Developing an Engineering Design Challenge (Grade 7)

Developing an Engineering Design Challenge

STEM professions require individuals to apply their content knowledge to unique circumstances and to solve problems using creativity and innovation. When engineers are presented with a problem, they research to determine if the problem has occurred before (language arts connection) and what innovations have been made in the past (historical connection). Then, the engineer will use engineering practices to develop a solution that applies science and math knowledge. Engineering design challenges can be created for a specific standard or aligned with multiple standards and subject areas. Cross-disciplinary instruction introduces concepts and skills that could be linked from two or more disciplines to highlight connections and deepen understanding. Integrated learning can help students see the connection across content areas and braid that understanding together to create a solution to a problem using the engineering design process.

Purpose of this Tool:

This tool supports educators in developing cross-curricular engineering design challenges anchored in the science standards. While engineering practices are embedded in the Texas Essential Knowledge and Skills (TEKS) for science, engineering design challenges can draw from multiple subject areas. By integrating content across disciplines, students apply their knowledge in meaningful ways to solve a real-world problem.

This tool includes the following components:

1. A graphic organizer to identify targeted standards
2. A content crosswalk to help educators identify potential connections for an engineering design challenge
3. STEM career highlights for each student expectation

Engineering Design Practices:

When developing an engineering design challenge, it is important to anchor the challenge in TEKS. The students will use the engineering practices TEKS paired with the science content TEKS when solving the engineering design challenge. The first strand in the science TEKS outlines the scientific and engineering practices for the grade level/courses. Engineering practices refer to the methods, techniques, and standards that engineers use to ensure their work is efficient, reliable, safe, and meets the intended requirements. To create a cohesive learning experience, educators should integrate scientific and engineering practices with content. Embedding these practices across the content areas as part of engineering design challenges provides

students with the context in which to ask questions, develop models, and analyze data that supports critical thinking and problem-solving skills in real-world scenarios.

Engineering Design Process:

The engineering design process is a systematic way of thinking, used to teach and apply concepts and skills in an integrated manner. Students engage with concepts from multiple disciplines while using design thinking to develop a solution to an open-ended, authentic problem. Learning from failure is a natural part of the iterative process. There are numerous engineering design process models; however, they share foundational practices that include identifying questions or defining problems, imagining solutions, brainstorming ideas, planning, creating, testing, and improving a design.

Engineering-Related TEKS:

In grade 7 science, the following engineering practices can be used in engineering design challenges. The student is expected to:

- Science.7.1.A ask questions and define problems based on observations or information from text, phenomena, models, or investigations
- Science.7.1.B use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems
- Science.7.1.G develop and use models to represent phenomena, systems, processes, or solutions to engineering problems
- Science.7.2.D evaluate experimental and engineering designs
- Science.7.4.A relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content
- Science.7.4.B make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used
- Science.7.4.C research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers
- Science.7.5.A identify and apply patterns to understand and connect scientific phenomena or to design solutions

Communication is also part of the engineering design process. Claim-Evidence-Reasoning (CER) is a discussion structure commonly used by scientists and engineers to engage in collaborative discussions with peers. While both scientists and engineers use the CER structure, they use it for different purposes. Scientists tend to focus on asking questions and analyzing patterns, while engineers tend to focus on solving problems. The following student expectations demonstrate the knowledge and skills students apply to communicate their thinking. The student is expected to:

Science.7.3.A develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories
Science.7.3.B communicate explanations and solutions individually and collaboratively in a variety of settings and formats
Science.7.3.C engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence

Component 1: Integration Planning Graphic Organizer

The *Integration Planning Graphic Organizer* can be used in conjunction with the Integrated Content Crosswalk for STEM Education to organize the standards and subject areas incorporated into an engineering design challenge. The graphic organizer serves as a workspace to capture ideas of possible connections, but not all spaces need to be filled. Many factors will influence the selection of standards during an engineering design challenge. Instructional materials, district scope and sequences, student age, and other factors that inform instructional decisions are some examples.

On the next page is an example of a grade 5 science engineering design challenge developed using the components of this tool. In this example, the graphic organizer has been completed with information from the Integrated Content Crosswalk for STEM Education. There are many ways to approach developing an engineering design challenge. An easy way to start is to select your science content standard, then identify the problem that needs to be solved, and what engineering practices will be used when solving the problem. The highlighted standard below is the content standard used as an anchor for this challenge. The engineering practices that align with this challenge are Science.5.1.G and Science.5.4.A.

