PLTW Launch Science Standards Guide

PA Science, Technology & Engineering, and Environmental Literacy & Sustainability Standards STEELS (K-5)

While performance expectations describe what students should do to demonstrate understanding of science concepts, the STEELS also stress three dimensions of science learning-disciplinary core ideas, science and engineering practices, and crosscutting concepts. PLTW Launch students experience this 3D learning as they actively engage in activities, projects, and problems. For modules that address only Technology and Engineering standards, students develop science and engineering practices and employ crosscutting concepts as they build knowledge and skills in activities and projects and then apply their learning by solving the open ended problem that anchors each module.

Please note: The information included in this document is subject to change. As with all course materials, we will continue to update as more information becomes available.

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Kindergarten Science STEELS

Science Standard Connections

100%

		Living Things: Needs and Impacts	Pushes and Pulls	Sunlight and Weather	Animals and Algorithms	Structure and Function: Exploring Design	Structure and Function: Human Body
Life Science	3.1.K.A Use observations to describe patterns of what plants and animals (including humans) need to survive.						
Physical Science	3.2.K.A Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.						
	3.2.K.B Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of the object.						
	3.2.K.C Make observations to determine the effect of sunlight on Earth's surface.						
	3.2.K.D Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.						
Earth and Space Science	3.3.K.A Use and share observations of local weather conditions to describe patterns over time.						
	3.3.K.B Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.						
	3.3.K.C Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.						
	3.3.K.D Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.						
	3.3.K.E Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.						

Additional K-2 standards connections listed below for:

- Environmental Literacy and Sustainability
- Technology and Engineering

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1st Grade Science STEELS

Science Standards Connections

100%

		Animal Adaptations	Designs Inspired by Nature	Light and Sound	Light: Observing the Sun, Moon, and Stars	Animated Storytelling
Life Science	3.1.1.A Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.					
	3.1.1.B Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.					
	3.1.1.C Make observations to construct and evidence-based account that young plants and animals are like, but not exactly like, their parents.					
Physical Science	3.2.1.A Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.					
	3.2.1.B Make observations to construct an evidence-based account that objects can be seen only when illuminated.					
	3.2.1.C Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.					
	3.2.1.D Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.					
Earth and Space Science	3.3.1.A Use observations of the sun, moon, and stars to describe patterns that can be predicted.					
	3.3.1.B Make observations at different times of year to relate the amount of daylight to the time of year.					

Additional K-2 standards connections listed below for:

- Environmental Literacy and Sustainability
- Technology and Engineering

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2nd Grade Science STEELS

Science Standards Connections

100%

		Living Things: Diversity of Life	Materials Science: Form and Function	Materials Science: Properties of Matter	The Changing Earth	Grids and Games
Life Science	3.1.2.A Plan and conduct an investigation to determine if plants need sunlight and water to grow.	■				
	3.1.2.B Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.		■			
	3.1.2.C Make observations of plans and animals to compare the diversity of life in different habitats.	■				
Physical Science	3.2.2.A Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.			■		
	3.2.2.B Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.		■	■		
	3.2.2.C Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object		■	■		
	3.2.2.D Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.			■		
Earth and Space Science	3.3.2.A Use information from several sources to provide evidence that Earth events can occur quickly or slowly.				■	
	3.3.2.B Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.				■	
	3.3.2.C Develop a model to represent the shapes and kinds of land and bodies of water in an area.				■	
	3.3.2.D Obtain information to identify where water is found of Earth and that it can be solid or liquid.				■	

Additional K-2 standards connections listed below for:

