

Embedded Inquiry

Conceptual Strand - *Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.*

Guiding Question - *What tools, skills, knowledge, and dispositions are needed to conduct scientific inquiry?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.Inq.1</p> <p>Explore different scientific phenomena by asking questions, making logical predictions, planning investigations, and recording data.</p>	<p>✓0407.Inq.1</p> <p>Identify specific investigations that could be used to answer a particular question and identify reasons for this choice.</p>	<p>SPI 0407.Inq.1</p> <p>Select an investigation that could be used to answer a specific question.</p>	<p>Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3) <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)
<p>GLE 0407.Inq.2</p> <p>Select and use appropriate tools and simple equipment to conduct an investigation.</p>	<p>✓0407.Inq.2</p> <p>Identify tools needed to investigate specific questions.</p>	<p>SPI 0407.Inq.1</p> <p>Select an investigation that could be used to answer a specific question.</p>	<p>Connections to Nature of Science</p> <p>Science is a Human Endeavor</p> <ul style="list-style-type: none"> Most scientists and engineers work in teams. (4-PS3-4) Science affects everyday life. (4-PS3-4)
<p>GLE 0407.Inq.3</p> <p>Organize data into appropriate tables, graphs, drawings, or diagrams.</p>	<p>✓0407.Inq.3</p> <p>Maintain a science notebook that includes observations, data, diagrams, and explanations.</p>	<p>SPI 0407.Inq.1</p> <p>Select an investigation that could be used to answer a specific question.</p>	<p>Developing and Using Models</p> <ul style="list-style-type: none"> Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1) Develop a model to describe phenomena. (4-PS4-2) <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)

<p>GLE 0407.Inq.4</p> <p>Identify and interpret simple patterns of evidence to communicate the findings of multiple investigations.</p>	<p>✓0407.Inq.4</p> <p>Analyze and communicate findings from multiple investigations of similar phenomena to reach a conclusion.</p>	<p>SPI 0407.Inq.1</p> <p>Select an investigation that could be used to answer a specific question.</p>	<p>4-PS4-3.</p> <p>Generate and compare multiple solutions that use patterns to transfer information.</p> <p>Connections to Nature of Science</p> <p>Scientific Knowledge is Based on Empirical Evidence Science findings are based on recognizing patterns. (4-PS4-1)</p>
<p>GLE 0407.Inq.5</p> <p>Recognize that people may interpret the same results in different ways.</p>	<p>✓0407.Inq.4</p> <p>Analyze and communicate findings from multiple investigations of similar phenomena to reach a conclusion.</p>	<p>SPI 0407.Inq.1</p> <p>Select an investigation that could be used to answer a specific question.</p>	<p>Obtaining, Evaluating, and Communicating Information</p> <ul style="list-style-type: none"> • Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluate the merit and accuracy of ideas and methods. • Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)
<p>GLE 0407.Inq.6</p> <p>Compare the results of an investigation with what scientists already accept about this question.</p>	<p>✓0407.Inq.1</p> <p>Identify specific investigations that could be used to answer a particular question and identify reasons for this choice.</p>	<p>SPI 0407.Inq.1</p> <p>Select an investigation that could be used to answer a specific question.</p>	<p>Connections to Nature of Science</p> <p>Scientific Knowledge is Based on Empirical Evidence Science findings are based on recognizing patterns. (4-PS4-1)</p> <p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> • Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Construct an argument with evidence, data, and/or a model. (4-LS1-1) • Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2) <p>Obtaining, Evaluating, and Communicating Information</p> <ul style="list-style-type: none"> • Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluate the merit and accuracy of ideas and methods. <p>Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)</p>