Highlighted Standards from the Example
The student is expected to:
Science.5.6.A compare and contrast matter based on measurable, testable, or observable physical properties, including mass, magnetism, relative density (sinking and floating using water as a reference point), physical state (solid, liquid, gas), volume, solubility in water, and the ability to conduct or insulate thermal energy and electric energy
Science.5.1.G develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem
Science.5.4.A how scientific discoveries and innovative solutions to problems impact science and society

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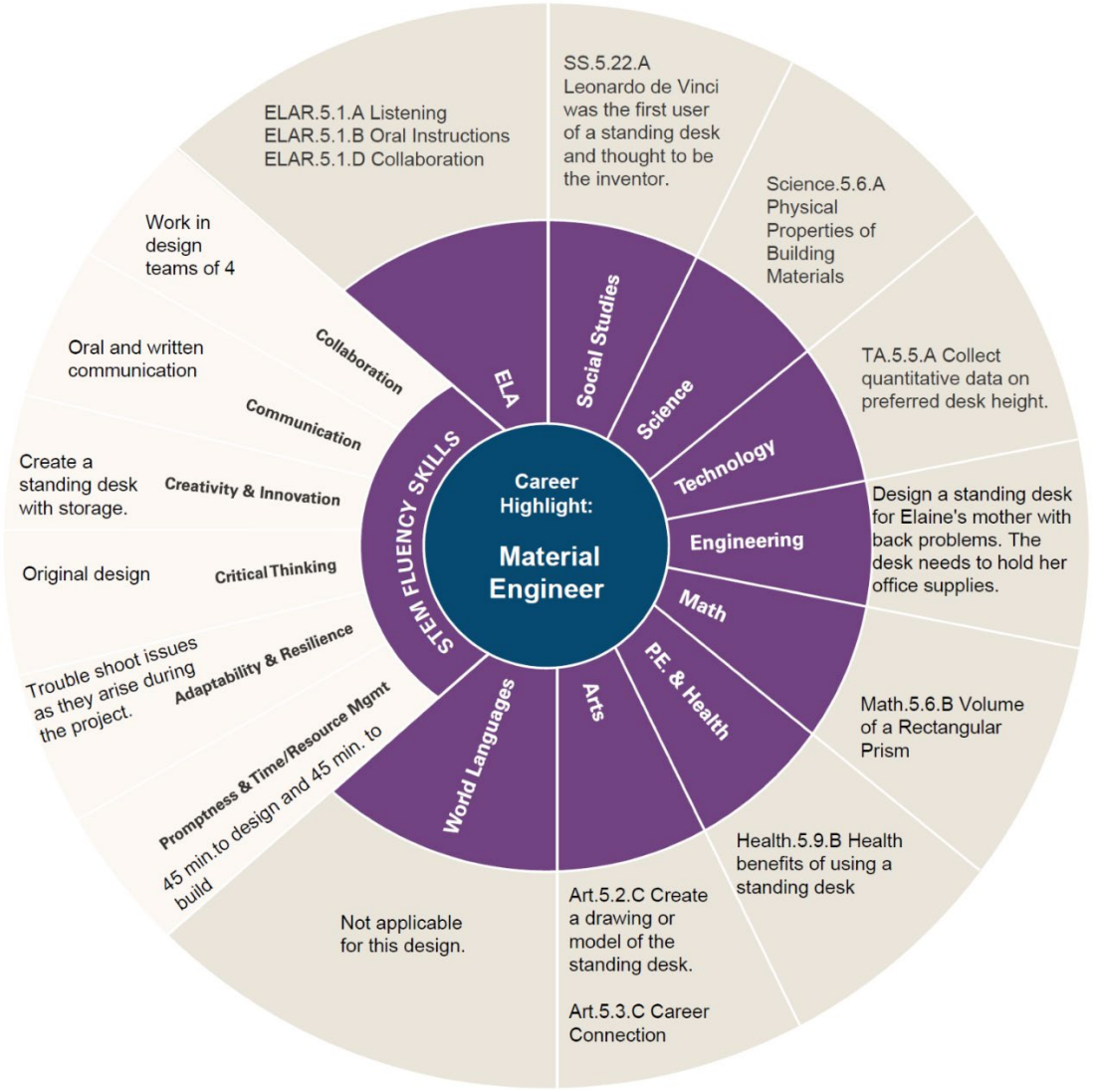

Engineering Design Challenge: Design a standing desk for Elaine's mother who has back problems. The desk needs to hold her office supplies.

