; Apollo 11 was the first spacecraft to successfully take astronauts to the moon.
2. **Literal.** What were some of the things that Aldrin and Armstrong did during their time on the moon?
   » They practiced walking, collected rock samples, took pictures, and performed experiments.

3. **Literal.** What were some of the things they learned while they were there?
   » They learned that the soil on the moon was fine and slippery, they brought back rocks that could be studied, and they learned about the effects of the gravity on the moon.

4. **Evaluative.** Identify and describe some of the different kinds of spacecraft and tools that scientists use to explore and study space.
   » A probe is an unmanned spacecraft that takes pictures and gathers information and can travel far out into the solar system; a space shuttle is a winged, manned, reusable spacecraft that carries astronauts and equipment; the Hubble Telescope orbits Earth and can gather information and images from far out in space; observatories are located in dark, high places on Earth and use telescopes to study space.

ANTICIPATORY GUIDE SUMMARY (5 MIN.)

- Direct students to look at the bottom of Activity Page 9.1. Tell students to think of a new title for the Read-Aloud "Space Exploration." Tell them to write why they would give it the new title.
- Collect Activity Page 9.1.

WORD WORK: TRIUMPH (5 MIN.)

1. In the Read-Aloud you heard, "With this new triumph, or accomplishment, scientists asked a new question."
2. Say the word *triumph* with me.
3. A triumph is a special achievement, success, accomplishment, or victory.
4. Writing his first chapter book was a triumph for Julian!
5. Have you ever experienced a triumph? Where were you? Be sure to use the word *triumph* when you tell about it. Ask two or three students. If necessary, guide and/or rephrase the students' responses to make complete sentences: "I experienced a triumph once when . . . "
6. What's the word we've been talking about? What part of speech is the word *triumph*?

- Use a Synonyms and Antonyms activity for follow-up. Ask students, "What does *triumph* mean? What are some words or phrases that are synonyms, or words that have a similar meaning?" Prompt students to provide words or phrases like *victory, first place, accomplishment, success, a win*, etc. Then ask, "What are some words or phrases you know that are antonyms, or opposites, of *triumph*?" Prompt students to provide words and phrases like *defeat, failure, disappointment, loss*, etc.

Lesson 9: Space Exploration

Writing

45M

Primary Focus: Students will write an opinion about the future of space exploration.

TEKS 3.11.A; TEKS 3.12.C

PLANNING (10 MIN.)

TEKS 3.11.A

- Have students turn to Activity Page 9.2.
- Explain to students that they will be writing an opinion piece about what they think the future of space travel will be.
- Have students look at the graphic organizer on Activity Page 9.2. Tell students that the organizer is there to help them plan for their writing. The topic is already provided in the middle. Students will come up with a minimum of three ideas about what they think space travel will be like. They can also add additional parts to the web to list the details to what they want to add.

WRITING AN OPINION (25 MIN.)

TEKS 3.12.C

- Tell students that they will now write their opinions about the future of space travel.
- Tell students that their writing must be at least one paragraph long, with several sentences explaining their key ideas and details. Encourage students to use specific and descriptive language.
- Remind students to write in complete sentences using correct capitalization, punctuation, spelling, and grammar.

SHARING (10 MIN.)

- Divide students into small groups of three to four students.
- Tell students that they will share their writing with their group.
- Remind students to take turns and be respectful while listening.

TEKS 3.11.A Plan a first draft by selecting a genre for a particular topic, purpose, and audience using a range of strategies such as brainstorming, freewriting, and mapping; **TEKS 3.12.C** Compose argumentative texts, including opinion essays, using genre characteristics and craft.

Activity Page 9.2

ENGLISH LANGUAGE LEARNERS

Writing

Writing

Beginning

Ask students to orally explain their ideas or write lists of their ideas.

Intermediate

Provide 1:1 support and prompting.

Advanced/Advanced High

Encourage students to write in complete sentences with correct capitalization, punctuation, spelling, and grammar.

ELPS 5.G

Support

Provide prompting and support when needed. If needed, pull a small group together to help with planning the writing.

- After students have finished sharing, collect Activity Page 9.2.

Lesson 9: Space Exploration

Language

15M

Primary Focus: Students will write words with spelling /n/ and add the appropriate suffixes to make sense in sentences. **TEKS 3.2.B.iv; TEKS 3.2.B.vii**

SPELLING (15 MIN.)

Blank Busters

- Tell students that they will practice writing their spelling words for the week.
- Tell students to turn to Activity Page 9.3. Note for students that some sentences have two blanks.
- Point out to students that the spelling words are listed in the box on the worksheet and on the board. Students may also have to add an appropriate suffix to have the sentence make sense:
    - –*s*, –*ed*, –*ly*, or –*ing*
- Ask students to read the statement in number 1 silently and fill in the blanks. When students have completed number 1, call on one student to read number 1 aloud with the spelling word in the blanks.
- Ask students if anyone had a different answer. Discuss the correct answer to be sure students understand why it is correct.
- Discuss the proper spelling of the word in the blank, referencing the table of this week's spelling words. Have students compare their spelling with the table.
- Have students complete the rest of the activity independently.

WRAP-UP

- If time permits, have students compare their answers.

End Lesson

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by spelling multisyllabic words with multiple sound-spelling patterns, (vii) spelling words using knowledge of suffixes, including how they can change base words such as dropping *e*, changing *y* to *i*, and doubling final consonants.

ENGLISH LANGUAGE LEARNERS

Language
Foundational Skills

Beginning
Read the sentence and provide a choice of two words to fill in the blank; e.g., "The bothersome TV show was so ____. Is it *annoyed* or *annoying*?"

Intermediate
Have students work with a partner to say the words with the different suffixes –*s*, –*ed*, –*ing*, –*er*, or –*ly* before completing the sentences.

Advanced/Advanced High
Encourage students to complete the activity independently.

ELPS 2.C

Activity Page 9.3

Support

Go through the list of words and practice adding suffixes –*s*, –*ed*, –*ing*, –*er*, or –*ly* to each of the words. Have students write down the newly formed words and then use them as a word bank to complete Activity Page 9.3.

Challenge

Have students create their own sentences using the spelling words with appropriate suffixes –*s*, –*ed*, –*ing*, –*er*, or –*ly*.

LESSON

10

Exploring Space

PRIMARY FOCUS OF LESSON

Language

Students will write words using spelling patterns and rules for the sound /n/. **TEKS 3.2.B.iv**

Reading

Students will read informational text about space exploration and answer comprehension questions by finding evidence in the text. **TEKS 3.7.C**

Students will find the relationship between content vocabulary words about astronomy using information gathered from reading and from the glossary. **TEKS 3.7.F**

Writing

Students will respond to text about space exploration in a variety of ways and for different purposes. **TEKS 3.6.B; TEKS 3.6.G; TEKS 3.6.H; TEKS 3.7.B; TEKS 3.7.C; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A**

FORMATIVE ASSESSMENT

Activity Page 10.1	**Spelling Assessment** Students will correctly spell words with the sound /n/. **TEKS 3.2.B.iv**
Activity Page 10.2	**Comprehension Questions** Students will answer questions after reading a text about exploring space. **TEKS 3.7.C**
Activity Page 10.3	**Triangle Connections** Students will find connections between vocabulary words. **TEKS 3.7.F**
Activity Page 10.4	**Reading/Writing Choice Board** Students will respond to text through writing activities. **TEKS 3.6.B; TEKS 3.6.G; TEKS 3.6.H; TEKS 3.7.B; TEKS 3.7.C; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A**

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; **TEKS 3.6.B** Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding; (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.10.A** Explain the author's purpose and message within a text.

LESSON AT A GLANCE

	Grouping	Time	Materials
Language (15 min.)			
Spelling Assessment	Independent	15 min.	❏ Activity Page 10.1
Reading (75 min.)			
Introducing the Chapter	Whole Group	10 min.	❏ *What's in Our Universe?* ❏ Activity Pages 10.2, 10.3
Partner Reading: "Exploring Space"	Partner	25 min.	
Comprehension Questions	Independent	15 min.	
Triangle Connections	Independent	25 min.	
Writing (30 min.)			
Reading/Writing Choice Board	Independent	30 min.	❏ *What's in Our Universe?* ❏ Activity Page 10.4 ❏ writing paper
Take-Home Material			
Reading: "Exploring Space"			❏ Activity Page 10.5

ADVANCE PREPARATION

Universal Access

- Provide additional differentiated activities to the Reading/Writing Choice Board to meet the individual needs of students.
- Assign partners strategically.

Start Lesson

Lesson 10: Exploring Space

Language

15M

Primary Focus: Students will write words using spelling patterns and rules for the sound /n/. **TEKS 3.2.B.iv**

SPELLING ASSESSMENT (15 MIN.)

Activity Page 10.1

- Have students turn to Activity Page 10.1 for the spelling assessment.
- Tell students that for this assessment, they will write their words under the header to which they belong. For example, if you call out the word *net*, they would write that word under the header for 'n' > /n/.
- Tell students that should a spelling word fit under more than one header, they should only write the word under one.
- Tell students that they may not have to use all the lines under each header.
- Using the chart below, call out the words using the following format: Say the word, use it in a sentence, and say the word once more.
- After you have called out all of the words, including the Challenge Words and the Content Word, go back through the list slowly, reading each word just once more.

1. nearby	12. manned
2. gnat	13. flannel
3. recently	14. campaign
4. knotted	15. channel
5. knowledge	16. annoy
6. knighted	17. knuckle
7. understand	**Challenge Word:** *very*
8. design	**Challenge Word:** *vary*
9. knobby	**Challenge Word:** *enough*
10. gnarly	**Content Word:** *astronomer*
11. skinny	

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by spelling multisyllabic words with multiple sound-spelling patterns.

- Ask students to write the following sentences as you dictate them:
  1. Nate needed knowledge about designing, so he went to the library.
  2. Do you understand what "enough is enough" means?
- You may find it helpful to use the Spelling Analysis Chart found at the end of this lesson to analyze students' mistakes. This will help you understand any patterns that are beginning to develop, or that are persistent among individual students.

Lesson 10: Exploring Space

Reading

75M

Primary Focus: Students will read informational text about space exploration and answer comprehension questions by finding evidence in the text. **TEKS 3.7.C**

Students will find the relationship between content vocabulary words about astronomy using information gathered from reading and from the glossary. **TEKS 3.7.F**

VOCABULARY: "EXPLORING SPACE"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.

observatory, a place used to observe the sun, moon, stars, and outer space (observatories)

launch, to send a rocket into outer space (launched)

Hubble Telescope, a large telescope that collects information in space; it was carried into space in 1990 and will be put out of service and pulled back into Earth's atmosphere in the near future

astronaut, a person who travels into outer space

manned, carrying and operated by people

Apollo 11, a rocket ship that took three American astronauts to the moon in 1969

gravity, a force that pulls things toward one another

attraction, when things are drawn to move closer together

Support

Pull a small group together to read the chapter. Provide support and prompting when needed.

TEKS 3.7.C Use text evidence to support an appropriate response; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate.

Vocabulary Chart for "Exploring Space"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	observatory Hubble Telescope astronaut Apollo 11 gravity	launch manned attraction
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE CHAPTER (10 MIN.)

- Ask students to recall what they learned from the Read-Aloud, "Space Exploration."
    » Answers vary, but should include Copernicus's heliocentric view, Galileo and the telescope, manned and unmanned spacecraft, Apollo 11 and men walking on the moon, space shuttles, etc.
- Tell students that today they will be reading aloud with a partner and then completing the comprehension questions on Activity Page 10.2 independently.

PARTNER READING: "EXPLORING SPACE" (25 MIN.)

- Divide students into partners.
- Tell students that they will take turns with their partners reading paragraphs aloud.
- Tell students that when they are finished, they should ask each other recall questions about the reading.

COMPREHENSION QUESTIONS (15 MIN.)

- Have students turn to Activity Page 10.2.
- Students will complete Activity Page 10.2 independently.
- Collect Activity Page 10.2 when complete.

Activity Page 10.2

ENGLISH LANGUAGE LEARNERS

Reading

Reading/Viewing Closely

Beginning
Ask questions that require one-word answers; e.g., "Galileo discovered what with his telescope?"

Intermediate
Allow students to partner read and work together to complete Activity Page 10.2.

Advanced/Advanced High
Encourage students to work independently.

ELPS 1.E; ELPS 4.F; ELPS 4.I

Support

Pull a small group together to complete Activity Page 10.2. Guide students to the details in the text that help answer the questions.

Challenge

Have students look at the Hubble Telescope photograph in the chapter and use clues from the photograph to determine where the Hubble gets its energy to operate.

Activity Page 10.3

ENGLISH LANGUAGE LEARNERS

Reading
Selecting Language Resources

Beginning
Provide a list of glossary words from the unit and review definitions. Provide support as students write sentences using the words.

Intermediate
Provide two content-related words and definitions. Have students say how the words are connected before writing the sentence.

Advanced/Advanced High
Encourage students to write complete sentences.

ELPS 1.E; ELPS 4.D; ELPS 4.J

Support

Have students choose two words instead of three. Have students state verbally how the pair of words is connected before writing the sentence.

Challenge

Have students explain how all three words are connected in the center of the triangle of words, or on a separate piece of paper.

TRIANGLE CONNECTIONS (25 MIN.)

- Have students get out their Student Readers, any notes from the unit so far, and Activity Page 10.3.
- Tell students they will review what they've learned about astronomy so far by making connections between the vocabulary words in the unit.
- Have students turn to the back of their Student Reader and find the glossary.
- Explain that they have not seen all of the words in the glossary yet, but they have seen most of them.
- Ask students to look through the glossary to look for words that they've heard about so far. Ask a few volunteers to share some of the words.
- Next, ask students to look at Activity Page 10.3.
- Explain that they will choose three words out of the glossary.
- Explain that they will write one of the words on each of the blanks.
- Read the directions: "Using your notes and the glossary in your Student Reader, select three words we've studied in the unit so far and arrange them in a triangle shape. Then connect the first word to the second word with a line and write on the line how the two words are connected. Next, draw a line from the second word to the third word and write on the line how those two words are connected. Finally, draw a line from the third word to the first word and write the connection."
- Make sure students understand the directions before letting them work independently on the task. Remind them that they can use any of their notes and the Student Reader to help them make the connections.
- Collect Activity Page 10.3.

Lesson 10: Exploring Space

Writing

30M

Primary Focus: Students will respond to text about space exploration in a variety of ways and for different purposes. **TEKS 3.6.B; TEKS 3.6.G; TEKS 3.6.H; TEKS 3.7.B; TEKS 3.7.C; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A**

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding; (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.10.A** Explain the author's purpose and message within a text.

READING/WRITING CHOICE BOARD (30 MIN.)

- Have students turn to Activity Page 10.4.
- Tell students that they will have a choice of activities in responding to Chapter 8.
- Have students look at the Reading/Writing Choice Board.

Reading/Writing Choice Board

Directions: Select activities in three of the boxes below after you complete your reading. Write your responses on a separate sheet of paper, making sure to include the number of the activities you chose. When completing the activities, write in complete sentences using correct spelling, capitalization, and punctuation.

1. Create a graphic organizer and compare and contrast two ideas in the text. **TEKS 3.6.H**	2. What is the key idea of the text? List three details from the text that support the key idea. **TEKS 3.6.G; TEKS 3.9.D.i**	3. Write a sentence describing the author's purpose. **TEKS 3.10.A**
4. Write three questions you still have after reading the text. **TEKS 3.6.B**	5. Write a list of three new words you learned in the text, their definitions, and use them in a sentence. **TEKS 3.7.F**	6. Describe how one of the images in the chapter helps you to understand the text. **TEKS 3.9.D.ii**
7. Find three sentences that show comparing or contrasting. Write the sentences and underline the comparing and contrasting word or words. **TEKS 3.9.D.iii**	8. Write a list of words the author uses to help the reader visualize the information. **TEKS 3.7.C**	9. Write three new things you learned from the text. **TEKS 3.7.B**

- Read through the directions and through each of the activities to make sure students understand what they'll need to do.
- Tell them that they will need to choose three activities from the board.
- Encourage students to choose different activities from the last time they used the Choice Board.

Activity Page 10.4

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Modify choices to include writing lists, answering simple yes and no questions, or drawing and labeling pictures.

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Encourage students to write their responses in complete sentences, with correct spelling, capitalization, and punctuation.

ELPS 5.F

Challenge

Have students choose two activities from the Choice Board and create their own third activity.

Challenge

Have students research the history of the Hubble Telescope online.

- Remind them that they'll be writing their responses on a separate sheet of paper.
- Students will be using the Reading/Writing Choice Board throughout the rest of the unit.

WRAP-UP

- When they've completed their activities, collect Activity Page 10.4 and their written responses.

End Lesson

Activity Page 10.5

Lesson 10: Exploring Space

Take-Home Material

- Have students take home Activity Page 10.5 to read to a family member.

SPELLING ANALYSIS CHART

Spelling Analysis Chart

																				Name
																				1. nearby
																				2. gnat
																				3. recently
																				4. knotted
																				5. knowledge
																				6. knighted
																				7. understand
																				8. design
																				9. knobby
																				10. gnarly
																				11. skinny
																				12. manned
																				13. flannel
																				14. campaign
																				15. channel
																				16. annoy
																				17. knuckle
																				Challenge Word: very
																				Challenge Word: vary
																				Challenge Word: enough
																				Content Word: astronomer

SPELLING ANALYSIS DIRECTIONS

Unit 7, Lesson 10

- Students are likely to make the following errors:
    - For 'n', students may write 'nn', 'kn', or 'gn'.
    - For 'nn', students may write 'n', 'kn', or 'gn'.
    - For 'kn', students may write 'n', 'nn', or 'gn'.
    - For 'gn', students may write 'n', 'nn', or 'kn'.
- While the above student-error scenarios may occur, you should be aware that misspellings may be due to many other factors. You may find it helpful to record the actual spelling errors that the student makes in the analysis chart. For example:
    - Is the student consistently making errors on specific vowels? Which ones?
    - Is the student consistently making errors at the end of the words?
    - Is the student consistently making errors on particular beginning consonants?
- Did the student write words for each feature correctly?
- Also, examine the dictated sentences for errors in capitalization and punctuation.

LESSON

11

Gravity—Close Reading, Part 1

PRIMARY FOCUS OF LESSON

Reading

Students will read informational text about gravity to find key ideas, details, words, and phrases. **TEKS 3.6.G; TEKS 3.7.E**

Writing

Students will write a summary about their experiences during a gravity experiment. **TEKS 3.6.F; TEKS 3.12.B**

Language

Students will write words using spelling patterns and rules for the sounds /ae/, /k/, /s/, /j/ and /n/. **TEKS 3.2.B.iv**

FORMATIVE ASSESSMENT

Writing	**Gravity Experiment** Students will write a summary about their experiences during a gravity experiment. **TEKS 3.6.F**

TEKS 3.6.G Evaluate details read to determine key ideas; **TEKS 3.7.E** Interact with sources in meaningful ways such as note-taking, annotating, freewriting, or illustrating; **TEKS 3.6.F** Make inferences and use evidence to support understanding; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft; **TEKS 3.2.B.iv** Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (65 min.)			
Introducing the Read-Aloud	Whole Group	10 min.	❏ Activity Page 11.1 ❏ highlighters or pens ❏ half sheets of paper (one per student)
Close Reading: "Gravity"	Whole Group	40 min.	
Sharing: Margin Notes	Partner	5 min.	
Muddiest Point	Independent	10 min.	
Writing (30 min.)			
Gravity Experiment	Small Group	20 min.	❏ Activity Page 11.2 ❏ marbles (one for each small group of 3 to 4 students each) ❏ sheets of paper (one for each small group)
Summary of Gravity Experiment	Independent	10 min.	
Language (25 min.)			
Introduce Spelling Words		25 min.	❏ Individual Code Charts ❏ Spelling Chart (Digital Projections)
Take-Home Material			
Spelling: Take-Home Letter			❏ Activity Page 11.3

ADVANCE PREPARATION

Reading

- You may wish to write on chart paper or on board the following, or use the prepared chart from Lesson 7:

> CIRCLE key ideas, words, and phrases.
>
> UNDERLINE words or phrases you do not understand.
>
> WRITE thoughts, ideas, or questions in the margins.

Language

- On chart paper, create the following chart or project Digital Projection DP.U7.L11.1.

/ae/	/k/	/s/	/j/	/n/

Universal Access

- Ask students to recall anything they know about gravity, what it does, and why it's important.
- Create partners and small groups strategically.
- Display vocabulary words and Image Cards to reinforce instruction and content.

Start Lesson

Lesson 11: Gravity—Close Reading, Part 1

Reading

65M

Primary Focus: Students will read informational text about gravity to find key ideas, details, words, and phrases. **TEKS 3.6.G; TEKS 3.7.E**

VOCABULARY: "GRAVITY"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.
    - Tell students that the vocabulary words are printed at the end of Activity Page 11.1 for their reference.

gravity, the force or pull created by the mass of objects in the universe toward each other

force, a pull or a push on an object or system

matter, the substances all objects on Earth are made of; all substances that take up space

gravitational pull, the force that draws all objects in the universe toward each other

black hole, an object or area in space that has such strong gravity that not even light can escape from it

tides, the periodic or regular rise and fall of the surfaces of large bodies of water on Earth that are caused by the interaction of the moon's gravity with Earth

Vocabulary Chart for "Gravity"		
Type	**Tier 3 Domain-Specific Words**	**Tier 2 General Academic Words**
Vocabulary	gravity force matter gravitational pull black hole	tides
Multiple Meaning		
Sayings and Phrases		

TEKS 3.6.G Evaluate details read to determine key ideas; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating.

Activity Page 11.1

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Listening Actively

Beginning
Allow students to work with partners when annotating text.

Intermediate
Provide 1:1 prompting and support when needed.

Advanced/Advanced High
Encourage students to work independently.

ELPS 2.I

Support

Provide support and prompting when needed.

Challenge

Allow students to read and annotate the text in small groups or independently.

INTRODUCING THE READ-ALOUD (10 MIN.)

- Have students turn to Activity Page 11.1.
- Tell students that today they will be reading the text as a class and annotating as they read.

Does anyone remember what we annotated in the text in the Read-Aloud lesson about galaxies?

» We circled key ideas, words, and phrases, underlined parts we did not understand, and wrote our thoughts and responses to the text in the margins.

- Show students the previously created annotation chart:

CIRCLE key ideas, words, and phrases.
UNDERLINE words or phrases you do not understand.
WRITE important thoughts, ideas, or questions in the margins.

- Tell students that they may wish to write these on the top of Activity Page 11.1 as a reminder of what they're looking for in the text.
- Distribute highlighters or pens.

CLOSE READING: "GRAVITY" (40 MIN.)

- Ensure students have Activity Page 11.1 and a highlighter or pen.

What exactly holds all of this stuff together in this huge universe? Why don't all these stars and planets just go flying off in any direction all over the universe? Why do they stick together in groups and clusters like solar systems and galaxies? These are excellent questions, and the answer is . . . gravity!

Gravity is an invisible **force** of attraction between objects. It's the **force** that holds galaxies and solar systems together. It's the force that keeps us firmly planted on planet Earth instead of flying off into space. It's the **force** that keeps Earth orbiting around the sun and keeps the moon orbiting around Earth. You can't see **gravity** or touch it, but **gravity** is present between everything in the universe that has mass. Because of **gravity**, every single bit of **matter** in the universe pulls on every other piece of **matter** in the universe.

- Pause and allow students to finish annotating the paragraph.

You and I exert a pull on each other, but because we have very little mass in our bodies compared to celestial bodies, our **gravitational pull** on each other is very small—so small we can't feel it at all.

Gravity depends greatly on mass . . . so what exactly is mass? Mass is just the amount of **matter** in an object. You and I are small compared to, say, a planet or a star. We're made of less "stuff," so our mass is much, much smaller. Mass is important when you are trying to understand gravity, because the larger the mass, the larger the **gravitational pull**. So objects with really large masses, like stars and planets, have a really big **gravitational pull** on other objects. And objects with really small masses, like you or me, have really small gravitational pulls on other objects—so small we don't even notice the pull at all. The more mass an object has, the more **gravity**, or pull, it is capable of. Because Earth has so much mass compared to all of the things that are on the surface of the earth, its surface **gravity** keeps the things on Earth from flying off into space. You, your house, your bed, a ball you throw up into the air—all of these things stay on Earth due to **gravity**! Even Earth's atmosphere and the oxygen we breathe are held close to Earth by its **gravitational pull**!

- Pause to allow students to finish annotating this paragraph.

Gravity also causes you to have weight when you stand on a scale! Earth's **gravity** pulls down on you. The more mass you have, the harder the pull, and the higher the numbers on the scale. Think about an astronaut who is standing on the moon. The astronaut stays on the surface of the moon because of the moon's **gravity**. If the astronaut stood on a scale on the moon, the astronaut's weight would be six times less than the weight of the same astronaut on a scale on Earth! So, a person who weighs 60 pounds on Earth would weigh only 10 pounds on the moon—about the weight of a bag of flour—because the moon has less mass than Earth, and its **force** of **gravity** is not as strong.

But the astronaut does not get pulled off the moon and back through space to Earth! Earth still has a larger mass than the moon, and it still has a larger **gravitational pull** than the moon. But because the astronaut is far away from Earth and very close to the moon, the **gravitational pull** of the moon has the most effect. It keeps the astronaut on the moon.

- Pause to allow students to finish annotating this paragraph.

That's another important thing to know about **gravity**—the distance between two objects affects the **gravitational pull** between them. Objects that are close to each other pull harder than objects that are farther away. The effect of an object's **gravitational pull** lessens as you get farther away from it. The sun has a lot more mass than Earth does. But the sun is also a lot farther away, and because we are on the surface of Earth, Earth's **gravity** has a much bigger effect on us, keeping us firmly on Earth—one of the many benefits of **gravity**!

The sun contains 99 percent of all the mass in our solar system. Because the sun has more mass by far than anything else in the solar system, it also has more **gravity** than anything else in the solar system. The sun's **gravity**—or **force** of attraction—is so strong that it constantly pulls the planets toward it.

- Pause to allow students to finish annotating these paragraphs.

You may be wondering why the planets don't crash into the sun if the sun is pulling on them. Don't worry; that never happens because the planets are also moving really fast in their own orbits around the sun.

The combination of the planets' own speed and the sun's **gravitational pull** toward it is what keeps the planets constantly circling in orbit around the sun. It's a perfect balance—the planets continue in their predictable movements around the sun.

Sometimes **gravity** is so powerful that a black hole is formed: an object or area with an extremely strong **gravitational pull**. There are many **black holes** in space, and a **black hole's gravity** is so strong that once something gets close enough, nothing can escape its **gravitational pull**—not even light! Astronomers find **black holes** in space by noticing the movement of objects around them. You can't see **gravity**, but you can observe the way the **force of gravity** affects objects. Scientists are still learning about **black holes**, like many others things in outer space.

- Pause to allow students to finish annotating these paragraphs.

On a clear night, we can often see the moon moving across our night sky. Have you ever been curious about why Earth has a moon? Many scientists think that about four and a half billion years ago there was a massive collision between Earth and a very large asteroid. The information they have gathered shows that the moon may have formed from the leftover debris from this amazing impact. Earth's **gravity** was able to hold the moon in its orbit. There is a strong **gravitational pull** between Earth and the moon. The moon's **gravity** pulls on all of the things on the earth—including people! But Earth's **gravity** is strong enough to keep us on Earth.

- Pause to allow students to finish annotating this paragraph.

The moon's **gravity** also pulls on Earth's oceans, but Earth's **gravity** pulls back—and it's a good thing it's stronger! The moon's gravity is just strong enough that it can move the water on Earth enough to cause **tides** in the oceans. **Tides** cause the regular rise and fall of the ocean's waters. People can see the effects of tides if they are at the seashore.

High **tides** cause the waves to come high up on the beach, and when low **tides** occur, the waves don't come up as far. Low **tide** is a good time to walk the beach and look for shells and creatures that live in the sand.

So, yes, the powerful effects of **gravity** can explain a lot of interesting things in the universe—it's what holds our moon in orbit around Earth. It's what causes ocean **tides** on Earth day after day. **Gravity** is why we stay on Earth and why objects we throw into the air come back down. **Gravity** even helps create new stars and planets by helping pull together the gases and dust that form them. We can't see **gravity**, but we can see its effects all around us—on Earth, in our solar system, and throughout our galaxy!

- Pause to allow students to finish annotating these paragraphs.

SHARING: MARGIN NOTES (5 MIN.)

- Divide students into pairs.
- Tell students to take turns sharing their margin notes with their partner.

MUDDIEST POINT (10 MIN.)

- Distribute the half sheets of paper, one per student. Tell students that they are going to take time to write out the "muddiest point" about what they read, or the idea in the reading that they did not understand and would like clarified. After students have finished writing, collect the papers and use the information to plan for additional instruction, if needed.

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

Lesson 11: Gravity—Close Reading, Part 1

Writing

30M

Primary Focus: Students will write a summary about their experiences during a gravity experiment. **TEKS 3.6.F; TEKS 3.12.B**

GRAVITY EXPERIMENT (20 MIN.)

Activity Page 11.2

- Tell students they are going to perform an experiment to observe how the force of gravity affects different objects.
- Divide the students into small groups of three to four students each.
- Have students turn to Activity Page 11.2. Tell students that they will be recording their results on this page.
- Distribute one marble and one sheet of paper to each group.
- Tell students to make a prediction about which object will hit the ground first when they are both dropped at the same time. Have students write their prediction for the first Experiment #1 on the activity sheet.
- Have the groups drop the objects and then write their results on the activity sheet.

1. What did you notice?
    - » They should notice that the marble hit the ground first.
2. Ask students why they think that is.
    - » Air friction slows the fall of the piece of paper; friction, or in this case, air friction, is a force that works against gravity.

- Have students write an explanation in the “Why did this happen?” box for Experiment #1.

3. What can we do to reduce the amount of friction on the paper?
    - » Answers may vary, but may include: crumple it, drop the paper vertically, fold the paper, etc.

- Tell students to test out their ideas for Experiment #2. They should make a prediction, record the result, and then explain why it happened.
- After students have conducted Experiment #2, have them try the experiment one more time, trying to reduce the air friction even more. Have them record the results.

TEKS 3.6.F Make inferences and use evidence to support understanding; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Modify the activity to allow for drawing and labeling pictures or creating lists.

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Encourage students to write their responses in complete sentences, with correct spelling, capitalization, and punctuation.

ELPS 5.C

Support

The small group activity provides interaction and peer support for all levels of students.

- Explain to students that the earth's gravity exerts the same force on all objects, no matter how much mass each object has. Explain also that it is friction that causes some items to fall more slowly than others. Guide students to understand that resistance due to friction can be reduced by changing an object's shape or how it is dropped.
- Remind students that in the Light and Sound unit, we learned about space being a vacuum, meaning there are no air particles in it. If we were to conduct the same experiment in a vacuum, the two falling objects, despite their size or weight, will not be affected by air friction and will therefore fall at the same rate.

SUMMARY OF GRAVITY EXPERIMENT (10 MIN.)

- Tell students to write a summary of the gravity experiment and what they learned from it in the box at the end of Activity Page 11.2.
- Collect Activity Page 11.2.

Lesson 11: Gravity—Close Reading, Part 1

Language

25M

Primary Focus: Students will write words using spelling patterns and rules for the sounds /ae/, /k/, /s/, /j/ and /n/. TEKS 3.2.B.iv

INTRODUCE SPELLING WORDS (25 MIN.)

- Tell students that this week, they will review the spellings of /ae/, /k/, /s/, /j/, and /n/.
- As you introduce each of the spelling words, write it on the board, pronouncing each word as you write it.
- Go back through the list of words, having students read the words and tell you what letters to circle for the sounds of /ae/, /k/, /s/, /j/, and /n/. Some of the words have more than one of the sounds.

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

1. yesterday	12. design
2. quickly	13. digest
3. jewel	14. kindness
4. recently	15. character
5. subject	16. budget
6. awaited	17. accomplish
7. fascinate	18. listen
8. annoy	**Challenge Word:** *different*
9. knowledge	**Challenge Word:** *thought*
10. refrigerate	**Content Word:** *atmosphere*
11. gymnasium	

- Point to the Challenge Words on the board. Explain to students that the Challenge Words, *different* and *thought*, are also part of the spelling list and are words used very often. *Different* does follow the spelling patterns for this week as the 'n' is pronounced /n/, while *thought* does not follow the spelling patterns for this week. Use the Challenge Words in sentences as examples for students: "Since you have finished your book, would you like a *different* book to read?" "I *thought* you might like to go with me to the movies."
- Tell students that the Content Word, *atmosphere*, does follow the spelling patterns for this week as the 's' is pronounced /s/. *Atmosphere* is a content-related word that is defined as an invisible, protective blanket of air around Earth and other heavenly bodies.
- Draw the following chart or use the previously prepared Digital Projection DP.U7.L11.1.

Projection DP.U7.L11.1

/ae/	/k/	/s/	/j/	/n/

- Ask students to refer to the Individual Code Chart, pages 1–3. Point out that they will be sorting words according to their sounds.
- Review with students the spelling that is most frequently used for each sound. ('a' > /ae/; 'c' > /k/; 's' > /s/; 'g' > /j/; 'n' > /n/) Remind students to look at the power bar under the spellings and the order in which the spellings are sequenced to determine frequency.
- Ask students to tell you which words to list under the /ae/ header. Briefly explain the meaning of each word.
- Continue through the columns until all words have been listed under the appropriate header. Some of the words have more than one sound found on the table. Briefly explain the meaning of each word.

/ae/	/k/	/s/	/j/	/n/
yesterday	quickly	yesterday	jewel	recently
awaited	subject	recently	subject	fascinate
fascinate	kindness	subject	knowledge	annoy
refrigerate	character	fascinate	refrigerate	knowledge
gymnasium	accomplish	digest	gymnasium	gymnasium
		kindness	digest	design
		listen	budget	kindness
		atmosphere		listen
				different

- Practice the words as follows during the remaining time. Call on a student to read any word on the table. Then have the student use the word in a meaningful sentence. After the student says the sentence, have them ask the class: "Does the sentence make sense?" If the class says yes, then the student puts a check mark in front of the word and calls on another student to come to the front and take a turn. If the class says no, have the student try again, or call on another student to come to the front and use the word in a meaningful sentence. This continues until all of the words are used or time has run out.
- Tell students this table will remain on display until the assessment so that students may refer to it during the week.
- Tell students they will take home Activity Page 11.3 with this week's spelling words to share with a family member.

End Lesson

Lesson 11: Gravity—Close Reading, Part 1

Take-Home Material

Activity Page 11.3

- Have students take home Activity Page 11.3 to share with a family member.

LESSON

12

Gravity—Close Reading, Part 2

PRIMARY FOCUS OF LESSON

Reading

Students will demonstrate comprehension of the text about gravity during a close reading activity. **TEKS 3.6.B; TEKS 3.6.F; TEKS 3.7.C**

Writing

Students will write a reflection about what they've learned about gravity from the reading. **TEKS 3.6.B; TEKS 3.7.B**

Language

Students will use correct punctuation in sentences with dialogue.
TEKS 3.11.D.x

FORMATIVE ASSESSMENT

Activity Page 12.1 — **Reflection 3-2-1** Students will write about what they've learned about gravity **TEKS 3.6.B; TEKS 3.7.B**

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.F** Make inferences and use evidence to support understanding; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.11.D.x** Edit drafts using standard English conventions, including: punctuation marks including apostrophes in contractions and possessives and commas in compound sentences and items in a series.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (70 min.)			
Close Reading: "Gravity"	Whole Group	40 min.	❑ Activity Page 11.1 from previous lesson ❑ chart paper (three pieces) ❑ markers
Corners Activity	Small Group	15 min.	
Wrap-Up Discussion	Whole Group	15 min.	
Writing (30 min.)			
3-2-1 Reflection	Independent	30 min.	❑ Activity Page 12.1
Language (20 min.)			
Grammar: Quotation Marks	Whole Group	20 min.	❑ Activity Page 12.2

ADVANCE PREPARATION

Reading

- Create three groups of students for the small group activity.

Language

- Write the following on the board or on chart paper for the grammar lesson:

  Quotation Marks

  Quotation Marks are punctuation marks used to show exactly what a person says or has said.

- Write the following sentences on the board or on chart paper for the grammar lesson:

  Bob said, “He eats bananas every day.”

  “He eats bananas every day,” said Bob.

  “That building is on fire!” exclaimed Mrs. White.

  “Should we call the fire department?” she asked.

  Mrs. White exclaimed, “That building is on fire!”

  She asked, “Should we call the fire department?”

Universal Access

- Create heterogeneous groups for the small group activity.
- Allow time for questions and clarification throughout the reading activity.
- Provide 1:1 or small group support.

Start Lesson

Lesson 12: Gravity—Close Reading, Part 2

Reading

70M

Primary Focus: Students will demonstrate comprehension of the text about gravity during a close reading activity. **TEKS 3.6.B; TEKS 3.6.F; TEKS 3.7.C**

CLOSE READING: “GRAVITY” (40 MIN.)

The practice of close reading involves directing students’ attention to specific aspects of a text. The guided reading supports in the close reading of “Gravity” are intended to provide this focus and are labeled as follows:

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.F** Make inferences and use evidence to support understanding; **TEKS 3.7.C** Use text evidence to support an appropriate response.

- **VOC.** indicates questions or comments that focus on vocabulary to explain meanings or check student understanding and may highlight multiple-meaning words or idioms.
- **SYN.** indicates questions or comments that focus on syntax to explain complex sentences and syntactic structure.
- **COMP.** indicates questions or comments that focus on students' understanding of the text. These questions require text-based responses and are sequenced to build a gradual understanding of key details of the text. Students may provide multiple responses using different pieces of evidence, grounding inferences logically in the text.
- **LIT.** indicates questions or comments that focus on literary devices, which are techniques an author uses to produce a specific effect such as alliteration, similes, metaphors, etc.

Not all question types will be included in each close reading lesson. These labels and their explanations are for your reference and are not intended to be shared with students.

- Have students get out Activity Page 11.1 from yesterday's lesson.
- You may decide which paragraphs you will read aloud, which ones the students can read silently, or which ones a volunteer can read aloud.
- When asking questions, remind students to look back into the text to find the answers.

What exactly holds all of this stuff together in this huge universe? Why don't all these stars and planets just go flying off in any direction all over the universe? Why do they stick together in groups and clusters like solar systems and galaxies? These are excellent questions, and the answer is . . . **gravity**!

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1. **VOC. Literal.** Who can tell us the definition of gravity?
   - » the force or pull created by the mass of objects in the universe toward each other

---

Gravity is an invisible **force** of attraction between objects. It's the **force** that holds galaxies and solar systems together. It's the **force** that keeps us firmly planted on planet Earth instead of flying off into

ENGLISH LANGUAGE LEARNERS

Reading
Reading/Viewing Closely

Beginning
Provide questions that require one-word answers; e.g., "The author uses what word in this paragraph many times to help us understand what gravity is?" (force)

Intermediate
Allow students to work with a partner to find answers to the questions.

Advanced/Advanced High
Provide students with support if needed.

ELPS 1.E; ELPS 4.E; ELPS 4.I

Activity Page 11.1

space. It's the **force** that keeps Earth orbiting around the sun and keeps the moon orbiting around Earth. You can't see **gravity** or touch it, but **gravity** is present between everything in the universe that has mass. Because of **gravity**, every single bit of **matter** in the universe pulls on every other piece of **matter** in the universe.

1. **LIT. Inferential.** Why does the author use the phrase, "It's the force that keeps us firmly planted on planet Earth"?
   - » The author uses the word "planted" to show that we don't move off the earth; we are planted like a plant or tree with roots.
2. **LIT. Evaluative.** Why do you think the author uses the phrase "It's the force" so many times in this paragraph?
   - » The author wanted to make sure that it's understood that gravity is a force.

You and I exert a pull on each other, but because we have very little mass in our bodies compared to celestial bodies, our **gravitational pull** on each other is very small—so small we can't feel it at all.

Gravity depends greatly on mass . . . so what exactly is mass? Mass is just the amount of **matter** in an object. You and I are small compared to, say, a planet or a star. We're made of less "stuff," so our mass is much, much smaller. Mass is important when you are trying to understand **gravity,** because the larger the mass, the larger the **gravitational pull**. So objects with really large masses, like stars and planets, have a really big **gravitational pull** on other objects. And objects with really small masses, like you or me, have really small gravitational pulls on other objects—so small we don't even notice the pull at all. The more mass an object has, the more **gravity**, or pull, it is capable of. Because Earth has so much mass compared to all of the things that are on the surface of the earth, its surface **gravity** keeps the things on Earth from flying off into space. You, your house, your bed, a ball you throw up into the air—all of these things stay on Earth due to **gravity**! Even Earth's atmosphere and the oxygen we breathe are held close to Earth by its **gravitational pull**!

1. **VOC. Literal.** What is mass?
   » the amount of matter in an object
2. **COMP. Inferential.** What is the connection between gravity and gravitational pull?
   » Gravity is a force created by the mass of the objects in the universe, while the gravitational pull is the amount of attraction between objects, based on their mass.
3. **COMP. Inferential.** Why is mass important to understanding gravity?
   » The amount of mass affects the amount of gravitational pull something has.
4. **COMP. Literal.** Do people have a gravitational pull toward each other?
   » Yes, but it's so small we can't feel it.
5. **COMP. Literal.** Why doesn't the atmosphere fly off into space?
   » Earth's gravitational pull keeps it close to Earth.

Gravity also causes you to have weight when you stand on a scale! Earth's **gravity** pulls down on you. The more mass you have, the harder the pull, and the higher the numbers on the scale. Think about an astronaut who is standing on the moon. The astronaut stays on the surface of the moon because of the moon's **gravity**. If the astronaut stood on a scale on the moon, the astronaut's weight would be six times less than the weight of the same astronaut on a scale on Earth! So, a person who weighs 60 pounds on Earth would weigh only 10 pounds on the moon—about the weight of a bag of flour—because the moon has less mass than Earth, and its **force** of **gravity** is not as strong.

But the astronaut does not get pulled off the moon and back through space to Earth! Earth still has a larger mass than the moon, and it still has a larger **gravitational pull** than the moon. But because the astronaut is far away from Earth and very close to the moon, the **gravitational pull** of the moon has the most effect. It keeps the astronaut on the moon.

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1. **COMP. Inferential.** Describe the relationship between gravity and your weight on a scale.
   » Gravity pulls down on you while you are standing on a scale. The more mass you have, the harder the pull, and the weight will show higher numbers.

2. **SYN. Literal.** Look at the sentences at the end of the first paragraph starting with "So, a person who weighs 60 pounds on Earth..." What other punctuation marks do you see in that sentence?
   - » comma, dash
3. **SYN. Evaluative.** Why did the author use dashes in this sentence?
   - » The words between give information that helps us to understand what 10 pounds feels like.
4. **COMP. Inferential.** What is the cause of astronauts staying in place on the moon and not flying back toward Earth?
   - » the gravitational pull of the moon

That's another important thing to know about **gravity**—the distance between two objects affects the **gravitational pull** between them. Objects that are close to each other pull harder than objects that are farther away. The effect of an object's **gravitational pull** lessens as you get farther away from it. The sun has a lot more mass than Earth does. But the sun is also a lot farther away, and because we are on the surface of Earth, Earth's **gravity** has a much bigger effect on us, keeping us firmly on Earth—one of the many benefits of **gravity**!

1. **VOC. Inferential.** What is the meaning of the word *benefits*, in the last sentence?
   - » something that is an advantage; a good thing

The sun contains 99 percent of all the mass in our solar system. Because the sun has more mass by far than anything else in the solar system, it also has more **gravity** than anything else in the solar system. The sun's **gravity**—or **force** of attraction—is so strong that it constantly pulls the planets toward it.

You may be wondering why the planets don't crash into the sun if the sun is pulling on them. Don't worry; that never happens because the planets are also moving really fast in their own orbits around the sun.

The combination of the planets' own speed and the sun's **gravitational pull** toward it is what keeps the planets constantly circling in orbit around the sun. It's a perfect balance—the planets continue in their predictable movements around the sun.

1. **COMP. Inferential.** What are the two factors that keep the planets in their orbits around the sun?
    » the planets' speed as they circle the sun and the sun's gravitational pull
2. **LIT. Evaluative.** Find words or phrases that the author uses to keep our attention.
    » Answers vary but should include: "You may be wondering...," "Don't worry...," and "perfect balance."

Sometimes **gravity** is so powerful that a **black hole** is formed: an object or area with an extremely strong **gravitational pull**. There are many **black holes** in space, and a **black hole's gravity** is so strong that once something gets close enough, nothing can escape its **gravitational pull**—not even light! Astronomers find **black holes** in space by noticing the movement of objects around them. You can't see **gravity**, but you can observe the way the **force of gravity** affects objects. Scientists are still learning about **black holes**, like many others things in outer space.

Did you know that there are many, many black holes in our own Milky Way Galaxy?

1. **COMP. Evaluative.** Why do you think these powerful areas of gravitational pull were named black holes?
    » Objects fall into them and not even light can escape.
2. **COMP. Inferential.** If you can't see black holes, how do scientists know they are there?
    » Scientists study the movement of the objects around them, watching for the effects of gravity.

On a clear night, we can often see the moon moving across our night sky. Have you ever been curious about why Earth has a moon? Many scientists think that about four and a half billion years ago there was a massive collision between Earth and a very large asteroid. The information they have gathered shows that the moon may have formed from the leftover debris from this amazing impact. Earth's **gravity** was able to hold the moon in its orbit. There is a strong **gravitational pull** between Earth and the moon. The moon's **gravity** pulls on all of the things on the earth—including people! But Earth's **gravity** is strong enough to keep us on Earth.

1. **VOC. Inferential.** What does the word *collision* mean?
   - » smashing together; a violent hit between two objects
2. **COMP Evaluative.** Why does the author say scientists "think" there was a massive collision or "the moon may have formed" when talking about the origins of the moon?
   - » It happened so long ago that there are no witnesses, so they are using information they gathered to form a theory about what happened.

The moon's **gravity** also pulls on Earth's oceans, but Earth's **gravity** pulls back—and it's a good thing it's stronger! The moon's **gravity** is just strong enough that it can move the water on Earth enough to cause **tides** in the oceans. **Tides** cause the regular rise and fall of the ocean's waters. People can see the effects of **tides** if they are at the seashore.

High **tides** cause the waves to come high up on the beach, and when low **tides** occur, the waves don't come up as far. Low **tide** is a good time to walk the beach and look for shells and creatures that live in the sand.

So, yes, the powerful effects of **gravity** can explain a lot of interesting things in the universe—it's what holds our moon in orbit around Earth. It's what causes ocean **tides** on Earth day after day. **Gravity** is why we stay on Earth and why objects we throw into the air come back down. **Gravity** even helps create new stars and planets by helping pull together the gases and dust that form them. We can't see **gravity**, but we can see its effects all around us—on Earth, in our solar system, and throughout our galaxy!

1. **COMP. Inferential.** Describe the effects of gravity on Earth's oceans.
    » The moon's gravity pulls on the oceans, but Earth's gravity pulls it back, creating tides.
2. **VOC. Inferential.** What does the beach look like at high tide?
    » The waves come up on the beach higher.
3. **VOC. Inferential.** What does the beach look like at low tide?
    » The waves don't come up as far; you might find shells and sea creatures.
4. **COMP. Evaluative.** In the last paragraph, which sentence sums up this entire text the best?
    » "We can't see gravity, but we can see its effects all around us...."

CORNERS ACTIVITY (15 MIN.)

- Divide students into three groups.
- Tell students to make sure they have Activity Page 11.1.
- Tell students that each group will be assigned to a corner of the classroom to discuss and record one of the three types of annotation they did yesterday. Remind students:
    - CIRCLE key ideas, words, and phrases.
    - UNDERLINE words or phrases you do not understand.
    - WRITE important thoughts, ideas, or questions in the margins.
- Tell students that they need to be respectful and take turns sharing ideas.
- Each group should have one or two people designated as recorders. You may decide who that will be or the students may decide in their groups.
- Designate one corner of the room to discuss what was "circled" in the text. Assign that corner to one group, and distribute the chart paper and markers.
- Designate another corner of the room to discuss what was "underlined" in the text. Assign that corner to one group, and distribute the chart paper and markers.

- Designate a third corner of the room to discuss the “margin” notes. Assign that corner to one group, and distribute the chart paper and markers.
- Circulate to ensure students are on task and that group members are contributing to the discussion.
- After 10 minutes, tell students that they should now decide as a group what their top five ideas are that they want to bring to the whole class discussion. They will circle those ideas on their chart paper.

WRAP-UP DISCUSSION (15 MIN.)

- Bring the class back together.
- Have a member from each group present their top five ideas from their discussion. Allow five minutes for each group, including additional follow-up questions or clarifications. Use their ideas as a check for understanding to help inform your instruction.

Lesson 12: Gravity—Close Reading, Part 2

Writing

30M

Primary Focus: Students will write a reflection about what they’ve learned about gravity from the reading. **TEKS 3.6.B; TEKS 3.7.B**

3-2-1 REFLECTION (30 MIN.)

- Have students turn to Activity Page 12.1.
- Have a student read the directions at the top of the page.
- Students will work independently to complete the activity.
- Collect Activity Page 12.1.

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text.

Activity Page 12.1

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Provide 1:1 prompting and support, referring students to their notes and discussing what they’ve learned.

Intermediate
Allow students to work with a partner on Activity Page 12.1.

Advanced/Advanced High
Encourage students to write in complete sentences, using domain vocabulary.

ELPS 5.B

Support

Work with students to look back on their notes and the Student Reader to make a list of things that they have learned and things that they already knew about gravity.

Challenge

Have students research to find the answer to the question they generated.

Lesson 12: Gravity—Close Reading, Part 2

Language

20M

Primary Focus: Students will use correct punctuation in sentences with dialogue. **TEKS 3.11.D.x**

GRAMMAR: QUOTATION MARKS (20 MIN.)

Review Quotation Marks

- Draw students' attention to the quotation marks poster you displayed in advance.

  Quotation Marks

  Quotation Marks are punctuation marks used to show exactly what a person says or has said.

- Have a student read it aloud to the class.
- Read and review the first two sentences you wrote on the board in advance, pointing out quotation marks, commas, capital letters, and end punctuation:
  - Bob said, "He eats bananas every day."
  - "He eats bananas every day," said Bob.
- Remind students that the comma separates the spoken sentence from the name of the speaker. If the speaker's name comes at the beginning of the sentence, it is followed by a speech word, such as *said*, which is followed by a comma. The comma separates it from the spoken sentence. If the speaker's name comes after what is said, a comma is needed after what is said aloud, just before the quotation marks.
- Read and review the next two sentences you wrote on the board in advance:
  - "That building is on fire!" exclaimed Mrs. White.
  - "Should we call the fire department?" she asked.
- Tell students that if the spoken sentence ends with a question mark or exclamation point, the spoken sentence or question always ends with that punctuation mark instead of a comma.

TEKS 3.11.D.x Edit drafts using standard English conventions, including: punctuation marks including apostrophes in contractions and possessives and commas in compound sentences and items in a series.

- Remind students that if you turn those sentences around and name the speaker first and the spoken sentence second, the sentence ends with the question mark or exclamation point, as follows:
    - Mrs. White exclaimed, "That building is on fire!"
    - She asked, "Should we call the fire department?"
- Have students turn to Activity Page 12.2, review the directions with students, and have them complete it independently.
- Collect Activity Page 12.2.

End Lesson

Activity Page 12.2

ENGLISH LANGUAGE LEARNERS

Language
Foundational Literacy Skills

Beginning
Provide 1:1 support when needed.

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Encourage students to complete Activity Page 12.2 independently.

ELPS 5.E

Support

Pull a small group together and, using previously read Student Readers or other classroom books that have dialogue, have students identify the types of sentences based on their end marks (declarative, interrogatory, or exclamatory, though students may not use those terms).

Challenge

Have students write their own sentences with dialogue, using a variety of end marks that indicate declarative, interrogatory, or exclamatory sentences.

Grade 3 | Unit 7

Pausing Point 2

Note to Teacher

At this point in the Astronomy unit, students have been learning more about the universe, some of its characteristics, and important people in our understanding of space. It is recommended that you pause here and spend a day reviewing, reinforcing, or extending the material taught so far.

We suggest you begin with the whole-class Read-Aloud activity to reinforce unit content and strengthen students' skills in reading across genres. Then you may wish to use the remaining time to provide remediation opportunities that target specific areas of weakness for individual students, small groups, or the whole class.

CORE CONTENT UP TO THIS PAUSING POINT

Students will:

- Describe stars as hot, distant, and made of gas.
- Describe the characteristics of stars.
- Compare and contrast our sun and other stars.
- Describe a galaxy as a very large cluster of stars.
- Identify the Milky Way as our own galaxy and Andromeda as the closest spiral galaxy in our universe.
- Describe the universe as a vast space that extends beyond the imagination.
- Describe gravity and the effects it has on Earth, within the solar system, and in the universe.
- Recognize and name important constellations and how they are useful.
- Describe the life and contributions of Nicolaus Copernicus.

READ-ALOUD

- Locate the trade book *Moonshot: The Flight of Apollo 11* by Brian Floca in your school or local library.
- Ask students to review what was important about the Apollo 11 mission. *(The Apollo 11 mission was the first time people landed on the moon).* If students need additional review, you may reread selections from Lesson 9, "Space Exploration," before reading the trade book.
- Ask students to think about how it would feel to travel in space. *(Answers may vary, but students might say it would be exciting, lonely, scary, etc.)*

- Explain that today you will read a book about the Apollo 11 mission. This book gave Michael Collins, an astronaut who flew in the Apollo 11 mission, the feeling that he "was back up in space." As you read aloud, students should listen carefully to think about how the author describes the experience of traveling in space.
- Read the trade book *Moonshot: The Flight of Apollo 11* by Brian Floca.

After the reading, use the following questions to facilitate discussion.

1. Who were the astronauts on Apollo 11?
   » Michael Collins, Neil Armstrong, and Buzz Aldrin
2. Where did Apollo 11 launch?
   » Florida
3. Name some of the text features in this book and explain how they contribute to the text's overall meaning.
   » The book's text features include detailed diagrams of the spacecraft and launch vehicle. Labels and descriptions on the diagrams help explain what each part of the spacecraft and launch vehicle does. The book also includes illustrations. They can add more information by helping readers understand what something looked like in space or from space. The book also uses formatting, such as bold print, to draw attention to certain parts of the text.
4. What is the author's purpose in this text? Name some examples from the text that help show the author's purpose.
   » The author's purpose is to help readers understand what happened on the Apollo 11 mission and what it was like for the astronauts. Textual examples may vary but could include that the diagrams give information to illustrate how the astronauts traveled or that the author explains what it was like to sleep, eat, or use the toilet in space.
5. Compare what people on Earth experience to what the astronauts experience. Make sure to include evidence from the text in your answer.
   » Answers may vary, but students should draw on the text for their response. For example, they may note that on the Moon, it is dark all day, while on Earth there is daylight.

ACTIVITIES

Image Review

Materials: digital images from Lessons 6–13

- Project the digital images from any Read-Aloud again and have students retell the Read-Aloud using the images.

Key Vocabulary Brainstorming

Materials: chart paper or board

- Give students a key domain concept or vocabulary word, such as *black hole*. Have them brainstorm everything that comes to mind when they hear the word. Record their responses on chart paper or a whiteboard for reference.

Graffiti Wall

Materials: chart paper, markers

- Give groups of students a key domain concept or vocabulary words, such as *black holes* or *observatory*. Have them brainstorm everything that comes to mind when they hear the word they were assigned. Students will record their response in both words and pictures on the chart paper. Have students do a gallery walk of other groups' charts.

Read, Remember, Retell

Materials: Student Readers

- Divide students into partners. Make sure they have their Student Readers. Direct them to choose any chapter between Chapters 1–8.
- In partners, have the students silently read a paragraph in the text. Next, the students will turn to their partners, cover up what they read, and try to remember and retell what they read. Their partner will listen and fill in any missing information. For the next paragraph, the partners can switch roles remembering and retelling. Continue going back and forth until the end of the chapter.

Poster Session

Materials: chart paper, markers

- Divide students into small groups. Let each group decide on a key idea or concept from their reading that can be visualized on a poster. Students can use words or pictures to describe the concept. When the posters are complete, hang them up around the room and allow students to walk around to view and discuss the posters.

Compare and Contrast

Materials: paper, pencil

- Have students compare and contrast any of the following, creating their own graphic organizer:
    - our solar system and the Milky Way Galaxy

- the Milky Way Galaxy and the Andromeda Galaxy

Constellation Stories

Materials: paper, pencil

- Have students draw their own constellation and write a story about how it got its name. Give examples from the reading, such as Ursa Major being called the Big Bear because connecting the dots creates an image of a bear, or the Big Dipper creates the image of a large ladle.

Planet for Sale!

Materials: paper, pencil or markers

- Have students design an advertisement to sell one of the planets in our solar system or a made-up planet in another galaxy. Students must name the planet, describe its characteristics, and describe its "neighborhood" (other planets close by or which galaxy it's in). Students should use descriptive and persuasive words designed to interest a buyer.

RAFT Writing

Materials: paper, pencil, whiteboard or chart paper

Students will complete a RAFT writing activity as described below.

Writing Prompt: Describe to someone in another galaxy what your galaxy, solar system, and planet are like.

- Go through the RAFT with students so they understand the task. Write the letters *RAFT* on the board. Explain to students:

> R—**Role** of the writer. Who are you?
>
> A—Who is the **audience**?
>
> F—In what **format** are you writing?
>
> T—What **topic** are you writing about?

- Tell students to write the letters *RAFT* going down from the top of their paper and fill in each of the categories next to the letters.
- Alternately, provide some of the categories for the students. For example, for the letter 'F', write *letter* so the students know the format they will be writing in.

Text Feature Comparison

Materials: trade books, textbooks, articles, images, photos, diagrams, etc., with text features on similar topics in astronomy

- Have students choose two materials to compare and contrast. For example, a student could choose an image of the Milky Way Galaxy and an article or text about shapes of galaxies. Students can use a T-chart or Venn diagram to compare and contrast the two materials.

Writing Prompts

Materials: pencil, paper

- Have students write to one of the following writing prompts:
    - The most interesting thing I've learned so far is ______.
    - The importance of gravity here on Earth (or in the solar system; in the galaxy) is ______.
    - Imagine that you could safely visit any planet in the solar system. Which one would you visit and why? Be sure to use the characteristics of the planet when describing why you would want to visit it.

Independent Reading

Materials: assortment of books about astronomy

- Have students read additional trade books about astronomy in your classroom or from the library. After reading, have the students write a book review that includes the following:
    - The title and author.
    - Why did you choose the book?
    - A brief summary.
    - Your favorite part.
    - What do you really want a reader to know about this book?
    - Would you recommend the book to others? Why?

Research Activity: The North Star

- Some students may wish to research the North Star and learn more about how it has changed over long periods of time. Allow students time to share their findings with a group or with the class.

Research Activity: Orienteering

- Some students may wish to research the recreational competition called orienteering and learn more about its history and how one participates in a modern orienteering event. Allow students the time to share their findings with a group or with the class.

LESSON

13

Reader's Theater: Nicolaus Copernicus

PRIMARY FOCUS OF LESSON

Reading

Students will establish a purpose for reading and will demonstrate comprehension of a text read aloud about Nicolaus Copernicus.

TEKS 3.6.A; TEKS 3.6.F; TEKS 3.6.G

Writing

Students will collaborate to write a narrative script based on informational text about Nicolaus Copernicus. **TEKS 3.1.D; TEKS 3.1.E; TEKS 3.9.C; TEKS 3.12.A**

Speaking and Listening

Students will read narrative text aloud with accuracy, appropriate rate, and expression. **TEKS 3.4**

FORMATIVE ASSESSMENT

Activity Page 13.2	**What's My Line?** Students will write out the dialogue they are responsible for delivering during their group's Reader's Theater presentation. **TEKS 3.1.D; TEKS 3.12.A**

TEKS 3.6.A Establish purpose for reading assigned and self-selected texts; **TEKS 3.6.F** Make inferences and use evidence to support understanding; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.1.D** Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.1.E** Develop social communication such as conversing politely in all situations; **TEKS 3.9.C** Discuss the elements in drama such as characters, dialogue, setting, and acts; **TEKS 3.12.A** Compose literary texts, including personal narratives and poetry, using genre characteristics and crafts; **TEKS 3.4** Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (35 min.)			
Introducing the Read-Aloud	Whole Group	10 min.	❏ Activity Page 13.1 ❏ highlighters or pens (optional)
Read-Aloud: "Nicolaus Copernicus"	Whole Group	20 min.	
Discussing the Read-Aloud	Whole Group	5 min.	
Writing (60 min.)			
Introduction to Reader's Theater	Whole Group	15 min.	❏ Activity Pages 13.1, 13.2 ❏ chart paper or board ❏ writing paper
Writing the Script	Small Group	45 min.	
Speaking and Listening (25 min.)			
Reader's Theater: Rehearsal	Small Group	25 min.	❏ Activity Pages 13.1, 13.2
Take-Home Material			
Spelling: Dictionary Skills			❏ Activity Page 13.3

ADVANCE PREPARATION

Writing

- Create six heterogeneous groups of students for the Writing lesson. You may wish to assign one student in each group to be the "director," or the person who will help stage the action and help the actors rehearse their lines. You may also wish to assign one person in each group to be the "producer," who ensures that each actor has what they need to perform (copies of their lines) and will make a single copy of the script.

Universal Access

- Display images or models of the solar system.
- Provide 1:1 or small group support when needed.

Start Lesson

Lesson 13: Reader's Theater: Nicolaus Copernicus

Reading

35M

Primary Focus: Students will establish a purpose for reading and will demonstrate comprehension of a text read aloud about Nicolaus Copernicus. **TEKS 3.6.A; TEKS 3.6.F; TEKS 3.6.G**

VOCABULARY: "NICOLAUS COPERNICUS"

- The following are core vocabulary words used in this lesson. Preview the words with the students before the lesson. Students are not expected to be able to use these words immediately, but with repeated exposure throughout the lessons they will acquire a good understanding of most of the words. Students may also keep a "unit dictionary" notebook along with definitions, sentences, and/or other writing exercises using these vocabulary words.
    - Tell students that the vocabulary words are also in the glossary on Activity Page 13.1.

calculations, mathematical methods used to answer a question

diurnal, having a daily cycle, or occurring daily, as a result of Earth's 24-hour rotation around its axis

geocentric, having Earth as the center

heliocentric, having the sun as the center

hypothesis, an idea that is based on observation and experimentation but that is not commonly accepted (**hypotheses, hypothesized**)

TEKS 3.6.A Establish purpose for reading assigned and self-selected texts; **TEKS 3.6.F** Make inferences and use evidence to support understanding; **TEKS 3.6.G** Evaluate details read to determine key ideas.

logical, makes sense in an organized, step-by-step way

opposed, resisted; was against (**opposition**)

Vocabulary Chart for "Nicolaus Copernicus"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	diurnal geocentric heliocentric hypothesis	calculations logical opposed
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE READ-ALOUD (10 MIN.)

Activity Page 13.1

- Have students turn to Activity Page 13.1.
- Distribute highlighters or pens for students to circle key ideas and details (optional).
- Tell students that today they'll be reading about an astronomer who lived in the late 1400s and 1500s named Nicolaus Copernicus.
- Tell students that there are several purposes for today's reading. First, they will learn about Copernicus and get the key idea of the text, but they will also be getting to know the text better because they will be using it to turn into a type of play called Reader's Theater.
- Have students take a moment to set their own purpose for reading, such as "learn more about Copernicus" or "find ideas to use in a play." **TEKS 3.6.A**
- Tell students that in today's Read-Aloud, they will again hear vocabulary words that are related to the process or work of science and also sometimes to our everyday lives. Ask students if they have ever heard the word *hypothesis* and what they think it means. Explain that people often come up with a hypothesis to explain why something happens as it does. For example, tell students that they might make a hypothesis to explain why a pet behaves a certain way.
- Tell students that after a person makes a hypothesis about why something happens, the next step is to gather evidence by observing closely and finding

TEKS 3.6.A Establish purpose for reading assigned and self-selected texts.

a way to test the idea. The evidence they find might cause them to change the hypothesis or to be more certain of it. Tell students that if a lot of evidence is found in support of a hypothesis and lots of people accept that it is true, then it becomes a theory.

- Tell students that Nicolaus Copernicus studied space and that his views and new ideas about space shocked many people, changing what people knew about astronomy forever.

READ-ALOUD: "NICOLAUS COPERNICUS" (20 MIN.)

- Make sure students follow along on Activity Page 13.1 as you read aloud.
- Remind students to circle key ideas as they read along. (Optional)

How would you like to present the world with a new idea about how something works? What if, besides being new, your idea was so different from the ideas that people had believed for so long that people were opposed to even listening to your ideas? That kind of fierce **opposition** is exactly what a man named Nicolaus Copernicus experienced hundreds of years ago when he had a new idea about astronomy.

Ask students the meaning of *fierce*. (*very intense or powerful*)

Nicolaus Copernicus was a regular person, just like you. He was born in Poland in 1473 and was raised by his uncle because both of his parents died when he was about 10 years old. Copernicus went to universities in Poland and Italy and became a clergyman and doctor.

Copernicus studied many subjects, including math, philosophy, church law, and medicine. But his favorite subject of all—and the thing that he had a big new idea about—was astronomy.

As you have learned, astronomy is the study of the stars, space, and the universe, and astronomers are scientists who study these amazing phenomena. Long before Copernicus was born, the Greek philosopher Aristotle observed that the sun appeared to "rise" in the east and "set" in the west. Because Aristotle observed this **diurnal** motion of the sun with his own eyes, he—and many others—believed that the earth was stationary and that the sun and all of the planets orbited around it.

Support

Remind students that *opposition* is from the word *oppose*, meaning "against something."

These observations and the strong belief in this way of looking at the universe shaped people's views for a very long time.

Have students check their glossary to find out what the word *diurnal* means.

Say, "We've heard the word *phenomena* before. Who remembers what it means?" (*It's the plural form of phenomenon, meaning "an impressive or extraordinary occurrence or event."*)

For more than 1,000 years before Copernicus was born, most astronomers and other people believed that the universe was **geocentric**. In other words, scientists thought that Earth was the center of the solar system and the universe. They believed Earth stood still and the sun and all of the planets and the moon circled around it, while the stars remained fixed in a rotating sphere that was farther away.

Ask, "Which sentence gives us the definition of geocentric?"(*In other words, scientists thought that Earth was the center of the solar system and the universe*.)

Call on a few volunteers to describe what this might look like. (It would look something like an onion with the earth at the center, the outer layer being all the stars, and the inner layers showing the orbits of the sun and the planets around the sun.)

You have heard that most people believed the **geocentric** theory of the universe for more than 1,000 years. Why? Because it was the best explanation anyone had come up with for why the sun and planets appeared to move the way they did. All of our observations were from Earth. Remember, people did not have all of the scientific tools back then that we have today, such as artificial satellites, spaceships, and high-powered telescopes. These tools have greatly expanded modern understandings of space through new opportunities for observation and gathering data. Think about the difference between a person standing on Earth looking around, and a person in an airplane looking down on the Earth-bound person. The person in the airplane can see a much wider scope of Earth. Powerful telescopes have given us this new kind of perspective when we look up into space.

ENGLISH LANGUAGE LEARNERS

Reading
Listening Actively

Beginning
Have students create a geocentric model representing Earth, the planets, sun, and stars. Have them act out the model by having Earth stand in the middle while the sun and planets orbit around Earth. The stars will be on the outside, moving around the whole thing but staying in one orbit. In the geocentric model, the sun is between Venus and Mars' orbits.

Intermediate
Have students draw and label pictures as to how the geocentric model would look.

Advanced/Advanced High
Encourage students to use complete sentences when describing the geocentric model.

ELPS 1.E; ELPS 2.E; ELPS 3.J

Most Greeks, including the famous philosopher Aristotle, believed the **geocentric** theory. There were a few exceptions, such as the Greek astronomer Aristarchus who, after much study, concluded that the sun was much larger than Earth, and that it was Earth that moved around the sun. His new idea, called a **hypothesis**, was never accepted by ancient astronomers, but after many, many years, Aristarchus's ideas greatly influenced other astronomers in their studies.

Ask, "Why is a hypothesis not just a wild guess?" (*A scientist has an idea and gathers evidence from study and observation*.)

Most ancient Romans believed the **geocentric** theory. During this time, it was the official position of the powerful Roman Catholic Church. Most astronomers were afraid to question it or explore other **hypotheses**, though there were others before Copernicus who were trying to work out alternative explanations. When Copernicus was born in 1473, almost everyone in Europe believed in this **geocentric** theory, too. And almost everyone had no idea that this view of the universe was about to change!

How could so many people have a completely different view of the universe than we do today? The answer is easy. What we know about the way the universe works—all of science—comes from the observations and **logical** thinking of regular people, just like you and me. Astronomers have always used scientific theories to explain the movement of the stars and planets. Scientific theories aren't necessarily complicated or hard to understand—they are just possible explanations of how or why things happen. But remember, scientific theories aren't just guesses. They are ideas that are based upon evidence and careful observation of the world—such as observing where the stars appear in the sky every night.

Sometimes, however, what we think we are seeing is not what actually is, such as the world looking flat but actually being round.

A long time ago, stargazers spent a lot of time outside looking at the night sky and noticed patterns in the sky. Early astronomers knew that the planets had different movements than the stars, which circled around Polaris once a day. Astronomers observed that the

Support

Explain that *hypotheses* is the plural of *hypothesis*.

Challenge

Have students explain how the belief that the world was flat affected some people's ideas about travel and exploration in ancient times.

planets moved slowly across the night sky along a certain pathway. But people had also started noticing some odd things about the motion of the planets as they followed this pathway. One of these odd things was that sometimes Mars and other planets made a strange backward loop in the sky. Scientists had tried to explain this motion using the **geocentric** theory of the universe, but the explanations became pretty complicated. Still, most people didn't question that Earth was the center of the universe.

Ask, "What do you remember about Polaris?"(*It is mostly fixed in the night sky, and all the rest of the stars appear to travel around it. It's also known as the North Star*.)

But Copernicus asked himself the question: If the planets were orbiting around Earth, why would they follow such complicated patterns? He didn't think they would, and so he used his **logical** mind to come up with a different scientific **hypothesis** that would better explain this strange looping motion. Copernicus also had the work of Aristarchus long before to add to his own studies. In science, often the work of one scientist is built upon the work of the many scientists who have come before them.

What was the scientific **hypothesis** that Copernicus decided upon? It was a **heliocentric hypothesis** of the universe. Does this idea sound familiar? This was the **hypothesis** of Aristarchus more than 1,000 years earlier! By using mathematics to make careful **calculations** of the positions of the sun, planets, and other celestial bodies, Nicolaus Copernicus came to the same conclusion: that the sun was at the center of everything. He believed that Earth orbited around the sun along with the rest of the planets. Copernicus also **hypothesized** that the earth is spinning and rotates on its own axis.

What did Copernicus do to come to his heliocentric hypothesis of the universe? (He observed the planets and stars in the sky. He used mathematics to calculate the positions of the sun, planets, and other celestial bodies. He used all this information to come to a logical conclusion.)

Call on a few volunteers to describe what this might look like.

Support

Have students demonstrate what a backward loop would look like to show the pathway of Mars and other planets if you were looking at it night after night in the sky.

Support

Remind students that the prefix *helio–* means "having to do with the sun."

Of course, we now know that the earth does rotate on its own axis. And we also know that although the sun isn't the center of the universe, it is the center of our solar system. So, the **heliocentric** scientific **hypothesis** that Copernicus presented in the 1500s (that was built upon the scientific **hypothesis** Aristarchus had presented more than 1,000 years earlier) was much closer to the truth than the **geocentric** theory that had been held for so many years.

Unfortunately, similar to Aristarchus, Copernicus's **hypothesis** was not widely accepted by people during his lifetime. For one thing, people thought that if the earth was spinning, all the things on it would be thrown off the earth and into space. They didn't understand that the force of gravity holds us firmly on Earth! Another part of the reason for this is that Copernicus's ideas were not published until literally the day he died.

Some people think that Copernicus may have waited until the very last moment in his life because his hypothesis was so unpopular.

But another part of the reason that the **heliocentric hypothesis** was not widely accepted was that Copernicus's ideas challenged the belief held by most people that humans were at the center of the universe. This was very difficult for many people to accept, so change came slowly. Still, as with the studies of Aristarchus, the studies of Copernicus greatly influenced the astronomers who came after him, including the great Italian astronomer Galileo Galilei.

Say, "In Chapter 8 of "*What's in Our Universe?*" we learned about the earliest exploration of space. Who remembers one of the things Galileo is known for?" (*Answers vary, but should be that he built a more powerful telescope and discovered four of Jupiter's moons*.)

Galileo was inspired by the work of Copernicus and became one of the first astronomers to build and use a telescope to study space in more detail. As you heard earlier, Galileo discovered four of Jupiter's moons. He observed that the moons orbit Jupiter instead of Earth. His discoveries provided further evidence that Aristarchus and Copernicus were—although in the great minority—correct in their **heliocentric** theories!

ENGLISH LANGUAGE LEARNERS

Reading
Listening Actively

Beginning
Have students create a heliocentric model by having students represent the sun, planets, and stars. Have them act out the model by having the sun stand in the middle while the planets orbit around the sun. The stars will be on the outside, clustered together in galaxies, and may have their own planets orbiting around them.

Intermediate
Have students draw and label pictures as to how the heliocentric model would look.

Advanced/Advanced High
Encourage students to use complete sentences when describing the heliocentric model.

ELPS 1.E; ELPS 2.E; ELPS 3.J

Challenge

Have students compare how scientific ideas were shared in Copernicus's time to how scientific ideas are shared today.

Nicolaus Copernicus had made careful observations of the stars and other celestial bodies. He recorded these observations with great attention. But it was his willingness to ask questions—even when unpopular—that led him to a clearer answer. Each time you ask questions to help understand something better, you are following in the footsteps of the great astronomer Nicolaus Copernicus.

Ask, "Why were Copernicus's ideas unpopular?"(*They went against what was believed at the time and the official position of the Roman Catholic Church*.)

Asking questions to get closer to the truth is what the scientific process is all about. Copernicus's questioning mind and careful observations led him to a new **hypothesis** about the arrangement of what we now know as the solar system. Though people were slow to accept his **hypothesis**, the astronomers who followed Copernicus gathered more and more evidence, so that today the **heliocentric** view is the accepted theory. It's important to remember that new information and evidence often change our views about the world!

DISCUSSING THE READ-ALOUD (5 MIN.)

1. **Evaluative.** What are some words you might use to describe Copernicus?
   - » Answers vary, but could include *thoughtful, curious, intelligent, brave, logical, observant,* etc.
2. **Evaluative.** What tools and methods did Copernicus use for studying space?
   - » He made many observations, kept records, did mathematical calculations, and studied other astronomer's views. He did not use a telescope; they hadn't been invented yet.
3. **Evaluative.** Astronomers in Copernicus's time were puzzled about the movement of Mars and some of the other planets. What question did they have about the planets' movements, and how did this lead Copernicus to a new understanding?
   - » Astronomers wondered why Mars and some of the planets seem to travel backward at times in their paths across the night sky. This led Copernicus to think of other arrangements of the planets and the sun that would explain this odd and unexpected movement.

4. **Inferential.** Why did people have a difficult time believing that Earth was spinning in space?
    - » They thought that if the Earth spun in space they would be thrown off, along with all the other objects on Earth.
5. **Inferential.** What was new about Copernicus's view of the world?
    - » He supported a heliocentric view with the sun in the center and Earth and the other planets orbiting the sun.
    - » gravity
6. **Inferential.** Name another astronomer who later worked to prove Copernicus's heliocentric view?
    - » Galileo
7. **Evaluative.** What is the difference between a hypothesis and a theory?
    - » A hypothesis is an explanation about why something occurs; a theory is a hypothesis that has been tested and has become widely accepted.

Lesson 13: Reader's Theater: Nicolaus Copernicus

Writing

60M

Primary Focus: Students will collaborate to write a narrative script based on informational text about Nicolaus Copernicus. **TEKS 3.1.D; TEKS 3.1.E; TEKS 3.9.C; TEKS 3.12.A**

INTRODUCTION TO READER'S THEATER (15 MIN.) TEKS 3.9.C

- Ask students to describe what happens in a play.
    - » Answers vary, but should include that it is a story that is acted out, had characters, dialogue, etc.
- Tell students they will be taking the text they just read, "Nicolaus Copernicus," and turning it into a play.
- Explain that this play is different, in that the actors do not have to memorize their lines. They are allowed to read their lines, which is why it is called a "Reader's Theater."

TEKS 3.1.D Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.1.E** Develop social communication such as conversing politely in all situations; **TEKS 3.9.C** Discuss the elements in drama such as characters, dialogue, setting, and acts; **TEKS 3.12.A** Compose literary texts, including personal narratives and poetry, using genre characteristics and craft.

- Also explain that, in Reader's Theater, there is no need for costumes or props.
- Brainstorm with the students the different types of jobs and roles that are required in a play.
- Write these on the board or chart paper and discuss what each person does.

> Director: helps stage the action and helps actors with their lines
>
> Actors: characters in the play that say the lines
>
> Narrator(s): people who read parts of the action aloud to move the story along
>
> Producer: person who makes sure that everyone involved with the play has everything they need. The producer will also write down all the lines in order on a single copy of the script. If possible, collect the copy from each of the producers when the scripts are completed and make copies of each for the members of the groups.
>
> Chorus: a role from ancient Greek times, where a group of actors say the lines together, usually to make a point or move action along

- Tell the students which groups they will be in, from 1 to 6. If you assigned the roles of director and producer in advance, tell the groups who they are.
- Tell students to make sure that they have Activity Page 13.1. Each part of the text is numbered 1–6. They will be responsible for the text that matches their group number.
- Have them turn to Activity Page 13.2 and go through the page so they understand what they need to do.
- Tell students that they should write down all of their lines for Reader's Theater on writing paper before they transfer their lines to Activity Page 13.2.

Activity Page 13.2

WRITING THE SCRIPT (45 MIN.)

TEKS 3.1.D; TEKS 3.1.E; TEKS 3.12.A

- Have the groups move to different parts of the room so that they can work together.
- Make sure each group has writing paper and each student has their two activity pages.

TEKS 3.1.D Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.1.E** Develop social communication such as conversing politely in all situations; **TEKS 3.12.A** Compose literary texts, including personal narratives and poetry, using genre characteristics and craft.

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Students will be working as members of a group, so circulate often to make sure that they are participating to the best of their ability. Assign a partner to help them with specific tasks if necessary.

Intermediate
Provide 1:1 support or prompting if necessary.

Advanced/Advanced High
Encourage students to contribute to the script by writing lines for the script independently.

ELPS 5.G

Support

This collaborative activity provides natural peer support. Circulate often to check in with students and provide additional support if necessary.

Challenge

- Collaborative activities are essential for students of all levels and abilities, so it is not recommended that students work independently on this activity.
- Students may be interested in using one of the other chapters from a Student Reader to write their own Reader's Theater script.

- Tell the groups they will collaborate to write a script for the section of the text that was assigned to their group.
- Explain that they will have to figure out how to bring the text to life with characters and dialogue.
- Explain that all members of the group will be expected to perform, so they may need to have more than one narrator, create characters that are already in the text, and/or have a chorus where several actors read lines together.
- Remind them that both the director and the producer are supposed to provide guidance and help, but that everyone's opinions and ideas are important and that everyone is considered a writer.
- Remind students to be respectful, take turns gaining the floor, stay on topic, and contribute to the task and conversation.
- Tell students that their scripts should take about 3–4 minutes to perform. They will need to use their imaginations to provide dialogue and action. The producer will keep track of the time.
- Allow students time to write their scripts out. Circulate often to answer questions and provide assistance as needed.

Lesson 13: Reader's Theater: Nicolaus Copernicus

Speaking and Listening

25M

Primary Focus: Students will read narrative text aloud with accuracy, appropriate rate, and expression. TEKS 3.4

READER'S THEATER: REHEARSAL (25 MIN.)

- Have students turn to Activity Page 13.2.
- By now, students should have written all the lines in their script. Direct students to complete Activity Page 13.2 before moving on to rehearse their script.

TEKS 3.4 Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.

- Students should rehearse their scripts, as they will be performed tomorrow. Tell the directors and producers that they should be working to "polish" up the play, making sure the lines are in the correct order and that the actors are reading their lines fluently and with expression.
- Allow students to rehearse until time runs out. They will be performing their scripts during Lesson 14.
- Do not collect Activity Page 13.2 until after the performance in Lesson 14.

End Lesson

Lesson 13: Reader's Theater: Nicolaus Copernicus

Take-Home Material

- Have students take home Activity Page 13.3 to complete.

ENGLISH LANGUAGE LEARNERS

Speaking and Listening

Using Foundational Literacy Skills

Beginning
Have students read and reread their lines orally in a 1:1 or small group situation. For some students, having a part in the chorus provides a strong fluency support.

Intermediate
Encourage students to read and reread their lines orally with a partner to build fluency.

Advanced/Advanced High
Encourage students to read their lines fluently and with the appropriate pace and expression.

ELPS 4.G

Activity Page 13.3

LESSON

14

What's It Like in Space?

PRIMARY FOCUS OF LESSON

Reading

Students will compare and contrast two texts about the moon landing and what it's like in space. **TEKS 3.1.D; TEKS 3.6.H**

Speaking and Listening

Students will read narrative text aloud during a Reader's Theater about Nicolaus Copernicus. **TEKS 3.4; TEKS 3.7.B; TEKS 3.9.C; TEKS 3.13.H**

Language

Students will use the meaning of suffixes to choose the correct word in sentences. **TEKS 3.3.C**

FORMATIVE ASSESSMENT

Activity Page 14.1	**Compare and Contrast** Students will write a summary about what is most similar about two texts. **TEKS 3.6.H**
Activity Page 14.2	**Reflection** Students will write a reflection about the reading, writing, and performing experience during Reader's Theater. **TEKS 3.7.B**
Activity Page 14.3	**Review Suffixes** Students will determine if the correct word is being used in a sentence using suffix meaning. **TEKS 3.3.C**

TEKS 3.1.D Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.4** Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.9.C** Discuss elements of drama such as characters, dialogue, setting, and acts; **TEKS 3.13.H** Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results; **TEKS 3.3.C** Identify the meaning of and use words with affixes such as im- (into), non-, dis-, in- (not, non), pre-, -ness, -y, and -ful.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (55 min.)			
Introducing the Chapters	Whole Group	10 min.	❏ "What's in Our Universe?" ❏ Activity Page 14.1
Small Group Reading: "A Walk on the Moon"	Small Group	15 min.	
Small Group Reading: "What's It Like in Space?	Small Group	15 min.	
Comparing and Contrasting	Partner	15 min.	
Speaking and Listening (50 min.)			
Performing Reader's Theater	Small Group	40 min.	❏ scripts from previous lesson ❏ Activity Page 13.2 ❏ Activity Page 14.2
Wrap-Up and Reflection	Whole Group	10 min.	
Language (15 min.)			
Morphology: Review Suffixes *–ous*, *–ive*, *–ly*, *–ful*, and *–less*	Whole Group	15 min.	❏ Activity Page 14.3
Take-Home Material			
"Nicolaus Copernicus"			❏ Activity Page 14.4

ADVANCE PREPARATION

Reading

- Students will be working with partners and will be rotating to form different small groups during the Reading lesson. You may wish to create the partners in advance.

Speaking and Listening

- Prepare a space in the classroom where each small group can perform their script. You may wish to borrow music stands from the music teacher to hold the scripts for the readers.

Universal Access

- Have a discussion in advance to find out what students know about being in space.
- Provide additional books, articles, and photographs about landing on the moon and being an astronaut.
- Provide a list of Internet sites, like NASA Education for Students so students can learn more.

Start Lesson

Lesson 14: What's It Like in Space?

Reading

55M

Primary Focus: Students will compare and contrast two texts about the moon landing and what it's like in space. **TEKS 3.1.D; TEKS 3.6.H**

Note: There is no new vocabulary for today's lesson.

INTRODUCING THE CHAPTERS (10 MIN.)

- Ensure that both you and your students have a Student Reader.
- Explain to students that they will be reading two chapters in small groups today, Chapter 9 "Walk on the Moon" and Chapter 10 "What's It Like in Space?"
- Tell students that after they've completed the reading, they will be working with their partners to compare and contrast the two chapters.
- Divide students into pairs. Number off the pairs 1, 2, 1, 2, 1, 2, etc.

TEKS 3.1.D Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.6.H** Synthesize information to create new understanding.

- Tell all the Number 1 partners that they will be staying in one spot. Tell the Number 2 partners that they will be the ones to move to the next group after reading the first chapter.
- Arrange the Number 1 pairs around the perimeter of the room, making sure there is space between each pair.
- Direct each Number 2 pair to join a Number 1 pair. Explain to students that after they finish reading Chapter 9, they will move to the next Number 1 group to their right to read Chapter 10 (clockwise).
- Remind students to follow group work rules, including taking turns reading aloud, staying on task, and being respectful.
- Explain to students that if they finish reading the chapter before the time is up, they can reread the text silently.

SMALL GROUP READING: "A WALK ON THE MOON" (15 MIN.)

- Students in small groups will be taking turns reading paragraphs out loud.
- If you are not working with a small group, this may be a good time to circulate among the groups and make anecdotal records of reading fluency.
- When time is up, tell the students who are in the Number 2 pairs to move one group to the right.

SMALL GROUP READING: "WHAT'S IT LIKE IN SPACE?" (15 MIN.)

- Students in small groups will be taking turns reading paragraphs out loud.
- If you are not working with a small group, this may be a good time to circulate among the groups and make anecdotal records of reading fluency.
- When the time is up, tell the students who are in the Number 2 pairs to move one group to the right.

Check for Understanding

Think-Pair-Share: Ask students why they think the people watching on TV went wild when Armstrong said, "The *Eagle* has landed!"? (This was the first time humans had landed on the moon.)

ENGLISH LANGUAGE LEARNERS

Reading
Using Foundational Literacy Skills

Beginning
Students who are not ready to read aloud in small groups may listen as others read aloud.

Intermediate
Students may read aloud in tandem with another student as support.

Advanced/Advanced High
Encourage students to read aloud in the small groups to practice their fluency.

ELPS 4.F

Support

You may wish to pull a small group to read aloud with you during this time.

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

Activity Page 14.1

COMPARING AND CONTRASTING (15 MIN.)

- Break the small groups up so that students are with their original partners.
- Have students turn to Activity Page 14.1.
- Tell students that they will use the graphic organizer to compare and contrast the two chapters they just read in small groups.
- Tell students that they can work together on the top part of the graphic organizer, but they must write the summary on the bottom independently.
- Collect Activity Page 14.1 when completed.

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Presenting

Beginning
Provide time for additional practice reading lines for Reader's Theater prior to the performance.

Intermediate
Provide support if needed.

Advanced/Advanced High
Provide support if needed.

ELPS 3.F

Lesson 14: What's It Like in Space?

Speaking and Listening

50M

Primary Focus: Students will read narrative text aloud during a Reader's Theater about Nicolaus Copernicus. **TEKS 3.4; TEKS 3.7.B; TEKS 3.9.C; TEKS 3.13.H**

PERFORMING READER'S THEATER (40 MIN.)

TEKS 3.9.C

- Tell students to get into their Reader's Theater groups.
- Remind students they should have their scripts ready to read aloud.
- If you made copies of the scripts from yesterday for the students, hand them out to the appropriate groups.
- Make sure a space is provided for the performances.
- Bring up Group 1. Remind the rest of the students that they need to listen respectfully. They should not be practicing their own lines or working on the script.
- After Group 1 has performed, continue with the rest of the groups.

Support

Provide time for students to go over the lines they will read prior to the group's performance.

WRAP-UP AND REFLECTION (10 MIN.)

- Have students return to their seats and turn to Activity Page 14.2. Tell them to also take out Activity Page 13.2 from the previous lesson.
- Call on a few students to share their experience doing Reader's Theater.

TEKS 3.4 Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.9.C** Discuss elements of drama such as characters, dialogue, setting, and acts; **TEKS 3.13.H** Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.

- Go through Activity Page 14.2 and tell the students to complete it independently.
- When completed, collect Activity Pages 13.2 and 14.2.

Lesson 14: What's It Like in Space?

Language

15M

Primary Focus: Students will use the meaning of suffixes to choose the correct word in sentences. **TEKS 3.3.C**

MORPHOLOGY: REVIEW SUFFIXES *–OUS, –IVE, –LY, –FUL,* AND *–LESS* (15 MIN.)

TEKS 3.3.C

- Review the meaning of the following suffixes:
  - *–ous* means "full of"
  - *–ive* means "relating to"
  - *–ly* means "in a_way"
  - *–ful* means "full of"
  - *–less* means "lacking"
- Tell students you will read a sentence that uses a word with one of the suffixes they are reviewing. Students must determine if the sentence demonstrates an example of the correct meaning of the word. If the sentence demonstrates an example of the correct meaning of the word, students should say yes. If not, students should say no.
- Tell students the target word is *careful*, and then read the following sentence aloud:
  - I rushed through my spelling assessment and made a careful mistake on one word.
- Ask students, "Does this sentence demonstrate an example of the correct meaning of the word *careful*?"
  - » No.
- After students have correctly answered, ask, "Why not?"
  - » To be careful means you are full of effort to do something correctly and in this sentence, the effort to do something correctly is not there.

TEKS 3.3.C Identify the meaning of and use words with affixes such as im- (into), non-, dis-, in- (not, non), pre-, -ness, -y, and -ful.

Activity Page 14.2

Activity Page 13.2

Support

Have students orally share their answers to each prompt before writing them down. Encourage students to write in complete sentences, but allow a list of words if necessary.

Challenge

Have students provide a list of topics that would work well to turn into a Reader's Theater and why.

Activity Page 14.3

ENGLISH LANGUAGE LEARNERS

Language
Evaluating Language Choices

Beginning
Read the sentences on Activity Page 14.3 aloud to the students and have them orally answer yes or no; e.g., "'Dana came up with an inventive way to hang art.' Is the word *inventive* used correctly in this sentence?"

