Developing an Engineering Design Challenge (Grade 6)

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

- Science.6.1.A ask questions and define problems based on observations or information from text, phenomena, models, or investigations
- Science.6.1.B use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems
- Science.6.1.G develop and use models to represent phenomena, systems, processes, or solutions to engineering problems
- Science.6.2.D evaluate experimental and engineering designs
- Science.6.4.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.6.4.B make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used
- Science.6.4.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.6.5.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.6.3.A develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories
Science.6.3.B communicate explanations and solutions individually and collaboratively in a variety of settings and formats
Science.6.3.C engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence

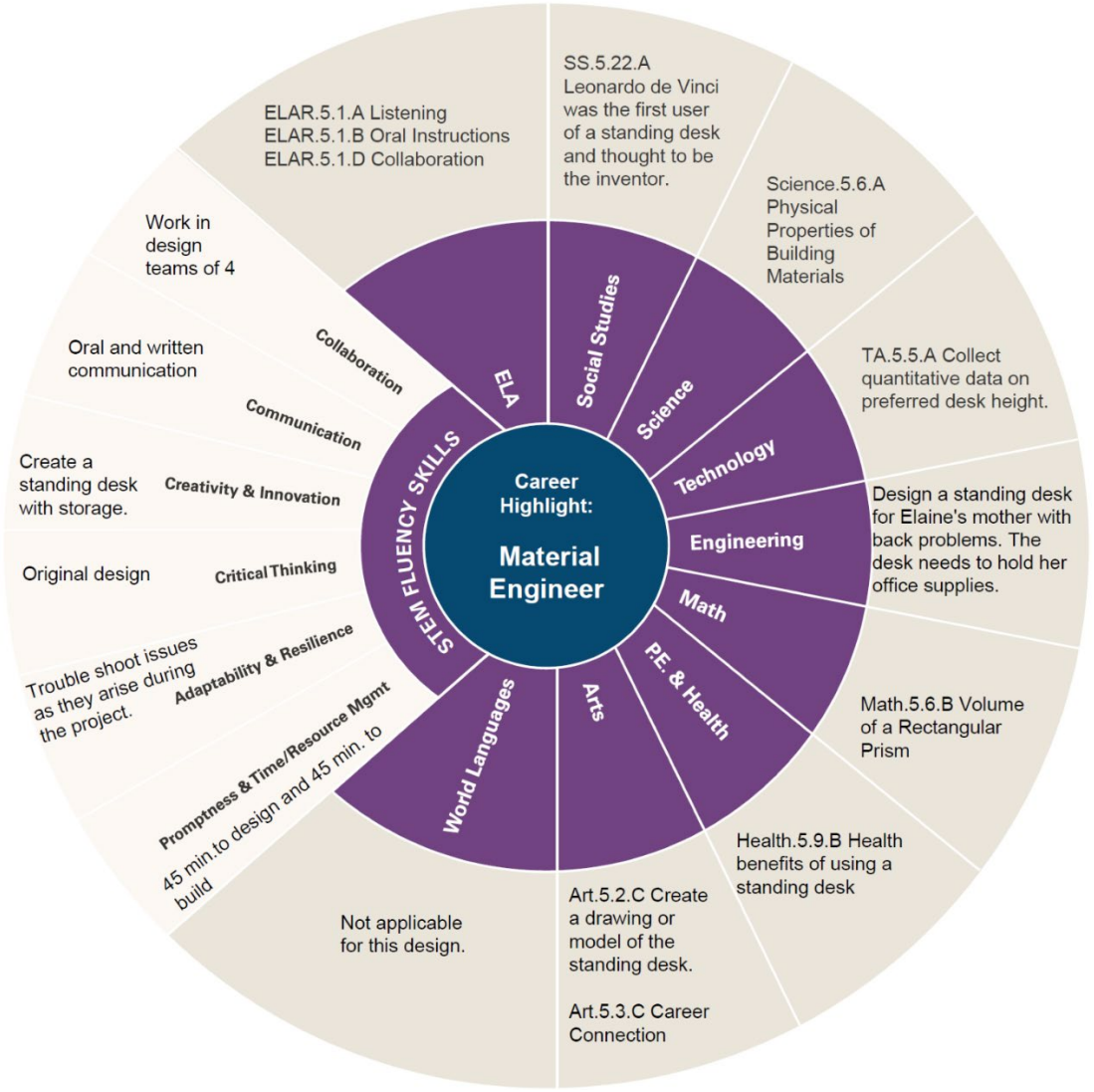
Component 1: Integration Planning Graphic Organizer

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

Developing an Engineering Design Challenge (Grade 6)



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

Developing an Engineering Design Challenge (Grade 6)

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

Developing an Engineering Design Challenge (Grade 6)

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.