Core Subject Area Connection Summary:

Science.5.6.A Compare and contrast physical properties of building materials

Math.5.6.B Calculate the volume of the standing desk (Rectangular Prism)

SS.5.22.A Read about Leonardo de Vinci was the first user of a standing desk and thought to be the inventor

ELAR TEKS Support the STEM Fluency Skills:

ELAR.5.1.A and 5.1.B Listen to others and provide oral Instructions (Communication)

ELAR.5.1.D Work in groups (Collaboration)

Enrichment Area Connection Summary:

TA.5.5.A Collect quantitative data on preferred desk height

Health.5.9.B Identify health benefits of using a standing desk

Art.5.2.C Create a drawing or model of the standing desk

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Component 2: Integrated Content Crosswalk for STEM Education

The Integrated Content Crosswalk for STEM Education section is a resource designed to help teachers identify connections between student expectations across the required curricula. It is important to note that this tool offers suggestions. Educators may use the suggestions in the crosswalk as a starting place for selecting student expectations across disciplines for an engineering design challenge. Student expectations in an integrated content crosswalk will vary and should align with the design challenge. The Integration Planning Graphic Organizer example provided for grade 5 includes the student expectations from the crosswalk, as well as additional standards from health and art. The boxes on the chart excerpt below indicate the student expectations that were used in the previous example on the graphic organizer.

In a STEM career, professionals must communicate throughout a design process. Students will practice language skills during engineering design challenges by using written and oral communication, research, questioning, and synthesizing information. Students may also use technology to create, develop, and communicate their ideas. The standards aligned to each project will change depending on what students are doing in the design challenge.

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.5.6.A compare and contrast matter based on measurable, testable, or observable physical properties, including mass, magnetism, relative density (sinking and floating using water as a reference point), physical state (solid, liquid, gas), volume, solubility in water, and the ability to conduct or insulate thermal energy and electric energy **Career Highlights:** Materials Engineers, Machinists, Service Unit Operators	**Math.5.1.E** create and use representations to organize, record, and communicate mathematical ideas **Math.5.6.A** recognize a cube with side length of one unit as a unit cube having one cubic unit of volume and the volume of a three-dimensional figure as the number of unit cubes (n cubic units) needed to fill it with no gaps or overlaps if possible **Math.5.6.B** determine the volume of a rectangular prism with whole number side lengths in problems related to the number of layers times the number of unit cubes in the area of the base	**SS.5.22.A** identify the accomplishments of notable individuals in the fields of science and technology such as Benjamin Franklin and Thomas Edison	**ELAR.5.1.B** follow, restate, and give oral instructions that include multiple action steps **ELAR.5.1.D** work collaboratively with others to develop a plan of shared responsibilities **ELAR.5.13.A** generate questions on a topic for formal and informal inquiry	**TA.5.5.A** identify and collect quantitative and qualitative data with digital tools

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Component 3: Career Highlights

The career highlights section is listed below each science student expectation in the Integrated Content Crosswalk for STEM Education. The career highlights are designed to provide career connections to the science content being taught. On the *Integrated Content Crosswalk*, each science standard has three career connections that support the incorporation of scientific and engineering practices for investigating STEM careers. The careers highlighted use the science content regularly by STEM professionals in their careers. The career highlights show science content that is regularly used by STEM professionals in the identified careers. The Texas Workforce Commission and O*NET provide the labor data information. Connecting engineering design challenges to careers promotes career awareness and provides relevance for learning content.

Getting Started:

To begin developing your own cross-curricular engineering design challenge, start by selecting a science content standard that aligns with your instructional goals. Use the Integration Planning Graphic Organizer in conjunction with the Integrated Content Crosswalk for STEM Education to identify meaningful connections across subject areas and incorporate relevant student expectations. Consider which engineering practices will be used to solve the real-world problem presented in the engineering design challenge. Leverage the career highlights to introduce students to STEM professions and make learning more relevant. As you plan, remember to adapt this tool to fit your students' needs, available resources, and instructional context.