Intermediate
Allow students to work with a partner to complete Activity Page 14.3.

Advanced/Advanced High
Have students write some of their own sentences with words using the suffixes they've reviewed.

ELPS 5.B

- Follow the same procedures for the following sentences:
    - The clicking sound coming from the front of the car mysteriously disappeared after she turned the corner.
        - » Yes.
    - Grandpa leads an active life, never leaving his house and not getting outside to get exercise and fresh air.
        - » No; to be active means you are doing something in a certain way, and never leaving the house is not doing something.
- Have students complete Activity Page 14.3 independently.

End Lesson

Lesson 14: What's It Like in Space?

Take-Home Material

- Have students take home Activity Page 14.4 to read to a family member.

Activity Page 14.4

LESSON

15

The Space Shuttle

PRIMARY FOCUS OF LESSON

Language

Students will write words using spelling patterns and rules for the sounds /ae/, /k/, /s/, /j/, and /n/. **TEKS 3.2.B.iv**

Speaking and Listening

Students will work collaboratively to make connections between sentences in text about the space shuttle and explain their ideas and reasoning.

TEKS 3.1.C; TEKS 3.1.D; TEKS 3.9.D.i; TEKS 3.9.D.iii

Reading

Students will demonstrate comprehension of an informational text about the space shuttle. **TEKS 3.7.C**

Students will make connections between sentences in paragraphs from text about Jupiter. **TEKS 3.9.D.i**

Writing

Students will write a brief informative paragraph using words that connect the sentences together in a logical sequence. **TEKS 3.9.D.i; TEKS 3.9.D.iii; TEKS 3.12.B**

FORMATIVE ASSESSMENT

Activity Page 15.1	**Spelling Assessment** Students will spell words correctly with /ae/, /k/, /s/, /j/, and /n/ sounds. **TEKS 3.2.B.iv**
Activity Page 15.2	**Comprehension Questions** Students will answer questions by finding evidence in the text. **TEKS 3.7.C**
Activity Page 15.3	**Connecting Sentences** Students will determine how sentences are connected in a paragraph. **TEKS 3.9.D.i**

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns; **TEKS 3.1.C** Speak coherently about the topic under discussion, employing eye contact, speaking rate, volume, enunciation, and the conventions of language to communicate ideas effectively; **TEKS 3.1.D** Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence, (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.

LESSON AT A GLANCE

	Grouping	Time	Materials
Language (15 min.)			
Spelling Assessment: /ae/, /k/, /s/, /j/, and /n/ sounds	Independent	15 min.	❏ Activity Page 15.1
Speaking and Listening (15 min.)			
Connecting Sentences in a Paragraph	Small Group	15 min.	❏ sentence strips in envelopes ❏ Text Structures Anchor Chart (Digital Projections)
Reading (50 min.)			
Introducing the Chapter	Whole Group	5 min.	❏ *What's in Our Universe?* ❏ Activity Pages 15.2, 15.3
Independent Reading: "The Space Shuttle"	Independent	20 min.	
Comprehension Questions	Independent	15 min.	
Connecting Sentences in a Paragraph	Independent	10 min.	
Writing (40 min.)			
Paragraph Writing: Connecting Sentences	Independent	25 min.	❏ blank paper ❏ scissors for students
Sharing: Connecting Sentences	Partner	10 min.	
Wrap-Up	Whole Group	5 min.	
Take-Home Material			
"The Space Shuttle"			❏ Activity Page 15.4

ADVANCE PREPARATION

Speaking and Listening

- Determine small groups of four to five students each.
- Prepare enough copies of Paragraph 1 and Paragraph 2 so that there is one copy each of Paragraph 1 for half of your small groups and one copy each of Paragraph 2 for the other half of the small groups. Cut out the sentence strips. Keep the sentences for each paragraph separate. Mix up the sentence strips before putting them in the envelopes, marking the outside either #1 or #2. Each small group will get either #1 or #2. Create enough so that there is an equal number of #1 and #2 envelopes.
- On chart paper, create the following chart or project Digital Projection DP.U7.L15.1.

Text Structures
How does the author organize information in a text?

Different Types of Text Structures	Defined	Clue Words
Time	Explains when an event took place	before now later
Sequence	Explains the order in which events happened	first next then after last finally
Cause and Effect	Explains why things happen	because then if so as a result when
Comparison	Shows differences and similarities between two or more things	however on the other hand like unlike same

Universal Access

- Read a short informational paragraph aloud and have students identify words that help connect the sentences together in a logical order. Paragraphs can show cause and effect, comparison, sequencing, or logical order.
- Provide additional books, articles, and photographs about the space shuttle.
- Group students together strategically for partner and small group activities.

Start Lesson

Lesson 15: The Space Shuttle

Language

15M

Primary Focus: Students will write words using spelling patterns and rules for the sounds /ae/, /k/, /s/, /j/, and /n/. **TEKS 3.2.B.iv**

SPELLING ASSESSMENT (15 MIN.)

Activity Page 15.1

- Have students turn to Activity Page 15.1 for the spelling assessment.
- Tell students that for this assessment, they will write their words under the header to which they belong. For example, if you call out the word *today*, they would write that word under the header 'ay'> /ae/.
- Tell students that should a spelling word fit under more than one header, they should only write the word under one.
- Tell students that they may not have to use all the lines under each header.
- Using the chart below, call out the words using the following format: Say the word, use it in a sentence, and say the word once more.
- After you have called out all of the words, including the Challenge Words and the Content Word, go back through the list slowly, reading each word just once more.

1. annoy	12. digest
2. yesterday	13. kindness
3. quickly	14. fascinate
4. gymnasium	15. character
5. recently	16. budget
6. subject	17. refrigerate
7. awaited	18. accomplish
8. knowledge	**Challenge Word:** *different*
9. listen	**Challenge Word:** *thought*
10. design	**Content Word:** *atmosphere*
11. jewel	

TEKS 3.2.B.iv Demonstrate and apply spelling knowledge by: spelling multisyllabic words with multiple sound-spelling patterns.

- Ask students to write the following sentences as you dictate them:
  1. The silly kitten basked in the sun.
  2. "Come join our basketball team," said the boy to his friends.
- You may find it helpful to use the Spelling Analysis Chart found at the end of this lesson to analyze students' mistakes. This will help you understand any patterns that are beginning to develop, or that are persistent among individual students.

Lesson 15: The Space Shuttle

Speaking and Listening

15M

Primary Focus: Students will work collaboratively to make connections between sentences in text about the space shuttle and explain their ideas and reasoning. **TEKS 3.1.C; TEKS 3.1.D; TEKS 3.9.D.i; TEKS 3.9.D.iii**

CONNECTING SENTENCES IN A PARAGRAPH (15 MIN.)

- Ask students why sentences in paragraphs are written by the author in a particular order. (so they make sense)
- Ask students how they know if the sentences in a paragraph are in the right order. (Answers vary, but should include that the content makes sense, or the chronology is right, or that there is a cause and an effect, or that there are clue words, etc.)
- Remind students of the informational text types they learned about in a previous unit. Go over the chart below, (DP.U7.L15.1), emphasizing the clue words for each of the types:

TEKS 3.1.C Speak coherently about the topic under discussion, employing eye contact, speaking rate, volume, enunciation, and the conventions of language to communicate ideas effectively; **TEKS 3.1.D** Work collaboratively with others by following agreed-upon rules, norms, and protocols; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence, (iii) organizational patterns such as cause and effect and problem and solution.

Projection DP.U7.L15.1

Text Structures How does the author organize information in a text?		
Different Types of Text Structures	**Defined**	**Clue Words**
Time	Explains when an event took place	before now later
Sequence	Explains the order in which events happened	first next then after last finally
Cause and Effect	Explains why things happen	because then if so as a result when
Comparison	Shows differences and similarities between two or more things	however on the other hand like unlike same

- Have the students get into the small groups you previously assigned.
- Give each small group either a #1 or a #2 envelope with the mixed-up sentence strips that you previously prepared.
- Tell the groups that they will be working together to put the sentences about the space shuttle in order so that they make the most sense. Tell them that the sentences may not have any of the clue words, so they will have to use their logic to figure out the order of the sentences.
- When all the groups have finished, have all the #1 groups read their paragraphs, with appropriate volume, clear enunciation, and correct pronunciation, and explain why they put the sentences in that particular order.
- Repeat with all the #2 groups.

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Exchanging Information and Ideas

Beginning
In the small groups, students can verbally state whether or not a sentence should be first, second, third, etc. Or students can physically move the sentence strips into the right order.

Intermediate
Students can read the sentences aloud in the order they think should be first, second, third, etc.

Advanced/Advanced High
Encourage students to share their ideas using complete sentences.

ELPS 3.C

Support

Students will benefit from the peer interaction and support during this group activity. Provide additional practice in sequencing sentences using shorter paragraphs with sentences that have clear clue words as a guide.

Lesson 15: The Space Shuttle

Reading

50M

Primary Focus: Students will demonstrate comprehension of an informational text about the space shuttle. **TEKS 3.7.C**

Students will make connections between sentences in paragraphs from text about Jupiter. **TEKS 3.9.D.i**

VOCABULARY: "THE SPACE SHUTTLE"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.

space shuttle—a manned spacecraft used for exploration

shuttle—to go back and forth from one place to the next

booster rocket—one of two parts of a space shuttle that helps launch it into space by overcoming gravity

especially—very much; particularly

unmanned—not carrying people

Vocabulary Chart for "The Space Shuttle"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	space shuttle booster rocket	shuttle especially unmanned
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE CHAPTER (5 MIN.)

- Make sure you and your students all have a copy of *What's in Our Universe?*
- Tell students that today they will be reading Chapter 11 silently on their own.
- You may wish to have a small group read the chapter with you.

TEKS 3.7.C Use text evidence to support an appropriate response; **TEKS 3.9.D.i** Recognize characteristics and structures of informational text, including the central idea with supporting evidence.

Chapter

11 The Space Shuttle

Interest in **manned** space exploration soared after **Apollo 11**. Other **astronauts** went to the moon. But scientists were also interested in exploring other parts of space beyond the moon. It was very expensive and took a lot of time to build and send spaceships into space. Do you remember that when **Apollo 11** returned from space, it landed in the sea? It was not able to land safely on the ground, so this type of spacecraft always had to land in the sea. Once it landed in the sea, this kind of spacecraft could not be used again.

In 1981, a **reusable spacecraft**, called a **space shuttle**, was built. It was able to fly up into space and then zoom back down to Earth. When it returned to Earth, the pilot was able to land the spacecraft on a runway almost like an airplane. It glided down from space and landed on a runway, but it had to be a very long runway.

72

*A **space shuttle** lifts off*

73

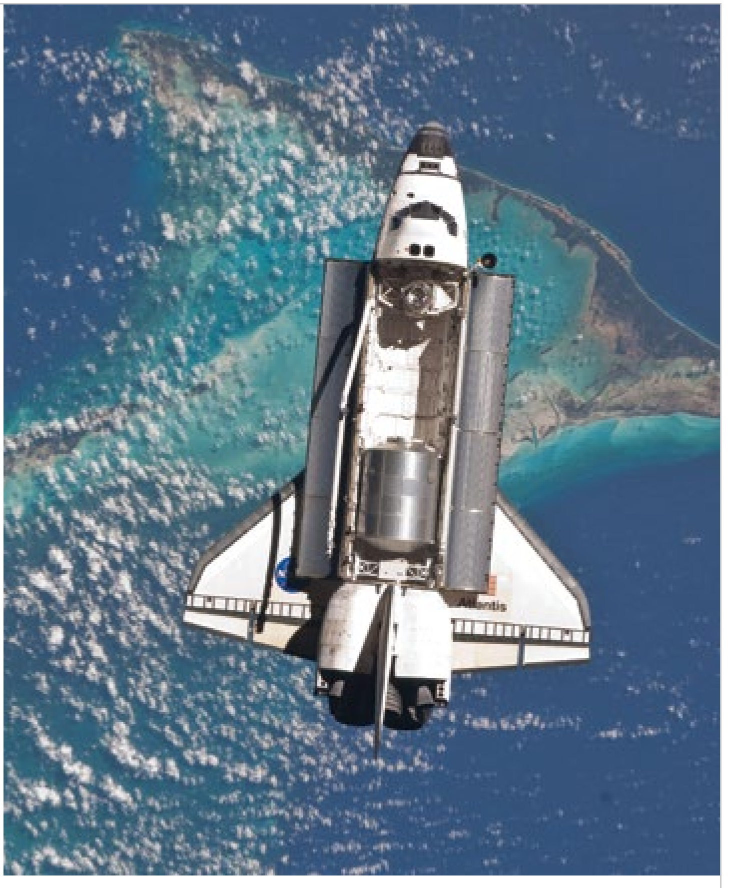
INDEPENDENT READING: "THE SPACE SHUTTLE" (20 MIN.)

Pages 72–73

- Read the title of the chapter together as a group, "The Space Shuttle."
- Point students' attention to the image on **page 73** and read the caption aloud as a class.
- Ask students to share what they know about the space shuttle.
- Tell students to read **pages 72–73** to themselves to find the answer to the question: "Why is the space shuttle reusable?"
- When students have finished reading, restate the question and ask students to answer.
    - » When the space shuttle returned to Earth, the pilot was able to land the spacecraft on a runway like an airplane. In that way, it was able to be used again.

The **space shuttle** was flown back into space again and again. It **shuttled** back and forth between Earth and space. That is why it was called the **space shuttle**.

The image on the previous page shows the **launch** of a **space shuttle**. The **space shuttle** itself is the white part that looks like a jet plane. The other parts are **booster rockets**. The **booster rockets** helped the **space shuttle** get off the ground. They helped the **space shuttle** overcome Earth's **gravity**. Once the **space shuttle** was up into space, it dropped the **booster rockets** because it no longer needed them.



*A **space shuttle** in orbit above Earth*

74 75

Pages 74–75

- Ask, "What are booster rockets and why are they a necessary part of the space shuttle?"
    - » They boost the space shuttle to get off the ground by helping to overcome Earth's gravity. Once up in space, the booster rockets are dropped because they are no longer needed.
- Direct students' attention to the image and caption on **page 75**.

In the thirty years between 1981 and 2011, different **space shuttles** carried **astronauts** up into space on many missions. The **space shuttle** was also used to bring research equipment and tools into space. The **astronauts** did many experiments to find out more about space. Scientists were **especially** interested in learning about what effect the lack of **gravity** would have on humans and other living things.

The **space shuttle** was also used to help build an amazing space station. **Astronauts** could live at the space station for months at a time. Often, the **space shuttle** carried supplies back and forth from Earth to the space station. It also provided a ride home to Earth when it was time for the **astronauts** to return.

The last **space shuttle** mission took place in July 2011. **NASA** scientists and Americans were proud of everything the **astronauts** had accomplished in thirty years. With the end of the **space shuttle** missions, **NASA** is planning other ways to explore space. Those plans include **launching unmanned probes** and **satellites**. **NASA** scientists hope to learn more about the moon's **gravity** and are even talking about trying to explore **asteroids**!

*A **space shuttle** comes in for a landing.*

76

77

Pages 76–77

- Point students' attention to the image on **page 77**. Read the caption together as a class or have a student read it to the class.
- Have students read **pages 76–77** to themselves to find the answer to the question: "What was the purpose of the space shuttle?"
- When students have finished reading, restate the question and ask students to answer.
    - » It carried astronauts into space on many missions, brought research equipment and tools into space, and helped build a space station.
- Ask, "When was the last space shuttle mission?"
    - » 2011
- Say, "List NASA's plans for exploring space in the future."
    - » launching unmanned probes and satellites, learning more about the moon's gravity, exploring asteroids

ENGLISH LANGUAGE LEARNERS

Reading
Reading/Viewing Closely

Beginning
Have students answer yes or no to the question, "Is it true that the space shuttle only carries astronauts into space?" and point to the sentence that helps answer the question.

Intermediate
Have students reread with partners before answering the questions.

Advanced/Advanced High
Encourage students to reread portions of text and work independently.

ELPS 1.E; ELPS 4.F

Support

Pull a small group of students to read the chapter with you and use the Small Group Guided Reading Support. Assist students in completing Activity Page 15.2.

Activity Page 15.2

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

Activity Page 15.3

Check for Understanding

Using chart paper or the board, have students brainstorm one word to describe the space shuttle. If students have difficulty producing words, direct them to reread portions of the text and look for key words.

COMPREHENSION QUESTIONS (15 MIN.)

- Have students turn to Activity Page 15.2.
- Tell students that they will be working on the page independently.
- Collect Activity Page 15.2 when completed.

CONNECTING SENTENCES IN A PARAGRAPH (10 MIN.)

- Have students turn to Activity Page 15.3.
- Tell students that they need to figure out the order of the mixed-up sentences from a paragraph about Jupiter.
- Tell students that there are some clue words, but mostly they'll need to see what makes the most sense.
- Collect Activity Page 15.3.

Lesson 15: The Space Shuttle

Writing

40M

Primary Focus: Students will write a brief informative paragraph using words that connect the sentences together in a logical sequence. **TEKS 3.9.D.i; TEKS 3.9.D.iii; TEKS 3.12.B**

PARAGRAPH WRITING: CONNECTING SENTENCES (25 MIN.) TEKS 3.12.B

- Tell students that they will now write their own informative paragraphs that they will cut out and mix up for a partner to try and put in the correct order.
- Tell students that they can write on any topic they want (e.g., dogs, making a sandwich, bugs, playing a game), but it must be informative and not a story.
- Show the text structures chart from earlier in the lesson (DP.U7.L15.1):

TEKS 3.9.D Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence, (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.

Projection DP.U7.L15.1

Text Structures How does the author organize information in a text?		
Different Types of Text Structures	**Defined**	**Clue Words**
Time	Explains when an event took place	before now later
Sequence	Explains the order in which events happened	first next then after last finally
Cause and Effect	Explains why things happen	because then if so as a result when
Comparison	Shows differences and similarities between two or more things	however on the other hand like unlike same

- Explain to students that they can choose to write in any form they choose that is listed in the chart.
- Tell students that once they've chosen how they will structure their paragraph, they will need to make sure that they include some clue words to help structure the order of the sentences. Not every sentence will need a clue word.
- Tell students that their paragraphs must have between five and seven sentences.
- Explain that they should first write their drafts on regular paper, revising and editing on that page, before they copy their final version to the blank paper you will give them.
- Distribute the blank paper and the scissors. It may be helpful to show a sample of how the sentences should be written on the blank paper.
- Tell students that they'll need to write each sentence separately, leaving enough room so that the sentences can be cut apart.
- Remind students that they will be expected to write in complete sentences, using appropriate capitalization and punctuation.

ENGLISH LANGUAGE LEARNERS

Writing
Understanding Text Structure

Beginning
Provide sentence frames; e.g., "If you want to ____, the first thing you should do is ____" or "I like ____ better than ____ because ____."

Intermediate
Have students work with a partner to create a paragraph.

Advanced/Advanced High
Encourage students to work independently, providing support if needed.

ELPS 5.F

Support

Pull a small group together to do a shared writing activity. Have all group members contribute to the informational paragraph and practice inserting clue words in the sentences.

Challenge

Tell students to use a variety of complex sentences, with one or more subordinate clauses in addition to the main clause.

- Students will write their paragraphs. Circulate around to answer questions and check on progress.

SHARING: CONNECTING SENTENCES (10 MIN.)

- Tell students that they should now use their scissors to cut their sentences apart.
- Have half of the students line up on one side of the room while the other half lines up on the opposite side of the room.
- Starting with the first student on one side and the first student on the other side, pair the students off. Continue pairing students from each line until everyone has a partner.
- The partners will exchange their mixed-up paragraph sentences and try to put them in the right order.

WRAP-UP (5 MIN.)

- Have students share their experiences briefly.
- Tell students that they will take home Activity Page 15.4 to read to a family member at home.

End Lesson

Lesson 15: The Space Shuttle

Take-Home Material

Activity Page 15.4

- Have students take home Activity Page 15.4 to read to a family member.

Connecting Sentences

Directions for the teacher: Prepare copies of Paragraph 1 and Paragraph 2. Cut out the sentences strips. Keep the sentences for each paragraph separate. Mix up the sentence strips before putting into an envelope, marking the outside either #1 or #2. Each small group will get either #1 or #2.

Paragraph 1

In 1981, a reusable spacecraft, called a space shuttle, was built.

It was able to fly up into space and then zoom back down to Earth.

When it returned to Earth, the pilot was able to land the spacecraft on a runway almost like an airplane.

It glided down from space and landed on a runway, but it had to be a very long runway.

Connecting Sentences

Paragraph 2

In the thirty years between 1981 and 2011, different space shuttles carried astronauts up into space on many missions.

The space shuttle was also used to bring research equipment and tools into space.

The astronauts did many experiments to find out more about space.

Scientists were especially interested in learning about what effect the lack of gravity would have on humans and other living things.

Spelling Analysis Chart

Name																				
1. annoy																				
2. yesterday																				
3. quickly																				
4. gymnasium																				
5. recently																				
6. subject																				
7. awaited																				
8. knowledge																				
9. listen																				
10. design																				
11. jewel																				
12. digest																				
13. kindness																				
14. fascinate																				
15. character																				
16. budget																				
17. refrigerate																				
18. accomplish																				
Challenge Word: different																				
Challenge Word: thought																				
Content Word: atmosphere																				

Spelling Analysis Directions

Unit 7, Lesson 15

- Students are likely to make the following errors:
  - For /ae/, writing ‘ay’, ‘ai’, ‘ea’, or ‘a_e’ for ‘a’
  - For /ae/, writing ‘ay’, ‘ai’, ‘ea’, or ‘a’ for ‘a_e’
  - For /ae/, writing ‘ay’, ‘ai’, ‘a’, or ‘a_e’ for ‘ea’
  - For /ae/, writing ‘ay’, ‘ea’, ‘a_e’, or ‘a’ for ‘ai’
  - For /ae/, writing ‘ai’, ‘ea’, ‘a_e’, or ‘a’ for ‘ay’
  - For /k/, writing ‘c’, ‘k’, ‘ck’, or ‘ch’ for ‘cc’
  - For /k/, writing ‘c’, ‘k’, ‘ck’, or ‘cc’ for ‘ch’
  - For /k/, writing ‘c’, ‘k’, ‘ch’, or ‘cc’ for ‘ck’
  - For /k/, writing ‘c’, ‘ck’, ‘ch’, or ‘cc’ for ‘k’
  - For /k/, writing ‘k’, ‘ck’, ‘ch’, or ‘cc’ for ‘c’
  - For /s/, writing ‘s’, ‘c’, ‘ss’, ‘ce’, ‘se’, or ‘st’ for ‘sc’
  - For /s/, writing ‘s’, ‘c’, ‘ss’, ‘ce’, ‘se’, or ‘sc’ for ‘st’
  - For /s/, writing ‘s’, ‘c’, ‘ss’, ‘ce’, ‘sc’, or ‘st’ for ‘se’
  - For /s/, writing ‘s’, ‘c’, ‘ss’, ‘se’, ‘st’, or ‘sc’ for ‘ce’
  - For /s/, writing ‘s’, ‘c’, ‘ce’, ‘se’, ‘st’, or ‘sc’ for ‘ss’
  - For /s/, writing ‘s’, ‘ss’, ‘ce’, ‘se’, ‘st’, or ‘sc’ for ‘c’
  - For /s/, writing ‘c’, ‘ss’, ‘ce’, ‘se’, ‘st’, or ‘sc’ for ‘s’
  - For /j/, writing ‘g’, ‘j’, ‘ge’, or ‘dge’ for ‘dg’
  - For /j/, writing ‘g’, ‘j’, ‘ge’, or ‘dg’ for ‘dge’
  - For /j/, writing ‘g’, ‘j’, ‘dge’, or ‘dg’ for ‘ge’
  - For /j/, writing ‘g’, ‘ge’, ‘dge’, or ‘dg’ for ‘j’
  - For /j/, writing ‘j’, ‘ge’, ‘dge’, or ‘dg’ for ‘g’
  - For /n/, writing ‘n’, ‘nn’, or ‘kn’ for ‘gn’
  - For /n/, writing ‘n’, ‘nn’, or ‘gn’ for ‘kn’
  - For /n/, writing ‘n’, ‘kn’, or ‘gn’ for ‘nn’
  - For /n/, writing ‘nn’, ‘kn’, or ‘gn’ for ‘n’

LESSON

16

Mae Jemison

PRIMARY FOCUS OF LESSON

Speaking and Listening

Students will listen to text read about astronaut Mae Jemison and answer questions about her life. **TEKS 3.1.A; TEKS 3.7.C**

Reading

Students will read about astronaut Mae Jemison and put the events of her life in sequence. **TEKS 3.7.B; TEKS 3.7.D**

Students will compare and contrast two texts about Mae Jemison. **TEKS 3.6.H**

Writing

Students will write an opinion about a famous quote by Mae Jemison. **TEKS 3.12.C**

FORMATIVE ASSESSMENT

Activity Page 16.1	**Mae Jemison** Students will answer questions about Mae Jemison's life during the Read-Aloud. **TEKS 3.7.C**
Activity Page 16.2	**Sequencing and Reflection** Students will put Mae Jemison's life events in order. **TEKS 3.7.B; TEKS 3.7.D**
Writing	**Opinion** Students will write about what a famous quote means to them. **TEKS 3.12.C**

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.D** Retell and paraphrase texts in ways that maintain meaning and logical order; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.12.C** Compose argumentative texts, including opinion essays, using genre characteristics and craft.

LESSON AT A GLANCE

	Grouping	Time	Materials
Speaking and Listening (45 min.)			
Introducing the Read-Aloud	Whole Group	10 min.	❏ Digital Flip Book: U7.L16.1–U7.L16.8 ❏ Activity Page 16.1
Read-Aloud: “Mae Jemison”	Whole Group	20 min.	
Discussing the Read-Aloud	Whole Group	5 min	
Word Work: *Mission*	Whole Group	5 min	
Sayings and Phrases: A Feather in Your Cap	Whole Group	5 min	
Reading (50 min.)			
Introducing the Chapter	Whole Group	10 min.	❏ *What’s in Our Universe?* ❏ Activity Page 16.2 ❏ chart paper and markers
Partner Reading: "Dr. Mae Jemison"	Partner	15 min.	
Sequencing	Independent	10 min.	
Compare and Contrast: Two Texts	Small Group	15 min.	
Writing (25 min.)			
Opinion: Quote by Mae Jemison	Independent	20 min.	❏ writing paper
Wrap-Up	Whole Group	5 min.	
Take-Home Material			
Reading: “Dr. Mae Jemison”			❏ Activity Page 16.3

ADVANCE PREPARATION

Speaking and Listening

- Prepare to project the following digital images during the Read-Aloud: U7.L16.1–U7.L16.8.

Writing

- Write the following quote on chart paper or on the board:
    - "The best way to make dreams come true is to wake up." Mae Jemison

Universal Access

- Read a short informational text that has a structure that is chronological or shows a sequence. Tell students to listen to clue words for sequencing as you read aloud and raise their hands when they hear it. Have students recall the sequence of events after reading.
- Provide additional books, articles, and photographs about Mae Jemison, other astronauts, or the Space Shuttle program.
- Group students together strategically for partner and small group activities.

Start Lesson

Lesson 16: Mae Jemison

Speaking and Listening 45M

Primary Focus: Students will listen to text read about astronaut Mae Jemison and answer questions about her life. **TEKS 3.1.A; TEKS 3.7.C**

VOCABULARY: "MAE JEMISON"

- The following are core vocabulary words used in this lesson. Preview the words with the students before the lesson. Students are not expected to be able to use these words immediately, but with repeated exposure throughout the lessons they will acquire a good understanding of most of the words. Students may also keep a "unit dictionary" notebook along with definitions, sentences, and/or other writing exercises using these vocabulary words.

aeronautics, the study or practice of flight and aircraft

applications, written requests to be considered for a program or job

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.7.C** Use text evidence to support an appropriate response.

engineering, the study and work of using science, knowledge, and methods to solve problems in the world

pursue, to do what it takes to accomplish something

refugees, people who flee to another country for protection and safety

tragedy, a very sad event or a disaster

Vocabulary Chart for "Mae Jemison"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	aeronautics engineering	applications pursue refugees tragedy
Multiple Meaning Vocabulary Words		
Sayings and Phrases	A feather in your cap	

INTRODUCING THE READ-ALOUD (10 MIN.)

- Remind students that in previous lessons they heard about the first astronauts to land on the moon and the space shuttle.
- Ask students to describe what Neil Armstrong may have been feeling when he first stepped on the moon.
    - » Answers vary, but could include feeling scared, excited, proud, etc.
- Ask students if they recall what letters in the acronym NASA stands for.
    - » National Aeronautics and Space Administration
- Share that NASA is an organization that was started to lead the scientific research and exploration of outer space. Tell students that it was NASA that coordinated the Apollo 11 trip to the moon, other manned flights into space, and many voyages of the spacecraft that have taken pictures of the distant planets in our solar system. Tell students that NASA was formed in 1958 and since then continues to change the way we think about the universe.

- Tell students that a lot of people work for NASA to support its many missions. Explain that a mission is a specific task or job that a person, team, or piece of equipment is sent to perform. Ask students, "What kinds of missions have you heard about that involved learning about space?" (Answers may vary.) Ask students, "What kinds of things do you think scientists and other workers at NASA might do to help astronauts and spacecraft triumph in their missions?" Guide students to understand that it takes many kinds of workers to help astronauts and spacecraft be successful in their missions to learn more about space.
- Tell students that today they'll be learning about a famous astronaut, Mae Jemison. While they're listening to the Read-Aloud, they'll be answering questions about Mae Jemison.
- Tell students to turn to Activity Page 16.1.
- Have a volunteer read the first question on Activity Page 16.1, "Why is Mae Jemison famous?" Tell students to listen carefully and to write the answer down when they hear it.

Activity Page 16.1

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Rephrase the questions on Activity Page 16.1 so students write one-word answers; e.g., "Mae Jemison was famous because she was the first African-American woman to go into ____." Alternatively, allow students to answer the questions orally.

Intermediate
Allow students to work with partners when answering the questions on Activity Page 16.1.

Advanced/Advanced High
Encourage students to answer questions in complete sentences, using correct capitalization and punctuation.

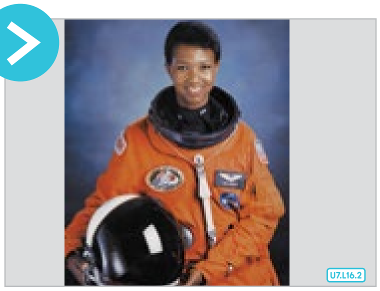
ELPS 3.D

READ-ALOUD: "MAE JEMISON" (20 MIN.)

Show Image U7.L16.1
Spacecraft

When Copernicus was born in the 1400s, space travel was an impossible dream. Copernicus didn't even have a telescope, let alone a spacecraft! But thanks to the careful observations, logical thinking, and bold ideas of Copernicus and many other scientists before and after him, today we live in an amazing time when dreams of space travel really can come true. Advancements or improvements in technology have made it possible for human beings to travel into space. Ever since Apollo 11 first landed on the moon in 1969, more and more astronauts have flown into space. Would you like to be one of them?

Ask students to raise their hand if they'd like to travel in space.



Show Image U7.L16.2
Astronaut Mae Jemison

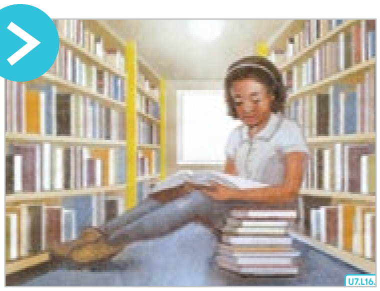
Mae Jemison's answer to that question was definitely yes! She dreamed about going into space from the time she was a little girl. And when she grew up, that's exactly what she did. In 1992, Mae Jemison blasted into space aboard the space shuttle *Endeavour*.

She lived on the *Endeavour* for 8 days and conducted, or carried out, many experiments while she was there. In these experiments, she carefully collected information about how weightlessness in space affects animals and humans. One of the experiments involved frog eggs. Jemison wanted to see if they would develop into tadpoles normally while in orbit.

Tell students to read and answer question #2 on Activity Page 16.1.

Mae Jemison was the first African-American woman ever to go into space. In fact, she was the first African-American female astronaut in the history of the National Aeronautics and Space Administration.

Ask students to look at the first question on Activity Page 16.1, "Why is Mae Jemison famous?" and tell them to write their answers in the first box.



Show Image U7.L16.3
Mae Jemison as a Child

How did Mae Jemison make her childhood dreams of space travel come true? Part of the answer is that when she was young, she read—a lot—about the things she was interested in. Jemison was born in 1956 in Decatur, Alabama, but grew up in Chicago, Illinois. As a child, Jemison was very interested in space. She was 12 years old

Support

Ask students why they would conduct weightlessness experiments aboard the space shuttle. (There is no gravity.)

Challenge

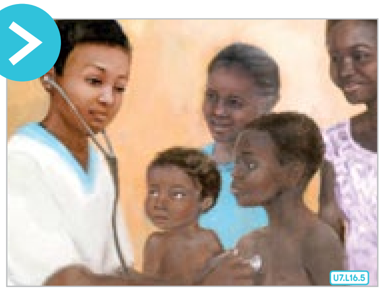
Have students give opinions as to what they think the results were from the experiments involving the frog eggs. Have them back up their opinion with reasons.

when astronaut Neil Armstrong and his Apollo 11 mission landed on the moon. At age 14, Jemison was still interested in space, so she read many adult books about astronomy. At the age of only 16, she graduated from high school and went to college at Stanford University in Stanford, California.

Show Image U7.L16.4
Mae Jemison Graduating from College

Education was very important to Mae Jemison. Education is also very important to NASA in choosing who will become an astronaut. While Jemison was at Stanford University, she studied chemical engineering, which is the study of chemicals or substances and how they can be used to solve problems or make products. While she was at college, Jemison also enjoyed theater, dancing, and playing football with her friends. She believed it was important to be a well-rounded person, which means to study and enjoy many different things. Jemison graduated from college with a degree in chemical engineering and African-American studies.

Tell students to look at #3 on their activity sheet and answer the question, "What kinds of characteristics and skills do you think made Jemison a good candidate for NASA?"



Show Image U7.L16.5
Mae Jemison Working in Africa

Besides wanting to be an astronaut, Mae Jemison also wanted to be a biomedical engineer.

Biomedical engineers seek new ways to use technology to improve health care for people. When Jemison graduated from college, she thought about applying right away to NASA to become an astronaut but decided to go to medical school first. In medical school, she traveled around the world, providing medical care to people living in developing countries.

Tell students that a developing country is a country where most people do not have a lot of money or resources, and many do not have all the basic things they need to live a healthy life, such as adequate food, health care, clean water, and education.

As a medical school student, Jemison traveled to Kenya in Africa where she helped with community medicine projects. Jemison also traveled to Thailand in Asia to care for refugees from Cambodia.

Have a volunteer point to Kenya, Thailand, and Cambodia on a world map or globe.

After Jemison graduated from medical school, she worked for the Peace Corps for more than 2 years. The Peace Corps is a U.S. governmental organization that sends volunteers to assist people in developing countries. In the Peace Corps, Jemison was responsible for the health of Peace Corps volunteers working in West Africa.

Tell students to read and answer question #4 on their activity page.

Show Image U7.L16.6
Mae Jemison at Work on the Space Shuttle

In 1985, Mae Jemison decided the time was right to pursue her dream of space travel. She applied to NASA to become an astronaut. But soon afterward, in January 1986, NASA suffered a terrible tragedy in its Space Shuttle program. The space shuttle *Challenger* burst into flames a little over a minute after it was launched. After this tragedy, all astronaut applications—including Jemison's—were postponed, meaning that NASA was not accepting

Support

Remind students that an engineer is a person who uses the knowledge and tools of engineering to solve problems.

Support

Remind students that refugees are people who have had to flee to another country to find safety.

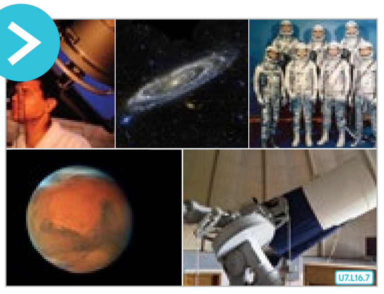
any applications for new astronauts for a time. After NASA reopened the astronaut application program, Jemison found out she was chosen to be an astronaut in 1987.

Tell students to read and answer question #5 on their activity page.

In 1992, after completing her Space Shuttle mission aboard the *Endeavour*, Jemison was famous. She was the first African-American woman to go into space. Jemison retired from NASA in 1993 to pursue some of her other dreams. Jemison has used her fame as a "launch pad" to bring important issues into the public spotlight. She founded an international science camp called The Earth We Share. Students at the international camp work to help solve current global problems by using science and technology. She also started her own company, which seeks to develop technologies that benefit planet Earth and the people who live on it. But most of all, Jemison is a great example of how important it is to follow your many dreams. Mae Jemison is living proof that your dreams can literally take you "out of this world!"

Check for Understanding

Have a discussion about how Mae Jemison used her fame as a "launch pad" for bringing attention to important issues. If students have difficulty expressing this, list some of the things she has accomplished since being an astronaut. Ask students if they think that more people would be willing to listen to what she has to say because they respect and look up to her for being the first African-American woman in space.



Show Image U7.L16.7
Astronomy Images

Mae Jemison is just one of many astronomers who have added to our knowledge and understanding of space and the universe. For thousands of years, humans have been curious about the celestial bodies and what lies beyond the earth. Even now, there are man-made satellites, spacecraft, and even scientists in space performing experiments, gathering information, and taking pictures.

Show Image U7.L16.8
Astronomy Images

What discoveries are yet to come? As we come to the end of our space journey together, there is still one question: what's next? As we learn more and more about our world, there could be a thrilling discovery waiting right around the corner. Will you be the next great scientist to contribute to the work of other scientists who have come before you? Will you become an astronaut and set foot on another planet or moon? Will you discover a new celestial body, a new galaxy, or a new way of thinking about our world? What's next?

DISCUSSING THE READ-ALOUD (5 MIN.)

- Spend this time having students share their answers to questions on Activity Page 16.1.
- Collect Activity Page 16.1.

WORD WORK: MISSION (5 MIN.)

1. In the Read-Aloud, you heard, "[Jemison] was 12 years old when astronaut Neil Armstrong and his Apollo 11 mission landed on the moon."
2. Say the word *mission* with me.
3. A mission is a special task or job that a person, team, or piece of equipment is sent to do.
4. People on Earth watched with excitement as astronauts Aldrin, Armstrong, and Collins carried out their mission to the moon on Apollo 11.

5. Have you ever been on a mission or pretended to be on a mission? Has an adult you know ever been on a mission? Be sure to use the word *mission* when you tell about it. Ask two or three students. If necessary, guide and/or rephrase the students' responses to make complete sentences: "______ was on a mission when ______."

6. What's the word we've been talking about? What part of speech is the word *mission*?

- Use a *Sharing* activity for follow-up. Directions: Turn to your partner and tell them about a time when you or someone you know was on a mission. What difficulties had to be overcome?

  What were the rewards for succeeding in the mission? Be sure to use the word *mission* in a complete sentence as you share.

SAYINGS AND PHRASES: A FEATHER IN YOUR CAP (5 MIN.)

- Ask students if they have ever heard someone say "a feather in your cap." Have students repeat the idiom. Ask students what a cap is.
  - » hat
- Explain that this idiom refers to an accomplishment that is worthy of praise. Memorizing all of the multiplication tables, for example, can be a feather in your cap. This 17th-century idiom comes from an ancient Native American and Asian custom. Warriors placed a feather in their headgear for every enemy they defeated in battle.
- Ask students, "In today's Read-Aloud, which of Jemison's accomplishments could be seen as a feather in her cap?
  - » becoming a doctor and an engineer, serving in the Peace Corps, being the first African-American female astronaut, etc.
- When Mae Jemison became the first African-American female in space, someone could have told her, "That accomplishment is a feather in your cap!" It used to be that only men with backgrounds as jet pilots were considered for becoming astronauts with NASA, so Jemison broke many boundaries as an African-American woman who worked hard to develop herself as a scientist.
- Ask students if they can think of a situation where they or someone else they know has achieved an accomplishment that is a feather in their cap. You may wish to share an example of your own. Try to find other opportunities to use this saying in the classroom.

Lesson 16: Mae Jemison

Reading

50M

Primary Focus: Students will read about astronaut Mae Jemison and put the events of her life in sequence. TEKS 3.7.B; TEKS 3.7.D

Students will compare and contrast two texts about Mae Jemison. TEKS 3.6.H

VOCABULARY: "DR. MAE JEMISON"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.

chemical engineering, a field of study in which scientists use their knowledge of chemistry and how things in the natural world are made and interact

African-American studies, the study of the history, culture, and politics of African-Americans, Americans who have ancestors from Africa

Peace Corps, a group of American volunteers who carry out projects in other countries to help improve the lives of people living there

Endeavour, a NASA space shuttle

health care, the prevention or treatment of illnesses by trained medical specialists

Vocabulary Chart for "Dr. Mae Jemison"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary	chemical engineering African-American studies Peace Corps Endeavour health care	
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

TEKS 3.7.B Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.D** Retell and paraphrase texts in ways that maintain meaning and logical order; **TEKS 3.6.H** Synthesize information to create new understanding.

INTRODUCING THE CHAPTER (10 MIN.)

- Make sure you and your students each have Student Readers.
- Tell students that today they will be reading Chapter 12 with a partner.

Support

Pull together a small group of students to read the chapter with you. You may wish to make anecdotal records about decoding and reading fluency. Have students complete Activity Page 16.2 as they read.

Chapter

12 Dr. Mae Jemison

Do you know what a role model is? A role model is someone who sets an example for others by the way they live. Many students admire people who are famous athletes, movie stars, or singers and use them as role models. They see them on TV, in newspapers and in magazines, and decide they want to be like them. But some of the best role models are people that you probably would not see on TV or in newspapers. They have jobs such as doctors, teachers, or police officers. Some are scientists and **astronauts**. One such person is Mae Jemison.

Mae Jemison

78

79

PARTNER READING: "DR. MAE JEMISON" (15 MIN.)

Pages 78–79

- Read the title of the chapter together as a group, "Dr. Mae Jemison."
- Direct students' attention to the image and caption on page **79**.

Mae Jemison was born October 17, 1956, in Decatur, Alabama. Her family moved to Chicago, Illinois when she was young. Mae always took great pride in her schoolwork. She was interested in science, but was also interested in the arts. She finished high school early at age 16! From there, she went to Stanford University in California. Most college students focus on only one topic of study because college is so challenging. Mae focused and excelled in two topics of study—**chemical engineering** and **African-American studies**!

After Stanford, Mae entered medical school to become a doctor. She wanted to use her medical training to help people in different countries on the continent of Africa. To do this, she joined the **Peace Corps** as a volunteer. As part of the Peace Corps, Mae treated patients and also helped train other **health care** workers. She worked hard to help improve health care in the countries where she worked.

80

Stanford University, where Mae went to college

81

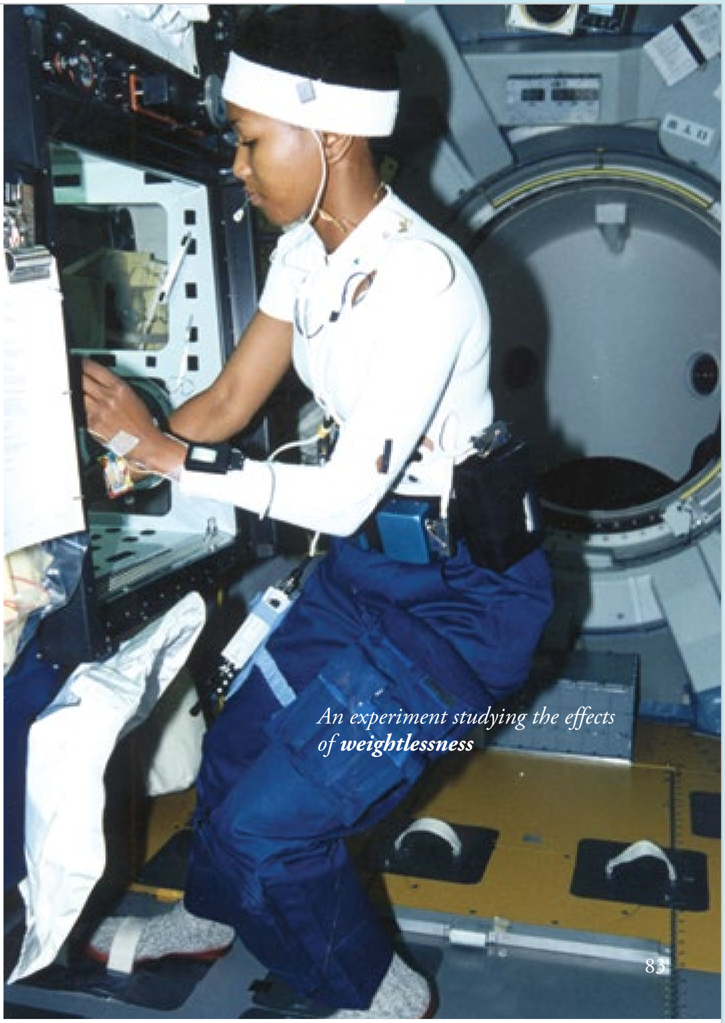
Pages 80–81

- Have students read **pages 80–81** to themselves to find the answer to these questions: "Who is Dr. Mae Jemison? Why do you think she makes a good role model?"
- When students have finished reading, restate the questions and ask students to answer.
    - » Dr. Jemison worked hard in school, finished early, studied two subjects at once in college, and joined the Peace Corps to use her medical training to help people in Africa and countries where people are poor.

After the **Peace Corps**, Mae came back to the United States. She set her sights on a different goal. Her greatest dream was to become an **astronaut** and travel into space. She decided to apply to **NASA** to become an **astronaut**. But the first time she applied, she was not accepted. Instead of giving up, she tried again and **NASA** accepted her the second time! She was one of only 15 people chosen from a group of 2,000 people who wanted to become **astronauts**!

Her training to become an **astronaut** was hard. She had to get into great shape and train to get used to being free of the effects of **gravity** in space. She also had to study and pass many tests about space travel. Mae Jemison succeeded in both.

82



*An experiment studying the effects of **weightlessness***

83

Pages 82–83

- Direct students' attention to the image and caption on **page 83**.
- Have students read **pages 82–83** to themselves to find the answer to the question: "What did Dr. Jemison do after finishing her time in the Peace Corps?"
- When students have finished reading, restate the question and ask students to answer.
    - » She became an astronaut and was chosen for a mission on the *Endeavour* space shuttle.

In 1992, Mae was chosen for a mission on the ***Endeavour*** **space shuttle**. A rocket **launched** the ***Endeavour*** into **orbit** around Earth. Mae became the first African-American female **astronaut** in space!

The mission was to study the effects of weightlessness on plants and animals. Mae conducted experiments during the mission with fellow **astronaut** Jan Davis. They collected information that the scientists at **NASA** could study. The mission was a great success.

After her successful mission, Mae retired from **NASA**. She became a professor at Dartmouth College, sharing her love of science and space with other students. She also started her own company called The Jemison Group, Inc. Mae's company searches for ways that science can help improve the lives of people in countries around the world. Mae Jemison is truly a role model that we can all admire!

Mae Jemison achieves her goal of becoming an ***astronaut****.*

84

85

Pages 84–85

- Have students read **pages 84-85** to themselves.
- Ask, "What is the important fact about her serving on the *Endeavour* that proves she is a good role model?"
    - » She became the first African-American female astronaut in space.

SEQUENCING (10 MIN.)

- Have students turn to Activity Page 16.2.
- Tell students that they will be working on the page independently.
- Collect Activity Page 16.2 when completed.

COMPARE AND CONTRAST: TWO TEXTS (15 MIN.)

- Divide the students into small groups of four to five students each.
- Make sure each small group has a one piece of chart paper and markers.
- Tell students they will be comparing the Read-Aloud and the reading about Mae Jemison.
- Tell students that they will create a compare and contrast poster, using their choice of graphic organizer.
- Remind students the types of organizers they've used in the past: T-chart, Venn diagram, web organizers, tables, etc.
- Allow students to work on their posters for about 10 minutes, leaving about 5 minutes for the groups to share out.

Lesson 16: Mae Jemison

Writing

25M

Primary Focus: Students will write an opinion about a famous quote by Mae Jemison. **TEKS 3.12.C**

OPINION: QUOTE BY MAE JEMISON (20 MIN.) TEKS 3.12.C

- Make sure students have writing paper.
- Tell students that Mae Jemison continues to work to help people and the Earth.
- Show students the quote you previously prepared on chart paper or the board and read it aloud:
    - "The best way to make dreams come true is to wake up." Mae Jemison

TEKS 3.12.C Compose argumentative texts, including opinion essays, using genre characteristics and craft.

Activity Page 16.2

ENGLISH LANGUAGE LEARNERS

Reading
Reading/
Viewing Closely

Beginning
Have students match the sentences on Activity Page 16.2 with correct sentences in the reading. Once they've found all the sentences in the chapter, guide them in finding the correct order.

Intermediate
Allow students to work with a partner to complete Activity Page 16.2.

Advanced/Advanced High
Encourage students to reread portions of text and work independently.

ELPS 4.D; ELPS 4.I

Support

Draw examples of compare and contrast graphic organizers as a reference.

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

ENGLISH LANGUAGE LEARNERS

Writing
Supporting Opinions

Beginning
Provide sentence frames; e.g., "I think that the quote means ____ because ____."

Intermediate
Provide 1:1 support and prompting as needed.

Advanced/Advanced High
Encourage students to write in complete sentences; provide support as needed.

ELPS 3.G; ELPS 5.F

Support

Have students first verbally share their opinion about what the quote means to them. Then guide them into turning that statement into a topic sentence. Have them create a list of reasons why they feel that way.

Challenge

Have students write about what dreams they have for the future and what they think they need to do to prepare for it.

- Explain to students that you want them to think about the quote. Ask, "What does the quote mean to you?"
- Tell students that they will answer that question by writing their opinion about what the quote means to them. Tell students that they should include reasons to support their opinion.
- Tell students to write in complete sentences, using correct grammar, capitalization, and punctuation.

WRAP-UP (5 MIN.)

- Have volunteers share their writing with the whole class.
- Collect the writing when completed.

End Lesson

Lesson 16: Mae Jemison

Take-Home Material

- Have students take home Activity Page 16.3 to read to a family member.

Activity Page 16.3

LESSON

17

A Tour of the International Space Station

PRIMARY FOCUS OF LESSON

Speaking and Listening

Students will identify key ideas and details from videos about the International Space Station. TEKS 3.1.A; TEKS 3.6.G; TEKS 3.7.E; TEKS 3.13.A; TEKS 3.13.B; TEKS 3.13.C; TEKS 3.13.F

Writing

Students will plan to write an informative piece about a day in the life of an astronaut aboard the International Space Station. TEKS 3.6.H; TEKS 3.11.A; TEKS 3.12.B; TEKS 3.13.C; TEKS 3.13.E

Reading

Students will read a story about a girl who goes to an astronomy camp and answer questions about the text. TEKS 3.7.C; TEKS 3.8.C

Language

Students will use the correct punctuation to indicate singular possessive nouns. TEKS 3.11.D.x

Reading

Students will demonstrate appropriate rate, accuracy, and prosody while reading aloud. TEKS 3.4

FORMATIVE ASSESSMENT

Activity Page 17.2	**Planning** Students will plan an informative writing piece using a graphic organizer. TEKS 3.6.H; TEKS 3.11.A; TEKS 3.12.B
Activity Page 17.3	**"Stargirl"** Students will read and answer questions about the story. TEKS 3.7.C; TEKS 3.8.C
Activity Page 17.4	**Optional Fluency Assessment** Students will demonstrate reading fluency. TEKS 3.2.A; TEKS 3.4

LESSON AT A GLANCE

	Grouping	Time	Materials
Speaking and Listening (50 min.)			
The International Space Station	Whole Group	10 min.	❑ Video: International Space Station 360º Virtual Tour ❑ Video: Space Station Live ❑ Videos: A Day in the Life: Aboard the International Space Station (6 videos from 2 to 8 min. each) ❑ writing paper for notes
Space Station Live	Whole Group	10 min.	
What Do Astronauts Do on the ISS?	Whole Group	30 min.	
Writing (25 min.)			
Introducing the Unit Assessment	Whole Group	10 min.	❑ Activity Pages 17.1, 17.2
Planning: A Day in the Life of an Astronaut on the ISS	Independent	15 min.	
Reading (25 min.)			
Independent Reading: "Stargirl"	Independent	15 min.	❑ Activity Pages 17.3, 17.4
Comprehension Questions	Independent	10 min.	
Language (20 min.)			
Grammar: Singular Possessive Nouns	Whole Group	20 min.	❑ Activity Page 17.5
Reading			
Optional Fluency Assessment: "The Hoba Meteorite"	Independent		

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating; **TEKS 3.13.A** Generate questions on a topic for formal and informal inquiry; **TEKS 3.13.B** Develop and follow a research plan with adult assistance; **TEKS 3.13.C** Identify and gather relevant information from a variety of sources; **TEKS 3.13.F** Recognize the difference between paraphrasing and plagiarism when using source materials; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.11.A** Plan a first draft by selecting a genre for a particular topic, purpose, and audience using a range of strategies such as brainstorming, freewriting, and mapping; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft; **TEKS 3.13.E** Demonstrate understanding of information gathered; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.8.C** Analyze plot elements, including the sequence of events, the conflict, and the resolution; **TEKS 3.11.D.x** Edit drafts using standard English conventions, including: punctuation marks including apostrophes in contractions and possessives and commas in compound sentences and items in a series; **TEKS 3.4** Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.

ADVANCE PREPARATION

Speaking and Listening

- Prepare to project the following videos for the Speaking and Listening lesson:
    - Video: International Space Station 360° Virtual Tour
    - Video: Space Station Live
    - Videos: A Day in the Life: Aboard the International Space Station
- It is highly recommended that you familiarize yourself with these videos prior to the lessons. You may find these videos by searching online. The ISS Live! Live Data Tutorial will be the most helpful for this lesson. You may wish to practice moving the view around and zooming in and out on the International Space Station 360° Virtual Tour. Note that there are components that you can click on for more information.

Writing

- This lesson introduces students to the unit assessment and continues having students work on the informative writing project through Lesson 19.
- Students will begin by planning for the informative writing piece about the International Space Station. If you plan to let students use computers to publish the piece, you may need to plan for extra time in the computer lab or allow them to publish at home.

Language

- Create the following poster on chart paper for the Grammar lesson:

    Possessive Nouns

    A **singular possessive noun** shows that one person, place, or thing has or owns something. Form a **singular possessive noun** by adding an apostrophe and 's' to a singular noun. (–'s)

- Write the following sentences on the board or chart paper for the Grammar lesson:
    - (The office of the doctor) is crowded today.
    - (The tractor of the farmer) is painted green.
    - (The ballet shoes of the dancer) are made of pink silk.
    - (The mitt of the catcher) is made of brown leather.
    - (The letters from the visitor) made me laugh.

Universal Access

- Brainstorm a list of essentials for living in space. What would an astronaut need? (food, shelter, communication, exercise, sleep, etc.)
- Provide additional books, articles, videos, and photos of the International Space Station and future plans for space missions.

Start Lesson

Lesson 17: A Tour of the International Space Station

Speaking and Listening

50M

Primary Focus: Students will identify key ideas and details from videos about the International Space Station.

TEKS 3.1.A; TEKS 3.6.G; TEKS 3.7.E; TEKS 3.13.A; TEKS 3.13.B; TEKS 3.13.C; TEKS 3.13.F

THE INTERNATIONAL SPACE STATION (10 MIN.)

TEKS 3.13.A–C, F

- Ask students if they remember talking about the space shuttle taking supplies and people up to a space station.
- Tell the students that even though the Space Shuttle program has ended, there are still spacecraft traveling to a space station, taking supplies and people back and forth from Earth.
- Write "International Space Station" on the board. Ask students if they've ever heard of it.
- Explain that the International Space Station, or ISS, is a large spacecraft that orbits the earth. Astronauts live and work on the ISS.
- Tell students that it is called the International Space Station because many countries came together to build it and to operate it.
- Tell students that it was built in pieces over time. The first piece went up into space in 1998. The first crew arrived to live on it in 2000. People have lived on the space station ever since.
- Explain that the inside of the space station is as big as a house with five bedrooms. The outside of the space station—which not only has the modules that the astronauts live in but also solar panels to power the station, robot arms for work and experiments, and various antennas and radar dishes to

TEKS 3.1.A Listen actively, ask relevant questions to clarify information, and make pertinent comments; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.7.E** Interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating; **TEKS 3.13.A** Generate questions on a topic for formal and informal inquiry; **TEKS 3.13.B** Develop and follow a research plan with adult assistance; **TEKS 3.13.C** Identify and gather relevant information from a variety of sources; **TEKS 3.13.F** Recognize the difference between paraphrasing and plagiarism when using source materials.

ENGLISH LANGUAGE LEARNERS

Speaking and Listening
Reading/ Viewing Closely

Beginning
Provide an outline for the notes with each of the categories: Morning Routine, Exercising, Eating, Working, Free Time, and Sleeping. After each video, state key ideas for students to copy into their outline.

Intermediate
Allow students to work with a partner to compile the notes for each category.

Advanced/Advanced High
Encourage students to work independently and check with a partner for accuracy.

ELPS 2.I

Support

Guide students in creating a graphic organizer for their notes.

Challenge

Ask students to make a list of items from the videos they would like to explore at a different time.

receive and send communications—is as big as a football field. At night, you can see the ISS if it is passing over where you live; it's one of the brightest objects in the sky.

- Tell students that over the next two lessons, they'll be learning more about the ISS and gathering information about living on the space station for an informative writing piece.
- Ensure that students have writing paper for note taking. They may need multiple sheets.
- Project the video: International Space Station 360º Virtual Tour. Spend a short time showing students the inside of the space station. Note that there are three viewing spots inside. Show students that because there is no gravity, there is no real up or down, so there are panels, tools, storage cabinets, and other items on all four walls.

SPACE STATION LIVE (10 MIN.)

- Project the Space Station Live video. Click on the Live Data tab at the bottom of the site.
- Depending on the time of day, you may see a live streaming video and you may hear the astronauts communicating with Mission Control.
- The Crew Timeline overview shows each of the crewmembers and what they are currently doing. Sometimes it is an experiment, sometimes routine work, and sometimes they are sleeping!
- The Science Timeline shows current data from experiments and research being conducted.
- The Console Display shows data about the operation of the station. Click on ADCO to see the orbital position in relation to Earth.

WHAT DO ASTRONAUTS DO ON THE ISS? (30 MIN.)

- Project the NASA video: A Day in the Life: Aboard the International Space Station.
- Tell students that they need to pay careful attention to the videos to capture information for their writing.

- You may show the videos in any order you wish. There are six videos from 3 to 8 minutes each. Write these topics of the videos on chart paper or on the board to help students organize their notes: Morning Routine, Exercising, Eating, Working, Free Time, and Sleeping.
- Go through each of the videos, reminding students to take notes, stopping briefly after each one to have students finish writing their notes.
- Tell students to keep their notes for the Writing lesson.

Check for Understanding

For each of the categories, Morning Routine, Exercising, Eating, Working, Free Time, and Sleeping, have a few students share some of their notes. If students are having difficulty, replay some of the videos a second time if time permits.

Lesson 17: A Tour of the International Space Station

Writing

25M

Primary Focus: Students will plan to write an informative piece about a day in the life of an astronaut aboard the International Space Station.

TEKS 3.6.H; TEKS 3.11.A; TEKS 3.12.B; TEKS 3.13.C; TEKS 3.13.E

INTRODUCING THE UNIT ASSESSMENT (10 MIN.)

TEKS 3.12.B; TEKS 3.13.C; TEKS 3.13.E

- Tell students that they will be writing an informative piece about a day in the life of an astronaut on the International Space Station.
- Ask students what it means to write an informative paragraph. They should recall from earlier in the year during the Animal Classification unit and the Light and Sound unit. (It means to relay information or facts that inform the reader about a specific topic.)
- Explain to students that they have already collected a lot of information from today's video, and also they have learned from their previous lessons what it's like to be in space. Tell them tomorrow they will be reading a little more about the ISS, and that they'll be able to add more to their notes.

TEKS 3.6.H Synthesize information to create new understanding; **TEKS 3.11.A** Plan a first draft by selecting a genre for a particular topic, purpose, and audience using a range of strategies such as brainstorming, freewriting, and mapping; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft; **TEKS 3.13.C** Identify and gather relevant information from a variety of sources; **TEKS 3.13.E** Demonstrate understanding of information gathered.

Activity Page 17.1

- Remind students of the steps of the writing process—plan, draft, revise, edit, and publish. Tell them that today we'll be focusing on planning their writing.
- Tell students that their informative piece should be longer than a paragraph, since there are many details to cover.
- Tell students to turn to Activity Page 17.1. Tell them that this is the rubric they will be using to score their writing. Go over the categories with students.

Informative Writing Rubric

	4	3	2	1
Organization	Writing is organized logically, with a strong introduction to the topic, several supporting details, and a strong conclusion.	Writing is organized logically, with an introduction, several details, and a conclusion.	Writing is organized logically, but may be missing an introduction, some details, or a conclusion.	Writing is not organized logically, and may be missing a topic sentence, details, and a conclusion.
Writing	Writing is clear and interesting to read, with many descriptive words and details. There are at least 3 paragraphs with appropriate linking words.	Writing is clear and easy to read, with some descriptive words and details. There are at least 2 paragraphs with some linking words.	Writing is unclear or without supporting details. Paragraphs are incomplete or unclear. Few linking words to tie ideas together.	Writing is difficult to read because of missing words, sentences, or incomplete ideas and contains no paragraphs. Lacking linking words.
Conventions	Correct sentence structure, grammar, punctuation, and capitalization.	Mostly correct sentence structure, grammar, punctuation, and capitalization with 1–2 errors.	Mostly correct sentence structure, grammar, punctuation, and capitalization with 3–4 errors.	Sentence structure, grammar, punctuation, and/or capitalization are incorrect with more than 5 errors.
Spelling	There are 0–2 spelling errors.	There are 3–4 spelling errors.	There are 4–5 spelling errors.	There are more than 6 spelling errors.

Support

Bring a small group together and create a shared graphic organizer on chart paper or the board by having students share their ideas from their notes. Make sure students have completed copies of the graphic organizer before tomorrow's lesson.

Check for Understanding

Have students explain in their own words what each of the categories on the rubric means.

PLANNING (15 MIN.)

- Have students turn to Activity Page 17.2.
- Explain to students that this is a web graphic organizer to help them plan their writing.
- Tell students that they will use the notes they took today during the videos to fill in key ideas and details in the graphic organizer.
- Do not collect Activity Page 17.2 at this time.

Lesson 17: A Tour of the International Space Station

Reading

25M

Primary Focus: Students will read a story about a girl who goes to an astronomy camp and answer questions about the text. **TEKS 3.7.C; TEKS 3.8.C**

INDEPENDENT READING: "STARGIRL" (15 MIN.)

- Have students turn to Activity Page 17.3.
- Tell students that today they will be reading a narrative story about space and astronomy.
- Have students read "Stargirl" independently.
- You may wish to administer the Optional Fluency Assessment found at the end of this lesson to some of your students during this reading time.

COMPREHENSION QUESTIONS (10 MIN.)

- When students have completed the reading, tell them to complete the comprehension questions at the end of the selection.
- Collect Activity Page 17.3.

Activity Page 17.2

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Provide 1:1 prompting and support as needed.

Intermediate
Allow students to work with a partner to complete the graphic organizer.

Advanced/Advanced High
Encourage students to work independently and provide support as needed.

ELPS 4.I; ELPS 5.G

Activity Page 17.3

TEKS 3.7.C Use text evidence to support an appropriate response; **TEKS 3.8.C** Analyze plot elements, including the sequence of events, the conflict, and the resolution.

ENGLISH LANGUAGE LEARNERS

Reading
Reading/
Viewing Closely

Beginning
Work with a small group to read the selection, then ask the questions on Activity Page 17.3 and allow students to answer orally.

Intermediate
Have students work with a partner to read and complete Activity Page 17.3.

Advanced/Advanced High
Encourage students to complete Activity Page 17.3 independently.

ELPS 4.F; ELPS 4.I

Support

Pull a small group together to read the selection aloud. Guide students to reread portions of the text that help to answer the questions.

Lesson 17: A Tour of the International Space Station

Language

20M

Primary Focus: Students will use the correct punctuation to indicate singular possessive nouns. **TEKS 3.11.D.x**

GRAMMAR (20 MIN.) **TEKS 3.11.D.x**

Introduce Singular Possessive Nouns

- Ask, "What is a noun?" (name of a person, place, or thing)
- Ask, "What is the difference between a common noun and a proper noun?" (A common noun names a general person, place, or thing, such as *boy, airport*, or *book.* A proper noun names a specific person, place, or thing, such as *Mrs. Brown, Park Elementary School*, or the *Washington Monument*.)
- Ask, "What is different between a common noun and a proper noun in terms of capitalization?"
  - » A common noun is not capitalized while a proper noun is capitalized.
- Ask, "What is the difference between singular and plural nouns?"
  - » Singular denotes one, while plural denotes more than one.
- Tell students, "One interesting way nouns can be used is to show ownership. Examples are: The book that belongs to a girl is the girl's book. The desk that belongs to a boy is the boy's desk. The pencil that belongs to Mrs. Todd is Mrs. Todd's pencil."
- Direct students' attention to the *possessive* nouns poster you created and displayed in advance and read it with them.
- Tell students that the words *girl's, boy's,* and *Mrs. Todd's* are called singular possessive nouns.
- Tell students that the word *possessive* means "to possess something or own it."
- Tell students that a singular possessive noun shows that one person, place, or thing has or owns something.

TEKS 3.11.D.x Edit drafts using standard English conventions, including: punctuation marks including apostrophes in contractions and possessives and commas in compound sentences and items in a series.

Possessive Nouns

A **singular possessive noun** shows that one person, place, or thing has or owns something. Form a **singular possessive noun** by adding an apostrophe and 's' to a singular noun. (–'s)

- Read aloud the following sentences, guiding them to find the possessive nouns:
  - The cat's whiskers are soft. (cat's)
  - The child's toy is lost. (child's)
  - The dog's bone is yucky. (dog's)
  - The school's clocks are all broken. (school's)
  - Mr. Lincoln's hat is black. (Mr. Lincoln's)
  - Joe's cupcakes are my favorite! (Joe's)
  - The Washington Monument's stairs are steep and hard to climb. (Washington Monument's)
- Ask students to justify their answers.
  - » All possessive nouns show ownership.
- Tell students that in these examples, the word that follows the singular possessive noun is what that person, place, or thing has or owns. Examples are: The cat's whiskers are soft. (The cat owns the whiskers. The whiskers belong to the cat.) The child's toy is lost. (The child owns the toy. The toy belongs to the child.)
- Direct the students' attention to the sentence you placed on the board or chart paper in advance.
  - (The office of the doctor) is crowded today.
  - (The tractor of the farmer) is painted green.
  - (The ballet shoes of the dancer) are made of pink silk.
  - (The mitt of the catcher) is made of brown leather.
  - (The letters from the visitor) made me laugh.

- Read the first sentence to students, "(The office of the doctor) is crowded today."
- Ask, "How can we change the words in the parentheses (*The office of the doctor*) to a singular possessive noun?" (Students should answer *The doctor's office* but will likely not include the apostrophe.)
- Ask students to support their answers. Ask why the word *doctor* is placed before the word *office.*
    - » The possessive noun is placed before the word that tells what is possessed or owned.
- Write *The doctors office* above (*The office of the doctor*).
- Tell students that a way to show that a noun is singular possessive is to add an apostrophe before the 's'.
- Note for students that the word *doctor* is singular.
- Write the apostrophe to become the word *doctor's* and direct students' attention to it.
- Tell students that to change a singular noun to a singular possessive noun, you add an apostrophe and 's'. Examples could be: *boy* becomes *boy's* and *Mrs. White* becomes *Mrs. White's*.
- Read the second sentence to students, "(The tractor of the farmer) is painted green."
- Ask, "How can we change the words in the parentheses (*The tractor of the farmer*) to a singular possessive noun?" (Students should answer *The farmer's tractor*.)
- Write *The farmer's tractor* above (*The tractor of the farmer*).
- Point out the apostrophe before the 's'.
- Guide students to change the remaining words in parentheses to singular possessive nouns, noting the apostrophe and the –*s*.
    - (The ballet shoes of the dancer) are made of pink silk. The dancer's ballet shoes are made of pink silk. (The mitt of the catcher) is made of brown leather. The catcher's mitt is made of brown leather. (The letters from the visitor) made me laugh. The visitor's letters made me laugh.
- Have students turn to Activity Page 17.5 and complete it as a teacher-guided activity.

ENGLISH LANGUAGE LEARNERS

Language Foundational Literacy Skills

Beginning
Provide 1:1 support as needed.

Intermediate
Allow students to work with partners during activity; provide support as needed.

Advanced/Advanced High
Provide support as needed.

ELPS 5.E

Activity Page 17.5

Lesson 17: A Tour of the International Space Station

Reading

Primary Focus: Students will demonstrate appropriate rate, accuracy, and prosody while reading aloud. **TEKS 3.4**

OPTIONAL FLUENCY ASSESSMENT **TEKS 3.4**

- You may wish to assess students' fluency in reading using any of the supplemental chapters that they have not yet read. Recording and Scoring Sheets have been specifically included for "The Hoba Meteorite."

INSTRUCTIONS FOR STUDENT FLUENCY ASSESSMENT

Activity Page 17.4

- Turn to the text copy of "The Hoba Meteorite" at the end of this lesson. This is the text copy students will read aloud.
- Ask the student to remove Activity Page 17.4 from their Activity Book. You will use this worksheet to mark as a running record as you listen to the student read orally.
- Tell the student that you are going to ask them to read the selection aloud. Explain that you are going to keep a record of the amount of time it takes them to read the selection. Please also explain to the student that they should not rush but rather read at their own regular pace.
- Begin timing when the student reads the first word of the selection. If you are using a watch, write the exact Start Time, in minutes and seconds, on your record page. If you are using a stopwatch, you do not need to write down the start time since the stopwatch will calculate Elapsed Time. As the student reads the selection, make a running record on the copy with the student's name using the following guidelines:

TEKS 3.4 Use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.

Words read correctly	No mark is required.
Omissions	Draw a long dash above the word omitted.
Insertions	Write a caret (^) at the point where the insertion was made. If you have time, write down the word that was inserted.
Words read incorrectly	Write an "X" above the word.
Substitutions	Write the substitution above the word.
Self-corrected errors	Replace original error mark with an "SC."
Teacher-supplied words	Write a "T" above the word (counts as an error).

- When the student finishes reading the selection, write the exact Finish Time in minutes and seconds on your record sheet. Alternatively, if you are using a stopwatch, simply write down the Elapsed Time in minutes and seconds. In the interest of time, ask students to read only the first three pages of text in either chapter. (Five minutes should be enough time to get a measurement on most students.) If the student does not read to the end, draw a vertical line on the record sheet to indicate how far he or she read. Also write down either the Finish Time or the Elapsed Time. After the student finishes reading orally, you may direct him to finish reading the remainder of the selection silently.

Guidelines for Calculating Words Correct Per Minute (W.C.P.M.) Scores

- If the reading was fairly accurate (< 10 uncorrected errors), you can get a rough (and easy) estimate of a student's W.C.P.M. score simply by noting the time and looking at the chart on Activity Page 17.4.
- To calculate a student's exact W.C.P.M. score, use the information you wrote down on the record sheet and follow the steps described below. The steps are also shown in graphic form on Activity Page 17.4. You will probably find it helpful to have a calculator available.

1. First, complete the Words section of Activity Page 17.4.
2. Count Words Read. This is the total number of words that the student read or attempted to read, up to the point where he or she stopped. It includes words that the student read correctly as well as words that the student read incorrectly or skipped over. If the student attempted to read the whole selection, use 337 words total. If the student did not finish the selection, you will need to count the number of words that the student actually attempted to read. Write the count for Words Read in the matching box on Activity Page 17.4.

3. Count the Uncorrected Mistakes noted in your running record. This includes words read incorrectly, omissions, substitutions, and words that you had to supply. Write the total in the box labeled Uncorrected Mistakes on Activity Page 17.4. (A mistake that is corrected by the student is not counted as a mistake; the student is penalized for the time he or she lost making the correction but not for the initial mistake.)

4. Subtract Uncorrected Mistakes from Words Read to get Words Correct.

5. Next, complete the Time section of the worksheet.

6. Calculate Elapsed Time in minutes and seconds. (If you used a stopwatch, this should already be done for you. Skip to the next step.) If you used a watch and recorded start and stop times, you will need to subtract the Start Time from the Finish Time to calculate the Elapsed Time. Subtract seconds from seconds and then minutes from minutes. Calculate Time in seconds. Multiply the number of minutes by 60 to convert minutes to seconds, and then add the number of seconds.

7. Next, complete the W.C.P.M. section of the worksheet.

8. Divide Words Correct by Time in Seconds. Then multiply by 60 to get Words Correct Per Minute (W.C.P.M.).

- As you evaluate W.C.P.M. scores, here are some factors to consider.
    - It is normal for students to show a wide range in fluency and in W.C.P.M. scores. However, a major goal for Grade 3 students is to read with sufficient fluency to ensure comprehension and independent reading of school assignments in subsequent grades. Exact fluency targets vary from state to state; the national mean calculated by Hasbrouck and Tindal in 2007 for Winter of Grade 3 is 97 W.C.P.M.
    - A student's W.C.P.M. score can be compared with the score of other students in the classroom (or grade level) and also with the national fluency norms for Winter of Grade 3 obtained by Hasbrouck and Tindal. Students whose scores are below the 25th percentile (62 W.C.P.M) are experiencing serious problems in reading fluently.

The Hoba Meteorite

A meteorite is a rock from outer space. There are lots of rocks floating around in space. If one of these rocks gets close to Earth, it will be attracted by Earth's gravity. It will begin to move closer to Earth. As the rock gets closer, Earth will exert a stronger and stronger gravitational pull on it. The rock will start moving faster and faster. It will also heat up. Eventually, it will turn into a special kind of fireball known as a meteor.

Many meteors burn up before they reach Earth. A few make it all the way to our planet and smack into the ground. If a meteor reaches Earth, we say it is a meteorite.

Someday you may see a meteor in the night sky. They are hard to see during the day, but at night it is much easier. Some people refer to meteors as "shooting stars." That's not quite the right term. Meteors are more like rocks than stars. But they do look like falling stars when they come zipping through the night sky.

More than 35,000 meteorites have been found on Earth. Some of these are tiny pebbles. Others are large boulders. The Hoba meteorite is the largest meteorite ever discovered on Earth. It weighs more than 60 tons.

The Hoba meteorite is in the African country of Namibia. It has never been moved to a museum. It is still lying where it fell. That's mainly because of its size. It would be very difficult to move.

The Hoba meteorite was discovered in 1920. A farmer was plowing his fields with an ox. He heard a metallic scratching noise. Then, his plow stopped suddenly. The farmer tried to dig around the rock and discovered that it was huge. A scientist came to look at it. He concluded that it was a meteorite.

Scientists think the Hoba meteorite fell to Earth about 80,000 years ago. It is about 84 percent iron and 16 percent nickel. Thousands of tourists come to see it each year.

End Lesson

LESSON

18

Unit Assessment: Informative Writing

PRIMARY FOCUS OF LESSON

Reading

Students will read about the International Space Station and respond in a variety of ways and for different purposes.

TEKS 3.6.B; TEKS 3.6.G; TEKS 3.6.H; TEKS 3.7.B; TEKS 3.7.C; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A

Language

Students will use correct punctuation to indicate plural possessive nouns.

TEKS 3.11.D.x

Writing

Students will plan and draft an informative piece about a day in the life of an astronaut aboard the International Space Station.

TEKS 3.11.B.i; TEKS 3.11.B.ii; TEKS 3.12.B

FORMATIVE ASSESSMENT

Activity Page 18.1 — **Reading/Writing Choice Board** Students will respond to text through various activities.

TEKS 3.6.B; TEKS 3.6.G; TEKS 3.6.H; TEKS 3.7.B; TEKS 3.7.C; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding; (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.10.A** Explain the author's purpose and message within a text; **TEKS 3.11.D.x** Edit drafts using standard English conventions, including: punctuation marks including apostrophes in contractions and possessives and commas in compound sentences and items in a series; **TEKS 3.11.B** Develop drafts into a focused, structured, and coherent piece of writing by: (i) organizing with purposeful structure including an introduction and conclusion, (ii) developing an engaging idea with relevant details; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.

LESSON AT A GLANCE

	Grouping	Time	Materials
Reading (50 min.)			
Introducing the Reading	Whole Group	5 min.	❏ *What's in Our Universe?* ❏ Activity Page 18.1 ❏ writing paper
Independent Reading: "The International Space Station"	Independent	15 min.	
Reading/Writing Choice Board	Independent	30 min.	
Language (20 min.)			
Grammar: Introduce Plural Possessive Nouns	Whole Group	20 min.	❏ Activity Page 18.2
Writing (50 min.)			
Informative Writing: Plan and Draft	Independent	50 min.	❏ Activity Page 17.2 ❏ notes from Lesson 17 ❏ writing paper
Take-Home Material			
Informative Writing Drafts			

ADVANCE PREPARATION

Language

- Add the following to the poster you created on chart paper for yesterday's Grammar lesson:

  Possessive Nouns

  A **singular possessive noun** shows that one person, place, or thing has or owns something. Form a **singular possessive noun** by adding an apostrophe and 's' to a singular noun. (–'s)

- Write the following sentences on the board or chart paper for use during the Grammar lesson:
  - (The offices of the doctors) are crowded today.
  - (The tractors of the farmers) are painted green.
  - (The ballet shoes of the dancers) are made of pink silk.
  - (The mitts of the catchers) are made of brown leather.
  - (The letters from the boys) made me laugh.

Writing

- Students will begin drafting an informative writing piece about the International Space Station. If you plan to let students use computers to write the piece, you may need to plan for extra time in the computer lab or allow them to publish at home.

Universal Access

- Provide 1:1 prompting and support during Reading and Writing.

Lesson 18: Unit Assessment: Informative Writing

Reading

50M

Primary Focus: Students will read about the International Space Station and respond in a variety of ways and for different purposes.

TEKS 3.6.B; TEKS 3.6.G; TEKS 3.6.H; TEKS 3.7.B; TEKS 3.7.C; TEKS 3.7.F; TEKS 3.9.D.i–iii; TEKS 3.10.A

VOCABULARY: "THE INTERNATIONAL SPACE STATION"

- The following are vocabulary words used in this lesson. Preview the words with the students before the lesson and refer back to them at appropriate times. The words also appear in the glossary in the back of the Student Reader.

international, involving more than one country

Vocabulary Chart for "The International Space Station"		
Type	**Tier 3** **Domain-Specific Words**	**Tier 2** **General Academic Words**
Vocabulary		international
Multiple Meaning Vocabulary Words		
Sayings and Phrases		

INTRODUCING THE READING (5 MIN.)

- Make sure you and your students each have a copy of *What's in Our Universe*?
- Tell students that today they will read Chapter 13, "The International Space Station," independently.
- Have students recall some of the things astronauts do on the space station from yesterday's lesson.

INDEPENDENT READING: "THE INTERNATIONAL SPACE STATION" (15 MIN.)

- Students will read the chapter independently.

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; **TEKS 3.9.D** Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding; (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.10.A** Explain the author's purpose and message within a text.

Support

Pull a small group to read the chapter together.

Check for Understanding

Ask students to list things that we do on Earth that are more challenging on the space station. Have them give examples from the text. (Answers vary: showering is tricky because the water needs to be scraped off; astronauts have to run at least once a day to stay in shape; sleeping is different because they don't feel the effects of gravity, so they can be upside down or right side up.)

READING/WRITING CHOICE BOARD (30 MIN.)

Activity Page 18.1

- Have students turn to Activity Page 18.1.
- Tell students that they will have a choice of activities in responding to Chapter 13.
- Have students look at the Reading/Writing Choice Board on Activity Page 18.1:

Reading/Writing Choice Board

Directions: Select activities in three of the boxes below after you complete your reading. Write your responses on a separate sheet of paper, making sure to include the number of the activities you chose. When completing the activities, write in complete sentences using correct spelling, capitalization, and punctuation.

1. Create a graphic organizer and compare and contrast two ideas in the text. **TEKS 3.6.H**	2. What is the key idea of the text? List three details from the text that support the key idea. **TEKS 3.6.G; TEKS 3.9.D.i**	3. Write a sentence describing the author's purpose and how the text structure supports that purpose. **TEKS 3.10.A**
4. Write three questions you still have after reading the text. **TEKS 3.6.B**	5. Write a list of three new words you learned in the text, their definitions, and use them in a sentence. **TEKS 3.7.F**	6. Describe how one of the images in the chapter helps you to understand the text. **TEKS 3.9.D.ii**
7. Find three sentences that show comparing or contrasting. Write the sentences and underline the comparing and contrasting word or words. **TEKS 3.9.D.iii**	8. Write a list of words the author uses to help the reader visualize the information. **TEKS 3.10.A**	9. Write three new things you learned from the text. **TEKS 3.7.B**

TEKS 3.6.B Generate questions about text before, during, and after reading to deepen understanding and gain information; **TEKS 3.6.G** Evaluate details read to determine key ideas; **TEKS 3.6.H** Synthesize information to create new understanding; **TEKS 3.7.B** Write a response to a literary or informational text that demonstrates an understanding of a text; **TEKS 3.7.C** Use text evidence to support an appropriate response; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate;

- Remind students of the directions and what they need to do for each of the activities.
- Tell them that they will need to choose three activities from the board.
- Encourage students to choose activities that they haven't tried before on the Choice Board.
- Remind them that they'll be writing their responses on a separate sheet of paper.
- When they've completed their activities, collect Activity Page 18.1 and their responses.

Lesson 18: Unit Assessment: Informative Writing

Language

20M

Primary Focus: Students will use correct punctuation to indicate plural possessive nouns. **TEKS 3.11.D.x**

GRAMMAR (20 MIN.)

Introducing Plural Possessive Nouns

- Remind students that an interesting way that nouns can be used is to show ownership. Examples are: The book that belongs to a girl is the girl's book. The desk that belongs to a boy is the boy's desk. The pencil that belongs to Mrs. Todd is Mrs. Todd's pencil.
- Remind students that the words *girl's, boy's,* and *Mrs. Todd's* are called singular possessive nouns.
- Remind students that the word *possessive* means to possess something or own it.
- Ask, "Are all nouns singular?"
  - » No, some are plural.
- Tell students that plural nouns can be possessive in the same way that singular nouns can be possessive.
- Direct students' attention to the Possessive Nouns poster you added to and displayed earlier and read it with them.

TEKS 3.9.D Recognize characteristics and structures of informational text, including: (i) the central idea with supporting evidence; (ii) features such as sections, tables, graphs, timelines, bullets, numbers, bold and italicized font to support understanding; (iii) organizational patterns such as cause and effect and problem and solution; **TEKS 3.10.A** Explain the author's purpose and message within a text; **TEKS 3.11.D.x** Edit drafts using standard English conventions, including: punctuation marks including apostrophes in contractions and possessives and commas in compound sentences and items in a series.

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Modify choices to include writing lists, answering simple yes and no questions, or drawing and labeling pictures.

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Encourage students to write their responses in complete sentences, with correct spelling, capitalization, and punctuation.

ELPS 5.F

Challenge

Have students choose two activities from the Choice Board and create their own third activity.

Challenge

Students can create questions and answers on index cards that can be used during a unit review game.

Possessive Nouns

A **singular possessive noun** shows that one person, place, or thing has or owns something. Form a **singular possessive noun** by adding an apostrophe and ‘s’ to a singular noun. (–*’s*)

A **plural possessive noun** shows that more than one person, place, or thing has or owns something. To form a **plural possessive noun** from a plural noun that ends with ‘s’ or ‘es’, add only an apostrophe to the plural noun. (–’)

- Tell students that a plural possessive noun shows that more than one person, place, or thing owns something.
- Ask students to supply plural nouns that end with ‘s’ or ‘es’. (Examples could be *rabbits, houses, sisters, uncles,* or *foxes*.)
- Ask students to think of something that could belong to rabbits.
- Write their suggestions on the board, following the word *rabbits*. For example:
    - rabbits hutches
    - rabbits fur
    - rabbits babies
- Tell students that to show plural possessives, you only need to add the apostrophe because the words already end with ‘s’. The difference between singular and plural possessive nouns is that the apostrophe comes after the ‘s’ instead of before it.
- Add the apostrophe to the three phrases on the board, noting for students that the apostrophe is after the ‘s’.
    - rabbits’ hutches
    - rabbits’ fur
    - rabbits’ babies
- Tell students that plural possessive nouns are nouns that name more than one person, place, or thing; and in this case, each phrase on the board names more than one rabbit.
- Read aloud the following sentences to students, guiding them to find the plural possessive nouns:
    - Cats’ whiskers are soft. (cats’)
    - Dogs’ bones are yucky. (dogs’)
    - Workers’ uniforms get dirty. (workers’)
    - Actors’ lines are long and hard to remember. (actors’)

- Foxes' noses are pointed. (foxes')
- Gardeners' yards are beautiful. (gardeners')
- Students' papers are written carefully. (students')

- Tell students that in the examples, the word that follows the plural possessive noun is what those people, places, or things own. Examples are: The cats' whiskers are soft. (The cats own the whiskers. The whiskers belong to the cats.) Dogs' bones are yucky. (The dogs own the bones. The bones belong to the dogs.)
- Reread the remaining five sentences that you read earlier and ask students to find both the plural possessive noun and what the plural possessive noun owns.
    - Workers' uniforms get dirty. (workers'; The workers own the uniforms. The uniforms belong to the workers.)
    - Actors' lines are long and hard to remember. (actors'; The actors own the lines. The lines belong to the actors.)
    - Foxes' noses are pointed. (foxes'; The foxes own the noses. The noses belong to the foxes.)
    - Gardeners' yards are beautiful. (gardeners'; The gardeners own the yards. The yards belong to the gardeners.)
    - Students' papers are written carefully. (students'; The students own the papers. The papers belong to the students.)
- Direct students' attention to the sentences you placed on the board or chart paper in advance.
- Read the first sentence to students, "(The offices of the doctors) are crowded today."
- Ask, "How can we change the words in the parentheses (*The offices of the doctors*) to a plural possessive noun?" Students should answer *The doctors' offices* but may not include the apostrophe.
- Write *The doctors offices* above *(The offices of the doctors)*.
- Tell students that a way to show that a noun is plural possessive is to add an apostrophe after the 's'.
- Write the apostrophe to become the word *doctors'* and direct students' attention to it.

- Tell students that to change a plural noun to a plural possessive noun, you add an apostrophe after the 's'. Examples could be: *boys* becomes *boys'* and *inventors* becomes *inventors'*.
- Read the second sentence to students, "(The tractors of the farmers) are painted green."
- Ask, "How can we change the words in the parentheses *(The tractors of the farmers)* to a plural possessive noun?" Students should answer *The farmers' tractors*.
- Write *The farmers' tractors* above *(The tractors of the farmers)*.
- Point out the apostrophe after the 's'.
- Guide students to change the remaining words in parentheses to plural possessive nouns.
    - (The ballet shoes of the dancers) are made of pink silk. The dancers' ballet shoes are made of pink silk.
    - (The mitts of the catchers) are made of brown leather. The catchers' mitts are made of brown leather.
    - (The letters from the boys) made me laugh. The boys' letters made me laugh.
- Have students turn to Activity Page 18.2 and complete it as a teacher-guided activity.

Activity Page 18.2

ENGLISH LANGUAGE LEARNERS

Language
Foundational Literacy Skills

Beginning
Provide 1:1 support as needed.

Intermediate
Allow students to work with partners during the activity; provide support as needed.

Advanced/Advanced High
Provide support as needed.

ELPS 5.E.i; ELPS 5.E.ii; ELPS 5.E.iii

Lesson 18: Unit Assessment: Informative Writing

Writing

50M

Primary Focus: Students will plan and draft an informative piece about a day in the life of an astronaut aboard the International Space Station.

TEKS 3.11.B.i; TEKS 3.11.B.ii; TEKS 3.12.B

INFORMATIVE WRITING: PLAN AND DRAFT (50 MIN.)

TEKS 3.11.B.i–ii

Structure of Writing

- Direct students to take out Activity Page 17.2 and the notes from the ISS videos from yesterday's lesson.

Activity Page 17.2

TEKS 3.11.B Develop drafts into a focused, structured, and coherent piece of writing by: (i) organizing with purposeful structure including an introduction and conclusion, (ii) developing an engaging idea with relevant details; **TEKS 3.12.B** Compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft.

- Make sure that students have plenty of writing paper.
- Tell students that today they will be finishing planning their informative piece on a day in the life of an astronaut on the International Space Station.
- Remind students that a well-written informative piece has a good introduction, a logical structure, and key ideas and details.
- Ask students what informational text structure would work best for this writing project. [Answers will vary, but descriptive or chronological (time) would work best.]
- Ask students to look at the details they have on Activity Page 17.2.
- Explain to the students that for descriptive informational writing, they may want to organize their paragraphs and writing by topic, such as Morning Routines, Eating, Sleeping, etc., and give details for each of the topics.
- Explain that for a chronological writing, they would organize it by what the astronaut does first, what they do second, and so on. Remind students that the readers would need clue words like *first/second*, or *first/then/next* to understand the chronology better.
- Have students take a few minutes to review their plans and decide how they are going to structure their writing.

Writing an Introduction

- Tell students that writing a strong introduction, something that captures the reader's interest, is very important in informative writing.
- Read the following two introductions below. Ask students which one grabs their attention more.
    - Life aboard the International Space Station is just like life on Earth, if you don't mind taking a shower while floating in space or taking a walk in space!
    - Astronauts live, work, eat, and sleep on the International Space Station.
- Explain that both of these sentences describe the main topic of the writing, but which one makes you want to read more? (Life aboard the International Space Station is just like life on Earth, if you don't mind taking a shower while floating in space or taking a walk in space!) Why? (It sounds more exciting to read.)
- Give students several minutes to write their introductions. Then have several students share theirs with the class.