Developing an Engineering Design Challenge (Grade 6)

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.6.6.A compare solids, liquids, and gases in terms of their structure, shape, volume, and kinetic energy of atoms and molecules **Career Highlights:** Materials Scientist, Chemical Engineer, Chemist	**Math.6.4.H** convert units within a measurement system, including the use of proportions and unit rates **Math.6.8.D** determine solutions for problems involving the area of rectangles, parallelograms, trapezoids, and triangles and volume of right rectangular prisms where dimensions are positive rational numbers		**ELAR.6.1.A** listen actively to interpret a message, ask clarifying questions, and respond appropriately **ELA.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement	
Science.6.6.B investigate the physical properties of matter to distinguish between pure substances, homogeneous mixtures (solutions), and heterogeneous mixtures **Career Highlights:** Chemist, Chemical Technician, Forensic Science Technician	**Math.6.4.E** represent ratios and percents with concrete models, fractions, and decimals **Math.6.5.A** represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions		**ELAR.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement **ELAR.6.5.F** make inferences and use evidence to support understanding	**TA.6.1.B** analyze the patterns and sequences found in visual representations such as learning maps, concept maps, or other representations of data **TA.6.6.A** use digital tools to transform data in order to identify and discuss trends and make inferences **TA.6.7.A** use digital tools to communicate and display data from a product or process to inform an intended audience

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.6.C identify elements on the periodic table as metals, nonmetals, metalloids, and rare Earth elements based on their physical properties and importance to modern life **Career Highlights:** Chemist, Chemical Engineer, Geoscientist			**ELAR.6.5.H** synthesize information to create new understanding **ELAR.6.12.D** identify and gather relevant information from a variety of sources	**TA.6.1.B** analyze the patterns and sequences found in visual representations such as learning maps, concept maps, or other representations of data
Science.6.6.D compare the density of substances relative to various fluids **Career Highlights:** Petroleum Engineer, Hydrologist, Chemical Engineer	**Math.6.4.E** represent ratios and percents with concrete models, fractions, and decimals **Math.6.5.A** represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions		**ELAR.6.1.A** listen actively to interpret a message, ask clarifying questions, and respond appropriately **ELAR.6.12.A** generate student-selected and teacher-guided questions for formal and informal inquiry	
Science.6.6.E identify the formation of a new substance by using the evidence of a possible chemical change, including production of a gas, change in thermal energy, production of a precipitate, and color change **Career Highlights:** Chemical Engineer, Material Engineer, Chemist	**Math.6.7.D** generate equivalent expressions using the properties of operations: inverse, identity, commutative, associative, and distributive properties		**ELAR.6.1.A** listen actively to interpret a message, ask clarifying questions, and respond appropriately **ELAR.6.12.A** generate student-selected and teacher-guided questions for formal and informal inquiry	

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.7.A identify and explain how forces act on objects, including gravity, friction, magnetism, applied forces, and normal forces, using real-world applications **Career Highlights:** Aerospace Engineer, Geoscientist, Civil Engineer	**Math.6.1.A** apply mathematics to problems arising in everyday life, society, and the workplace **Math.6.6.A** identify independent and dependent quantities from tables and graphs		**ELAR.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement **ELAR.6.5.E** make connections to personal experiences, ideas in other texts, and society	**TA.6.1.A** decompose real-world problems into structured parts by using visual representation **TA.6.7.A** use digital tools to communicate and display data from a product or process to inform an intended audience
Science.6.7.B calculate the net force on an object in a horizontal or vertical direction using diagrams and determine if the forces are balanced or unbalanced **Career Highlights:** Aerospace Engineer, Industry Machinery Mechanic, Environmental Engineer	**Math.6.6.A** identify independent and dependent quantities from tables and graphs **Math.6.6.B** write an equation that represents the relationship between independent and dependent quantities from a table		**ELAR.6.1.B** follow and give oral instructions that include multiple action steps **ELAR.6.5.E** make connections to personal experiences, ideas in other texts, and society	**TA.6.1.B** analyze the patterns and sequences found in visual representations such as learning maps, concept maps, or other representations of data **TA.6.6.A** use digital tools to transform data in order to identify and discuss trends and make inferences

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.7.C identify simultaneous force pairs that are equal in magnitude and opposite in direction that result from the interactions between objects using Newton's Third Law of Motion **Career Highlights:** Robotics Engineer, Aerospace Engineer, Mechanical Engineer	**Math.6.2.D** order a set of rational numbers arising from mathematical and real-world contexts **Math.6.6.C** represent a given situation using verbal descriptions, tables, graphs, and equations in the form y = kx or y = x + b		**ELAR.6.5.E** make connections to personal experiences, ideas in other texts, and society **ELAR.6.5.H** synthesize information to create new understanding	
Science.6.8.A compare and contrast gravitational, elastic, and chemical potential energies with kinetic energy **Career Highlights:** Civil Engineer, Biomedical Engineer, Materials Engineer			**ELAR.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement **ELAR.6.5.H** synthesize information to create new understanding	