STEMs TO SUNSHINE

Embedded Technology & Engineering

Conceptual Strand - *Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies.*

Guiding Question - *How do science concepts, engineering skills, and applications of technology improve the quality of life?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.T/E.1</p> <p>Describe how tools, technology, and inventions help to answer questions and solve problems.</p>	<p>✓0407.T/E.1</p> <p>Explain how different inventions and technologies impact people and other living organisms.</p>	<p>SPI 0407.T/E.1</p> <p>Select a tool, technology, or invention that was used to solve a human problem.</p>	<p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1) Apply scientific ideas to solve design problems. (4-PS3-4)
<p>GLE 0407.T/E.2</p> <p>Recognize that new tools, technology, and inventions are always being developed.</p>	<p>✓0407.T/E.2</p> <p>Design a tool or a process that addresses an identified problem caused by human activity.</p>	<p>SPI 0407.T/E.2</p> <p>Recognize the connection between a scientific advance and the development of a new tool or technology.</p>	<p>Connections to Engineering, Technology, and Applications of Science</p> <p>Influence of Science, Engineering and Technology on Society and the Natural World</p> <p>Engineers improve existing technologies or develop new ones. (4-PS3-4)</p>
<p>GLE 0407.T/E.3</p> <p>Identify appropriate materials, tools, and machines that can extend or enhance the ability to solve a specified problem.</p>	<p>✓0407.T/E.3</p> <p>Determine criteria to evaluate the effectiveness of a solution to a specified problem.</p>	<p>SPI 0407.T/E.1</p> <p>Select a tool, technology, or invention that was used to solve a human problem.</p>	<p>ETS1.C: Optimizing The Design Solution</p> <p>Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3)</p>
<p>GLE 0407.T/E.4</p> <p>Recognize the connection between scientific advances, new knowledge, and the availability of new tools and technologies.</p>	<p>✓0407.T/E.4</p> <p>Evaluate an invention that solves a problem and determine ways to improve the design.</p>	<p>SPI 0407.T/E.2</p> <p>Recognize the connection between a scientific advance and the development of a new tool or technology.</p>	<p>ETS1.A: Defining Engineering Problems</p> <ul style="list-style-type: none"> Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4) <p>Connections to Engineering, Technology, and Applications of Science</p>

			<p>Interdependence of Science, Engineering, and Technology Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4-3)</p>
<p>GLE 0407.T/E.5</p> <p>Apply a creative design strategy to solve a particular problem generated by societal needs and wants.</p>		<p>SPI 0407.T/E.1</p> <p>Select a tool, technology, or invention that was used to solve a human problem.</p>	<p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> • Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1) • Apply scientific ideas to solve design problems. (4-PS3-4) • Identify the evidence that supports particular points in an explanation. (4-ESS1-1) <p>ETS1.C: Optimizing The Design Solution Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3)</p> <p>PS4.C: Information Technologies and Instrumentation</p> <ul style="list-style-type: none"> • Digitized information transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it <p>Influence of Science, Engineering and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> • Over time, people’s needs and wants change, as do their demands for new and improved technologies. (4-ESS3-1) • Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2)

STEMs TO SUNSHINE

Standard 1 – Cells

Conceptual Strand 1 - All living things are made of cells that perform functions necessary for life.

Guiding Question 1 - How are plant and animals cells organized to carry on the processes of life?

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.1.1</p> <p>Recognize that cells are the building blocks of all living things.</p>	<p>✓0407.1.1 Use illustrations or direct observations to compare and contrast the basic structures of plant and animal cells.</p> <p>✓0407.1.2 Create a basic model of the cell that illustrates different cell structures and describes their functions.</p>	<p>SPI 0407.1.1</p> <p>Compare basic structures of plant and animal cells.</p>	<p>4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p>4-LS1-2. 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.</p> <p>LS1.A: Structure and Function Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)</p> <p>LS1.D: Information Processing Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal’s brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)</p>

Standard 2 – Interdependence

Conceptual Strand 2 - All life is interdependent and interacts with the environment.

Guiding Question 2 - How do living things interact with one another and with the non-living elements of their environment?