- Environmental Literacy and Sustainability
- Technology and Engineering

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K-2 STEELS

Standards Connections

100%

		Living Things: Needs and Impacts	Pushes and Pulls	Sunlight and Weather	Animals and Algorithms	Structure and Function: Exploring Design	Structure and Function: Human Body	Animal Adaptations	Designs Inspired by Nature	Light and Sound	Light: Observing the Sun, Moon, and Stars	Animated Storytelling	Living Things: Diversity of Life	Materials Science: Form and Function	Materials Science: Properties of Matter	The Changing Earth	Grids and Games
		Kindergarten						1st Grade					2nd Grade				
Environmental Literacy and Sustainability	3.4.K-2.A Categorize ways people harvest, re-distribute, and use natural resources.	■															
	3.4.K-2.B Examine how people from different cultures and communities, including one's own, interact and express their beliefs about nature.	■															
	3.4.K-2.C Explain ways that places differ in their physical characteristics, their meaning, and their value and/or importance.							■									
	3.4.K-2.D Plan and carry out an investigation to address an issue in their local environment and community.	■						■				■	■			■	
	Technology																
Technology and Engineering	3.5.K-2.A Identify and use everyday symbols.			■					■			■			■	■	■
	3.5.K-2.B Describe qualities of everyday products.			■		■		■	■	■			■	■	■		
	3.5.K-2.C Explain ways that technology helps with everyday tasks.			■				■	■	■	■			■	■		
	3.5.K-2.D Select ways to reduce, reuse, and recycle resources in daily life.	■	■								■						
	3.5.K-2.E Illustrate helpful and harmful effects of technology.			■			■		■	■	■					■	
	3.5.K-2.F Investigate the use of technologies in the home and community.			■	■			■		■	■	■		■	■	■	
	3.5.K-2.G Explain the tools and techniques that people use to help them do things.			■	■			■	■	■	■		■	■	■	■	
	3.5.K-2.H Explain the needs and wants of individuals and societies					■	■		■	■							
	3.5.K-2.I Compare simple technologies to evaluate their impacts.				■			■			■		■	■			
	3.5.K-2.J Design new technologies that could improve their daily lives.				■			■	■	■				■	■		■
	3.5.K-2.K Safely use tools to complete tasks.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.L Explore how technologies are developed to meet individual and societal needs and wants.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

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K-2 STEELS

Standards Connections

100%

	Design and Design Thinking	Living Things: Needs and Impacts	Pushes and Pulls	Sunlight and Weather	Animals and Algorithms	Structure and Function: Exploring Design	Structure and Function: Human Body	Animal Adaptations	Designs Inspired by Nature	Light and Sound	Light: Observing the Sun, Moon, and Stars	Animated Storytelling	Living Things: Diversity of Life	Materials Science: Form and Function	Materials Science: Properties of Matter	The Changing Earth	Grids and Games
		Kindergarten						1st Grade					2nd Grade				
Technology and Engineering	3.5.K-2.M Demonstrate essential skills of the engineering design process.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.N Analyze how things work.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.O Illustrate that there are different solutions to a design and that none are perfect.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.P Discuss that all designs have different characteristics that can be described.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.Q Apply skills necessary for making in design.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.R Draw connections between technology and human experiences.		■	■				■	■			■		■	■	■	■
	3.5.K-2.S Apply design concepts, principles, and processes through play and exploration.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.T Demonstrate that designs have requirements.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.U Explain that design is a response to wants and needs.				■		■		■				■				
	Integration of Knowledge, Technologies and Practices																
	3.5.K-2.V Explain that materials are selected for use because they possess desirable properties and characteristics	■	■	■	■	■	■	■	■	■	■	■		■	■	■	
	3.5.K-2.W Apply concepts and skills from technology and engineering activities that reinforce concepts and skills across multiple content areas.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.X Develop a plan in order to complete a task.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Nature, Core Concepts and History of Technology																
	3.5.K-2.Y Discuss how the way people live and work has changed throughout history is because of technology.								■					■	■		■
	3.5.K-2.Z Illustrate how systems have parts or components that work together to accomplish a goal.	■					■	■					■				
	3.5.K-2.AA Demonstrate that creating can be done by anyone.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.BB Compare the natural world and human-made world.	■				■		■	■				■	■	■		
	3.5.K-2.CC Discuss the roles of scientists, engineering, technologists and others who work with technology.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.K-2.DD Collaborate effectively as a member of a team.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

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3rd Grade Science STEELS

Science Standards Connections

100%

		Life Cycles and Survival	Variation of Traits	Environmental Changes	Stability and Motion: Forces and Interactions	Stability and Motion: Science of Flight	Weather: Factors and Hazards	Programming Patterns
Life Science	3.1.3.A Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.	■						
	3.1.3.B Construct an argument that some animals form groups that help members survive.	■						
	3.1.3.C Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms.		■					
	3.1.3.D Use evidence to support the explanation that traits can be influenced by the environment.		■					
	3.1.3.E Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.			■				
	3.1.3.F Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.		■					
	3.1.3.G Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.			■				
	3.1.3.H Make a claim supported by evidence about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.			■				
Physical Science	3.2.3.A Make and communicate observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.				■	■		
	3.2.3.B Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.				■	■		
	3.2.3.C Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.				■			
	3.2.3.D Define a simple design problem that can be solved by applying scientific ideas about magnets.				■			
Earth and Space Science	3.3.3.A Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.						■	
	3.3.3.B Obtain and combine information to describe climates in different regions of the world.						■	
	3.3.3.C Make a claim supported by evidence about the merit of a design solution that reduces the impacts of a weather-related hazard.						■	

Additional 3-5 standards connections listed below for:

- Environmental Literacy and Sustainability
- Technology and Engineering

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4th Grade Science STEELS

Science Standards Connections

100%

		Organisms: Structure and Function	Input/Output: Human Brain	Energy Exploration	Waves and the Properties of Light	Input/Output: Computer Systems	Earth: Past, Present, and Future	Earth: Human Impact and Natural Disasters
Life Science	3.1.4.A Construct and argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	■						
	3.1.4.B Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	■	■					
Physical Science	3.2.4.A Use evidence to construct an explanation relating the speed of an object to the energy of that object.			■				
	3.2.4.B Make and communicate observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.			■				
	3.2.4.C Ask questions and predict outcomes about the changes in energy that occur when objects collide			■				
	3.2.4.D Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.			■				
	3.2.4.E Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.				■			
	3.2.4.F Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.				■			
	3.2.4.G Generate and compare multiple solutions that use patterns to transfer information.					■		
Earth and Space Science	3.3.4.A Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time						■	
	3.3.4.B Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.						■	
	3.3.4.C Analyze and interpret data from maps to describe patterns of Earth's features.						■	
	3.3.4.D Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.							■
	3.3.4.E Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.							■

Additional 3-5 standards connections listed below for:

- Environmental Literacy and Sustainability
- Technology and Engineering

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5th Grade Science STEELS

Science Standards Connections

100%

		Ecosystems: Flow of Matter and Energy	Matter: Properties and Reactions	Patterns in the Universe	Earth's Water and Interconnected Systems	Robotics and Automation	Robotics and Automation: Challenge	Infection: Detection	Infection: Simulation and Modeling
Life Science	3.1.5.A Support an argument that plants get the materials they need for growth chiefly from air and water.								
Physical Science	3.2.5.A Support a model to describe that matter is made of particles too small to be seen.								
	3.2.5.B Make and communicate observations and measurements to identify materials based on their properties.								
	3.2.5.C Interpret and analyze data to make decisions about how to utilize materials based on their properties.								
	3.2.5.D Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.								
	3.2.5.E Conduct an investigation to determine whether the mixing of two or more substances results in new substances.								
	3.2.5.F Support an argument that the gravitational force exerted by Earth on objects is directed down.								
	3.2.5.G Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.								
Earth and Space Science	3.3.5.A Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.								
	3.3.5.B Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.								
	3.3.5.C Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.								
	3.3.5.D Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.								

Additional 3-5 standards connections listed below for:

- Environmental Literacy and Sustainability
- Technology and Engineering

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3-5 STEELS

Standards Connections

98%

		Life Cycles and Survival	Variation of Traits	Environmental Changes	Stability and Motion: Forces and Interactions	Stability and Motion: Science of Flight	Weather: Factors and Hazards	Programming Patterns	Organisms: Structure and Function	Input/Output: Human Brain	Energy Exploration	Waves and the Properties of Light	Input/Output: Computer Systems	Earth: Past, Present, and Future	Earth: Human Impact and Natural Disasters	Ecosystems: Flow of Matter and Energy	Matter: Properties and Reactions	Patterns in the Universe	Earth's Water and interconnected Systems	Robotics and Automation	Robotics and Automation: Challenge	Infection: Detection	Infection: Modeling and Simulation
		3rd Grade							4th Grade							5th Grade							
Environmental Literacy and Sustainability	3.4.3-5.A Analyze how living organisms, including humans, affect the environment in which they live, and how their environment affects them.	■		■			■				■			■		■			■			■	
	3.4.3-5.B Make a claim about the environmental and social impacts of design solutions and civic actions, including their own actions.	■									■				■	■							
	3.4.3-5.C Examine ways you influence your local environment and community by collecting and displaying data.	■					■								■							■	■
	3.4.3-5.D Develop a model to demonstrate how local environmental issues are connected to larger local environment and human systems.			■			■								■				■			■	■
	3.4.3-5.E Construct an argument to support whether action is needed on a selected environmental issue and propose possible solutions.	■		■			■									■			■				
	3.4.3-5.F Critique ways that people depend on and change the environment.						■								■	■			■				
	3.4.3-5.G Investigate how perspectives over the use of resources and the development of technology have changed over time and resulted in conflict over the development of societies and nations.						■								■								
Technology and Engineering	**Technology**																						
	3.5.3-5.A Use appropriate symbols, numbers and words to communicate key ideas about technological products and systems.				■	■	■	■			■	■	■		■		■	■	■	■	■		
	3.5.3-5.B Examine information to assess the trade-offs of using a product or system.																			■			
	3.5.3-5.C Follow directions to complete a technological task.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.D Predict how certain aspects of their daily lives would be different without given technologies.				■																		
	3.5.3-5.E Explain why responsible use of technology requires sustainable management of resources.																						
	3.5.3-5.F Classify resources used to create technologies as either renewable or nonrenewable.										■				■								
	3.5.3-5.G Describe the helpful and harmful effects of technology.				■		■				■		■							■	■		