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.8.B describe how energy is conserved through transfers and transformations in systems such as electrical circuits, food webs, amusement park rides, or photosynthesis **Career Highlights:** Electrical Engineer, Environmental Scientist, Physicist	**Math.6.7.D** generate equivalent expressions using the properties of operations: inverse, identity, commutative, associative, and distributive properties		**ELAR.6.5.B** generate questions about text before, during, and after reading to deepen understanding and gain information **ELAR.6.5.D** create mental images to deepen understanding	
Science.6.9.A model and illustrate how the tilted Earth revolves around the Sun, causing changes in seasons **Career Highlights:** Astronomer, Remote Sensing Analyst, Agricultural Engineer	**Math.6.5.A** represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions **Math.6.6.C** represent a given situation using verbal descriptions, tables, graphs, and equations in the form y = kx or y = x + b	**SS.6.3.A** identify and explain the geographic factors responsible for patterns of population in places and regions	**ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.H** synthesize information to create new understanding	**TA.6.7.A** use digital tools to communicate and display data from a product or process to inform an intended audience
Science.6.9.B describe and predict how the positions of the Earth, Sun, and Moon cause daily, spring, and neap cycles of ocean tides due to gravitational forces **Career Highlights:** Marine Engineer, Environmental Scientist, Astronomer	**Math.6.5.A** represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions Math.6.6.C represent a given situation using verbal descriptions, tables, graphs, and equations in the form y = kx or y = x + b		**ELAR.6.5.E** make connections to personal experiences, ideas in other texts, and society **ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.G** evaluate details read to determine key ideas	**TA.6.1.B** analyze the patterns and sequences found in visual representations such as learning maps, concept maps, or other representations of data **TA.6.6.A** use digital tools to transform data in order to identify and discuss trends and make inferences

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.10.A differentiate between the biosphere, hydrosphere, atmosphere, and geosphere and identify components of each system **Career Highlights:** Biologist, Hydrologist, Atmospheric and Space Scientist		**SS.6.3.A** identify and explain the geographic factors responsible for patterns of population in places and regions	**ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.G** evaluate details read to determine key ideas **ELAR.6.5.H** synthesize information to create new understanding	
Science.6.10.B model and describe the layers of Earth, including the inner core, outer core, mantle, and crust **Career Highlights:** Mining and Geological Engineer, Civil Engineer, Petroleum Engineer	**Math.6.4.E** represent ratios and percents with concrete models, fractions, and decimals		**ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.G** evaluate details read to determine key ideas **ELAR.6.5.H** synthesize information to create new understanding	
Science.6.10.C describe how metamorphic, igneous, and sedimentary rocks form and change through geologic processes in the rock cycle **Career Highlights:** Geoscientist, Petroleum Engineer, Environmental Engineer			**ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.G** evaluate details read to determine key ideas **ELAR.6.5.H** synthesize information to create new understanding	**TA.6.1.B** analyze the patterns and sequences found in visual representations such as learning maps, concept maps, or other representations of data

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.11.A research and describe why resource management is important in reducing global energy, poverty, malnutrition, and air and water pollution **Career Highlights:** Environmental Scientist, Environmental Engineer, Hydrologist	**Math.6.12.C** summarize numeric data with numerical summaries, including the mean and median (measures of center) and the range and interquartile range (IQR) (measures of spread), and use these summaries to describe the center, spread, and shape of the data distribution **Math.6.12.D** summarize categorical data with numerical and graphical summaries, including the mode, the percent of values in each category (relative frequency table), and the percent bar graph, and use these summaries to describe the data distribution	**SS.6.5.C** identify and analyze ways people have modified the physical environment such as mining, irrigation, and transportation infrastructure **SS.6.6.A** describe ways in which the factors of production (natural resources, labor, capital, and entrepreneurs) influence the economies of various contemporary societies **SS.6.6.B** identify problems that may arise when one or more of the factors of production is in relatively short supply	**ELAR.6.12.C** refine the major research question, if necessary, guided by the answers to a secondary set of questions **ELAR.6.12.D** identify and gather relevant information from a variety of sources **ELAR.6.12.E** differentiate between primary and secondary sources **ELAR.6.12.F** synthesize information from a variety of sources	**TA.6.3.C** identify how the design process is used in various industries **TA.6.4.A** discuss how changes in technology throughout history have impacted various areas of study **TA.6.4.B** discuss how global trends impact the development of technology **TA.6.9.C** create citations and cite sources for a variety of digital forms of intellectual property