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.2.1</p> <p>Analyze the effects of changes in the environment on the stability of an ecosystem.</p>	<p>✓0407.2.1 Analyze how an increase or decrease in competition or predation affects an ecosystem.</p> <p>✓0407.2.2 Design a simple experiment to illustrate the effects of competition, predation, and interdependency among living things</p>	<p>SPI 0407.2.1</p> <p>Recognize the impact of predation and competition on an ecosystem.</p>	<p>Systems and System Models</p> <p>A system can be described in terms of its components and their interactions. (4-LS1-1), (4-LS1-2)</p>



Standard 3 – Flow of Matter & Energy

Conceptual Strand 3 – *Matter and energy flow through the biosphere.*

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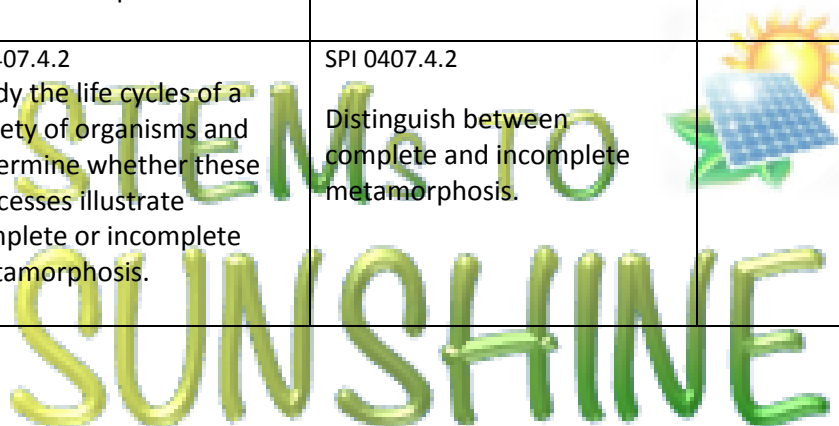
Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.3.1</p> <p>Demonstrate that plants require light energy to grow and survive.</p>	<p>✓0407.3.1 Create a food web that illustrates the energy relationships between plants and animals and the key issues or assumptions found in the model.</p> <p>✓0407.3.3 Identify how a variety of organisms meet their energy needs.</p>	<p>SPI 0407.3.1</p> <p>Determine how different organisms function within an environment in terms of their location on an energy pyramid.</p>	<p>4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p>LS1.A: Structure and Function Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)</p>
<p>GLE 0407.3.2</p> <p>Investigate different ways that organisms meet their energy needs.</p>	<p>✓0407.3.1 Create a food web that illustrates the energy relationships between plants and animals and the key issues or assumptions found in the model.</p> <p>✓0407.3.2 Classify organisms as carnivores, herbivores, or omnivores.</p> <p>✓0407.3.3 Identify how a variety of organisms meet their energy needs.</p>	<p>SPI 0407.3.1</p> <p>Determine how different organisms function within an environment in terms of their location on an energy pyramid.</p>	<p>3-LS2-1. Construct an argument that some animals form groups that help members survive.</p> <p>LS2.D: Social Interactions and Group Behavior Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). (3-LS2-1)</p>

Standard 4 – Heredity

Conceptual Strand 4 – *Plants and animals reproduce and transmit heredity information.*

Guiding Question 4 – *What are the principal mechanisms by which living things reproduce and transmit information between parents and offspring?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
GLE 0407.4.1 Recognize the relationship between reproduction and the continuation of a species.	✓0407.4.1 Design a simple demonstration that illustrates the relationship between reproduction and survival of a species.	SPI 0407.4.1 Draw conclusions about the relationship between reproduction and the survival of a species.	Not addressed
GLE 0407.4.2 Differentiate between complete and incomplete metamorphosis.	✓0407.4.2 Study the life cycles of a variety of organisms and determine whether these processes illustrate complete or incomplete metamorphosis.	SPI 0407.4.2 Distinguish between complete and incomplete metamorphosis.	Not addressed



Standard 5 – Biodiversity & Change

Conceptual Strand 5 – *A rich diversity of complex organisms have developed in response to a continually changing environment.*