Activity Page 17.1

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Provide 1:1 prompting and support as needed. Some students may benefit from having sentence starters; e.g., "When astronauts have meals on the space station, they..."

Intermediate
Provide 1:1 or small group support as needed.

Advanced/Advanced High
Encourage students to write in complete sentences using appropriate grammar, punctuation, and capitalization.

ELPS 5.E.i; ELPS 5.E.ii; ELPS 5.E.iii

Support

Provide small group mini-conferences as needed around each of the stages of writing the draft: writing the introduction, organizing the text structure, writing the conclusion, etc.

Drafting

- Tell students that they will write their drafts, making sure that they are following the text structure they decided on (descriptive or chronological), have at least three paragraphs, include key ideas and details from their notes and graphic organizer, and finish with a concluding sentence.
- Remind students to look at the Informative Writing Rubric on Activity Page 17.1 to remind them how they will be scored on their writing.
- Circulate as students are writing to provide support and answer questions. You may wish to hold mini-conferences with students to check on their progress.

End Lesson

Lesson 18: Unit Assessment: Informative Writing

Take-Home Material

- Have students take home drafts to finish at home.

LESSON

19 Unit Assessment: Informative Writing

PRIMARY FOCUS OF LESSON

Writing

Students will complete their drafts and revise an informative piece describing a day in the life of an astronaut on the International Space Station. **TEKS 3.11.C**

Students will edit and publish an informative text describing a day in the life of an astronaut on the International Space Station.

TEKS 3.11.C; TEKS 3.11.D.i–vii, ix–xi; TEKS 3.11.E; TEKS 3.13.H

Speaking and Listening

Students will present their informative writing piece in a gallery setting, speaking clearly and at an appropriate pace. **TEKS 3.1.C; TEKS 3.13.E; TEKS 3.13.H**

Students will listen closely to the speaker and make comments about the published writing piece. **TEKS 3.1.A**

FORMATIVE ASSESSMENT

Informative Writing	**Unit Assessment: A Day in the Life of an Astronaut on the International Space Station** Students will revise, edit, and publish an informative piece on the day in the life of an astronaut on the International Space Station. **TEKS 3.11.C; TEKS 3.11.D.i–vii, ix–xi; TEKS 3.11.E**

TEKS 3.11.C Revise drafts to improve sentence structure and word choice by adding, deleting, combining, and rearranging ideas for coherence and clarity; **TEKS 3.11.D** Edit drafts using standard English conventions, including (i) complete simple and compound sentences with subject-verb agreement; (ii) past, present, and future verb tense; (iii) singular, plural, common, and proper nouns; (iv) adjectives, including their comparative and superlative forms; (v) adverbs that convey time and adverbs that convey manner; (vi) prepositions and prepositional phrases; (vii) pronouns, including subjective, objective, and possessive cases; (ix) capitalization of official titles of people, holidays, and geographical names and places; (x) punctuation marks, including apostrophes in contractions and possessives and commas in compound sentences and items in a series; (xi) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words; **TEKS 3.11.E** Publish written work for appropriate audiences; **TEKS 3.13.H** Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results; **TEKS 3.1.C** Speak coherently about the topic under discussion, employing eye contact, speaking rate, volume, enunciation, and the conventions of language to communicate ideas effectively; **TEKS 3.13.E** Demonstrate understanding of information gathered; **TEKS 3.1.A** Listen actively, ask relevant questions to clarify information, and make pertinent comments.

LESSON AT A GLANCE

	Grouping	Time	Materials
Writing (90 min.)			
Informative Writing: Drafting/Revising	Independent	45 min.	❏ Activity Page 19.1 ❏ Writing Questions (Digital Projections) ❏ Editing Checklist Chart (Digital Projections) ❏ chart paper or board
Informative Writing: Editing/Publishing	Independent	45 min.	❏ writing paper ❏ Informative Writing Rubric
Speaking and Listening			
Informative Writing: Presenting	Whole Group	30 min.	❏ sticky notes ❏ chart paper or board

ADVANCE PREPARATION

Writing

- On chart paper, create the following chart or project Digital Projection DP.U7.L19.1.

1.	Do I have a good topic sentence?	
2.	Do I have a good concluding sentence?	
3.	Are there any parts that do not make sense?	
4.	Do my sentences flow well in this order?	
5.	Do I have a good variety of sentence structures?	
6.	Could I combine any of my sentences?	
7.	Do I have a good variety of descriptive words?	
8.	Is my writing interesting?	
9.	Is this my best work?	

- You may wish to write this paragraph on chart paper or on the board:

> The Space station does not have a lot of room. The Space Station is filled with lots of equipment. The astronauts must work very close together.

- On chart paper, create the following chart or display Digital Projection DP.U7.L19.2:

1.	Do I have a fitting title?	
2.	Do all of my sentences start with a capital letter?	
3.	Do all of my sentences end with the correct punctuation?	
4.	Have I spelled all of my words correctly?	
5.	Have I used correct grammar?	
6.	Does each sentence provide a complete thought?	

- You may wish to have students write and publish their writing using a computer. This may require scheduling additional time in the computer lab or plan for students to write them at home.

Speaking and Listening

- Establish rules for the gallery walk, such as circulation time, number of students at a desk, etc. You may also wish to connect to the content learning by calling the gallery walk a spacewalk.
- Provide each student with blank sticky notes.
- Write the following comment prompts on chart paper or on the board and cover them for use during the Speaking and Listening lesson.
    - I really liked _____.
    - I wondered about _____.

Universal Access

- Provide 1:1 or small group support when necessary.
- Set up the classroom so students can circulate easily for the gallery walk.

Start Lesson

Lesson 19: Unit Assessment: Informative Writing

Writing

90M

Primary Focus: Students will complete their drafts and revise an informative piece describing a day in the life of an astronaut on the International Space Station.

TEKS 3.11.C

Students will edit and publish an informative text describing a day in the life of an astronaut on the International Space Station.

TEKS 3.11.C; TEKS 3.11.D.i–vii, ix–xi; TEKS 3.11.E; TEKS 3.13.H

TEKS 3.11.C Revise drafts to improve sentence structure and word choice by adding, deleting, combining, and rearranging ideas for coherence and clarity; **TEKS 3.11.D** Edit drafts using standard English conventions, including (i) complete simple and compound sentences with subject-verb agreement; (ii) past, present, and future verb tense; (iii) singular, plural, common, and proper nouns; (iv) adjectives, including their comparative and superlative forms; (v) adverbs that convey time and adverbs that convey manner; (vi) prepositions and prepositional phrases; (vii) pronouns, including subjective, objective, and possessive cases; (ix) capitalization of official titles of people, holidays, and geographical names and places; (x) punctuation marks, including apostrophes in contractions and possessives and commas in compound sentences and items in a series; (xi) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words; **TEKS 3.11.E** Publish written work for appropriate audiences; **TEKS 3.13.H** Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.

INFORMATIVE WRITING: DRAFTING/REVISING (45 MIN.) TEKS 3.11.C

- Tell students that as they are finishing their drafts and beginning their revising, they should look for places to add more information, details, or descriptive words that will help the readers visualize the International Space Station and what the astronaut is doing or what they are experiencing.
- Tell the students that they also might want to revise their drafts so that the sentences flow better or make more sense to the reader.
- Copy Activity Page 19.1 onto chart paper or the board. Go through the Revision Checklist with students.

1.	Do I have a good topic sentence?	
2.	Do I have a good concluding sentence?	
3.	Are there any parts that do not make sense?	
4.	Do my sentences flow well in this order?	
5.	Do I have a good variety of sentence structures?	
6.	Could I combine any of my sentences?	
7.	Do I have a good variety of descriptive words?	
8.	Is my writing interesting?	
9.	Is this my best work?	

- Draw attention to numbers 5 and 6 on the Revision Checklist.
- Ask students to explain what they mean.
- Write the paragraph below on the board:

The Space station does not have a lot of room. The Space Station is filled with lots of equipment. The astronauts must work very close together.

- Have a discussion about ways to improve this paragraph, focusing on using a variety of sentence structures and on combining sentences.
- Draw attention to numbers 7 and 8 on the Revision Checklist.
- Ask students to think of ways to add more descriptive words and make the sample paragraph more interesting.
- Have students reread and revise their own drafts, using the Revision Checklist on the chart or board as a guide.
- You may wish to have students exchange their writing with their peers for additional feedback.

TEKS 3.11.C Revise drafts to improve sentence structure and word choice by adding, deleting, combining, and rearranging ideas for coherence and clarity.

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Provide 1:1 prompting and support when needed.

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Provide support if needed.
ELPS 5.F

Support

Work with students individually or in small groups based on need.

INFORMATIVE WRITING: EDITING/PUBLISHING (45 MIN.)

TEKS 3.11.D.i–vii, ix–xi; TEKS 3.11.E; TEKS 3.13.H

- Have students complete their revisions if they haven't already done so.
- Draw on chart paper or on the board or use the previously prepared Editing Checklist Chart (DP.U7.L19.2).

Projection DP.U7.L19.2

1.	Do I have a fitting title?	
2.	Do all of my sentences start with a capital letter?	
3.	Do all of my sentences end with the correct punctuation?	
4.	Have I spelled all of my words correctly?	
5.	Have I used correct grammar?	
6.	Does each sentence provide a complete thought?	

- Go through the Editing Checklist with the students and answer any questions students may have.
- Tell students that when they've completed editing their revised draft, they will then write their final version on regular, lined writing paper.
- Remind them to look at the Informative Writing Rubric on Activity Page 17.1 to see how they will be scored and to ensure they have done their best before writing their final copy.
- Allow students to spend the rest of the time publishing their final copies.

Activity Page 17.1

Challenge

Ask students to pick an area that needs revision, then to propose two different ways to revise their work to address this area. Have students pick which way will be the most effective for their work and to give a reason supporting their choice.

ENGLISH LANGUAGE LEARNERS

Writing
Writing

Beginning
Provide 1:1 prompting and support when needed.

Intermediate
Allow students to work with partners.

Advanced/Advanced High
Provide support if needed.

ELPS 5.D

Support

Work with students individually or in small groups based on need.

Lesson 19: Unit Assessment: Informative Writing

Speaking and Listening

30M

Primary Focus: Students will present their informative writing piece in a gallery setting, speaking clearly and at an appropriate pace.

TEKS 3.1.C; TEKS 3.13.E; TEKS 3.13.H

Students will listen closely to the speaker and make comments about the author's published work.

TEKS 3.1.A

INFORMATIVE WRITING: PRESENTING (30 MIN.)

- Give each student blank sticky notes.
- Divide the class into two groups.
- Tell students that they will need their final, published version of their informative writing piece.
- Explain to students that they will be presenting their work to the class in a gallery-style setting.
- Explain that one group will be at their desks ready to read their informative writing piece and the other group will circulate throughout the classroom to listen to the authors read their work.
- Review the gallery walk rules that you prepared in advance.
- Tell students that after the author finishes reading, they will use the sticky notes to write a comment about the author's published work.
- Tell students the comments should focus on something that they really liked or something that they wondered about.
- Uncover the comment prompts you prepared in advance and read them aloud.
    - I really liked _______.
    - I wondered about ______.

TEKS 3.1.C Speak coherently about the topic under discussion, employing eye contact, speaking rate, volume, enunciation, and the conventions of language to communicate ideas effectively; **TEKS 3.13.E** Demonstrate understanding of information gathered; **TEKS 3.13.H** Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results; **TEKS 3.1.A** Listen actively, ask relevant questions to clarify information, and make pertinent comments.

- Remind students that, when reading, they should speak clearly and at an appropriate pace, and when listening, they should be respectful and listen actively.
- Circulate around the room, providing support and informally observing students.
- Once all students in the group have presented and students circulating around the room have listened to at least one author, switch group roles.
- After all students have completed their presentations and provided feedback, conclude the gallery walk with a brief whole-class discussion. Ask students to share what they heard, liked, and wondered.

Note: The TEKS below are aligned with the Informative Writing Scoring Rubric on the following page.

TEKS 3.2.B Demonstrate and apply spelling knowledge by (i) spelling multisyllabic words with closed syllables, open syllables, VCe syllables, vowel teams, including digraphs and diphthongs, r-controlled syllables, and final stable syllables; (ii) spelling homophones; (iii) spelling compound words, contractions, and abbreviations; (iv) spelling multisyllabic words with multiple sound-spelling patterns; (v) spelling words using knowledge of syllable division such as VCCV, VCV, and VCCCV; (vi) spelling words using knowledge of prefixes; (vii) spelling words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants; **TEKS 3.7.F** Respond using newly acquired vocabulary as appropriate; T**EKS 3.11.B** Develop drafts into a focused, structured, and coherent piece of writing by (i) organizing with purposeful structure including an introduction and conclusion; (ii) developing an engaging idea with relevant details; **TEKS 3.11.C** Revise drafts to improve sentence structure and word choice by adding, deleting, combining, and rearranging ideas for coherence and clarity; **TEKS 3.11.D** Edit drafts using standard English conventions, including (i) complete simple and compound sentences with subject-verb agreement; (ii) past, present, and future verb tense; (iii) singular, plural, common, and proper nouns; (iv) adjectives, including their comparative and superlative forms; (v) adverbs that convey time and adverbs that convey manner; (vi) prepositions and prepositional phrases; (vii) pronouns, including subjective, objective, and possessive cases; (ix) capitalization of official titles of people, holidays, and geographical names and places; (x) punctuation marks, including apostrophes in contractions and possessives and commas in compound sentences and items in a series; (xi) correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words; **TEKS 3.11.E** Publish written work for appropriate audiences; **TEKS 3.13.H** Use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.

WRAP-UP

- Collect the final copies of the students' writing and use the rubric to score.

Informative Writing

Scoring Rubric

Standards that may be assessed with this rubric:

TEKS 3.2.B.i–vii; TEKS 3.7.F; TEKS 3.11.B.i; TEKS 3.11.B.ii; TEKS 3.11.C; TEKS 3.11.D.i-vii, ix-vi

	4	3	2	1
Organization	Writing is organized logically, with a strong introduction to the topic, several supporting details, and a strong conclusion.	Writing is organized logically, with an introduction, several details, and a conclusion.	Writing is organized logically, but may be missing an introduction, some details, or a conclusion.	Writing is not organized logically, and may be missing a topic sentence, details, and a conclusion.
Writing	Writing is clear and interesting to read, with many descriptive words and details. There are at least 3 paragraphs with appropriate linking words.	Writing is clear and easy to read, with some descriptive words and details. There are at least 2 paragraphs with some linking words.	Writing is unclear or without supporting details. Paragraphs are incomplete or unclear. Few linking words to tie ideas together.	Writing is difficult to read because of missing words, sentences, or incomplete ideas and contains no paragraphs. Lacking linking words.
Conventions	Correct sentence structure, grammar, punctuation, and capitalization.	Mostly correct sentence structure, grammar, punctuation, and capitalization with 1–2 errors.	Mostly correct sentence structure, grammar, punctuation, and capitalization with 3–4 errors.	Sentence structure, grammar, punctuation, and/or capitalization are incorrect with more than 5 errors.
Spelling	There are 0–2 spelling errors.	There are 3–4 spelling errors.	There are 4–5 spelling errors.	There are more than 6 spelling errors.

Grade 3 | Unit 7

Pausing Point 3

Note to Teacher

This marks the end of the Astronomy unit, and students have learned about more of the universe, some of its characteristics, and important people in the history of space travel. It is recommended that you pause here and spend a day reviewing, reinforcing, or extending the material they have been taught.

You may do the activities in any order or combination, using whole class or small groups to meet the needs of the students.

CORE CONTENT UP TO THIS PAUSING POINT

Students will:

- Describe methods and tools used to study space and share information.
- Identify and use vocabulary important to the process of science.
- Recall key details about the history of space exploration.
- Describe the life and contributions of astronaut Mae Jemison.

ACTIVITIES

Image Review

Materials: digital images from Lessons 14–19

- Project the digital images from any Read-Aloud again and have students retell the Read-Aloud using the images.

Key Vocabulary Brainstorming

Materials: chart paper or board

- Give students a key domain concept or vocabulary word, such as *matter*. Have them brainstorm everything that comes to mind when they hear the word. Record their responses on chart paper or a whiteboard for reference.

Astronomy Bulletin Board

Materials: drawing paper, drawing tools

- Make a bulletin board to illustrate what students have learned in this domain. Have students draw pictures of planets and other celestial bodies, galaxies, eclipses, etc., or cut out images from magazines depicting these items. Have students write a fact about each illustration. As students create, encourage them to use complex vocabulary, including, if possible, any domain-related vocabulary.

Riddles 1

Materials: paper, pencil

- Have students create and exchange riddles to review everything they've learned about in the Astronomy unit. For example, "I am a large spacecraft that orbits the earth and I'm a home to many astronauts from around the world. What am I?" (International Space Station)

Riddles 2

Materials: none

- Ask students riddles such as the following to review core content:
    - I theorized that the sun was at the center of the solar system. Who am I? (Nicolaus Copernicus)
    - I was the first African-American woman to travel to space. Who am I? (Mae Jemison)
    - I am the name of the mission during which astronauts Neil Armstrong and Buzz Aldrin first landed on the moon. What was I called? (Apollo 11)
    - I am a picture that a group of stars appears to make in the night sky. What am I? (constellation)
    - I am far from the sun and have been reclassified because of new scientific evidence. What am I? (Pluto)
    - The axis of the earth points to me, and I show humans where to find a northern direction. What am I? (the North Star, or Polaris)
    - I was the first satellite made by humans to be sent into space. What am I? (Sputnik 1)

- I improved upon the telescope and discovered the four moons nearest to Jupiter. Who am I? (Galileo)
- I am a journey with a purpose, perhaps to the moon or Jupiter or Africa or even across town. What am I? (a mission)

Word Scramble

Materials: paper, pencil

- Have students unscramble these words from the unit. You may wish to put these into a worksheet that you can copy or write the scrambled versions on chart paper or on the board.

Word	Scrambled Version
atmosphere	mstporaeeh
eclipse	cspeile
meteoroids	otdsmeiroe
asteroids	odsiarset
universe	viensuer
galaxies	axeglsai
constellation	olnlticensota
billions	ollinisb
theory	teorhy
expanding	egnpainxd
navigation	nvtgnaiaio
comet	temoc
orbit	tbiro
astronomer	ntsrormaoe
gravity	gyivtar

Poster Session

Materials: chart paper, markers

- Divide students into small groups. Let each group decide on a key idea or concept from their reading that can be visualized on a poster. Students can use words or pictures to describe the concept. When the posters are complete, hang them up around the room and allow students to walk around to view and discuss the posters.

Paragraph Puzzles

Materials: Student Readers, paper, pencil (optional: sentence strips or index cards)

- Have each student choose a different paragraph from their reading. On a sheet of paper, students will write out each sentence of the paragraph on a separate line, leaving enough space between lines so that the sentences can be cut out. Alternately, students could write the sentences on sentence strips or on index cards. After the sentences are prepared, have students mix up their sentences. Divide students into partners. Each partner will take turns putting their partner's sentences in the right order without looking at the Student Reader. After the pairs have finished, create new partners and repeat.

Graffiti Wall

Materials: chart paper, markers

- Give groups of students a key domain concept or vocabulary words, such as *black holes* or *observatory*. Have them brainstorm everything that comes to mind when they hear the word they were assigned. Students will record their response in both words and pictures on the chart paper. Have students do a gallery walk of other groups' charts.

Multiple-Meaning Word Activity: Conducted

Materials: chart paper, chalkboard, or whiteboard; images depicting the various meanings of the word *conducted*

1. In the Read-Aloud "Mae Jemison," you heard the word *conducted* in this sentence about Jemison: "She lived on the *Endeavour* for 8 days and conducted many experiments while she was there."
2. With your neighbor, think of and discuss as many meanings for the word *conducted* as you can. (Give students a few minutes to brainstorm and discuss. You may wish to encourage them to jot down their ideas.)

3. Create three columns on chart paper, a chalkboard, or a whiteboard. Write the letter 'A' at the top of the first column. Now ask a volunteer to come up with a definition for the word *conducted* as it occurred in the Read-Aloud. Write "carried out or made something happen" next to the 'A'.

4. Ask a volunteer to share a different meaning of *conducted* that may have emerged from their discussions; guide students to the second meaning for *conducted*. Write the letter 'B' at the top of the second columns, and add the definition "directed or led" beside it.

5. Ask if anyone came up with a third different meaning for *conducted*; guide the discussion to the third meaning. Write the letter 'C' at the top of the third column, and add the definition "served as a route/path or direction for, as for electricity."

6. Read the following sentences one at a time. At the end of each sentence, have students indicate which column the sentence belongs in according to the meaning for *conducted*, and write it on chart paper, a chalkboard, or whiteboard in the correct column.

    - Terry Ann conducted the orchestra for her school's spring musical. (B)
    - Electricity cannot be conducted through rubber, so a safe place during a lightning storm is in a car. (C)
    - Mr. Lee's class conducted a survey to find out which piece of playground equipment was most commonly used. (A)
    - The mother duck conducted her ducklings through the rippling stream, seemingly to avoid the waterfall. (B)
    - The soapstone floor under Sandy's wood stove conducted heat, which warmed the entire room. (C)
    - The marching band played their instruments together beautifully as Minna conducted them with precision. (B)
    - Judge Vance conducted the trial with fairness and compassion. (A)

Class Book—Astronomy: Our Solar System and Beyond

Materials: drawing paper, drawing tools

- Tell the class or group of students that they are going to create a class book to help them remember what they learned in this unit. Have students brainstorm important information that should be in the book, including information about our solar system, stars and galaxies, and important people, etc. Have each student choose one idea to draw a picture of and ask them to write a caption for the picture. Bind the pages to make a book to put in the classroom library for students to read again and again.

Unit Review Game

Materials: questions and answers on index cards from Challenge activities

- If students have been writing review questions and answers suggested during Challenge activities throughout the unit, the index cards can now be used to review unit content in a *Jeopardy*-type game.

Independent Reading

Materials: assortment of books about astronomy

- Have students read additional trade books about astronomy in your classroom or from the library. After reading, have the students write a book review that includes the following:
    - The title and author.
    - Why did you choose the book?
    - A brief summary.
    - Your favorite part.
    - What do you really want a reader to know about this book?
    - Would you recommend the book to others? Why?

Research Activity: Sir Isaac Newton

- Some students may wish to research Sir Isaac Newton, who discovered the laws of gravity.

Research Activity: Astronauts

- Some students may wish to research additional astronauts, such as Buzz Aldrin or Neil Armstrong.

Research Activity: Space Travel

- Some students may wish to research further into the history of space travel, such as the Mercury, Gemini, or Apollo missions, or the current state or future of space travel.

Grade 3 | Unit 7

Teacher Resources

In this section, you will find:

- Glossary
- Activity Book Answer Key
- Texas Essential Knowledge and Skills Correlation Chart
- English Language Proficiency Standards Correlation Chart

Grade 3 | Unit 7

Glossary

A

aeronautics—the study or practice of flight and aircraft

African-American studies—the study of the history, culture, and politics of African-Americans, Americans who have ancestors from Africa

Andromeda Galaxy—the spiral galaxy that is closest to the Milky Way Galaxy

Apollo 11—a rocket ship that took three American astronauts to the moon in 1969

applications—written requests to be considered for a program or job

asteroid—a space rock, smaller than a planet, that orbits the sun (**asteroids**)

asteroid belt—an area between Mars and Jupiter where thousands of asteroids orbit around the sun in a shape like a belt

astronaut—a person who travels into outer space

astronomer—a scientist who studies stars, planets, and outer space (**astronomers**)

astronomical—really large; enormous in number, size, or distance

atmosphere—an invisible, protective blanket of air around Earth and other heavenly bodies

atoms—tiny particles from which all substances are made

attraction—when things are drawn to move closer together

axis—an imaginary straight line through the middle of an object, around which that object spins

B

billion—a very large number (**billions**)

black hole—an object or area in space that has such a strong gravity that not even light beams can escape its gravitational pull

booster rocket—one of two parts of a space shuttle that helps launch it into space by overcoming gravity (**booster rockets**)

C

calculations—mathematical methods used to answer a question

celestial bodies—any objects, including planets, moons, stars, comets, or meteors, which can be found in outer space

chemical engineering—a field of study in which scientists use their knowledge of chemistry and how things in the natural world are made and interact

cluster—a number of things of the same kind that are together in a group

comet—a frozen ball of dust and ice that travels through outer space (**comets**)

compressed—pressed together into less space

constellation—stars that form a pattern or shape that looks like such things as a person, an object, or an animal as seen from Earth (**constellations**)

core—the central inside part of a celestial body, other objects, or ideas

courage—bravery

D

data—facts or pieces of information that have been collected, often in the form of measurements

debris—bits and pieces of leftover dust and rocks

diurnal—having a daily cycle or occurring daily as a result of the earth's 24-hour rotation around its axis

E

eclipse—the blocking of the light from the sun by another heavenly body (**eclipses**)

***Endeavour*—**a NASA space shuttle

engineering—the study and work of using science, knowledge, and methods to solve problems in the world

especially—very much; particularly

expanding—becoming larger; increasing in area; spreading out

exploration—the study of unknown places or things

F

force—a pull or a push on an object or system

frigid—extremely cold

fuse—to join together

G

galaxy—a very large cluster of billions of stars, dust, and gas held together by gravity and separated from other star systems by a large amount of space (**galaxies**)

gas giant—one of the large outer planets, Jupiter, Saturn, Uranus, and Neptune, that is composed of mainly hydrogen gas (**gas giants**)

geocentric—having the earth as the center

gravitational pull—the force that draws all objects in the universe toward each other

gravity—a force that pulls things toward one another

greenhouse—a building with a transparent glass or plastic roof and walls made to trap in heat from the sun and grow plants all year round

H

Halley's comet—a famous comet named for British scientist Edmund Halley that is visible from Earth with the naked eye every 76 years

health care—the prevention or treatment of illnesses by trained medical specialists

heliocentric—having the sun as the center

hemisphere—half of the sphere of Earth

Hubble Telescope—a large telescope that collects information in space; it was carried into space in 1990 and will be there until 2014

hydrogen—a gas that is lighter than air and easily catches fire

hypothesis—an idea that is based on observation and experimentation but that is not commonly accepted

I

imagine—to pretend

international—involving more than one country

irregular—uneven, not regular in shape, size, or other characteristics

L

ladle—a spoon or dipper with a long handle and a cup-like end used for serving liquids

launch—to send a rocket into outer space (**launched**)

light-years—distance traveled by light over a period of years; a measure of length used in astronomy

logical—makes sense in an organized, step-by-step way

M

magnetic—exerting a strong attractive force

manned—carrying and operated by people

matter—the stuff everything in the universe is made of; anything that takes up space

meteor—a piece of rock that burns very brightly when it enters Earth's atmosphere from space, also called a shooting star (**meteors**)

meteorite—a meteor that does not fully burn up in Earth's atmosphere and falls to Earth

meteoroid—a space rock, smaller than an asteroid, that orbits the sun (**meteoroids**)

Milky Way Galaxy—the galaxy that contains Earth and the solar system in which it lies

module—a segment or section of a spacecraft designed to do a specific job

N

naked eye—your eye

NASA—National Aeronautics and Space Administration; an organization in the United States that directs space travel and research

navigate—to find one's way

O

observatory—a place used to observe the sun, moon, stars, and outer space (**observatories**)

opposed—resisted; was against

orbit—the curved path something in space takes around another object in space; planets move in an orbit around the sun (**orbiting**)

orient—to identify your position in relation to things around you

orienteering—a modern sporting competition in which participants orient their movements by compass or GPS (Global Positioning System) to accomplish a set of goals

P

Peace Corps—a group of American volunteers who carry out projects in other countries to help improve the lives of people living there

phenomenon—an interesting fact or event that can be studied

planet—a round object in space that orbits a star (**planets**)

polar—related to the pole of a planet or the area surrounding it

Polaris—the North Star; the brightest star at the end of the handle of the Ursa Minor/Little Dipper that stays in the same place in the night sky all year long

probe—a tool used to explore something, such as outer space (**probes**)

pursue—to do what it takes to accomplish something

R

refugees—people who flee to another country for protection and safety

research—the kind of equipment used to collect information through experiments

reusable—when something can be used more than once

rotate—turn about an axis or a center (**rotating, rotates, rotation**)

S

satellite—a natural or man-made object that orbits a planet or smaller object (**satellites**)

shuttle—to go back and forth from one place to the next (**shuttled**)

solar system—the sun, other bodies like asteroids and meteors, and the planets that orbit the sun

spacecraft—a manned or unmanned vehicle designed to travel into space for research and exploration

space shuttle—a manned spacecraft used for exploration

space station—a manned satellite that is made to be in outer space for a long period of time

spiral—curved in shape; gradually winding around a center point

T

terrain—the surface of the land and its features

tides—the periodic or regular rise and fall of the surface of large bodies of water on Earth that are caused by the interaction of the moon's gravity with Earth

tilted—slanted or tipped to one side

tragedy—a very sad event or a disaster

triumph—a special achievement, success, accomplishment, or victory

U

universe—all objects and matter in space including Earth and beyond

unmanned—not carrying people

Ursa Major—the constellation named by Ptolemy that is also called Big Bear; it includes the Big Dipper

Ursa Minor—the constellation made of seven stars named by Ptolemy that is also called Little Bear; it is the Little Dipper

V

volunteer—a person who willingly performs a service without getting paid

W

weightlessness—to have little or no weight

Digital Exit Ticket Suggested Answers	
QUESTION	ANSWER
Lesson 1	
How does Earth's tilt produce seasons? Use evidence from the text to support your response.	Student answers should reference the movement of the Earth around the sun and discuss how the tilt of the Earth closer to the sun produces the warmer seasons while the tilt of the Earth away from the sun produces the cooler seasons.
Lesson 2	
How can we see the moon at night? Does the moon give off its own light? Use evidence from the text to support your answer.	It is a ball of rock that gives off no light of its own, but rather reflects light from the sun.
Lesson 3	
How did people look at the planets a long time ago compared to now?	They used only their own eyes a long time ago, but today they use telescopes and other tools to get a better look.
Lesson 4	
Today you read about the four outer planets in our solar system. Select one of the outer planets and write two or three important facts about it.	Answers will vary, but should include one of the four outer planets with corresponding facts.
Lesson 5	
Compare and contrast a comet and an asteroid. Use details from the text to support your response.	A comet is a ball of ice and dust that streams gas off the end when it gets close to the sun; a meteor is a space rock that falls to Earth.
Lesson 6	
What have astronomers discovered about how stars differ from one another?	They can be different sizes and colors. Some are closer to Earth than others. Some are hotter than others. The hottest stars and the stars that are closest to Earth appear brighter.
Lesson 7	
Today you compared and contrasted two stories about galaxies and stars. Write at least three sentences that include the key similarities and differences between the two texts.	Answers will vary, but should reference the two texts.
Lesson 8	
Who was Ptolemy? What are constellations? Use evidence from the text to support your answer.	Ptolemy was an ancient astronomer. Constellations are a group of stars in the night sky that appear to form a picture of an object, animal, or person. Constellations often have stories that explain how they came to be in the sky.
Lesson 9	
Identify and describe some of the different kinds of spacecraft and tools that scientists use to explore and study space.	Answers will vary, but should include spacecraft and tools mentioned within the context of the lesson.

Lesson 10	
What are telescopes and why are they useful? What is the Hubble Telescope? Use details from the text to support your response.	A telescope is a tool that allows scientists to view something that is far away. The Hubble Space Telescope is a telescope that was launched into space and now orbits the Earth.
Lesson 11	
What is gravity? Use key details from the text to support your answer.	Gravity is an invisible force of attraction between objects.
Lesson 12	
Describe the effects of gravity on the earth's oceans. What does the beach look like at high tide?	The moon's gravity pulls on the oceans, but Earth's gravity pulls it back, creating tides. At high tide, the waves move higher up on the beach.
Lesson 13	
Astronomers in Copernicus's time were puzzled about the movement of Mars and some other planets. What question did they have about the planets' movements? How did this lead Copernicus to a new understanding?	Astronomers wondered why Mars and some of the planets seem to travel backward at times in their paths across the night sky. This led Copernicus to think of other arrangements of the planets and the sun that would explain this odd and unexpected movement.
Lesson 14	
Why do you think people watching on TV went wild when Neil Armstrong said "The Eagle has landed!"?	Answers will vary.
Lesson 15	
What are booster rockets? Why are they a necessary part of a space shuttle?	They boost the space shuttle to get off the ground by helping to overcome Earth's gravity. Once up in space, the booster rockets are dropped because they are no longer needed.
Lesson 16	
How did Mae Jemison use her fame as a "launch pad" for bringing attention to important issues?	More people would be willing to listen to what she had to say about important issues because they respect and look up to her for being the first African-American woman in space.
Lesson 17	
In this lesson you read a story about a girl, Jen, who goes to an astronomy camp. What did she learn about during her first day?	She learned about the Hubble Space Telescope, Halley's Comet, and galaxies.
Lesson 18	
Name some things we do on Earth that are more challenging on the space station. Use details from the text to support your response.	Answers will vary.

ACTIVITY BOOK ANSWER KEY

Activities with widely variable or subjective responses may not be reprinted in this Appendix.

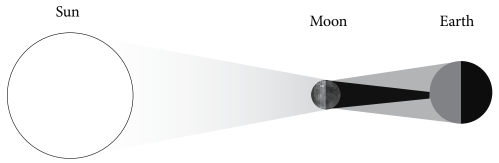
NAME: ______________________

DATE: ______________________

1.1 ACTIVITY PAGE

A Solar Eclipse

Directions: Read the statements and look at the diagram. Sequence the events of a solar eclipse in the correct order.



5 The moon's shadow falls somewhere on the surface of Earth.

2 In its orbit around Earth, the moon passes between the sun and Earth.

4 A shadow forms behind the moon.

1 The sun's light shines on half of Planet Earth.

3 The moon blocks some of the sunlight that is shining on Earth.

Grade 3 Activity Book | Unit 7 1

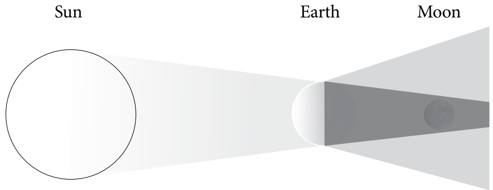
NAME: ______________________

DATE: ______________________

1.2 ACTIVITY PAGE

A Lunar Eclipse

Directions: Read the statements and look at the diagram. Sequence the events of a lunar eclipse in the correct order.



5 Earth's shadow crosses the face of the moon, and the moon appears darkened as we view it from Earth.

2 The moon reflects the sunlight so that we see a bright moon from Earth.

3 Earth passes between the sun and the moon.

1 The sun's light shines on the moon.

4 Earth blocks some or all of the sunlight that is shining on the moon.

Grade 3 Activity Book | Unit 7 3

NAME: ______________________

DATE: ______________________

1.3 ACTIVITY PAGE

The Sun, Earth, and Our Solar System

1. What two types of energy does the sun provide?
   A. The sun provides electrical and wind energy.
   B. The sun provides heat and light energy.
   C. The sun provides light and electrical energy.
   D. The sun provides water and heat energy.

   page 4

2. How many days does it take for the Earth to orbit the sun?
   A. It takes about 78 days for the Earth to orbit the sun.
   B. It takes about 439 days for the Earth to orbit the sun.
   C. It takes about 365 days for the Earth to orbit the sun.
   D. It takes about 149 days for the Earth to orbit the sun.

   page 6

3. How long does it take for the Earth to make a full rotation on its axis?
   A. It takes 24 hours for the Earth to make a full rotation on its axis.
   B. It takes 3 days for the Earth to make a full rotation on its axis.
   C. It takes 365 days for the Earth to make a full rotation on its axis.
   D. It takes 24 days for the Earth to make a full rotation on its axis.

   page 6

Grade 3 Activity Book | Unit 7 5

4. What creates the energy that the sun gives off?
   A. The sun's gases create the energy that the sun gives off.
   B. Light and heat from other stars create the energy that the sun gives off.
   C. Absorbing energy from the eight planets creates the energy that the sun gives off.
   D. Running into objects in space creates the energy that the sun gives off.

   page 4

5. What is the solar system?

   The solar system is made up of the sun, the planets, and other objects in space that orbit the sun.

   page 5

6 Unit 7 | Activity Book Grade 3

NAME:

DATE:

2.1 ACTIVITY PAGE

The Moon

1. Describe what happens during a solar eclipse.

   A solar eclipse occurs when the moon gets in between the sun and Earth.

   page 11

2. Describe what happens during an eclipse of the moon.

   A lunar eclipse occurs when the moon passes behind Earth and into its shadow.

   page 12

3. Why does the moon look different on different nights of the month?

   The moon looks different at different times of the month because of the way the light is reflected and how much of the moon we can see from Earth.

   page 10

4. Compare and contrast Earth's orbit around the sun and the moon's orbit around Earth.

   It takes 365 days for Earth to orbit the sun. It takes a month for the moon to orbit Earth. Both Earth and the moon orbit another body.

   pages 6, 10

If a statement is true, write "true" on the line. If a statement is false, write "false" on the line.

5. The moon gives off light of its own just like the sun.

   false

   page 8

6. The moon orbits around Earth.

   true

   page 10

7. It takes 24 hours for the moon to orbit around Earth.

   false

   page 10

8. Solar eclipses happen much more often than eclipses of the moon.

   false

   page 12

NAME:

DATE:

2.2 ACTIVITY PAGE

Compare and Contrast—Our Solar System

Video	Read-Aloud
Answers vary but could include:	Answers vary but could include:
The sun is at the center and is the biggest thing in our solar system.	We live in a solar system.
Earth and all the planets go around the sun.	It looks like a target with sun in the middle and eight planets going around it.
Everything in the solar system is pulled toward the sun by gravity.	Astronomers know there are other solar systems in the universe.
A solar system is a star with all the things that orbit around it.	Our solar system was formed from gas and dust about 4.5 billion years ago.
Our sun is a yellow star.	Celestial bodies: planets, moons, dwarf planets, satellites, asteroids, meteoroids, comets
There are eight planets.	The sun is made of hot gas and is so big Earth could fit into it 1 million times.
The inner planets have surfaces made of rock.	Eight planets in the solar system
The outer planets have surfaces made of gases.	Pluto is no longer a planet because it hasn't cleared the path of debris.
Gas giants	Many planets have moons.
Terrestrial	
Dwarf planets	

NAME:

DATE:

2.2 ACTIVITY PAGE

Compare and Contrast—Our Solar System

Video	Read-Aloud
Answers may vary but could include:	Answers may vary but could include:
Asteroids	Planetary years
Moons	Inner planets are rocky. Outer planets are made of gas.
Comets	Ceres is a huge asteroid in the asteroid belt between Mars and Jupiter.
Hundreds of thousands of objects in the solar system.	Meteoroids are shooting stars. Meteors and meteorites
Three things to be a planet: big enough to form nearly round shape; must orbit a star; must not cross paths with other objects.	Comets
Pluto used to be a planet.	Halley's Comet
There's a spacecraft on the way to Pluto.	

Write a summary about how the video and the Read-Aloud were most similar:

Both the video and the Read-Aloud talked about the sun being a very large ball of gas at the center of our solar system with eight planets orbiting it. They both talked about other objects such as moons, asteroids, meteors, and comets. The video and the Read-Aloud mentioned that Pluto used to be classified as a planet but now is called a dwarf planet.

NAME:
DATE:

Conjunction *so*

Match the sentences by writing the number of the cause *in the blank that identifies the appropriate* effect. *Rewrite the sentences below, inserting the conjunction* so. *Remember to add correct capitalization and punctuation.*

Causes	Effects
1. The book was very exciting.	3 We played inside.
2. The puppy was very tired.	4 We helped her look for them.
3. The weather was rainy.	2 It took a long nap.
4. Mother lost her glasses.	1 Randy read it three times.

1. The book was very exciting, so Randy read it three times.
2. The puppy was very tired, so it took a long nap.
3. The weather was rainy, so we played inside.
4. My mother lost her glasses, so we helped her look for them.

A. *Read the two simple sentences.*
B. *Decide which happened first and write the word* Cause *over top of it.*
C. *Decide which happened second and write the word* Effect *over top of it.*
D. *Add the conjunction* so *before the simple sentence that happens second and is the effect, join the two sentences.*
E. *Then, write them as a compound sentence including the conjunction* so.

Example: I forgot to clean up my room. I wasn't allowed to go out to play.

Cause Effect

I forgot to clean up my room, so I wasn't allowed to go out to play.

Cause Effect

1. Chocolate is my favorite flavor of ice cream. I asked for it for dessert.

   Chocolate is my favorite flavor of ice cream, so I asked for it for dessert.

Cause Effect

2. Tom enjoys Uncle Steve's company very much. He invited Uncle Steve to go out to a movie.

   Tom enjoys Uncle Steve's company very much, so he invited Uncle Steve to go out to a movie.

Cause Effect

3. The little girl said hello. Her neighbor said hello back.

   The little girl said hello, so her neighbor said hello back.

NAME:
DATE:

Practice Conjunction *so*

Match the sentences by writing the number of the cause *in the blank that identifies the appropriate* effect. *Rewrite the sentences below, inserting the conjunction* so. *Remember to add correct capitalization and punctuation.*

Causes	Effects	
1. The day was very hot.	4	We adopted her immediately.
2. The day was very cold.	2	We bundled up in several layers of clothing.
3. The puppy was shivering and afraid.	1	We asked Mom if we could go swimming at the park.
4. The kitten was cute.	3	He hid behind the couch to escape the thunder.

1. The day was very hot, so we asked Mom if we could go swimming at the park.
2. The day was very cold, so we bundled up in several layers of clothing.
3. The puppy was shivering and afraid, so he hid behind the couch to escape the thunder.
4. The kitten was cute, so we adopted her immediately.

NAME: ______________________________

DATE: ______________________________

3.1 ACTIVITY PAGE

Key Idea in Paragraphs

Directions: After reading the selection, reread to find the key idea of three of the paragraphs. Then, write a summary of the selection from the three key ideas.

Title:
Mars

rocks, rust, red	probes landed, took photos, dug up rocks	ice found; could mean life now or long ago
What is the key idea?	What is the key idea?	What is the key idea?

Summary

Mars appears red because it is covered with rocks containing rust. Probes have landed on Mars that have taken photographs and dug up rocks under the surface. Probes have also found ice, which shows that there might have been life there at some point.

NAME: ______________________________

DATE: ______________________________

3.2 ACTIVITY PAGE

Blank Busters

jellyfish	germy	digest	fringe
nudging	ridge	exchange	eject
budget	lodging	gymnasium	jewel
bridging	dodge	average	fudge
giraffe			

Challenge Word: *answer*
Challenge Word: *great/grate*
Content Word: *Jupiter*

Fill in the blanks in the sentences below with one of the spelling words in the chart. Only if needed, add a suffix to the end of a word in order for the sentence to make sense: –s, –ed, –ing, –er, *or* –ly.

1. The stained sink was dirty and germy.
2. The normal or average size of jellyfish in the ocean is about five inches.
3. The long-necked giraffe at the zoo looks like a giant to a short child.
4. My stomach is digesting the yummy fudge that my grandmother made.

5. In the school's gymnasium students made a huge replica of the planets in our solar system, and our class made Jupiter.
6. The fringe around the collar of your jacket looks just great.
7. My little brother kept nudging me with his elbow so I would look at all of the sparkly jewels in the glass case.
8. Our group was ejected from the game because the referee said we were cheating.
9. Asking questions and answering them are opposites.

Write three sentences using spelling words of your choice that were not used in the first ten sentences. Make sure to use correct capitalization and punctuation. You may use the Challenge Words or Content Word in your sentences.

1. Answers may vary.
2. Answers may vary.
3. Answers may vary.

NAME: ______________________________

DATE: ______________________________

3.4 TAKE-HOME

The Planets Closest to the Sun

If a statement is true, write "true" on the line. If a statement is false, write "false" on the line.

1. Venus is a good place for us to live and visit.

   false

2. The planet Mars looks red because its rocks have rust in them.

   true

3. It takes Mercury less time to orbit the sun than the Earth does because Mercury is much closer to the sun.

   true

4. The four planets closest to the sun have a rocky and solid surface.

   true

5. Write an interesting fact about Mercury, Venus, and Mars. (Do not use a fact from the earlier questions on this worksheet.)

Mercury: Answers may vary.

Venus: Answers may vary.

Mars: Answers may vary.

6. Compare and contrast an inner planet and our moon.

Inner Planet		Moon
Answers may vary.	size?	The moon is smaller than the inner planets.
Answers may vary.	surface?	The moon is a ball of rock.
Answers may vary.	appearance?	The moon looks different on different days.
Answers may vary.	interesting fact?	Answers may vary.

NAME:

DATE:

4.1 ACTIVITY PAGE

Key Idea in Paragraphs

Directions: After reading the selection, reread to find the key idea of three of the paragraphs. Then, write a summary of the selection from the three key ideas.

Title: Jupiter

gas giant, largest planet, mostly made of hydrogen gas	gases blowing around; giant red spot; storm; hurricane	63 moons, very large; some larger than Earth's moon
What is the key idea?	What is the key idea?	What is the key idea?

Summary

Jupiter is the largest planet in the solar system. It is one of the gas giants that's made mostly of hydrogen gas. The gases blow all around the planet. The giant red spot that you can see on the planet is a giant storm, like a hurricane. Jupiter also has 63 moons, and some of them are larger than Earth's moon.

NAME:

DATE:

4.2 ACTIVITY PAGE

–ful: Suffix Meaning "full of"

Directions: The left-hand side of the table contains words that use the suffix you have been studying. Use the blanks on the right side to record additional words that use the same suffix. Make sure to include the definition for the new words you brainstorm.

careful—(adjective) full of effort to do something correctly or safely	Answers may vary.
fearful—(adjective) full of the feeling that something bad will happen	Answers may vary.
hopeful—(adjective) full of the feeling of wanting something to happen and thinking it will	Answers may vary.
painful—(adjective) full of suffering caused by injury, illness, or sadness	Answers may vary.

Write the correct word to complete each sentence.

hopeful	careful	fearful	painful	powerful

1. I had a painful blister on my foot from walking a long distance in my new shoes.
2. Grandma told us to be careful when we walked on the icy sidewalk so we wouldn't fall.
3. The fearful kitten hid under the couch when the thunderstorm came through with lots of noises and flashes.
4. The powerful motor in the boat allowed the boat to move quickly even with so many people in it.

5. Write your own sentence using the one word left in the box.

Answers may vary but should include the word ***hopeful***.

NAME: ______________________________ **4.3** ACTIVITY PAGE
DATE: ______________________________

–less: Suffix Meaning "lacking"

careless—(adjective) lacking the effort to do something correctly or safely	Answers may vary.
powerless—(adjective) lacking the strength or authority to do something	Answers may vary.
fearless—(adjective) lacking the feeling that something bad will happen	Answers may vary.
hopeless—(adjective) lacking the feeling of wanting something to happen and thinking it will	Answers may vary.

Write the correct word to complete each sentence.

powerless	careless	painless	hopeless	fearless

1. He smiled and had a ____fearless____ look in his eye as he climbed the ladder up to the high dive platform for the first time.
2. Steven made a ____careless____ mistake on his math test because he didn't check over his answers before turning in the test.
3. Katie had the ____hopeless____ thought that she would never finish writing her paper in time for the due date.
4. The ____powerless____ lawn mower needed more gas to start up again.

5. Write your own sentence using the one word left in the box.

Answers may vary but should include the word *painless.*

NAME: ______________________________ **4.4** TAKE-HOME
DATE: ______________________________

Suffixes *–ful* and *–less*

Write the correct suffix in the blank to complete the sentence. Explain why the suffix you added makes the correct word for the sentence.

1. She had a hope ____ful____ (–ful, –less) expression on her face as she checked the weather and saw that the rain would stop before the outdoor concert that night.

   Why did you choose your answer? Answers may vary but should defend students' choices.

2. With a fear ____less____ (–ful, –less) look in his eyes, Jack touched the snake that the zookeeper brought around to the group even though he was terrified of snakes.

   Why did you choose your answer? Answers may vary but should defend students' choices.

3. Her last visit to the doctor was pain ____less____ (–ful, –less) because she felt great and did not need any shots or medicine.

   Why did you choose your answer? Answers may vary but should include that she didn't need shots or medicine.

4. He used a care ____ful____ (–ful, –less) and steady hand to paint the details on the outside of the wooden box so the design would look perfect.

   Why did you choose your answer? Answers may vary but should include that he wanted the details to be perfect.

5. The power ____less____ (–ful, –less) camera needed to have a charged battery to start back up again.

   Why did you choose your answer? Answers may vary but should include that the camera had no power.

6. The hope ____less____ (–ful, –less) search for Grandpa's missing glasses took all morning and finally stopped when he said he would just go to the eye doctor to get a new pair.

   Why did you choose your answer? Answers may vary but should defend students' choices.

7. She had the fear ____less____ (–ful, –less) thought that during her next swim practice, she would try to swim the entire length of the pool without stopping.

   Why did you choose your answer? Answers may vary but should include that she was going to attempt to swim the length of the pool.

NAME:
DATE:

4.6 TAKE-HOME

The Outer Planets

1. The planets below are in the wrong order. Use the numbers 1–8 to put them in the right order from closest to the sun to farthest away from the sun.

A. 4	Mars	E. 7	Uranus
B. 8	Neptune	F. 6	Saturn
C. 2	Venus	G. 3	Earth
D. 1	Mercury	H. 5	Jupiter

2. Which planet is the only one that cannot be seen from Earth with the naked eye?
   A. Neptune is the only one that cannot be seen with the naked eye.
   B. Uranus is the only one that cannot be seen with the naked eye.
   C. Jupiter is the only one that cannot be seen with the naked eye.
   D. Saturn is the only one that cannot be seen with the naked eye.

3. What feature is the planet Saturn most known for?
   Saturn is best known for its rings.

4. Out of all eight planets, which one is the largest?
   A. Mercury is the largest of all eight planets.
   B. Jupiter is the largest of all eight planets.
   C. Saturn is the largest of all eight planets.
   D. Neptune is the largest of all eight planets.

5. Jupiter is made up mostly of a gas that is the most common gas in the universe. What type of gas is it?
   Jupiter is mostly made of hydrogen.

6. Choose an inner planet (Mercury, Venus, Earth, Mars) and compare and contrast it with an outer planet (Jupiter, Saturn, Uranus, Neptune).

Inner Planet		Outer Planet
Answers may vary.	size?	Answers may vary.
Answers may vary.	rings?	Answers may vary.
Answers may vary.	surface?	Answers may vary.
Answers may vary.	distance from Earth?	Answers may vary.
Answers may vary.	interesting fact?	Answers may vary.

NAME:
DATE:

5.2 ACTIVITY PAGE

Exit Ticket: Meteors, Meteoroids and Meteorites

Directions: Write a paragraph explaining the differences between meteors, meteoroids, and meteorites. Be sure to use correct spelling, capitalization, and punctuation. You may draw a triple Venn diagram on the back of this page to help you before you begin writing.

Meteors, meteoroids, and meteorites are all made of rock or metal. Meteoroids orbit the sun in space. When they enter Earth's atmosphere and burn up, they are called meteors or shooting stars. If they get through the atmosphere and hit the ground without completely burning up, they are called meteorites.

NAME:
DATE:

5.3 TAKE-HOME

Building Sentences with the Conjunction *so*

Add adjectives and adverbs to the first set of rows. Add simple sentences to the second set of rows to answer the question what happened because. *Choose from your list to create two new, more interesting sentences using the conjunction* so *to connect the two simple sentences.*

Starter Sentence: **The girl sang.**			
Adjectives to describe **the girl**	Adverbs to describe **how**	Adverbs to describe **when**	Adverbs to describe **where**
1. Answers may	1. Answers may	1. Answers may	1. Answers may
2. vary.	2. vary.	2. vary.	2. vary.
3.	3.	3.	3.
4.	4.	4.	4.
Simple sentences that answer the question, **"What happened because the girl sang?"**			
1. Answers may vary.			
2. Answers may vary.			
3. Answers may vary.			
4. Answers may vary.			

New sentences:

1. Answers may vary.

2. Answers may vary.

Starter Sentence: **My brother jumped.**

Adjectives to describe **my brother**	Adverbs to describe **how**	Adverbs to describe **when**	Adverbs to describe **where**
1. Answers may	1. Answers may	1. Answers may	1. Answers may
2. vary.	2. vary.	2. vary.	2. vary.
3.	3.	3.	3.
4.	4.	4.	4.

Simple sentences that answer the question, **"What happened because my brother jumped?"**

1. Answers may vary.
2. Answers may vary.
3. Answers may vary.
4. Answers may vary.

New sentences:

1. Answers may vary.

2. Answers may vary.

NAME:

DATE:

6.1 ACTIVITY PAGE

Galaxies and Stars

	Key ideas from the text
Pages 34–35	Lots of stars in the sky. The sun is a star. Stars are big balls of hot gas. Stars look different than our sun because they are farther away.
Pages 36–37	Scientists who study space are called astronomers. Stars are different in many ways. Different sizes and colors. Some are hotter than others. The stars that are brightest in the sky are the hottest and closest.
Pages 38–39	Stars cluster together to form galaxies. There are billions of stars in a galaxy. Our solar system is in the Milky Way Galaxy. It has a spiral shape. It looks like a milky band of white light.
Pages 40–41	The nearest spiral galaxy to us is called the Andromeda Galaxy. It is billions and billions of miles away. Scientists believe that there are billions of galaxies in the universe.

NAME:

DATE:

6.2 ACTIVITY PAGE

Galaxies and Stars

If a statement is true, write "true" on the line. If a statement is false, write "false" on the line.

1. The stars do not look like the sun because they are all a lot smaller than the sun. false
   page 34
2. Stars are similar in size, color, and brightness. true
   page 36, 37
3. Other stars are balls of hot gas, just like the sun. true
   page 36
4. The Greek root *astron* means sky. false
   page 36
5. Our solar system is in the Andromeda Galaxy. false
   page 38

Answer the following question in complete sentences on the lines below.

6. What are some ways that stars can be different?

   Answers may vary, but they should include something about size, color, and temperature.

   page(s)

7. Compare and contrast a solar system and a galaxy.

Our Solar System		Our Galaxy
Answers may vary.	size?	Answers may vary.
Answers may vary.	location?	Answers may vary.
Answers may vary.	characteristics?	Answers may vary.

NAME: ______________________________

DATE: ______________________________

6.4 ACTIVITY PAGE

Conjunctions *and* and *or*

Read both sentences in each item carefully, looking at the words in the sentence. Choose and write one conjunction (and, or) *in the blank so that the sentence makes sense.*

1. Saturday is going to be a busy day full of fun things to do. First, Mother plans to take all of us to the library, ___and___ then we will go to get ice cream at my favorite ice cream shop. Yum!

2. My little sister had forgotten to make her bed. Father said to her, "Sandy, you must make your bed, ___or___ you will not be able to watch TV tonight."

Read both sentences in each item carefully, looking closely at the conjunction and *or* or *and other clue words in each sentence. Circle the choice that uses the conjunction correctly so that the sentence makes sense.*

3. A. My sister wants to go shopping, and my brother wants to go too.
   B. My sister wants to go shopping, or my brother wants to go too.

4. A. Sally could wake up early in the morning, or she could sleep late today.
   B. Sally could wake up early in the morning, and she could sleep late today.

5. A. Pete's favorite color is orange, or his favorite color is blue.
   B. Pete's favorite color is orange, and his favorite color is blue.

6. A. Aunt Dolly should go to the gas station, or she will run out of gas.
   B. Aunt Dolly should go to the gas station, and she will run out of gas.

Choose the correct answer, looking closely at the conjunctions and *or* or.

7. A. Tim is going to play board games, or he is going to play basketball this weekend. He can't decide which one.
   B. Tim is going to play board games, and he is going to play basketball this weekend. He can't decide which one.

8. A. She will feel better, or she will still be sick in the morning.
   B. She will feel better, and she will still be sick in the morning.

Write compound sentences using the conjunctions and *or* or.

9. (and)
   Answers may vary.

10. (or)
    Answers may vary.

NAME: ______________________________

DATE: ______________________________

7.2 ACTIVITY PAGE

Compare and Contrast Two Texts

Reading "Galaxies and Stars"	Read-Aloud "Galaxies"
Answers may vary but could include:	Answers may vary but could include:
Lots of stars in the sky.	The sun is much brighter in the sky than other stars because it is closest to us.
The sun is a star.	The sun and most stars are made mostly of incredibly hot hydrogen gas.
Stars are big balls of hot gas.	Hydrogen atoms fuse to form a gas called helium.
Stars look different than our sun because they are farther away.	Fusion forms light and heat.
Scientists who study space are called astronomers.	The amount of heat and light determines a star's color.
Stars are different in many ways.	Our sun is a medium-hot yellow star.
Stars are different sizes and colors.	Stars have different ages.
Some stars are hotter than others.	Our sun is billions of years old; some stars are very new.
The stars that are brightest in the sky are the hottest and closest.	

NAME: ______________________________

DATE: ______________________________

7.2 ACTIVITY PAGE

Compare and Contrast Two Texts

Reading "Galaxies and Stars"	Read-Aloud "Galaxies"
Stars cluster together to form galaxies.	There are stars larger and smaller than our sun.
There are billions of stars in a galaxy.	A galaxy is a cluster of many stars.
Our solar system is in the Milky Way Galaxy.	Some are spiral, some are elliptical, and some are irregular in shape.
The Milky Way has a spiral shape.	Our solar system is in the Milky Way Galaxy.
The Milky Way looks like a milky band of light at night.	The Milky Way Galaxy is spiral.
The nearest galaxy to us is another spiral galaxy called the Andromeda Galaxy.	You can see it on a clear night.
It is billions and billions of miles away.	The Andromeda Galaxy is a spiral shape and closest to our galaxy.
Scientists believe that there are billions of galaxies in the universe.	A light-year is about 6 trillion miles. It's the distance light travels in one year.

Compare and Contrast Summary

Directions: using your notes from the graphic organizer, write a paragraph about how the two texts are most similar and another paragraph about how they are different.

Answers may vary.

NAME: ____________________
DATE: ____________________

7.3 ACTIVITY PAGE

Word Sort

Identify the headers. Read the words in the box and circle the letters that have the /j/ sound. Write the words under each header that match the header's spelling pattern.

'j' > /j/	'dge' > /j/	'g' > /j/
Jill	budge	cage
adjective	smudge	gymnast
ajar	pledge	appendage
injury	fudge	giant
enjoy	gadget	cabbage
judgment		tonnage

'dg' > /j/	'ge' > /j/
hedging	gerbil
porridge	gelcap
wedged	gemstones
abridging	
judgment	

budge	game	beige	cabbage	great
hedging	Jill	gemstones	gadget	botch
cage	gerbil	abridging	gallery	tonnage
gymnast	gelcap	ghastly	ajar	enjoy
appendage	smudge	adjective	injury	judgment
porridge	wedged	giant	pledge	fudge

NAME: ____________________
DATE: ____________________

7.4 TAKE-HOME

Dictionary Skills

Use the following portion of a dictionary page to answer the questions below.

jester **jiffy**

jet 1. *noun* A stream of liquid forced out a small opening. 2. *noun* A plane powered by jet engines. 3. *verb* To travel by jet.

jewel 1. *noun* A gem used in jewelry. 2. *noun* A thing greatly valued.

1. What are the two guide words on the page? jester jiffy
2. What are the two entry words on the page? jet jewel
3. How many definitions are there for *jet*? 3
4. Would the word *jest* be on this page? no
5. Circle the words that would come before *jester* from the following list:
   jeep, jigsaw, jettison

6. Which definition of *jet* matches the use of the word in the sentence:

When you shake up a soda and open it, a *jet* of soda will shoot out of the can opening. 1

What part of speech is *jet* in this sentence? noun

7. Choose one of the two remaining definitions for *jet* and write a sentence using *jet* in that form. Answers may vary.

8. Which definition of *jewel* matches the use of the word in the sentence:

The smallest puppy in the litter was the *jewel* of the bunch.

2

What part of speech is *jewel* in this sentence? noun

9. Write a sentence using definition 1 for *jewel*. Answers may vary.

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8.1 ACTIVITY PAGE

Constellations

1. How many constellations can be seen in the night sky?
   A. 40 constellations can be seen in the night sky.
   B. 64 constellations can be seen in the night sky.
   C. 88 constellations can be seen in the night sky.
   D. 48 constellations can be seen in the night sky.

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2. Why might the stars in constellations look brighter than other stars?
   A. The stars look brighter because they are closer to the Earth.
   B. The stars look brighter because they are reflecting light of other stars.
   C. The stars look brighter because they are hotter than other stars.
   D. Both A and C

3. What is another name for the constellation Ursa Major?

   Another name for Ursa Major is Big Bear.

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4. What group of stars is within the constellation Ursa Major?
   A. The Little Dipper is within the constellation Ursa Major.
   B. The Big Dipper is within the constellation Ursa Major.
   C. Ursa Minor is within the constellation Ursa Major.
   D. Polaris is within the constellation Ursa Major.

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5. Why is Polaris different from other stars in the sky?
   A. It is part of the Big Dipper.
   B. It never stays in the same place.
   C. It is not really a star.
   D. It stays in the same place all year.

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6. Pretend you are outside on a clear night. Describe the steps you would take to locate Polaris.

   Answers may vary but could include facing north.

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8.3 ACTIVITY PAGE

Practice Conjunction *so*

Create an Effect *to go with the* Cause *listed below, adding the conjunction* so, *to make a compound sentence. Draw two lines under* so.

1. Today is Saturday Answers may vary.

2. There is no school in summer Answers may vary.

3. The merry-go-round was lots of fun Answers may vary.

4. Pink cotton candy is my favorite flavor Answers may vary.

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Create a Cause *to go with the* Effect *listed below, adding the conjunction* so*, to make a compound sentence. Draw two lines under* so.

1. Answers may vary.

_______________ the leaves dropped off of the trees.

2. Answers may vary.

_______________ we opened presents.

3. Answers may vary.

_______________ Mother ran to answer the phone.

4. Answers may vary.

_______________ Tom put his foot on the brake and stopped the car.

NAME:

DATE:

9.1 ACTIVITY PAGE

Anticipatory Guide for "Space Exploration"

Before Listening	Statement	After Listening
T or F	Our solar system is geocentric.	T or F
T or F	Neptune wasn't discovered until more powerful telescopes were invented.	T or F
T or F	Observatories are built on mountains so they are closer to the stars.	T or F
T or F	The Hubble Space Telescope orbits the solar system.	T or F
T or F	The first human being to go into space was Soviet cosmonaut Yuri Gagarin.	T or F
T or F	Astronaut Buzz Aldrin was the first man to walk on the moon.	T or F
T or F	The Apollo 11 space capsule was not a reusable spacecraft.	T or F

If you could rename this Read-Aloud, what would you name it? Why?

Answers may vary.

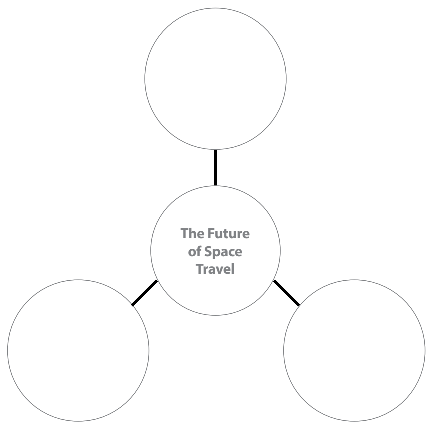
NAME:

DATE:

9.2 ACTIVITY PAGE

The Future of Space Travel: Opinion

Answers may vary.



The Future of Space Travel

Answers may vary.

NAME:
DATE:

9.3 ACTIVITY PAGE

Blank Busters

gnat	skinny	knotted	recently
flannel	knighted	nearby	understand
design	knobby	manned	knowledge
channel	annoy	gnarly	knuckle
campaign			

Challenge Word: *very/vary*
Challenge Word: *enough*
Content Word: *astronomer*

Fill in the blanks in the sentences below with one of the spelling words in the box. Only if needed, add a suffix to the end of a word in order for the sentence to make sense: –s, –ed, –ing, –er, or –ly.

1. The bothersome TV show was so annoying that I begged my family to change the channel.
2. My very silly uncle conducted a lavish campaign to be knighted Sir Uncle Fred!
3. Scientists called astronomers study stars, planets, and satellites that are manned by astronauts.
4. In the pasture is a tree that is so old that its branches are gnarly and knotted.

5. The flannel nightgowns were warm.
6. When the lights went out, I fumbled around in the dark and ran my knuckles into a closed door.
7. Teachers make it so easy to understand difficult topics and they love to fill our heads with knowledge.
8. I had searched for months but recently discovered there is a library right around the corner which is nearby enough for me to walk to it.

Write three sentences using spelling words of your choice that were not used in the first ten sentences. Make sure to use correct capitalization and punctuation. You may use the Challenge Words or Content Word in your sentences.

1. Answers may vary but should include the words *design, skinny, knobby,* or *gnat.*
2.
3.

NAME:
DATE:

10.2 ACTIVITY PAGE

Exploring Space

1. What did Galileo discover with his telescope?
   A. Galileo discovered Mars with his telescope.
   B. Galileo discovered Jupiter with his telescope.
   C. Galileo discovered four of Jupiter's moons with his telescope.
   D. Galileo discovered the Andromeda Galaxy with his telescope.

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2. What is the Hubble Telescope?
   A. It is a telescope in an observatory in Texas.
   B. It is a telescope launched into space by NASA.
   C. It is Galileo's first telescope.
   D. It is a large telescope NASA put on the moon.

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3. If the Hubble Telescope took a picture of Jupiter, describe what the picture would look like.
   Answers may vary but could include Jupiter's many moons.

4. Who was the first American astronaut to go into space?
   Alan Shepard was the first American astronaut to go into space.
   page 54

5. When did the first rocket ship go to the moon?
   A. The first rocket ship went to the moon in 1969.
   B. The first rocket ship went to the moon in 1961.
   C. The first rocket ship went to the moon in 1972.
   D. The first rocket ship went to the moon in 1965.

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6. What is gravity and why is it a challenge for rocket ships?
   Gravity is a force of attraction that pulls things toward one another. Earth's gravity pulls things back down to Earth, like rocket ships. So rocket ships need a lot of force to escape Earth's gravity.

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DATE:

10.3 ACTIVITY PAGE

Triangle Connections

Directions: Using your notes and the glossary in your Student Reader, select three words we've studied in the unit so far and arrange them in a triangle shape. Then, connect the first word to second word with a line and write on the line how the two words are connected. Next, draw a line from the second word to the third word and write on the line how those two words are connected. Finally, draw a line from the third word to the first word and write the connection.

First word:

Answers may vary.

Second word: **Third word:**

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11.2 ACTIVITY PAGE

Gravity Experiment

Directions: Follow your teacher's directions for conducting the experiment. You will record your predictions, results, and conclusions on this page.

Objects dropped		My prediction	Result
Experiment number 1	Marble Paper	Answers may vary.	Answers may vary.
Why did this happen? Answers may vary.			
Experiment number 2		Answers may vary.	Answers may vary.
Why did this happen? Answers may vary.			

Objects dropped		My prediction	Result
Experiment number 3		Answers may vary.	Answers may vary.
Why did this happen? Answers may vary.			
Write a summary of the gravity experiment and what you learned: Answers may vary.			

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12.1 ACTIVITY PAGE

Reflection 3-2-1

Write a sentence for each of the categories below:

Write three things you learned from "Gravity."

1. Answers may vary.
2. Answers may vary.
3. Answers may vary.

Write two things that you already knew about gravity before reading "Gravity."

1. Answers may vary.
2. Answers may vary.

What is the one question about gravity that did not get answered from the reading or the discussion about the text?

1. Answers may vary.

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12.2 ACTIVITY PAGE

Grammar Review

Circle the sentence that is punctuated correctly.

1. A. "she was so glad to see her friend remarked Sally."
   B. "She was so glad to see her friend," remarked Sally.
   C. "She was so glad to see her friend?" remarked Sally.
   D. "She was so glad to see her friend, remarked Sally."

2. A. "The tunnel was dark long and scary, said Ted."
   B. "The tunnel was dark, long, and scary," said Ted.
   C. "The tunnel was dark, long, and scary, said Ted."
   D. "The tunnel was dark long, and scary," said Ted.

3. A. Mrs. Black asked "Do you have your reader open."
   B. Mrs. Black asked "Do you have your reader open?"
   C. Mrs. Black asked? "Do you have your reader open."
   D. Mrs. Black asked, "Do you have your reader open?"

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13.3 TAKE-HOME

Dictionary Skills

Use the following portion of a dictionary page to answer the questions below.

name **neck**

name 1. *noun* A word used to call a person, place, or thing. 2. *noun* A bad word or phrase used to hurt someone. 3. *noun* A person's reputation. 4. *verb* To state the name of something. 5. *verb* To select someone for a job.

neat 1. *adjective* Not messy. 2. *adjective* Great or exellent.

1. Would the word *narrate* be on this page? yes
2. Circle the words that would come before *name* from the following list:
   nails, nag, namely
3. Which definition of *neat* matches the use of the word in the sentence:

   My desk at school is always *neat*. 1

   What part of speech is *neat* in this sentence? adjective
4. Write a sentence using definition 2 for *neat*.

   Answers may vary.

5. Write a sentence using definition 1 for *name*.

   Answers may vary.

6. Write a sentence using definition 2 for *name*.

   Answers may vary.

7. Write a sentence using definition 3 for *name*.

   Answers may vary.

8. Write a sentence using definition 4 for *name*.

   Answers may vary.

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14.1 ACTIVITY PAGE

Compare and Contrast: Chapter 9 and Chapter 10

Chapter 9 "A Walk on the Moon"	Chapter 10 "What's it Like in Space?"
Answers may vary but should include:	Answers may vary but should include:
Three astronauts were on Apollo 11.	Gravity is a force of attraction.
Columbia—Spaceship	Gravity is less on the moon than on Earth.
One astronaut stayed to fly it.	Astronauts feel no gravity in space.
Eagle—landing craft	It's like floating.
Two astronauts landed on the moon.	Eating in space is different because your food floats around.
Armstrong flew the *Eagle*.	No oxygen in space; it has to be pumped into the spacecraft.
"The *Eagle* has landed."	It's very cold in space.
no air on the moon—astronauts had breathing tanks, masks, and spacesuits	You cannot hear sounds in space.
very cold on the moon	
Armstrong first man to walk on the moon	
Aldrin was the second man on the moon.	
"One small step for a man, one giant leap for mankind."	

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14.1 ACTIVITY PAGE

Compare and Contrast: Chapter 9 and Chapter 10

Chapter 9 "A Walk on the Moon"	Chapter 10 "What's it Like in Space?"
People around the world watched on TV.	
Moon has less gravity than on Earth	
Astronauts used tools to gather information and dig up samples of moon rock.	
All three astronauts splashed down in the sea.	

What is most similar about the two texts?

Both texts talked about spacecraft and how they work in space. Also, both texts talked about gravity, and how there is little gravity on the moon and no gravity in space. Both texts said that it is also very cold in space.

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14.2 ACTIVITY PAGE

Reader's Theater Reflection

What was your favorite part of Reader's Theater?

Answers may vary.

What was your least favorite part?

Answers may vary.

Would you like to do a Reader's Theater activity again? Why or why not?

Answers may vary.

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14.3 ACTIVITY PAGE

Suffix Review

Reminder:
- *–ous* means "full of"
- *–ive* means "relating to"
- *–ly* means "in a ___________ way"
- *–ful* means "full of"
- *–less* means "lacking"

If the sentence shows an example of the correct meaning of the underlined word, write yes on the blank that follows. If the sentence does not show an example of the correct definition of the underlined word, write no.

1. Dana came up with an inventive way to hang art in her room and made the arrangement look like all the other rooms in the house. no
2. I saw the hopeless look in my brother's eyes when I told him Dad was running late and we probably wouldn't make it to the movie tonight. yes
3. Dad keeps poisonous cleaning supplies locked up in the shed so no one can accidentally get into them and get sick. yes
4. He drove dangerously through the neighborhood, taking his time and slowing down when he saw people walking or riding bikes. no
5. The principal appreciatively presented the teacher with her award, thanking her for her hard work and dedication. yes
6. I had a painful gash on my knee from falling on the playground that throbbed and ached. yes
7. At the craft store, she bought supplies to make a decorative frame to hang on a wall that needed some decoration. yes

8. His fearless attitude prevented him from trying new things since he was scared of almost everything. no
9. We drove through the mountainous area and could see nothing but flat farmland all around. no
10. Workers used the powerful crane to lift the steel beams high up to the top of the building to put them in. yes

Write a sentence for each word like the previous ones that you can answer with yes.

1. *creative*

   Answers may vary.

2. *furiously*

   Answers may vary.

3. *fearful*

   Answers may vary.

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15.2 ACTIVITY PAGE

The Space Shuttle

If a statement is true, write "true" on the line. If a statement is false, write "false" on the line.

1. A space shuttle only carries astronauts into space. false

   page 76

2. Booster rockets help space shuttles get off the ground and overcome Earth's gravity to get into space. true

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3. The last space shuttle mission took place in July, 2013. false

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Answer the following questions on the lines provided.

4. How is a space shuttle different from the Apollo 11 spacecraft?

   Answers may vary but should state that space shuttles are reusable.

   page(s) 72

5. What are the other ways NASA is planning to explore space?

NASA is planning to launch unmanned probes and satellites. NASA hopes to learn more about the moon's gravity and wants to explore asteroids.

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15.3 ACTIVITY PAGE

Connecting Sentences

Directions: Read the mixed-up sentences from a paragraph below. In the spaces, write the number for the correct order of the sentences, 1, 2, 3, 4, or 5.

There is no land on Jupiter.	2, 1
The two main gases are hydrogen and helium.	4, 3
The planet is a big ball of swirling gases.	3, 2
Jupiter is a planet, but it is a very different kind of planet from Earth.	1, 5
There are also other gases on Jupiter, and all of them are blowing and swirling around.	5, 4

Answers may vary, but they should follow a logical order.

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16.1 ACTIVITY PAGE

Read-Aloud: Mae Jemison

Directions: complete the questions below while listening to the Read-Aloud.

1. Why is Mae Jemison famous?

   In 1992, she was the first African-American woman to become an astronaut and travel into space.

2. Describe Jemison's mission as an astronaut.

   She traveled into space and lived on the space shuttle *Endeavour* for eight days. She conducted many experiments about how weightlessness affects animals and humans.

3. NASA considers many applications for the astronaut program. What kinds of characteristics and skills do you think made Jemison a good candidate for NASA?

   She was a well-rounded person with many goals. She became an engineer and doctor and traveled the world helping others.

4. What kind of international work did Jemison do to help people around the world?

   Jemison helped with community medicine projects in Kenya; she helped care for Cambodian refugees in Thailand; and she was responsible for the healthcare of Peace Corps volunteers in West Africa.

5. Why did NASA stop taking applications for new astronauts for a period of time when Jemison was interested in joining NASA?

   There was a tragedy in the space program when the space shuttle *Challenger* burst into flames. NASA stopped taking applications for new astronauts for a while.

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16.2 ACTIVITY PAGE

Dr. Mae Jemison

1. The events of Mae Jemison's life listed below are in the wrong order. Use the numbers 1–7 to put them in the right order.

   __4__ Joins the Peace Corps and goes to Africa

   __1__ Graduates from high school at the age of 16

   __6__ Becomes the first African-American female astronaut to go into space

   __2__ Attends Stanford University

   __5__ Is one of 15 people chosen out of 2,000 applicants to be an astronaut

   __3__ Goes to medical school

   __7__ Retires from NASA and becomes a professor

2. Why do you think Mae Jemison is a good role model for others? Can you name any other people that you have learned about in previous lessons who would be a good role model?

   Answers may vary.

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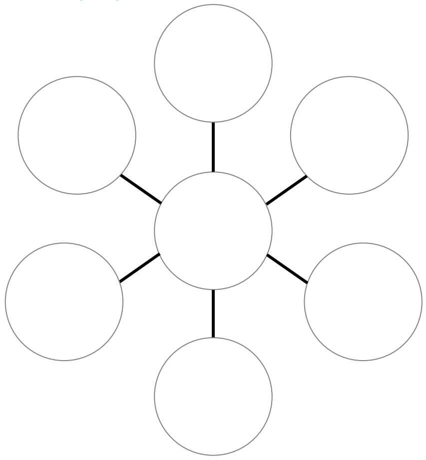
17.2 ACTIVITY PAGE

Planning: Informative Writing

"A Day in the Life of an Astronaut on the International Space Station"

Answers may vary.



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17.3 CONTINUED ACTIVITY PAGE

1. Where is the family at the beginning of this selection?

   They are at Mega Adventure Land.

2. List five things Jen knew about astronomy:

   Atmosphere of Venus

   Rings of Saturn

   Great Red Spot on Jupiter

   Why Pluto was no longer counted as a planet

   About Apollo 11 and moon landings

3. Why was it like Jen to take an awesome ride and turn it into a science lesson?

   Jen is nuts about science.

4. Arrange the events from the selection in order from one to five.

   __5__ Jen called to tell her family about the first day of astronomy camp.

   __2__ Jen's dad saw a flyer for astronomy camp and thought Jen would like it.

   __1__ Jen calculated the g-force on the last plunge of the roller coaster ride.

   __4__ Jen's mother cried most of the way home.

   __3__ Jen's family took her to astronomy camp.

5. Which of the following was not something Jen learned about during her first day at astronomy camp?

   A. The Hubble Space Telescope

   B. booster rockets

   C. Galaxies

   D. Halley's Comet

NAME: ______________________ **17.5** ACTIVITY PAGE

DATE: ______________________

Singular Possessive Nouns

Rewrite each sentence, changing the group of words in parentheses to a singular possessive noun.

Example: (The light of the sun) is warm on my face.
The sun's light is warm on my face.

1. (The child of my aunt) came to visit us.
   My aunt's child came to visit us.

2. (The car belonging to my friend) was hit by a truck.
   My friend's car was hit by a truck.

3. (The phone call from my teacher) made my mother very happy.
   My teacher's phone call made my mother very happy.

4. (The cage belonging to the hamster) needed to be cleaned.
   The hamster's cage needed to be cleaned.

Write the singular possessive noun and what belongs to each singular possessive noun on the appropriate blanks.

Example: The boy's picture was hung in the front hall.
Singular Possessive Noun: boy's What belongs to him/her/it? picture

1. Hank's skateboard is purple.

Singular Possessive Noun: Hank's What belongs to him/her/it? skateboard

2. The giant's footsteps in the hall were thunderous.

Singular Possessive Noun: giant's What belongs to him/her/it? footsteps

3. The horse's mane blew in the wind as he ran around the track.

Singular Possessive Noun: horse's What belongs to him/her/it? mane

4. The artist's portrait was so realistic that I thought it would speak to me.

Singular Possessive Noun: artist's What belongs to him/her/it? portrait

NAME: ______________________ **18.2** ACTIVITY PAGE

DATE: ______________________

Plural Possessive Nouns

Rewrite each sentence, changing the group of words in parentheses to include a plural possessive noun.

Example: (The statues belonging to the sculptors) are very lifelike.
The sculptors' statues are very lifelike.

1. (The neighbors of my cousins) came to visit us.
   My cousins' neighbors came to visit us.

2. (The bicycles belonging to my friends) are all brand new.
   My friends' bicycles are all brand new.

3. (The cards from well-wishers) made my brother feel very loved.
   Well-wishers' cards made my brother feel very loved.

4. (The leashes belonging to my cats) should be replaced.
   My cats' leashes should be replaced.

Write the plural possessive noun and what belongs to each plural possessive noun on the appropriate blanks.