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Integrated Content Crosswalk for STEM Education and Career Highlights:

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.6.A compare and contrast elements and compounds in terms of atoms and molecules, chemical symbols, and chemical formulas **Career Highlights:** Materials Scientist, Chemical Engineer, Chemist	**Math.7.9.C** determine the area of composite figures containing combinations of rectangles, squares, parallelograms, trapezoids, triangles, semicircles, and quarter circles		**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.G** evaluate details read to determine key ideas	
Science.7.6.B use the periodic table to identify the atoms and the number of each kind within a chemical formula **Career Highlights:** Chemist, Chemical Engineer, Forensic Science Technician	**Math.7.9.C** determine the area of composite figures containing combinations of rectangles, squares, parallelograms, trapezoids, triangles, semicircles, and quarter circles		**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.G** evaluate details read to determine key ideas	

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.6.C distinguish between physical and chemical changes in matter **Career Highlights:** Chemical Engineer, Forensic Science Technician, Environmental Scientist			**ELAR.7.1.B** follow and give complex oral instructions to perform specific tasks, answer questions, or solve problems **ELAR.7.5.F** make inferences and use evidence to support understanding	
Science.7.6.D describe aqueous solutions in terms of solute and solvent, concentration, and dilution **Career Highlights:** Chemical Engineer, Environmental Scientist, Chemist	**Math.7.4.C** determine the constant of proportionality (k = y/x) within mathematical and real-world problems **Math.7.4.D** solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems		**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.F** make inferences and use evidence to support understanding	

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.6.E investigate and model how temperature, surface area, and agitation affect the rate of dissolution of solid solutes in aqueous solutions **Career Highlights:** Chemical Engineer, Material Engineer, Chemist	**Math.7.4.C** determine the constant of proportionality (k = y/x) within mathematical and real-world problems **Math.7.4.D** solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems **Math.7.4.E** convert between measurement systems, including the use of proportions and the use of unit rates		**ELAR.7.1.B** follow and give complex oral instructions to perform specific tasks, answer questions, or solve problems **ELAR.7.5.F** make inferences and use evidence to support understanding	**TA.7.3.B** discuss and implement a design process that includes planning and selecting digital tools to develop and refine a prototype or model through trial and error **TA.7.6.A** use digital tools in order to transform data to analyze trends and make inferences and predictions
Science.7.7.A calculate average speed using distance and time measurements from investigations of friction, magnetism, applied forces, and normal forces, using real-world applications **Career Highlights:** Aerospace Engineer, Mechanical Engineer, Industrial Engineer	**Math.7.4.A** The student is expected to represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt **Math.7.7.A** represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b		**ELAR.7.5.E** make connections to personal experiences, ideas in other texts, and society **ELAR.7.5.F** make inferences and use evidence to support understanding	**TA.7.6.A** use digital tools in order to transform data to analyze trends and make inferences and predictions

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.7.B distinguish between speed and velocity in linear motion in terms of distance, displacement, and direction **Career Highlights:** Aerospace Engineer, Mechanical Engineer, Civil Engineer	**Math.7.4.A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt **Math.7.4.D** solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems		**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.F** make inferences and use evidence to support understanding	**TA.7.6.A** use digital tools in order to transform data to analyze trends and make inferences and predictions
Science.7.7.C measure, record, and interpret an object's motion using distance-time graphs **Career Highlights:** Robotics Engineer, Aerospace Engineer, Mechanical Engineer	**Math.7.4.A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt **Math.7.7.A** represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b		**ELAR.7.1.B** follow and give complex oral instructions to perform specific tasks, answer questions, or solve problems **ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others	**TA.7.6.A** use digital tools in order to transform data to analyze trends and make inferences and predictions

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.7.D analyze the effect of balanced and unbalanced forces on the state of motion of an object using Newton's First Law of Motion **Career Highlights:** Civil Engineer, Mechanical Engineer, Aerospace Engineer			**ELAR.7.1.B** follow and give complex oral instructions to perform specific tasks, answer questions, or solve problems **ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others	**TA.7.6.A** use digital tools in order to transform data to analyze trends and make inferences and predictions
Science.7.8.A investigate methods of thermal energy transfer into and out of systems, including conduction, convection, and radiation **Career Highlights:** Environmental Scientist, Architect, Mechanical Engineer			**ELAR.7.1.B** follow and give complex oral instructions to perform specific tasks, answer questions, or solve problems **ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others	**TA.7.1.B** analyze the patterns and sequences found in flowcharts **TA.7.6.A** use digital tools in order to transform data to analyze trends and make inferences and predictions