Guiding Question 5 – *How does natural selection explain how organisms have changed over time?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.5.1</p> <p>Analyze physical and behavioral adaptations that enable organisms to survive in their environment.</p>	<p>✓0407.5.1 Classify animals according to their physical adaptations for obtaining food, oxygen, and surviving within a particular environment.</p> <p>✓0407.5.2 Describe how animal behaviors such as migration, defense, means of locomotion, and hibernation enable them to survive in an environment.</p> <p>✓0407.5.3 Investigate tropisms that plants exhibit in response to changes in their environment.</p>	<p>SPI 0407.5.1</p> <p>Determine how a physical or behavioral adaptation can enhance the chances of survival.</p>	<p style="text-align: center;">Not addressed</p>
<p>GLE 0407.5.2</p> <p>Describe how environmental changes caused the extinction of various plant and animal species.</p>	<p>✓0407.5.4 Gather fossil information to draw conclusions about organisms that exist today.</p> <p>✓0407.5.5 Analyze the common causes of extinction and explain how human actions sometimes result in the extinction of a species.</p>	<p>SPI 0407.5.2</p> <p>Infer the possible reasons why a species became endangered or extinct.</p>	<p>4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.</p> <p>ESS1.C: The History of Planet Earth Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)</p>

			<p>4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</p> <p>4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.</p> <p>ESS3.A: Natural Resources Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)</p> <p>ESS3.B: Natural Hazards A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)</p>
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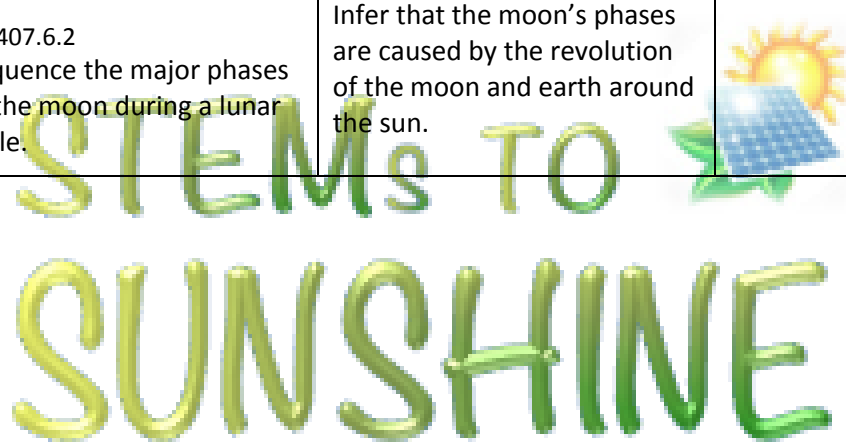
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Standard 6 – The Universe

Conceptual Strand 6 – *The cosmos is vast and explored well enough to know basic structures and operational principals.*

Guiding Question 6 – *What big ideas guide human understanding about the origin and structure of the universe, Earth’s place in the cosmos, and observable motions and patterns in the sky?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
GLE 0407.6.1 Analyze patterns, relative movements, and relationships among the sun, moon, and earth.	✓0407.6.1 Chart the movements of the sun, moon, and earth to develop an explanation for the phases of the moon and solar and lunar eclipses. ✓0407.6.2 Sequence the major phases of the moon during a lunar cycle.	SPI 0407.6.1 Organize the phases of the moon in the correct sequence. SPI 0407.6.2 Infer that the moon’s phases are caused by the revolution of the moon and earth around the sun.	Not addressed



Standard 7 – The Earth

Conceptual Strand 7 - Major geologic events that occur over eons or brief moments in time continually shape and reshape the surface of the Earth, resulting in continuous global change.

Guiding Question 7 - How is the earth affected by long-term and short term geological cycles and the influence of man?

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.7.1</p> <p>Investigate how the Earth’s geological features change as a result of erosion (weathering and transportation) and deposition.</p>	<p>✓0407.7.1 Prepare a demonstration to illustrate how wind and water affect the earth’s surface features.</p> <p>✓0407.7.2 Design an investigation to demonstrate how erosion and deposition change the earth’s surface.</p>	<p>SPI 0407.7.1</p> <p>Design a simple model to illustrate how the wind and movement of water alter the earth’s surface.</p>	<p>4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p> <p>4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth’s features.</p> <p>ESS2.A: Earth Materials and Systems Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)</p> <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)</p> <p>ESS2.E: Biogeology Living things affect the physical characteristics of their regions. (4-ESS2-1)</p>