Example: The boys' pictures were taped to the refrigerator.
Plural Possessive Noun: boys' What belongs to them? pictures

1. The painters' places to paint are near the ocean.

Plural Possessive Noun: painters' What belongs to them? spots

2. The magicians' tricks fooled all of us.

Plural Possessive Noun: magicians' What belongs to them? tricks

3. The kittens' ears all twitch when I open a can of cat food.

Plural Possessive Noun: kittens' What belongs to them? ears

4. The plumbers' tools are shiny and new.

Plural Possessive Noun: plumbers' What belongs to them? tools

Unit 7		Correlation—Teacher's Guide
(1) Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking—oral language. The student develops oral language through listening, speaking, and discussion. The student is expected to:		
TEKS 3.1.A	listen actively, ask relevant questions to clarify information, and make pertinent comments	U7: p. 8, U7: p. 11, U7: p. 13, U7: p. 14, U7: p. 34, U7: p. 42, U7: p. 58, U7: p. 60, U7: p. 80, U7: p. 83, U7: p. 130, U7: p. 133, U7: p. 144, U7: p. 145, U7: p. 149, U7: p. 164, U7: p. 167, U7: p. 264, U7: p. 266, U7: p. 284, U7: p. 285, U7: p. 287; U7: p. 312, U7: p. 319
TEKS 3.1.B	follow, restate, and give oral instructions that involve a series of related sequences of action	
TEKS 3.1.C	speak coherently about the topic under discussion, employing eye contact, speaking rate, volume, enunciation, and the conventions of language to communicate ideas effectively	U7: p. 246, U7: p. 250, U7: p. 312, U7: p. 319
TEKS 3.1.D	work collaboratively with others by following agreed-upon rules, norms, and protocols	U7: p. 92, U7: p. 96, U7: p. 144, U7: p. 145, U7: p. 149, U7: p. 224, U7: p. 234, U7: p. 235, U7: p. 238, U7: p. 240, U7: p. 246, U7: p. 250
TEKS 3.1.E	develop social communication such as conversing politely in all situations	U7: p. 224, U7: p. 234, U7: p. 235
(2) Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking—beginning reading and writing. The student develops word structure knowledge through phonological awareness, print concepts, phonics, and morphology to communicate, decode, and spell. The student is expected to:		
(A) demonstrate and apply phonetic knowledge by:		
TEKS 3.2.A.i	decoding multisyllabic words with multiple sound-spelling patterns, such as eigh, ough, and en	
TEKS 3.2.A.ii	decoding multisyllabic words with closed syllables, open syllables, VCe syllables, vowel teams, including digraphs and diphthongs, r-controlled syllables, and final stable syllables	
TEKS 3.2.A.iii	decoding compound words, contractions, and abbreviations	
TEKS 3.2.A.iv	decoding words using knowledge of syllable division such as VCCV, VCV, and VCCCV with accent shifts	
TEKS 3.2.A.v	decoding words using knowledge of prefixes	
TEKS 3.2.A.vi	decoding words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants	U7: p. 80, U7: p. 89, U7: p. 130, U7: p. 142
TEKS 3.2.A.vii	identifying and reading high-frequency words from a research-based list	
(B) demonstrate and apply spelling knowledge by:		
TEKS 3.2.B.i	spelling multisyllabic words with closed syllables, open syllables, VCe syllables, vowel teams, including digraphs and diphthongs, r-controlled syllables, and final stable syllables	
TEKS 3.2.B.ii	spelling homophones	
TEKS 3.2.B.iii	spelling compound words, contractions, and abbreviations	

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TEKS 3.2.B.iv	spelling multisyllabic words with multiple sound-spelling patterns	U7: p. 8, U7: p. 30, U7: p. 58, U7: p. 77, U7: p. 92, U7: p. 95, U7: p. 112, U7: p. 125, U7: p. 164, U7: p. 179, U7: p. 180, U7: p. 183, U7: p. 192, U7: p. 202, U7: p. 246, U7: p. 249
TEKS 3.2.B.v	spelling words using knowledge of syllable division such as VCCV, VCV, and VCCCV	
TEKS 3.2.B.vi	spelling words using knowledge of prefixes	
TEKS 3.2.B.vii	spelling words using knowledge of suffixes, including how they can change base words such as dropping e, changing y to i, and doubling final consonants	U7: p. 164
TEKS 3.2.C	alphabetize a series of words to the third letter	
TEKS 3.2.D	write complete words, thoughts, and answers legibly in cursive leaving appropriate spaces between words.	
(3) Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking—vocabulary. The student uses newly acquired vocabulary expressively. The student is expected to:		
TEKS 3.3.A	use print or digital resources to determine meaning, syllabication, and pronunciation	
TEKS 3.3.B	use context within and beyond a sentence to determine the meaning of unfamiliar words and multiple-meaning words	
TEKS 3.3.C	identify the meaning of and use words with affixes such as *im-* (into), *non-*, *dis-*, *in-* (not, non), *pre-*, *-ness*, *-y*, and *-ful*	U7: p. 80, U7: p. 89, U7: p. 130, U7: p. 142, U7: p. 238, U7: p. 243
TEKS 3.3.D	identify and explain the meaning of antonyms, synonyms, idioms, homophones, and homographs in a text	
(4) Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking—fluency. The student reads grade-level text with fluency and comprehension. The student is expected to use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text.		
TEKS 3.4	use appropriate fluency (rate, accuracy, and prosody) when reading grade-level text	U7: p. 224, U7: p. 236, U7: p. 238, U7: p. 242, U7: p. 284, U7: p. 285, U7: p. 295
(5) Developing and sustaining foundational language skills: listening, speaking, reading, writing, and thinking—self-sustained reading. The student reads grade-appropriate texts independently. The student is expected to self-select text and read independently for a sustained period of time.		
TEKS 3.5	self-select text and read independently for a sustained period of time	
(6) Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts. The student is expected to:		
TEKS 3.6.A	establish purpose for reading assigned and self-selected texts	U7: p. 224, U7: p. 226, U7: p. 227
TEKS 3.6.B	generate questions about text before, during, and after reading to deepen understanding and gain information	U7: p. 112, U7: p. 122, U7: p. 123, U7: p. 180, U7: p. 186, U7: p. 187, U7: p. 206, U7: p. 208, U7: p. 216, U7: p. 300, U7: p. 303, U7: p. 304
TEKS 3.6.C	make, correct, or confirm predictions using text features, characteristics of genre, and structures	U7: p. 58, U7: p. 71, U7: p. 72
TEKS 3.6.D	create mental images to deepen understanding	
TEKS 3.6.E	make connections to personal experiences, ideas in other texts, and society	U7: p. 8, U7: p. 11, U7: p. 80, U7: p. 87, U7: p. 88
TEKS 3.6.F	make inferences and use evidence to support understanding	U7: p. 192, U7: p. 201, U7: p. 206, U7: p. 208, U7: p. 224, U7: p. 226

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TEKS 3.6.G	evaluate details read to determine key ideas	U7: p. 34, U7: p. 38, U7: p. 58, U7: p. 60, U7: p. 76, U7: p. 80, U7: p. 83, U7: p. 87, U7: p. 112, U7: p. 116, U7: p. 122, U7: p. 123, U7: p. 130, U7: p. 133, U7: p. 134, U7: p. 164, U7: p. 167, U7: p. 180, U7: p. 186, U7: p. 187, U7: p. 192, U7: p. 195, U7: p. 224, U7: p. 226, U7: p. 284, U7: p. 285, U7: p. 287, U7: p. 300, U7: p. 303, U7: p. 304
TEKS 3.6.H	synthesize information to create new understanding	U7: p. 92, U7: p. 96, U7: p. 102, U7: p. 123, U7: p. 130, U7: p. 141, U7: p. 144, U7: p. 145, U7: p. 149, U7: p. 180, U7: p. 186, U7: p. 187, U7: p. 238, U7: p. 240, U7: p. 264, U7: p. 275, U7: p. 284, U7: p. 285, U7: p. 289, U7: p. 300, U7: p. 303, U7: p. 304
TEKS 3.6.I	monitor comprehension and make adjustments such as re-reading, using background knowledge, asking questions, and annotating when understanding breaks down	
(7) Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The student responds to an increasingly challenging variety of sources that are read, heard, or viewed. The student is expected to:		
TEKS 3.7.A	describe personal connections to a variety of sources including self-selected texts	
TEKS 3.7.B	write a response to a literary or informational text that demonstrates an understanding of a text	U7: p. 8, U7: p. 11, U7: p. 34, U7: p. 42, U7: p. 58, U7: p. 60, U7: p. 76, U7: p. 80, U7: p. 83, U7: p. 112, U7: p. 116, U7: p. 122, U7: p. 123, U7: p. 130, U7: p. 141, U7: p. 180, U7: p. 186, U7: p. 187, U7: p. 206, U7: p. 216, U7: p. 238, U7: p. 242, U7: p. 264, U7: p. 275, U7: p. 300, U7: p. 303, U7: p. 304
TEKS 3.7.C	use text evidence to support an appropriate response	U7: p. 8, U7: p. 24, U7: p. 34, U7: p. 38, U7: p. 58, U7: p. 71, U7: 112, U7: p. 122, U7: p. 123, U7: p. 144, U7: p. 145, U7: p. 147, U7: p. 149, U7: p. 180, U7: p. 184, U7: p. 186, U7: p. 206, U7: p. 208, U7: p. 246, U7: p. 252, U7: p. 264, U7: p. 266, U7: p. 284, U7: p. 285, U7: p. 291, U7: p. 300, U7: p. 303, U7: p. 304
TEKS 3.7.D	retell and paraphrase texts in ways that maintain meaning and logical order	U7: p. 8, U7: p. 11, U7: p. 264, U7: p. 275
TEKS 3.7.E	interact with sources in meaningful ways such as notetaking, annotating, freewriting, or illustrating	U7: p. 92, U7: p. 96, U7: p. 112, U7: p. 116, U7: p. 130, U7: p. 133, U7: p. 134, U7: p. 192, U7: p. 195, U7: p. 284, U7: p. 285, U7: p. 287
TEKS 3.7.F	respond using newly acquired vocabulary as appropriate	U7: p. 8, U7: p. 11, U7: p. 112, U7: p. 122, U7: p. 123, U7: p. 180, U7: p. 184, U7: p. 186, U7: p. 187, U7: p. 300, U7: p. 303, U7: 304, U7: p. 320
TEKS 3.7.G	discuss specific ideas in the text that are important to the meaning	
(8) Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts—literary elements. The student recognizes and analyzes literary elements within and across increasingly complex traditional, contemporary, classical, and diverse literary texts. The student is expected to:		
TEKS 3.8.A	infer the theme of a work, distinguishing theme from topic	
TEKS 3.8.B	explain the relationships among the major and minor characters	
TEKS 3.8.C	analyze plot elements, including the sequence of events, the conflict, and the resolution	U7: p. 284, U7: p. 285, U7: p. 291

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TEKS 3.8.D	explain the influence of the setting on the plot	
(9) Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts—genres. The student recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts. The student is expected to:		
TEKS 3.9.A	demonstrate knowledge of distinguishing characteristics of well-known children's literature such as folktales, fables, fairy tales, legends, and myths	
TEKS 3.9.B	explain rhyme scheme, sound devices, and structural elements such as stanzas in a variety of poems	U7: p. 144, U7: p. 145, U7: p. 149, U7: p. 160
TEKS 3.9.C	discuss the elements in drama such as characters, dialogue, setting, and acts	U7: p. 224, U7: p. 234, U7: p. 238, U7: p. 242
(D) recognize characteristics and structures of informational text, including:		
TEKS 3.9.D.i	the central idea with supporting evidence	U7: p. 112, U7: p. 122, U7: p. 123, U7: p. 180, U7: p. 186, U7: p. 187, U7: p. 246, U7: p. 250, U2: p. 252, U7: p. 256, U7: p. 300, U7: p. 303, U7: p. 304
TEKS 3.9.D.ii	features such as sections, tables, graphs, timelines, bullets, numbers, and bold and italicized font to support understanding	U7: p. 112, U7: p. 122, U7: p. 123, U7: p. 180, U7: p. 186, U7: p. 187, U7: p. 300, U7: p. 303, U7: p. 304
TEKS 3.9.D.iii	organizational patterns such as cause and effect and problem and solution	U7: p. 112, U7: p. 122, U7: p. 123, U7: p. 180, U7: p. 186, U7: p. 187, U7: p. 246, U7: p. 250, U7: p. 256, U7: p. 300, U7: p. 303, U7: p. 304
(E) recognize characteristics and structures of argumentative text by:		
TEKS 3.9.E.i	identifying the claim	
TEKS 3.9.E.ii	distinguishing facts from opinion	
TEKS 3.9.E.iii	identifying the intended audience or reader	
TEKS 3.9.F	recognize characteristics of multimodal and digital texts	U7: p. 34, U7: p. 42, U7: p. 45
(10) Author's purpose and craft: listening, speaking, reading, writing, and thinking using multiple texts. The student uses critical inquiry to analyze the authors' choices and how they influence and communicate meaning within a variety of texts. The student analyzes and applies author's craft purposefully in order to develop his or her own products and performances. The student is expected to:		
TEKS 3.10.A	explain the author's purpose and message within a text	U7: p. 112, U7: p. 122, U7: p. 123, U7: p. 180, U7: p. 186, U7: p. 187, U7: p. 300, U7: p 301, U7: p. 303, U7: p. 304
TEKS 3.10.B	explain how the use of text structure contributes to the author's purpose	
TEKS 3.10.C	explain the author's use of print and graphic features to achieve specific purposes	
TEKS 3.10.D	describe how the author's use of imagery, literal and figurative language such as simile, and sound devices such as onomatopoeia achieves specific purposes	U7: p. 144, U7: p. 145, U7: p. 149, U7: p. 159, U7: p. 160
TEKS 3.10.E	identify the use of literary devices, including first- or third-person point of view	
TEKS 3.10.F	discuss how the author's use of language contributes to voice	
TEKS 3.10.G	identify and explain the use of hyperbole	U7: p. 144, U7: p. 149

Unit 7		Correlation—Teacher's Guide
(11) Composition: listening, speaking, reading, writing, and thinking using multiple texts—writing process. The student uses the writing process recursively to compose multiple texts that are legible and uses appropriate conventions. The student is expected to:		
TEKS 3.11.A	plan a first draft by selecting a genre for a particular topic, purpose, and audience using a range of strategies such as brainstorming, freewriting, and mapping	U7: p. 164, U7: p. 178, U7: p. 284, U7: p. 285, U7: p. 289
(B) develop drafts into a focused, structured, and coherent piece of writing by:		
TEKS 3.11.B.i	organizing with purposeful structure including an introduction and conclusion	U7: p. 300, U7: p. 308, U7: p.320, U7: p. 321
TEKS 3.11.B.ii	developing an engaging idea with relevant details	U7: p. 300, U7: p. 308, U7: p.320, U7: p. 321
TEKS 3.11.C	revise drafts by adding, revise drafts to improve sentence structure and word choice by adding, deleting, combining, and rearranging ideas for coherence and clarity deleting, or rearranging words, phrases or sentences	U7: p. 312, U7: p. 316, U7: p. 320, U7: p. 321
(D) edit drafts using standard English conventions, including:		
TEKS 3.11.D	edit drafts using standard English conventions	
TEKS 3.11.D.i	complete simple and compound sentences with subject-verb agreement	U7: p. 312, U7: p. 316, U7: p. 317, U7: p. 318, U7: p. 321
TEKS 3.11.D.ii	past, present, and future verb tense	U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.D.iii	singular, plural, common, and proper nouns	U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.D.iv	adjectives, including their comparative and superlative forms	U7: p. 92, U7: p. 103, U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.D.v	adverbs that convey time and adverbs that convey manner	U7: p. 92, U7: p. 103, U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.D.vi	prepositions and prepositional phrases	U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.D.vii	pronouns, including subjective, objective, and possessive cases	U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.D.viii	coordinating conjunctions to form compound subjects, predicates, and sentences	U7: p. 34, U7: p. 54, U7: p. 92, U7: p. 103, U7: p. 112, U7: p. 123, U7: p. 124, U7: p. 144, U7: p. 145, U7: p. 161
TEKS 3.11.D.ix	capitalization of official titles of people, holidays, and geographical names and places	U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.D.x	punctuation marks including apostrophes in contractions and possessives and commas in compound sentences and items in a series	U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.D.xi	correct spelling of words with grade-appropriate orthographic patterns and rules and high-frequency words	U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 321
TEKS 3.11.E	publish written work for appropriate audiences	U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 320

Unit 7

		Correlation—Teacher's Guide
(12) Composition: listening, speaking, reading, writing, and thinking using multiple texts—genres. The student uses genre characteristics and craft to compose multiple texts that are meaningful. The student is expected to:		
TEKS 3.12.A	compose literary texts, including personal narratives and poetry, using genre characteristics and craft	U7: p. 110, U7: p. 224, U7: p. 234, U7: p. 235
TEKS 3.12.B	compose informational texts, including brief compositions that convey information about a topic, using a clear central idea and genre characteristics and craft	U7: p. 80, U7: p. 87, U7: p. 88, U7: p. 92, U7: p. 102, U7: p. 192, U7: p. 201, U7: p. 246, U7: p. 256, U7: p. 284, U7: p. 285, U7: p. 289, U7: p. 300, U7: p. 308
TEKS 3.12.C	compose argumentative texts, including opinion essays, using genre characteristics and craft	U7: p. 164, U7: p. 178, U7: p. 264, U7: p. 281
TEKS 3.12.D	compose correspondence such as thank you notes or letters	
(13) Inquiry and research: listening, speaking, reading, writing, and thinking using multiple texts. The student engages in both short-term and sustained recursive inquiry processes for a variety of purposes. The student is expected to:		
TEKS 3.13.A	generate questions on a topic for formal and informal inquiry	U7: p. 284, U7: p. 285, U7: p. 287
TEKS 3.13.B	develop and follow a research plan with adult assistance	U7: p. 284,U7: p. 285, U7: p. 287
TEKS 3.13.C	identify and gather relevant information from a variety of sources	U7: p. 284, U7: p. 285, U7: p. 287, U7: p. 289
TEKS 3.13.D	identify primary and secondary sources	
TEKS 3.13.E	demonstrate understanding of information gathered	U7: p. 284, U7: p. 285, U7: p. 289, U7: p. 312, U7: p. 319
TEKS 3.13.F	recognize the difference between paraphrasing and plagiarism when using source materials	U7: p. 284, U7: p. 285, U7: p. 287
TEKS 3.13.G	create a works cited page	
TEKS 3.13.H	use an appropriate mode of delivery, whether written, oral, or multimodal, to present results	U7: p. 238, U7: p. 242, U7: p. 312, U7: p. 316, U7: p. 318, U7: p. 319, U7: p. 320

Unit 7		Correlation—Teacher's Guide
(1) Cross-curricular second language acquisition/learning strategies. The ELL uses language learning strategies to develop an awareness of his or her own learning processes in all content areas. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. The student is expected to:		
ELPS 1.A	use prior knowledge and experiences to understand meanings in English	
ELPS 1.B	monitor oral and written language production and employ self-corrective techniques or other resources	
ELPS 1.C	use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary	U7: p. 31, U7: p. 90
ELPS 1.D	speak using learning strategies such as requesting assistance, employing non-verbal cues, and using synonyms and circumlocution (conveying ideas by defining or describing when exact English words are not known)	
ELPS 1.E	internalize new basic and academic language by using and reusing it in meaningful ways in speaking and writing activities that build concept and language attainment	U7: p. 23, U7: p. 30, U7: p. 31, U7: p. 54, U7: p. 70, U7: p. 89, U7: p. 148, U7: p. 185, U7: p. 186, U7: p. 209, U7: p. 229, U7: p. 232, U7: p. 256
ELPS 1.F	use accessible language and learn new and essential language in the process	
ELPS 1.G	demonstrate an increasing ability to distinguish between formal and informal English and an increasing knowledge of when to use each one commensurate with grade-level learning expectations	
ELPS 1.H	develop and expand repertoire of learning strategies such as reasoning inductively or deductively, looking for patterns in language, and analyzing sayings and expressions commensurate with grade-level learning expectations	
(2) Cross-curricular second language acquisition/listening. The ELL listens to a variety of speakers including teachers, peers, and electronic media to gain an increasing level of comprehension of newly acquired language in all content areas. ELLs may be at the beginning, intermediate, advanced, or advanced high stage of English language acquisition in listening. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. The student is expected to:		
ELPS 2.A	distinguish sounds and intonation patterns of English with increasing ease	U7: p. 31
ELPS 2.B	recognize elements of the English sound system in newly acquired vocabulary such as long and short vowels, silent letters, and consonant clusters	
ELPS 2.C	learn new language structures, expressions, and basic and academic vocabulary heard during classroom instruction and interactions	U7: p. 77, U7: p. 143, U7: p. 162, U7: p. 179
ELPS 2.D	monitor understanding of spoken language during classroom instruction and interactions and seek clarification as needed	U7: p. 54
ELPS 2.E	use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborated spoken language	U7: p. 229, U7: p. 232

Unit 7		Correlation—Teacher's Guide
ELPS 2.F	listen to and derive meaning from a variety of media such as audio tape, video, DVD, and CD-ROM to build and reinforce concept and language attainment	
ELPS 2.G	understand the general meaning, main point, and important details of spoken language ranging from situations in which topics, language, and contexts are familiar to unfamiliar	
ELPS 2.H	understand implicit ideas and information in increasingly complex spoken language commensurate with grade-level learning expectations	
ELPS 2.I	demonstrate listening comprehension of increasingly complex spoken English by following directions, retelling or summarizing spoken messages, responding to questions and requests, collaborating with peers, and taking notes commensurate with content and grade-level needs	U7: p. 134, U7: p. 196, U7: p. 288
(3) Cross-curricular second language acquisition/speaking. The ELL speaks in a variety of modes for a variety of purposes with an awareness of different language registers (formal/informal) using vocabulary with increasing fluency and accuracy in language arts and all content areas. ELLs may be at the beginning, intermediate, advanced, or advanced high stage of English language acquisition in speaking. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. The student is expected to:		
ELPS 3.A	practice producing sounds of newly acquired vocabulary such as long and short vowels, silent letters, and consonant clusters to pronounce English words in a manner that is increasingly comprehensible	
ELPS 3.B	expand and internalize initial English vocabulary by learning and using high-frequency English words necessary for identifying and describing people, places, and objects, by retelling simple stories and basic information represented or supported by pictures, and by learning and using routine language needed for classroom communication	U7: p. 160
ELPS 3.C	speak using a variety of grammatical structures, sentence lengths, sentence types, and connecting words with increasing accuracy and ease as more English is acquired	U7: p. 251
ELPS 3.D	speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency	U7: p. 268
ELPS 3.E	share information in cooperative learning interactions	
ELPS 3.F	ask and give information ranging from using a very limited bank of high-frequency, high-need, concrete vocabulary, including key words and expressions needed for basic communication in academic and social contexts, to using abstract and content-based vocabulary during extended speaking assignments	U7: p. 23, U7: p. 70, U7: p. 242
ELPS 3.G	express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics	U7: p. 282

Unit 7		Correlation—Teacher's Guide
ELPS 3.H	narrate, describe, and explain with increasing specificity and detail as more English is acquired	
ELPS 3.I	adapt spoken language appropriately for formal and informal purposes	
ELPS 3.J	respond orally to information presented in a wide variety of print, electronic, audio, and visual media to build and reinforce concept and language attainment	U7: p. 229, U7: p. 232
(4) Cross-curricular second language acquisition/reading. The ELL reads a variety of texts for a variety of purposes with an increasing level of comprehension in all content areas. ELLs may be at the beginning, intermediate, advanced, or advanced high stage of English language acquisition in reading. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. For kindergarten and grade 1, certain of these student expectations apply to text read aloud for students not yet at the stage of decoding written text. The student is expected to:		
ELPS 4.A	learn relationships between sounds and letters of the English language and decode (sound out) words using a combination of skills such as recognizing sound-letter relationships and identifying cognates, affixes, roots, and base words	
ELPS 4.B	recognize directionality of English reading such as left to right and top to bottom	
ELPS 4.C	develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures used routinely in written classroom materials	
ELPS 4.D	use prereading supports such as graphic organizers, illustrations, and pretaught topic-related vocabulary and other prereading activities to enhance comprehension of written text	U7: p. 168, U7: p. 186, U7: p. 281
ELPS 4.E	read linguistically accommodated content area material with a decreasing need for linguistic accommodations as more English is learned	U7: p. 209
ELPS 4.F	use visual and contextual support and support from peers and teachers to read grade-appropriate content area text, enhance and confirm understanding, and develop vocabulary, grasp of language structures, and background knowledge needed to comprehend increasingly challenging language	U7: p. 30, U7: p. 41, U7: p. 75, U7: p. 77, U7: p. 101, U7: p. 120, U7: p. 148, U7: p. 185, U7: p. 241, U7: p. 256, U7: p. 292
ELPS 4.G	demonstrate comprehension of increasingly complex English by participating in shared reading, retelling or summarizing material, responding to questions, and taking notes commensurate with content area and grade level needs	U7: p. 85, U7: p. 134, U7: p. 141, U7: p. 237
ELPS 4.H	read silently with increasing ease and comprehension for longer periods	
ELPS 4.I	demonstrate English comprehension and expand reading skills by employing basic reading skills such as demonstrating understanding of supporting ideas and details in text and graphic sources, summarizing text, and distinguishing main ideas from details commensurate with content area needs	U7: p. 75, U7: p. 134, U7: p. 141, U7: p. 148, U7: p. 185, U7: p. 209, U7: p. 281, U7: p. 291, U7: p. 292

Unit 7		**Correlation—Teacher's Guide**
ELPS 4.J	demonstrate English comprehension and expand reading skills by employing inferential skills such as predicting, making connections between ideas, drawing inferences and conclusions from text and graphic sources, and finding supporting text evidence commensurate with content area needs	U7: p. 186
ELPS 4.K	demonstrate English comprehension and expand reading skills by employing analytical skills such as evaluating written information and performing critical analyses commensurate with content area and grade-level needs	
(5) Cross-curricular second language acquisition/writing. The ELL writes in a variety of forms with increasing accuracy to effectively address a specific purpose and audience in all content areas. ELLs may be at the beginning, intermediate, advanced, or advanced high stage of English language acquisition in writing. In order for the ELL to meet grade-level learning expectations across foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. For kindergarten and grade 1, certain of these student expectations do not apply until the student has reached the stage of generating original written text using a standard writing system. The student is expected to:		
ELPS 5.A	learn relationships between sounds and letters of the English language to represent sounds when writing in English	
ELPS 5.B	write using newly acquired basic vocabulary and content-based grade-level vocabulary	U7: p. 89, U7: p. 216, U7: p. 244, U7: p. 268,
ELPS 5.C	spell familiar English words with increasing accuracy, and employ English spelling patterns and rules with increasing accuracy as more English is acquired	U7: p. 202
ELPS 5.D	edit writing for standard grammar and usage, including subject-verb agreement, pronoun agreement, and appropriate verb tenses commensurate with grade-level expectations as more English is acquired	U7: p. 318
ELPS 5.E	employ increasingly complex grammatical structures in content area writing commensurate with grade level expectations such as (i) using correct verbs, tenses, and pronouns/antecedents; (ii) using possessive case (apostrophe -s) correctly; and, (iii) using negatives and contractions correctly	U7: p. 102, U7: p. 104, U7: p. 218, U7: p. 294, U7: p. 308, U7: p. 310
ELPS 5.F	write using a variety of grade-appropriate sentence lengths, patterns, and connecting words to combine phrases, clauses, and sentences in increasingly accurate ways as more English is acquired	U7: p. 56, U7: p. 76, U7: p. 123, U7: p. 125, U7: p. 187, U7: p. 257, U7: p. 282, U7: p. 305, U7: p. 317
ELPS 5.G	narrate, describe, and explain with increasing specificity and detail to fulfill content area writing needs as more English is acquired	U7: p. 87, U7: p. 178, U7: p. 236, U7: p. 291

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Astronomy: Our Solar System and Beyond

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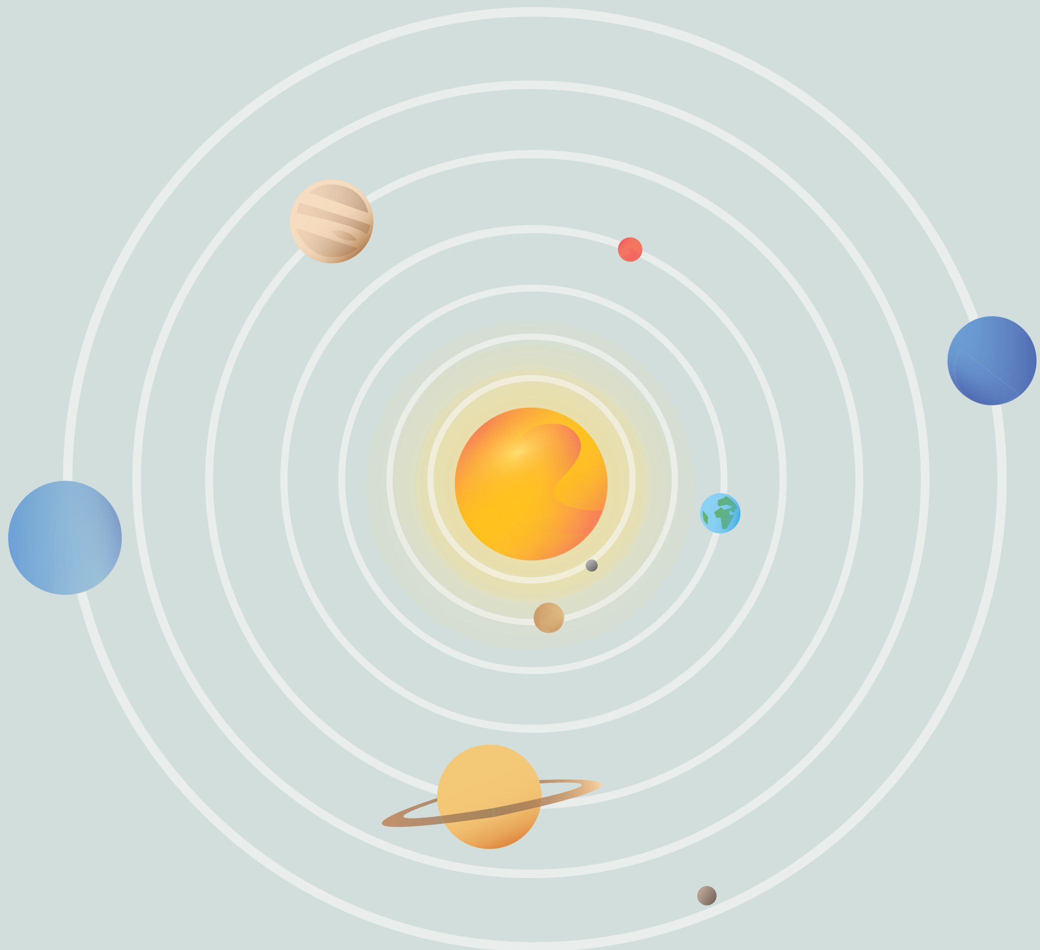

Grade 3

Unit 7 | Activity Book

Astronomy: Our Solar System and Beyond

Grade 3 | Unit 7

Astronomy: Our Solar System and Beyond

Activity Book

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Unit 7
Astronomy:
Our Solar System and Beyond
Activity Book

This Activity Book contains activity pages that accompany the lessons from the Unit 7 Teacher Guide*.* The activity pages are organized and numbered according to the lesson number and the order in which they are used within the lesson. For example, if there are two activity pages for Lesson 4, the first will be numbered 4.1 and the second 4.2. The Activity Book is a student component, which means each student should have an Activity Book.

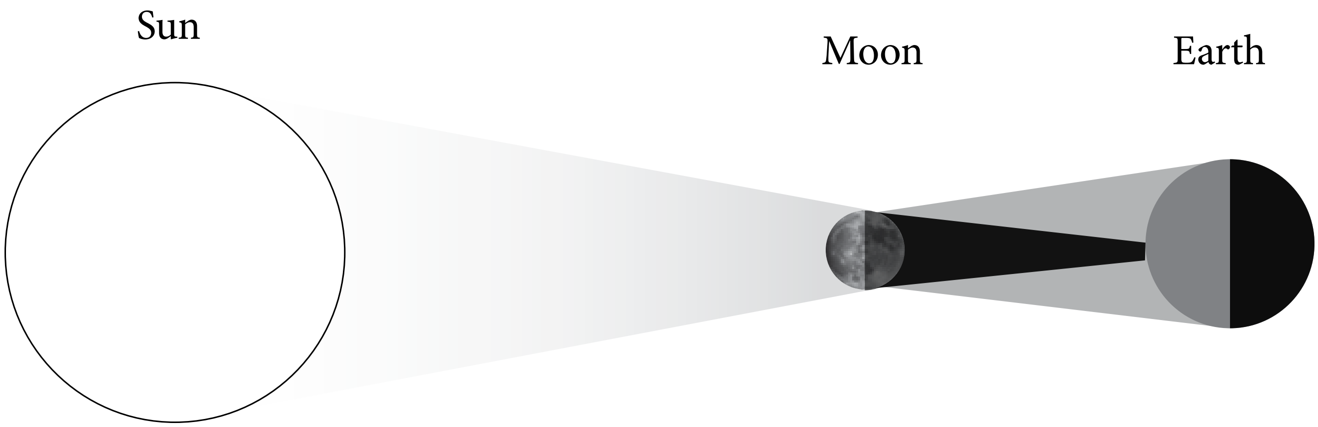
NAME: ______________________

DATE: ______________________

1.1 ACTIVITY PAGE

A Solar Eclipse

Directions: Read the statements and look at the diagram. Sequence the events of a solar eclipse in the correct order.



___ The moon's shadow falls somewhere on the surface of Earth.

___ In its orbit around Earth, the moon passes between the sun and Earth.

___ A shadow forms behind the moon.

___ The sun's light shines on half of Planet Earth.

___ The moon blocks some of the sunlight that is shining on Earth.

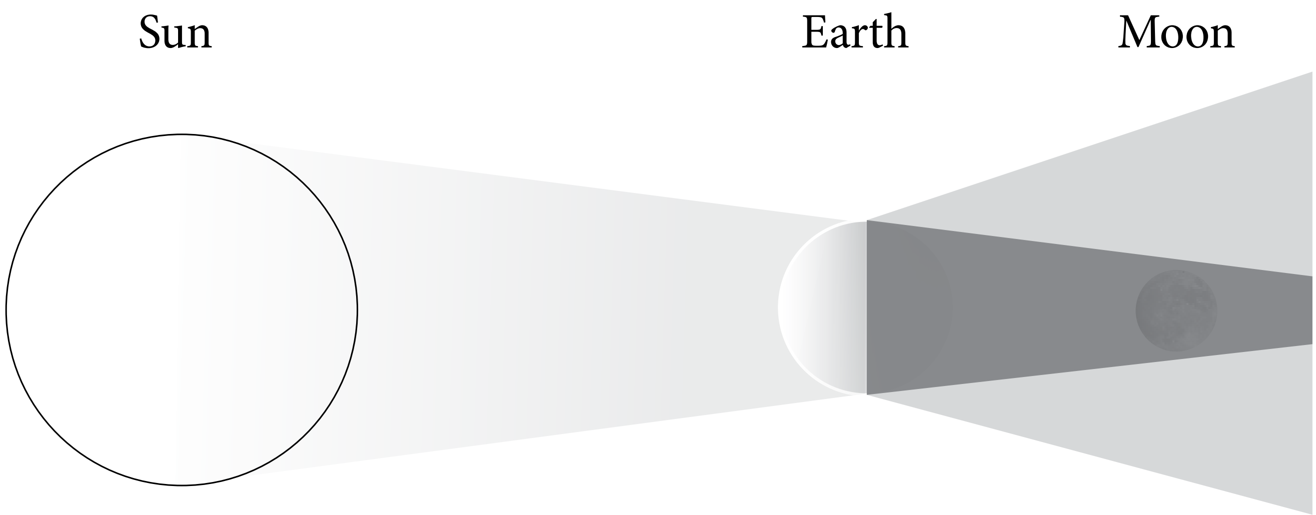
NAME: ______________________

DATE: ______________________

1.2 ACTIVITY PAGE

A Lunar Eclipse

Directions: Read the statements and look at the diagram. Sequence the events of a lunar eclipse in the correct order.



___ Earth's shadow crosses the face of the moon, and the moon appears darkened as we view it from Earth.

___ The moon reflects the sunlight so that we see a bright moon from Earth.

___ Earth passes between the sun and the moon.

___ The sun's light shines on the moon.

___ Earth blocks some or all of the sunlight that is shining on the moon.

The Sun, Earth, and Our Solar System

1. What two types of energy does the sun provide?
   A. The sun provides electrical and wind energy.
   B. The sun provides heat and light energy.
   C. The sun provides light and electrical energy.
   D. The sun provides water and heat energy.

   page __________

2. How many days does it take for the Earth to orbit the sun?
   A. It takes about 78 days for the Earth to orbit the sun.
   B. It takes about 439 days for the Earth to orbit the sun.
   C. It takes about 365 days for the Earth to orbit the sun.
   D. It takes about 149 days for the Earth to orbit the sun.

   page __________

3. How long does it take for the Earth to make a full rotation on its axis?
   A. It takes 24 hours for the Earth to make a full rotation on its axis.
   B. It takes 3 days for the Earth to make a full rotation on its axis.
   C. It takes 365 days for the Earth to make a full rotation on its axis.
   D. It takes 24 days for the Earth to make a full rotation on its axis.

   page __________

4. What creates the energy that the sun gives off?
   A. The sun's gases create the energy that the sun gives off.
   B. Light and heat from other stars create the energy that the sun gives off.
   C. Absorbing energy from the eight planets creates the energy that the sun gives off.
   D. Running into objects in space creates the energy that the sun gives off.

   page ________

5. What is the solar system?

   ____

   ____

   ____

   page ________

NAME: ______________________________

DATE: ______________________________

1.4 TAKE-HOME

Dear Family Members,

Please help your student succeed in spelling by taking a few minutes each evening to review the words together. Helpful activities for your student to do include: spelling the words orally, writing sentences using the words, or simply copying the words.

Spelling Words

This week, we are reviewing all five spelling patterns for /j/ that we have already learned. Your student will be tested on these words.

Students have been assigned three Challenge Words, *answer*, *great*, and *grate*. Challenge Words are words used very often. The Challenge Words do not follow the spelling patterns for this week and need to be memorized.

The Content Word for this week is *Jupiter*. This word is directly related to the material that we are reading in *What's in Our Universe?* The Content Word is an optional spelling word for your student. If your student would like to try it but gets it incorrect, it will not count against them on the test for trying. We encourage everyone to stretch themselves a bit and try to spell this world.

The spelling words, including the Challenge Words and the Content Word, are listed below:

1. jellyfish	8. eject	15. average
2. germy	9. budget	16. fudge
3. digest	10. lodging	17. giraffe
4. fringe	11. gymnasium	**Challenge Word**: *answer*
5. nudging	12. jewel	**Challenge Word**: *great/grate*
6. ridge	13. bridging	**Content Word**: *Jupiter*
7. exchange	14. dodge	

Student Reader

The chapters your student will read this week in *What's in Our Universe?* include information about our solar system: the sun, Earth, our moon, the eight planets, asteroids, comets, and meteors. Be sure to ask your student each evening about what they are learning.

Students will take home text copies of the chapters in the reader throughout the unit. Encouraging students to read a text directly related to this domain-based unit will provide content and vocabulary reinforcement. Your student will also bring home a copy of the glossary for use in reading the text copies to family members. The bolded words on the text copies are the words found in the glossary.

The Sun, Earth, and Our Solar System

Look up in the sky at noon. What do you see? If it is not cloudy, you will see the sun shining brightly in the sky.

The sun provides energy—both light and heat energy. The sun's light and heat give life to plants and animals. Without the sun, Earth would be freezing cold. Have you ever wondered what the sun is made of or why it gives off so much light and heat?

You may be surprised to know that the sun is a star. It is in fact the closest star to Earth. It is made up of different, hot gases. How hot? A hot summer day on Earth is 100 degrees. On the sun, it is 10,000 degrees! The sun stays that hot all the time! The sun's gases create the light and heat energy it gives off.

Long ago, people believed that the sun moved around Earth. This seemed to make sense. Each morning at the start of the day, the sun rose in the east. At the end of the day, the sun set in the west—exactly opposite from where it had come up. To explain this change, people said the sun moved around Earth. But now we know that this is not what really happens. The sun does not move around Earth. It is Earth that moves around the sun!

The sun is in the center of a group of eight **planets**. All of these **planets**, including Earth, circle, or **orbit**, around the sun. The sun, **planets**, and other objects in space that **orbit** the sun are called the **solar system**. The word *solar* has the Latin root word *sol*, which means "the sun." Everything in the **solar system** relates to the sun.

Our **planet**, Earth, moves in two ways. We have just learned that Earth circles around the sun. It takes about 365 days, which is one year, for Earth to **orbit** the sun.

Earth also moves by spinning, or **rotating**, on its **axis**. It is this spinning that makes day and night on Earth and the motion of the sun across the sky from sunrise to sunset. It takes one day for Earth to make one complete **rotation** on its axis. As Earth **rotates** and spins, different parts of it face the sun. When the part facing the sun gets sunlight, it is daytime on that side of Earth. The part that faces away from the sun gets no sunlight. So, on that side of Earth, it is nighttime. Did you know that when it is daytime where we live, it is nighttime on the other side of Earth?

When Earth **rotates** on its **axis**, it is **tilted**. At certain times of the year, one part of Earth is **tilted** toward the sun. The sunlight is more direct and it feels hotter. For people living on this part of Earth, it is summer. For people living on the part of Earth **tilted** away from the sun, there is less sunlight and it is winter. So, when it is summertime for us, there are people living on other parts of Earth where it is winter! So, the fact that Earth is **tilted** on its **axis** is what creates the seasons of the year.

NAME: ______________________________

DATE: ______________________________

1.6 TAKE-HOME

Dear Family Members,

Over the next several days, your student will be learning about astronomy, the solar system, and galaxies. They will review the organization of the solar system, with the sun at the center and Earth and the other planets orbiting it. They will learn that gravity is an important force in the universe and will also learn about galaxies, specifically the Milky Way and Andromeda galaxies.

Below are some suggestions for activities that you may do at home to reinforce what your student is learning about astronomy.

1. Solar System Model

During this unit your student will be seeing images of the planets and their positions in the solar system. You may wish to reinforce this by working with them to make your own model of the solar system out of play dough, clay, or papier-mâché. You may wish to reference the diagram of our solar system at the end of this letter. In your model, be sure to include the sun, the eight planets, and the asteroid belt found between Mars and Jupiter. You may also wish to include Earth's moon, the moons of other planets, and/or the dwarf planets Pluto and Ceres. (Pluto is no longer grouped with the eight planets.) You may wish to try to recreate the colors of the planets as shown in photographs taken by the Hubble telescope. (As you create your models, you may wish to depict the orbits of the planets as well.)

2. Gravity, Forces, and Mass

Your student will be learning about a force called *gravity.* In this lesson, your student will be introduced to many new words, that you may want to review at home. Two of the words used are *force,* which is a pull or push on an object or system, and *mass,* which is the amount of material something is made of.

3. Out-of-This-World Images

Your student has learned that a great deal of what we know about space has been discovered through scientific observation. They have heard that scientists use telescopes to observe outer space and that the most famous of these is the Hubble telescope. Your student has also learned about galaxies, what they are made of, and how they are shaped. Search online for and visit the Hubble gallery with your student to view photographs of the planets in our solar system, objects in the universe, and various galaxies. You may also wish to search for related television programs on Discovery, National Geographic, and PBS channels.

4. Words to Use

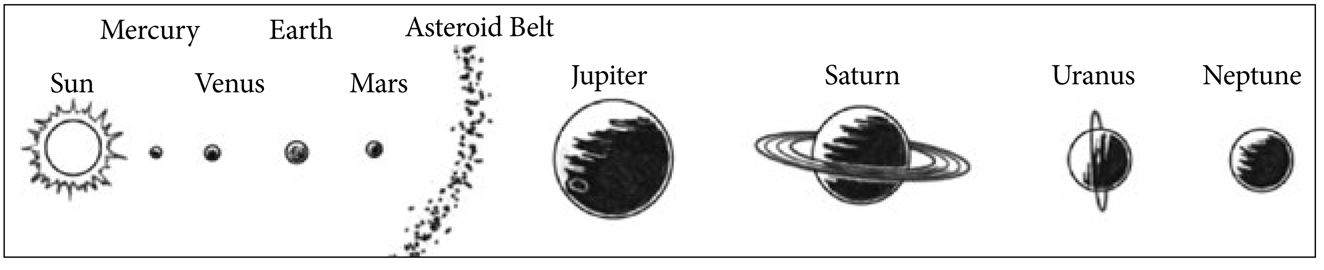
Below are several of the words that your student will be learning about and using. Try to use these words as they come up in everyday speech with your student.

- *satellite*—The moon is Earth's only natural satellite; Jupiter, however, has more than sixty natural satellites.
- *rotates*—We experience daylight and the darkness of night because planet Earth rotates around its axis once each day and causes different parts of Earth to face the sun.
- *cluster*—Our Milky Way Galaxy is a cluster of billions of stars.
- *gravity*—Gravity is a force of attraction between two objects that pulls the object with less mass toward the object with greater mass.

5. Read Aloud Each Day

It is very important that you read with your student every day. Set aside time to read to your student and to listen to your student read to you. Books related to astronomy may be found at your local library.

Be sure to praise your student whenever they share what has been learned at school.



NAME: ______________________________

DATE: ______________________________

2.1 ACTIVITY PAGE

The Moon

1. Describe what happens during a solar eclipse.

____

____

____

page ________

2. Describe what happens during an eclipse of the moon.

____

____

____

page ________

3. Why does the moon look different on different nights of the month?

____

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____

page ________

4. Compare and contrast Earth's orbit around the sun and the moon's orbit around Earth.

____

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____

pages ________

If a statement is true, write "true" on the line. If a statement is false, write "false" on the line.

5. The moon gives off light of its own just like the sun.

____

page ________

6. The moon orbits around Earth.

____

page ________

7. It takes 24 hours for the moon to orbit around Earth.

____

page ________

8. Solar eclipses happen much more often than eclipses of the moon.

____

page ________

NAME: ______________________________

DATE: ______________________________

Compare and Contrast—Our Solar System

Video	Read-Aloud

Write a summary about how the video and the Read-Aloud were most similar:

NAME: ______________________________

DATE: ______________________________

2.3 ACTIVITY PAGE

Conjunction *so*

Match the sentences by writing the number of the cause *in the blank that identifies the appropriate* effect. *Rewrite the sentences below, inserting the conjunction* so. *Remember to add correct capitalization and punctuation.*

Causes	**Effects**
1. The book was very exciting.	______ We played inside.
2. The puppy was very tired.	______ We helped her look for them.
3. The weather was rainy.	______ It took a long nap.
4. Mother lost her glasses.	______ Randy read it three times.

1. ____

____

2. ____

____

3. ____

____

4. ____

____

A. *Read the two simple sentences.*

B. *Decide which happened first and write the word* Cause *over top of it.*

C. *Decide which happened second and write the word* Effect *over top of it.*

D. *Add the conjunction* so *before the simple sentence that happens second and is the effect, join the two sentences.*

E. *Then, write them as a compound sentence including the conjunction* so.

Example: I forgot to clean up my room. I wasn't allowed to go out to play.

Cause	Effect
I forgot to clean up my room, so	*I wasn't allowed to go out to play.*

1. Chocolate is my favorite flavor of ice cream. I asked for it for dessert.

____

____

2. Tom enjoys Uncle Steve's company very much. He invited Uncle Steve to go out to a movie.

____

____

3. The little girl said hello. Her neighbor said hello back.

____

____

The Moon

Look up in the sky at night. What do you see? If it is not cloudy, you may be able to see the moon.

When you see the moon at night, it might look white. It might look gray or silver. Sometimes, it seems to shine and glow. But the moon does not give off light the way the sun does. The moon is a ball of rock that gives off no light of its own. It simply reflects light from the sun. That means light from the sun hits the moon and bounces off.

You already know that Earth **orbits** around the sun. But did you know that the moon **orbits** around Earth? It takes just about one month for the moon to completely circle Earth. If you look up at the night sky each night of the month, you may think that the size and shape of the moon is changing. However, the size and shape are not really changing. The moon is still a round ball. It looks different at different times of the month because of the way the light from the sun is reflected and how much of the moon we can see from Earth.

The way that Earth, the moon, and the sun move can also make other interesting things to look at in the sky. When Earth, the moon, and the sun all move together in a direct line, something called an **eclipse** can take place.

We can see two kinds of **eclipses** from Earth. One kind happens when the moon gets in between the sun and Earth. When that happens, we can't see the sun for a while. At least, we can't see part of it. We call this a solar **eclipse** or an **eclipse** of the sun.

The other kind of **eclipse**, called a lunar eclipse, also involves the sun, the moon, and Earth. It takes place when the moon passes behind Earth and into its shadow. It is Earth's shadow that you see. Earth has blocked out the sun and left part of the moon in darkness.

Eclipses do not happen often because the sun, Earth, and the moon all have to line up just right. Solar **eclipses** can only be seen from a narrow strip of Earth at a time. While they happen once or twice a year, it is very, very rare to see one. **Eclipses** of the moon happen more often, several times each year. They can be seen from half of Earth at a time, so are more often visible.

Whether or not you can see an **eclipse** depends on where you are on Earth. You must never look directly at a solar **eclipse**. The sun is very bright and could burn your eyes. But, it is safe to look at an **eclipse** of the moon. If an **eclipse** is predicted, it is usually big news, so you will likely hear about it.

Practice Conjunction *so*

Match the sentences by writing the number of the cause *in the blank that identifies the appropriate* effect. *Rewrite the sentences below, inserting the conjunction* so. *Remember to add correct capitalization and punctuation.*

Causes	Effects	
1. The day was very hot.	________	We adopted her immediately.
2. The day was very cold.	________	We bundled up in several layers of clothing.
3. The puppy was shivering and afraid.	________	We asked Mom if we could go swimming at the park.
4. The kitten was cute.	________	He hid behind the couch to escape the thunder.

1. ____

____

2. ____

____

3. ____

____

4. ____

____

NAME: ______________________________

DATE: ______________________________

3.1 ACTIVITY PAGE

Key Idea in Paragraphs

Directions: After reading the selection, reread to find the key idea of three of the paragraphs. Then, write a summary of the selection from the three key ideas.

Title:

What is the key idea?	What is the key idea?	What is the key idea?

Summary

____

____

____

____

____

____

____

Blank Busters

jellyfish	germy	digest	fringe
nudging	ridge	exchange	eject
budget	lodging	gymnasium	jewel
bridging	dodge	average	fudge
giraffe			
Challenge Word: *answer* **Challenge Word**: *great/grate* **Content Word**: *Jupiter*			

Fill in the blanks in the sentences below with one of the spelling words in the chart. Only if needed, add a suffix to the end of a word in order for the sentence to make sense: –s, –ed, –ing, –er, *or* –ly.

1. The stained sink was dirty and ________________.

2. The normal or ________________ size of ________________ in the ocean is about five inches.

3. The long-necked ________________ at the zoo looks like a giant to a short child.

4. My stomach is ________________ the yummy ________________ that my grandmother made.

5. In the school's __________________ students made a huge replica of the planets in our solar system, and our class made __________________.

6. The __________________ around the collar of your jacket looks just __________________.

7. My little brother kept __________________ me with his elbow so I would look at all of the sparkly __________________ in the glass case.

8. Our group was __________________ from the game because the referee said we were cheating.

9. Asking questions and __________________ them are opposites.

Write three sentences using spelling words of your choice that were not used in the first ten sentences. Make sure to use correct capitalization and punctuation. You may use the Challenge Words or Content Word in your sentences.

1. ____

____

2. ____

____

3. ____

____

NAME: ______________________

DATE: ______________________

3.3 TAKE-HOME

The Planets Closest to the Sun: Mercury, Venus, Earth, and Mars

Our planet Earth is one of eight planets in our solar system that orbit around the sun. The other planets are Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune. People have been looking at the planets for thousands of years. People from Mesopotamia, the Greeks, Mayans, Incas, and Aztecs were all interested in the planets. They used just their **naked eye** to study the planets. Now, we have telescopes and other tools that help us get a better look at the planets.

The four planets closest to the sun—Mercury, Venus, Earth, and Mars—are small planets. These planets have a rocky, or solid, surface.

Mercury and Venus are closer to the sun than Earth. The other planets are farther away.

Earth needs 365 days to make one orbit around the sun. That is the length of one year on Earth.

The closer a planet is to the sun, the less time it needs to make an orbit around the sun. Mercury is the closest planet to the sun. It needs just 88 days to make one orbit. Venus is the next closest to the sun. It needs just 225 days to make an orbit. The planets that are farther away take much longer. It takes Neptune 165 years to orbit the sun!

Besides being closest to the sun, Mercury is the smallest of all the planets. The English name for the planet comes from the Romans. They named the planet after the Roman god Mercury. The Greek name for this same god is Hermes.

Venus is the second planet from the sun and is closest to Earth. This planet was named after the Roman goddess of love. For a long time, scientists thought that Venus might be a lot like Earth. After all, it is close to Earth. It is about the same size as Earth and it is covered with clouds, like Earth. But this idea turned out to be wrong, too. We know now that Venus and Earth are different in lots of ways.

Scientists had to change their ideas to fit the new facts. They have now concluded that Venus is much hotter than Earth. It would not be a good place for us to live or even visit.

Mars is the fourth planet from the sun. It is named after the Roman god of war. When you look at Mars in the night sky, it looks quite red. This is because the rocks on Mars contain rust.

Many space **probes** and robots have landed on Mars. They have taken photographs and also dug up rocks.

One **probe** that went to Mars not long ago found some ice. That was big news. Ice is frozen water. If there is water on Mars, there might be life. Some experts argue that nothing could live on Mars. They say it is too cold and too dry. Others think there might be life on Mars. They think there might be something alive down under the rocks. Still others think there might have been life on Mars at one time but there isn't any now.

NAME: ______________________________

DATE: ______________________________

3.4 TAKE-HOME

The Planets Closest to the Sun

If a statement is true, write "true" on the line. If a statement is false, write "false" on the line.

1. Venus is a good place for us to live and visit.

   ____

2. The planet Mars looks red because its rocks have rust in them.

   ____

3. It takes Mercury less time to orbit the sun than the Earth does because Mercury is much closer to the sun.

   ____

4. The four planets closest to the sun have a rocky and solid surface.

   ____

5. Write an interesting fact about Mercury, Venus, and Mars. (Do not use a fact from the earlier questions on this worksheet.)

Mercury: ____

____

____

Venus: ____

____

____

Mars: ____

____

____

6. Compare and contrast an inner planet and our moon.

Inner Planet		Moon
	size?	
	surface?	
	appearance?	
	interesting fact?	

NAME: ______________________________

DATE: ______________________________

4.1 ACTIVITY PAGE

Key Idea in Paragraphs

Directions: After reading the selection, reread to find the key idea of three of the paragraphs. Then, write a summary of the selection from the three key ideas.

Title:

What is the key idea?	What is the key idea?	What is the key idea?

Summary

____

____

____

____

____

____

____

NAME: ____

DATE: ____

–ful: Suffix Meaning "full of"

Directions: The left-hand side of the table contains words that use the suffix you have been studying. Use the blanks on the right side to record additional words that use the same suffix. Make sure to include the definition for the new words you brainstorm.

careful—(adjective) full of effort to do something correctly or safely	
fearful—(adjective) full of the feeling that something bad will happen	
hopeful—(adjective) full of the feeling of wanting something to happen and thinking it will	
painful—(adjective) full of suffering caused by injury, illness, or sadness	

Write the correct word to complete each sentence.

hopeful	careful	fearful	painful	powerful

1. I had a ____________________ blister on my foot from walking a long distance in my new shoes.

2. Grandma told us to be ____________________ when we walked on the icy sidewalk so we wouldn't fall.

3. The ____________________ kitten hid under the couch when the thunderstorm came through with lots of noises and flashes.

4. The ____________________ motor in the boat allowed the boat to move quickly even with so many people in it.

5. Write your own sentence using the one word left in the box.

NAME: ____________________

DATE: ____________________

4.3 ACTIVITY PAGE

–*less*: Suffix Meaning "lacking"

careless—(adjective) lacking the effort to do something correctly or safely	
powerless—(adjective) lacking the strength or authority to do something	
fearless—(adjective) lacking the feeling that something bad will happen	
hopeless—(adjective) lacking the feeling of wanting something to happen and thinking it will	

Write the correct word to complete each sentence.

powerless	careless	painless	hopeless	fearless

1. He smiled and had a ____________________ look in his eye as he climbed the ladder up to the high dive platform for the first time.

2. Steven made a ____________________ mistake on his math test because he didn't check over his answers before turning in the test.

3. Katie had the ____________________ thought that she would never finish writing her paper in time for the due date.

4. The ____________________ lawn mower needed more gas to start up again.

5. Write your own sentence using the one word left in the box.

Suffixes –*ful* and –*less*

Write the correct suffix in the blank to complete the sentence. Explain why the suffix you added makes the correct word for the sentence.

1. She had a hope ______________ (–ful, –less) expression on her face as she checked the weather and saw that the rain would stop before the outdoor concert that night.

   Why did you choose your answer? ________________________________

   ____

2. With a fear ______________ (–ful, –less) look in his eyes, Jack touched the snake that the zookeeper brought around to the group even though he was terrified of snakes.

   Why did you choose your answer? ________________________________

   ____

3. Her last visit to the doctor was pain ______________ (–ful, –less) because she felt great and did not need any shots or medicine.

   Why did you choose your answer? ________________________________

   ____

4. He used a care ______________ and steady hand to paint the details on
(–ful, –less)
the outside of the wooden box so the design would look perfect.

Why did you choose your answer? ________________________________

____

5. The power ______________ camera needed to have a charged battery to
(–ful, –less)
start back up again.

Why did you choose your answer? ________________________________

____

6. The hope ______________ search for Grandpa's missing glasses took all
(–ful, –less)
morning and finally stopped when he said he would just go to the eye doctor to get a new pair.

Why did you choose your answer? ________________________________

____

7. She had the fear ______________ thought that during her next swim
(–ful, –less)
practice, she would try to swim the entire length of the pool without stopping.

Why did you choose your answer? ________________________________

____

NAME: ______________________________

DATE: ______________________________

4.5 TAKE-HOME

The Outer Planets: Jupiter, Saturn, Uranus, and Neptune

Do you remember the names of the four planets closest to the sun? If you said, "Mercury, Venus, Earth, and Mars," you are right! There are four more planets called the outer planets. So there are eight planets in all.

Jupiter is the very next planet after Mars. After Jupiter come Saturn, Uranus, and Neptune in that order. Neptune is the planet that is farthest from the sun. Uranus is difficult to see with the naked eye and Neptune is impossible to see without help. Neptune is only visible using a telescope.

The outer planets are very large and are mostly made of gas. Scientists often call these planets **gas giants**. Of all the planets, Jupiter is the largest: 1,300 Earths could fit inside Jupiter! It is made mostly of **hydrogen** gas, the most common gas in the universe.

The gases on Jupiter seem to be blowing around. When you see images of Jupiter, you can see a giant red spot. It looks like an eye! Experts think it is a big wind storm, like a huge hurricane.

Jupiter also has 63 known moons that orbit it. Some of these moons are very large, even larger than Earth's moon.

Saturn is known for its many large rings that orbit the planet. These rings are made of ice and dust. The ice reflects light and makes the rings glow. Saturn also has many moons that orbit it.

The last two planets are Uranus and Neptune. These planets are the farthest from the sun so they are very cold. Uranus and Neptune also have rings, but they aren't easily seen like Saturn's. Both planets also have moons.

So now you know the names of all eight planets. Try asking the adults in your family how many planets there are. They may tell you that there are nine planets. When the adults in your family were in school, people said that there was a ninth planet called Pluto. But in 2006, scientists decided that Pluto did not have all of the characteristics needed to be classified as a planet. They removed Pluto's name from the list of planets, so now there are only eight planets.

NAME: ________________________________

DATE: ________________________________

The Outer Planets

1. The planets below are in the wrong order. Use the numbers 1–8 to put them in the right order from closest to the sun to farthest away from the sun.

   A. _____ Mars
   B. _____ Neptune
   C. _____ Venus
   D. _____ Mercury
   E. _____ Uranus
   F. _____ Saturn
   G. _____ Earth
   H. _____ Jupiter

2. Which planet is the only one that cannot be seen from Earth with the naked eye?

   A. Neptune is the only one that cannot be seen with the naked eye.
   B. Uranus is the only one that cannot be seen with the naked eye.
   C. Jupiter is the only one that cannot be seen with the naked eye.
   D. Saturn is the only one that cannot be seen with the naked eye.

3. What feature is the planet Saturn most known for?

   ____

   ____

4. Out of all eight planets, which one is the largest?
   A. Mercury is the largest of all eight planets.
   B. Jupiter is the largest of all eight planets.
   C. Saturn is the largest of all eight planets.
   D. Neptune is the largest of all eight planets.

5. Jupiter is made up mostly of a gas that is the most common gas in the universe. What type of gas is it?

____

____

6. Choose an inner planet (Mercury, Venus, Earth, Mars) and compare and contrast it with an outer planet (Jupiter, Saturn, Uranus, Neptune).

Inner Planet		Outer Planet
	size?	
	rings?	
	surface?	
	distance from Earth?	
	interesting fact?	

NAME: ______________________________

DATE: ______________________________

5.1 ACTIVITY PAGE

Spelling Assessment

As your teacher calls out the words, write them under the correct header.

'j' > /j/	'dge' > /j/	'g' > /j/
____________	____________	____________
____________	____________	____________
____________	____________	____________
____________	____________	____________
____________	____________	____________

'dg' > /j/	'ge' > /j/
____________	____________
____________	____________
____________	____________
____________	____________
____________	____________

Challenge Word: ____________ **Challenge Word:** ____________

Challenge Word: ____________ **Content Word:** ____________

Dictated Sentences

1.

2.

NAME: ______________________________

DATE: ______________________________

5.2 ACTIVITY PAGE

Exit Ticket: Meteors, Meteoroids and Meteorites

Directions: Write a paragraph explaining the differences between meteors, meteoroids, and meteorites. Be sure to use correct spelling, capitalization, and punctuation. You may draw a triple Venn diagram on the back of this page to help you before you begin writing.

Building Sentences with the Conjunction *so*

Add adjectives and adverbs to the first set of rows. Add simple sentences to the second set of rows to answer the question what happened because. *Choose from your list to create two new, more interesting sentences using the conjunction* so *to connect the two simple sentences.*

Starter Sentence: **The girl sang.**			
Adjectives to describe **the girl**	Adverbs to describe **how**	Adverbs to describe **when**	Adverbs to describe **where**
1.	1.	1.	1.
2.	2.	2.	2.
3.	3.	3.	3.
4.	4.	4.	4.
Simple sentences that answer the question, **"What happened because the girl sang?"**			
1.			
2.			
3.			
4.			

New sentences:

1. ____

____

2. ____

____

Starter Sentence: **My brother jumped.**			
Adjectives to describe **my brother**	Adverbs to describe **how**	Adverbs to describe **when**	Adverbs to describe **where**
1.	1.	1.	1.
2.	2.	2.	2.
3.	3.	3.	3.
4.	4.	4.	4.
Simple sentences that answer the question, **"What happened because my brother jumped?"**			
1.			
2.			
3.			
4.			

New sentences:

1. ______________________________

____

2. ______________________________

____

NAME: ______________________________

DATE: ______________________________

6.1 ACTIVITY PAGE

Galaxies and Stars

	Key ideas from the text
Pages 34–35	
Pages 36–37	
Pages 38–39	
Pages 40–41	

Galaxies and Stars

If a statement is true, write "true" on the line. If a statement is false, write "false" on the line.

1. The stars do not look like the sun because they are all a lot smaller than the sun. ____________

   page ________

2. Stars are similar in size, color, and brightness. ____________

   page ________

3. Other stars are balls of hot gas, just like the sun. ____________

   page ________

4. The Greek root *astron* means sky. ____________

   page ________

5. Our solar system is in the Andromeda Galaxy. ____________

   page ________

Answer the following question in complete sentences on the lines below.

6. What are some ways that stars can be different?

____

____

____

____

____

____

____

____

page(s) ________

7. Compare and contrast a solar system and a galaxy.

Our Solar System		Our Galaxy
	size?	
	location?	
	characteristics?	

NAME: ______________________________

DATE: ______________________________

6.3 ACTIVITY PAGE

Reading/Writing Choice Board

Directions: Select activities in three of the boxes below after you complete your reading. Write your responses on a separate sheet of paper, making sure to include the numbers of the activities you chose. When completing the activities, write in complete sentences using correct spelling, capitalization, and punctuation.

1. Create a graphic organizer and compare and contrast two ideas in the text.	2. What is the key idea of the text? List three details from the text that support the key idea.	3. Write a sentence describing the author's purpose (persuade, inform, or entertain).
4. Write three questions you still have after reading the text.	5. Write a list of three new words you learned in the text, their definitions, and use them in a sentence.	6. Describe how one of the images in the chapter helps you to understand the text.
7. Find three sentences that show comparing or contrasting. Write the sentences and underline the comparing and contrasting word or words.	8. Write three new things that you learned from the text.	9. Write a list of words the author uses to help the reader visualize the information.

NAME: ______________________________

DATE: ______________________________

Conjunctions *and* and *or*

*Read both sentences in each item carefully, looking at the words in the sentence. Choose and write one conjunction (*and, or*) in the blank so that the sentence makes sense.*

1. Saturday is going to be a busy day full of fun things to do. First, Mother plans to take all of us to the library, ___________ then we will go to get ice cream at my favorite ice cream shop. Yum!

2. My little sister had forgotten to make her bed. Father said to her, "Sandy, you must make your bed, ___________ you will not be able to watch TV tonight."

Read both sentences in each item carefully, looking closely at the conjunction and *or* or *and other clue words in each sentence. Circle the choice that uses the conjunction correctly so that the sentence makes sense.*

3. A. My sister wants to go shopping, and my brother wants to go too.
   B. My sister wants to go shopping, or my brother wants to go too.

4. A. Sally could wake up early in the morning, or she could sleep late today.
   B. Sally could wake up early in the morning, and she could sleep late today.

5. A. Pete's favorite color is orange, or his favorite color is blue.
   B. Pete's favorite color is orange, and his favorite color is blue.

6. A. Aunt Dolly should go to the gas station, or she will run out of gas.
   B. Aunt Dolly should go to the gas station, and she will run out of gas.

Choose the correct answer, looking closely at the conjunctions and *or* or.

7. A. Tim is going to play board games, or he is going to play basketball this weekend. He can't decide which one.
   B. Tim is going to play board games, and he is going to play basketball this weekend. He can't decide which one.

8. A. She will feel better, or she will still be sick in the morning.
   B. She will feel better, and she will still be sick in the morning.

Write compound sentences using the conjunctions and *or* or.

9. (and)

____

____

____

10. (or)

____

____

____

Dear Family Members,

Please help your student succeed in spelling by taking a few minutes each evening to review the words together. Helpful activities for your student to do include: spelling the words orally, writing sentences using the words, or simply copying the words.

Spelling Words

This week, we are reviewing all four spelling patterns for /n/ that we have already learned. Your student will be assessed on these words.

Students have been assigned three Challenge Words, *very*, *vary*, and *enough*. Challenge Words are words used very often. The Challenge Words do not follow the spelling patterns for this week and need to be memorized.

The Content Word for this week is *astronomer*. This word is directly related to the material that we are reading in *What's in Our Universe?* The Content Word is an optional spelling word for your student. If your student would like to try it but gets it incorrect, it will not count against them on the test for trying. We encourage everyone to stretch themselves a bit and try to spell this world.

The spelling words, including the Challenge Words and the Content Word, are listed below:

1. gnat	8. design	15. knuckle
2. skinny	9. knobby	16. campaign
3. knotted	10. manned	17. giraffe
4. flannel	11. knowledge	**Challenge Word**: *very/vary*
5. knighted	12. channel	**Challenge Word**: *enough*
6. nearby	13. annoy	**Content Word**: *astronomer*
7. understand	14. gnarly	

Student Reader

The chapters your student will read this week in *What's in Our Universe?* include information about our solar system: galaxies, stars, and constellations. Students will also read chapters about exploring space, walking on the moon, and what it's like in space. Be sure to ask your student each evening about what they are learning.

Students will take home text copies of the chapters in the reader throughout the unit. Encouraging students to read a text directly related to this domain-based unit will provide content and vocabulary reinforcement. Please remind your student that the glossary can be used for finding the meaning of the bolded words.

Galaxies and Stars

Look up in the sky at night. What do you see besides the moon? If it is not cloudy, you may be able to see lots of stars glittering in the sky.

Remember that the sun is also a star. The stars in the night sky do not look like the sun. They do not look as big or as bright. But they are, in fact, very much alike. The stars in the night sky are big balls of hot gas, just like the sun.

So why don't they look the same? The night stars are much, much farther away from Earth than the sun. That is why they look like tiny specks of light. If we could get close to the stars, they would look bigger, brighter, and more like the sun. But the stars we see at night are so far away that no one from Earth has ever been able to get close to them.

Scientists who study the stars and outer space are called **astronomers**. The Greek root word *astron* means star. The prefix *astro* is used in many other English words.

All stars are big balls of hot gas, but **astronomers** have discovered that stars differ in many ways. Stars can be different sizes and colors. Some stars are closer to Earth than others and some stars are hotter than others. Stars that are the hottest and closest to Earth appear brighter than other stars.

Astronomers also discovered that stars cluster together in large groups. A large group of stars that cluster together in one area is called a **galaxy**. There are **billions** and **billions** of stars in one **galaxy**. That's a lot of stars!

The **galaxy** to which our sun and solar system belong is called the **Milky Way Galaxy**. It has a spiral shape when viewed from space. From Earth, it looks like a "milky" band of white light.

The nearest spiral galaxy to the **Milky Way Galaxy** is called the **Andromeda Galaxy**. It is **billions** and **billions** of miles from the **Milky Way Galaxy**. There's that number **billions** again. You have probably heard of a million before. A million is a huge number. So what's a **billion**? It's one thousand million! It is safe to say that the **Andromeda Galaxy** is a long, long, long way away! Even so, it is sometimes possible to see the **Andromeda Galaxy** at night.

Scientists think there are **billions** of **galaxies** in the universe. There's that number **billions** again. There are **billions** of stars in each **galaxy** and **billions** of **galaxies** in the universe—that is almost more than you can think about!

"Galaxies"

Isn't space amazing? The thing that may amaze you most is how much distance there is between the planets in our solar system. No wonder they call it space! Now that we have reached the edge of our solar system, do you want to see more closely what lies in the center? Before you can understand what lies beyond our solar system, you need to know a little more about what stars are. And the best place to start is with the star that lies at the center of our solar system that you see every day: our very own sun.

The sun is so much brighter and bigger than all the rest of the stars because we are so much closer to our star than we are to any other star. We only see our star, the sun, in the daytime because that's when we're facing it. And when the sun lights up our skies, it is so bright that we can't usually see any other stars in the daytime.

You can tell just by looking that there is no way a spaceship could land on the sun—it's a big mass of incredibly hot gas! There's no solid surface to land on. The sun, like all stars, is made mostly of a gas called hydrogen. Hydrogen atoms in the center of the sun crash into each other under intense heat and pressure. The hydrogen **atoms fuse**, or join together, to form another gas called helium, and this fusion creates energy you can see and feel in the form of light and heat. So, hydrogen turning into helium produces vast amounts of energy, and is what causes the sun to shine.

The amount of heat and light being produced by a star determines its color. The surface of our sun is about ten thousand degrees Fahrenheit, not nearly as hot as the inside of the star! Even though ten thousand degrees is really hot compared to boiling water, our sun is still only considered a medium-hot, yellow star. Some stars are even hotter and some are not as hot as our sun. In fact, our sun is not as hot as it used to be.

Scientists believe that all stars are made of more or less the same things: hydrogen, helium, and smaller amounts of other basic substances. But just because stars are made from huge amounts of hydrogen and helium doesn't mean that all stars are the same—they aren't. The amount of substance or mass that makes up each star can vary. And the substances that make up some stars are more packed together than in others.

Stars have different ages, too. Some stars in the universe were literally just born yesterday, and some—like the sun—are believed to be billions of years old. But our sun is not at the end of its life either; many scientists believe our sun still has **billions** of years yet to live! So stars can be very different from each other.

Our sun seems large to us, and it is. In fact, it's so large that more than one million Earths could fit inside it! That's a lot of Earths—and just one Earth is pretty big. But believe it or not, our sun is small compared to many other stars. There are stars in the universe that are two thousand times as big as the sun! Our sun seems very bright to us, and it is. But there are stars that are more than four million times as bright! Even so, there are stars that are smaller than our sun and some that are less bright. So you see, stars can differ in size, mass, color, brightness, temperature, and age. But the one thing that most stars have in common is that they exist in groups called galaxies.

Do you remember how we defined our solar system as a neighborhood of planets, asteroids, and other objects in orbit around a star? Well, a galaxy is a **cluster** of many stars that orbit around together as an even bigger neighborhood—like a country. So, a galaxy is basically a gigantic country of stars. But all galaxies are not the same; they come in many shapes and sizes. Some galaxies are **spiral**. Some galaxies are elliptical in shape. Still other galaxies are **irregular** in shape, with no particular pattern.

The galaxy that our solar system is in is called the **Milky Way Galaxy**, which is a **spiral** galaxy. When you are standing on Earth you are in the **Milky Way Galaxy**. If you look up into the sky on a very clear, dark night away from the lights of a city, you can see a narrow band of thousands of stars going through the sky. When you look at this cloudy-looking band, you are looking into the thickest, densest part of the **Milky Way**. The ancient Greeks called this band of stars the Milky Circle, and the ancient Romans called it the Milky Road. But guess what? When you stand outside of the Milky Way and look at it, it looks like a **spiral**.

This is a view of a spiral galaxy like the **Milky Way**, looking down on it. Astronomers know what the Milky Way Galaxy looks like, but no person or spaceship has ever traveled outside of the Milky Way to take a picture of the whole galaxy. Scientists have figured out by using modern scientific instruments that the Milky Way is a **spiral** galaxy and looks very much like other **spiral** galaxies that we can take pictures of. As you can see, this spiral **galaxy** has a bright center, or hub, of many bright stars with star-studded arms swirling out from it amid clouds of gas.

How many stars do you think are in one galaxy? A single galaxy usually contains between one **billion** and a few hundred **billion** stars. And that's not even counting any planets or other objects that may be in orbit around all of those **billions** of stars. In addition to **billions** of stars, galaxies also contain clouds of gas and pieces of dust which can eventually come together to form new stars.

And don't forget—galaxies also include the space in between the stars that are in it. There is a huge amount of space in space! Stars in the Milky Way Galaxy can be one hundred thousand **light-years** away from each other, or they can be five **light-years** away from each other, but most are somewhere in between.

A **light-year** is the distance that light travels in one year. Light travels at a speed of 186,282 miles per second. So one l**ight-year** is nearly six trillion miles! That's about six thousand billion miles. And you thought a **billion** was big! Well, as you can see, stars in the same galaxy are very far away from each other. Those are **astronomical** distances!

Astronomers use different kinds of powerful telescopes to see even more distant parts of the Milky Way Galaxy. Some of those telescopes are on Earth, and some are in orbit around Earth. And there are even a few telescopes zooming through our solar system.

Astronomers share their observations, their photographs, and the data they have gathered with each other—and luckily, with us, too. Even with all of our powerful equipment, there are still things in the Milky Way Galaxy—and beyond it—that no one has ever seen. Sometimes there is something in the way, like a star or another galaxy, and some things are still too far away even for our most powerful telescopes. There are more stars and galaxies in the universe than we can imagine!

As you look out at the Milky Way, you may wonder about the other galaxies out there. One of the closest galaxies to our Milky Way Galaxy is called the Andromeda (/an*drom*eh*dah/) Galaxy. The Andromeda Galaxy is a **spiral** galaxy like our Milky Way. Even though Andromeda is the closest **spiral** galaxy to our galaxy, the Andromeda Galaxy is still very far away, and there is still much that remains unknown about it. Several other small **irregular** galaxies lie between the Milky Way Galaxy and the Andromeda Galaxy.

Now you know a lot more about our school's "space address." We live on the planet Earth. Earth is the third planet from the sun in our solar system, one of four small, rocky planets. Our solar system is just one planetary system located in one of the **spiral** arms of the Milky Way Galaxy.

You may be thinking about all of the other galaxies that exist besides our galaxy. There are **billions** of galaxies in the universe. Another **astronomical** number! "Wait," you may be thinking, "let me get this right".

"There are **billions** of galaxies . . . and all of them have billions of stars in them? Wow—that's so big I can't even get my mind around it!" The universe truly is an incredibly gigantic and vast place.

Glossary:

1. **astronomical**—really large; enormous in number, size, or distance
2. **atoms**—the tiny particles from which all substances are made
3. **cluster**—a number of things of the same kind that are together in a group
4. **fuse**—join together (fusion)
5. **irregular**—uneven; not regular in shape, size, or other characteristics
6. **light-years**—distance traveled by light over a period of years; a measure of length used in astronomy
7. **spiral**—curved in shape; gradually winding around a center point

NAME:

DATE:

7.2 ACTIVITY PAGE

Compare and Contrast Two Texts

Reading "Galaxies and Stars"	Read-Aloud "Galaxies"

Compare and Contrast Summary

Directions: using your notes from the graphic organizer, write a paragraph about how the two texts are most similar and another paragraph about how they are different.

NAME: ______________________________

DATE: ______________________________

7.3 ACTIVITY PAGE

Word Sort

Identify the headers. Read the words in the box and circle the letters that have the /j/ sound. Write the words under each header that match the header's spelling pattern.

'j' > /j/	**'dge' > /j/**	**'g' > /j/**
________	________	________
________	________	________
________	________	________
________	________	________
________	________	________
________	________	________

'dg' > /j/	**'ge' > /j/**
________	________
________	________
________	________
________	________
________	________
________	________

budge	game	beige	cabbage	great
hedging	Jill	gemstones	gadget	botch
cage	gerbil	abridging	gallery	tonnage
gymnast	gelcap	ghastly	ajar	enjoy
appendage	smudge	adjective	injury	judgment
porridge	wedged	giant	pledge	fudge

Dictionary Skills

Use the following portion of a dictionary page to answer the questions below.

jester **jiffy**

jet 1. *noun* A stream of liquid forced out a small opening. 2. *noun* A plane powered by jet engines. 3. *verb* To travel by jet.

jewel 1. *noun* A gem used in jewelry. 2. *noun* A thing greatly valued.

1. What are the two guide words on the page? ______________________________

2. What are the two entry words on the page? ______________________________

3. How many definitions are there for *jet*? ______________________________

4. Would the word *jest* be on this page? ______________________________

5. Circle the words that would come before *jester* from the following list:
   jeep, *jigsaw*, *jettison*

6. Which definition of *jet* matches the use of the word in the sentence:

   When you shake up a soda and open it, a *jet* of soda will shoot out of the can opening. ______________________________

   What part of speech is *jet* in this sentence? ______________________________

7. Choose one of the two remaining definitions for *jet* and write a sentence using *jet* in that form. ______________________________

   ____

   ____

8. Which definition of *jewel* matches the use of the word in the sentence:

   The smallest puppy in the litter was the *jewel* of the bunch.

   ____

   What part of speech is *jewel* in this sentence? ______________________________

9. Write a sentence using definition 1 for *jewel*. ______________________________

   ____

   ____

Constellations

1. How many constellations can be seen in the night sky?
   A. 40 constellations can be seen in the night sky.
   B. 64 constellations can be seen in the night sky.
   C. 88 constellations can be seen in the night sky.
   D. 48 constellations can be seen in the night sky.

   page __________

2. Why might the stars in constellations look brighter than other stars?
   A. The stars look brighter because they are closer to the Earth.
   B. The stars look brighter because they are reflecting light of other stars.
   C. The stars look brighter because they are hotter than other stars.
   D. Both A and C

3. What is another name for the constellation Ursa Major?

   ____

   page __________

4. What group of stars is within the constellation Ursa Major?
   A. The Little Dipper is within the constellation Ursa Major.
   B. The Big Dipper is within the constellation Ursa Major.
   C. Ursa Minor is within the constellation Ursa Major.
   D. Polaris is within the constellation Ursa Major.

   page ________

5. Why is Polaris different from other stars in the sky?
   A. It is part of the Big Dipper.
   B. It never stays in the same place.
   C. It is not really a star.
   D. It stays in the same place all year.

   page ________

6. Pretend you are outside on a clear night. Describe the steps you would take to locate Polaris.

   ____

   ____

   ____

   ____

   ____

   page ________

"Escape at Bedtime"

By Robert Louis Stevenson

The lights from the parlour and kitchen shone out
Through the blinds and the windows and bars;
And high overhead and all moving about,
There were thousands of millions of stars.
There ne'er were such thousands of leaves on a tree
Nor of people in church or the Park,
As the crowds of stars that looked down on me,
And that glittered and winked in the dark.

The Dog, and the Plough, and the Hunter, and all,
And the star of the sailor, and Mars,
These shone in the sky, and the pail by the wall
Would be half full of water and stars.
They saw me at last, and they chased me with cries,
And soon had me packed into bed;
But the glory kept shining and bright in my eyes,
And stars going round in my head.

NAME: ______________________________

DATE: ______________________________

8.3 ACTIVITY PAGE

Practice Conjunction *so*

Create an Effect *to go with the* Cause *listed below, adding the conjunction* so, *to make a compound sentence. Draw two lines under* so.

1. Today is Saturday ____

____

____

____.

2. There is no school in summer ____

____

____

____.

3. The merry-go-round was lots of fun ____

____

____

____.

4. Pink cotton candy is my favorite flavor ____

____

____

____.

Create a Cause *to go with the* Effect *listed below, adding the conjunction* so, *to make a compound sentence. Draw two lines under* so.

1. ____

____

________________________________ the leaves dropped off of the trees.

2. ____

____

____ we opened presents.

3. ____

____

________________________________ Mother ran to answer the phone.

4. ____

____

__________________ Tom put his foot on the brake and stopped the car.

Dear Family Members,

Over the next few days, your student will be learning more about the universe and space exploration, focusing on key figures such as Nicolaus Copernicus and Mae Jemison.

Below are some suggestions for activities that you may do at home to reinforce what your student is learning about astronomy.

1. Space Exploration

Over the next few days, your student will be learning about NASA-led space exploration. You may want to review with your student that space exploration is one way astronomers learn more about the universe. Your student will hear about the Apollo 11 mission to the moon and the astronaut Mae Jemison. Ask your student to share what they remember about these two topics. (Neil Armstrong and Buzz Aldrin were the first to set foot on the moon; they traveled on a rocket; etc. Mae Jemison was the first female African American astronaut.) You may wish to supplement what your student has learned by visiting the NASA website to research current NASA endeavors and the most recent astronauts and space explorations.

2. Stargazing

Go outside one evening and stargaze with your student. Point out any constellations you know and have your student share with you any of the constellations they have learned. You may also wish to point out any of the planets visible in the night sky, like Venus or Mars. If you have access to technology, such as a computer tablet or smartphone, you may wish to use a stargazing application.

If you live in a city, it may be hard to see stars because light pollution will interfere with the light from the stars. Sometimes the outskirts of a city, or even a high point in the city, have less light pollution, making stars more visible. You may want to consider traveling to one of these areas to stargaze. You may also wish to visit a science museum or planetarium to observe constellations more closely.

3. Words to Use

Below are several of the words that your student will be learning about and using. Try to use these words as they come up in everyday speech with your student.

- *expanding*—The balloon is expanding with each breath I blow into it.
- *constellations*—Ancient peoples created stories about groups of stars that made patterns called constellations in the night sky in the shapes of people, animals, and other objects.
- *opposed*—In Copernicus's time, many people opposed the idea that the sun was at the center of the solar system.

4. Read Aloud Each Day

It is very important that you read with your student every day. Set aside time to read to your student and to listen to your student read to you.

Be sure to praise your student whenever they share what has been learned at school.

NAME: ____________________

DATE: ____________________

Anticipatory Guide for "Space Exploration"

Before Listening	Statement	After Listening
T or F	Our solar system is geocentric.	T or F
T or F	Neptune wasn't discovered until more powerful telescopes were invented.	T or F
T or F	Observatories are built on mountains so they are closer to the stars.	T or F
T or F	The Hubble Space Telescope orbits the solar system.	T or F
T or F	The first human being to go into space was Soviet cosmonaut Yuri Gagarin.	T or F
T or F	Astronaut Buzz Aldrin was the first man to walk on the moon.	T or F
T or F	The Apollo 11 space capsule was not a reusable spacecraft.	T or F

If you could rename this Read-Aloud, what would you name it? Why?

____

____

____

____

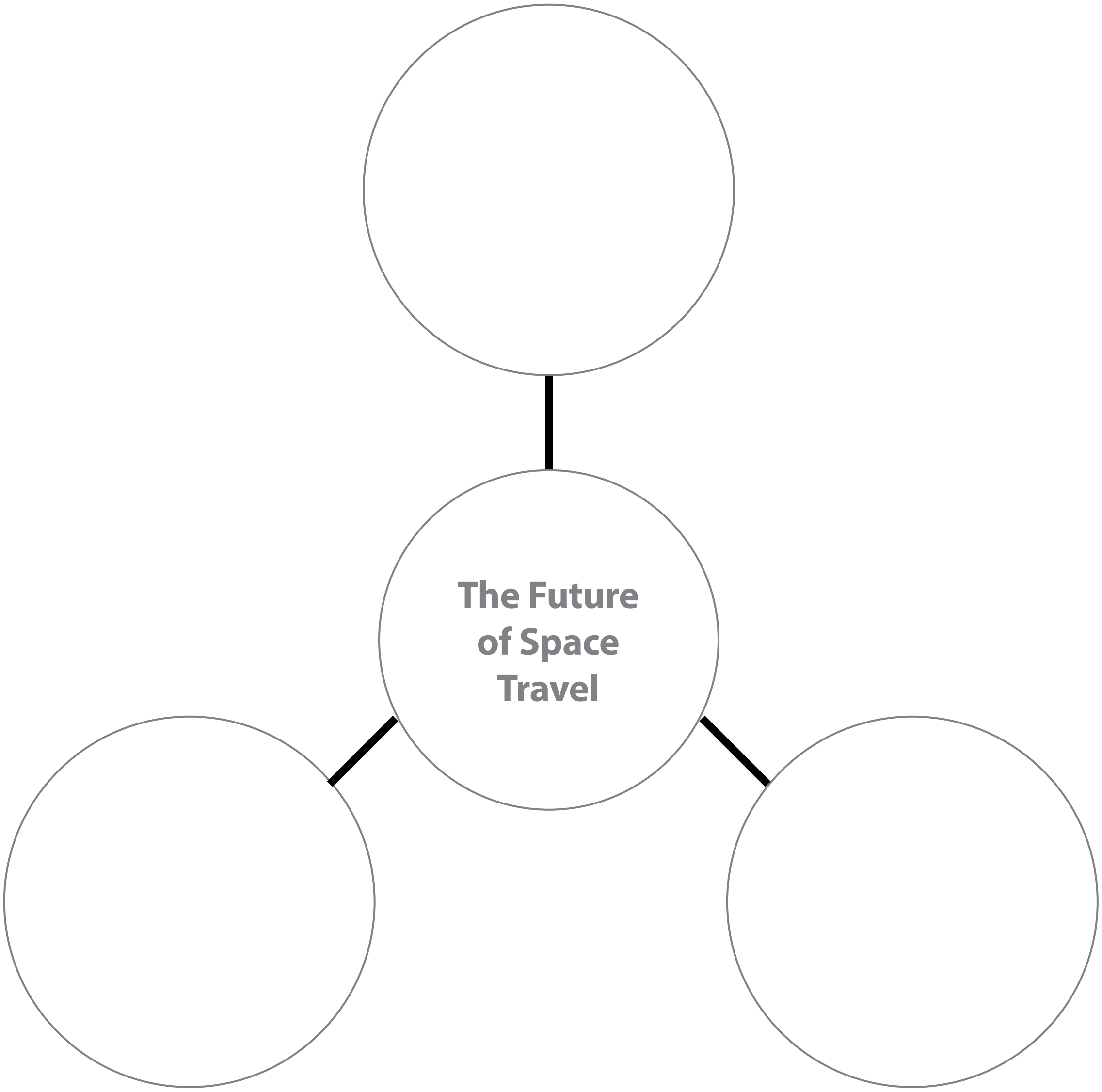
____

____

NAME: ______________________________

DATE: ______________________________

The Future of Space Travel: Opinion



The Future of Space Travel

Blank Busters

gnat	skinny	knotted	recently
flannel	knighted	nearby	understand
design	knobby	manned	knowledge
channel	annoy	gnarly	knuckle
campaign			

Challenge Word: *very/vary*
Challenge Word: *enough*
Content Word: *astronomer*

Fill in the blanks in the sentences below with one of the spelling words in the box. Only if needed, add a suffix to the end of a word in order for the sentence to make sense: –s, –ed, –ing, –er, *or* –ly.

1. The bothersome TV show was so __________________ that I begged my family to change the __________________.

2. My __________________ silly uncle conducted a lavish __________________ to be __________________ Sir Uncle Fred!

3. Scientists called ____________________ study stars, planets, and satellites that are ____________________ by astronauts.

4. In the pasture is a tree that is so old that its branches are ____________________ and ____________________.

5. The ____________________ nightgowns were warm.

6. When the lights went out, I fumbled around in the dark and ran my ____________________ into a closed door.

7. Teachers make it so easy to ____________________ difficult topics and they love to fill our heads with ____________________.

8. I had searched for months but ____________________ discovered there is a library right around the corner which is ____________________ enough for me to walk to it.

Write three sentences using spelling words of your choice that were not used in the first ten sentences. Make sure to use correct capitalization and punctuation. You may use the Challenge Words or Content Word in your sentences.

1. ____

   ____

2. ____

   ____

3. ____

   ____

NAME: ______________________________

DATE: ______________________________

Spelling Assessment

As your teacher calls out the words, write them under the correct header.

'nn' > /n/	'gn' > /n/
________________	________________
________________	________________
________________	________________
________________	________________
________________	________________
________________	________________

'n' > /n/	'kn' > /n/
________________	________________
________________	________________
________________	________________
________________	________________
________________	________________
________________	________________

Challenge Word: ________________

Challenge Word: ________________

Challenge Word: ________________

Content Word: ________________

Dictated Sentences

1. ____

____

____

____

2. ____

____

____

____

NAME: ____________________

DATE: ____________________

Exploring Space

1. What did Galileo discover with his telescope?
   A. Galileo discovered Mars with his telescope.
   B. Galileo discovered Jupiter with his telescope.
   C. Galileo discovered four of Jupiter's moons with his telescope.
   D. Galileo discovered the Andromeda Galaxy with his telescope.

   page ______

2. What is the Hubble Telescope?
   A. It is a telescope in an observatory in Texas.
   B. It is a telescope launched into space by NASA.
   C. It is Galileo's first telescope.
   D. It is a large telescope NASA put on the moon.

   page ______

3. If the Hubble Telescope took a picture of Jupiter, describe what the picture would look like.

   ____

   ____

   ____

   ____

4. Who was the first American astronaut to go into space?

____

page ________

5. When did the first rocket ship go to the moon?
   A. The first rocket ship went to the moon in 1969.
   B. The first rocket ship went to the moon in 1961.
   C. The first rocket ship went to the moon in 1972.
   D. The first rocket ship went to the moon in 1965.

page ________

6. What is gravity and why is it a challenge for rocket ships?

____

____

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____

____

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page ________

NAME: ______________________________

DATE: ______________________________

Triangle Connections

Directions: Using your notes and the glossary in your Student Reader, select three words we've studied in the unit so far and arrange them in a triangle shape. Then, connect the first word to second word with a line and write on the line how the two words are connected. Next, draw a line from the second word to the third word and write on the line how those two words are connected. Finally, draw a line from the third word to the first word and write the connection.

First word:

Second word:

Third word:

Reading/Writing Choice Board

Directions: Select activities in three of the boxes below after you complete your reading. Write your responses on a separate sheet of paper, making sure to include the numbers of the activities you chose. When completing the activities, write in complete sentences using correct spelling, capitalization, and punctuation.

1. Create a graphic organizer and compare and contrast two ideas in the text.	2. What is the key idea of the text? List three details from the text that support the key idea.	3. Write a sentence describing the author's purpose.
4. Write three questions you still have after reading the text.	5. Write a list of three new words you learned in the text, their definitions, and use them in a sentence.	6. Describe how one of the images in the chapter helps you to understand the text.
7. Find three sentences that show comparing or contrasting. Write the sentences and underline the comparing and contrasting word or words.	8. Write a list of words the author uses to help the reader visualize the information.	9. Write three new things that you learned from the text.

Exploring Space

As you have learned in the last chapters, people have been interested in studying space since ancient times. It was possible to see only some stars and planets with the naked eye. Since they were far, far away, it was impossible to see anything in very much detail.

In 1609, an astronomer named Galileo [ga-li-LAE-oe] created a telescope that he used to observe the night sky. Galileo's telescope made things appear three times larger. Using his telescope, he discovered four of the many moons that orbit the planet Jupiter. He also observed the planet Saturn and the Milky Way.

Since Galileo's time, scientists have created more and more powerful telescopes. Some telescopes are housed in large **observatories** on Earth. Often, these **observatories** are on the top of mountains, far away from any cities or lights. This allows astronomers to clearly see the stars and planets.

Other telescopes are **launched** into space using rockets. They travel far above Earth and have a better view of the universe than telescopes on Earth. One of these telescopes is the **Hubble Telescope**. It was launched in 1990 by **NASA**, the American group of scientists who study outer space. The **Hubble Telescope** is still in space today, orbiting Earth. Since its **launch**, it has sent back thousands of photos to **NASA**. **Hubble's** photos have led to many new discoveries about the universe. For example, using photos from **Hubble**, scientists now think that the universe is about 13 to 14 billion years old!

Besides sending telescopes into space, **NASA** has also launched rocket ships into space. Scientists believed it was too dangerous for humans to ride the first rocket ships into space. They did not know what effects space travel might have on humans. So, **NASA** first sent apes into space on rocket ships. "Why apes?" you might ask. Think back to what you learned in a previous reader about animals. Apes are mammals and belong to same group of animals, called primates, as humans. By studying the apes, scientists hoped to learn how space travel might affect humans. In 1961, **NASA** sent the first American **astronaut** into space on a rocket ship. His name was Alan Shepard. He stayed in space for only 15 minutes.

After 1961, **NASA** sent more **manned** flights into space. These flights orbited Earth but did not stop or land anywhere in space. Then, in 1969, the United States sent a rocket ship to the moon. The rocket ship was called **Apollo 11**.

Have you ever tried to throw a ball up in the air? The ball goes up at first. Then, it comes back down. No matter how hard you throw it, it comes back down because of **gravity**. **Gravity** is a force of **attraction** that pulls things toward one another. Earth's **gravity** pulls the ball back down to Earth.

Earth's **gravity** is a challenge for rocket ships like **Apollo 11**. In order to fly off into outer space, the rocket ship has to push up with a lot of force. It has to push up with so much force that **gravity** cannot pull it back down.

Apollo 11 fired a lot of strong rockets. It lifted off and went up slowly at first. Then, it got faster and faster. This is what it looked like after a few seconds. After just a few seconds more, it shot up out of Earth's atmosphere and into outer space.

"Gravity"

What exactly holds all of this stuff together in this huge universe? Why don't all these stars and planets just go flying off in any direction all over the universe? Why do they stick together in groups and clusters like solar systems and galaxies? These are excellent questions, and the answer is . . . **gravity**!

Gravity is an invisible **force** of attraction between objects. It's the **force** that holds galaxies and solar systems together. It's the **force** that keeps us firmly planted on planet Earth instead of flying off into space. It's the **force** that keeps Earth orbiting around the sun and keeps the moon orbiting around Earth. You can't see **gravity** or touch it, but **gravity** is present between everything in the universe that has mass. Because of **gravity**, every single bit of **matter** in the universe pulls on every other piece of **matter** in the universe.

You and I exert a pull on each other, but because we have very little mass in our bodies compared to celestial bodies, our **gravitational pull** on each other is very small—so small we can't feel it at all.

Gravity depends greatly on mass . . . so what exactly is mass? Mass is just the amount of **matter** in an object. You and I are small compared to, say, a planet, or a star. We're made of less "stuff," so our mass is much, much smaller. Mass is important when you are trying to understand **gravity,** because the larger the mass, the larger the **gravitational pull**. So objects with really large masses, like stars and planets, have a really big **gravitational pull** on other objects. And objects with really small masses, like you or me, have really small gravitational pulls on other objects—so small we don't even notice the pull at all. The more mass an object has, the more **gravity**, or pull, it is capable of. Because Earth has so much mass compared to all of the things that are on the surface of the Earth, its surface **gravity** keeps the things on Earth from flying off into space. You, your house, your bed, a ball you throw up into the air—all of these things stay on Earth due to **gravity**! Even the Earth's atmosphere and the oxygen we breathe are held close to Earth by its **gravitational pull**!

Gravity also causes you to have weight when you stand on a scale! Earth's **gravity** pulls down on you. The more mass you have, the harder the pull, and the higher the numbers on the scale. Think about an astronaut who is standing on the moon. The astronaut stays on the surface of the moon because of the moon's **gravity**. If the astronaut stood on a scale on the moon, the astronaut's weight would be six times less than the weight of the same astronaut on a scale on Earth! So, a person who weighs sixty pounds on Earth would weigh only ten pounds on the moon—about the weight of a bag of flour—because the moon has less mass than Earth, and its **force** of **gravity** is not as strong.

But the astronaut does not get pulled off the moon and back through space to Earth! Earth still has a larger mass than the moon, and it still has a larger **gravitational pull** than the moon. But because the astronaut is far away from Earth and very close to the moon, the **gravitational pull** of the moon has the most effect. It keeps the astronaut on the moon.

That's another important thing to know about **gravity**—the distance between two objects affects the **gravitational pull** between them. Objects that are close to each other pull harder than objects that are farther away. The effect of an object's **gravitational pull** lessens as you get farther away from it. The sun has a lot more mass than Earth does. But the sun is also a lot farther away, and because we are on the surface of Earth, Earth's **gravity** has a much bigger effect on us, keeping us firmly on Earth—one of the many benefits of **gravity**!

The sun contains ninety-nine percent of all the mass in our solar system. Because the sun has more mass by far than anything else in the solar system, it also has more **gravity** than anything else in the solar system. The sun's **gravity**—or **force** of attraction—is so strong that it constantly pulls the planets toward it.

You may be wondering why the planets don't crash into the sun if the sun is pulling on them. Don't worry; that never happens because the planets are also moving really fast in their own orbits around the sun.

The combination of the planets' own speed and the sun's **gravitational pull** toward it is what keeps the planets constantly circling in orbit around the sun. It's a perfect balance—the planets continue in their predictable movements around the sun.

Sometimes **gravity** is so powerful that a **black hole** is formed: an object or area with an extremely strong **gravitational pull**. There are many **black holes** in space, and a **black hole's gravity** is so strong that once something gets close enough, nothing can escape its **gravitational pull**—not even light! Astronomers find **black holes** in space by noticing the movement of objects around them. You can't see **gravity**, but you can observe the way the **force** of **gravity** affects objects. Scientists are still learning about **black holes**, like many others things in outer space.

On a clear night we can often see the moon moving across our night sky. Have you ever been curious about why Earth has a moon? Many scientists think that about four and a half billion years ago there was a massive collision between Earth and a very large asteroid. The information they have gathered shows that the moon may have formed from the leftover debris from this amazing impact. Earth's **gravity** was able to hold the moon in its orbit. There is a strong **gravitational pull** between Earth and the moon. The moon's **gravity** pulls on all of the things on the Earth—including people! But the Earth's **gravity** is strong enough to keep us on Earth.

The moon's **gravity** also pulls on Earth's oceans, but the Earth's **gravity** pulls back—and it's a good thing it's stronger! The moon's **gravity** is just strong enough that it can move the water on Earth enough to cause **tides** in the oceans. **Tides** cause the regular rise and fall of the ocean's waters. People can see the effects of **tides** if they are at the seashore.

High **tides** cause the waves to come high up on the beach, and when low **tides** occur, the waves don't come up as far. Low **tide** is a good time to walk the beach and look for shells and creatures that live in the sand.