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.11.B explain how conservation, increased efficiency, and technology can help manage air, water, soil, and energy resources **Career Highlights:** Environmental Scientist, Hydrologist, Energy Engineer	**Math.6.12.C** summarize numeric data with numerical summaries, including the mean and median (measures of center) and the range and interquartile range (IQR) (measures of spread), and use these summaries to describe the center, spread, and shape of the data distribution **Math.6.12.D** summarize categorical data with numerical and graphical summaries, including the mode, the percent of values in each category (relative frequency table), and the percent bar graph, and use these summaries to describe the data distribution	**SS.6.6.B** identify problems that may arise when one or more of the factors of production is in relatively short supply **SS.6.18.A** identify examples of scientific discoveries, technological innovations, and scientists and inventors that have shaped the world **SS.6.18.B** explain how resources, economic factors, and political decisions affect the use of technology	**ELAR.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement **ELAR.6.5.E** make connections to personal experiences, ideas in other texts, and society **ELAR.6.6.C** use text evidence to support an appropriate response	**TA.6.4.A** discuss how changes in technology throughout history have impacted various areas of study **TA.6.4.B** discuss how global trends impact the development of technology **TA.6.4.C** transfer current knowledge to the learning of newly encountered technologies

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.12.A investigate how organisms and populations in an ecosystem depend on and may compete for biotic factors such as food and abiotic factors such as availability of light and water, range of temperatures, or soil composition **Career Highlights:** Biologist, Microbiologist, Conservation Scientist	**Math.6.6.A** identify independent and dependent quantities from tables and graphs **Math.6.6.C** represent a given situation using verbal descriptions, tables, graphs, and equations in the form y = kx or y = x + b **Math.6.12.B** use the graphical representation of numeric data to describe the center, spread, and shape of the data distribution	**SS.6.3.A** identify and explain the geographic factors responsible for patterns of population in places and regions **SS.6.4.B** identify geographic factors such as location, physical features, transportation corridors and barriers, and distribution of natural resources that influence a society's political relationships		**TA.6.1.B** analyze the patterns and sequences found in visual representations such as learning maps, concept maps, or other representations of data **TA.6.6.A** use digital tools to transform data in order to identify and discuss trends and make inferences **TA.6.7.A** use digital tools to communicate and display data from a product or process to inform an intended audience
Science.6.12.B describe and give examples of predatory, competitive, and symbiotic relationships between organisms, including mutualism, parasitism, and commensalism **Career Highlights:** Biologist, Zoologists and Wildlife Biologist, Environmental Scientist	**Math.6.6.A** identify independent and dependent quantities from tables and graphs **Math.6.12.A** represent numeric data graphically, including dot plots, stem-and-leaf plots, histograms, and box plots **Math.6.12.B** use the graphical representation of numeric data to describe the center, spread, and shape of the data distribution		**ELAR.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and and disagreement **ELAR.6.5.F** make inferences and use evidence to support understanding	

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science.6.12.C describe the hierarchical organization of organism, population, and community within an ecosystem **Career Highlights:** Zoologist and Wildlife Biologist, Environmental Scientist, Biologist	**Math.6.5.A** represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions		**ELAR.6.5.E** make connections to personal experiences, ideas in other texts, and society **ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.G** evaluate details read to determine key ideas **ELAR.6.5.H** synthesize information to create new understanding	
Science.6.13.A describe the historical development of cell theory and explain how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function **Career Highlights:** Molecular and Cellular Biologist, Microbiologist, Physician and Pathologist			**ELAR.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement **ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.H** synthesize information to create new understanding	**TA.6.4.A** discuss how changes in technology throughout history have impacted various areas of study

Developing an Engineering Design Challenge (Grade 6)

Science Student Expectation	Math Connection	Social Studies Connection	Reading Language Arts Connection	Technology Applications Connection
Science 6.13.B identify and compare the basic characteristics of organisms, including prokaryotic and eukaryotic, unicellular and multicellular, and autotrophic and heterotrophic **Career Highlights:** Microbiologist, Bioengineer and Biomedical Engineer, Biologist			**ELAR.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement **ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.H** synthesize information to create new understanding	
Science 6.13.C describe how variations within a population can be an advantage or disadvantage to the survival of a population as environments change **Career Highlights:** Geneticist, Molecular and Cellular Biologist, Agricultural Engineer	**Math.6.6.A** identify independent and dependent quantities from tables and graphs **Math.6.12.A** represent numeric data graphically, including dot plots, stem-and-leaf plots, histograms, and box plots **Math.6.12.B** use the graphical representation of numeric data to describe the center, spread, and shape of the data distribution **Math.6.13.A** interpret numeric data summarized in dot plots, stem-and-leaf plots, histograms, and box plots		**ELAR.6.1.D** participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement **ELAR.6.5.F** make inferences and use evidence to support understanding **ELAR.6.5.H** synthesize information to create new understanding	