<p>GLE 0407.7.2</p> <p>Evaluate how some earth materials can be used to solve human problems and enhance the quality of life.</p>	<p>✓0407.7.3 List factors that determine the appropriate use of an earth material.</p> <p>✓0407.7.4 Use data from a variety of informational texts to analyze and evaluate man's impact on non-renewable resources.</p>	<p>SPI 0407.7.2</p> <p>Analyze how different earth materials are utilized to solve human problems or improve the quality of life.</p>	<p>4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</p> <p>4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.</p> <p>ESS3.A: Natural Resources Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)</p> <p>ESS3.B: Natural Hazards A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)</p>
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Standard 8 - The Atmosphere

Conceptual Strand 8 - *The earth is surrounded by an active atmosphere and an energy system that controls the distribution life, local weather, climate, and global temperature.*

Guiding Question 8 - *How do the physical characteristics and the chemical makeup of the atmosphere influence surface processes and life on Earth?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
GLE 0407.8.1 Recognize the major components of the water cycle.	✓0407.8.1 Prepare a model that illustrates the basic features of the water cycle.	SPI 0407.8.1 Identify the basic features of the water cycle and describe their importance to life on earth.	Not addressed
GLE 0407.8.2 Differentiate between weather and climate.	✓0407.8.2 Use long term weather data to distinguish between weather and climate. ✓0407.8.3 Use an illustration to predict and draw conclusions about how weather and climate affect the water cycle.	SPI 0407.8.2 Distinguish between weather and climate.	 Not addressed

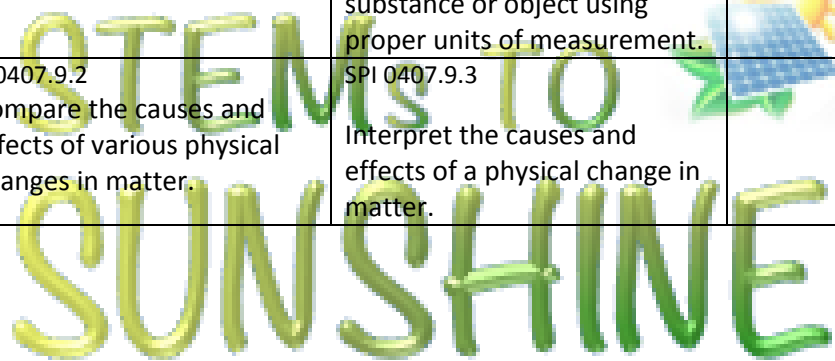
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Standard 9 – Matter

Conceptual Strand 9 - *The composition and structure of matter is known, and it behaves according to principles that are generally understood.*

Guiding Question 9 - *How does the structure of matter influence its physical and chemical behavior?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.9.1</p> <p>Collect data to illustrate that the physical properties of matter can be described with tools that measure weight, mass, length, and volume.</p>	<p>✓0407.9.1</p> <p>Use appropriate tools to measure and compare the physical properties of various solids and liquids.</p>	<p>SPI 0407.9.1</p> <p>Choose an appropriate tool for measuring a specific physical property of matter.</p> <p>SPI 0407.9.2</p> <p>Determine the mass, volume, and temperature of a substance or object using proper units of measurement.</p>	<p>Not addressed</p>
<p>GLE 0407.9.2</p> <p>Explore different types of physical changes in matter.</p>	<p>✓0407.9.2</p> <p>Compare the causes and effects of various physical changes in matter.</p>	<p>SPI 0407.9.3</p> <p>Interpret the causes and effects of a physical change in matter.</p>	<p>Not addressed</p>



Standard 10 - Energy

Conceptual Strand 10 - Various forms of energy are constantly being transformed into other types without any net loss of energy from the system.

Guiding Question 10 - What basic energy related ideas are essential for understanding the dependency of the natural and man-made worlds on energy?