So, yes, the powerful effects of **gravity** can explain a lot of interesting things in the universe—it's what holds our moon in orbit around Earth. It's what causes ocean **tides** on Earth day after day. **Gravity** is why we stay on Earth and why objects we throw into the air come back down. **Gravity** even helps create new stars and planets by helping pull together the gases and dust that form them. We can't see **gravity**, but we can see its effects all around us—on Earth, in our solar system, and throughout our galaxy!

Glossary for "Gravity"

1. **gravity**—the force or pull created by the mass of objects in the universe toward each other
2. **force**—a pull or a push on an object or system
3. **matter**—the substances all objects on Earth are made of; all substances that take up space
4. **gravitational pull**—the force that draws all objects in the universe toward each other
5. **black hole**—an object or area in space that has such strong gravity that not even light can escape from it
6. **tides**—the periodic or regular rise and fall of the surfaces of large bodies of water on Earth that are caused by the interaction of the moon's gravity with Earth

NAME: ____________________

DATE: ____________________

11.2 ACTIVITY PAGE

Gravity Experiment

Directions: Follow your teacher's directions for conducting the experiment. You will record your predictions, results, and conclusions on this page.

Objects dropped		My prediction	Result
Experiment number 1	**Marble** **Paper**		
Why did this happen?			
Experiment number 2			
Why did this happen?			

Objects dropped		My prediction	Result
Experiment number 3			
Why did this happen?			
Write a summary of the gravity experiment and what you learned:			

NAME: ______________________________

DATE: ______________________________

11.3 TAKE-HOME

Dear Family Members,

Please help your student succeed in spelling by taking a few minutes each evening to review the words together. Helpful activities for your student to do include: spelling the words orally, writing sentences using the words, or simply copying the words.

Spelling Words

This week, we are reviewing the spellings of /ae/, /k/, /s/, /j/, and /n/ that students have already learned. Your student will be assessed on these words.

Students have been assigned two Challenge Words, *different* and *thought*. Challenge Words are words used very often. The Challenge Word *different* does follow the spelling patterns for this week as the 'n' is pronounced /n/.

The Content Word for this week is *atmosphere*. This word is directly related to the material that we are reading in *What's in Our Universe?* The Content Word is an optional spelling word for your student. If your student would like to try it but gets it incorrect, it will not count against them on the test for trying. We encourage everyone to stretch themselves a bit and try to spell this world.

The spelling words, including the Challenge Words and the Content Word, are listed below:

1. yesterday	8. annoy	15. character
2. quickly	9. knowledge	16. budget
3. jewel	10. refrigerate	17. accomplish
4. recently	11. gymnasium	18. listen
5. subject	12. design	**Challenge Word**: *different*
6. awaited	13. digest	**Challenge Word**: *thought*
7. fascinate	14. kindness	**Content Word**: *atmosphere*

Student Reader

The chapters your student will read this week in *What's in Our Universe*? include information about the space shuttle and the international space station. Students may read chapters about Dr. Mae Jemison and Nicolaus Copernicus. Be sure to ask your student each evening about what they are learning.

Students will take home text copies of the chapters in the reader throughout the unit. Encouraging students to read a text directly related to this domain-based unit will provide content and vocabulary reinforcement. Please remind your student that the glossary can be used for finding the meaning of the bolded words.

NAME: ______________________

DATE: ______________________

12.1 ACTIVITY PAGE

Reflection 3-2-1

Write a sentence for each of the categories below:

Write three things you learned from “Gravity.”

1.
2.
3.

Write two things that you already knew about gravity before reading “Gravity.”

1.
2.

What is the one question about gravity that did not get answered from the reading or the discussion about the text?

1.

NAME: ______________________________

DATE: ______________________________

Grammar Review

Circle the sentence that is punctuated correctly.

1. A. "she was so glad to see her friend remarked Sally."

   B. "She was so glad to see her friend," remarked Sally.

   C. "She was so glad to see her friend?" remarked Sally.

   D. "She was so glad to see her friend, remarked Sally."

2. A. "The tunnel was dark long and scary, said Ted."

   B. "The tunnel was dark, long, and scary," said Ted.

   C. "The tunnel was dark, long, and scary, said Ted."

   D. "The tunnel was dark long, and scary," said Ted.

3. A. Mrs. Black asked "Do you have your reader open."

   B. Mrs. Black asked "Do you have your reader open?"

   C. Mrs. Black asked? "Do you have your reader open."

   D. Mrs. Black asked, "Do you have your reader open?"

Nicolaus Copernicus

1. How would you like to present the world with a new idea about how something works? What if, besides being new, your idea was so different from the ideas that people had believed for so long that people were opposed to even listening to your ideas? That kind of fierce **opposition** is exactly what a man named Nicolaus Copernicus experienced hundreds of years ago when he had a new idea about astronomy.

Nicolaus Copernicus was a regular person, just like you. He was born in Poland in 1473 and was raised by his uncle because both of his parents died when he was about ten years old. Copernicus went to universities in Poland and Italy and became a clergyman and doctor.

Copernicus studied many subjects, including math, philosophy, church law, and medicine. But his favorite subject of all—and the thing that he had a big new idea about—was astronomy.

As you have learned, astronomy is the study of the stars, space, and the universe, and astronomers are scientists who study these amazing phenomena. Long before Copernicus was born, the Greek philosopher Aristotle observed that the sun appeared to "rise" in the east and "set" in the west. Because Aristotle observed this **diurnal** motion of the sun with his own eyes, he—and many others—believed that the Earth was stationary and that the sun and all of the planets orbited around it. These observations and the strong belief in this way of looking at the universe shaped people's views for a very long time.

2. For more than one thousand years before Copernicus was born, most astronomers and other people believed that the universe was **geocentric**. In

other words, scientists thought that Earth was the center of the solar system and the universe. They believed Earth stood still and the sun and all of the planets and the moon circled around it, while the stars remained fixed in a rotating sphere that was farther away.

You have heard that most people believed the **geocentric** theory of the universe for more than one thousand years. Why? Because it was the best explanation anyone had come up with for why the sun and planets appeared to move the way they did. All of our observations were from Earth. Remember, people did not have all of the scientific tools back then that we have today, such as artificial satellites, spaceships, and high-powered telescopes. These tools have greatly expanded modern understandings of space through new opportunities for observation and gathering data. Think about the difference between a person standing on Earth looking around and a person in an airplane looking down on the Earth-bound person. The person in the airplane can see a much wider scope of Earth. Powerful telescopes have given us this new kind of perspective when we look up into space.

Most Greeks, including the famous philosopher Aristotle, believed the **geocentric** theory. There were a few exceptions, such as the Greek astronomer Aristarchus who, after much study, concluded that the sun was much larger than Earth, and that it was Earth that moved around the sun. His new idea, called a **hypothesis**, was never accepted by ancient astronomers, but after many, many years, Aristarchus's ideas greatly influenced other astronomers in their studies.

3. Most ancient Romans believed the **geocentric** theory. During this time it was the official position of the powerful Roman Catholic Church. Most astronomers were afraid to question it or explore other **hypotheses,** though

there were others before Copernicus who were trying to work out alternative explanations. When Copernicus was born in 1473, almost everyone in Europe believed in this **geocentric** theory, too. And almost everyone had no idea that this view of the universe was about to change!

How could so many people have a completely different view of the universe than we do today? The answer is easy. All of what we know about the way the universe works—all of science—comes from the observations and **logical** thinking of regular people, just like you and me. Astronomers have always used scientific theories to explain the movement of the stars and planets. Scientific theories aren't necessarily complicated or hard to understand—they are just possible explanations of how or why things happen. But remember, scientific theories aren't just guesses. They are ideas that are based upon evidence and careful observation of the world—such as observing where the stars appear in the sky every night.

Sometimes, however, what we think we are seeing is not what actually is, such as the world looking flat but actually being round.

4. A long time ago stargazers spent a lot of time outside looking at the night sky and noticed patterns in the sky. Early astronomers knew that the planets had different movements than the stars which circled around Polaris once a day. Astronomers observed that the planets moved slowly across the night sky along a certain pathway. But people had also started noticing some odd things about the motion of the planets as they followed this pathway. One of these odd things was that sometimes Mars and other planets made a strange backward loop in the sky. Scientists had tried to explain this motion using the **geocentric** theory of the universe, but the explanations became pretty

complicated. Still, most people didn't question that Earth was the center of the universe.

But Copernicus asked himself the question: if the planets were orbiting around Earth, why would they follow such complicated patterns? He didn't think they would, and so he used his **logical** mind to come up with a different scientific **hypothesis** that would better explain this strange looping motion. Copernicus also had the work of Aristarchus long before to add to his own studies. In science, often the work of one scientist is built upon the work of the many scientists who have come before them.

5. What was the scientific **hypothesis** that Copernicus decided upon? It was a **heliocentric hypothesis** of the universe. Does this idea sound familiar? This was the **hypothesis** of Aristarchus more than one thousand years earlier! By using mathematics to make careful **calculations** of the positions of the sun, planets, and other celestial bodies, Nicolaus Copernicus came to the same conclusion: that the sun was at the center of everything. He believed that Earth orbited around the sun along with the rest of the planets. Copernicus also **hypothesized** that the Earth is spinning and rotates on its own axis.

Of course, we now know that the Earth does rotate on its own axis. And we also know that although the sun isn't the center of the universe, it is the center of our solar system. So, the **heliocentric** scientific **hypothesis** Copernicus presented in the 1500s (that was built upon the scientific **hypothesis** Aristarchus had presented more than one thousand years earlier) was much closer to the truth than the **geocentric** theory that had been held for so many years.

Unfortunately, similar to Aristarchus, Copernicus's **hypothesis** was not widely accepted by people during his lifetime. For one thing, people thought that if the Earth was spinning, all the things on it would be thrown off the Earth and into space. They didn't understand that the force of gravity holds us firmly on Earth! Another part of the reason for this is that Copernicus's ideas were not published until literally the day he died.

But another part of the reason that the **heliocentric hypothesis** was not widely accepted was that Copernicus's ideas challenged the belief held by most people that humans were at the center of the universe. This was very difficult for many people to accept, so change came slowly. Still, as with the studies of Aristarchus, the studies of Copernicus greatly influenced the astronomers who came after him, including the great Italian astronomer Galileo Galilei.

6. Galileo was inspired by the work of Copernicus and became one of the first astronomers to build and use a telescope to study space in more detail. As you heard earlier, Galileo discovered four of Jupiter's moons. He observed that the moons orbit Jupiter instead of Earth. His discoveries provided further evidence that Aristarchus and Copernicus were—although in the great minority—correct in their **heliocentric** theories!

Nicolaus Copernicus had made careful observations of the stars and other celestial bodies. He recorded these observations with great attention. But it was his willingness to ask questions—even when unpopular—that led him to a clearer answer. Each time you ask questions to help understand something better, you are following in the footsteps of the great astronomer Nicolaus Copernicus. Asking questions to get closer to the truth is what the scientific process is all about. Copernicus's questioning mind and careful observations led him to a new **hypothesis** about the arrangement of what we now know as the solar system. Though people were slow to accept his **hypothesis**, the astronomers who followed Copernicus gathered more and more evidence, so that today the **heliocentric** view is the accepted theory. It's important to remember that new information and evidence often change our views about the world!

Glossary for "Nicolaus Copernicus"

1. **calculations**—mathematical methods used to answer a question
2. **diurnal**—having a daily cycle or occurring daily as a result of the Earth's 24-hour rotation around its axis
3. **geocentric**—having the Earth as the center
4. **heliocentric**—having the sun as the center
5. **hypothesis**—an idea that is based on observation and experimentation but that is not commonly accepted (hypotheses, hypothesized)
6. **logical**—makes sense in an organized, step-by-step way
7. **opposed**—resisted; was against (opposition)

NAME: ______________________________

DATE: ______________________________

Reader's Theater—Nicolaus Copernicus

What's My Line?

Your role: __________________

Write out the dialogue that you will be presenting during Reader's Theater. Make sure that you know when you are supposed to speak by listing the line that comes before yours. Example:

Line before you speak (put the name of the character who speaks before you here, for example, Astronomer 1): "I think that the Earth is at the center of solar system."

Your line (put the name of your role here, for example, Copernicus): "I disagree! I think the Sun is the center of the solar system."

Dictionary Skills

Use the following portion of a dictionary page to answer the questions below.

name **neck**

name 1. *noun* A word used to call a person, place, or thing. 2. *noun* A bad word or phrase used to hurt someone. 3. *noun* A person's reputation. 4. *verb* To state the name of something. 5. *verb* To select someone for a job.

neat 1. *adjective* Not messy. 2. *adjective* Great or excellent.

1. Would the word *narrate* be on this page? ______________________________

2. Circle the words that would come before *name* from the following list:
   nails, *nag*, *namely*

3. Which definition of *neat* matches the use of the word in the sentence:

   My desk at school is always *neat*. ____________________

   What part of speech is *neat* in this sentence? ____________________

4. Write a sentence using definition 2 for *neat*. ____________________________

   ____

   ____

5. Write a sentence using definition 1 for *name*. ______________________________

____

____

6. Write a sentence using definition 2 for *name*. ______________________________

____

____

7. Write a sentence using definition 3 for *name*. ______________________________

____

____

8. Write a sentence using definition 4 for *name*. ______________________________

____

____

NAME: ___

DATE: ___

14.1 ACTIVITY PAGE

Compare and Contrast: Chapter 9 and Chapter 10

Chapter 9 "A Walk on the Moon"	Chapter 10 "What's it Like in Space?"

What is most similar about the two texts?

Reader's Theater Reflection

What was your favorite part of Reader's Theater?

What was your least favorite part?

Would you like to do a Reader's Theater activity again? Why or why not?

Suffix Review

Reminder:

- *–ous* means "full of"
- *–ive* means "relating to"
- *–ly* means "in a __________ way"
- *–ful* means "full of"
- *–less* means "lacking"

If the sentence shows an example of the correct meaning of the underlined word, write yes *on the blank that follows. If the sentence does not show an example of the correct definition of the underlined word, write* no.

1. Dana came up with an <u>inventive</u> way to hang art in her room and made the arrangement look like all the other rooms in the house. _____
2. I saw the <u>hopeless</u> look in my brother's eyes when I told him Dad was running late and we probably wouldn't make it to the movie tonight. _____
3. Dad keeps <u>poisonous</u> cleaning supplies locked up in the shed so no one can accidentally get into them and get sick. _____
4. He drove <u>dangerously</u> through the neighborhood, taking his time and slowing down when he saw people walking or riding bikes. _____
5. The principal <u>appreciatively</u> presented the teacher with her award, thanking her for her hard work and dedication. _____
6. I had a <u>painful</u> gash on my knee from falling on the playground that throbbed and ached. _____
7. At the craft store, she bought supplies to make a <u>decorative</u> frame to hang on a wall that needed some decoration. _____

8. His fearless attitude prevented him from trying new things since he was scared of almost everything. _____

9. We drove through the mountainous area and could see nothing but flat farmland all around. _____

10. Workers used the powerful crane to lift the steel beams high up to the top of the building to put them in. _____

Write a sentence for each word like the previous ones that you can answer with yes.

1. *creative*

2. *furiously*

3. *fearful*

Nicolaus Copernicus

Do you remember in the very first chapter of this reader you learned that long ago, people believed that the sun moved around Earth? This seemed to make sense. Each morning at the start of the day, the sun rose in the east. At the end of the day, the sun set in the west—exactly opposite from where it had come up. To explain this change, people said the sun moved around Earth. This is what the Greeks and other ancient people believed. But you also learned in the first chapter that this was not true.

About the same time that Christopher Columbus landed in America, a man named Nicolaus Copernicus was studying math and astronomy at a university in Poland. He later moved to Italy where he also studied medicine and law.

But Copernicus' real love was astronomy. He knew that since ancient times, people believed that the sun moved around Earth. Copernicus began to carefully observe and record the movement of the sun, planets, and stars. After much research, Copernicus decided that the belief that the sun moved around Earth could not be true. Copernicus' observations led him to believe just the opposite! He realized that instead, Earth was moving around the sun! He also believed that as Earth orbited the sun, it also completed a full rotation each day.

All of Copernicus' ideas came from viewing space without the help of a telescope. He wrote down what he observed from a cathedral bell tower. He also used math to help him prove his point. Finally, Copernicus wrote a book explaining his new ideas about how the universe worked. His fellow scientists went to work trying to prove him wrong, but they couldn't. Most were amazed by his discovery!

However, Copernicus' ideas were different from what people had believed for thousands of years. They believed that Earth and humans were the center of the universe. Many of the teachings of the church at that time were also based on this belief. Copernicus had dared to suggest that Earth was not the center of the universe. Instead, he said, the sun was at the center! Many in the church disagreed with Copernicus' ideas and spoke out against them. So, his beliefs were not widely accepted while he was alive.

In fact, even after Copernicus died, the church continued to argue against the view that the sun was at the center of the universe. Some scientists agreed with Copernicus' ideas. Galileo agreed with Copernicus and was punished and put in jail for a long time.

Today we know, of course, that Copernicus was right. It took great **courage** to speak up and suggest an idea that was so different from what people had always believed. But that is how science works. Even today, scientists continue to learn new things about the universe, so our knowledge is always changing and growing.

NAME: ______________________________

DATE: ______________________________

15.1 ACTIVITY PAGE

Spelling Assessment

As your teacher calls out the words, write them under the correct header.

/n/	/ae/	/s/
________	________	________
________	________	________
________	________	________
________	________	________
________	________	________
________	________	________

/k/	/j/
________	________
________	________
________	________
________	________
________	________
________	________

Challenge Word: ____________________

Challenge Word: ____________________

Content Word: ____________________

Dictated Sentences

1.

2.

NAME: ______________________________

DATE: ______________________________

15.2 ACTIVITY PAGE

The Space Shuttle

If a statement is true, write "true" on the line. If a statement is false, write "false" on the line.

1. A space shuttle only carries astronauts into space. ____________________

   page _________

2. Booster rockets help space shuttles get off the ground and overcome Earth's gravity to get into space. ____________________

   page _________

3. The last space shuttle mission took place in July, 2013. ________________

   page _________

Answer the following questions on the lines provided.

4. How is a space shuttle different from the Apollo 11 spacecraft?

   ____

   ____

   ____

   ____

   page(s) _______

5. What are the other ways NASA is planning to explore space?

____

____

____

____

____

page ________

NAME: ____________________

DATE: ____________________

Connecting Sentences

Directions: Read the mixed-up sentences from a paragraph below. In the spaces, write the number for the correct order of the sentences, 1, 2, 3, 4, or 5.

There is no land on Jupiter.	
The two main gases are hydrogen and helium.	
The planet is a big ball of swirling gases.	
Jupiter is a planet, but it is a very different kind of planet from Earth.	
There are also other gases on Jupiter, and all of them are blowing and swirling around.	

The Space Shuttle

Interest in manned space **exploration** soared after Apollo 11. Other astronauts went to the moon. But scientists were also interested in exploring other parts of space beyond the moon. It was very expensive and took a lot of time to build and send spaceships into space. Do you remember that when Apollo 11 returned from space, it landed in the sea? It was not able to land safely on the ground, so this type of spacecraft always had to land in the sea. Once it landed in the sea, this kind of spacecraft could not be used again.

In 1981, a **reusable** spacecraft, called a **space shuttle**, was built. It was able to fly up into space and then zoom back down to Earth. When it returned to Earth, the pilot was able to land the spacecraft on a runway almost like an airplane. It glided down from space and landed on a runway, but it had to be a very long runway.

The **space shuttle** was flown back into space again and again. It **shuttled** back and forth between Earth and space. That is why it was called the **space shuttle**.

The image on the previous page shows the launch of a **space shuttle**. The **space shuttle** itself is the white part that looks like a jet plane. The other parts are **booster rockets**. The **booster rockets** helped the **space shuttle** get off the ground. They helped the **space shuttle** overcome Earth's gravity. Once the **space shuttle** was up into space, it dropped the **booster rockets** because it no longer needed them.

In the thirty years between 1981 and 2011, different **space shuttles** carried astronauts up into space on many missions. The **space shuttle** was also used to bring **research** equipment and tools into space. The astronauts did many experiments to find out more about space. Scientists were **especially** interested in learning about what effect the lack of gravity would have on humans and other living things.

The **space shuttle** was also used to help build an amazing **space station**. Astronauts could live at the **space station** for months at a time. Often, the **space shuttle** carried supplies back and forth from Earth to the **space station**. It also provided a ride home to Earth when it was time for the astronauts to return.

The last **space shuttle** mission took place in July 2011. NASA scientists and Americans were proud of everything the astronauts had accomplished in thirty years. With the end of the **space shuttle** missions, NASA is planning other ways to explore space. Those plans include launching **unmanned** probes and **satellites**. NASA scientists hope to learn more about the moon's gravity and are even talking about trying to explore asteroids!

NAME: ______________________

DATE: ______________________

16.1 ACTIVITY PAGE

Read-Aloud: Mae Jemison

Directions: complete the questions below while listening to the Read-Aloud.

1. Why is Mae Jemison famous?
2. Describe Jemison's mission as an astronaut.
3. NASA considers many applications for the astronaut program. What kinds of characteristics and skills do you think made Jemison a good candidate for NASA?

4. What kind of international work did Jemison do to help people around the world?
5. Why did NASA stop taking applications for new astronauts for a period of time when Jemison was interested in joining NASA?

Dr. Mae Jemison

1. The events of Mae Jemison's life listed below are in the wrong order. Use the numbers 1–7 to put them in the right order.

   _______ Joins the Peace Corps and goes to Africa

   _______ Graduates from high school at the age of 16

   _______ Becomes the first African-American female astronaut to go into space

   _______ Attends Stanford University

   _______ Is one of 15 people chosen out of 2,000 applicants to be an astronaut

   _______ Goes to medical school

   _______ Retires from NASA and becomes a professor

2. Why do you think Mae Jemison is a good role model for others? Can you name any other people that you have learned about in previous lessons who would be a good role model?

   ____

   ____

   ____

   ____

   ____

   ____

Dr. Mae Jemison

Do you know what a role model is? A role model is someone who sets an example for others by the way they live. Many students admire people who are famous athletes, movie stars, or singers and use them as role models. They see them on TV, in newspapers and magazines, and decide they want to be like them. But some of the best role models are people that you probably would not see on TV or in newspapers. They have jobs such as doctors, teachers, or police officers. Some are scientists and astronauts. One such person is Mae Jemison.

Mae Jemison was born October 17, 1956, in Decatur, Alabama. Her family moved to Chicago, Illinois when she was young. Mae always took great pride in her schoolwork. She was interested in science, but was also interested in the arts. She finished high school early at age 16! From there, she went to Stanford University in California. Most college students focus on only one topic of study because college is so challenging. Mae focused on and excelled in two topics of study—**chemical engineering** and **African-American studies**!

After Stanford, Mae entered medical school to become a doctor. She wanted to use her medical training to help people in different countries on the continent of Africa. To do this, she joined the **Peace Corps** as a volunteer. As part of the Peace Corps, Mae treated patients and also helped train other **health care** workers. She worked hard to help improve health care in the countries where she worked.

After the **Peace Corps**, Mae came back to the United States. She set her sights on a different goal. Her greatest dream was to become an **astronaut** and travel into space. She decided to apply to **NASA** to become an **astronaut**. But the first time she applied, she was not accepted. Instead of giving up, she tried again and NASA accepted her the second time! She was one of only 15 people chosen from a group of 2,000 people who wanted to become **astronauts**!

Her training to become an **astronaut** was hard. She had to get into great shape and train to get used to being free of the effects of **gravity** in space. She also had to study and pass many tests about space travel. Mae Jemison succeeded in both.

In 1992, Mae was chosen for a mission on the ***Endeavour*** **space shuttle**. A rocket **launched** the ***Endeavour*** into orbit around Earth. Mae became the first African-American female **astronaut** in space!

The mission was to study the effects of **weightlessness** on plants and animals. Mae conducted experiments during the mission with fellow **astronaut** Jan Davis. They collected information that the scientists at **NASA** could study. The mission was a great success.

After her successful mission, Mae retired from **NASA**. She became a professor at Dartmouth College, sharing her love of science and space with other students. She also started her own company called The Jemison Group, Inc. Mae's company searches for ways that science can help improve the lives of people in countries around the world. Mae Jemison is truly a role model that we can all admire!

Scoring Rubric

	4	3	2	1
Organization	Writing is organized logically, with a strong introduction to the topic, several supporting details, and a strong conclusion.	Writing is organized logically, with an introduction, several details, and a conclusion.	Writing is organized logically but may be missing an introduction, some details, or a conclusion.	Writing is not organized logically and may be missing a topic sentence, details, and a conclusion.
Writing	Writing is clear and interesting to read, with many descriptive words and details. There are at least three paragraphs with appropriate linking words.	Writing is clear and easy to read, with some descriptive words and details. There are at least two paragraphs with some linking words.	Writing is unclear or without supporting details. Paragraphs are incomplete or unclear. There are few linking words to tie ideas together.	Writing is difficult to read because of missing words, sentences, or incomplete ideas and contains no paragraphs. There is a lack of linking words.
Conventions	Correct sentence structure, grammar, punctuation, and capitalization.	Mostly correct sentence structure, grammar, punctuation, and capitalization with one to two errors.	Mostly correct sentence structure, grammar, punctuation, and capitalization with three to four errors.	Sentence structure, grammar, punctuation, and/or capitalization are incorrect with more than five errors.
Spelling	There are zero to two spelling errors.	There are three to four spelling errors.	There are four to five spelling errors.	There are more than six spelling errors.

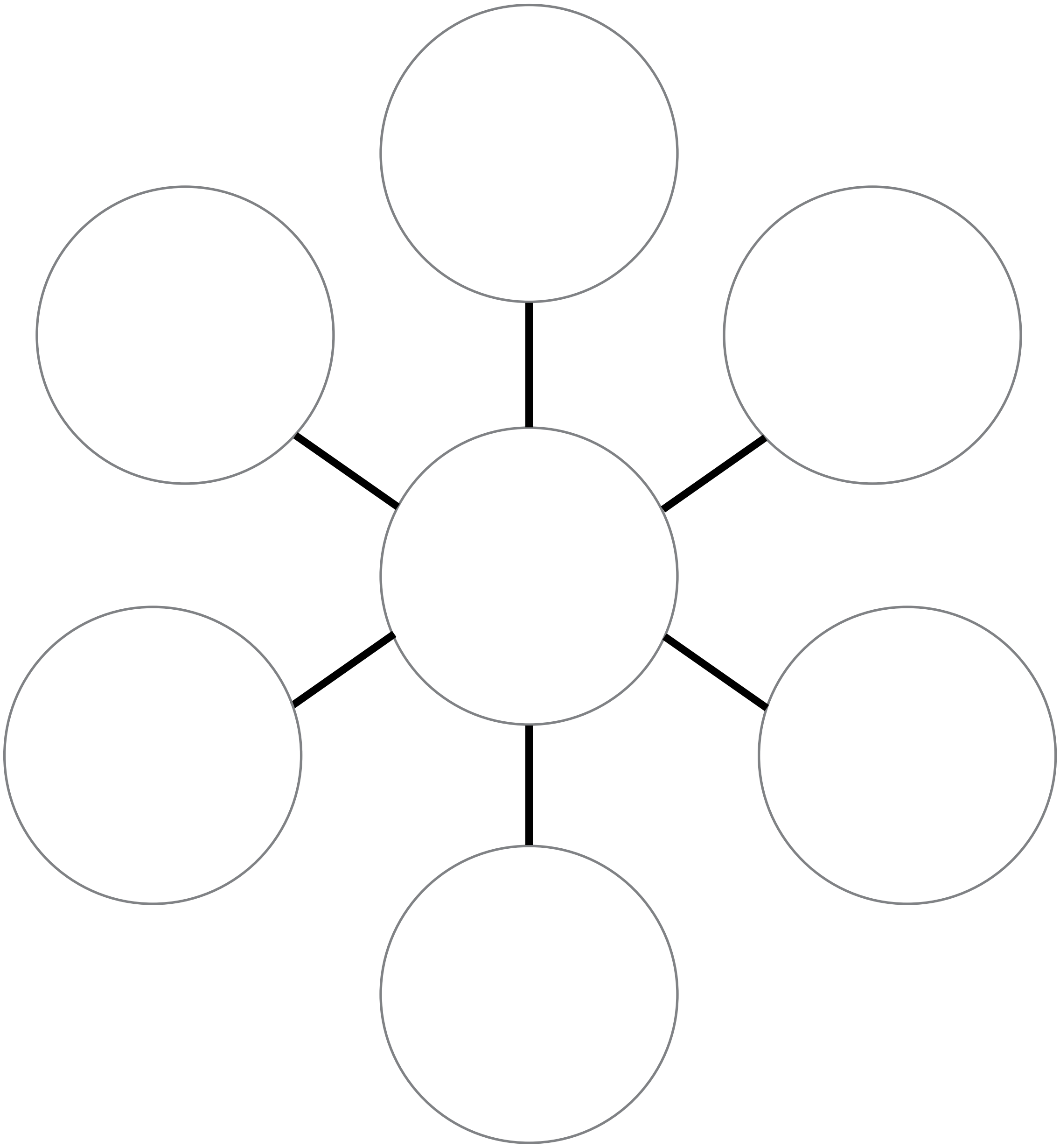
NAME: ______________________

DATE: ______________________

17.2 ACTIVITY PAGE

Planning: Informative Writing

"A Day in the Life of an Astronaut on the International Space Station"



NAME: ______________________________

DATE: ______________________________

17.3 ACTIVITY PAGE

Directions: Read the story below and answer the questions.

Stargirl

"Wow!" said Billy Jones. "What an awesome ride!"

"Oh, no!" said Mrs. Jones. "I think I'm going to be sick!"

The Jones family had just come off The Gorgon, the new roller coaster in Mega Adventure Land.

Billy had enjoyed the ride. His mom had not. She felt dizzy and sick to her stomach.

"Are you really going to be sick, Mom?" Billy asked. He had never seen his mom get sick.

Meanwhile, Billy's sister Jen was tapping away on her pocket calculator.

"I calculate that the g-force on that last plunge was about 3.5 g's!" she said. "That's three times the force of gravity on the surface of Earth! That's roughly what the astronauts in the space shuttle experience during re-entry!"

Billy rolled his eyes. It was just like Jen to take an awesome ride and turn it into a science lesson.

Jen was nuts about science and especially about astronomy. She had read every astronomy book in the school library. She could tell you about the atmosphere of Venus, the rings of Saturn, and the Great Red Spot on Jupiter. She knew why Pluto was no longer counted as a planet. She knew everything about Apollo 11 and the moon landings. She had a big photograph of the first moon landing on her bedroom door. Below the photo, Jen had written, “One small step for man, one giant leap for mankind.” Jen’s hero was Dr. Mae Jemison, a female astronaut, who went up in the space shuttle.

Jen already knew more about astronomy than either of her parents. Mr. and Mrs. Jones wanted to help her learn more, but they were not quite sure how to do it. That’s why Mr. Jones was so happy when he spotted the flyer.

“Beth!” he called out, as he came in. “Look at this!”

It was a blue flyer. Mr. Jones had found it at the bagel shop. It said, “Astronomy Camp!”

Mr. and Mrs. Jones studied the flyer. The camp would be held during the summer, on the campus of a college a few hours away. The flyer said the camp was for kids 12 to 17 years old.

“It’s perfect!” said Mr. Jones.

Mrs. Jones did not reply. A funny look came over her face.

“What?” asked Mr. Jones. He had seen that look before. “What’s the matter?”

“Jen is only twelve,” said Mrs. Jones.

“So?” said Mr. Jones. “It says right here the camp is for ages 12 to 17.”

“She’ll be the youngest one there!” said Mrs. Jones. “Plus, she’s never been away from home before! She might get scared.”

“Oh, nonsense!” said Mr. Jones. “She’ll be fine! This is right up her alley. She’s going to love it!”

Six weeks later, Mr. and Mrs. Jones loaded up the car and drove Jen to astronomy camp. Mrs. Jones was nervous. She bit her fingernails all the way there.

The camp director gave a welcome speech. It was a speech designed to make worried moms worry less. The speech made Mrs. Jones feel better, but she was still worrying when she hugged Jen good-bye.

"Call me tonight!" she said. "Promise you will!"

"I will," said Jen. "I promise."

It was a long ride home. Mrs. Jones cried most of the way. Every so often, she would call out, "My baby girl!"

By the time they got home, the sun had set, although if Jen had been there, she would have pointed out that the sun does not really rise and set. Earth rotates on its axis, and that's what gives us days and nights.

Mr. Jones parked the car and opened the door for his wife. Inside, he got her a glass of water and sat next to her on the couch.

"Why hasn't she called?" Mrs. Jones said, tearfully. Just then, the phone rang.

Mrs. Jones grabbed the phone. "Are you okay?" she sobbed.

Jen did not hear her mom sobbing. She was too busy describing her first day at camp.

"It was so fun!" she said. "First we learned about comets. Did you know that Halley's Comet is visible from Earth every 76 years? It will come around again in 2061.Then, we learned about galaxies and solar systems. Did you know that there are millions of galaxies in the universe? Our professor, Dr. Phillips, is so cool! He told us that there are probably lots of solar systems out there that are a lot like our galaxy. That means they have a hot star at the center, like our sun, and some planets orbiting around . . ."

“Is she okay?” asked Mr. Jones.

Mrs. Jones nodded. Then, she held out the phone.

From the earpiece, Jen’s voice, overflowing with joy and excitement, drifted out into the air: “After lunch, we learned about the Hubble Space Telescope. It’s a telescope that floats up in space. . .”

Mr. and Mrs. Jones felt a tremendous sense of relief. They knew that their daughter was safe and happy—and getting smarter every day.

NAME: ______________________________

DATE: ______________________________

17.3 CONTINUED

ACTIVITY PAGE

1. Where is the family at the beginning of this selection?

____

____

2. List five things Jen knew about astronomy:

____

____

____

____

____

3. Why was it like Jen to take an awesome ride and turn it into a science lesson?

____

____

____

____

____

____

4. Arrange the events from the selection in order from one to five.

_____ Jen called to tell her family about the first day of astronomy camp.

_____ Jen's dad saw a flyer for astronomy camp and thought Jen would like it.

_____ Jen calculated the g-force on the last plunge of the roller coaster ride.

_____ Jen's mother cried most of the way home.

_____ Jen's family took her to astronomy camp.

5. Which of the following was not something Jen learned about during her first day at astronomy camp?

   A. The Hubble Space Telescope

   B. booster rockets

   C. Galaxies

   D. Halley's Comet

NAME: ______________________

DATE: ______________________

Fluency Assessment

The Hoba Meteorite

A meteorite is a rock from outer space. There are lots of rocks floating 14
around in space. If one of these rocks gets close to Earth, it will be attracted 30
by Earth's gravity. It will begin to move closer to Earth. As the rock gets 45
closer, Earth will exert a stronger and stronger gravitational pull on it. The 58
rock will start moving faster and faster. It will also heat up. Eventually, it 72
will turn into a special kind of fireball known as a meteor. 84

Many meteors burn up before they reach Earth. A few make it all the 98
way to our planet and smack into the ground. If a meteor reaches Earth, we 113
say it is a meteorite. 118

Someday you may see a meteor in the night sky. They are hard to see 133
during the day, but at night it is much easier. Some people refer to meteors 148
as "shooting stars." That's not quite the right term. Meteors are more like 161
rocks than stars. But they do look like falling stars when they come zipping 175
through the night sky. 179

More than 35,000 meteorites have been found on Earth. Some of 190
these are tiny pebbles. Others are large boulders. The Hoba meteorite 201
is the largest meteorite ever discovered on Earth. It weighs more than 213
60 tons. 215

The Hoba meteorite is in the African country of Namibia. It has 227
never been moved to a museum. It is still lying where it fell. That's mainly 242
because of its size. It would be very difficult to move. 253

The Hoba meteorite was discovered in 1920. A farmer was plowing 264
his fields with an ox. He heard a metallic scratching noise. Then, his plow 278
stopped suddenly. The farmer tried to dig around the rock and discovered 290
that it was huge. A scientist came to look at it. He concluded that it was 306
a meteorite. 308

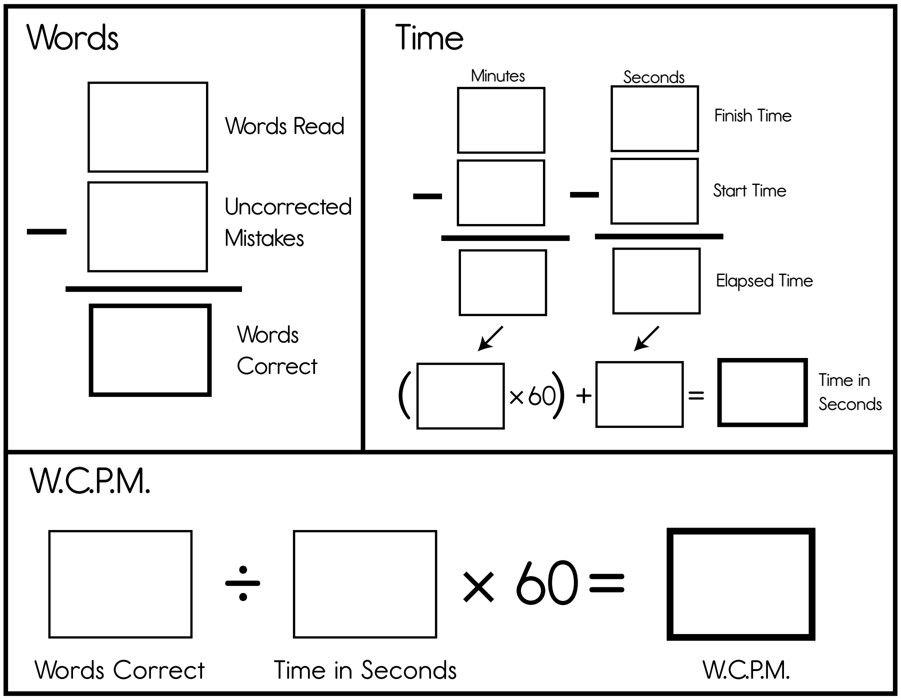
Scientists think the Hoba meteorite fell to Earth about 80,000 years ago. 320
It is about 84% iron and 16% nickel. Thousands of tourists come to see it 335
each year. 337

W.C.P.M. Calculation Worksheet

Student: ______________________________ Date: ____________________

Story: *The Hoba Meteorite*

Total words: 337



Compare the student's W.C.P.M. scores to national norms for Winter of Grade 3 (Hasbrouck and Tindal, 2006):	
W.C.P.M.	National Percentiles for Winter, Grade 3:
146	90th
120	75th
92	50th
62	25th
36	10th

Comprehension Total _____/ 4	
Answers Correct	Level
4	Independent comprehension level
3	Instructional comprehension level
1-2	Frustration comprehension level
0	Intensive remediation warranted for this student

Singular Possessive Nouns

Rewrite each sentence, changing the group of words in parentheses to a singular possessive noun.

Example: (The light of the sun) is warm on my face.

The sun's light is warm on my face.

1. (The child of my aunt) came to visit us.

2. (The car belonging to my friend) was hit by a truck.

3. (The phone call from my teacher) made my mother very happy.

4. (The cage belonging to the hamster) needed to be cleaned.

Write the singular possessive noun and what belongs to each singular possessive noun on the appropriate blanks.

Example: The boy's picture was hung in the front hall.

Singular Possessive Noun: boy's What belongs to him/her/it? picture

1. Hank's skateboard is purple.

Singular Possessive Noun: What belongs to him/her/it?

______________________ ______________________

2. The giant's footsteps in the hall were thunderous.

Singular Possessive Noun: What belongs to him/her/it?

______________________ ______________________

3. The horse's mane blew in the wind as he ran around the track.

Singular Possessive Noun: What belongs to him/her/it?

______________________ ______________________

4. The artist's portrait was so realistic that I thought it would speak to me.

Singular Possessive Noun: What belongs to him/her/it?

______________________ ______________________

NAME: ______________________________

DATE: ______________________________

Reading/Writing Choice Board

Directions: Select activities in three of the boxes below after you complete your reading. Write your responses on a separate sheet of paper, making sure to include the numbers of the activities you chose. When completing the activities, write in complete sentences using correct spelling, capitalization, and punctuation.

1. Create a graphic organizer and compare and contrast two ideas in the text.	2. What is the key idea of the text? List three details from the text that support the key idea.	3. Write a sentence describing the author's purpose.
4. Write three questions you still have after reading the text.	5. Write a list of three new words you learned in the text, their definitions, and use them in a sentence.	6. Describe how one of the images in the chapter helps you to understand the text.
7. Find three sentences that show comparing or contrasting. Write the sentences and underline the comparing and contrasting word or words.	8. Write a list of words the author uses to help the reader visualize the information.	9. Write three new things that you learned from the text.

NAME: ______________________________

DATE: ______________________________

18.2 ACTIVITY PAGE

Plural Possessive Nouns

Rewrite each sentence, changing the group of words in parentheses to include a plural possessive noun.

Example: (The statues belonging to the sculptors) are very lifelike.

The sculptors' statues are very lifelike.

1. (The neighbors of my cousins) came to visit us.

____

____

2. (The bicycles belonging to my friends) are all brand new.

____

____

3. (The cards from well-wishers) made my brother feel very loved.

____

____

4. (The leashes belonging to my cats) should be replaced.

____

____

Write the plural possessive noun and what belongs to each plural possessive noun on the appropriate blanks.

Example: The boys' pictures were taped to the refrigerator.

Plural Possessive Noun: boys' What belongs to them? pictures

1. The painters' places to paint are near the ocean.

Plural Possessive Noun: ______________________ What belongs to them? ______________________

2. The magicians' tricks fooled all of us.

Plural Possessive Noun: ______________________ What belongs to them? ______________________

3. The kittens' ears all twitch when I open a can of cat food.

Plural Possessive Noun: ______________________ What belongs to them? ______________________

4. The plumbers' tools are shiny and new.

Plural Possessive Noun: ______________________ What belongs to them? ______________________

Revision Checklist

Ask yourself these questions as you reread and revise your writing:

1.	Do I have a good topic sentence?	
2.	Do I have a good concluding sentence?	
3.	Are there any parts that do not make sense?	
4.	Do my sentences flow well in this order?	
5.	Do I have a good variety of sentence structures?	
6.	Could I combine any of my sentences?	
7.	Do I have a good variety of descriptive words?	
8.	Is my writing interesting?	
9.	Is this my best work?	

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Grade 3 | **Unit 7** | Activity Book

Astronomy: Our Solar System and Beyond

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ELEMENTARY LITERACY PROGRAM

ENGLISH

Grade 3

Unit 7 | Reader

What's in Our Universe?

Grade 3 | Unit 7

What's in Our Universe?

Reader

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Table of Contents

What's in Our Universe?

Unit 7 Reader

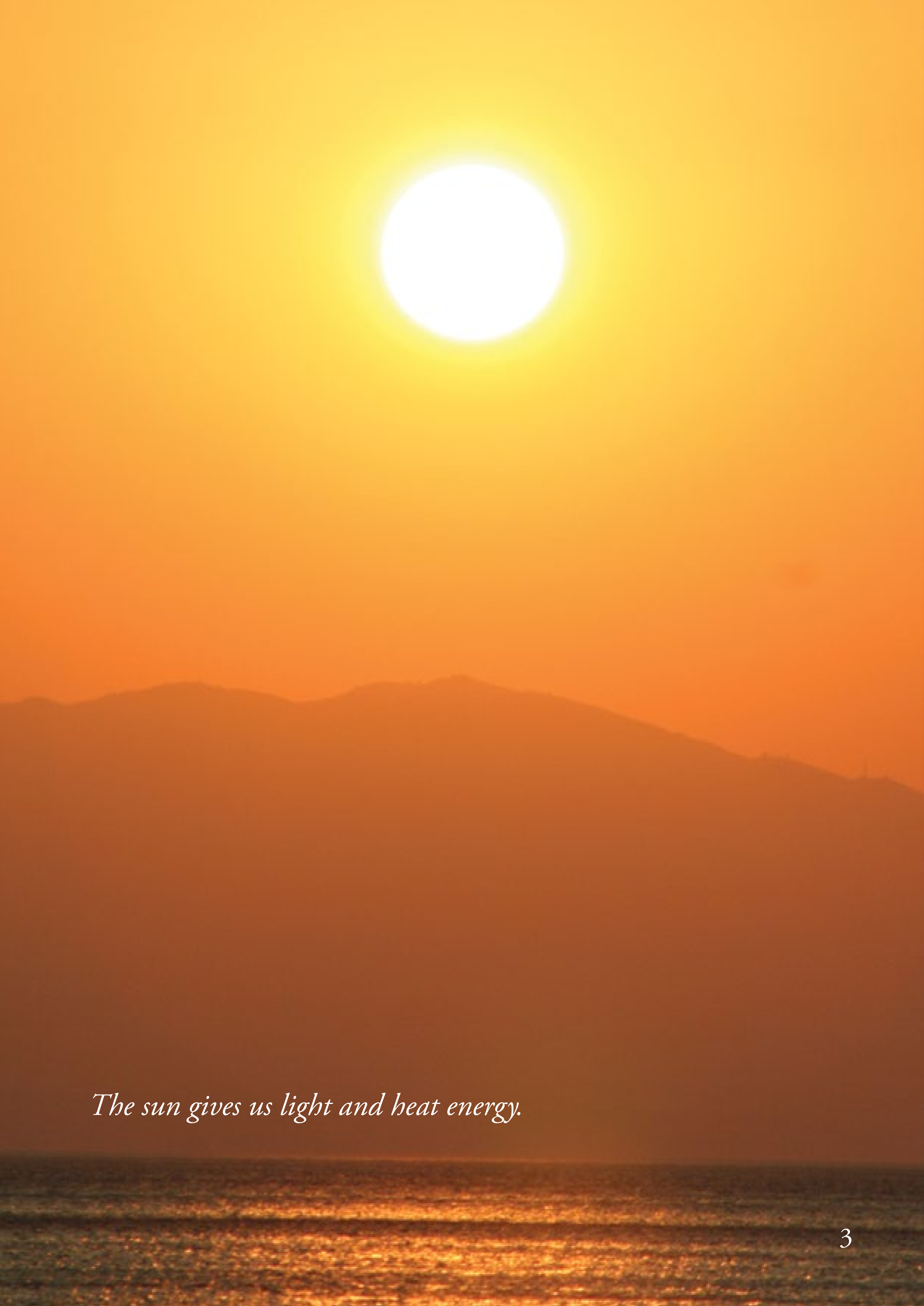
Pausing Point (Additional Chapters for Enrichment)

Chapter 1

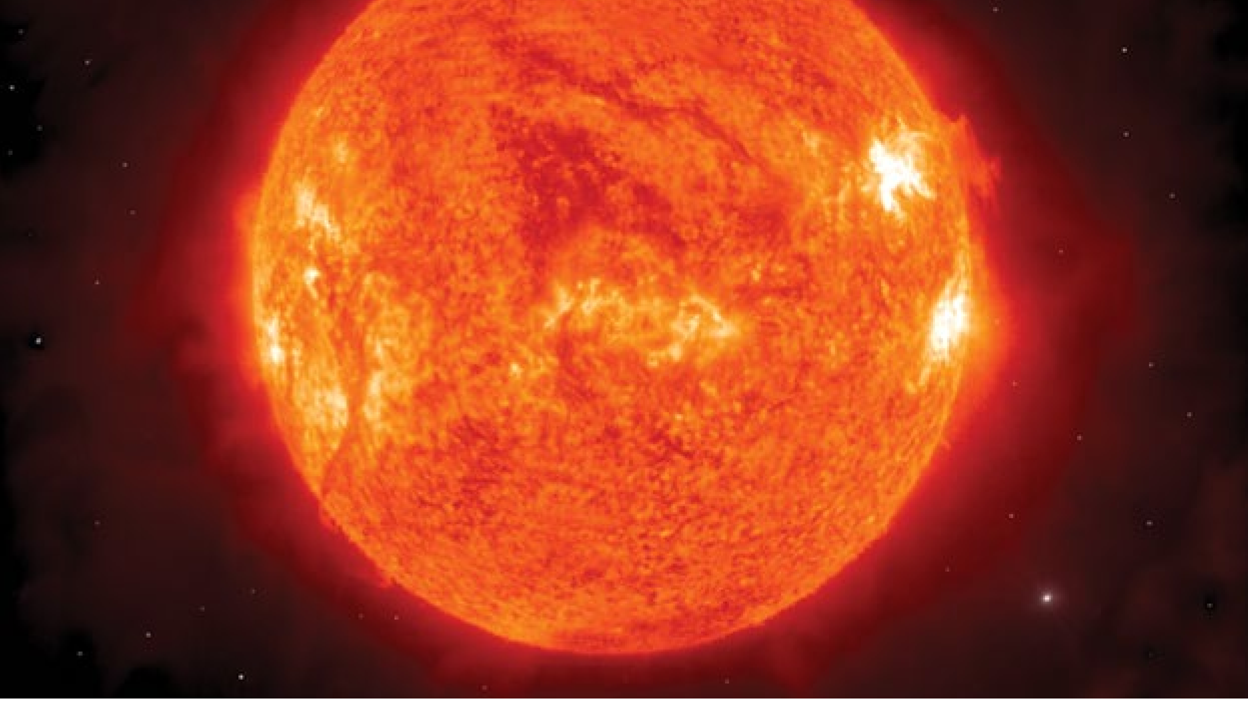
The Sun, Earth, and Our Solar System

Look up in the sky at noon. What do you see? If it is not cloudy, you will see the sun shining brightly in the sky.

The sun provides energy—both light and heat energy. The sun's light and heat give life to plants and animals. Without the sun, Earth would be freezing cold. Have you ever wondered what the sun is made of or why it gives off so much light and heat?



The sun gives us light and heat energy.



A close-up of the sun

You may be surprised to know that the sun is a star. It is in fact the closest star to Earth. It is made up of different, hot gases. How hot? A hot summer day on Earth is 100 degrees. On the sun, it is 10,000 degrees! The sun stays that hot all the time! The sun's gases create the light and heat energy it gives off.

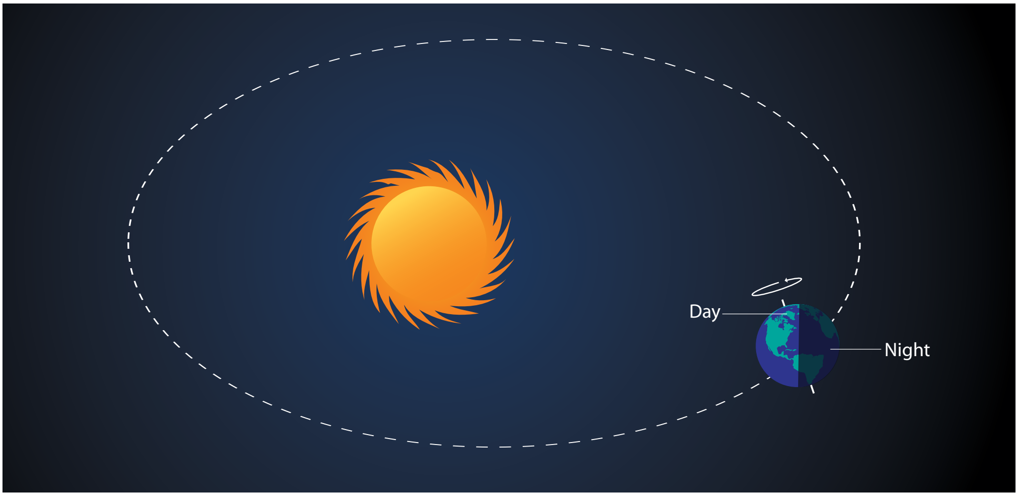
Long ago, people believed that the sun moved around Earth. This seemed to make sense. Each morning at the start of the day, the sun rose in the east. At the end of the day, the sun set in the west—exactly opposite from where it had come up. To explain this change, people said the sun moved around Earth. But now we know that this is not what really happens. The sun does not move around Earth. It is Earth that moves around the sun!

The sun is in the center of a group of eight **planets**. All of these **planets**, including Earth, circle, or **orbit**, around the sun. The sun, **planets**, and other objects in space that **orbit** the sun are called the **solar system**. The word *solar* has the Latin root word *sol*, which means "the sun." Everything in the **solar system** relates to the sun.

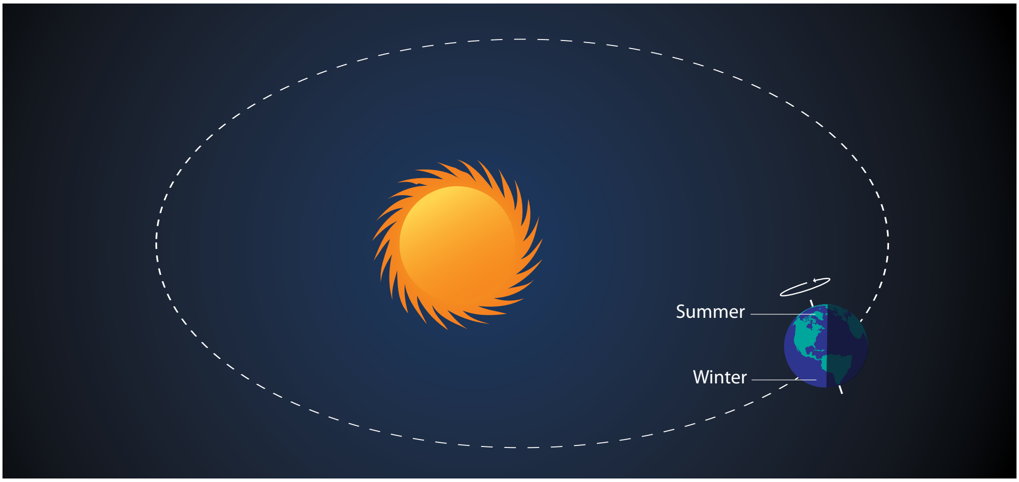
***Planets orbiting** the sun*

Our **planet**, Earth, moves in two ways. We have just learned that Earth circles around the sun. It takes about 365 days, which is one year, for Earth to **orbit** the sun.

Earth also moves by spinning, or **rotating**, on its **axis**. It is this spinning that makes day and night on Earth and the motion of the sun across the sky from sunrise to sunset. It takes one day for Earth to make one complete **rotation** on its **axis**. As Earth **rotates** and spins, different parts of it face the sun. When the part facing the sun gets sunlight, it is daytime on that side of Earth. The part that faces away from the sun gets no sunlight. So, on that side of Earth, it is nighttime. Did you know that when it is daytime where we live, it is nighttime on the other side of Earth?



*Earth spins on its **axis**. On the side of Earth facing the sun, it is daytime. On the side facing away from the sun, it is nighttime.*



*When Earth is **tilted** on its **axis** towards the sun, it is spring and summer. When Earth is **tilted** on its **axis** away from the sun, it is fall and winter.*

When Earth **rotates** on its **axis**, it is **tilted**. At certain times of the year, one part of Earth is **tilted** toward the sun. The sunlight is more direct and it feels hotter. For people living on this part of Earth, it is summer. For people living on the part of Earth **tilted** away from the sun, there is less sunlight and it is winter. So, when it is summertime for us, there are people living on other parts of Earth where it is winter! So, the fact that Earth is **tilted** on its **axis** is what creates the seasons of the year.

Chapter 2

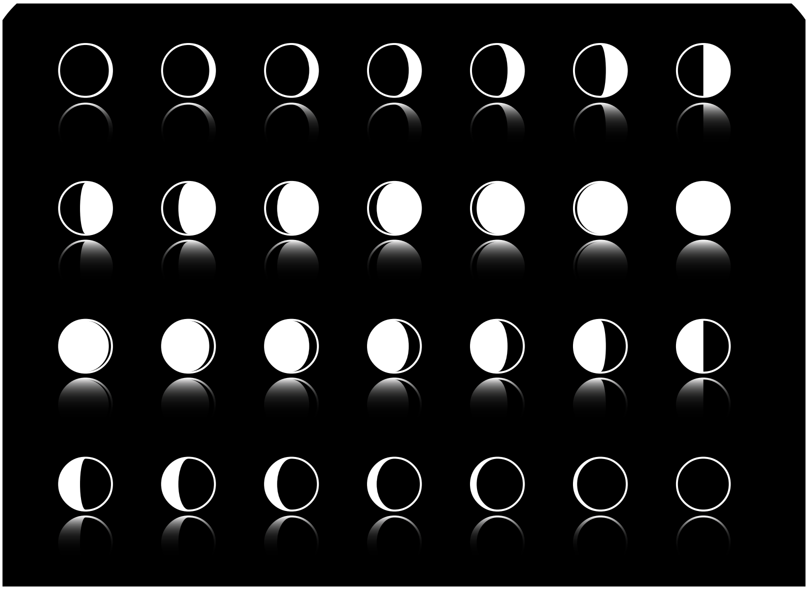
The Moon

Look up in the sky at night. What do you see? If it is not cloudy, you may be able to see the moon.

When you see the moon at night, it might look white. It might look gray or silver. Sometimes, it seems to shine and glow. But the moon does not give off light the way the sun does. The moon is a ball of rock that gives off no light of its own. It simply reflects light from the sun. That means light from the sun hits the moon and bounces off.

Our moon is easily visible on most clear nights.

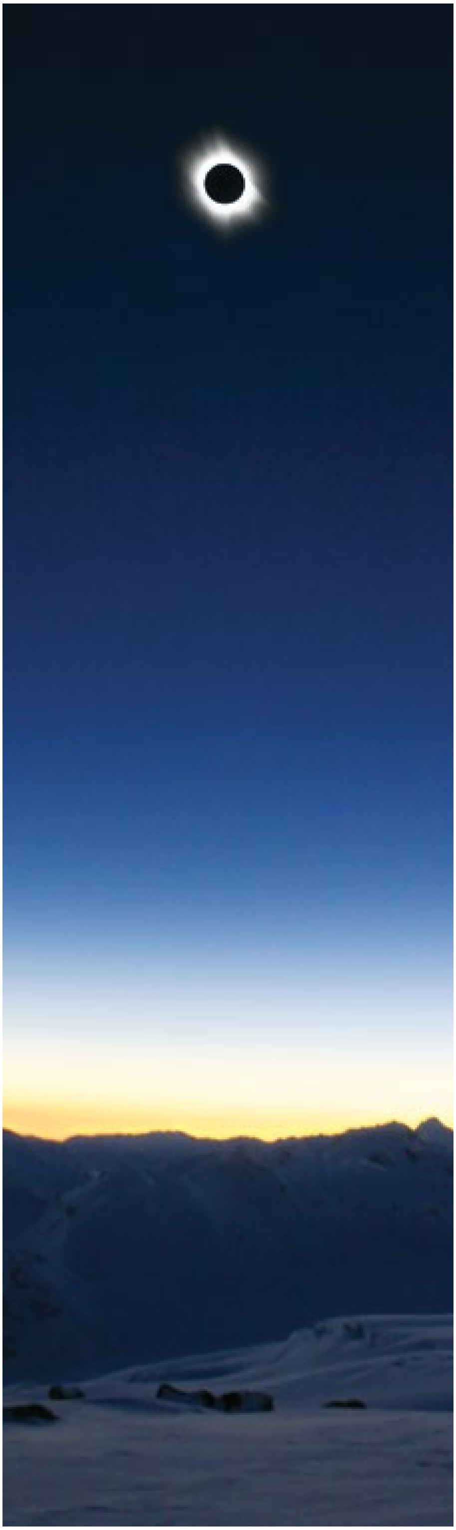
You already know that Earth **orbits** around the sun. But did you know that the moon **orbits** around Earth? It takes just about one month for the moon to completely circle Earth. If you look up at the night sky each night of the month, you may think that the size and shape of the moon is changing. However, the size and shape are not really changing. The moon is still a round ball. It looks different at different times of the month because of the way the light from the sun is reflected and how much of the moon we can see from Earth.



This chart shows the phases of the moon. It shows what you might see if you looked at the moon each night for a month. You can read the chart just like you would read a book. Start at the top and go from left to right. When you finish reading the first row, go on to the next one. You can see how the moon seems to change during the month.

The way that Earth, the moon, and the sun move can also make other interesting things to look at in the sky. When Earth, the moon, and the sun all move together in a direct line, something called an **eclipse** can take place.

We can see two kinds of **eclipses** from Earth. One kind happens when the moon gets in between the sun and Earth. When that happens, we can't see the sun for a while. At least, we can't see part of it. We call this a solar **eclipse** or an **eclipse** of the sun.



*During an **eclipse** of the sun, the moon moves between Earth and sun and blocks out the sun.*

The other kind of **eclipse**, called a lunar **eclipse**, also involves the sun, the moon, and Earth. It takes place when the moon passes behind Earth and into its shadow. In the image on the next page, you can see that a shadow covers part of the moon. It is Earth's shadow that you see. Earth has blocked out the sun and left part of the moon in darkness.

Eclipses do not happen often because the sun, Earth, and the moon all have to line up just right. Solar **eclipses** can only be seen from a narrow strip of Earth at a time. While they happen once or twice a year, it is very, very rare to see one. **Eclipses** of the moon happen more often, several times each year. They can be seen from half of Earth at a time, so are more often visible.

Whether or not you can see an **eclipse** depends on where you are on Earth. You must never look directly at a solar **eclipse**. The sun is very bright and could burn your eyes. But, it is safe to look at an **eclipse** of the moon. If an **eclipse** is predicted, it is usually big news, so you will likely hear about it.

The moon during a lunar ***eclipse***

Chapter 3

The Planets Closest to the Sun: Mercury, Venus, Earth, and Mars

Our **planet** Earth is one of eight **planets** in our **solar system** that **orbit** around the sun. The other **planets** are Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune. People have been looking at the **planets** for thousands of years. People from Mesopotamia, the Greeks, Mayans, Incas, and Aztecs were all interested in the **planets**. They used just their **naked eye** to study the **planets**. Now, we have telescopes and other tools that help us get a better look at the **planets**.

A telescope

The four **planets** closest to the sun—Mercury, Venus, Earth, and Mars—are small **planets**. These **planets** have a rocky, or solid, surface.

Mercury and Venus are closer to the sun than Earth. The other **planets** are farther away.

Earth needs 365 days to make one **orbit** around the sun. That is the length of one year on Earth.

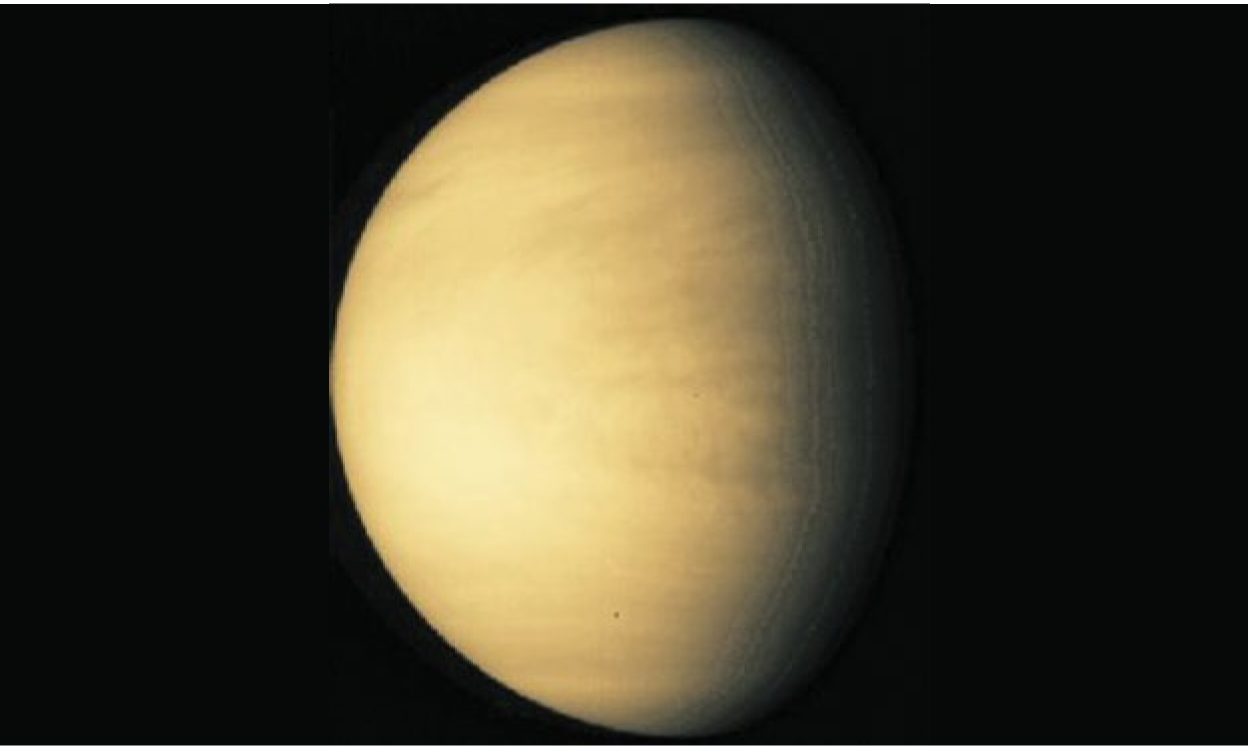
The closer a **planet** is to the sun, the less time it needs to make an **orbit** around the sun. Mercury is the closest **planet** to the sun. It needs just 88 days to make one **orbit**. Venus is the next closest to the sun. It needs just 225 days to make an **orbit**. The **planets** that are farther away take much longer. It takes Neptune 165 years to **orbit** the sun!

The sun and ***planets***

Besides being closest to the sun, Mercury is the smallest of all the **planets**. The English name for the **planet** comes from the Romans. They named the **planet** after the Roman god Mercury. The Greek name for this same god is Hermes.

Venus is the second **planet** from the sun and is closest to Earth. This **planet** was named after the Roman goddess of love. For a long time, scientists thought that Venus might be a lot like Earth. After all, it is close to Earth. It is about the same size as Earth and it is covered with clouds, like Earth. But this idea turned out to be wrong, too. We know now that Venus and Earth are different in lots of ways.

Scientists had to change their ideas to fit the new facts. They have now concluded that Venus is much hotter than Earth. It would not be a good place for us to live or even visit.



Mercury (top) and Venus

Mars is the fourth **planet** from the sun. It is named after the Roman god of war. When you look at Mars in the night sky, it looks quite red. This is because the rocks on Mars contain rust.

Many space **probes** and robots have landed on Mars. They have taken photographs and also dug up rocks.

One **probe** that went to Mars not long ago found some ice. That was big news. Ice is frozen water. If there is water on Mars, there might be life. Some experts argue that nothing could live on Mars. They say it is too cold and too dry. Others think there might be life on Mars. They think there might be something alive down under the rocks. Still others think there might have been life on Mars at one time but there isn't any now.

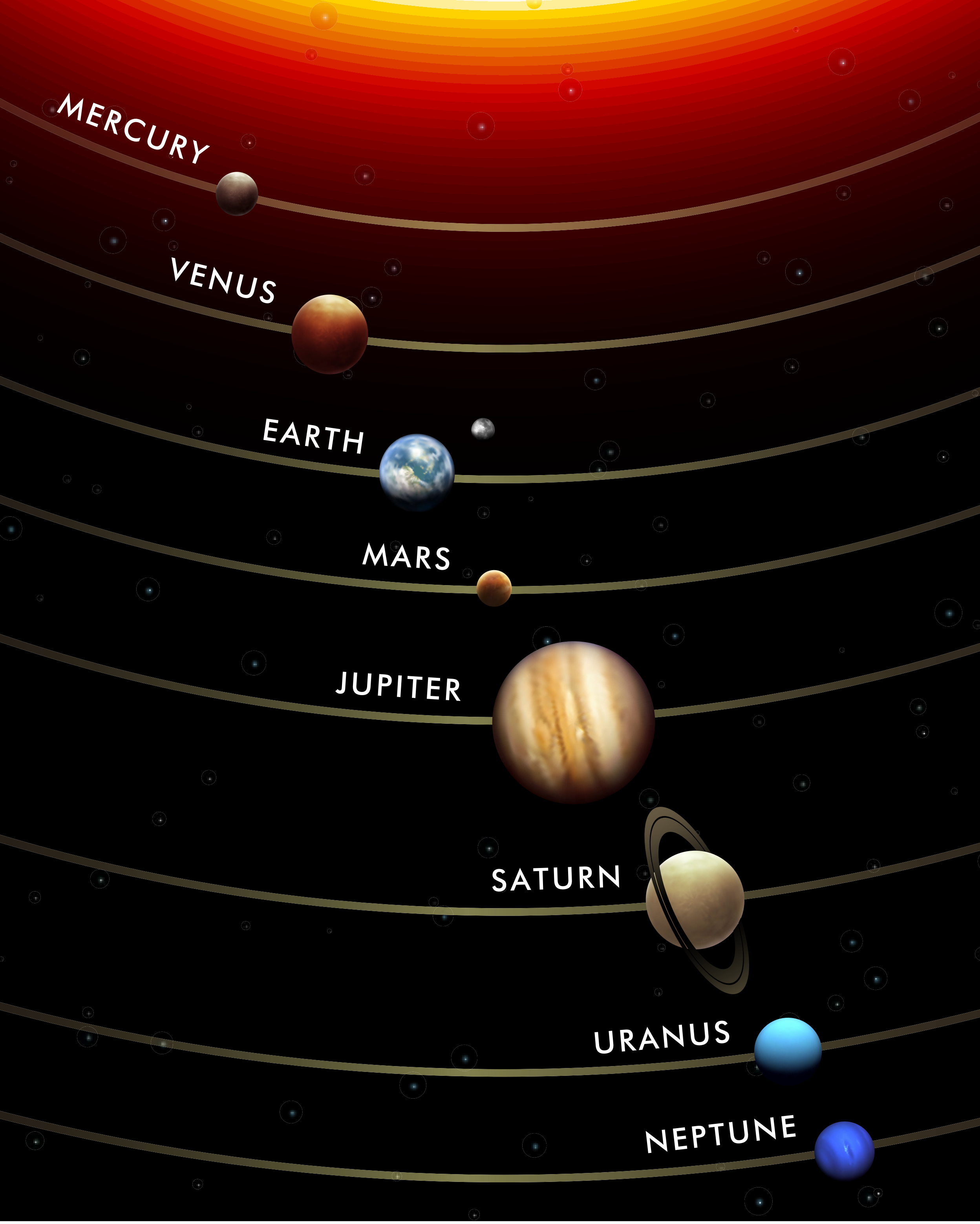
Mars

Chapter 4

The Outer Planets: Jupiter, Saturn, Uranus, and Neptune

Do you remember the names of the four **planets** closest to the sun? If you said, "Mercury, Venus, Earth, and Mars," you are right! There are four more **planets** called the outer **planets**. So there are eight **planets** in all.

Jupiter is the very next **planet** after Mars. After Jupiter come Saturn, Uranus, and Neptune in that order. Neptune is the **planet** that is farthest from the sun. Uranus is difficult to see with the **naked eye** and Neptune is impossible to see without help. Neptune is only visible using a telescope.



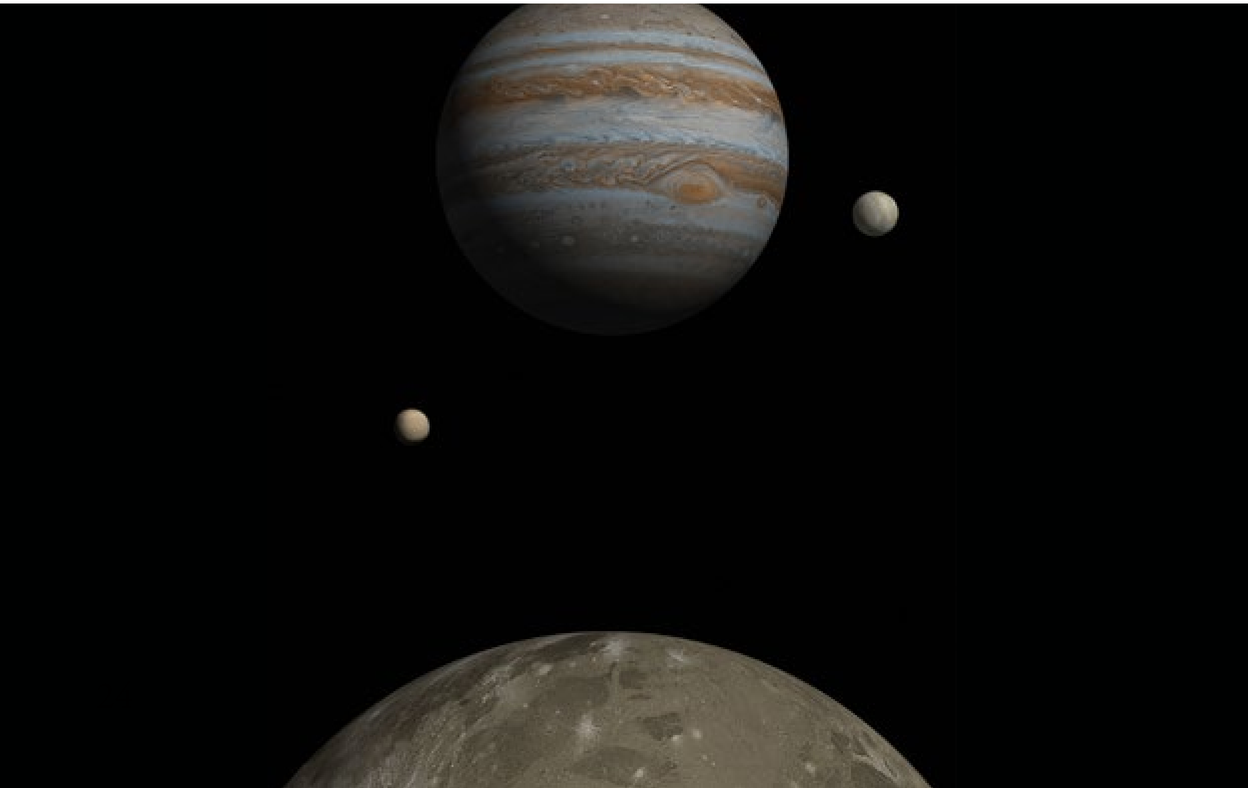
Our ***solar system:*** *the sun and eight* ***planets***

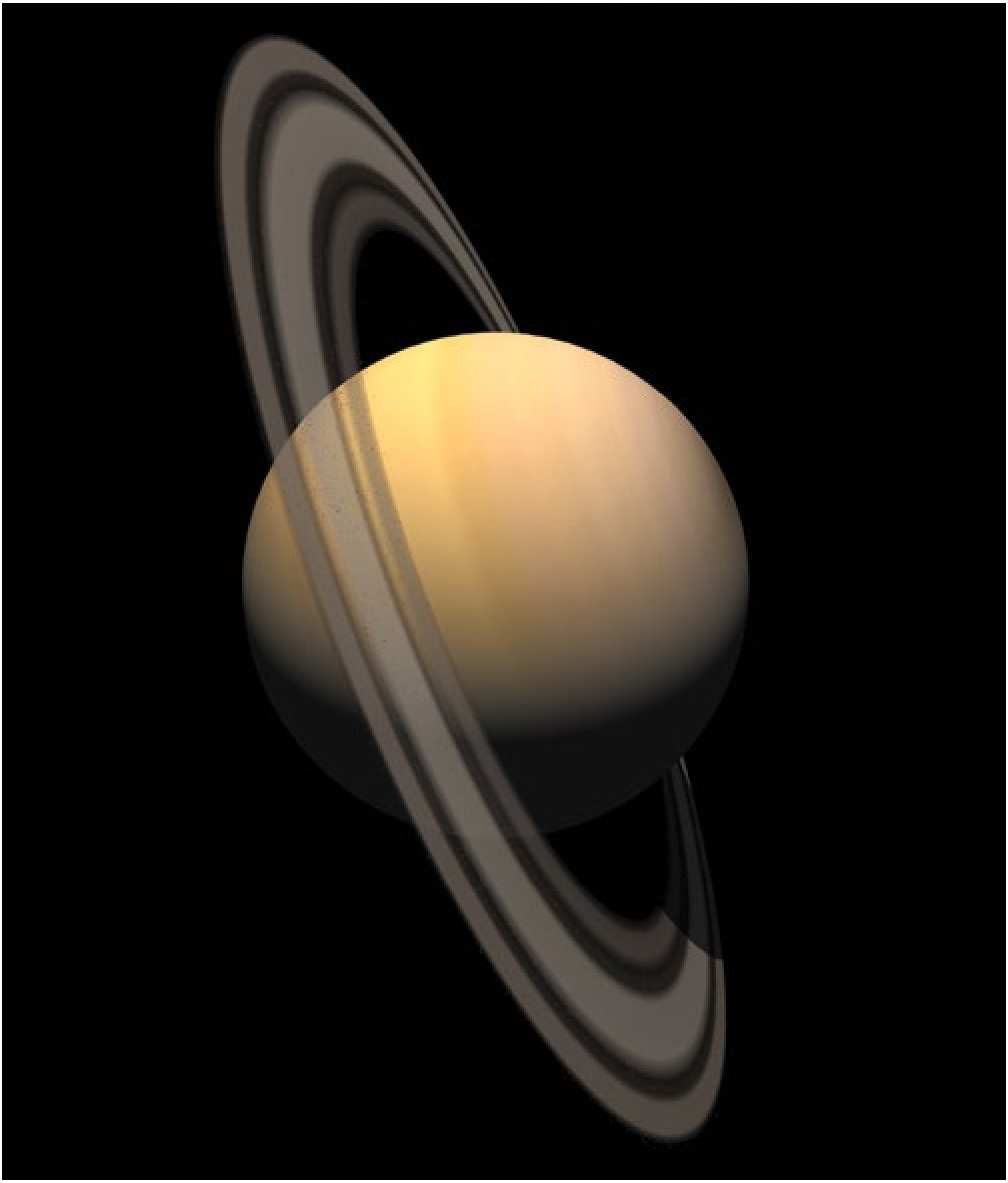
The outer **planets** are very large and are mostly made of gas. Scientists often call these **planets gas giants**. Of all the **planets**, Jupiter is the largest: 1,300 Earths could fit inside Jupiter! It is made mostly of **hydrogen** gas, the most common gas in the universe.

The gases on Jupiter seem to be blowing around. In the image of Jupiter on the next page, you can see the giant, red spot. It looks like an eye! Experts think it is a big wind storm, like a huge hurricane.

Jupiter also has 63 known moons that **orbit** it. Some of these moons are very large, even larger than Earth's moon.

Jupiter and some of its moons



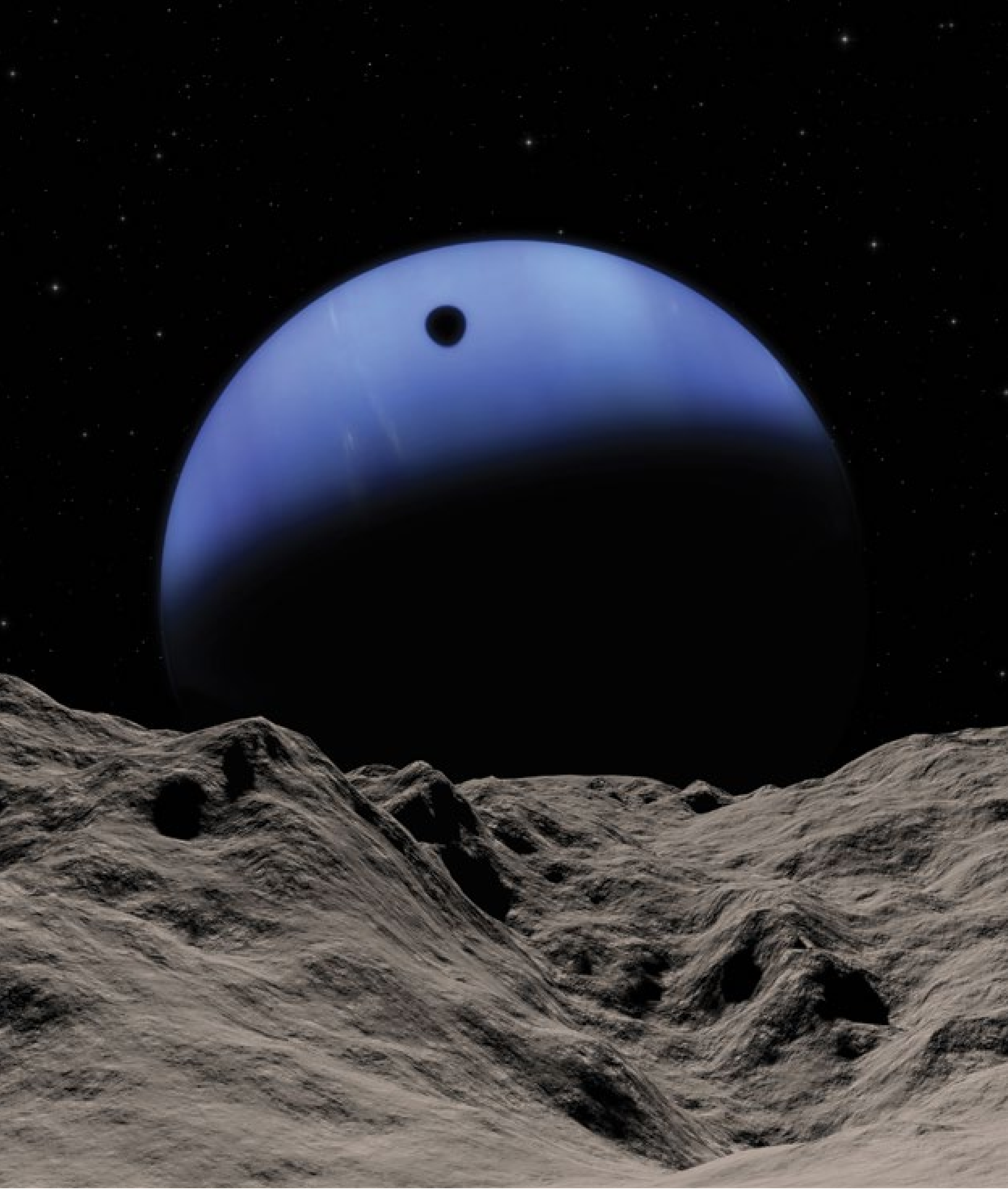


Saturn and its rings

Saturn is known for its many large rings that **orbit** the **planet**. These rings are made of ice and dust. The ice reflects light and makes the rings glow. Saturn also has many moons that **orbit** it.

The last two **planets** are Uranus and Neptune. These **planets** are the farthest from the sun so they are very cold. Uranus and Neptune also have rings, but they aren't easily seen like Saturn's. Both **planets** also have moons.

So now you know the names of all eight **planets**. Try asking the adults in your family how many **planets** there are. They may tell you that there are nine **planets**. When the adults in your family were in school, people said that there was a ninth **planet** called Pluto. But in 2006, scientists decided that Pluto did not have all of the characteristics needed to be classified as a **planet**. They removed Pluto's name from the list of **planets**, so now there are only eight **planets**.

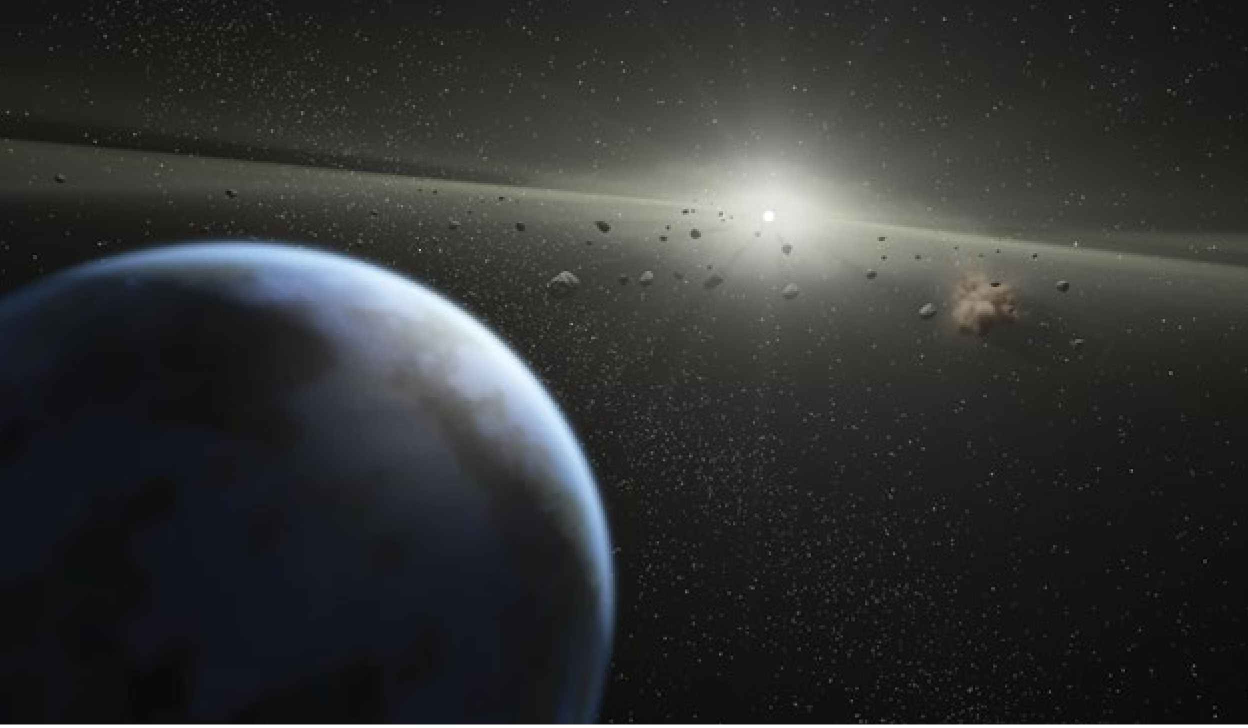


This is Neptune as it might look if seen from one of its moons. The shadow of another moon makes a dark spot on the planet's surface.

Chapter 5

Asteroids, Comets, and Meteors

There are other objects that **orbit** the sun in the **solar system** besides the **planets**. Millions of space rocks called **asteroids** also **orbit** the sun. **Asteroids** are made of rock, metal, and sometimes ice. Many **asteroids** are found **orbiting** the sun between the **planets** Mars and Jupiter. They **cluster** together in a shape like a belt as they **orbit** the sun. This part of the **solar system** is called the **asteroid belt**.



Top: An artist's image of an ***asteroid belt*** *around a star*
Bottom: An up-close image of an ***asteroid*** *from our* ***solar system***

Comets also **orbit** the sun. **Comets** are made mostly of ice and dust. When a **comet** gets close to the sun, the sun's heat causes some of the **comet** to change into a gas. This gas streams off the end of the **comet** like a tail.

The most famous **comet** is **Halley's Comet**. It is named for the British scientist Edmund Halley who first discovered it. **Halley's Comet** is visible from Earth with the **naked eye** every 76 years. It was last seen in 1986. Can you figure out when it will be seen again?

*A **comet** in the night sky*

Other kinds of space rocks called **meteoroids** are also found throughout the **solar system**. When a **meteoroid** enters Earth's **atmosphere**, we call it a **meteor**. Small pieces of the **meteor** burn brightly and look like a white trail across the sky when viewed from Earth. Sometimes people call this a "shooting star." Have you ever seen one? A **meteor** "shower" is when many **meteors** can be seen falling in the sky on the same night. Sometimes they last over several nights. It's an amazing space show!

If a **meteor** doesn't fully burn up in the **atmosphere**, it falls to Earth and can make a large hole called a crater. Pieces of a **meteor** found on the ground are **meteorites.**

*Top: An artist's drawing of a **meteor** shower at night*

*Bottom: **Meteor** Crater in Arizona formed when a **meteorite** hit Earth. Notice the road and buildings to the left of the crater. This crater is very big!*

Chapter 6

Galaxies and Stars

Look up in the sky at night. What do you see besides the moon? If it is not cloudy, you may be able to see lots of stars glittering in the sky.

Remember that the sun is also a star. The stars in the night sky do not look like the sun. They do not look as big or as bright. But they are, in fact, very much alike. The stars in the night sky are big balls of hot gas, just like the sun.

So why don't they look the same? The night stars are much, much farther away from Earth than the sun. That is why they look like tiny specks of light. If we could get close to the stars, they would look bigger, brighter, and more like the sun. But the stars we see at night are so far away that no one from Earth has ever been able to get close to them.

Stars in the night sky

Scientists who study the stars and outer space are called **astronomers**. The Greek root word *astron* means star. The prefix *astro* is used in many other English words.

All stars are big balls of hot gas, but **astronomers** have discovered that stars differ in many ways. Stars can be different sizes and colors. Some stars are closer to Earth than others and some stars are hotter than others. Stars that are the hottest and closest to Earth appear brighter than other stars.

All stars are made of gases, but they can differ in size, color, and brightness.

Astronomers also discovered that stars **cluster** together in large groups. A large group of stars that **cluster** together in one area is called a **galaxy**. There are **billions** and **billions** of stars in one **galaxy**. That's a lot of stars!

The **galaxy** to which our sun and **solar system** belong is called the **Milky Way Galaxy**. It has a **spiral** shape when viewed from space. From Earth, it looks like a "milky" band of white light.

*The **Milky Way** as it appears in the night sky*

The nearest **spiral galaxy** to the **Milky Way Galaxy** is called the **Andromeda Galaxy**. It is **billions** and **billions** of miles from the **Milky Way Galaxy**. You have probably heard of a million before. A million is a huge number. So what's a **billion**? It's one thousand million! It is safe to say that the **Andromeda Galaxy** is a long, long, long way away! Even so, it is sometimes possible to see the **Andromeda Galaxy** at night.

Scientists think there are **billions** of **galaxies** in the universe. There's that number **billions** again. There are **billions** of stars in each **galaxy** and **billions** of **galaxies** in the universe—that is almost more than you can think about!

Andromeda Galaxy

Chapter

7 Constellations

Go outside one night and look at the stars. Of the **billions** of stars in our **galaxy**, it is possible to see only 2,000 with the **naked eye**. When you first look at them, you might not see much. They might look like just a bunch of tiny dots.

Look a little closer. You will see that some stars shine more brightly than others. Focus on the bright stars. Which ones really jump out at you?