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.8.B investigate how thermal energy moves in a predictable pattern from warmer to cooler until all substances within the system reach thermal equilibrium **Career Highlights:** Mechanical Engineer, Atmospheric and Space Scientist, Solar Energy Systems Engineer	**Math.7.4.A** The student is expected to represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt		**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others	**TA.7.1.B** analyze the patterns and sequences found in flowcharts **TA.7.6.A** use digital tools in order to transform data to analyze trends and make inferences and predictions **TA.7.7.A** use digital tools to communicate and display data from a product or process to inform or persuade an intended audience
Science.7.8.C explain the relationship between temperature and the kinetic energy of the particles within a substance **Career Highlights:** Mechanical Engineer, Atmospheric and Space Scientist, Chemical Engineer	**Math.7.4.A r**epresent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt **Math.7.7.A** represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form y = mx + b		**ELAR.7.1.A** listen actively to interpret a message and ask clarifying questions that build on others' ideas **ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.F** make inferences and use evidence to support understanding	**TA.7.7.A** use digital tools to communicate and display data from a product or process to inform or persuade an intended audience

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.9.A describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud **Career Highlights:** Atmospheric and Space Scientist, Astronomer, Physicist	**Math.7.5.C** solve mathematical and real-world problems involving similar shape and scale drawings **Math.7.9.B** determine the circumference and area of circles **Math.7.9.C** use models to determine the approximate formulas for the circumference and area of a circle and connect the models to the actual formulas	**SS.7.19.C** analyze the effects of various scientific discoveries and technological innovations on the development of Texas such as advancements in the agricultural, energy, medical, computer, and aerospace industries	**ELAR.7.5.C** make and correct or confirm predictions using text features, characteristics of genre, and structures **ELAR.7.12.D** identify and gather relevant information from a variety of sources **ELAR.7.12.F** synthesize information from a variety of sources	
Science.7.9.B describe how gravity governs motion within Earth's solar system **Career Highlights:** Atmospheric and Space Scientist, Astronomer, Physicist	**Math.7.4.A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt **Math.7.4.D** solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems		**ELAR.7.5.C** make and correct or confirm predictions using text features, characteristics of genre, and structures **ELAR.7.12.D** identify and gather relevant information from a variety of sources **ELAR.7.12.F** synthesize information from a variety of sources	

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.9.C analyze the characteristics of Earth that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere **Career Highlights:** Geoscientist, Environmental Engineer, Biologist	**Math.7.5.C** solve mathematical and real-world problems involving similar shape and scale drawings	**SS.7.19.C** analyze the effects of various scientific discoveries and technological innovations on the development of Texas such as advancements in the agricultural, energy, medical, computer, and aerospace industries	**ELAR.7.5.C** make and correct or confirm predictions using text features, characteristics of genre, and structures **ELAR.7.12.D** identify and gather relevant information from a variety of sources **ELAR.7.12.F** synthesize information from a variety of sources	
Science.7.10.A describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition **Career Highlights:** Environmental Scientist, Geoscientist, Petroleum Engineer	**Math.7.4.A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt	**SS.7.8.A** locate and compare the Mountains and Basins, Great Plains, North Central Plains, and Coastal Plains regions	**ELAR.7.5.D** create mental images to deepen understanding **ELAR.7.5.F** make inferences and use evidence to support understanding **ELAR.7.5.H** synthesize information to create new understanding	

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.10.B describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including super volcanoes and hot spots **Career Highlights:** Geoscientist, Physicist, Environmental Scientist	**Math.7.4.A** represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including d = rt		**ELAR.7.5.D** create mental images to deepen understanding **ELAR.7.5.F** make inferences and use evidence to support understanding **ELAR.7.5.H** synthesize information to create new understanding	

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.11.A analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed **Career Highlights:** Hydrologist, Environmental Scientist, Zoologist and Wildlife Biologist	**Math.7.1.D** communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate **Math.7.12.A** compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads	**SS.7.8.C** analyze the effects of physical and human factors such as climate, weather, landforms, irrigation, transportation, and communication on major events in Texas **SS.7.9.A** identify ways in which Texans have adapted to and modified the environment and explain the positive and negative consequences of the modifications **SS.7.9.B** explain ways in which geographic factors such as the Galveston Hurricane of 1900, the Dust Bowl, limited water resources, and alternative energy sources have affected the political, economic, and social development of Texas	**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.B** generate questions about text before, during, and after reading to deepen understanding and gain information **ELAR.7.5.E** make connections to personal experiences, ideas in other texts, and society	**TA.7.4.A** explain how changes in technology throughout history have impacted various areas of study