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3-5 STEELS

Standards Connections

98%

	Technology cont.	Life Cycles and Survival	Variation of Traits	Environmental Changes	Stability and Motion: Forces and Interactions	Stability and Motion: Science of Flight	Weather: Factors and Hazards	Programming Patterns	Organisms: Structure and Function	Input/Output: Human Brain	Energy Exploration	Waves and the Properties of Light	Input/Output: Computer Systems	Earth: Past, Present, and Future	Earth: Human Impact and Natural Disasters	Ecosystems: Flow of Matter and Energy	Matter: Properties and Reactions	Patterns in the Universe	Earth's Water and interconnected Systems	Robotics and Automation	Robotics and Automation: Challenge	Infection: Detection	Infection: Modeling and Simulation
		3rd Grade							4th Grade							5th Grade							
Technology and Engineering	3.5.3-5.H Determine factors that influence changes in a society's technological systems or infrastructure.																						
	3.5.3-5.I Design solutions by safely using tools, materials, and skills.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.J Explain how technologies are developed or adapted when individual or societal needs and wants change.										■				■				■	■	■		
	3.5.3-5.K Judge technologies to determine the best one to use to complete a given task or meet a need.	■		■			■					■	■	■			■		■				
	3.5.3-5.L Demonstrate how tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.				■			■					■							■	■		
	Design and Design Thinking																						
	3.5.3-5.M Demonstrate essential skills of the engineering design process.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.N Identify why a product or system is not working property.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.O Describe requirements of designing or making a product or system.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.P Evaluate the strengths and weaknesses of existing design solutions, including their own solutions.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.Q Practice successful design skills.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.R Apply tools, techniques, and materials in a safe manner as part of the design process.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5. S Illustrate that there are multiple approaches to design.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.T Apply universal principles and elements of design.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.U Evaluate designs based on criteria, constraints, and standards.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	3.5.3-5.V Interpret how good design improves the human condition.				■						■				■					■	■		

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3-5 STEELS

Standards Connections

98%

	Integration of Knowledge, Technologies, and Practices	Life Cycles and Survival	Variation of Traits	Environmental Changes	Stability and Motion: Forces and Interactions	Stability and Motion: Science of Flight	Weather: Factors and Hazards	Programming Patterns	Organisms: Structure and Function	Input/Output: Human Brain	Energy Exploration	Waves and the Properties of Light	Input/Output: Computer Systems	Earth: Past, Present, and Future	Earth: Human Impact and Natural Disasters	Ecosystems: Flow of Matter and Energy	Matter: Properties and Reactions	Patterns in the Universe	Earth's Water and interconnected Systems	Robotics and Automation	Robotics and Automation: Challenge	Infection: Detection	Infection: Modeling and Simulation
		3rd Grade							4th Grade							5th Grade							
Technology and Engineering	3.5.3-5.W Describe the properties of different materials.					■	■					■					■						
	3.5.3-5.X Explain how various relationships can exist between technology and engineering and other content areas.												■							■	■		
	3.5.3-5.Y Identify the resources needed to get a technical job done, such as people, materials, capital, tools, machines, knowledge, energy, and time.												■										
	3.5.3-5.Z Create a new product that improves someone's life.				■	■	■		■		■								■	■	■		
	Nature, Core Concepts and History of Technology																						
	3.5.3-5.AA Create representations of the tools people made, how they cultivated to provide food, made clothing, and built shelters to protect themselves.						■				■												
	3.5.3-5.BB Illustrate how, when parts of a system are missing, it may not work as planned.	■		■				■	■	■									■		■	■	■
	3.5.3-5.CC Describe how a subsystem is a system that operates as a part of another larger system.				■				■	■						■			■	■			
	3.5.3-5.DD Demonstrate how simple technologies are often combined to form more complex systems.				■			■				■	■							■			
	3.5.3-5.EE Explain how solutions to problems are shaped by economic, political, and cultural forces.	■															■			■			
	3.5.3-5.FF Compare how things found in nature differ from things that are human-made, noting differences and similarities in how they are produced and used.	■							■	■											■		
	3.5.3-5.GG Describe the unique relationship between science and technology, and how the natural world can contribute to the human-made world to foster innovation.		■		■	■	■					■					■			■			
	3.5.3-5.HH Differentiate between the role of scientists, engineers, technologists, and others in creating and maintaining technological systems.		■		■	■	■	■	■	■	■		■	■			■	■	■	■	■	■	■