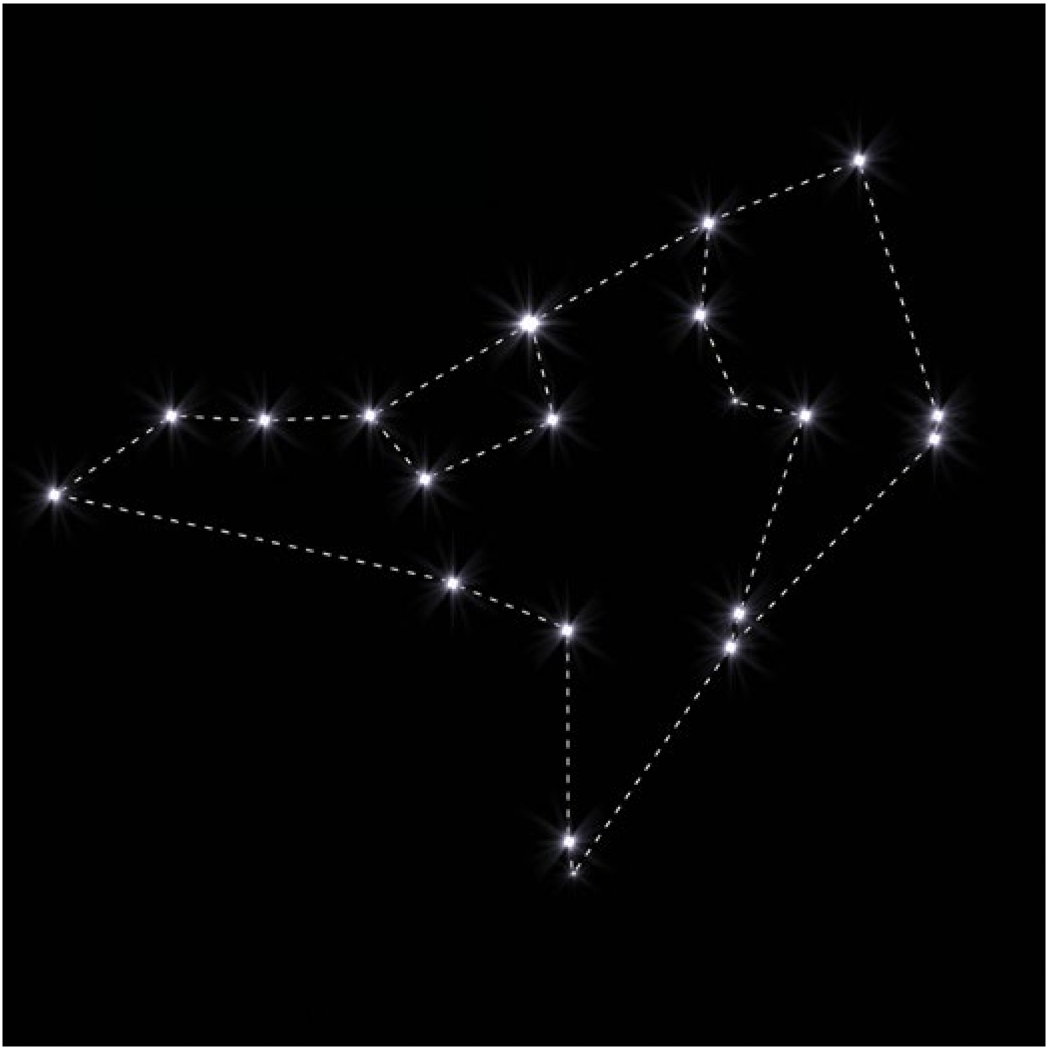
Then, focus on the spaces in between the bright stars. Ask yourself, "What would it look like if I drew lines from one bright star to the next? What would it look like if I were to connect the dots? Would I see any shapes? Would I see any patterns?"

Since ancient times, people have been studying the stars. When ancient people looked at the stars, some seemed to be closer together and formed patterns.

On a clear night away from city lights, you can see the stars that fill the night sky.

One of the first people to describe these star patterns, called **constellations**, was a man named Ptolemy [TO-lə-mee]. He picked out the brightest stars and traced lines from one star to the next. He saw all types of shapes and patterns. One looked like a bull. He saw another that looked like a crab. A third looked like a bear. In all, he found 48 **constellations**. Much later, 40 more **constellations** were added to Ptolemy's list. Today, **astronomers** say there are 88 **constellations** that can be seen in the night sky.

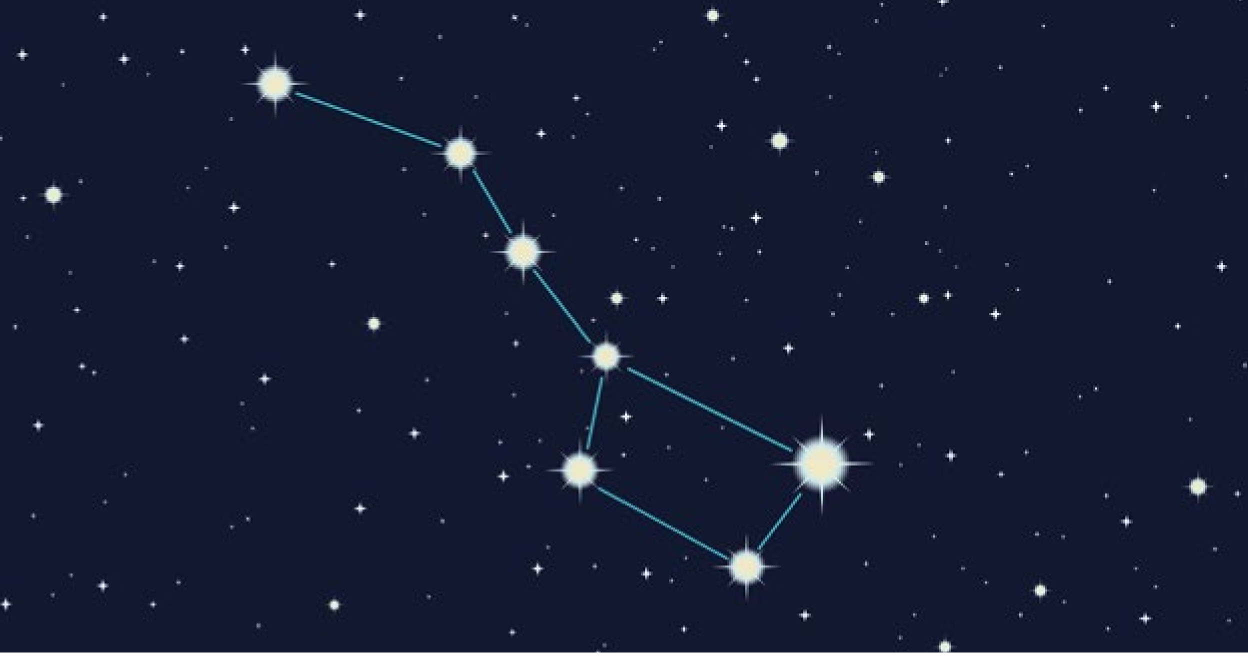
On the next page is a drawing of a **constellation** that Ptolemy described. It is called **Ursa Major** or Big Bear. The white dots or circles stand for the stars in the **constellation**. The dotted lines connect the stars and trace the pattern so you can see the shape. Do you see a Big Bear in the pattern? It does not look exactly like a real bear. So, you may need to imagine that it looks like a bear. Hint: its head is to the left with its nose being the star that is on the far left.



Ursa Major

Within **Ursa Major**, there are seven very bright stars that form another small group of stars called the Big Dipper. Look at the image at the top of the next page. Can you see why it is called the Big Dipper? When you trace a line from star to star, the shape looks like a dipper. A dipper is like a **ladle** you can use to scoop something into a bowl. The stars on the left look like the handle. The stars on the right look like the scoop.

Ptolemy also described another **constellation** called **Ursa Minor** or Little Bear. This **constellation** is also made up of seven stars. In the image on the bottom of the next page, the seven dots stand for the stars. An artist has added a drawing of a bear to help you better imagine how the star pattern looks like a bear.

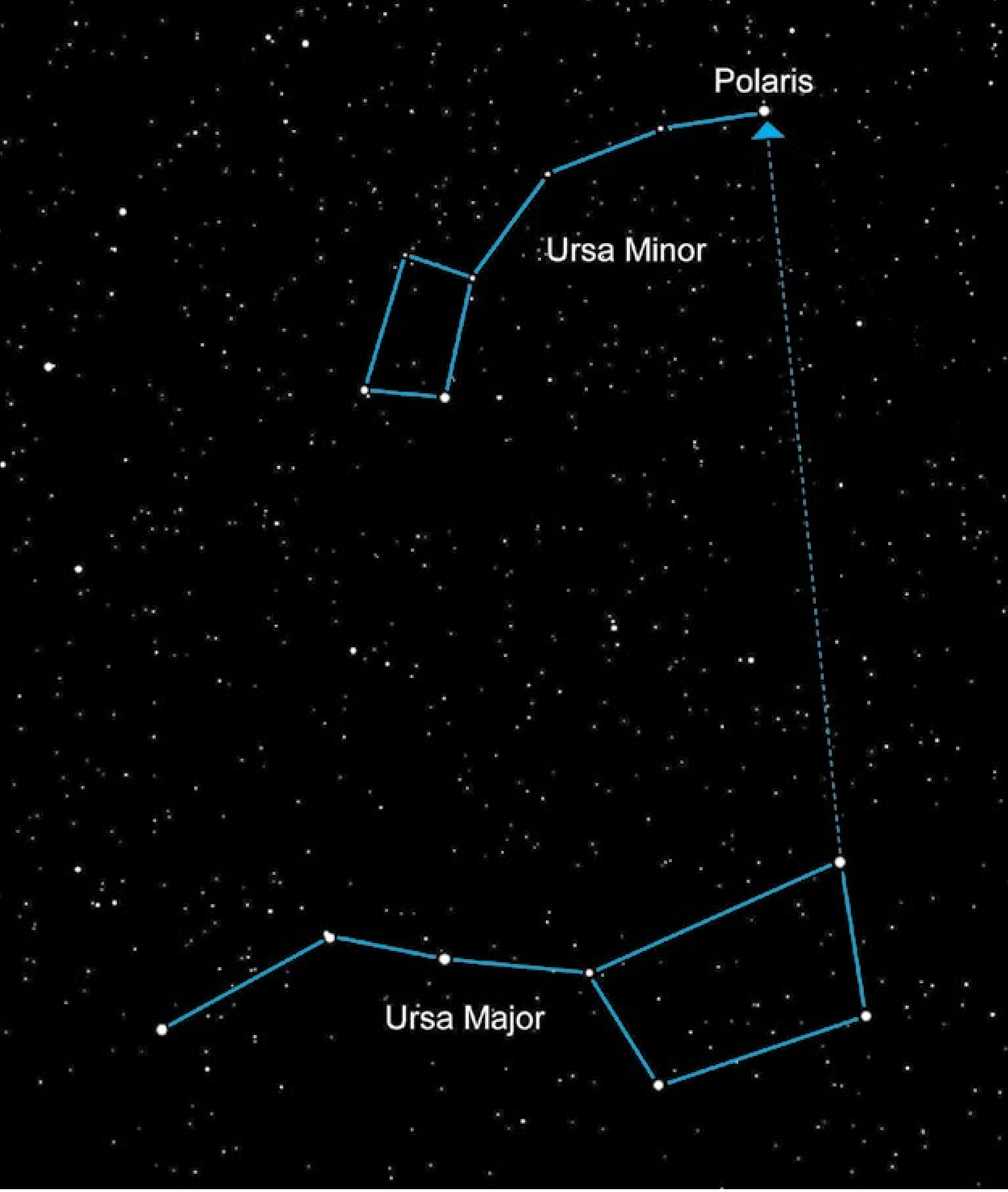


The Big Dipper

Ursa Minor

Ursa Minor is also called the Little Dipper. The brightest star at the end of the handle is called **Polaris**. Can you see it? **Polaris** stays in the same place in the night sky all year long. (Other stars are found in different places in the sky at different times of the year.) **Polaris's** place in the sky is almost directly over the North Pole of Earth. By finding **Polaris**, also called the North Star, you can find the direction north and the other directions. In ancient times, sailors and explorers used this star to find their way when they traveled.

Try to find **Polaris** the next time you look at the night sky. Start by first looking for the Big Dipper because it is easier to find. Then, find the two "pointer" stars at the edge of the Big Dipper's scoop. Then, pretend there is a long arrow pointing the same way as the pointer stars. The first star you will see at the end of the arrow is **Polaris**.



The 'pointer' stars of the Big Dipper pointing to ***Polaris****,*
the North Star

Chapter

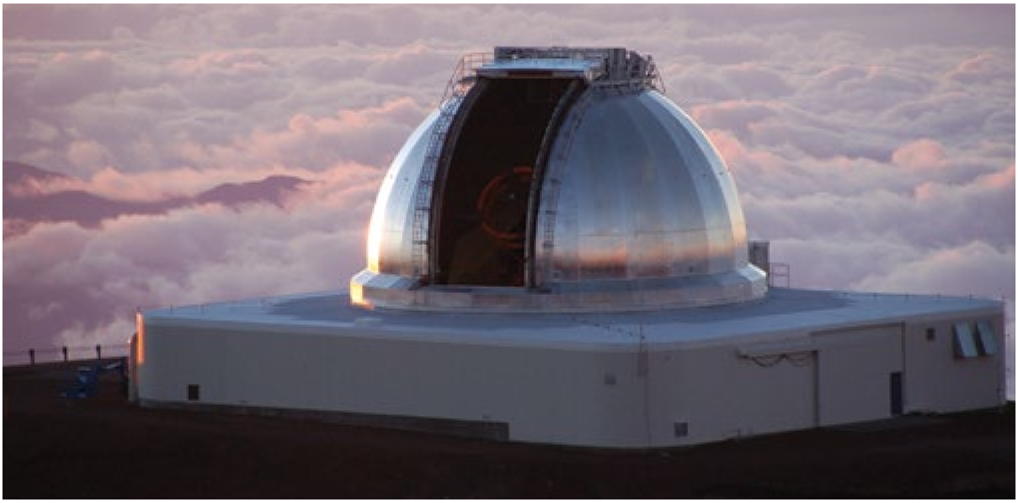
8 Exploring Space

As you have learned in the last chapters, people have been interested in studying space since ancient times. It was possible to see only some stars and **planets** with the **naked eye**. Since they were far, far away, it was impossible to see anything in very much detail.

In 1609, an astronomer named Galileo [ga-li-lae-oe] created a telescope that he used to observe the night sky. Galileo's telescope made things appear three times larger. Using his telescope, he discovered four of the many moons that **orbit** the **planet** Jupiter. He also observed the **planet** Saturn and the Milky Way.

A portrait of Galileo holding a telescope

Since Galileo's time, scientists have created more and more powerful telescopes. Some telescopes are housed in large **observatories** on Earth. Often, these **observatories** are on the top of mountains, far away from any cities or lights. This allows **astronomers** to clearly see the stars and **planets**.



Building an ***observatory*** *on top of a mountain helps to get a better view of the sky.*

*The **Hubble Telescope** orbits Earth above its atmosphere.*

Other telescopes are **launched** into space using rockets. They travel far above Earth and have a better view of the universe than telescopes on Earth. One of these telescopes is the **Hubble Telescope**. It was **launched** in 1990 by **NASA**, the American group of scientists who study outer space. The **Hubble Telescope** is still in space today, **orbiting** Earth. Since its **launch**, it has sent back thousands of photos to **NASA**. **Hubble's** photos have led to many new discoveries about the universe. For example, using photos from **Hubble**, scientists now think that the universe is about 13 to 14 billion years old!

Besides sending telescopes into space, **NASA** has also **launched** rocket ships into space. Scientists believed it was too dangerous for humans to ride the first rocket ships into space. They did not know what effects space travel might have on humans. So, **NASA** first sent apes into space on rocket ships. "Why apes?" you might ask. Think back to what you learned in a previous reader about animals. Apes are mammals and belong to the same group of animals, called primates, as humans. By studying the apes, scientists hoped to learn how space travel might affect humans. In 1961, **NASA** sent the first American **astronaut** into space on a rocket ship. His name was Alan Shepard. He stayed in space for only 15 minutes.

Top image: Ham, one of the first apes ***launched*** *into space*
Bottom image: Alan Shepard was the first American ***astronaut*** *in space.*

Apollo 11 *fires its rockets during lift-off.*

After 1961, **NASA** sent more **manned** flights into space. These flights **orbited** Earth but did not stop or land anywhere in space. Then, in 1969, the United States sent a rocket ship to the moon. The rocket ship was called **Apollo 11**.

Have you ever tried to throw a ball up in the air? The ball goes up at first. Then, it comes back down. No matter how hard you throw it, it comes back down because of **gravity**. **Gravity** is a **force** of **attraction** that pulls things toward one another. Earth's **gravity** pulls the ball back down to Earth.

Earth's **gravity** is a challenge for rocket ships like **Apollo 11**. In order to fly off into outer space, the rocket ship has to push up with a lot of **force**. It has to push up with so much **force** that **gravity** cannot pull it back down.

Apollo 11 fired a lot of strong rockets. It lifted off and went up slowly at first. Then, it got faster and faster. This is what it looked like after a few seconds. After just a few seconds more, it shot up out of Earth's **atmosphere** and into outer space.

Apollo 11 *shooting up into space*

Chapter 9

A Walk on the Moon

Once **Apollo 11** was up in space, the **astronauts** had to steer it to the moon. There were three **astronauts** on **Apollo 11**. You can see them in the image on the next page. Each had a job to do. One of them was in charge of flying the spaceship, called Columbia. The other two had to get into a landing craft called the Eagle. Then, they had to steer it down and land it on the moon.

The Apollo 11 astronauts

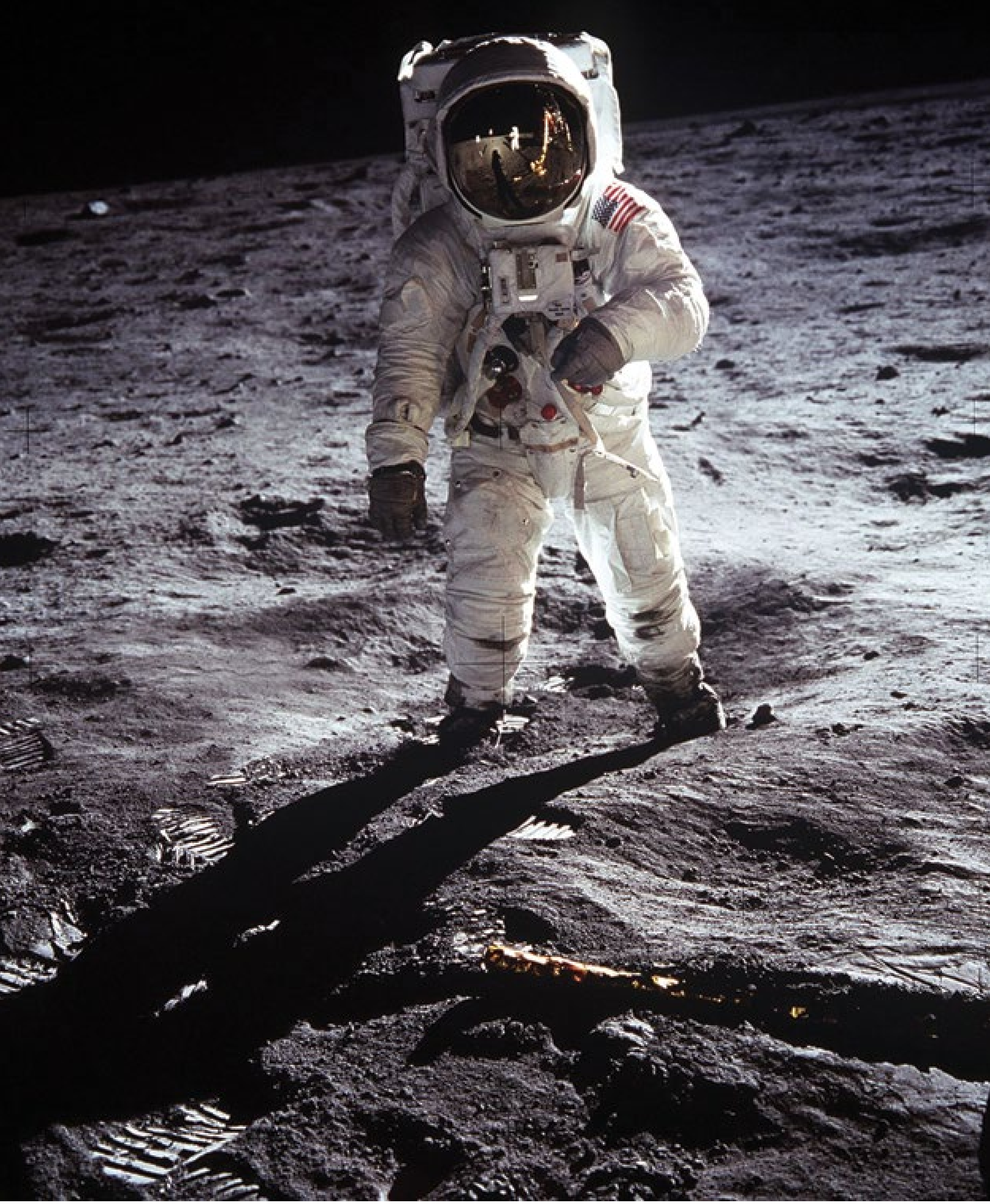
The **astronaut** who had to steer the Eagle was named Neil Armstrong. He had to find a good, flat spot to land. He also had to set the Eagle down gently.

Lots of people tuned in to watch Armstrong and the Eagle on live TV. At first, Armstrong had a hard time getting the Eagle to go where he wanted it to go. But, in the end, he landed it just fine.

Armstrong sent a message back by radio: "The Eagle has landed!"

The crowds watching it on TV went wild. They danced and sang. They shouted and waved the United States flag. For the first time ever, humans had landed on the moon!

What happened next was even more amazing. The **astronauts** went for a walk on the moon!

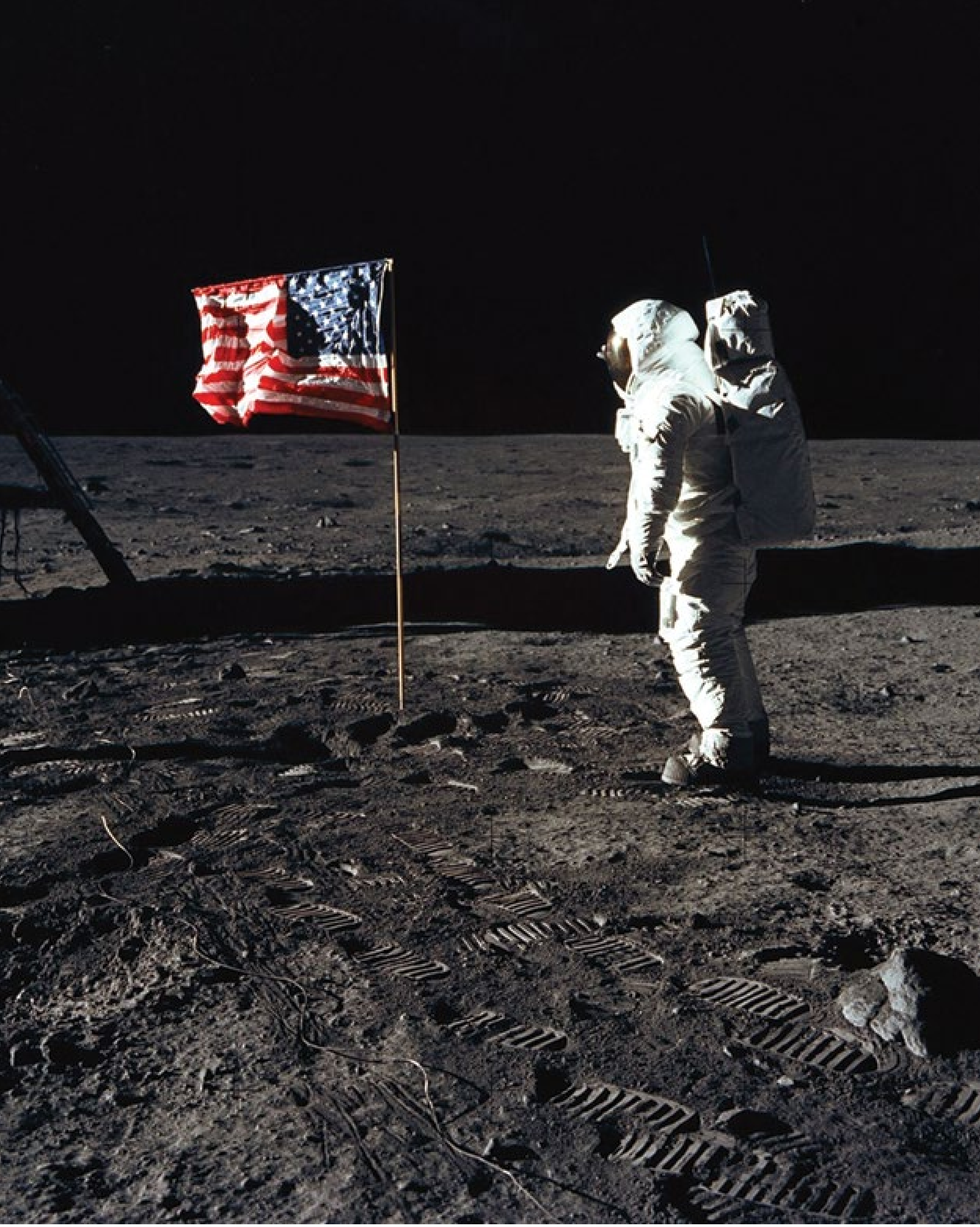


Here is one of the Apollo 11 astronauts walking on the moon.
Can you see his footprints?

There is no air for breathing on the moon. It is also very cold. So, the **astronauts** could not just walk out in shorts and a T-shirt. They had to put on space suits like the one in the image on the next page. They had to wear masks. They had to carry tanks full of air for breathing.

Armstrong went out first. He went down the steps of the Eagle until he was on the last one. Then, he made a little hop. He landed on the moon and kicked up a little moon dust. Then, he said, "That's one small step for man, one giant leap for mankind." Another **astronaut** joined Armstrong on the moon. His name was Buzz Aldrin.

Once again, people watching it on TV cheered. They were proud that the United States had put a man on the moon!



Buzz Aldrin plants the U.S. flag on the moon.

While Armstrong and Aldrin were on the moon, pilot Michael Collins stayed on a part of the spaceship that was still **orbiting** the moon. Armstrong and Aldrin spent more than 21 hours on the moon. They found that it was easy to move about on the moon, which has less **gravity** than Earth. They could jump up high and seemed to float down slowly. They used different tools to explore the moon. They knew the scientists back on Earth were hoping to learn new information about the moon. They dug up samples of moon rocks to take back to Earth.

After exploring the moon, Aldrin and Armstrong got back in the Eagle. They lifted off. They met up with Michael Collins on board the other part of the spaceship. Then, all three of them flew back to Earth. The spaceship came speeding back from space and splashed down into the sea. A Navy ship came to pick up the **astronauts** and take them back to **NASA**.

*Splashdown of **Apollo 11***

Chapter 10 What's It Like in Space?

Since **Apollo 11**, many more **astronauts** have traveled in space. Scientists have learned that there are many differences between Earth and space. One of the biggest differences has to do with **gravity**. Remember that **gravity** is a **force** of **attraction** that pulls things toward one another. The **force** of **gravity** on Earth is pretty strong. Even the best jumpers can only jump a few feet off the ground. (Try it and see!)

Want to jump high? You will have to fight against gravity.

*This **astronaut** is inside a spaceship in space, where the **force** of **gravity** is less.*

Remember that on the moon, **astronauts** Aldrin and Armstrong were easily able to jump up high. They didn't come down quickly either. Instead, they seemed to float down slowly. That was because the **force** of **gravity** on the moon is not as strong as on Earth. The moon is not as big as Earth. So the **force** of **gravity** is not as strong on the moon.

If you think that is cool, wait until you read what happens out in space, away from the moon or **planets**. Out in space, **astronauts** do not feel the effects of **gravity**. They and their spaceship are moving freely in space. Since the **astronaut** and spaceship are moving freely together, the **astronauts** look and feel as if they are floating!

Up in space, lots of things are different. You can do a flip and not worry about whether you will make it all the way around before you come down!

*When you are free of the effects of **gravity**, it is easier to do flips and cartwheels.*

*Look, no hands! These **astronauts'** lunches appear to be floating!*

Eating is different in space, too. I'll bet when you eat lunch at school, your food stays where you put it. If you set it on a table, it stays there until you pick it up. The **force** of **gravity** holds it down. But if you were up in space, you and your food would be moving freely together. If you let go of it, your food might drift away!

There are other differences in space besides less **gravity**. Do you remember that the **astronauts** on the moon had to carry tanks of air for breathing? Another way outer space is different from Earth is that there is no air or oxygen at all in outer space. Look again at the image on page 69 of the **astronauts** inside the spaceship. The **astronauts** are not carrying tanks of air. That's because oxygen is being pumped inside the spaceship.

Since there is no air in space, you also do not hear sounds in outer space. It is also very cold in space. The **astronauts** must train many months before going into space so they know what to expect. Do you think you would like to go into space some day?

This is what Earth looks like from the moon. Can you name some ways that being in space is different from being on Earth?

Chapter

11 The Space Shuttle

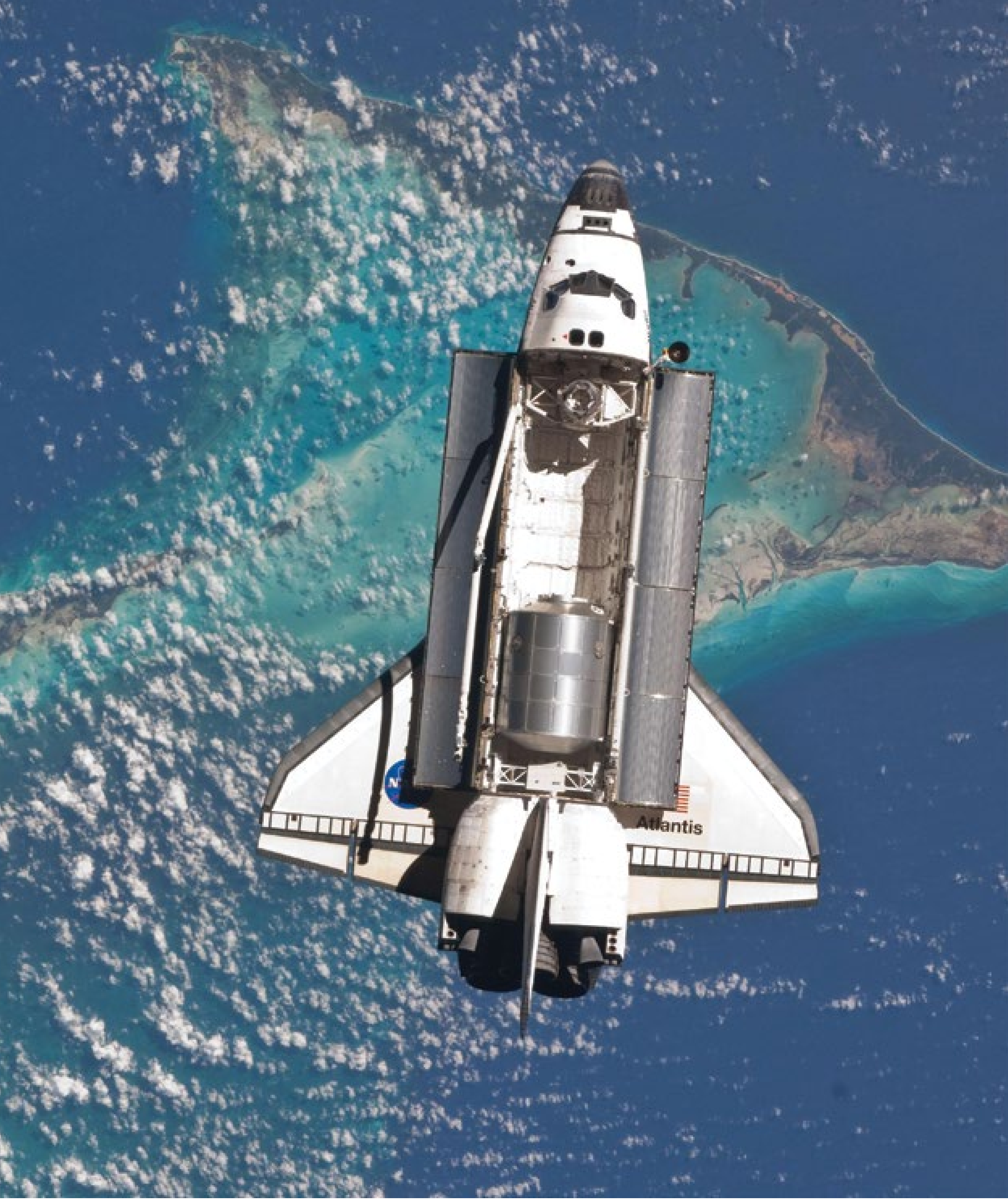
Interest in **manned** space exploration soared after **Apollo 11**. Other **astronauts** went to the moon. But scientists were also interested in exploring other parts of space beyond the moon. It was very expensive and took a lot of time to build and send spaceships into space. Do you remember that when **Apollo 11** returned from space, it landed in the sea? It was not able to land safely on the ground, so this type of spacecraft always had to land in the sea. Once it landed in the sea, this kind of spacecraft could not be used again.

In 1981, a **reusable spacecraft**, called a **space shuttle**, was built. It was able to fly up into space and then zoom back down to Earth. When it returned to Earth, the pilot was able to land the spacecraft on a runway almost like an airplane. It glided down from space and landed on a runway, but it had to be a very long runway.

A ***space shuttle*** *lifts off*

The **space shuttle** was flown back into space again and again. It **shuttled** back and forth between Earth and space. That is why it was called the **space shuttle**.

The image on the previous page shows the **launch** of a **space shuttle**. The **space shuttle** itself is the white part that looks like a jet plane. The other parts are **booster rockets**. The **booster rockets** helped the **space shuttle** get off the ground. They helped the **space shuttle** overcome Earth's **gravity**. Once the **space shuttle** was up into space, it dropped the **booster rockets** because it no longer needed them.

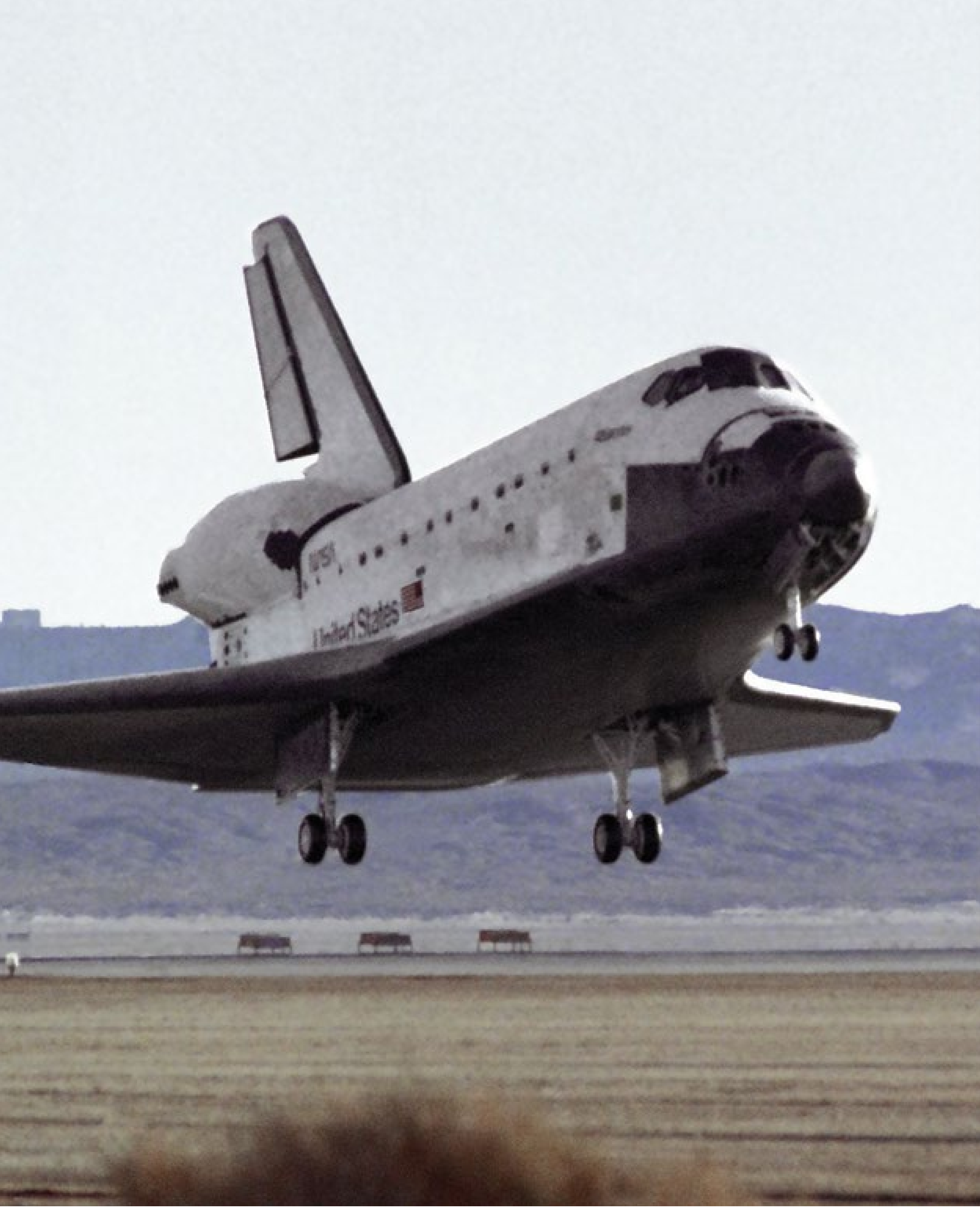


*A **space shuttle** in orbit above Earth*

In the thirty years between 1981 and 2011, different **space shuttles** carried **astronauts** up into space on many missions. The **space shuttle** was also used to bring research equipment and tools into space. The **astronauts** did many experiments to find out more about space. Scientists were **especially** interested in learning about what effect the lack of **gravity** would have on humans and other living things.

The **space shuttle** was also used to help build an amazing space station. **Astronauts** could live at the space station for months at a time. Often, the **space shuttle** carried supplies back and forth from Earth to the space station. It also provided a ride home to Earth when it was time for the **astronauts** to return.

The last **space shuttle** mission took place in July 2011. **NASA** scientists and Americans were proud of everything the **astronauts** had accomplished in thirty years. With the end of the **space shuttle** missions, **NASA** is planning other ways to explore space. Those plans include **launching unmanned probes** and **satellites**. **NASA** scientists hope to learn more about the moon's **gravity** and are even talking about trying to explore **asteroids**!



*A **space shuttle** comes in for a landing.*

Chapter

12 Dr. Mae Jemison

Do you know what a role model is? A role model is someone who sets an example for others by the way they live. Many students admire people who are famous athletes, movie stars, or singers and use them as role models. They see them on TV, in newspapers and in magazines, and decide they want to be like them. But some of the best role models are people that you probably would not see on TV or in newspapers. They have jobs such as doctors, teachers, or police officers. Some are scientists and **astronauts**. One such person is Mae Jemison.

Mae Jemison

Mae Jemison was born October 17, 1956, in Decatur, Alabama. Her family moved to Chicago, Illinois when she was young. Mae always took great pride in her schoolwork. She was interested in science, but was also interested in the arts. She finished high school early at age 16! From there, she went to Stanford University in California. Most college students focus on only one topic of study because college is so challenging. Mae focused and excelled in two topics of study—**chemical engineering** and **African-American studies**!

After Stanford, Mae entered medical school to become a doctor. She wanted to use her medical training to help people in different countries on the continent of Africa. To do this, she joined the **Peace Corps** as a volunteer. As part of the Peace Corps, Mae treated patients and also helped train other **health care** workers. She worked hard to help improve health care in the countries where she worked.

Stanford University, where Mae went to college

After the **Peace Corps**, Mae came back to the United States. She set her sights on a different goal. Her greatest dream was to become an **astronaut** and travel into space. She decided to apply to **NASA** to become an **astronaut**. But the first time she applied, she was not accepted. Instead of giving up, she tried again and **NASA** accepted her the second time! She was one of only 15 people chosen from a group of 2,000 people who wanted to become **astronauts**!

Her training to become an **astronaut** was hard. She had to get into great shape and train to get used to being free of the effects of **gravity** in space. She also had to study and pass many tests about space travel. Mae Jemison succeeded in both.

An experiment studying the effects of ***weightlessness***

In 1992, Mae was chosen for a mission on the ***Endeavour* space shuttle**. A rocket **launched** the ***Endeavour*** into **orbit** around Earth. Mae became the first African-American female **astronaut** in space!

The mission was to study the effects of weightlessness on plants and animals. Mae conducted experiments during the mission with fellow **astronaut** Jan Davis. They collected information that the scientists at **NASA** could study. The mission was a great success.

After her successful mission, Mae retired from **NASA**. She became a professor at Dartmouth College, sharing her love of science and space with other students. She also started her own company called The Jemison Group, Inc. Mae's company searches for ways that science can help improve the lives of people in countries around the world. Mae Jemison is truly a role model that we can all admire!

*Mae Jemison achieves her goal of becoming an **astronaut**.*

Chapter 13 The International Space Station

Would you like to have a bedroom in outer space? Some **astronauts** do!

The United States and other countries use the **space shuttle** to send **astronauts** to an **international** space station. The space station **orbits** Earth. Three **astronauts** can live there at one time. They stay for six months at a time. This image shows the space station.

The space station orbits Earth.

The space station **orbits** far above Earth. So the **astronauts** in the space station don't feel the effects of **gravity** like we do on Earth. When we lift our arms and legs here on Earth, we have to work against **gravity**. That is good for us. It helps us stay in shape. But **astronauts** in space don't have the effects of **gravity** to work against. They do not get much of a workout from drifting around. They have to run at least once a day to stay in good shape. In this image, you can see an **astronaut** jogging in space.

Astronauts have to jog in space to stay in shape.

These two ***astronauts*** *are taking a nap in space.*

These two men are sleeping in space. They don't feel the effects of **gravity** so they are moving freely within the spaceship. This means they can sleep right side up or upside down. It is all the same. Do you think you would like sleeping this way?

Taking a shower in space is tricky. On Earth, the water comes out of the spout. It falls down and splashes on your body. Then, it runs off. But this is not what happens in space! In space, you have to rub the water on your skin. Also, it does not just drip off. You have to scrape it off. You have to shower in a little pod. The pod keeps the water you scrape off your skin from drifting off in the air. If it drifted off, it might cause problems. It might mess up the computers and equipment inside the space station.

You can see that lots of things are different when you live in space. That is why leaving the space station and coming back to Earth can be hard. It takes time for the **astronauts** to get used to Earth again. After months in space, they struggle with the **gravity** on Earth. Their arms and legs feel heavy. They find it hard to stand up. They feel off balance. But in a few weeks, they begin to feel normal again. Sometimes when they look up at the sky, they even feel a little homesick for their home in outer space.

*An **astronaut** taking a space shower*

Chapter 14

Nicolaus Copernicus

Do you remember in the very first chapter of this reader you learned that long ago, people believed that the sun moved around Earth? This seemed to make sense. Each morning at the start of the day, the sun rose in the east. At the end of the day, the sun set in the west—exactly opposite from where it had come up. To explain this change, people said the sun moved around Earth. This is what the Greeks and other ancient people believed. But you also learned in the first chapter that this was not true.

About the same time that Christopher Columbus arrived in America, a man named Nicolaus Copernicus was studying math and astronomy at a university in Poland. He later moved to Italy where he also studied medicine and law.

Young Copernicus studied math, astronomy, medicine, and law.

But Copernicus' real love was astronomy. He knew that since ancient times, people believed that the sun moved around Earth. Copernicus began to carefully observe and record the movement of the sun, **planets**, and stars. After much research, Copernicus decided that the belief that the sun moved around Earth could not be true. Copernicus' observations led him to believe just the opposite! He realized that instead, Earth was moving around the sun! He also believed that as Earth **orbited** the sun, it also completed a full **rotation** each day.

All of Copernicus' ideas came from viewing space without the help of a telescope. He wrote down what he observed from a cathedral bell tower. He also used math to help him prove his point. Finally, Copernicus wrote a book explaining his new ideas about how the universe worked. His fellow scientists went to work trying to prove him wrong, but they couldn't. Most were amazed by his discovery!

Copernicus spent hours observing the movement of the stars, planets, and sun.

However, Copernicus' ideas were different from what people had believed for thousands of years. They believed that Earth and humans were the center of the universe. Many of the teachings of the church at that time were also based on this belief. Copernicus had suggested that Earth was not the center of the universe. Instead, he said, the sun was at the center! Some people disagreed with Copernicus' ideas and spoke out against them. So, his beliefs were not widely accepted while he was alive.

After Copernicus died, other scientists and church officials continued to argue against the view that the sun was at the center of the universe. Some scientists agreed with Copernicus' ideas. Galileo agreed with Copernicus and was punished and put in jail for a long time.

Today we know that Copernicus's ideas led to our current understanding of how the solar system works. The sun is at the center, and the planets revolve around it in elliptical orbits. His work led to other theories and discoveries as well. Even today, scientists continue to learn new things about the universe, so our knowledge is always changing and growing.

Copernicus argued that the sun, not Earth, was at the center of the universe.

Glossary for *What's in Our Universe?*

A

African-American studies—the study of the history, culture, and politics of African-Americans, Americans who have ancestors from Africa

Andromeda Galaxy—the spiral galaxy that is closest to the Milky Way Galaxy

Apollo 11—a rocket ship that took three American astronauts to the moon in 1969

asteroid—a space rock, smaller than a planet, that orbits the sun (**asteroids**)

asteroid belt—an area between Mars and Jupiter where thousands of asteroids orbit around the sun in a shape like a belt

astronaut—a person who travels into outer space

astronomer—a scientist who studies stars, planets, and outer space (**astronomers**)

atmosphere—an invisible, protective blanket of air around Earth and other heavenly bodies

attraction—when things are drawn to move closer together

axis—an imaginary straight line through the middle of an object, around which that object spins

B

billion—a very large number (**billions**)

booster rocket—one of two parts of a space shuttle that helps launch it into space by overcoming gravity (**booster rockets**)

C

chemical engineering—a field of study in which scientists use their knowledge of chemistry and how things in the natural world are made and interact

comet—a frozen ball of dust and ice that travels through outer space (**comets**)

constellation—stars that form a pattern or shape that looks like such things as a person, an object, or an animal as seen from Earth (**constellations**)

courage—bravery

E

eclipse—the blocking of the light from the sun by another heavenly body (**eclipses**)

Endeavour—a NASA space shuttle

especially—very much, particularly

exploration—the study of unknown places or things

G

galaxy—a very large cluster of billions of stars, dust, and gas held together by gravity and separated from other star systems by a large amount of space (**galaxies**)

gas giant—one of the large outer planets, Jupiter, Saturn, Uranus, and Neptune, that is composed of mainly hydrogen gas (**gas giants**)

gravity—a force that pulls things toward one another

H

Halley's Comet—a famous comet named for British scientist Edmund Halley that is visible from Earth with the naked eye every 76 years

health care—the prevention or treatment of illnesses by trained medical specialists

Hubble Telescope—a large telescope that collects information in space; It was carried into space in 1990 and will be there until 2014.

hydrogen—the most common gas in the universe, which is lighter than air and easily catches fire

I

imagine—to pretend

international—involving more than one country

L

ladle—a spoon or dipper with a long handle and a cup-like end used for serving liquids

launch—to send a rocket into outer space (**launched**)

M

manned—carrying and operated by people

meteor—a piece of rock that burns very brightly when it enters Earth's atmosphere from space, also called a shooting star (**meteors**)

meteorite—a meteor that does not fully burn up in Earth's atmosphere and falls to Earth

meteoroid—a space rock, smaller than an asteroid, that orbits the sun (**meteoroids**)

Milky Way Galaxy—the galaxy that contains Earth and the solar system in which it lies

N

naked eye—your eye

NASA—National Aeronautics and Space Administration; an organization in the United States that directs space travel and research

O

observatory—a place used to observe the sun, moon, stars, and outer space (**observatories**)

orbit—the curved path something in space takes around another object in space; Planets move in an orbit around the sun. (**orbiting**)

P

Peace Corps—a group of American volunteers who carry out projects in other countries to help improve the lives of people living there

planet—a round object in space that orbits a star (**planets**)

Polaris—the North Star; the brightest star at the end of the handle of the Ursa Minor/Little Dipper that stays in the same place in the night sky all year long

probe—a tool used to explore something, such as outer space (**probes**)

R

research—the kind of equipment used to collect information through experiments

reusable—when something can be used more than once

rotate—to turn about an axis or a center (**rotating**, **rotates**, **rotation**)

S

satellite—a natural or man-made object that orbits a planet or smaller object (**satellites**)

shuttle—to go back and forth from one place to the next (**shuttled**)

solar system—the sun, other bodies like asteroids and meteors, and the planets that orbit the sun

spacecraft—a manned or unmanned vehicle designed to travel into space for research and exploration

space shuttle—a manned spacecraft used for exploration

space station—a manned satellite that is made to be in outer space for a long period of time

T

tilted—slanted or tipped to one side

U

unmanned—not carrying people

Ursa Major—the constellation named by Ptolemy that is also called Big Bear; It includes the Big Dipper

Ursa Minor—the constellation made of seven stars named by Ptolemy that is also called Little Bear; It is the Little Dipper

V

volunteer—a person who willingly performs a service without getting paid

W

weightlessness—to have little or no weight

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Grade 3 | **Unit 7** | Reader

What's in Our Universe?

730L

ISBN 9781643837291

Grade 3
Unit 7: *Astronomy: Our Solar System and Beyond*

Unit-level Essential Question
What celestial objects make up our solar system?

Lessons 1–5

Guiding Question: What are the features of the eight planets in our solar system?

Writing Prompt: Why are the outer planets colder than the first few planets?

Lessons 6–10

Guiding Question: Where are certain constellations visible in the night sky?

Writing Prompt: Do you live in the Northern Hemisphere or the Southern Hemisphere? Based on your answer, what constellations could you see at night?

Lessons 11–15

Guiding Question: How do we know that the planets orbit the sun?

Writing Prompt: What scientific hypothesis did Copernicus decide upon?

Lessons 16–19

Guiding Question: What is an ordinary day like on the International Space Station?

Writing Prompt: What have you learned about the jobs of astronauts on the International Space Station? What are their goals while they are stationed there?

Unit 7 Culminating Activity

Scientists and astronauts have explored a lot of planets to learn more about them, but we still don't know everything we could know. What planet should we learn more about? In this essay, persuade your audience to go to the planet you choose. What do we already know about this planet, and what else would you like to find out?

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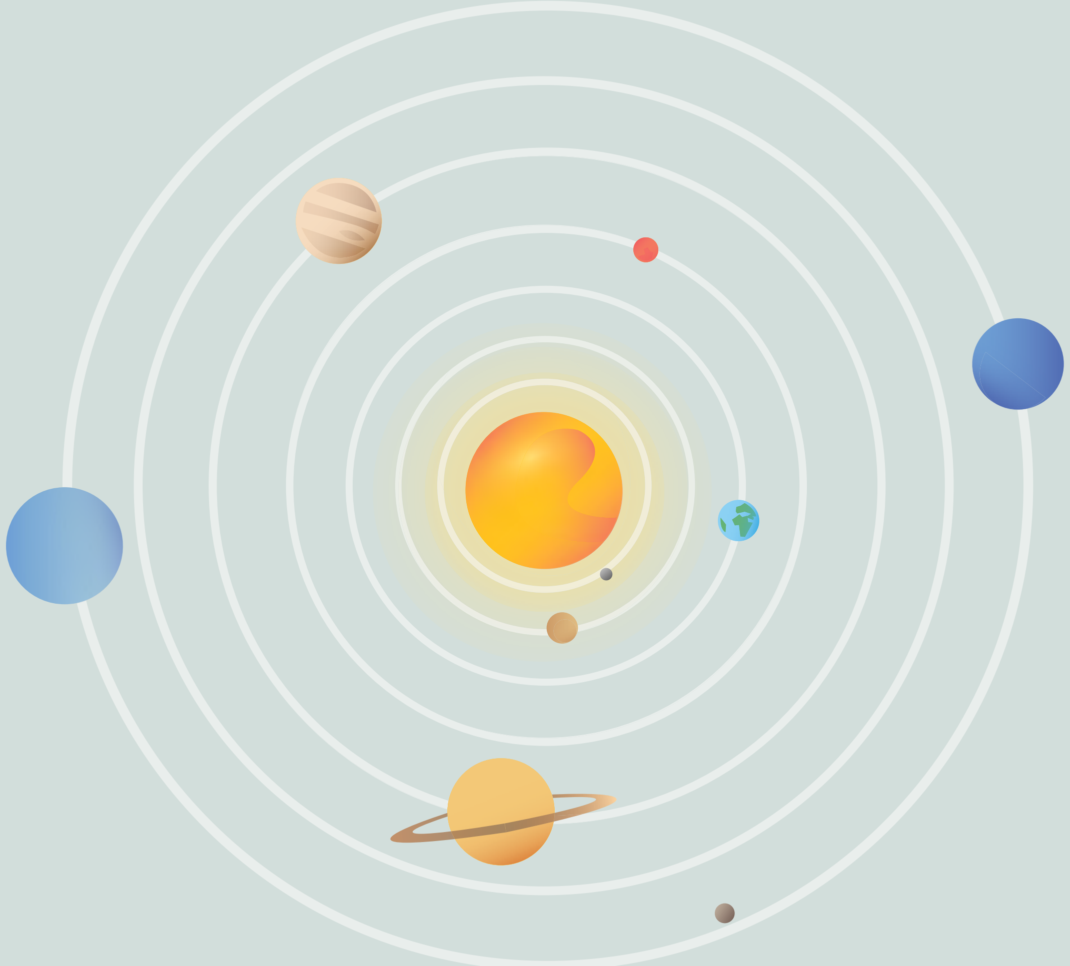

Grade 3

Unit 7 | Digital Projections

Astronomy: Our Solar System and Beyond

Grade 3 | Unit 7

Astronomy:
Our Solar System and Beyond

Digital Projections

Contents

Astronomy: Our Solar System and Beyond

Digital Projections

Spelling Chart

‘g’ > /j/	‘j’ > /j/	‘ge’ > /j/	‘dge’ > /j/	‘dg’ > /j/

Compare/Contrast

Compare	Contrast
Same	Different
Both	Unlike
Alike	But
Similar	Instead of
Compare to	In contrast to
Also	On the other hand
In the same way	However
Too	While

Spelling Chart

‘n’ > /n/	‘nn’ > /n/	‘kn’ > /n/	‘gn’ > /n/

Spelling Chart

/ae/	/k/	/s/	/j/	/n/

Text Structures Anchor Chart

How Does the Author Organize Information in a Text?		
Different Types of Text Structures	**Defined**	**Clue Words**
Time	Explains when an event took place	before now later
Sequence	Explains the order in which events happened	first next then after last finally
Cause and Effect	Explains why things happen	because then if so as a result when
Comparison	Shows differences and similarities between two or more things	however on the other hand like unlike same

Writing Questions

1. Do I have a good topic sentence?	
2. Do I have a good concluding sentence?	
3. Are there any parts that do not make sense?	
4. Do my sentences flow well in this order?	
5. Do I have a good variety of sentence structures?	
6. Could I combine any of my sentences?	
7. Do I have a good variety of descriptive words?	
8. Is my writing interesting?	
9. Is this my best work?	

Editing Checklist Chart

1. Do I have a fitting title?	
2. Do all of my sentences start with a capital letter?	
3. Do all of my sentences end with the correct punctuation?	
4. Have I spelled all of my words correctly?	
5. Have I used correct grammar?	
6. Does each sentence provide a complete thought?	

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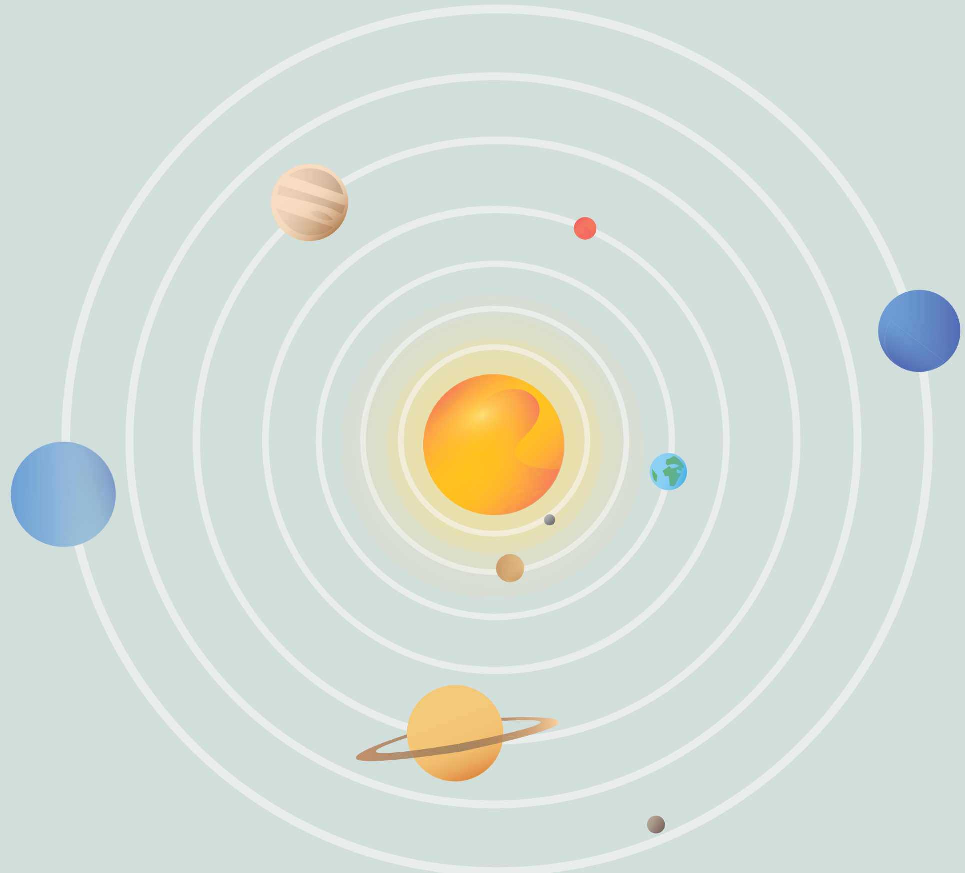

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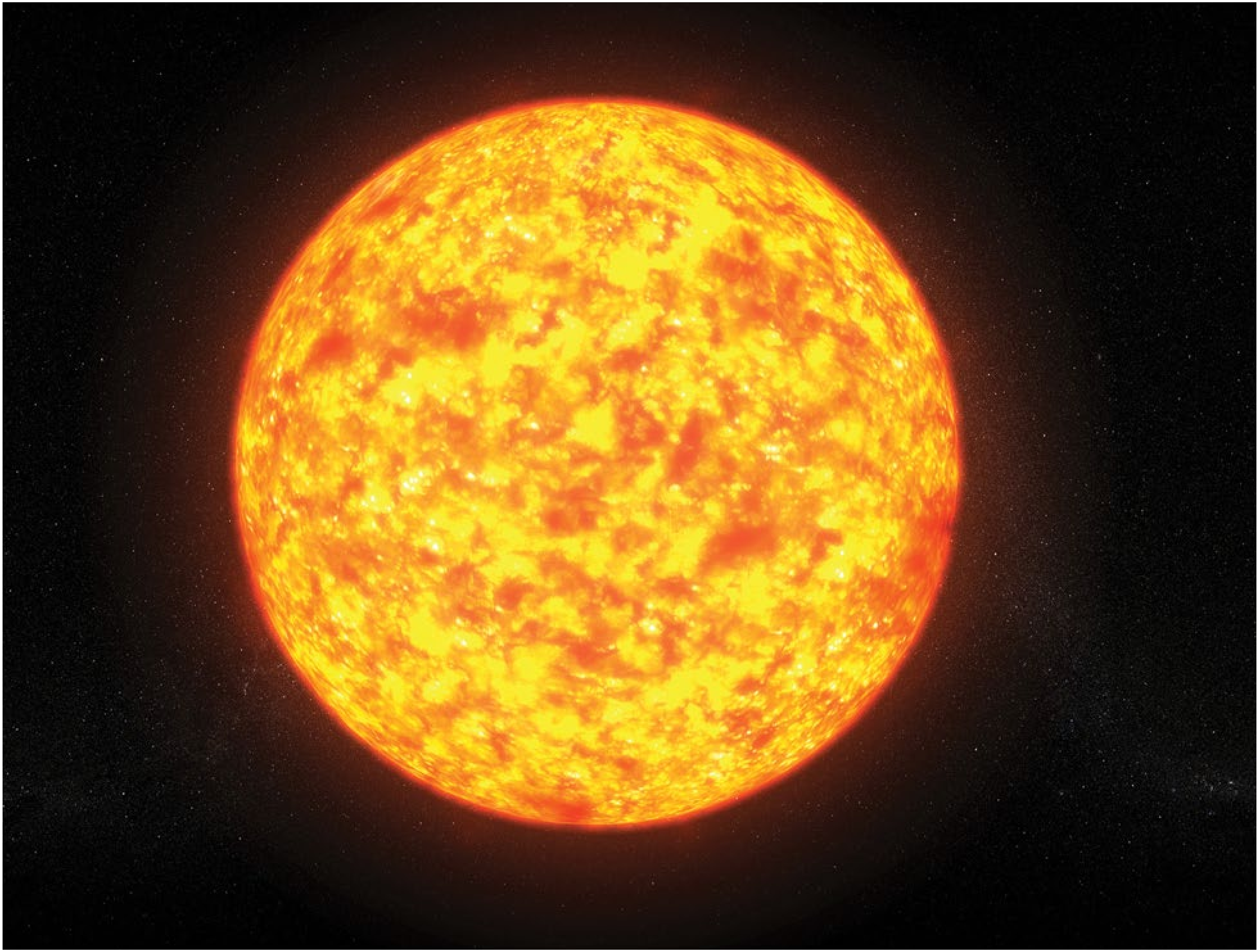

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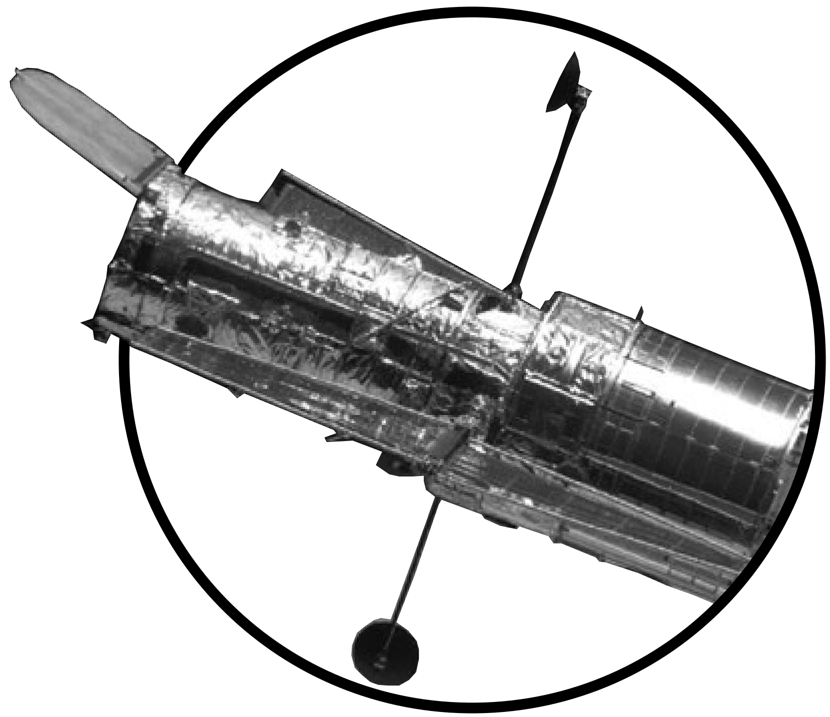

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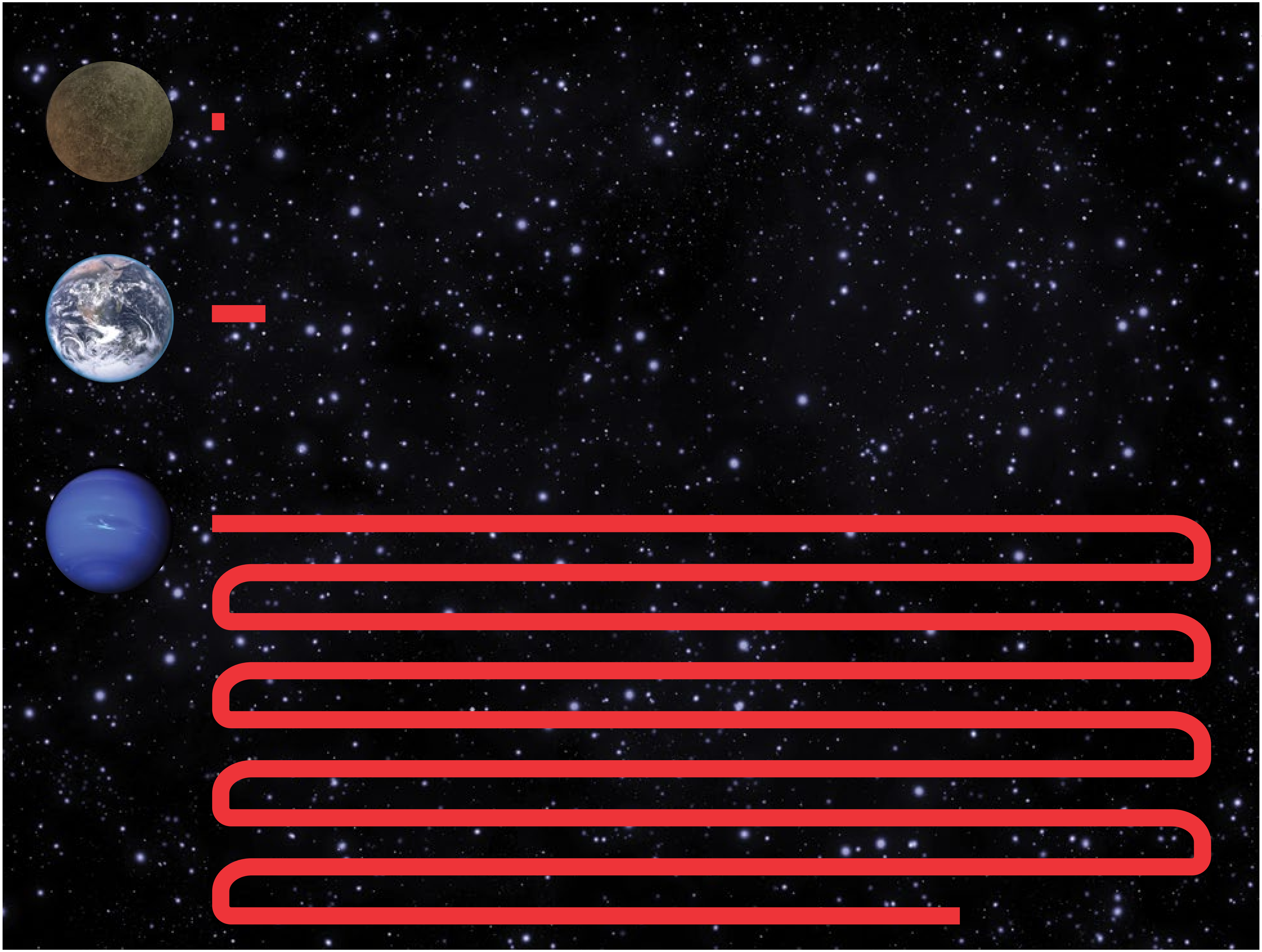
Astronomy: Our Solar System and Beyond

top

C.U7.L1.1 Sun



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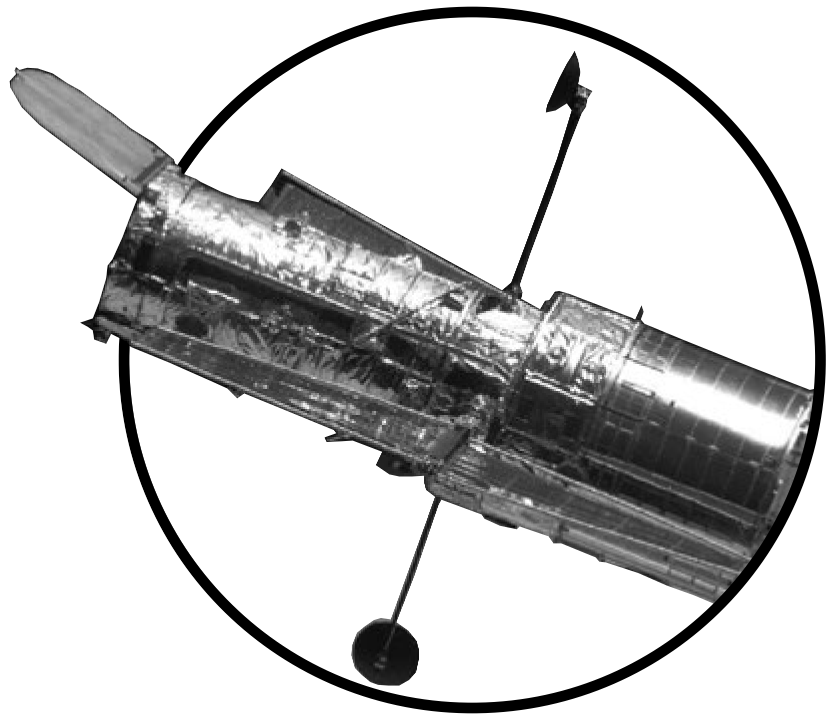

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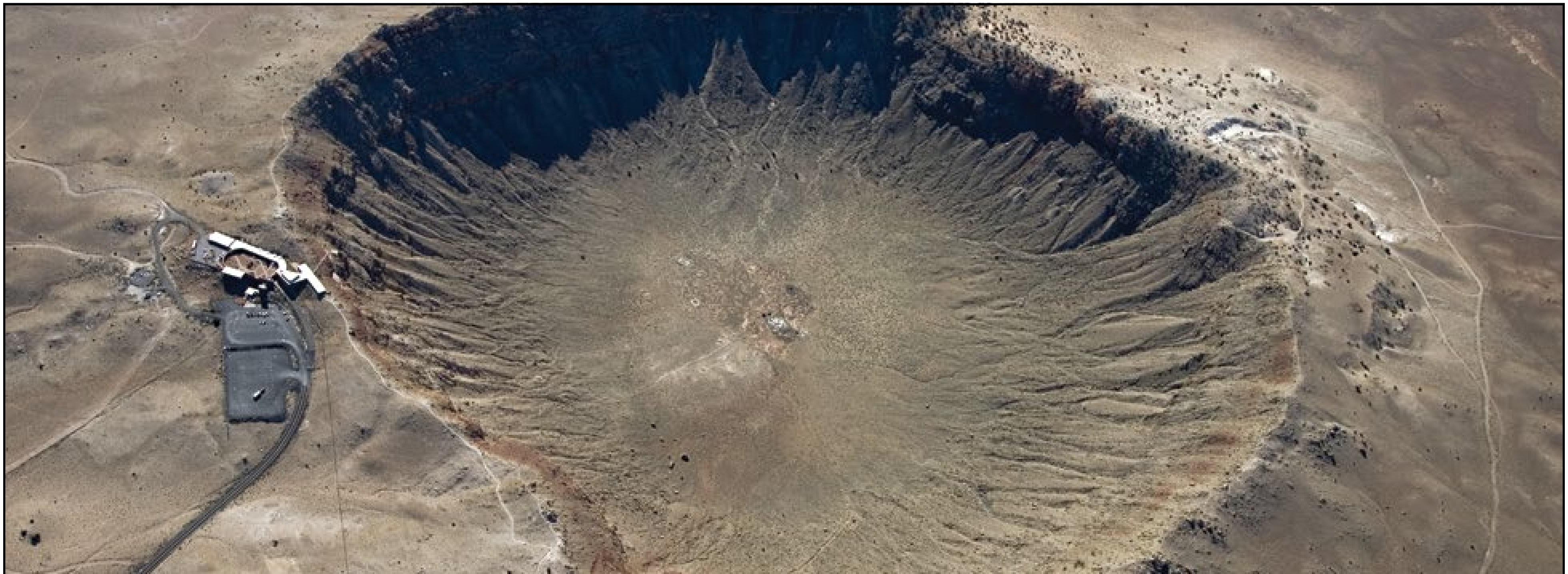

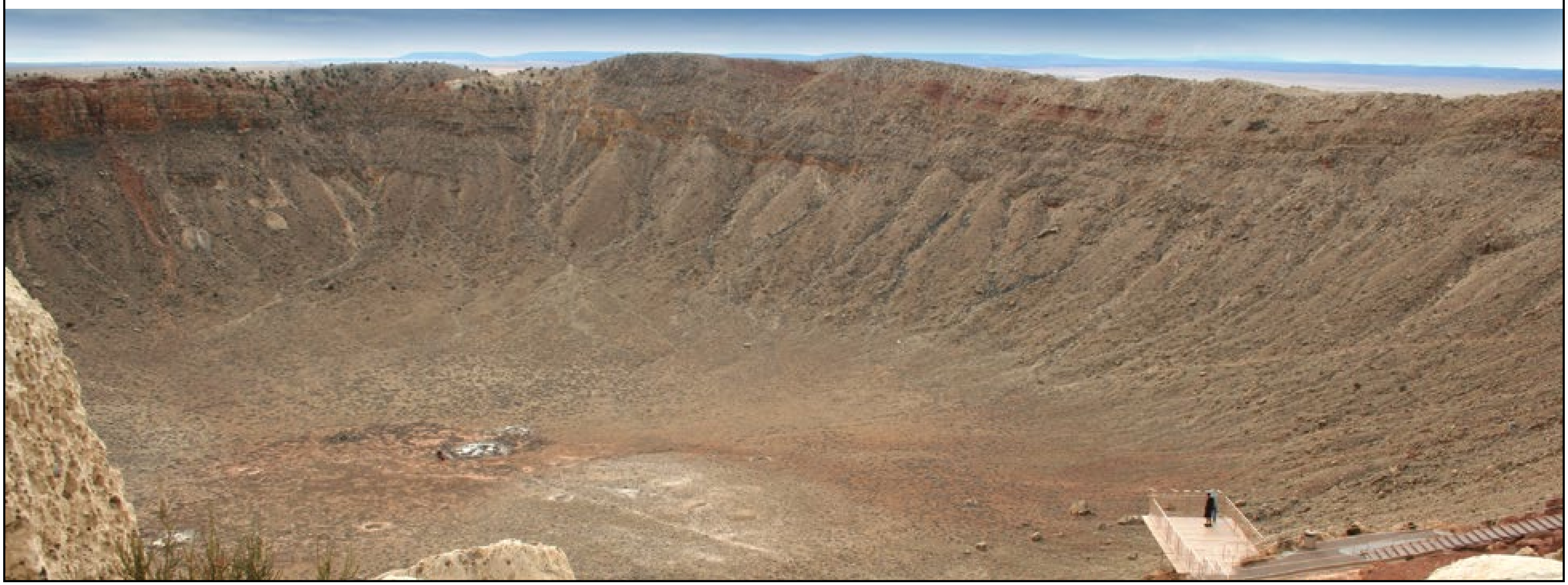

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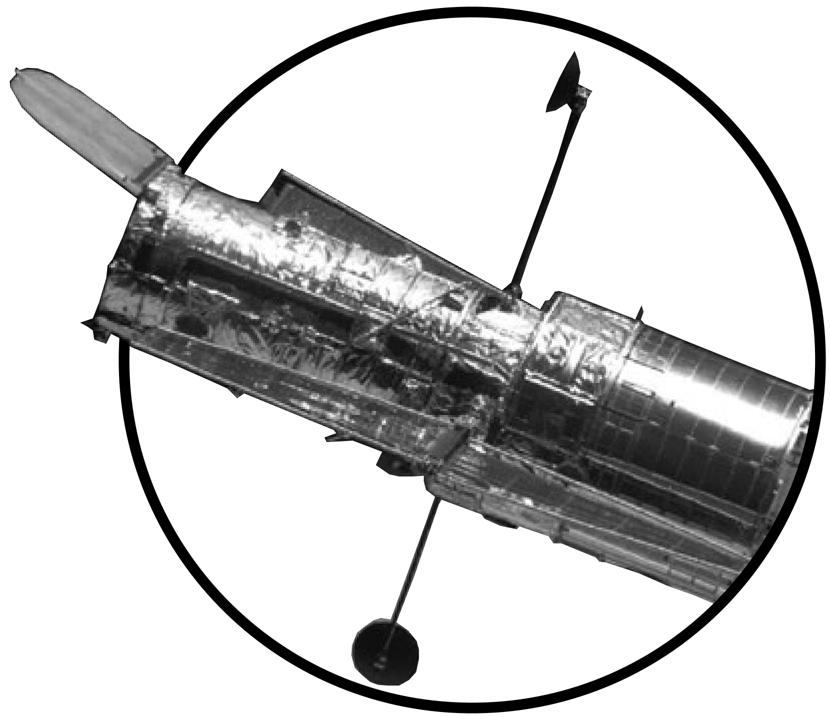

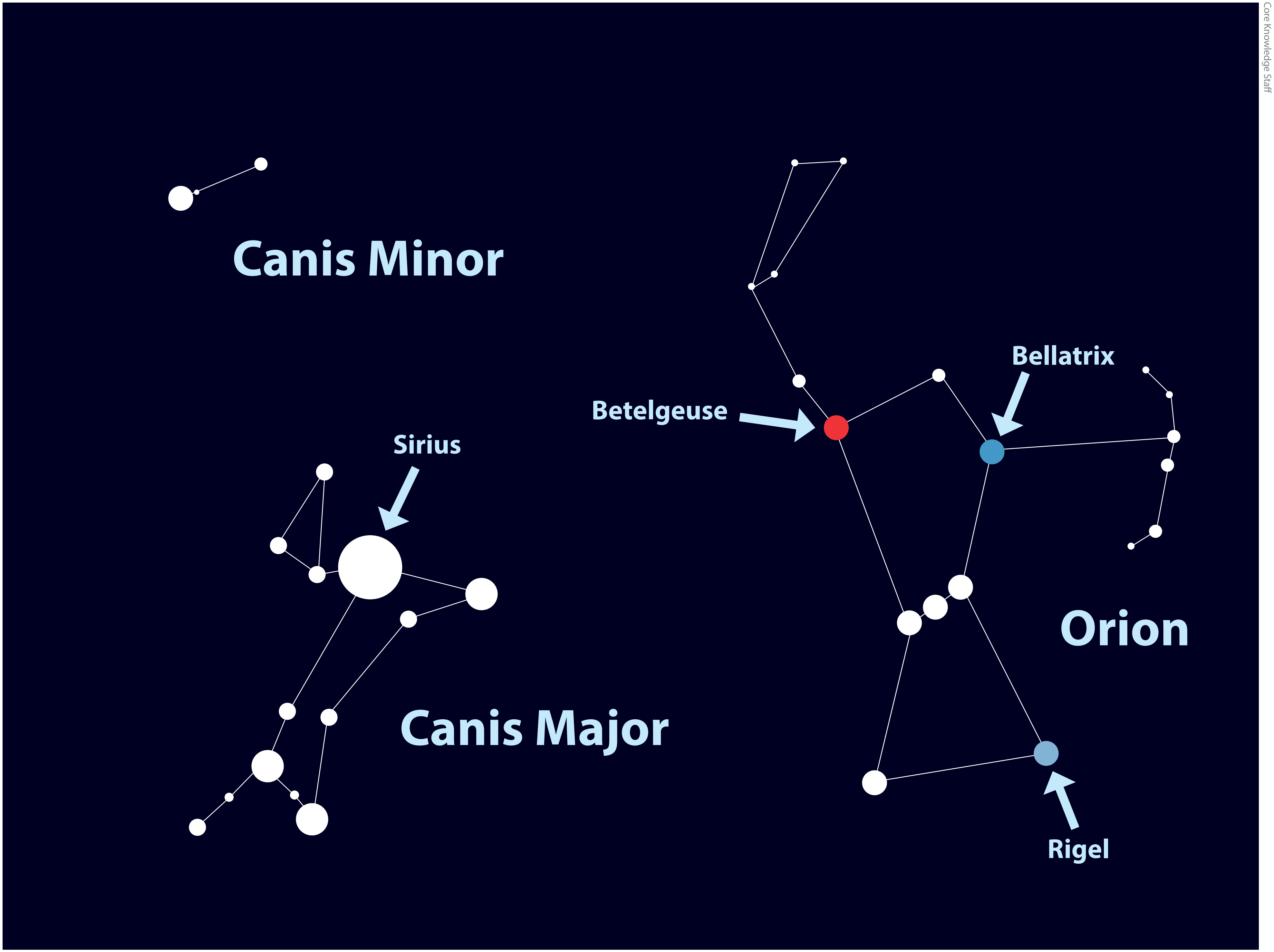
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Sirius
Canis Major
Betelgeuse
Bellatrix
Orion
Rigel
Core Knowledge Staff

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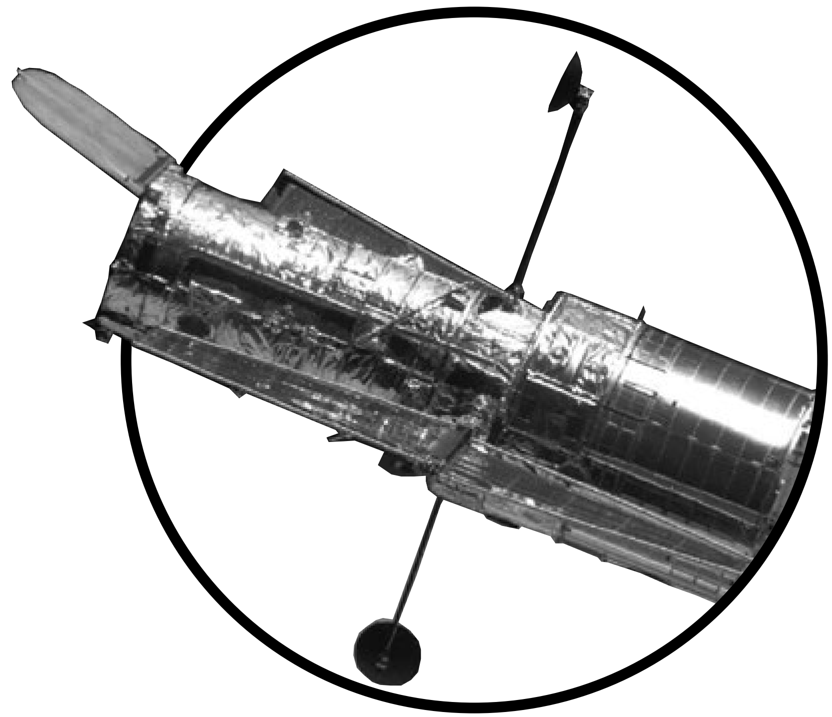


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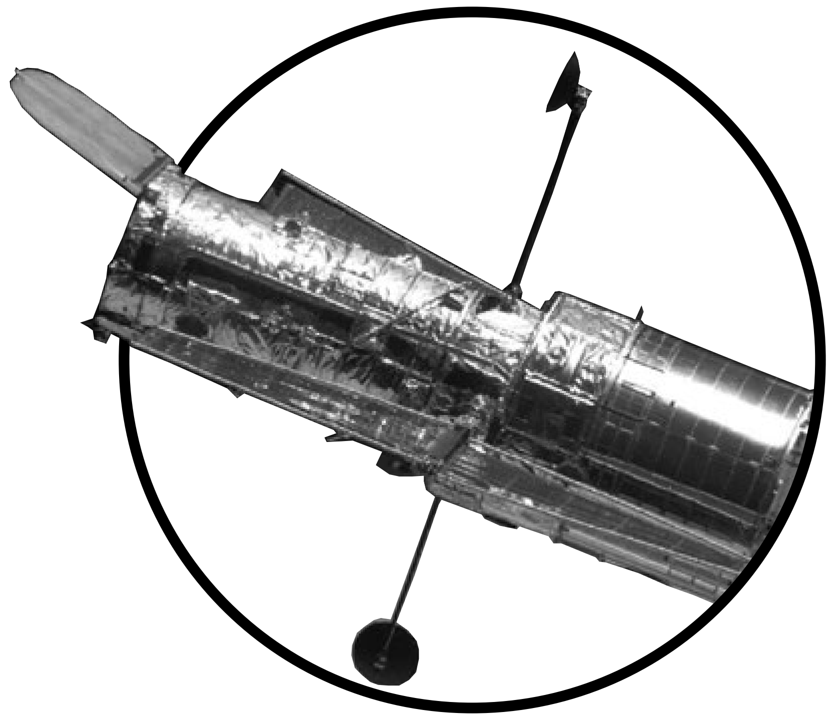

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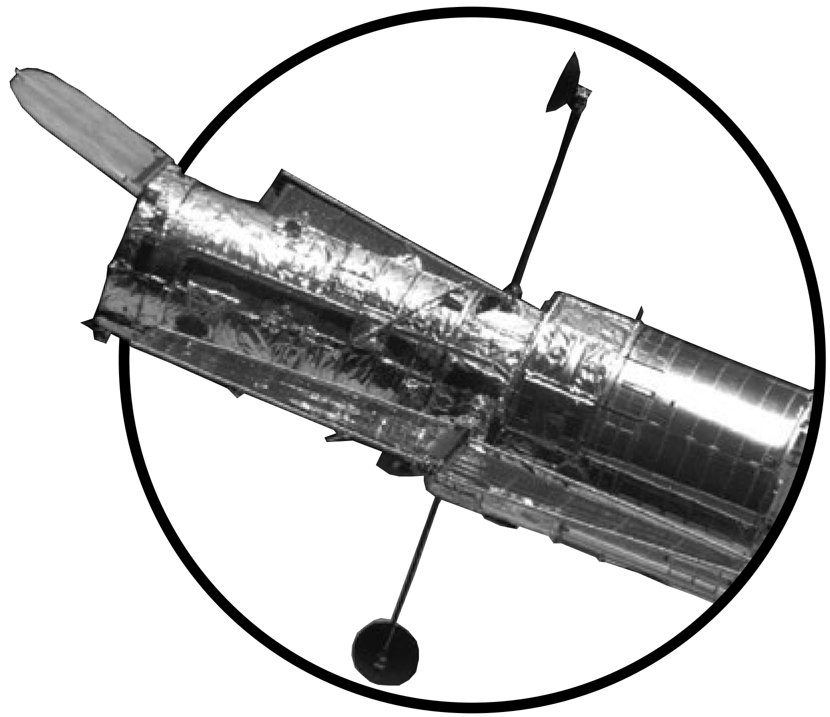

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C.U7.L9.1 Space Shuttle

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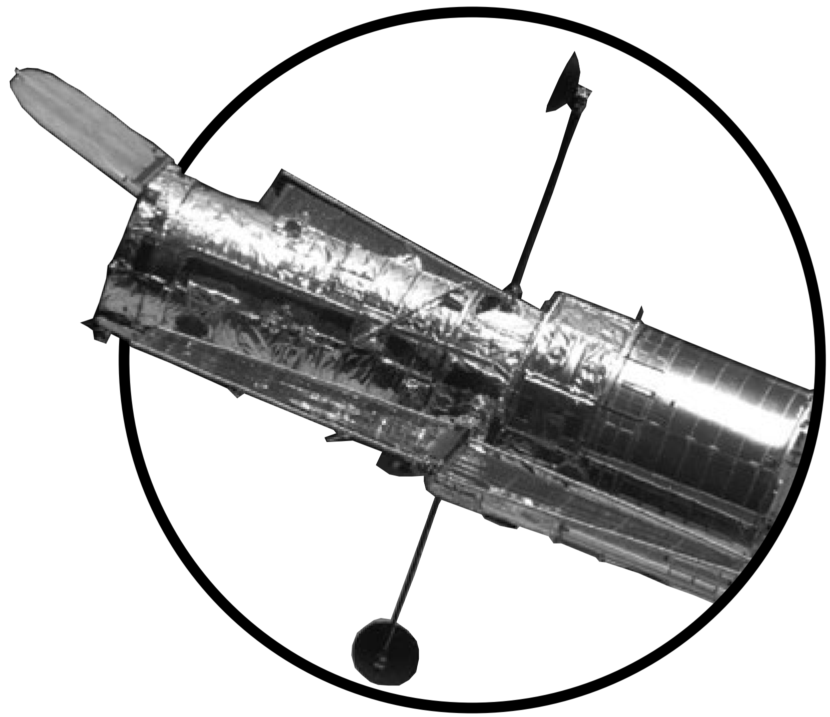
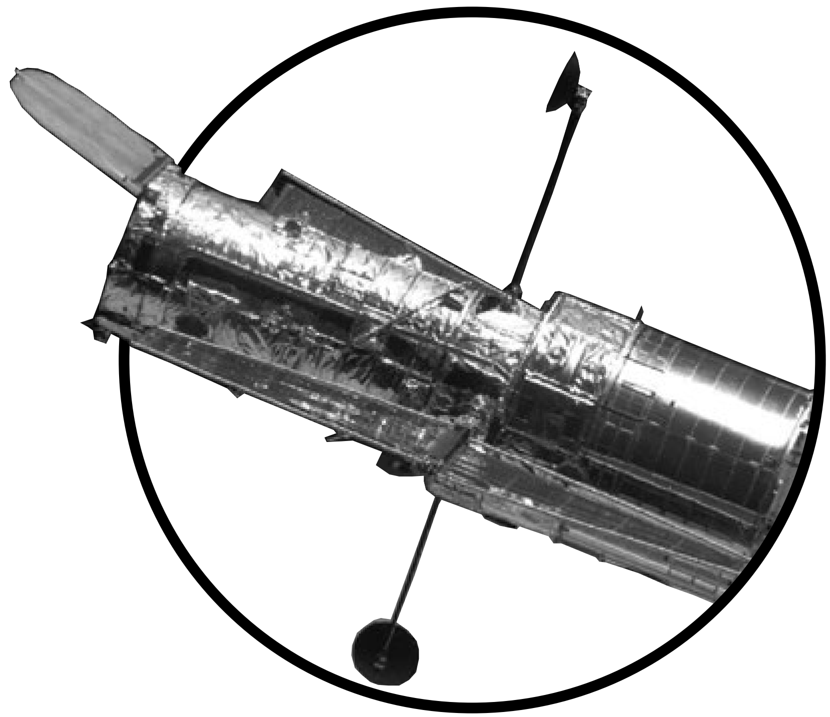