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.11.B describe human dependence and influence on ocean systems and explain how human activities impact these systems **Career Highlights:** Biologist, Zoologist and Wildlife Biologist, Environmental Scientist	**Math.7.1.D** communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate **Math.7.12.A** compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads	**SS.7.9.B** explain ways in which geographic factors such as the Galveston Hurricane of 1900, the Dust Bowl, limited water resources, and alternative energy sources have affected the political, economic, and social development of Texas	**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.B** generate questions about text before, during, and after reading to deepen understanding and gain information **ELAR.7.5.E** make connections to personal experiences, ideas in other texts, and society	
Science.7.12.A diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids **Career Highlights:** Zoologist and Wildlife Biologist, Environmental Scientist, Biologist	**Math.7.1.D** communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate **Math.7.4.D** solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems		**ELAR.7.5.F** make inferences and use evidence to support understanding **ELAR.7.12.F** synthesize information from a variety of sources	**TA.7.1.B** analyze the patterns and sequences found in flowcharts

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.12.B describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere **Career Highlights:** Hydrologist, Environmental Scientist, Geoscientist	**Math.7.1.D** communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate **Math.7.12.C** compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations		**ELAR.7.5.F** make inferences and use evidence to support understanding **ELAR.7.12.F** synthesize information from a variety of sources	**TA.7.1.B** analyze the patterns and sequences found in flowcharts
Science 7.13.A identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems **Career Highlights:** Bioengineer and Biomedical Engineer, Molecular and Cellular Biologist, Physician and Pathologist			**ELAR.7.5.F** make inferences and use evidence to support understanding **ELAR.7.5.G** evaluate details read to determine key ideas **ELAR.7.5.H** synthesize information to create new understanding	

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science 7.13.B describe the hierarchical organization of cells, tissues, organs, and organ systems within plants and animals **Career Highlights:** Geneticist, Molecular and Cellular Biologist, Agricultural Scientist	**Math.7.9.C** determine the area of composite figures containing combinations of rectangles, squares, parallelograms, trapezoids, triangles, semicircles, and quarter circles		**ELAR.7.5.F** make inferences and use evidence to support understanding **ELAR.7.5.G** evaluate details read to determine key ideas **ELAR.7.5.H** synthesize information to create new understanding **ELAR.7.6.C** use text evidence to support an appropriate response	
Science.7.13.C compare the results of asexual and sexual reproduction of plants and animals in relation to the diversity of offspring and the changes in the population over time **Career Highlights:** Geneticist, Molecular and Cellular Biologist, Soil and Plant Scientist	**Math.7.12.B** use data from a random sample to make inferences about a population **Math.7.12.C** compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations	**SS.7.10.C** describe the structure of the population of Texas using demographic concepts such as growth rate and age distribution **SS.7.21.A** create and interpret thematic maps, graphs, and charts representing various aspects of Texas during the 19th, 20th, and 21st centuries	**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.F** make inferences and use evidence to support understanding	

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.13.D describe and give examples of how natural and artificial selection change the occurrence of traits in a population over generations **Career Highlights:** Geneticist, Molecular and Cellular Biologist, Zoologist and Wildlife Biologist	**Math.7.12.B** use data from a random sample to make inferences about a population **Math.7.12.C** compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations		**ELAR.7.1.D** engage in meaningful discourse and provide and accept constructive feedback from others **ELAR.7.5.F** make inferences and use evidence to support understanding	
Science.7.14.A describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups **Career Highlights:** Biologist, Zoologist and Wildlife Biologist, Bioengineer and Biomedical Engineer	**Math.7.2.A** extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of rational numbers **Math.7.4.B** extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of rational numbers		**ELAR.7.5.F** make inferences and use evidence to support understanding **ELAR.7.5.G** evaluate details read to determine key ideas **ELAR.7.5.H** synthesize information to create new understanding	

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Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.7.14.B describe the characteristics of the recognized kingdoms and their importance in ecosystems such as bacteria aiding digestion or fungi decomposing organic matter **Career Highlights:** Environmental Engineer, Zoologist and Wildlife Biologist, Soil and Plant Scientist			**ELAR.7.5.F** make inferences and use evidence to support understanding **ELAR.7.5.G** evaluate details read to determine key ideas **ELAR.7.5.H** synthesize information to create new understanding	