Astronomy: Our Solar System and Beyond

C.U7.L9.2 Stamps Honoring Space Dog Laika

NASA



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top

C.U7.L9.3 Armstrong, Collins, and Aldrin

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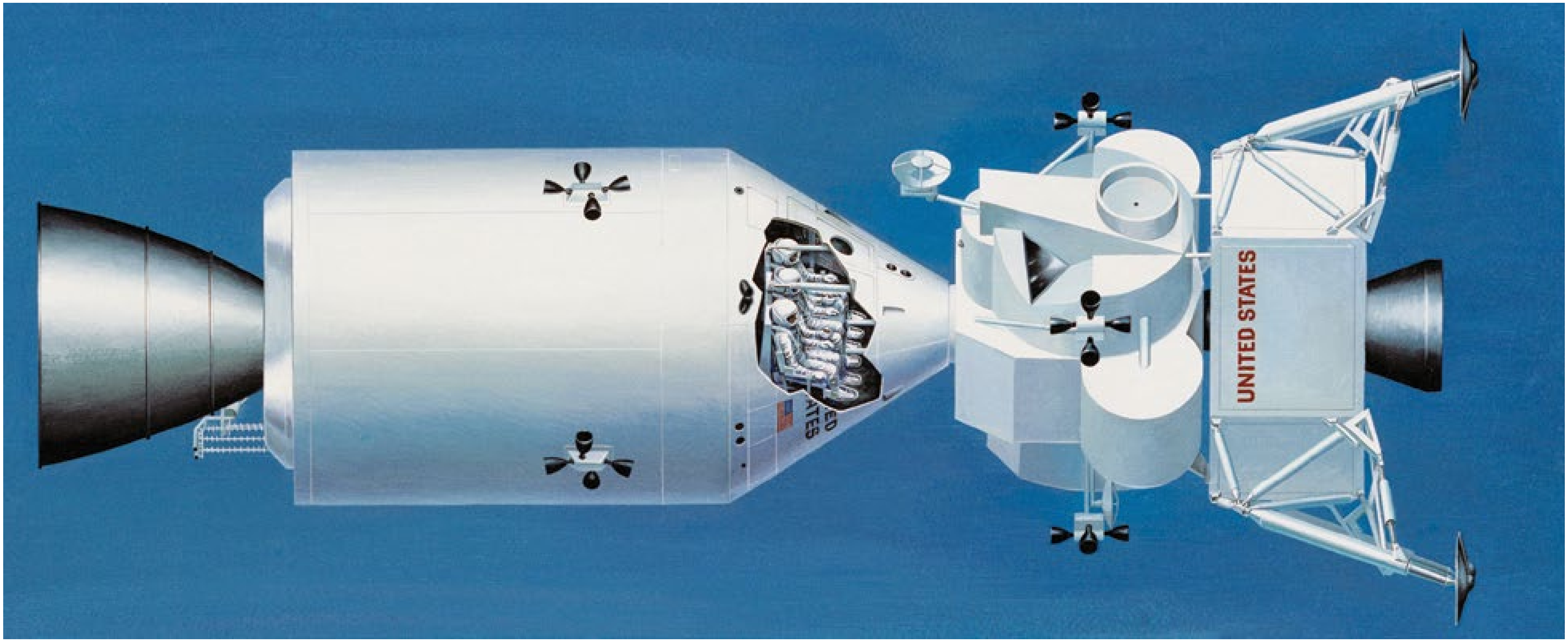
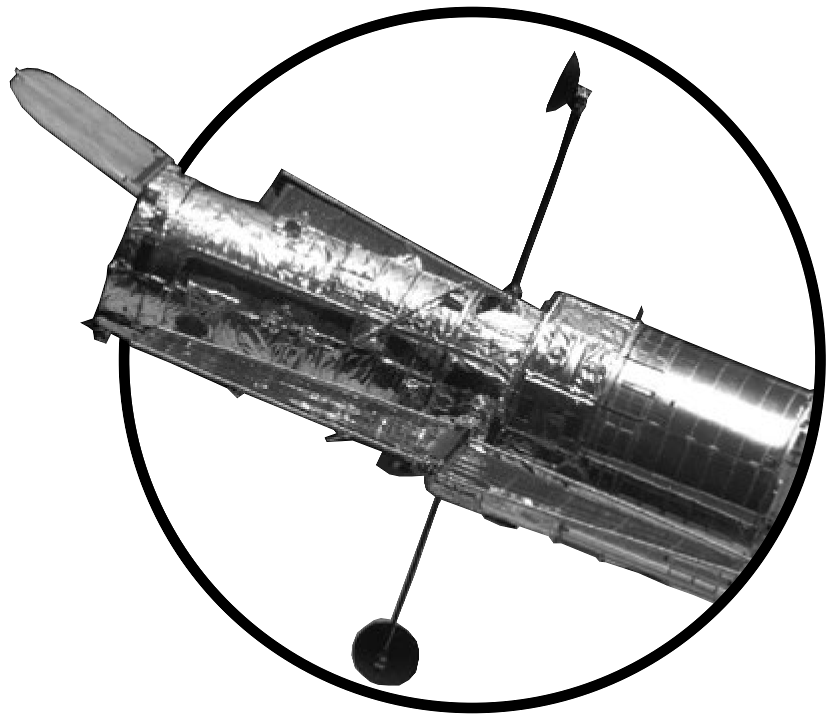


Service Module | Command Module | Lunar Module



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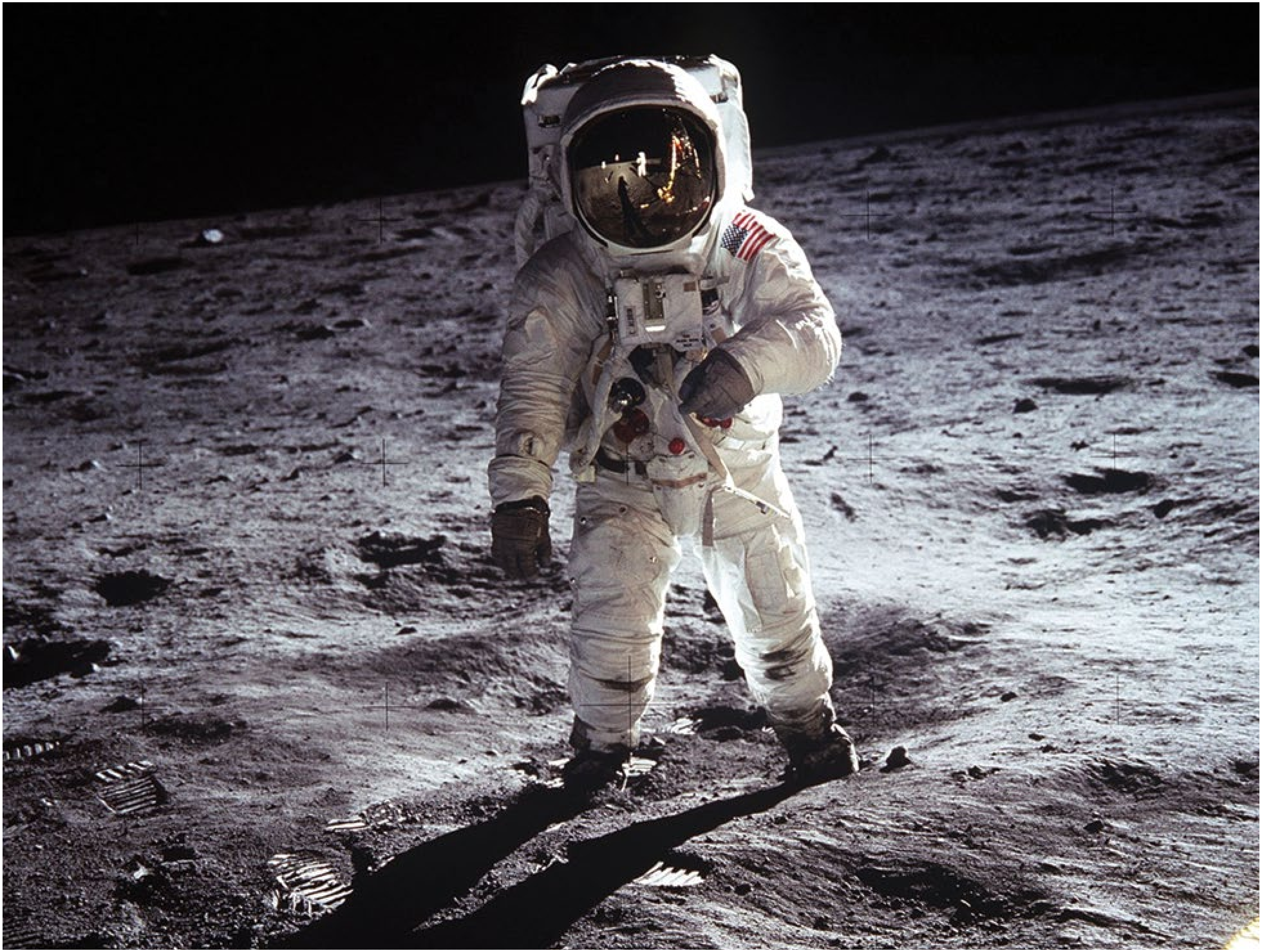

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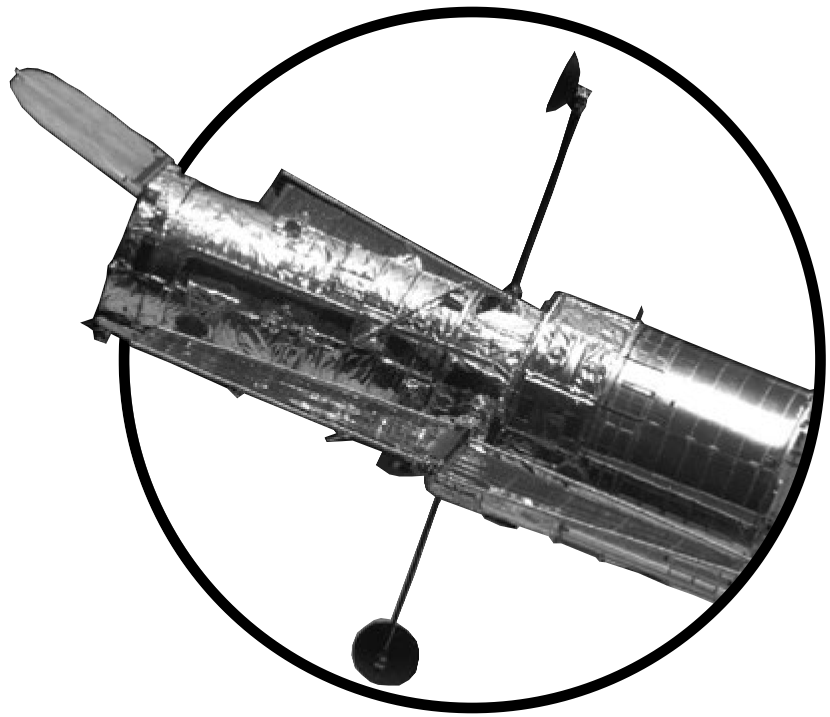

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Contributors to Earlier Versions of these Materials

Susan B. Albaugh, Kazuko Ashizawa, Kim Berrall, Ang Blanchette, Nancy Braier, Maggie Buchanan, Paula Coyner, Kathryn M. Cummings, Michelle De Groot, Michael Donegan, Diana Espinal, Mary E. Forbes, Michael L. Ford, Sue Fulton, Carolyn Gosse, Dorrit Green, Liza Greene, Ted Hirsch, Danielle Knecht, James K. Lee, Matt Leech, Diane Henry Leipzig, Robin Luecke, Martha G. Mack, Liana Mahoney, Isabel McLean, Steve Morrison, Juliane K. Munson, Elizabeth B. Rasmussen, Ellen Sadler, Rachael L. Shaw, Sivan B. Sherman, Diane Auger Smith, Laura Tortorelli, Khara Turnbull, Miriam E. Vidaver, Michelle L. Warner, Catherine S. Whittington, Jeannette A. Williams

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Schools

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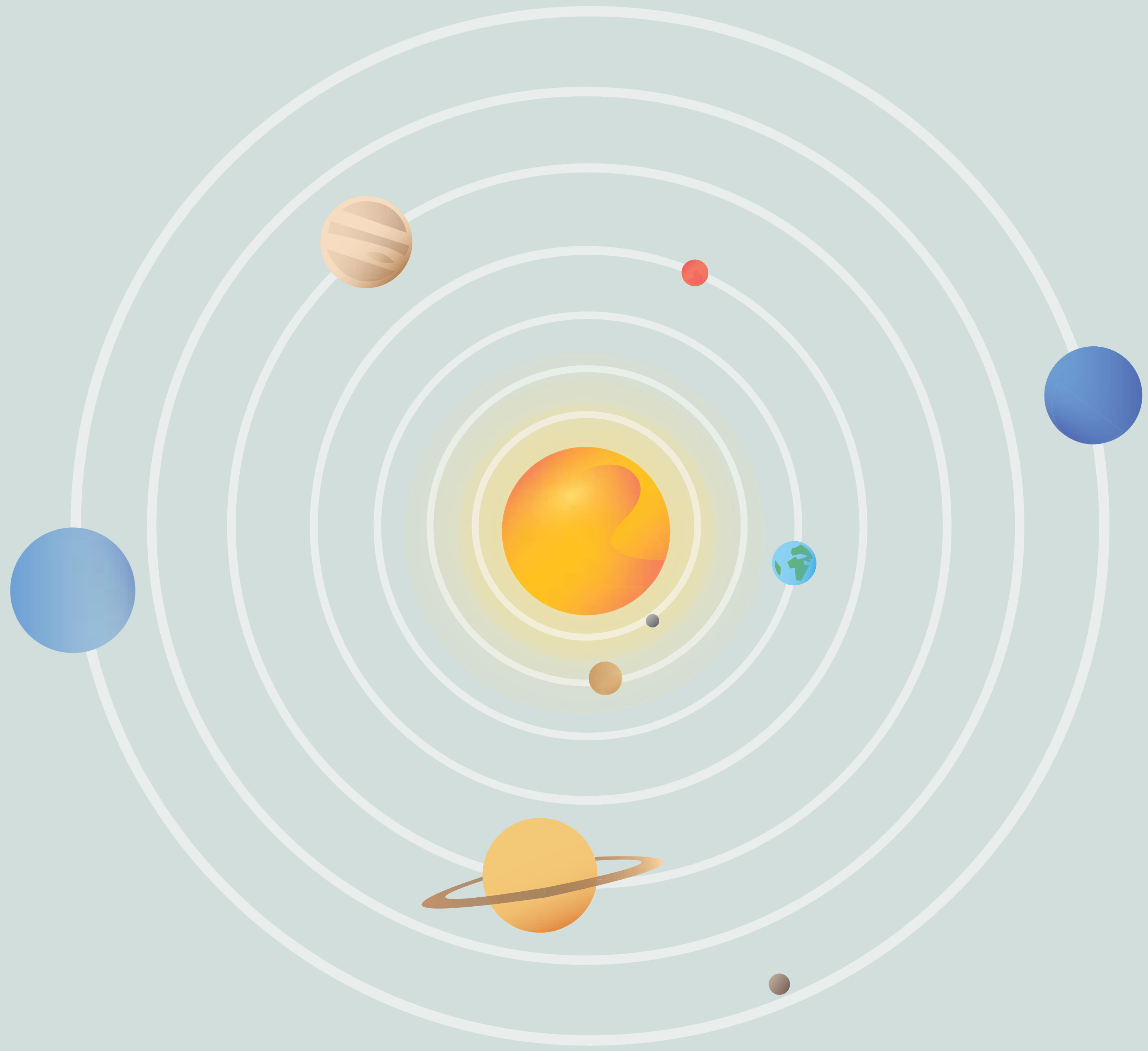


Grade 3

Unit 7 | Digital Flip Book

Astronomy: Our Solar System and Beyond

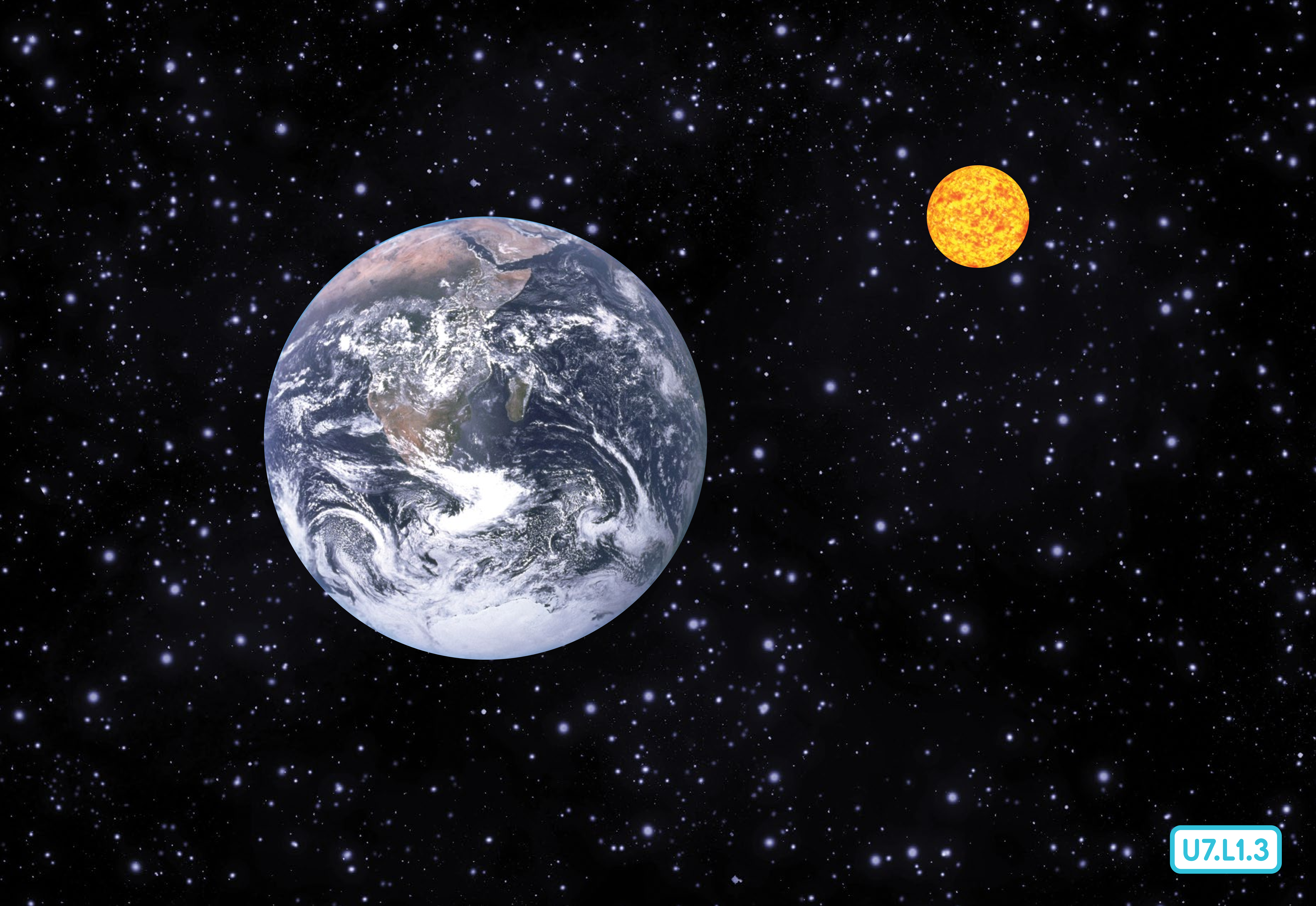
Grade 3 | Unit 7

Astronomy:
Our Solar System and Beyond

Digital Flip Book


U7.L1.1

U7.L1.2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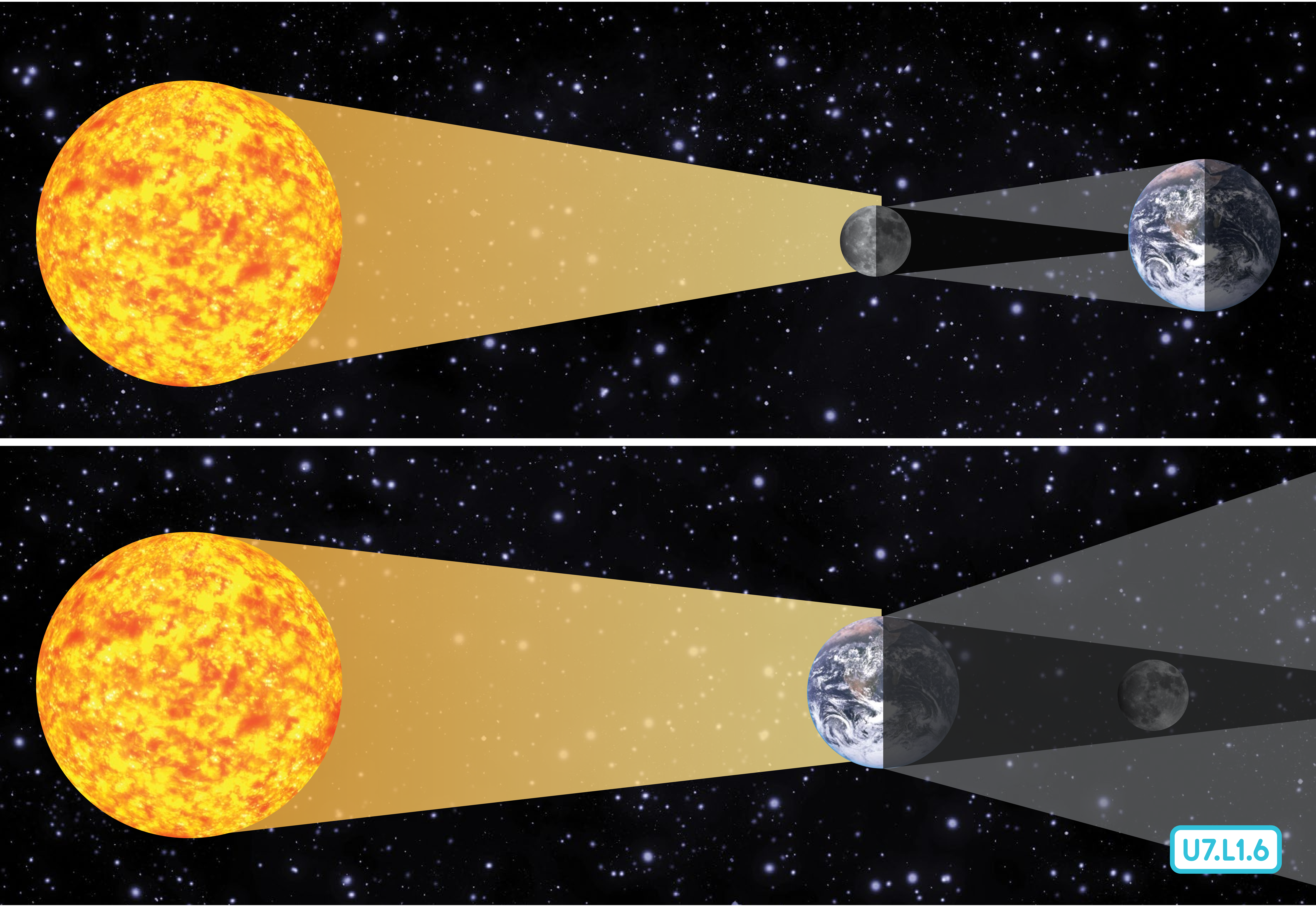
U7.L1.5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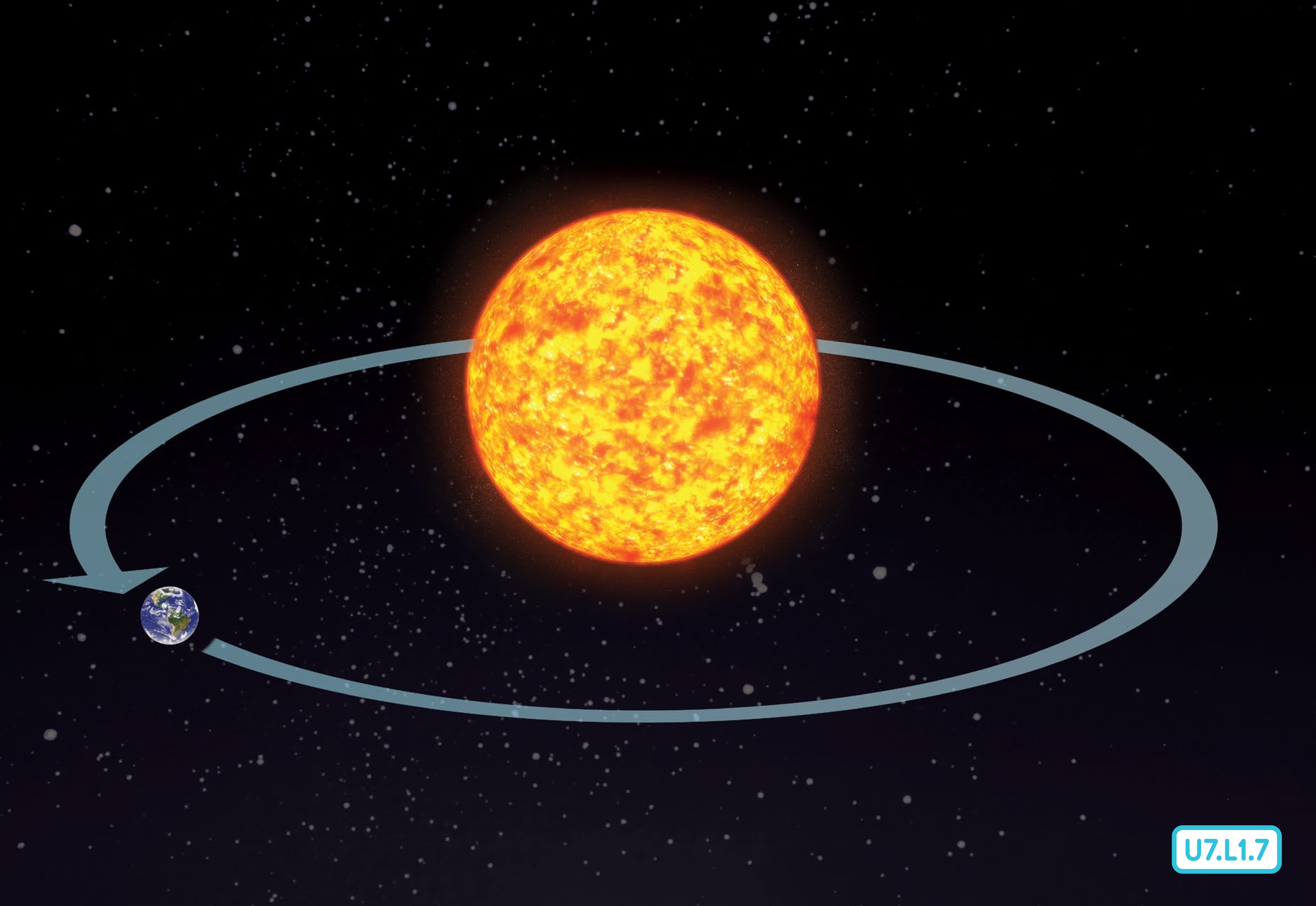
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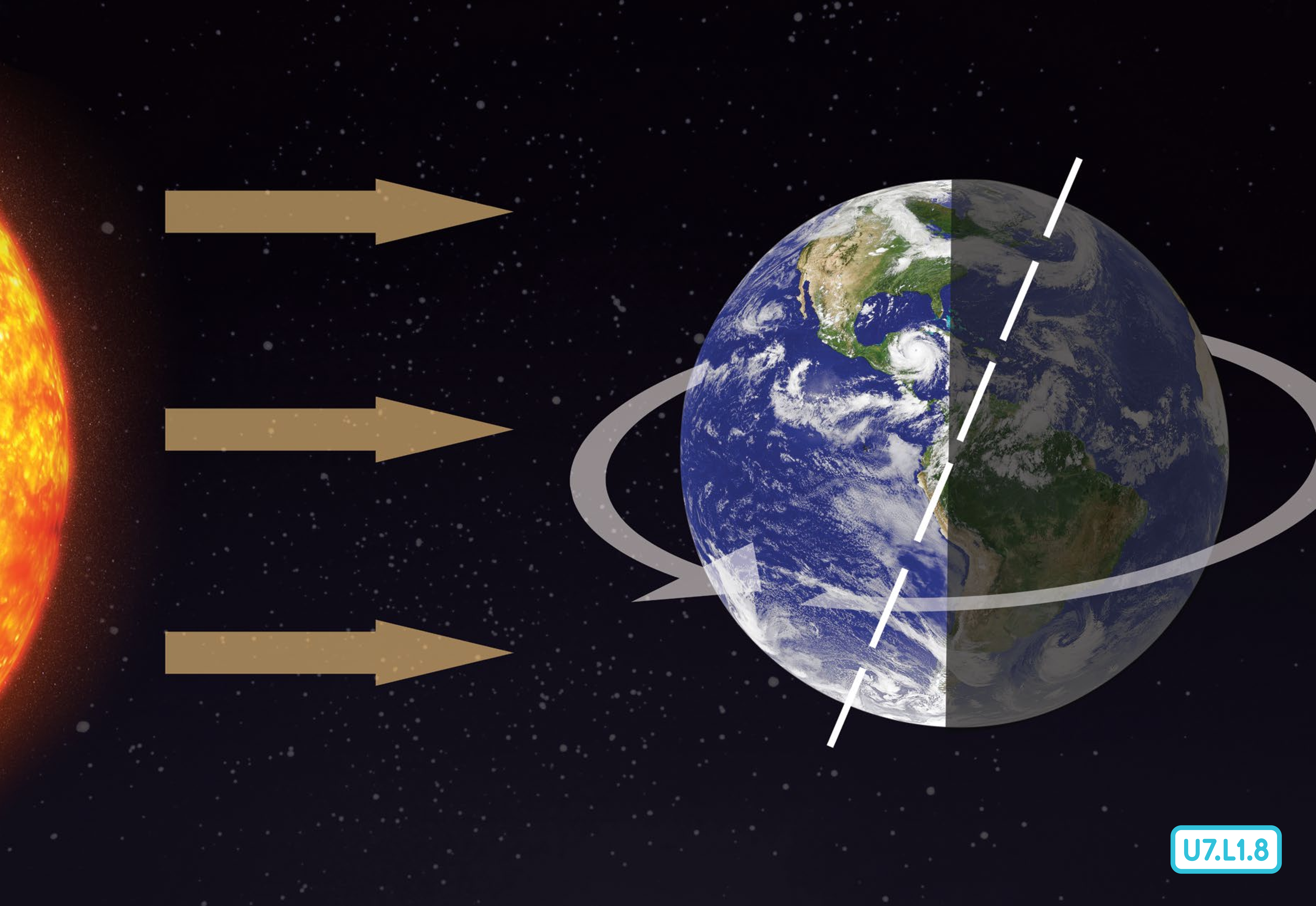

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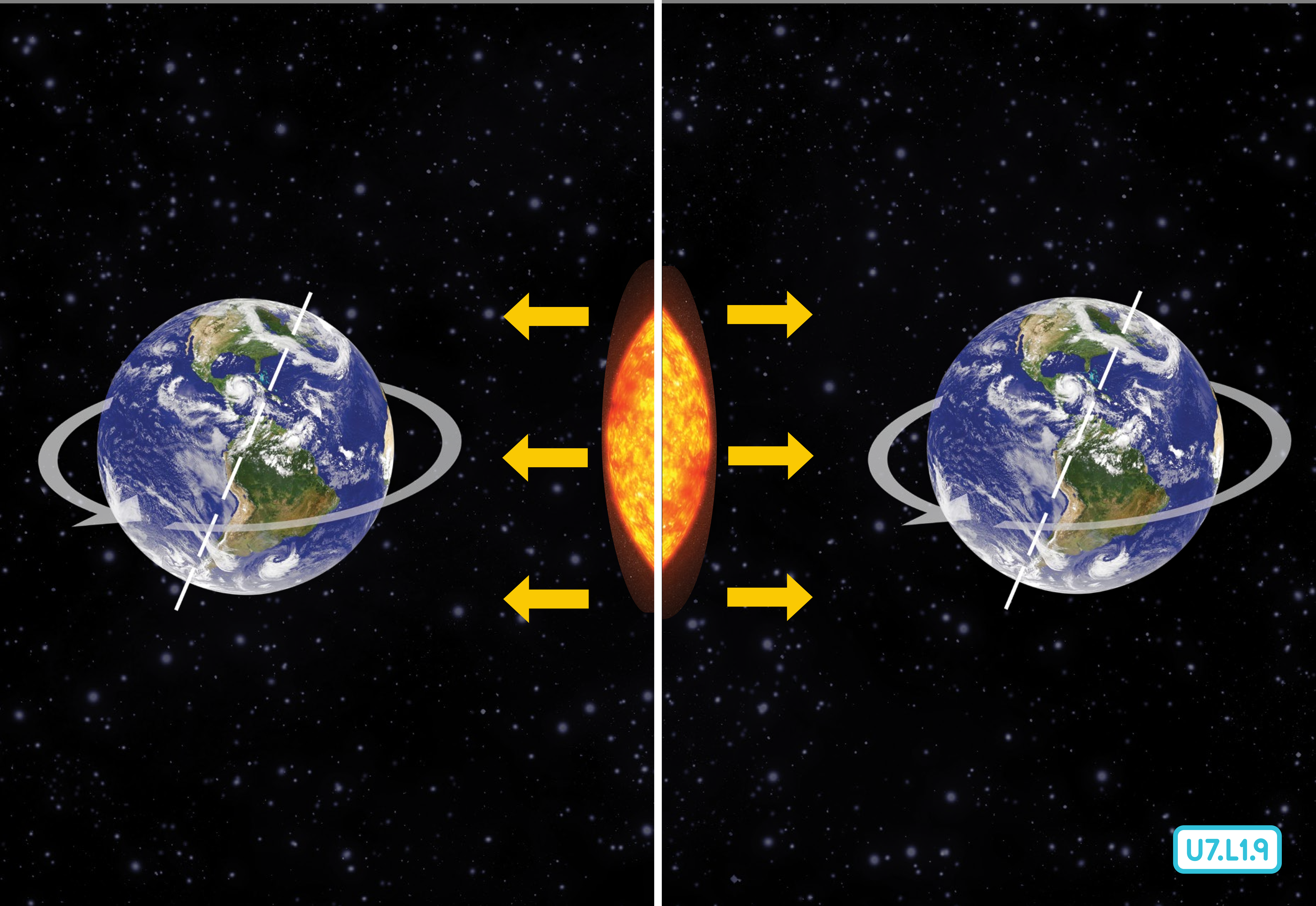

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U7.L1.10

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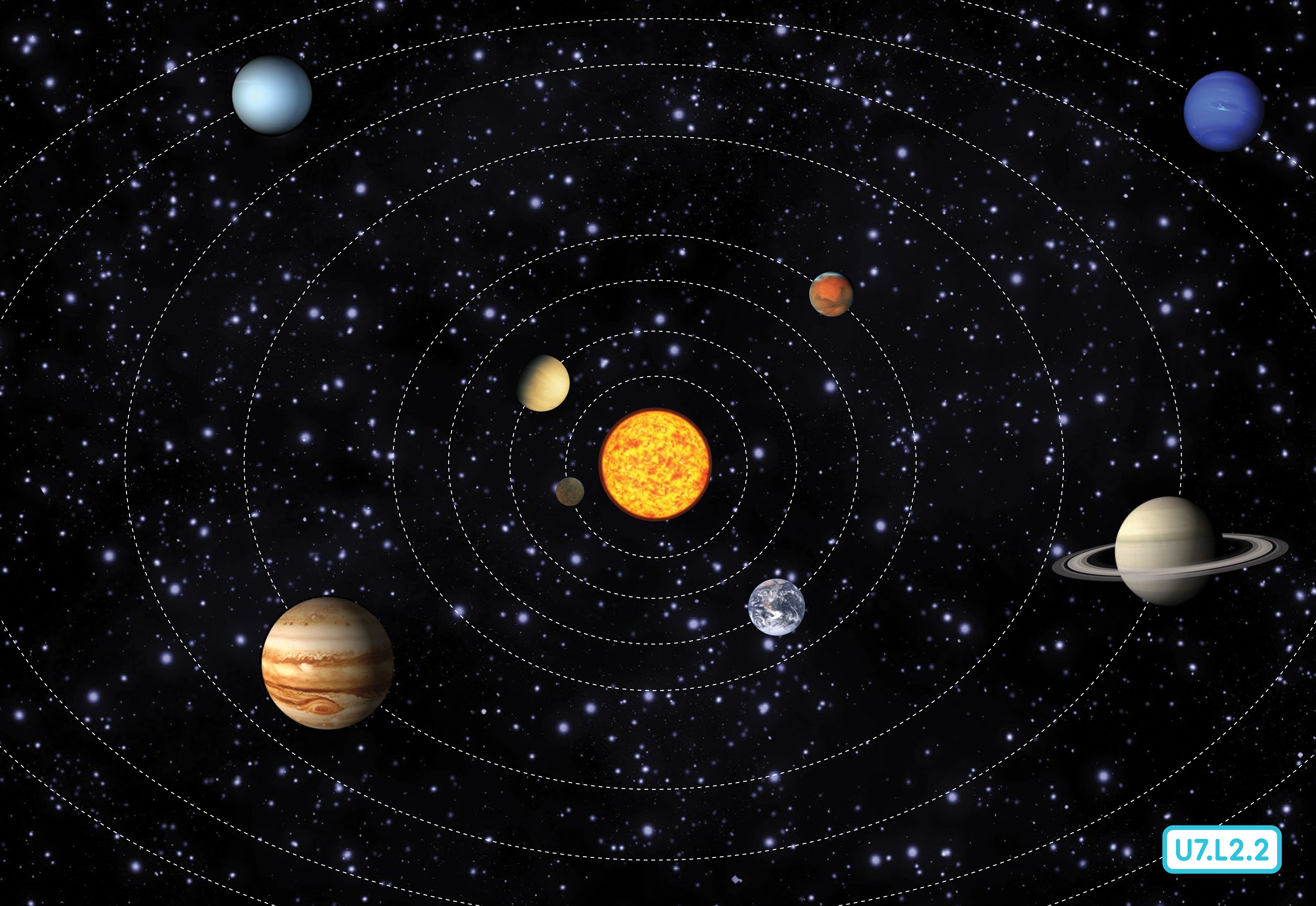

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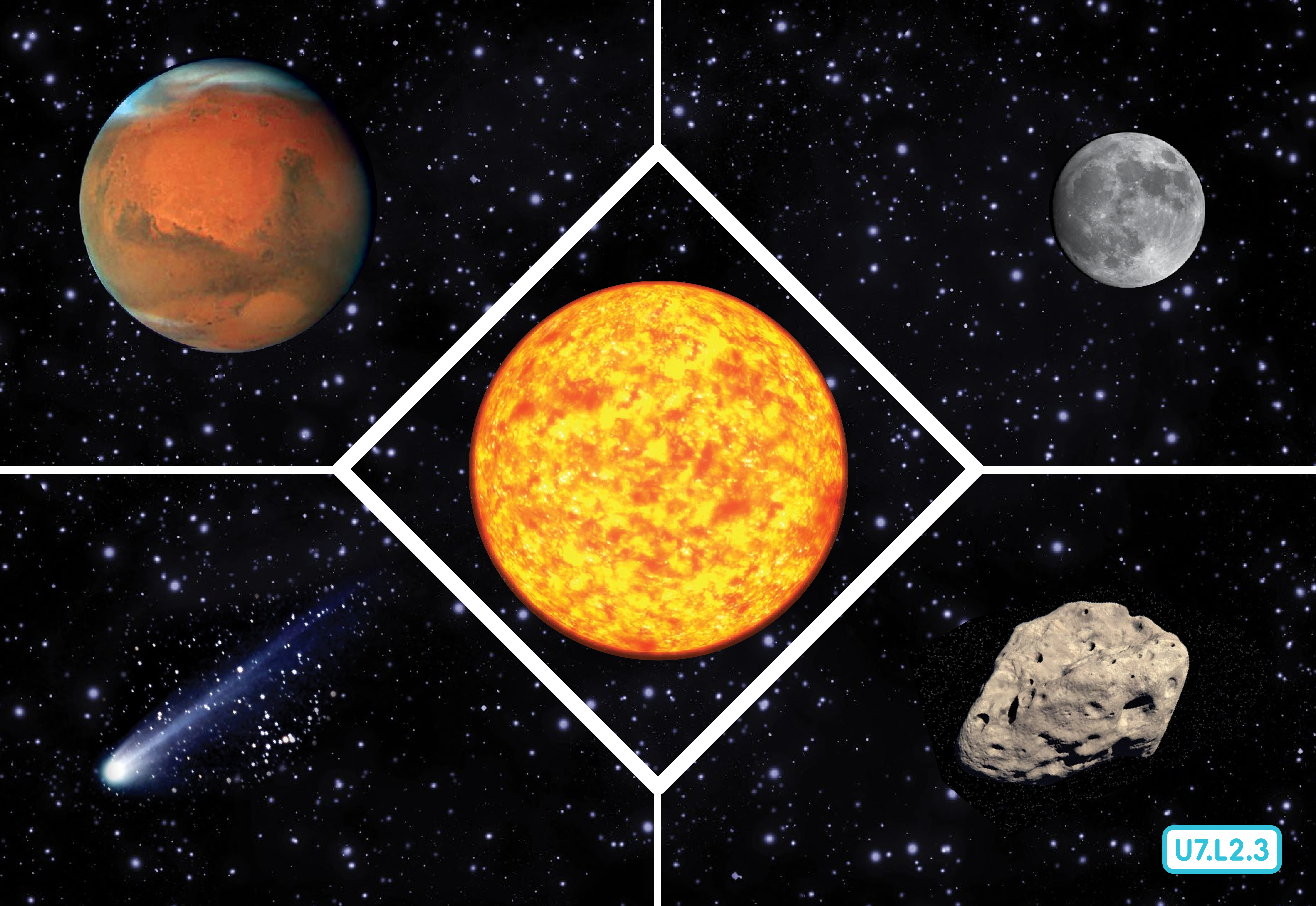
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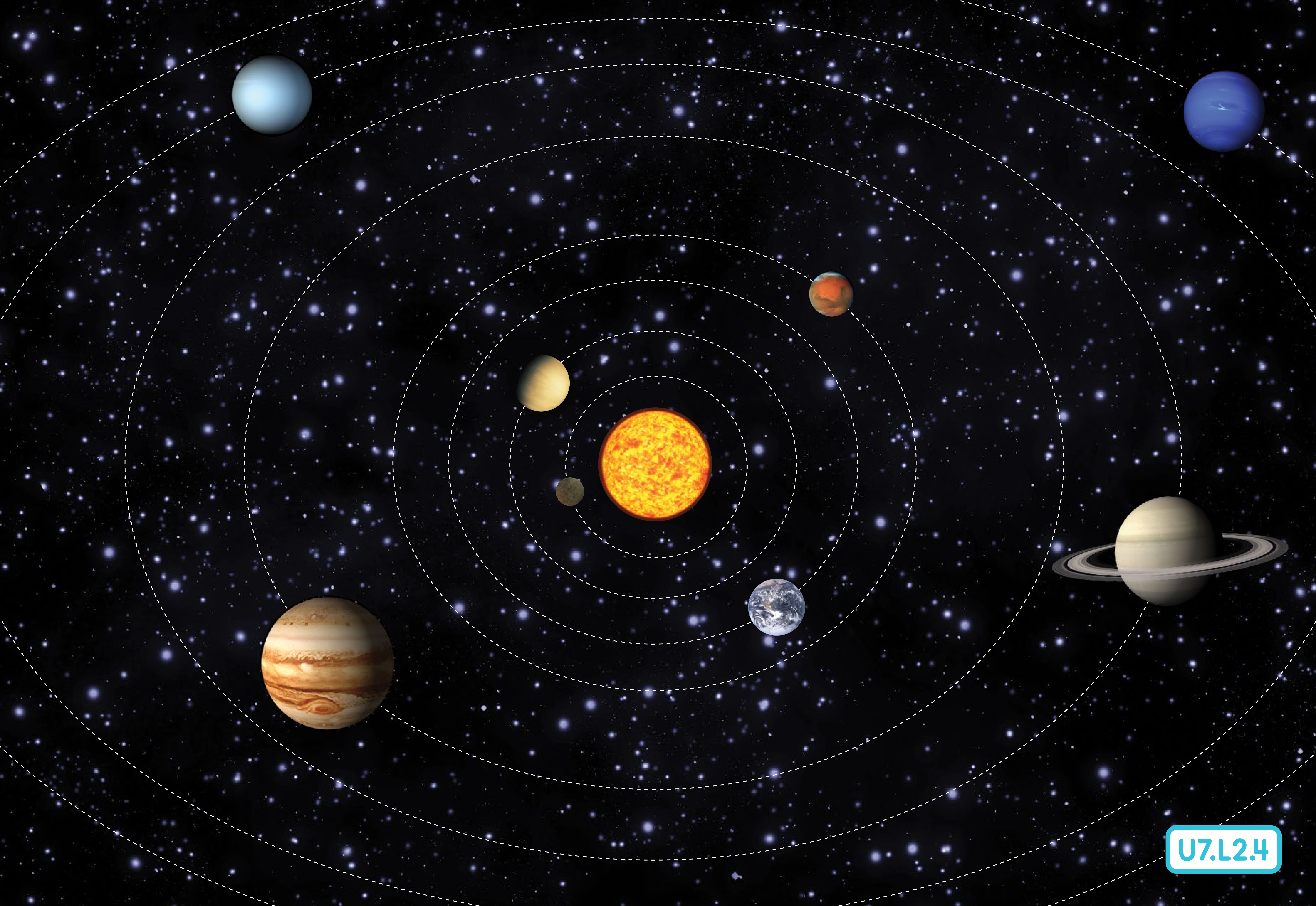
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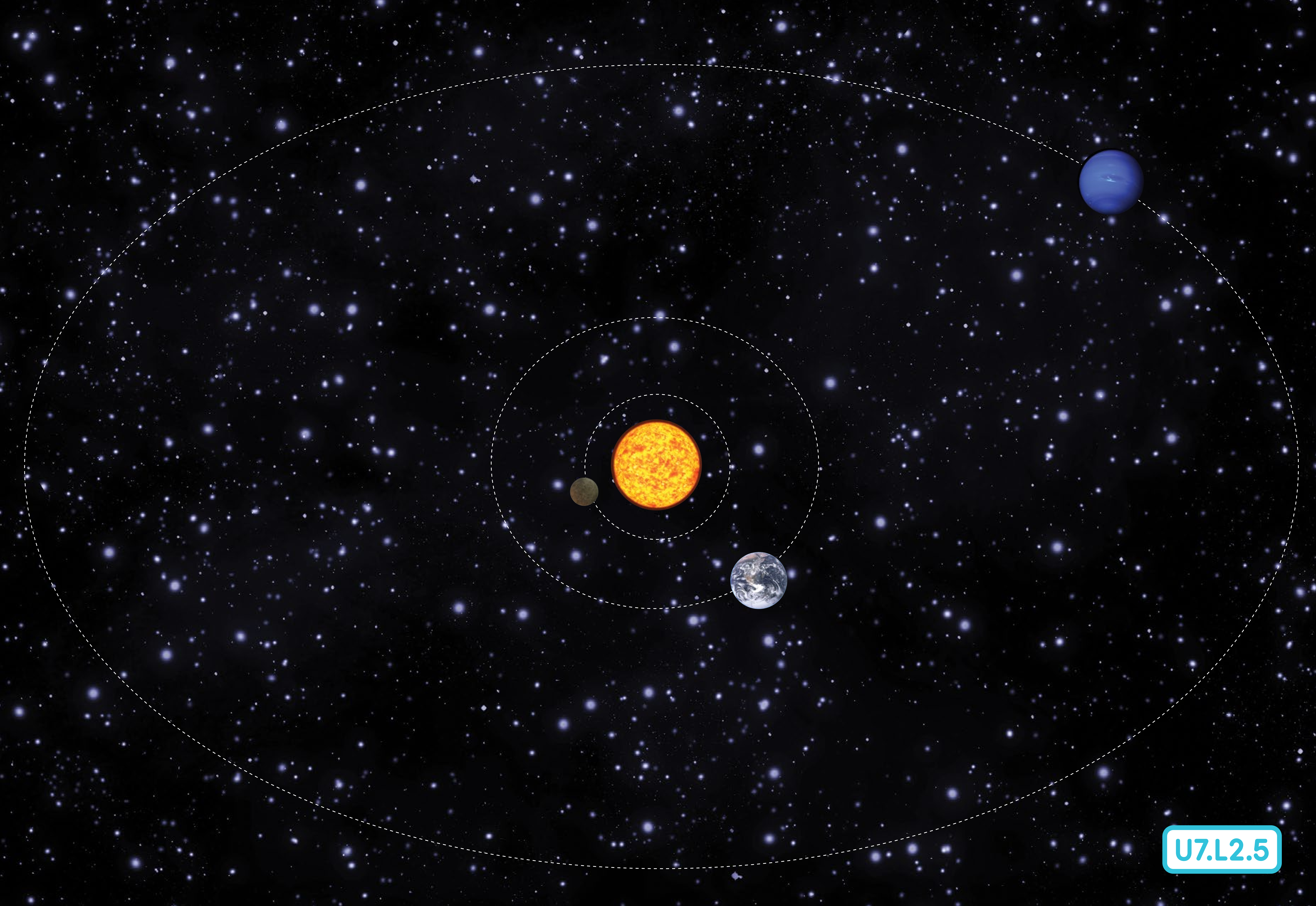
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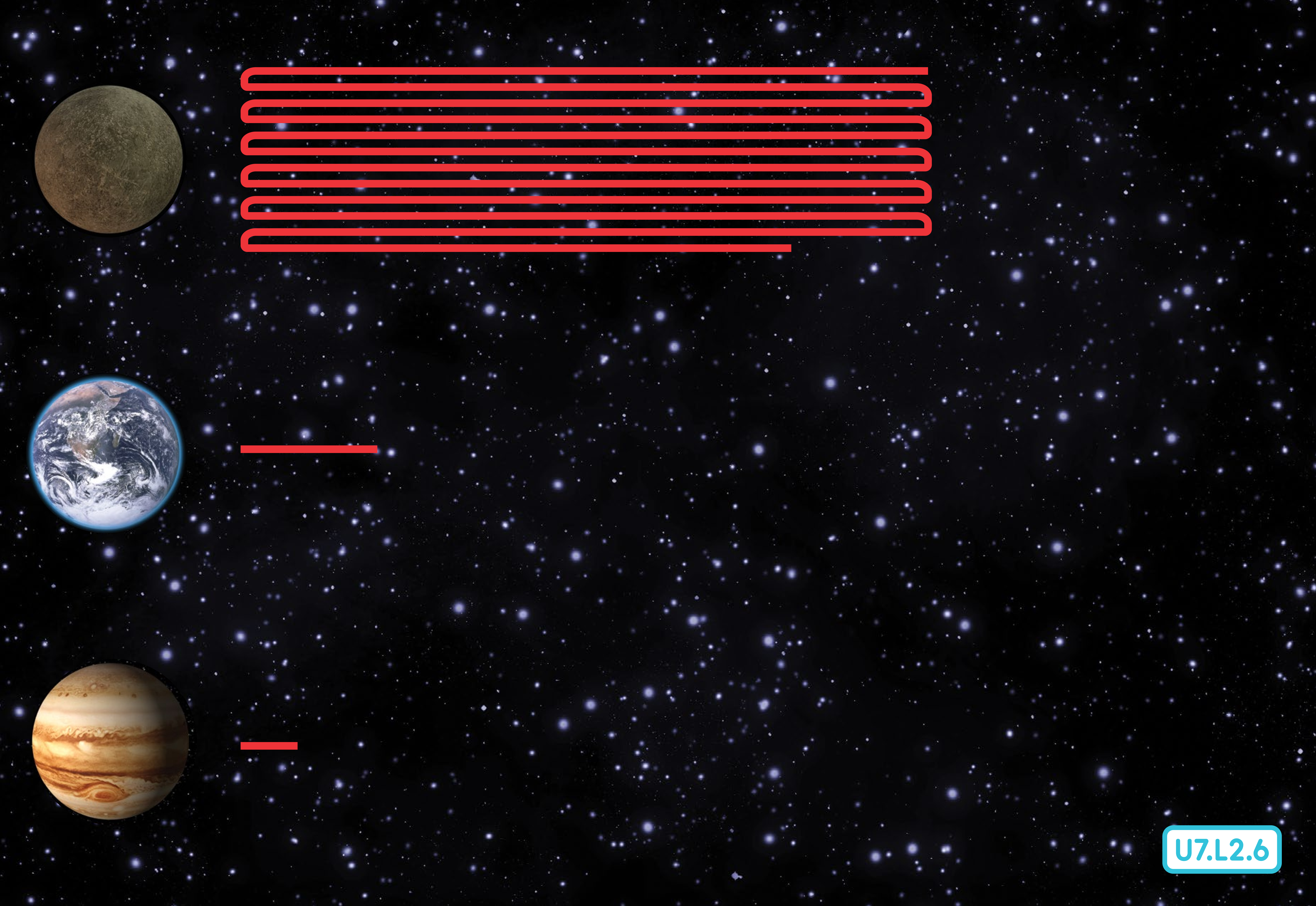

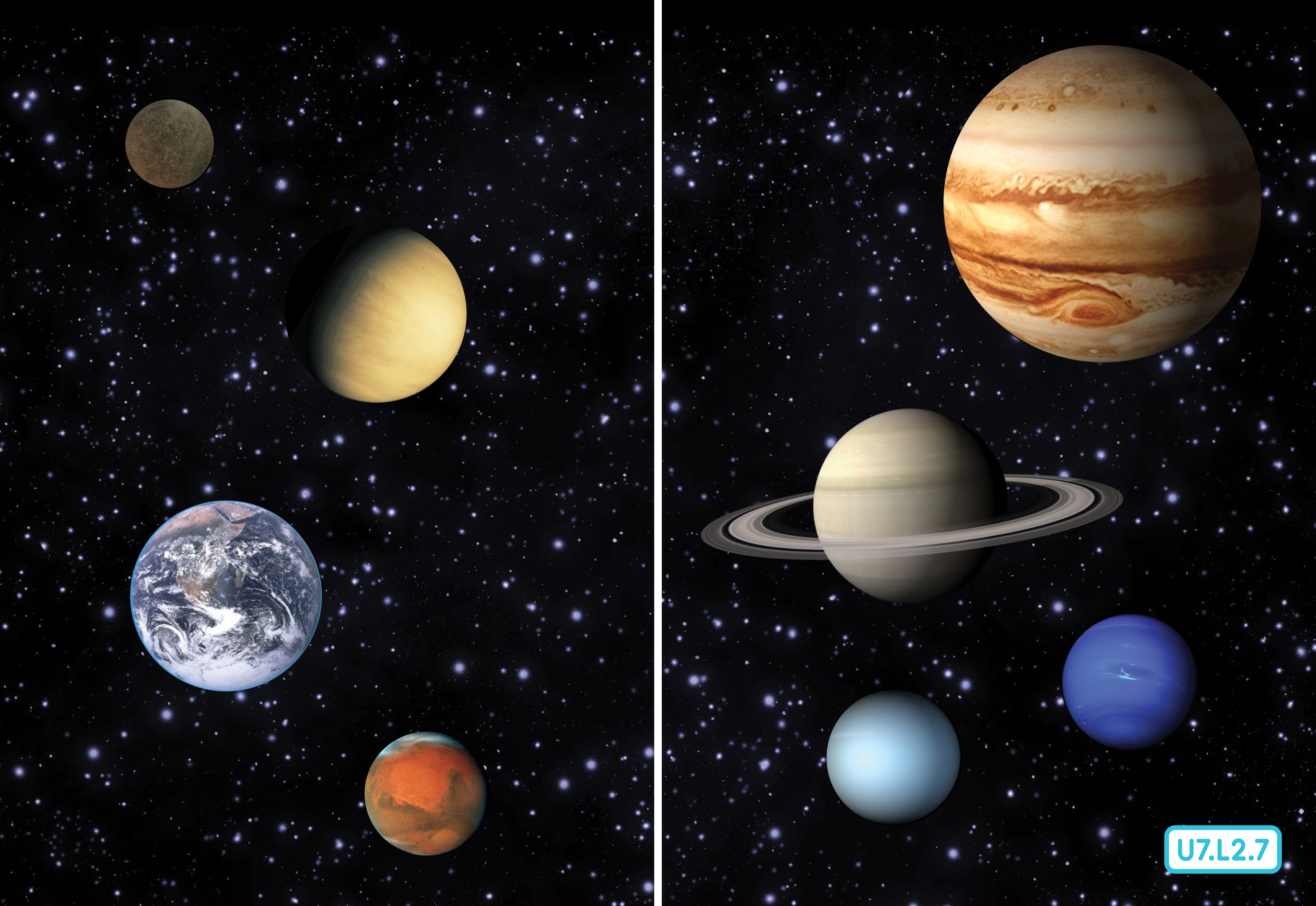

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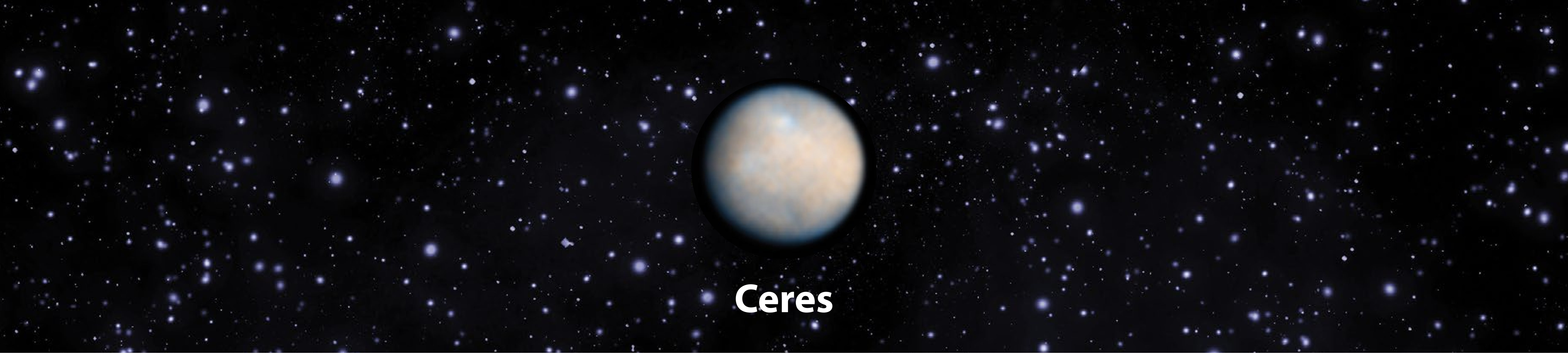
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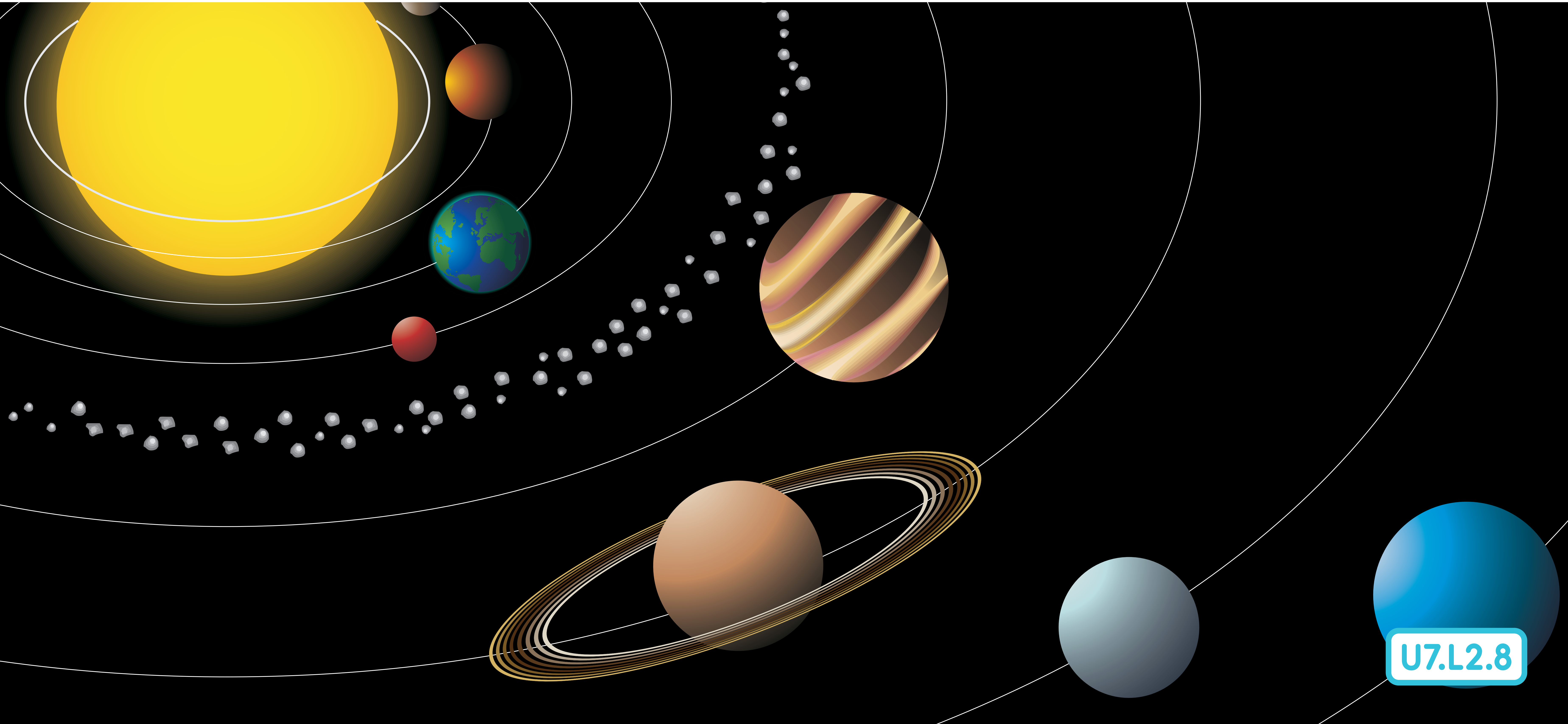
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U7.L2.10


U7.L2.11

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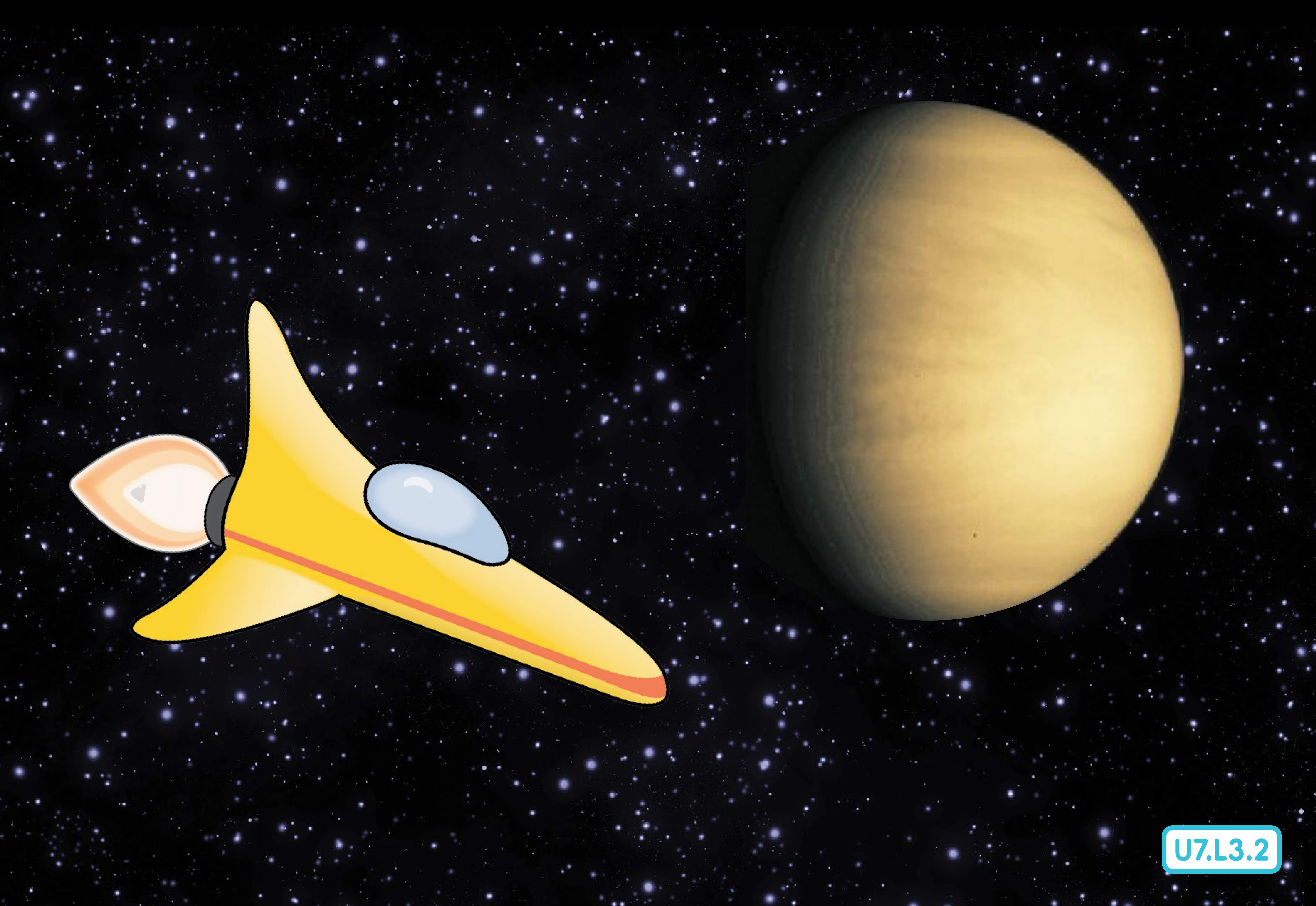
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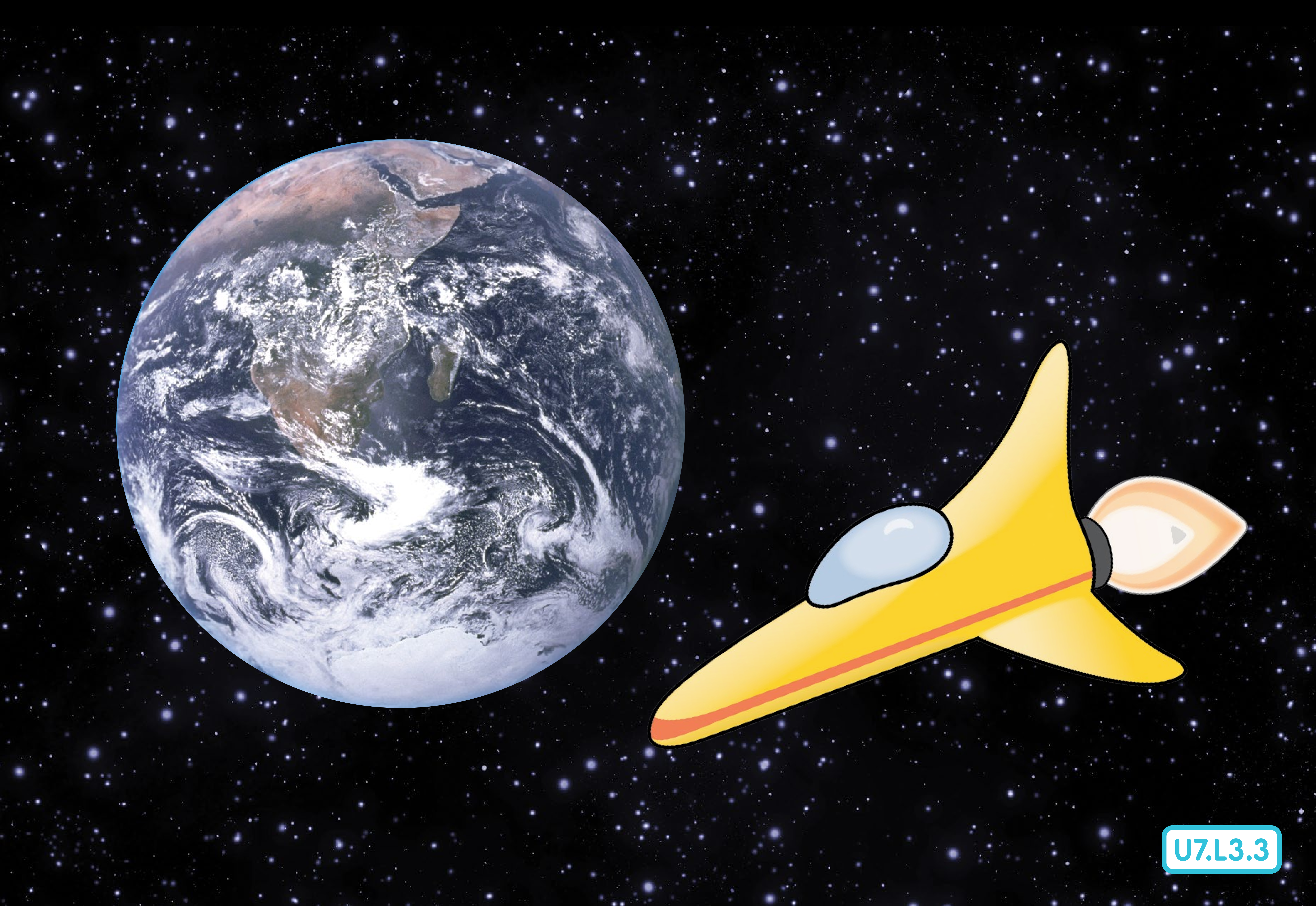

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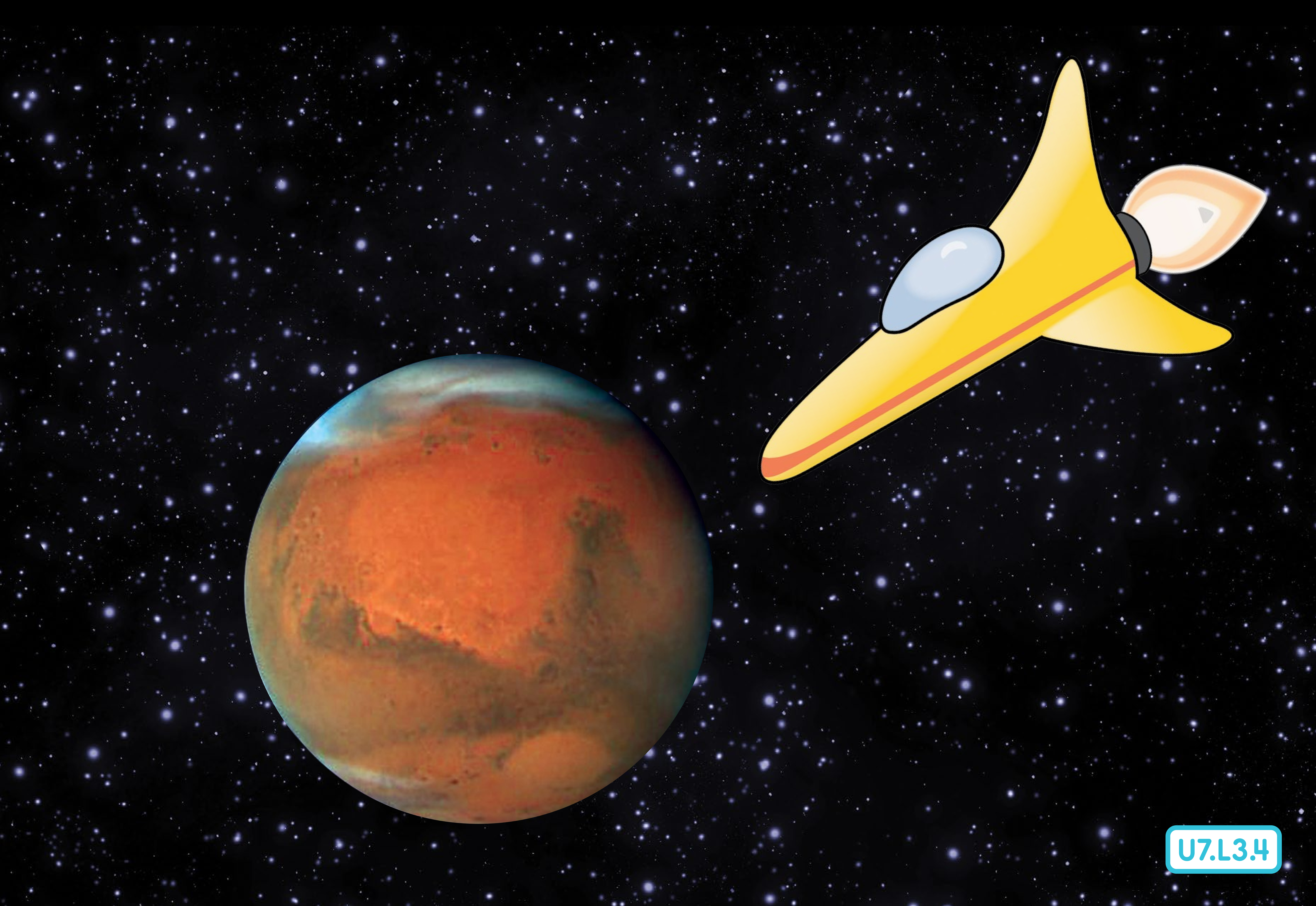
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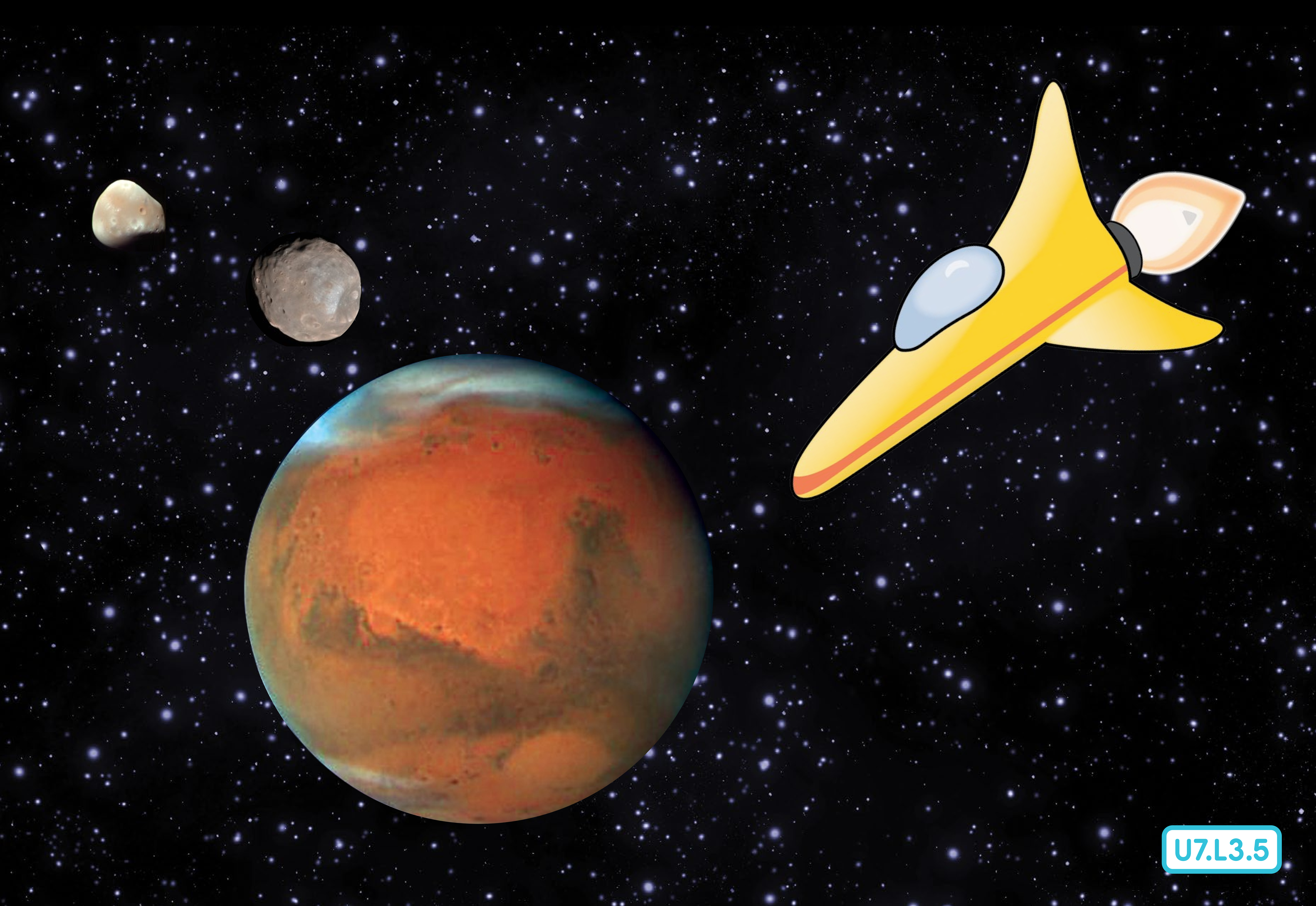

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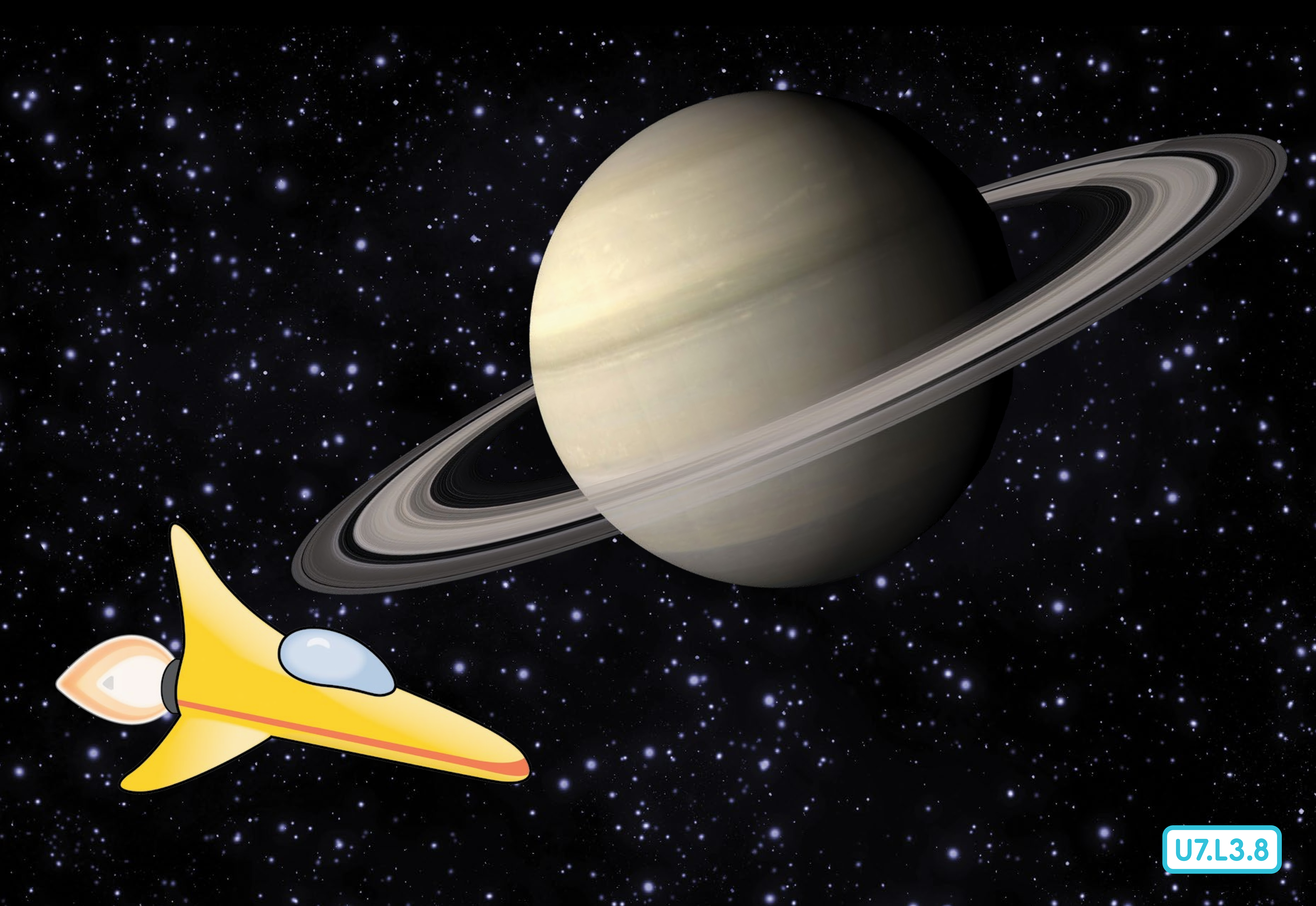

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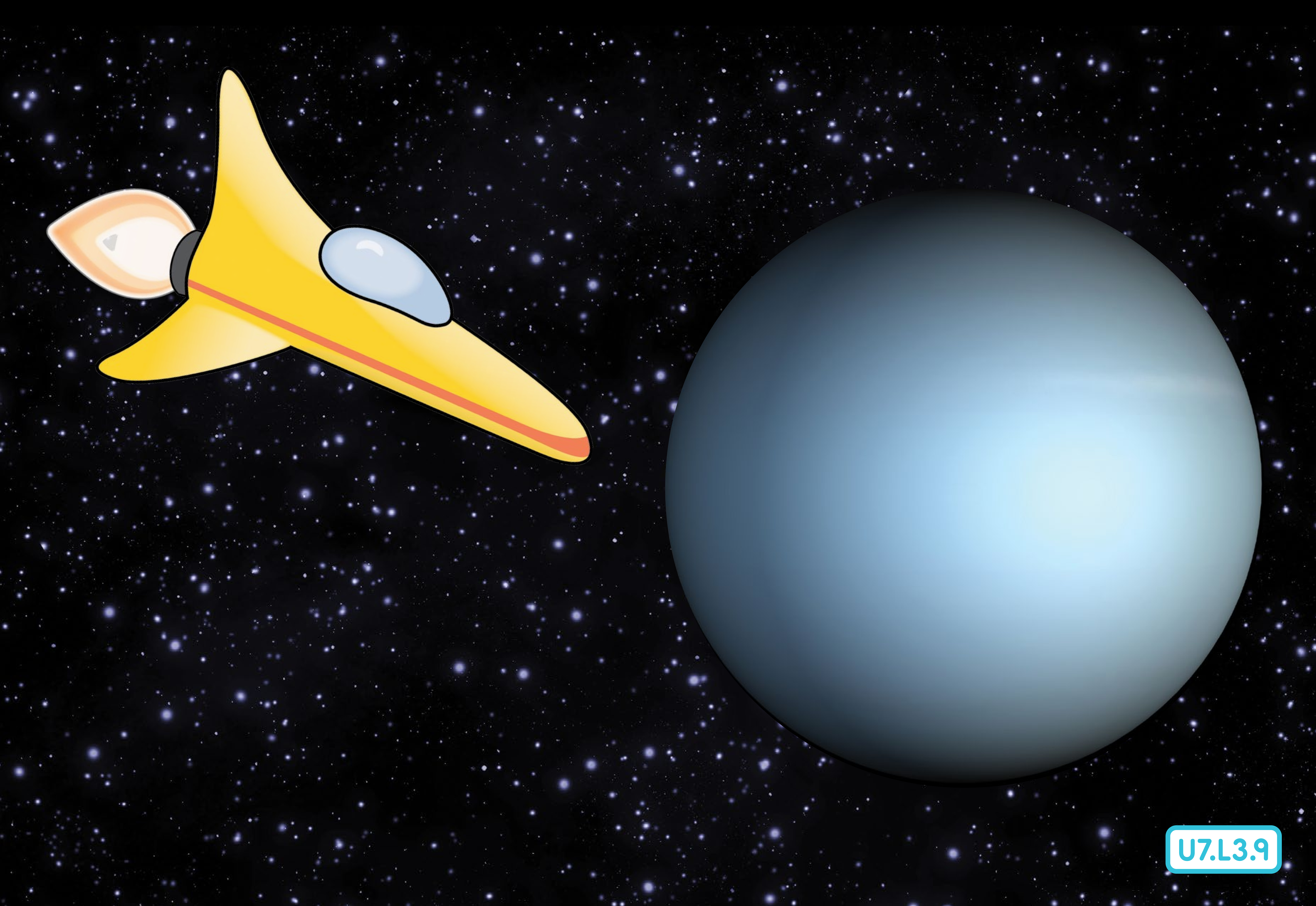
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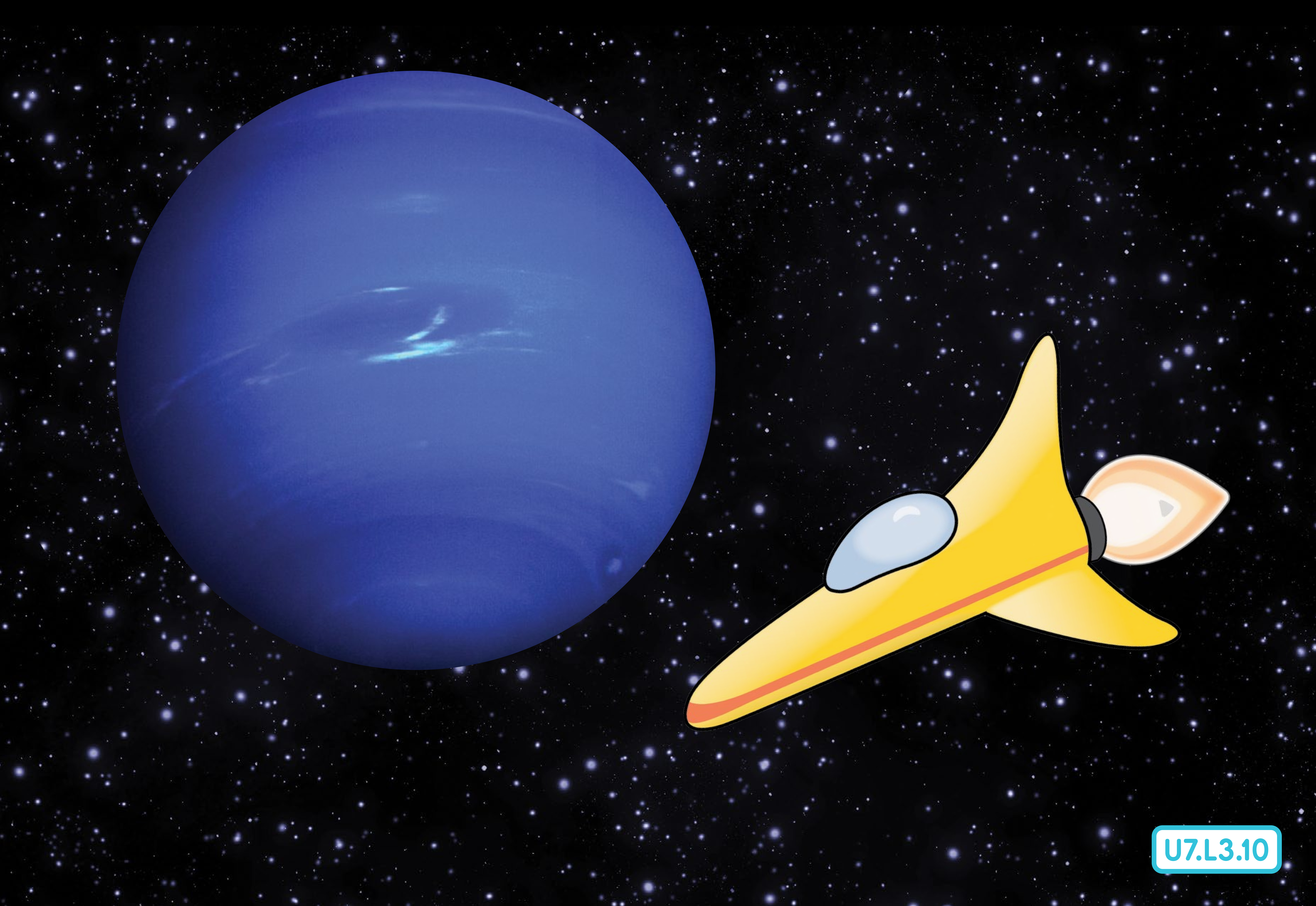
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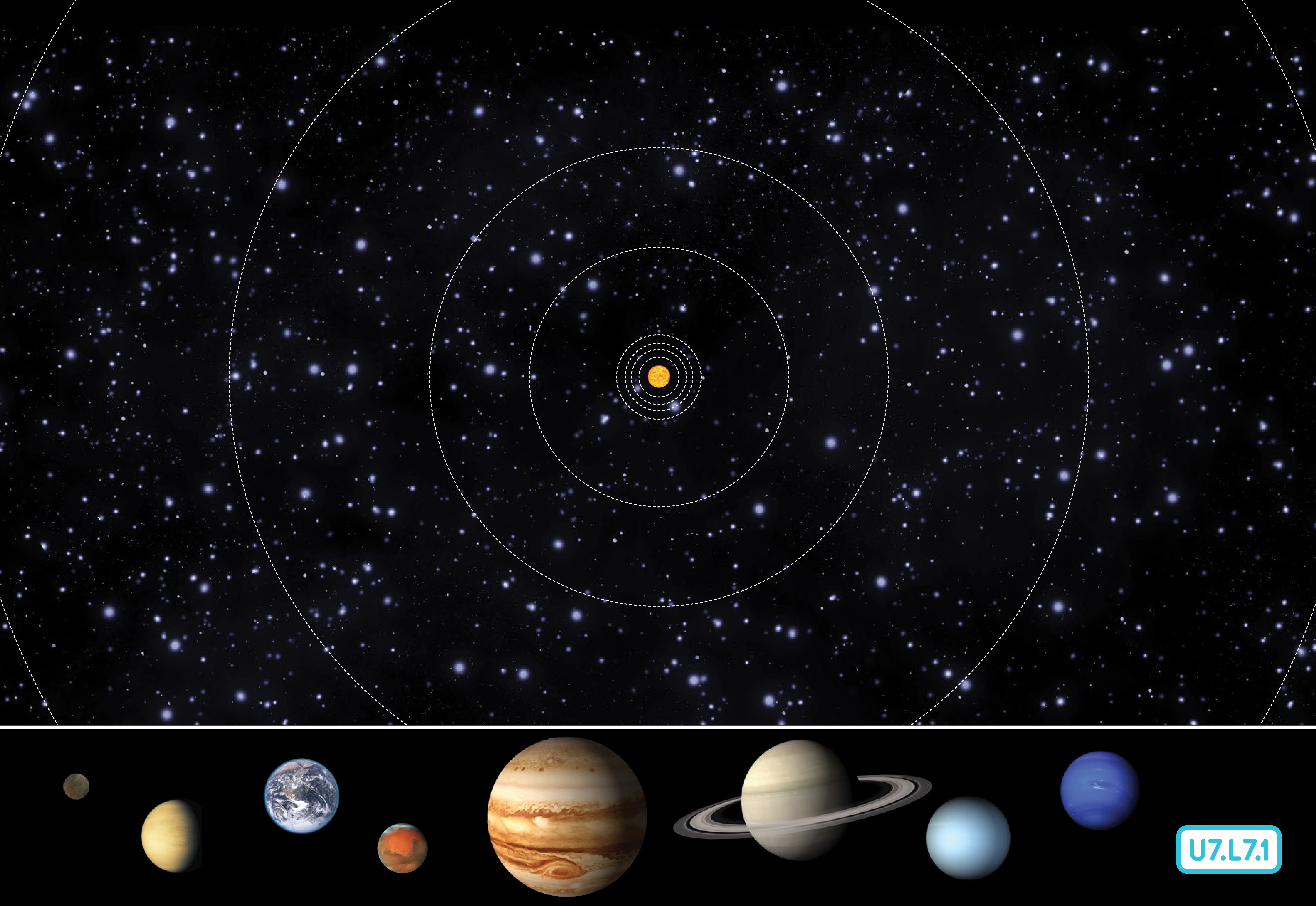
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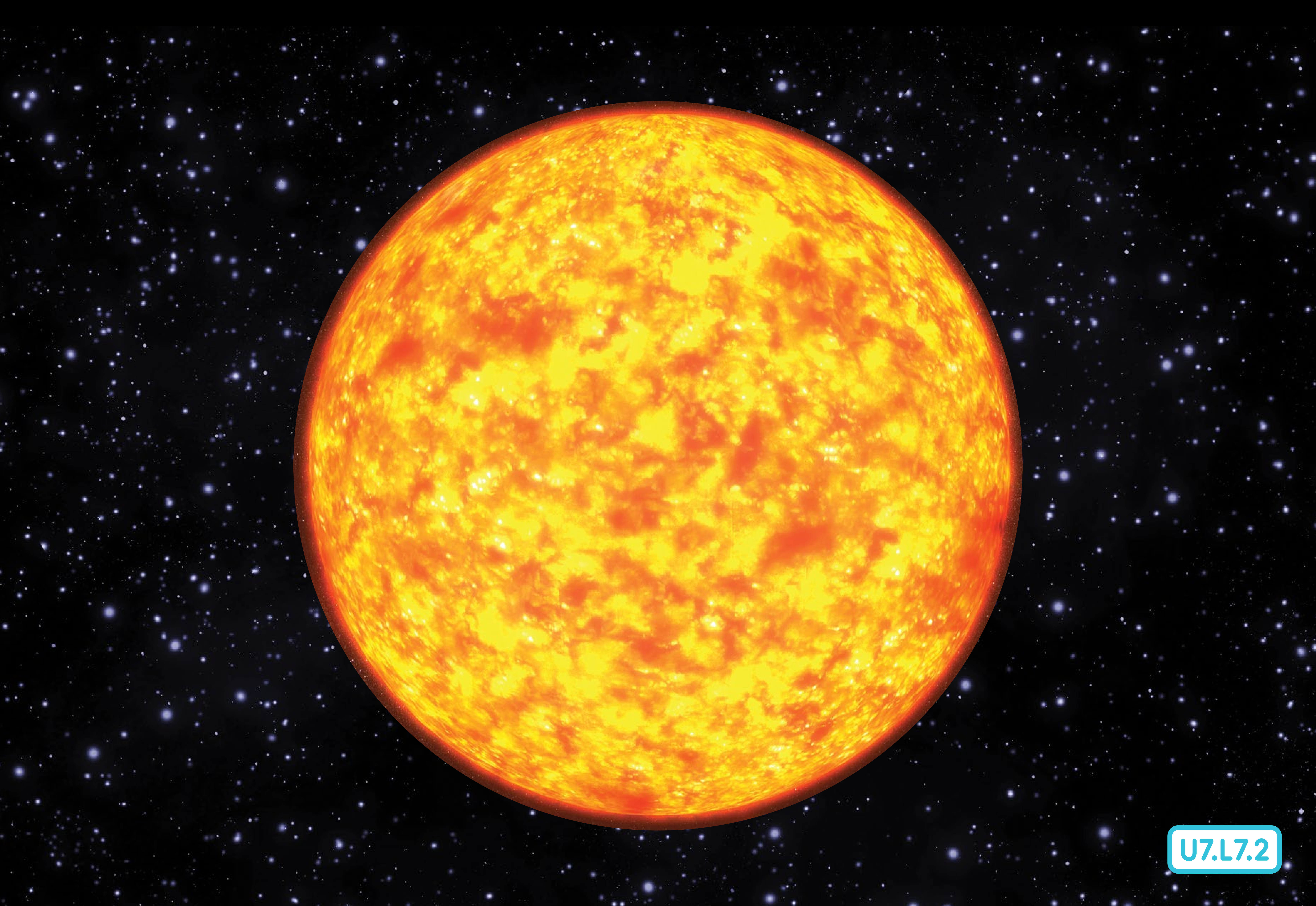

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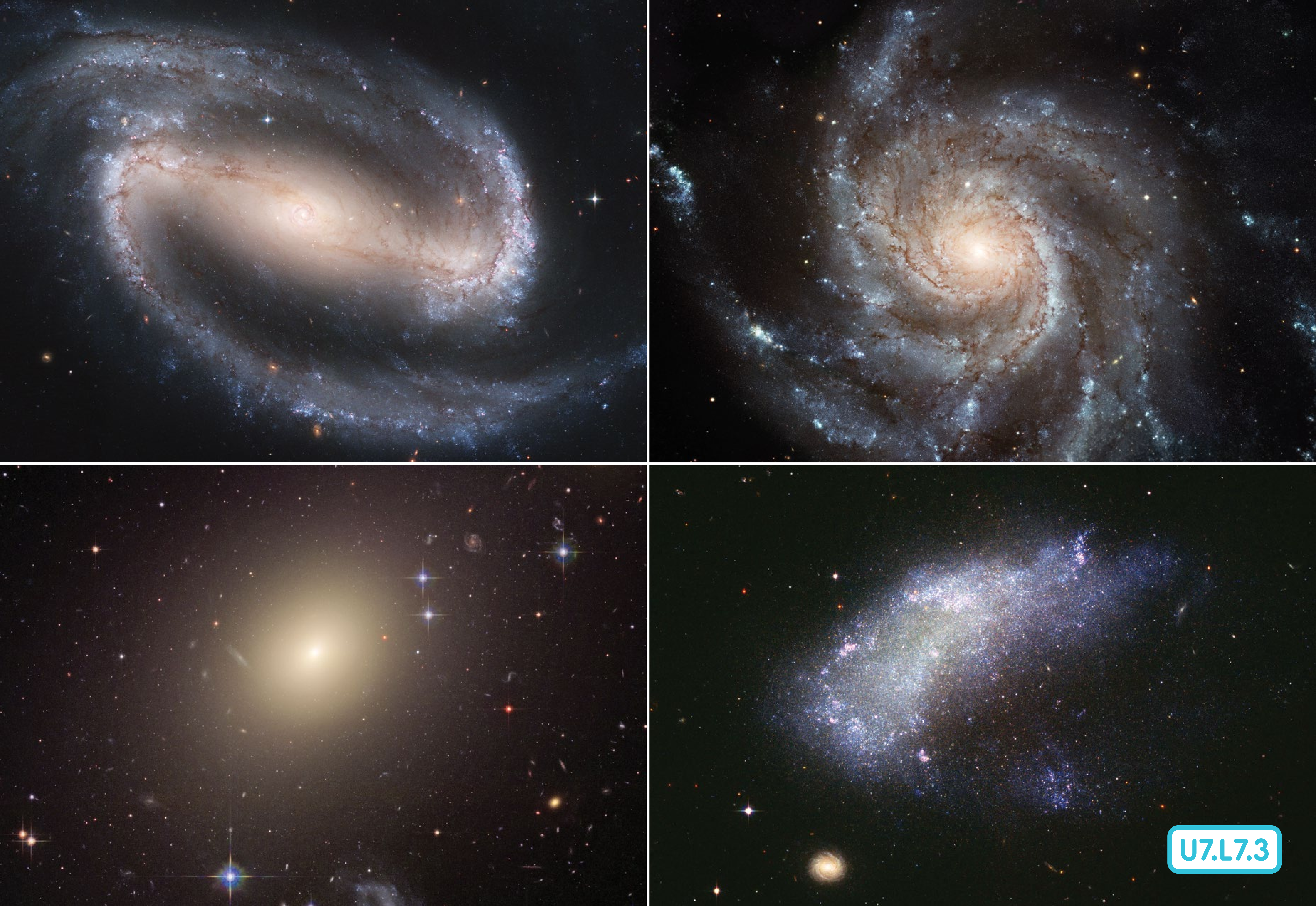
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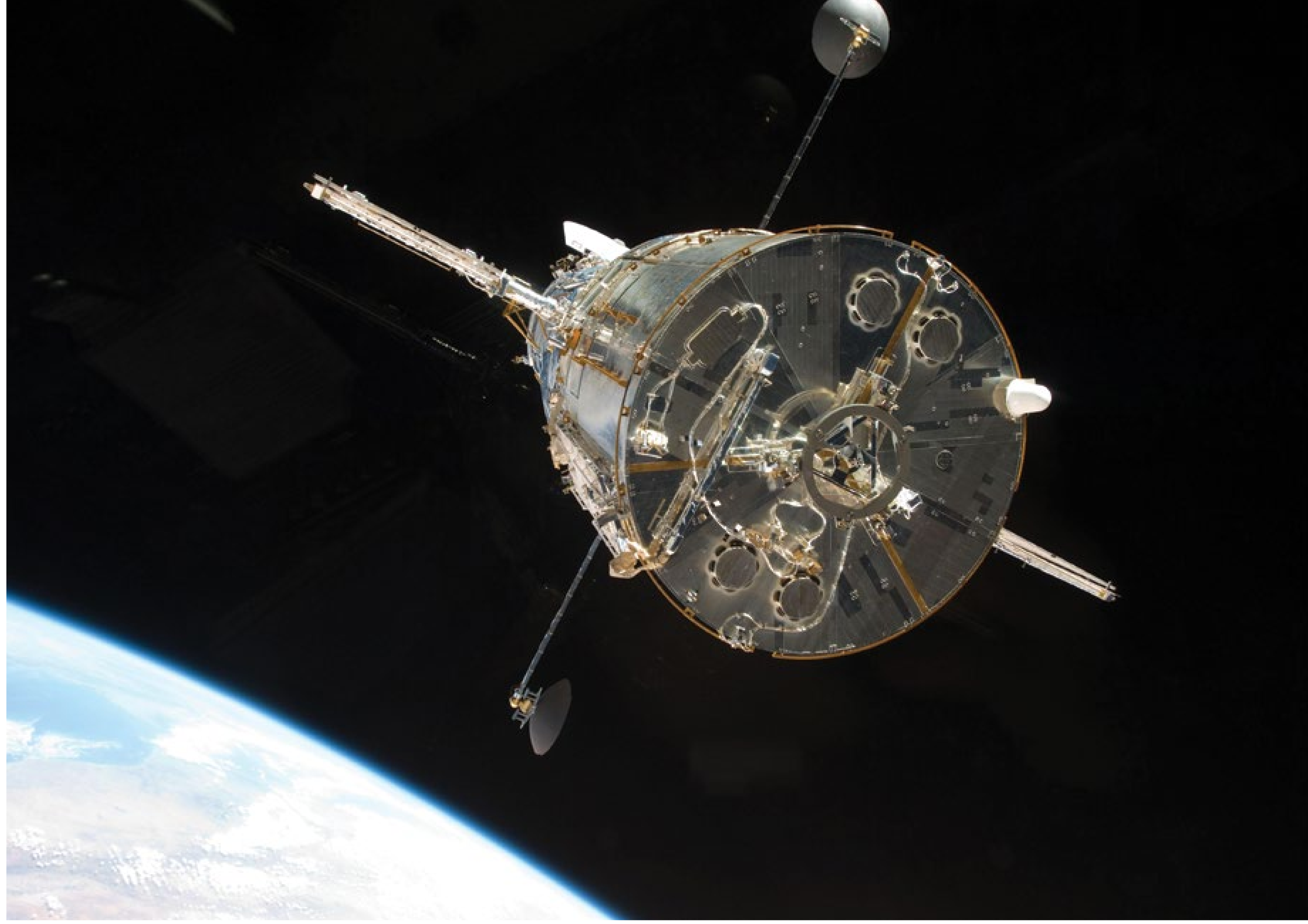
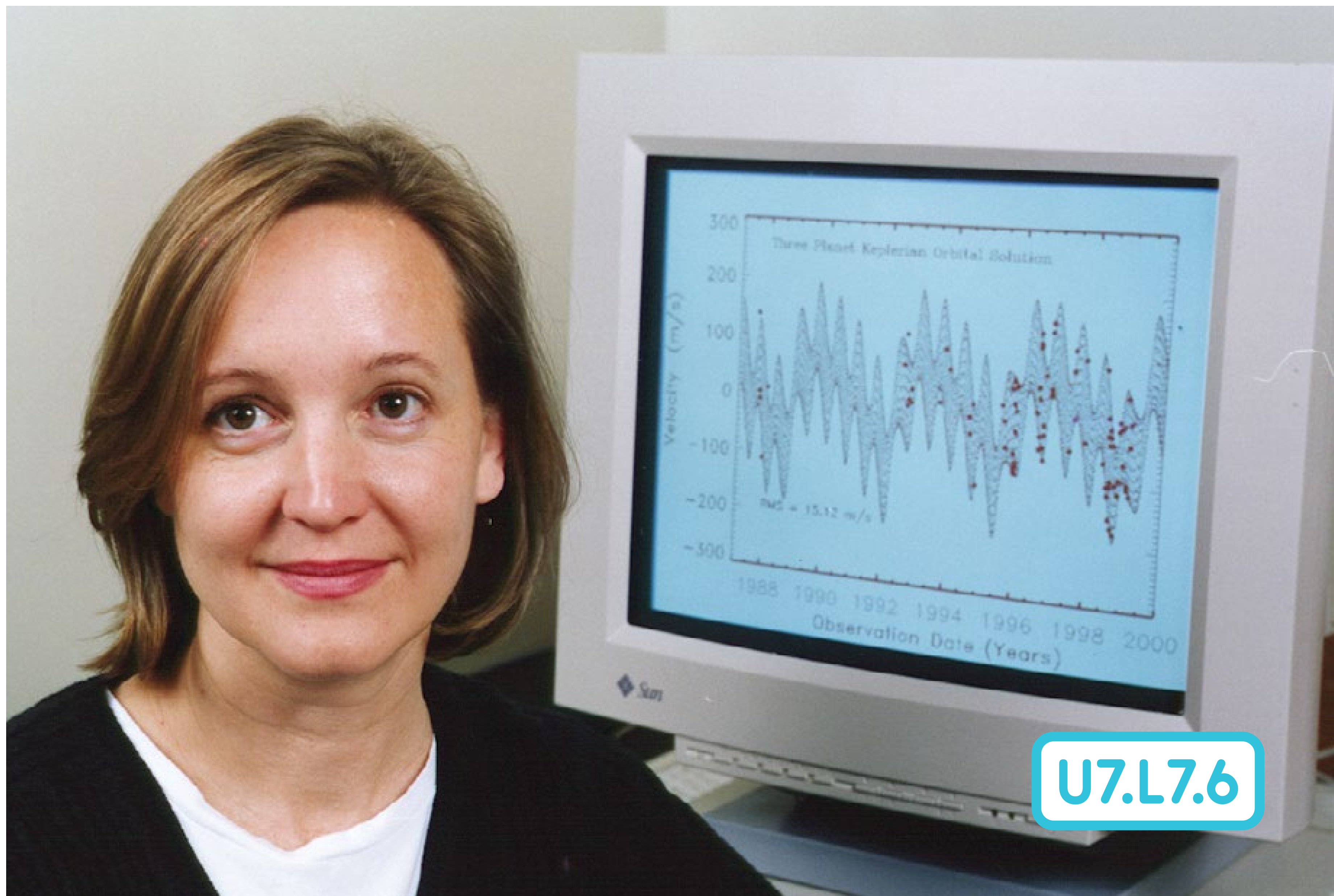
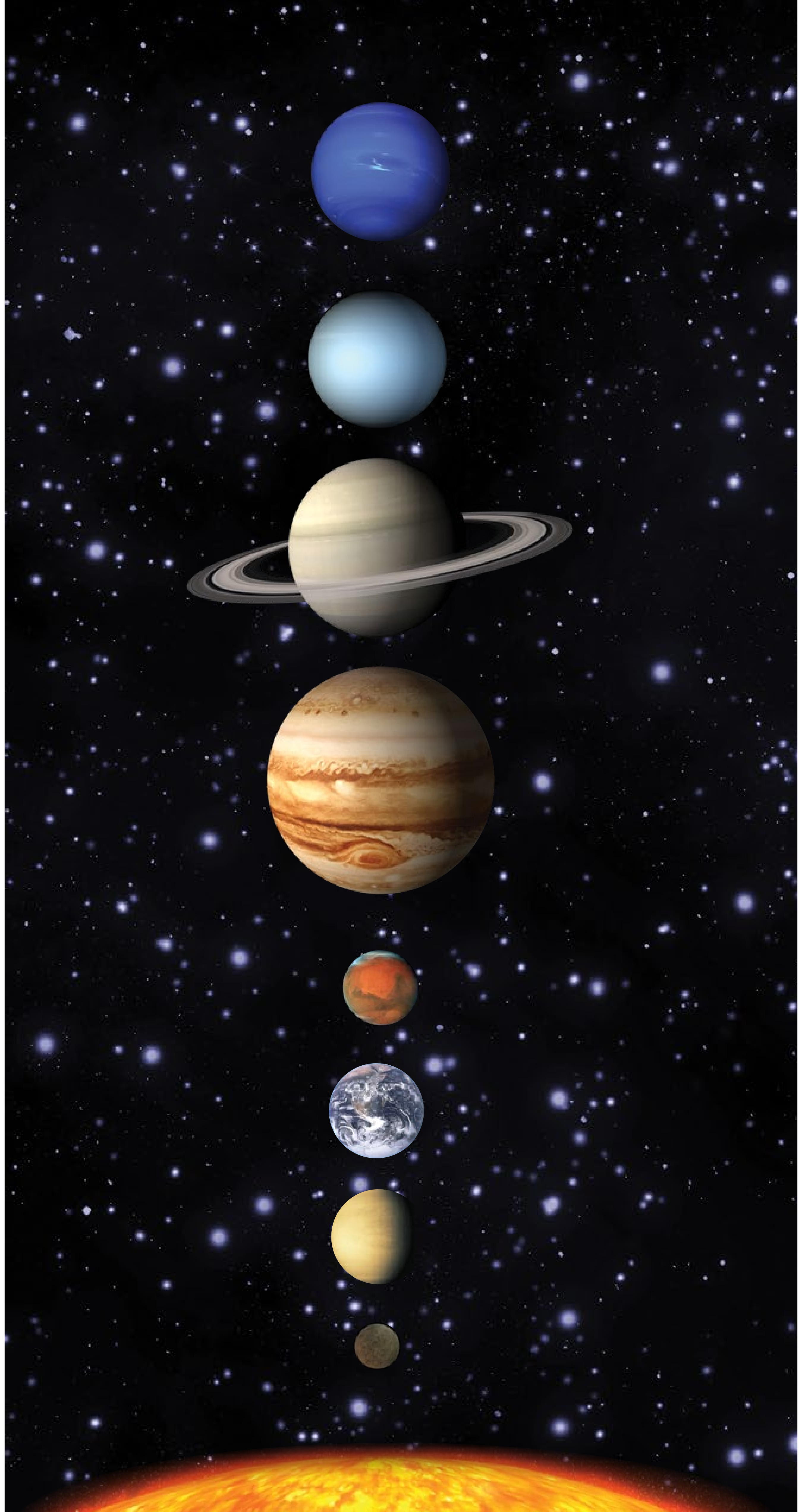



Three Planet Keplerian Orbital Solution
Velocity (m/s)
RMS = 15.12 m/s
Observation Date (Years)

U7.L7.6


U7.L7.7



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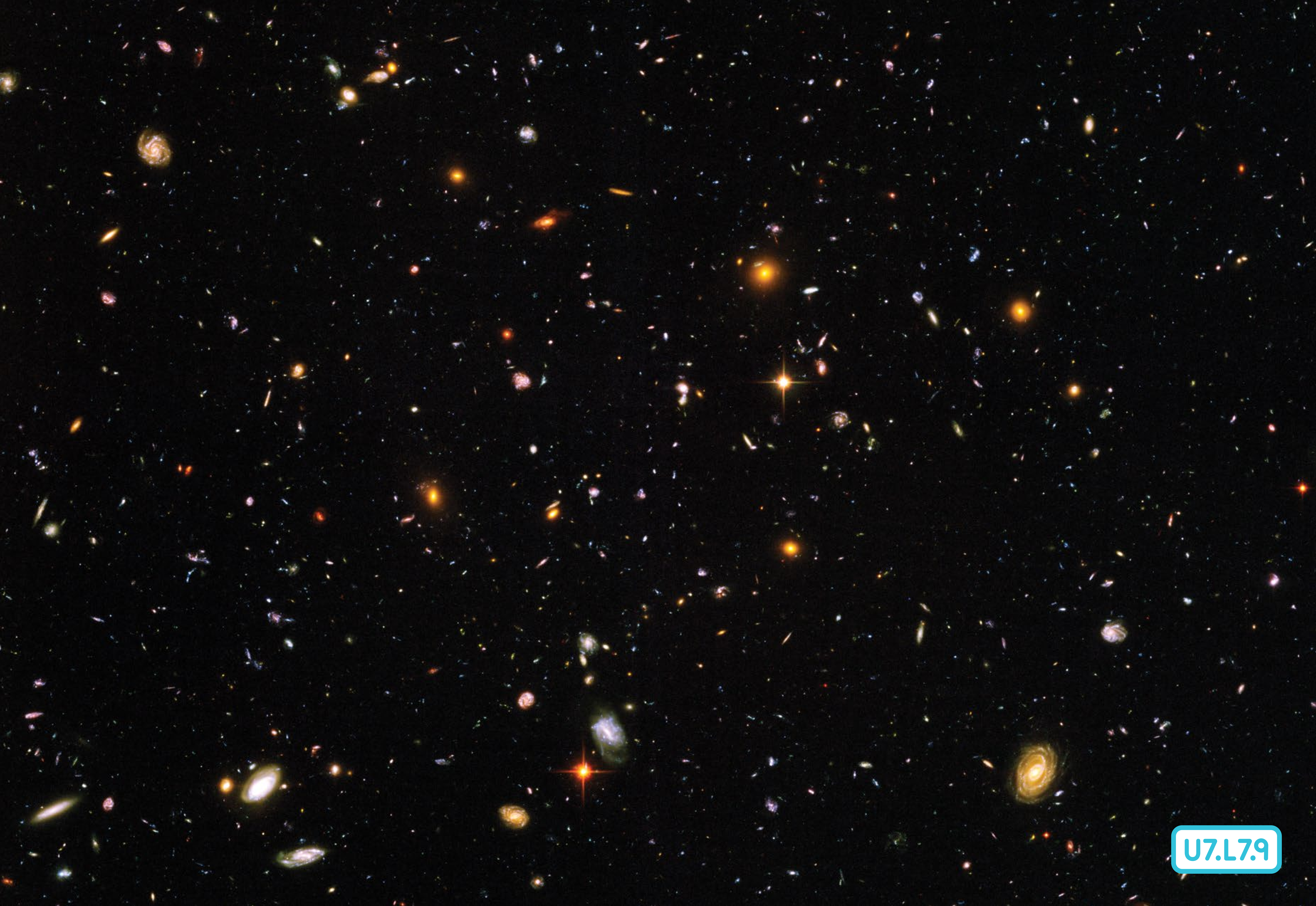
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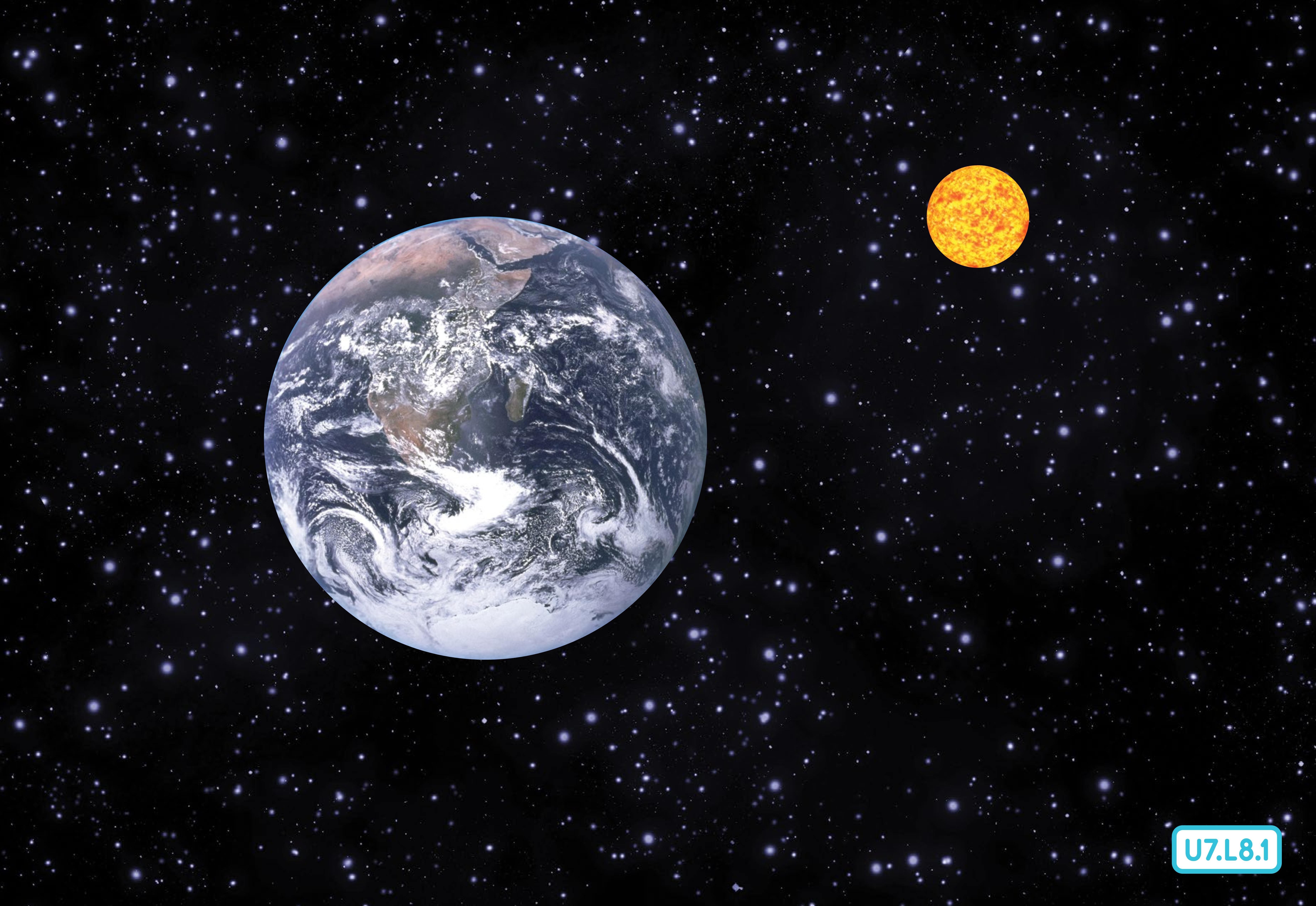
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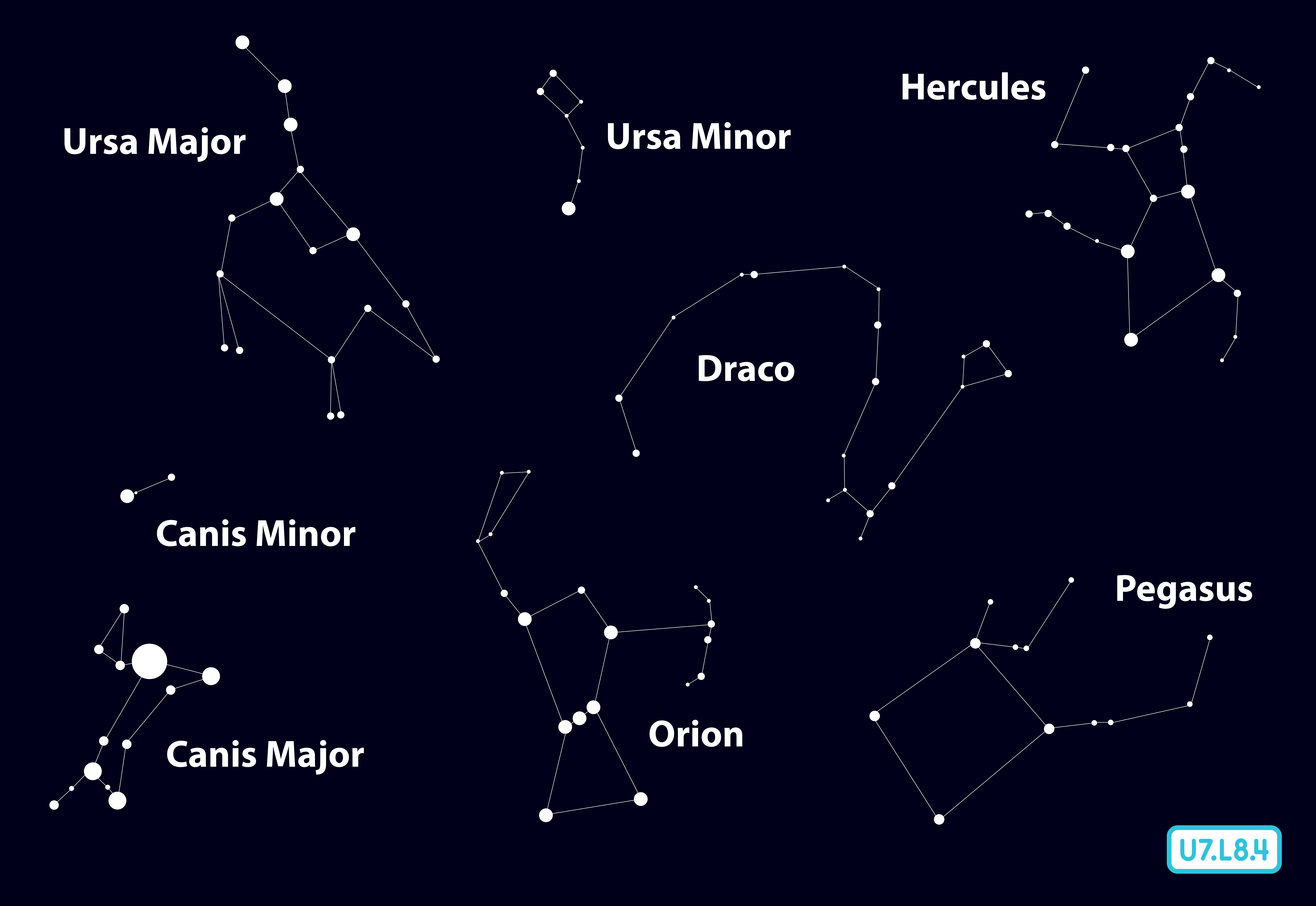
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Ursa Minor
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Draco
Canis Minor
Canis Major
Orion
Pegasus
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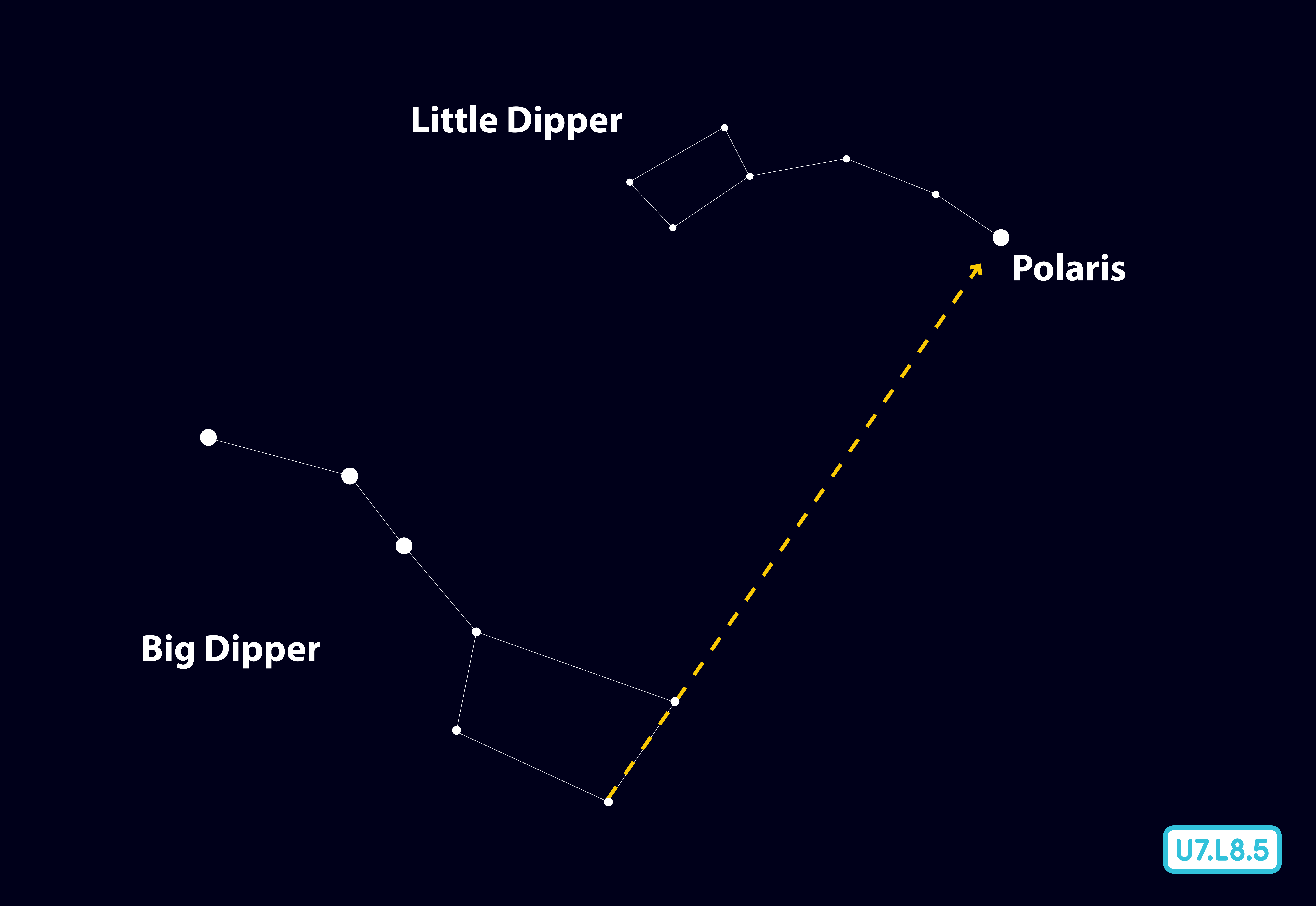
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Polaris
Big Dipper
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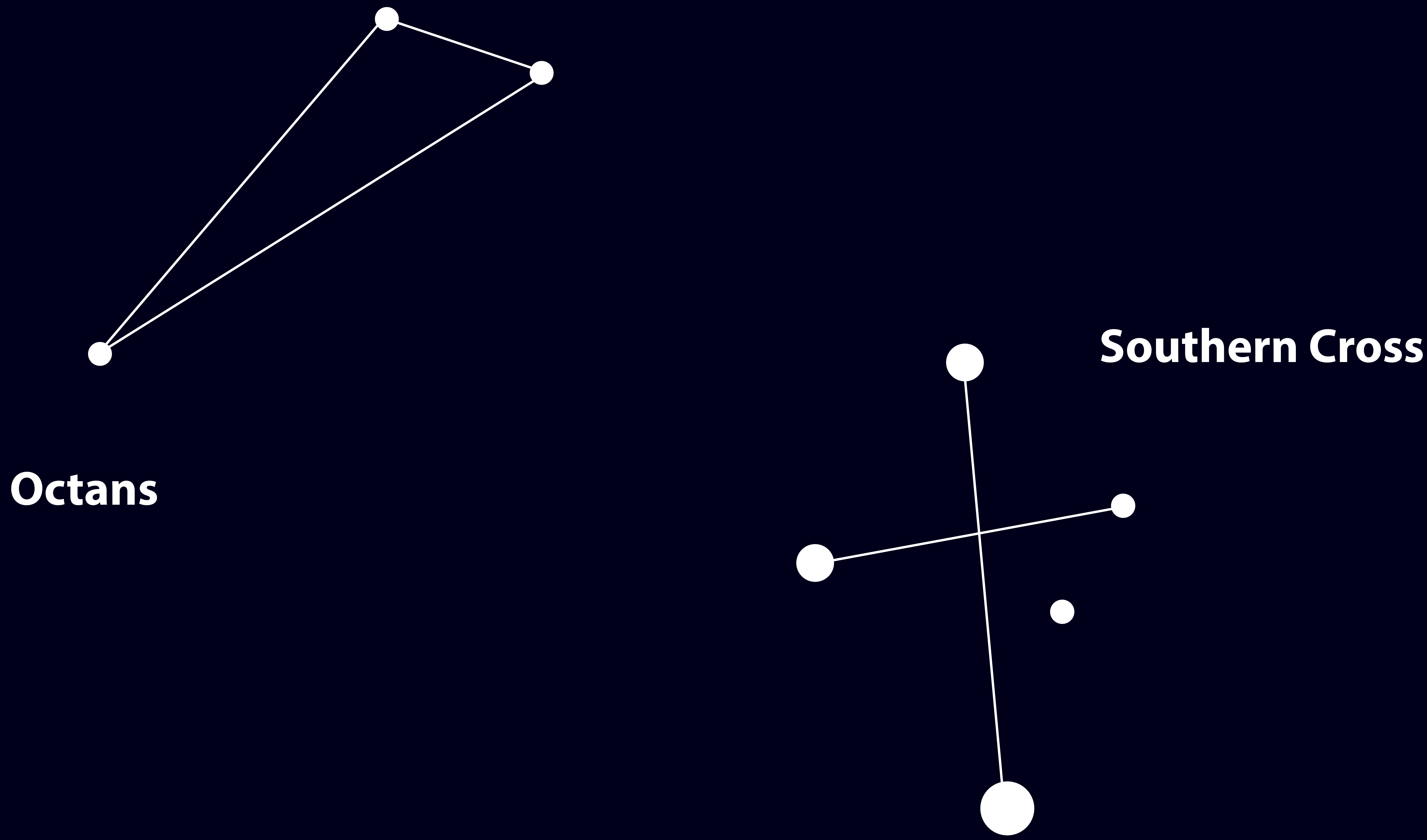

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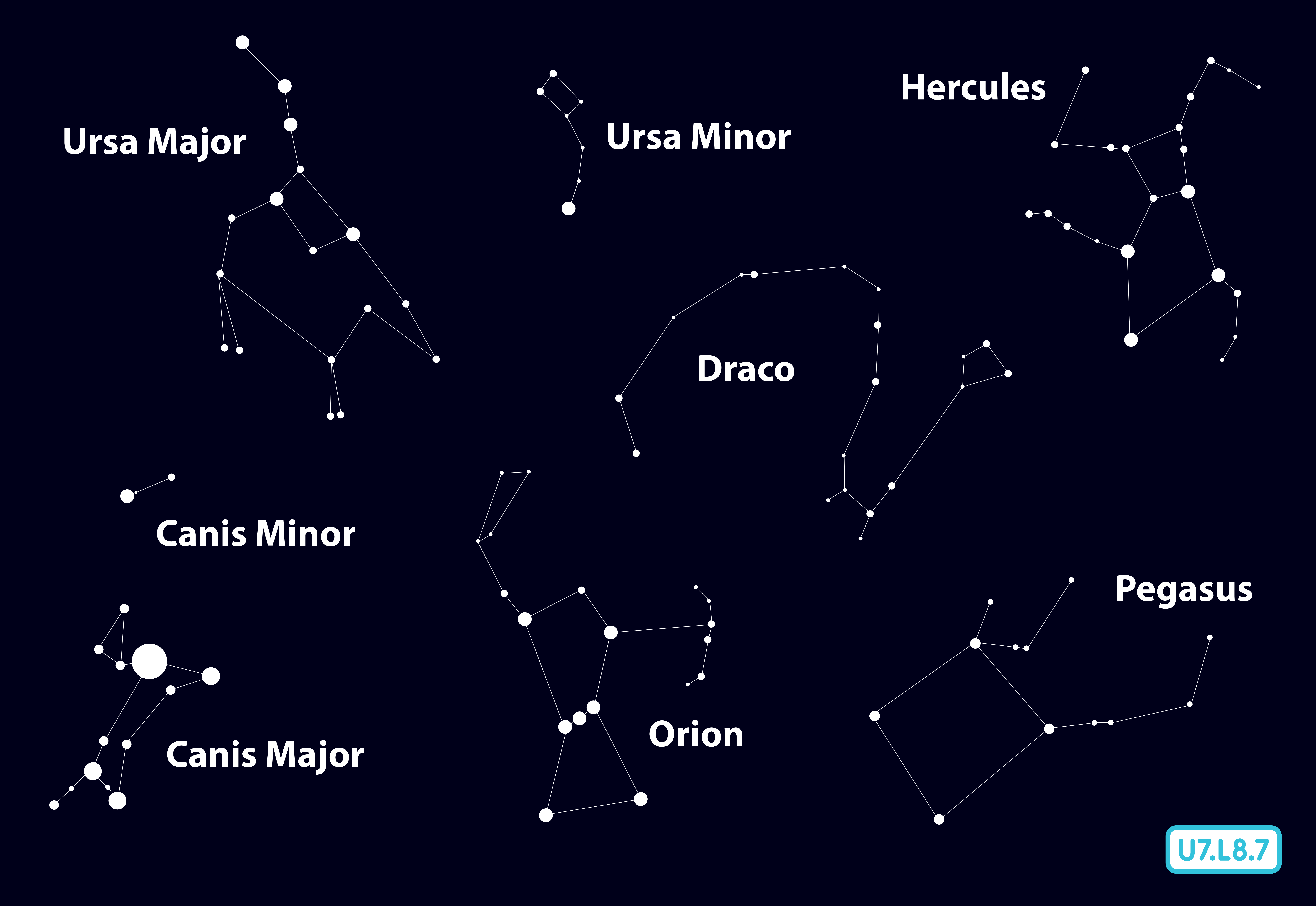
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Draco
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Canis Major
Orion
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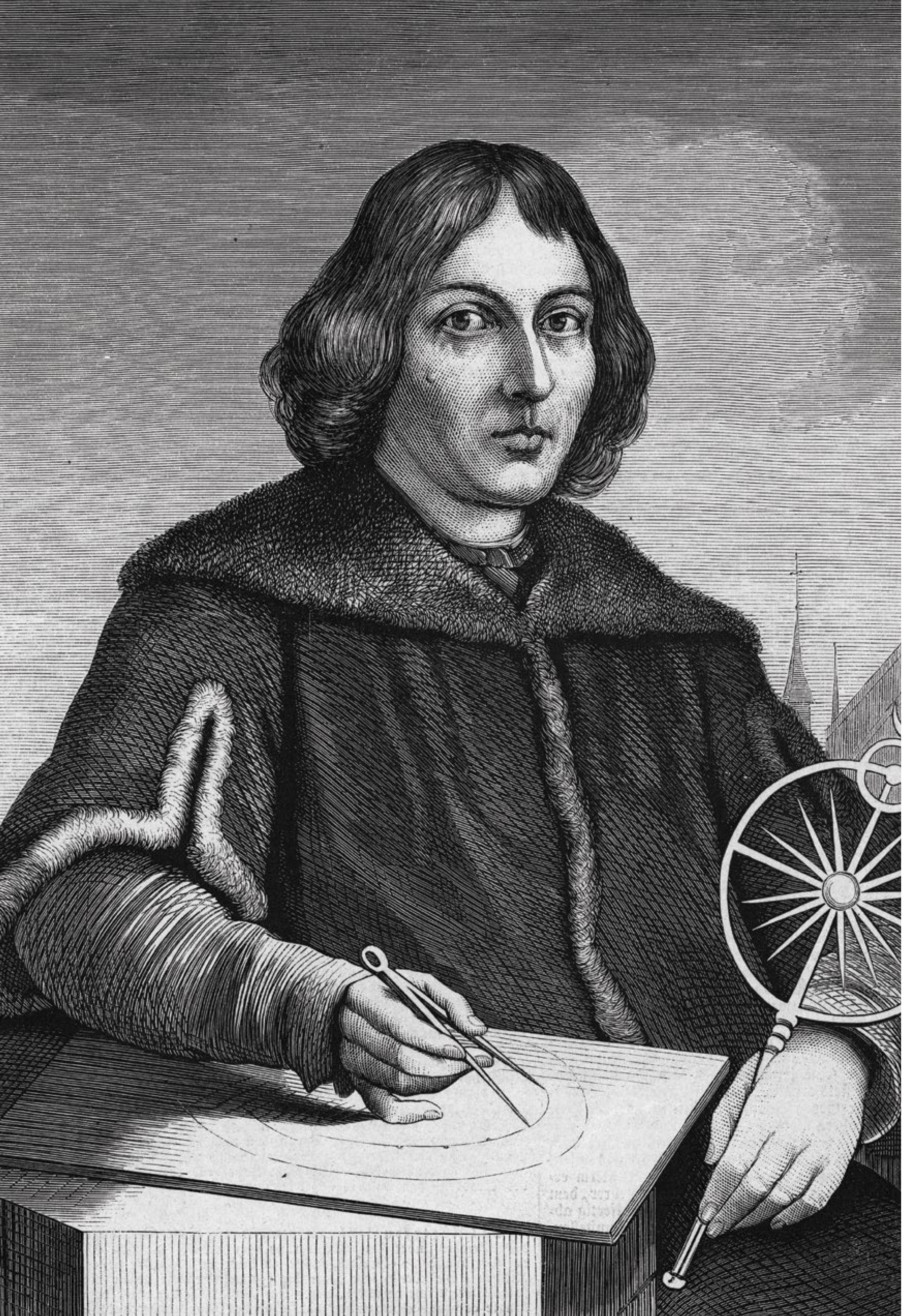

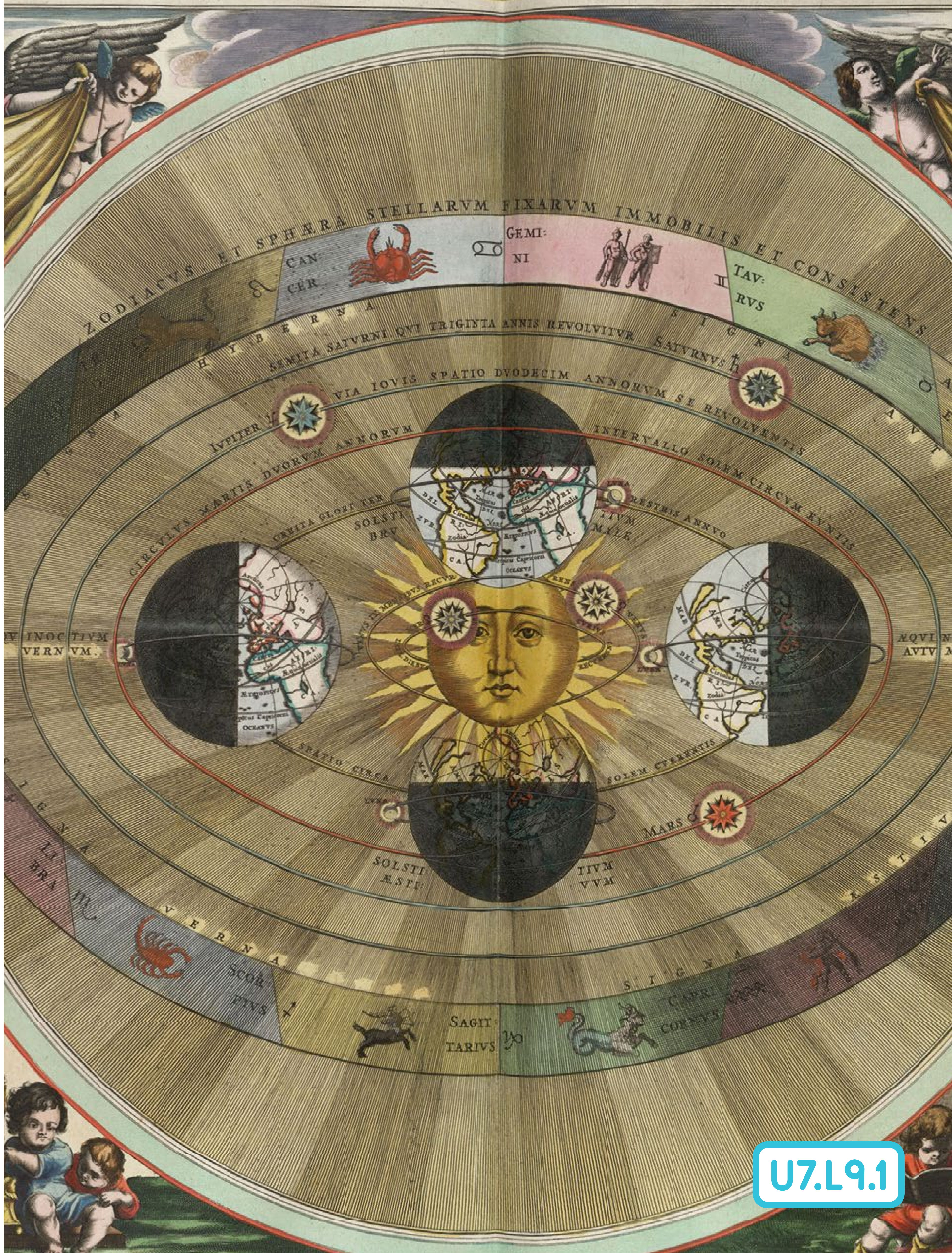
ZODIACVS ET SPHÆRA STELLARVM FIXARVM IMMOBILIS ET CONSISTENS
CAN CER
GEMI NI
TAV RVS
SEMITA SATVRNI QVI TRIGINTA ANNIS REVOLVITVR SATVRNVS
IVPITER
VIA IOVIS SPATIO DVODECIM ANNORVM SE REVOLVENTIS
CIRCVLVS MARTIS DVORVM ANNORVM
MARS
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SAGIT TARIVS
CAPRI CORNVS

U7.L9.1


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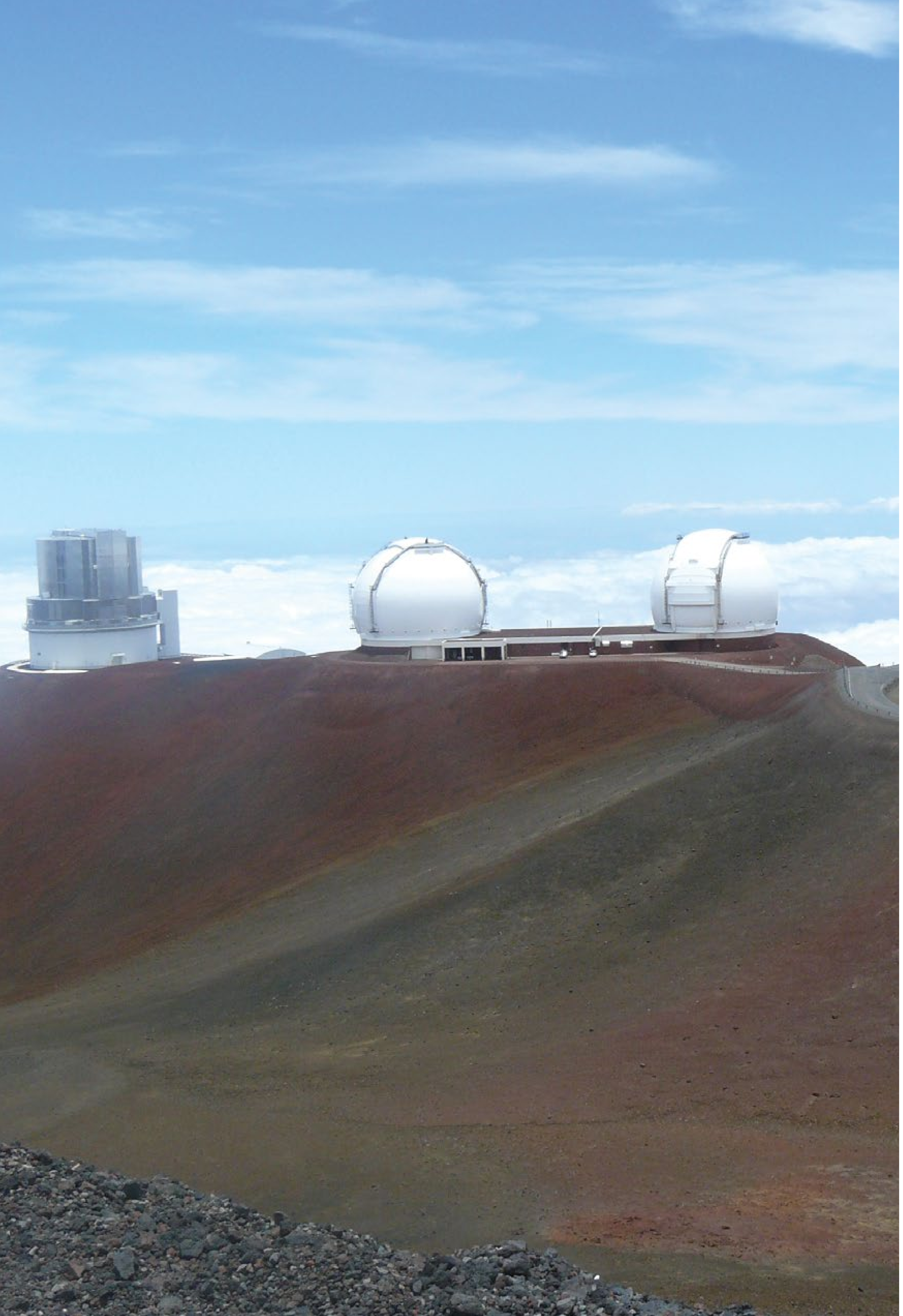

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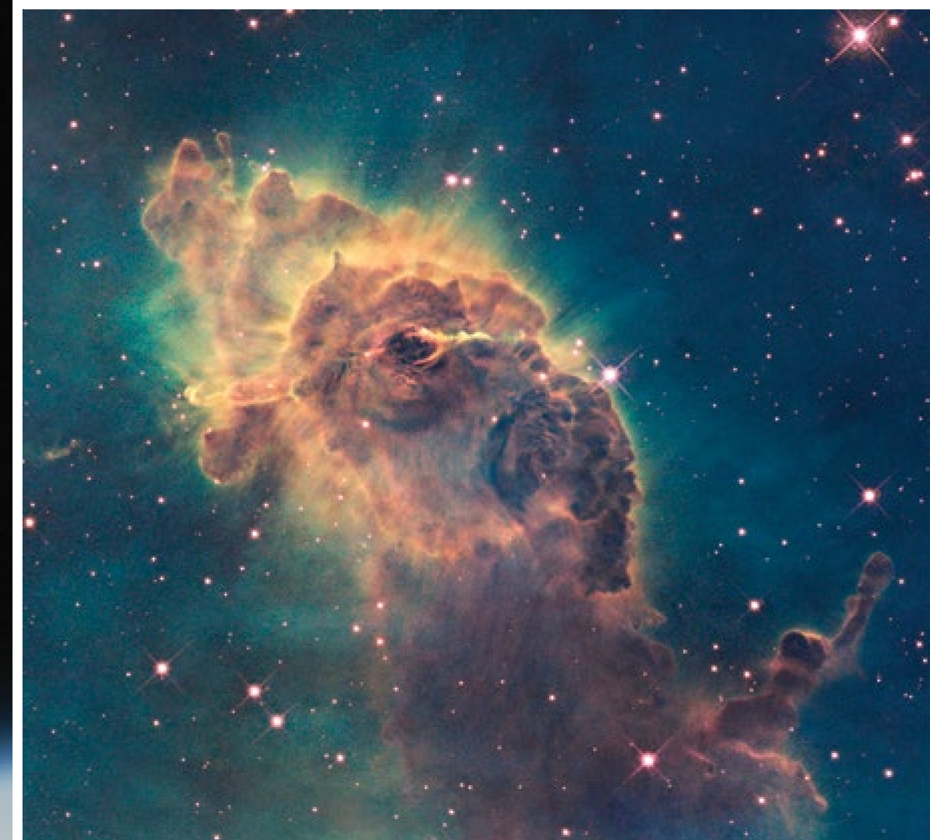


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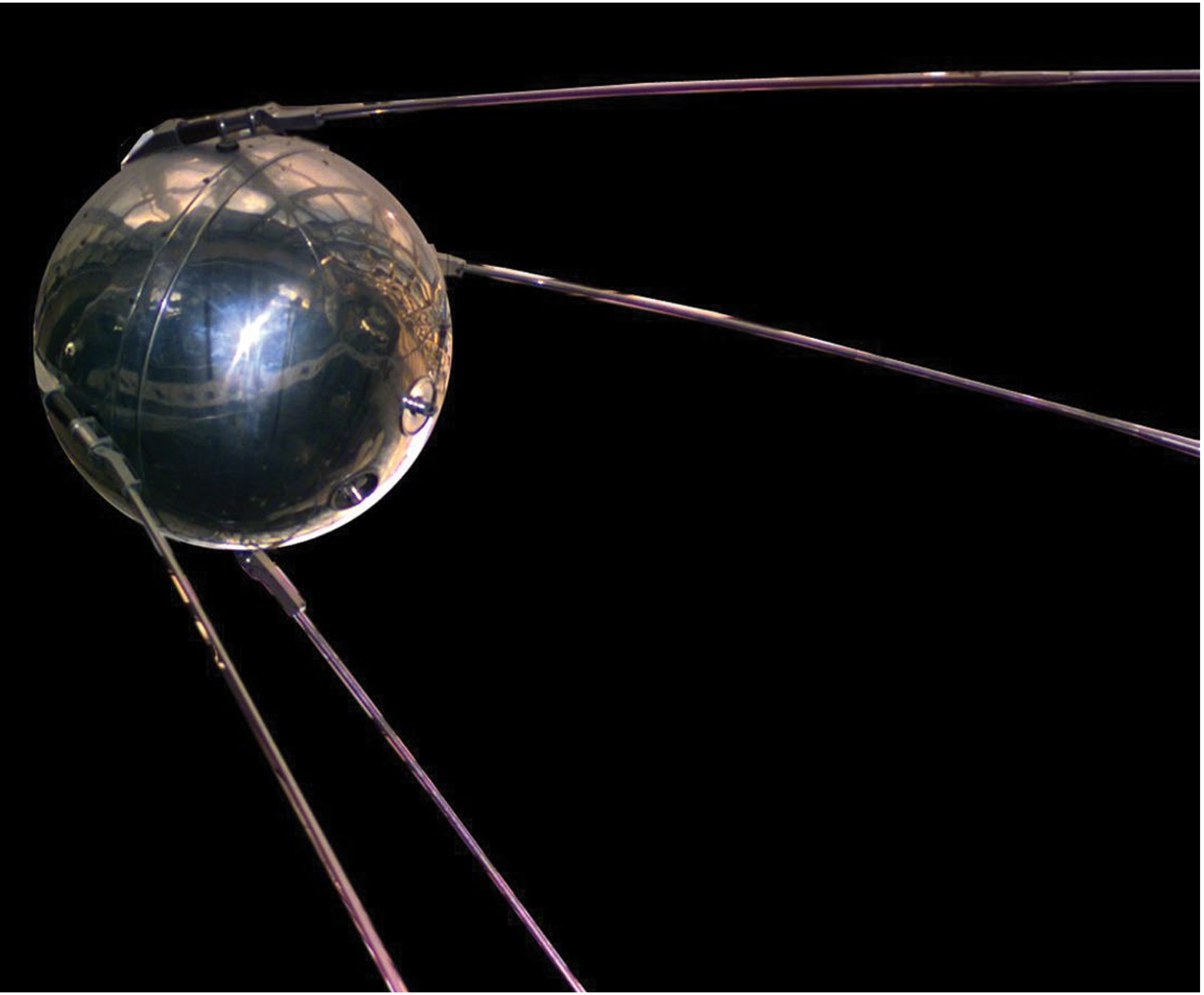

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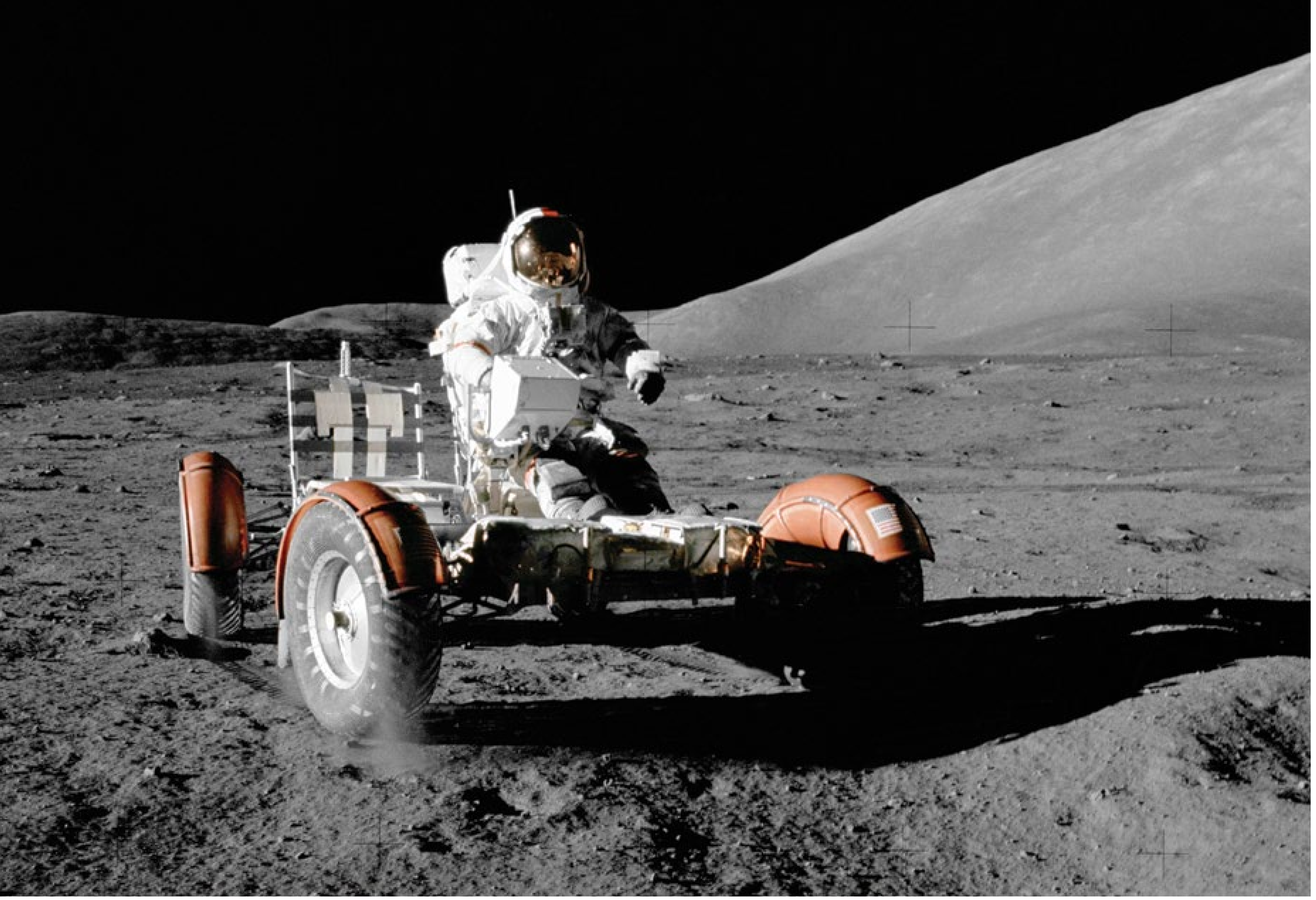

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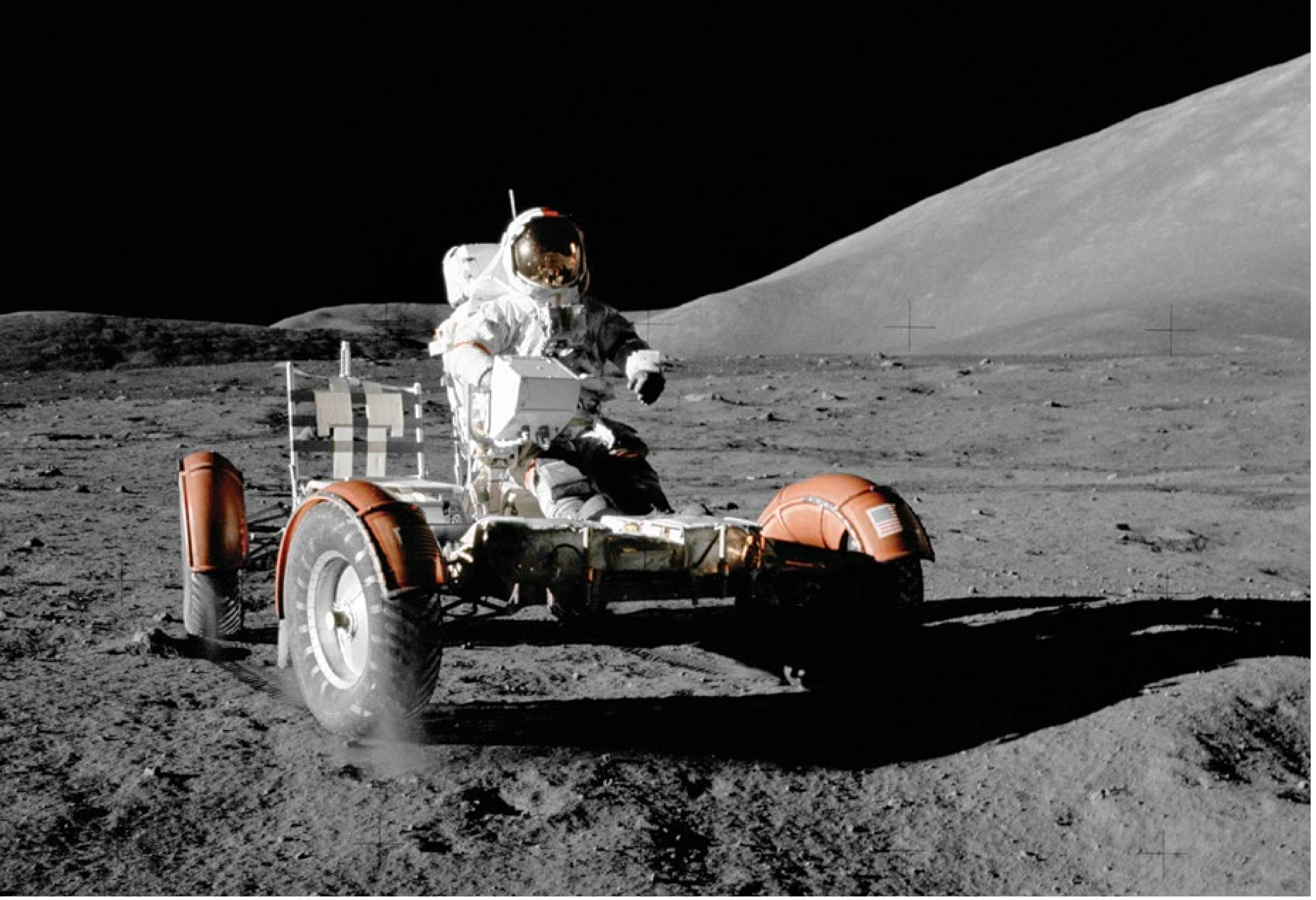

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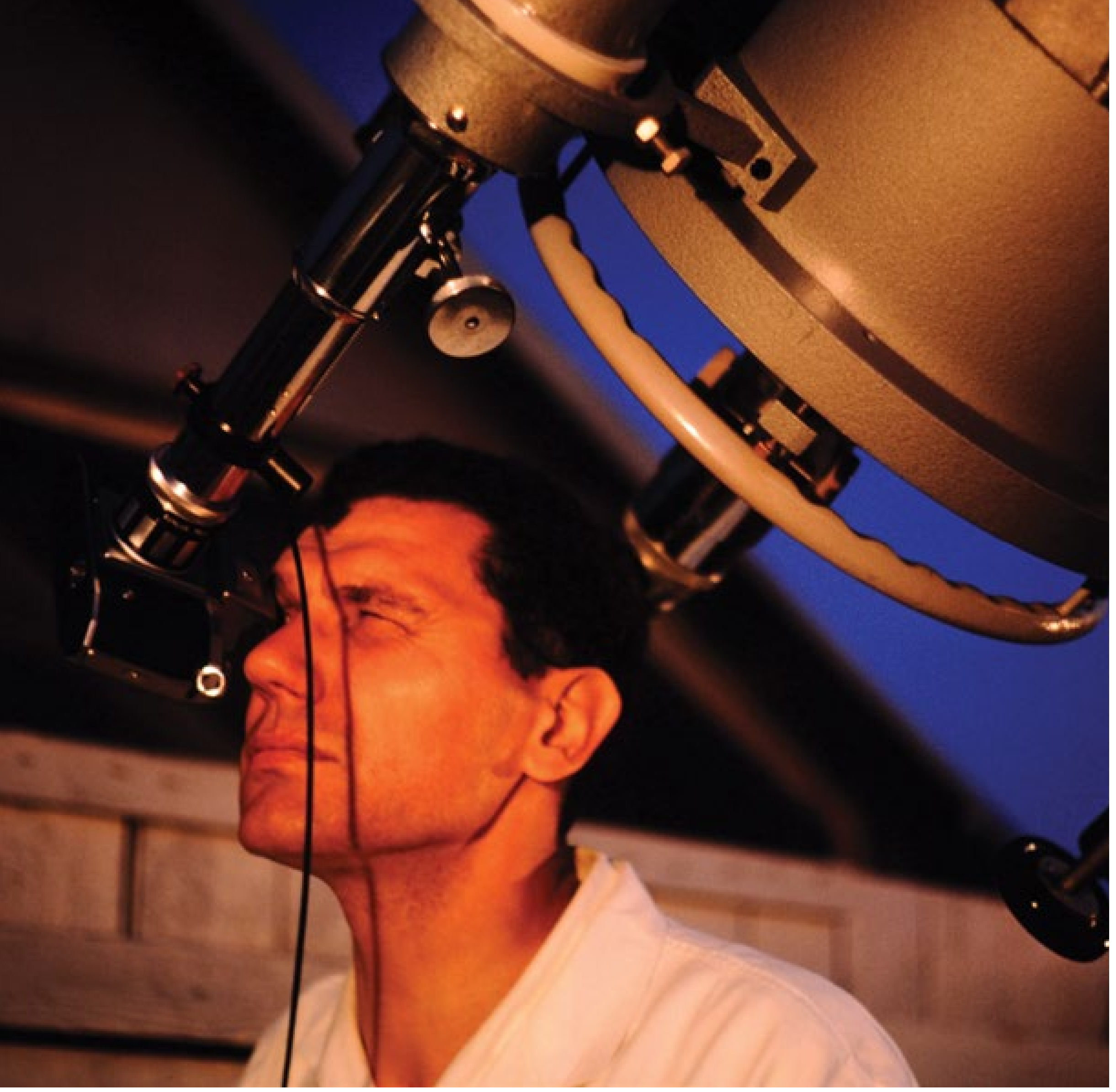


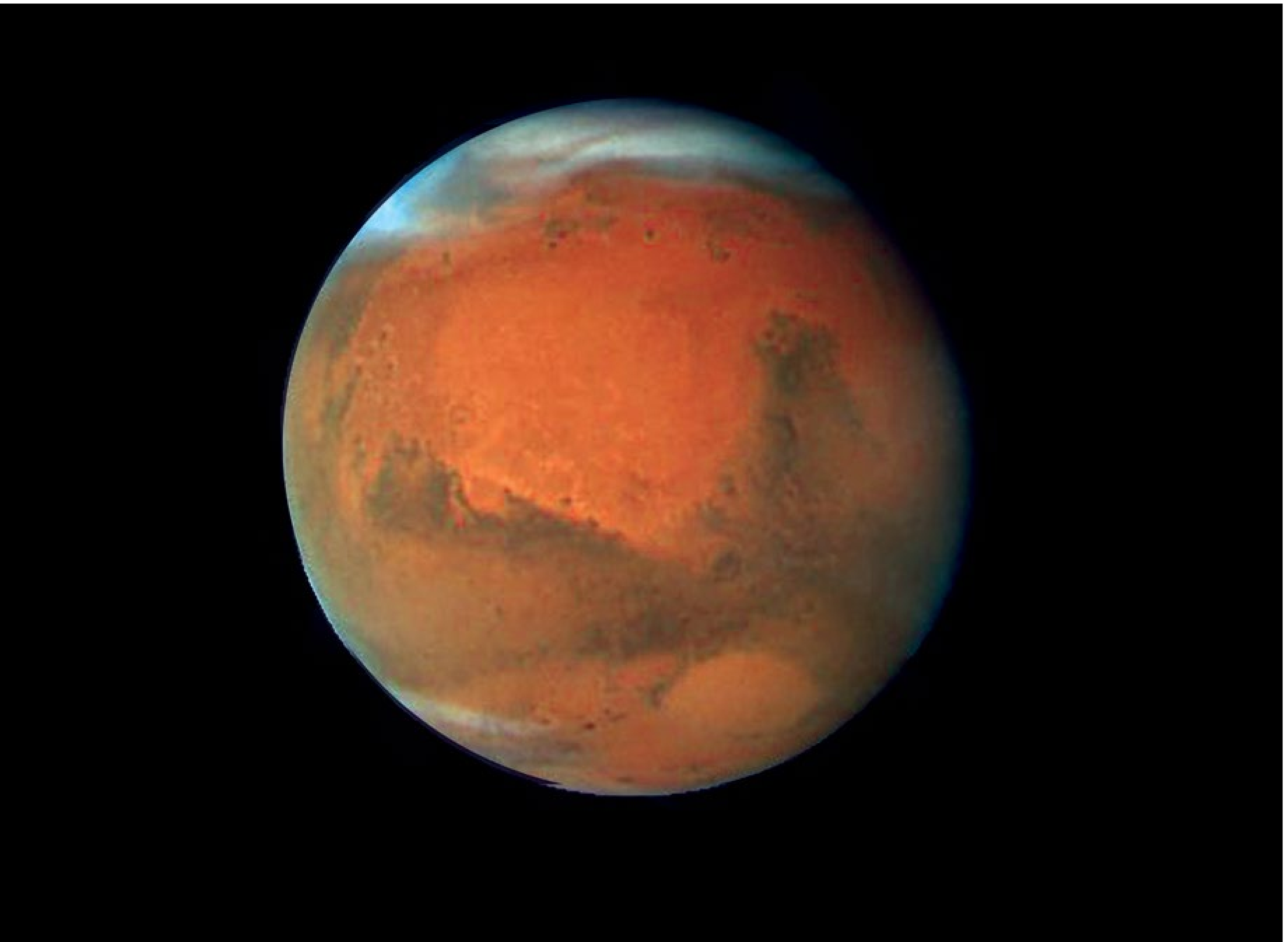


U7.L16.7

U7.L16.8

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Grade 3 | **Unit 7** | Digital Flip Book

Astronomy: Our Solar System and Beyond

Welcome!

Grade 3, Unit 7

Astronomy: Our Solar System and Beyond

In this unit, students will learn more about our solar system and galaxy, other galaxies, and the universe.

What's the story?

Students will explore the **solar system**, the concept of **gravity**, and the exploration of **outer space** by reading an informational text that will take them on a journey through the **universe**.

What will my student learn?

Students will study the concept of **gravity and its effect** on the earth and other places in space. They will also learn about key people and events involved in the **study and exploration of outer space**. Students will explore the **sun**, the inner and outer **planets**, and the objects existing in our **solar system**. They will also study why planets stay in **orbit**.

Students will write in a variety of ways and for different purposes. They will complete a multiday **informative writing project** in which they will describe a day in the life of an astronaut on the International Space Station. Students will **collaborate** with their peers, **share ideas**, and **provide feedback** on one another's writing.

Conversation starters

Ask your student questions about the unit to promote discussion and continued learning:

1. Can you use **M**any **V**ery **E**nergetic **M**ermaids **J**ust **S**wam **U**nder **N**eptune to tell me the order of the planets?
2. What has been the most interesting planet you have learned about so far?
   Follow up: Why? What have you learned about it? Compare it to another planet you have been reading about. How are they the same? How are they different?
3. What is the greenhouse effect?
4. What is a meteor?
   Follow up: What is a meteoroid? And a meteorite?
5. What have you learned about the Milky Way?
   Follow up: How did it get its name? How many galaxies do scientists believe there are? (billions)
6. What are some of the constellations you have been reading about?
   Follow up: What colors can stars be? Why are they those colors? What stars are the hottest based on their color?

Name: ______________________________ Date: ____________________

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Grade 3

Unit 7, Lesson 1 - How does Earth's tilt produce seasons? Use evidence from the text to support your response.

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Grade 3

Unit 7, Lesson 2 - How can we see the moon at night? Does the moon give off its own light? Use evidence from the text to support your answer.

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Grade 3

Unit 7, Lesson 3 - How did people look at the planets a long time ago compared to now?

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Grade 3

Unit 7, Lesson 4 - Today you read about the four outer planets in our solar system. Select one of the outer planets and write two or three important facts about it.

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Grade 3

Unit 7, Lesson 5 - Compare and contrast a comet and an asteroid. Use details from the text to support your response.

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Grade 3

Unit 7, Lesson 6 - What have astronomers discovered about how stars differ from one another?

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Unit 7, Lesson 7 - Today you compared and contrasted two stories about galaxies and stars. Write at least three sentences that include the key similarities and differences between the two texts.

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Grade 3

Unit 7, Lesson 8 - Who was Ptolemy? What are constellations? Use evidence from the text to support your answer.

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Unit 7, Lesson 9 - Identify and describe some of the different kinds of spacecraft and tools that scientists use to explore and study space.

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Unit 7, Lesson 10 - What are telescopes and why are they useful? What is the Hubble Telescope? Use details from the text to support your response.

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Grade 3

Unit 7, Lesson 11 - What is gravity? Use key details from the text to support your answer.

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Grade 3

Unit 7, Lesson 12 - Describe the effects of gravity on the earth's oceans. What does the beach look like at high tide?

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Grade 3

Unit 7, Lesson 13 - Astronomers in Copernicus's time were puzzled about the movement of Mars and some other planets. What question did they have about the planets' movements? How did this lead Copernicus to a new understanding?

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Unit 7, Lesson 14 - Why do you think people watching on TV went wild when Neil Armstrong said "The *Eagle* has landed!"?

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Grade 3

Unit 7, Lesson 15 - What are booster rockets? Why are they a necessary part of a space shuttle?

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Grade 3

Unit 7, Lesson 16 - How did Mae Jemison use her fame as a "launch pad" for bringing attention to important issues?

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Unit 7, Lesson 17 - In this lesson you read a story about a girl, Jen, who goes to an astronomy camp. What did she learn about during her first day?

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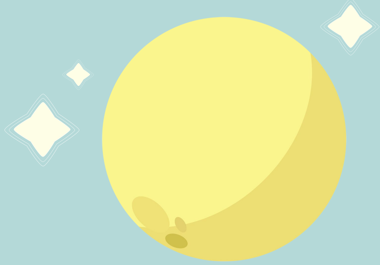
Unit 7, Lesson 18 - Name some things we do on Earth that are more challenging on the space station. Use details from the text to support your response.



Vocabulary

Grade 3 Unit 7: Astronomy: Our Solar System and Beyond

Abbreviations

Introduction: Abbreviations

An **abbreviation** is a shortened form of a word or phrase. When we shorten a word or phrase it is called *abbreviating*.

In the *Astronomy: Our Solar System and Beyond* unit we learn about the phases of the moon. There are four phases of the moon: new, crescent, half, and full. We cycle through the phases of the moon each month. Let's talk about the abbreviations used for each month of the year.

January = **Jan.**

February = **Feb.**

March = **Mar.**

April = **Apr.**

August = **Aug.**

September = **Sept.**

October = **Oct.**

November = **Nov.**

December = **Dec.**

To abbreviate a word we remove letters from the existing word. Most months have a designated abbreviation, but three of the twelve months are not abbreviated. There are nine month abbreviations in total.

Let’s go through the months that do not have abbreviations. The following three months are generally not abbreviated:

May

June

July

The remaining nine months (**January, February, March, April, August, September, October, November, December**) have abbreviations that are frequently used.

To abbreviate the first month of the year let’s first identify the month: **January**

To abbreviate January we remove the letters u, a, r, y.

Jan~~uary~~

This leaves the abbreviation **Jan.**

Most abbreviations end with a period.

Let’s Try It Together!

Look at the months below. Let’s abbreviate them together.

September

April

Turn to a partner and whisper how many letters in **September** will need to be removed. Now turn to your partner and whisper how many letters in **April** will need to be removed.

Hold up one finger if you think both words will lose the *same* number of letters.

Hold up five fingers if you think both words will lose a *different* number of letters.

September and April each will lose a different number of letters when they are abbreviated.

To abbreviate **September**, *five* letters need to be removed.

To abbreviate **April**, *two* letters need to be removed.

September will be abbreviated to four letters and April will be abbreviated to three letters.

Sept.

Apr.

Now they are abbreviated!

Try one with a partner. How would you abbreviate the month below?

November

Raise three fingers if you think the abbreviation for **November** is three letters long.

November is abbreviated by eliminating -ember.

Nov.

Nov. is the three letter abbreviation for November

Now Try One by Yourself!

Identify the abbreviations for the months listed below:

June

August

October

Write down all three months.

Cross out the letters that need to be eliminated.

Write out the abbreviation for each month.

Answer

June, June, **June**

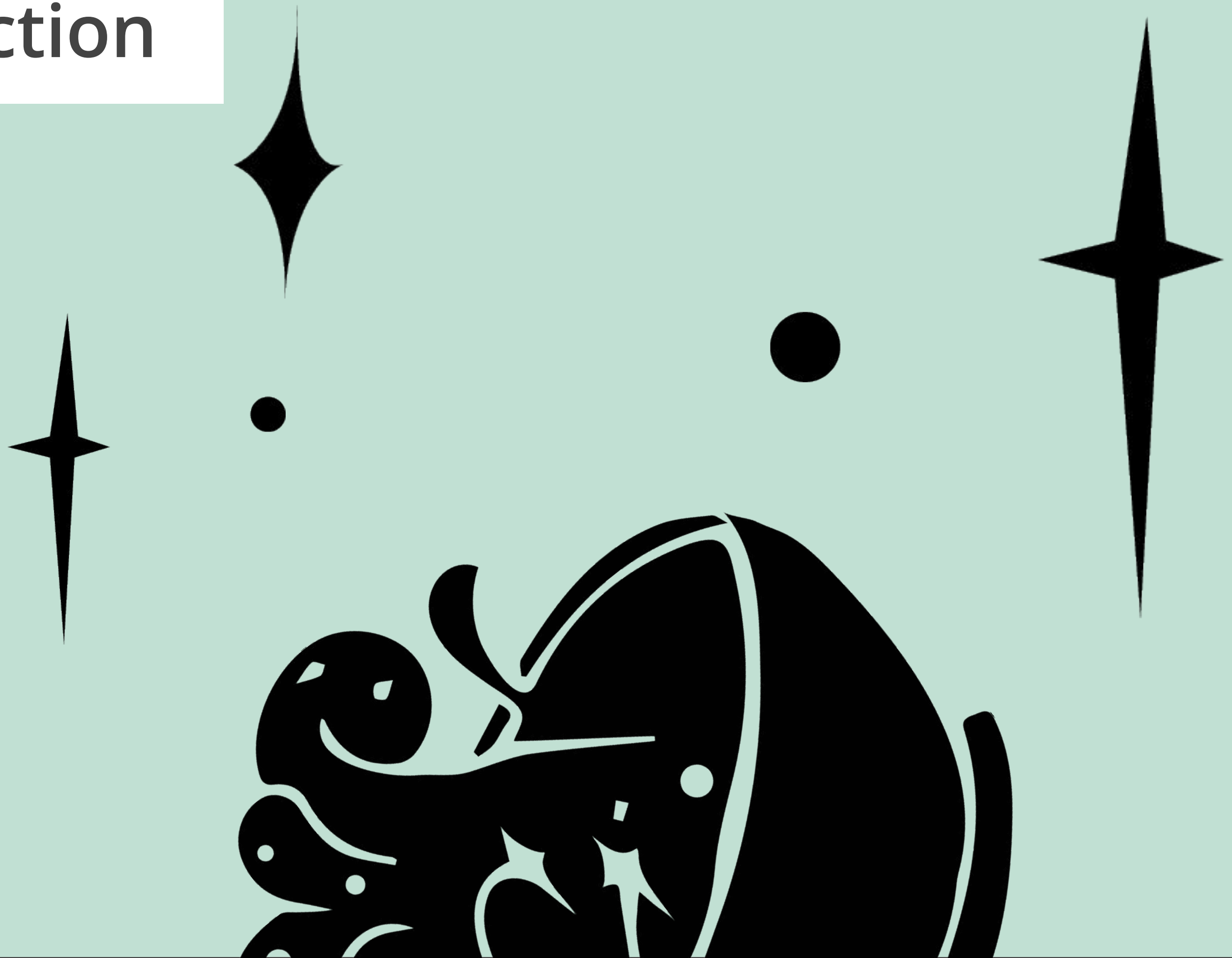
August, Aug~~ust~~, **Aug.**

October, Oct~~ober~~, **Oct.**

POETRY

Grade 3 Lesson 4:
"Summer Stars" by Carl Sandburg

Introduction



Today we’re going to read a poem about the night sky.

Listen to the speaker’s description of the stars.

Read "Summer Stars" by Carl Sandburg aloud.

The poem can be found on the program's digital components site.

Does this poem use rhymed verse or free verse?

Give an example from the poem to support your answer.

Does this poem use rhymed verse or free verse?

rhymed verse

Give an example from the poem to support your answer.

Answers may include that the word stars *is repeated in multiple lines or that* strumming *is repeated in the last two lines.*

How does the speaker describe the stars?

What does the speaker say a long-armed man can do with the stars?

How does the speaker describe the stars?

low, near, lazy, strumming

What does the speaker say a long-armed man can do with the stars?

He can reach and pick up the stars.

Reading

The poem we read today uses hyperbole.

Hyperbole is an exaggerated statement or claim not meant to be taken literally. Hyperbole can describe things without writing exactly what they are like. By exaggerating a part of something, hyperbole can show what is important about that thing.

For example, “This backpack weighs a ton!”

The backpack does not actually weigh a ton. The person speaking is exaggerating how heavy the backpack is to show that it is really heavy.

Turn and talk to a partner. Using the list of statements below, determine if they are a hyperbole or not.

She took a big bite of her sandwich.

That story went on forever.

A foot of snow fell overnight.

Her smile was a mile wide.

He couldn’t see anything in the dark.

I’m so hungry I could eat a horse.

Hyperbole

Her smile was a mile wide.

That story went on forever.

I’m so hungry I could eat a horse.

Not Hyperbole

She took a big bite of her sandwich.

He couldn’t see anything in the dark.

A foot of snow fell overnight.

As we reread the poem, listen to find out which line in the poem shows an example of hyperbole.

Read "Summer Stars" by Carl Sandburg aloud.

The poem can be found on the program's digital components site.

Which line in the poem uses hyperbole?

Why is it an exaggeration?

Which line in the poem uses hyperbole?

“So near, a long-arm man can pick off stars”

Why is it an exaggeration?

Stars are too far away and too large for someone to pick them, even if the person has long arms.

Why might the poet use this hyperbole in the poem?

Why might the poet use this hyperbole in the poem?

The hyperbole helps to emphasize how close the stars look.

Wrap-Up

Now it’s your turn! Come up with your own example of hyperbole.

Summer Stars

Carl Sandburg

Bend low again, night of summer stars.
So near you are, sky of summer stars,
So near, a long-arm man can pick off stars,
Pick off what he wants in the sky bowl,
So near you are, summer stars,
So near, strumming, strumming,
            So lazy and hum-strumming.