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.10.1</p> <p>Distinguish among heat, radiant, and chemical forms of energy.</p>	<p>✓0407.10.1</p> <p>Design an investigation to demonstrate how different forms of energy release heat or light.</p>	<p>SPI 0407.10.1</p> <p>Identify different forms of energy, such as heat, light, and chemical.</p>	<p>4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p> <p>4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.</p> <p>PS3.A: Definitions of Energy</p> <ul style="list-style-type: none"> • The faster a given object is moving, the more energy it possesses. (4-PS3-1) • Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) <p>PS3.B: Conservation of Energy and Energy Transfer</p> <ul style="list-style-type: none"> • Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) • Light also transfers energy from place to place. (4-PS3-2) • Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)

			<p>PS3.D: Energy in Chemical Processes and Everyday Life</p> <ul style="list-style-type: none"> The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) <p>Energy and Matter Energy can be transferred in various ways and between objects. (4-PS3-1), (4-PS3-2),(4-PS3-3),(4-PS3-4)</p>
<p>GLE 0407.10.2</p> <p>Investigate how light travels and is influenced by different types of materials and surfaces.</p>	<p>✓0407.10.2 Design an experiment to investigate how different surfaces determine if light is reflected, refracted, or absorbed.</p> <p>✓0407.10.3 Gather and organize information about a variety of materials to categorize them as translucent, transparent, or opaque.</p>	<p>SPI 0407.10.2</p> <p>Determine which surfaces reflect, refract, or absorb light.</p> <p>SPI 0407.10.3</p> <p>Determine whether a material is transparent, translucent, or opaque.</p>	<p>4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.</p> <p>4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p> <p>4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.</p> <p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; it does not move in the direction of the wave except when the water meets the beach. (Note: This grade band endpoint was moved from K–2.) (4-PS4-1) Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1) <p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2) <p>PS4.C: Information Technologies and Instrumentation</p>

			<ul style="list-style-type: none">• Digitized information transmitted over long distances without significant degradation. High-tech devices, such as• computers or cell phones, can receive and decode information—convert it
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STEMs TO SUNSHINE

Standard 11 – Motion

Conceptual Strand 11 - *Objects move in ways that can be observed, described, predicted, and measured.*

Guiding Question 11 - *What causes objects to move differently under different circumstances?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
<p>GLE 0407.11.1</p> <p>Recognize that the position of an object can be described relative to other objects or a background.</p>	<p>✓0407.11.1 Identify the position of objects relative to fixed reference points.</p> <p>✓0407.11.3 Complete a coordinate graph to describe the relative positions of objects.</p>	<p>SPI 0407.11.1</p> <p>Describe the position of an object relative to fixed reference points.</p>	<p>4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p> <p>4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide.</p> <p>PS3.A: Definitions of Energy</p> <ul style="list-style-type: none"> • The faster a given object is moving, the more energy it possesses. (4-PS3-1) • Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) <p>PS3.B: Conservation of Energy and Energy Transfer</p> <ul style="list-style-type: none"> • Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) • Light also transfers energy from place to place. (4-PS3-2) • Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)

			PS3.C: Relationship Between Energy and Forces When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)
GLE 0407.11.2 Design a simple investigation to demonstrate how friction affects the movement of an object.	✓0407.11.2 Design an investigation to identify factors that affect the speed and distance traveled by an object in motion. ✓0407.11.4 Plan and execute an investigation that demonstrates how friction affects the movement of an object.	SPI 0407.11.2 Identify factors that influence the motion of an object.	Not addressed
GLE 0407.11.3 Investigate the relationship between the speed of an object and the distance traveled during a certain time period.	✓0407.11.5 Design and implement an investigation to determine that the speed of an object is equal to the distance traveled over time.	SPI 0407.11.3 Determine the relationship between speed and distance traveled over time.	 4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.

Standard 12 - Forces in Nature

Conceptual Strand 12 - *Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.*

Guiding Question 12 - *What are the scientific principles that explain gravity and electromagnetism?*

Grade Level Expectations (GLE)	Checks For Understanding (CFU)	State Performance Indicator (SPI)	Next Generation Science Standards (NGSS)
GLE 0407.12.1 Explore the interactions between magnets.	✓0407.12.1 Explore the interactions between an electrically charged object and other materials.	SPI 0407.12.1 Identify how magnets attract or repel one another.	Not addressed
GLE 0407.12.2 Observe that electrically charged objects exert a pull on other materials.	✓0407.12.2 Design an experiment to investigate how a simple electromagnet affects common objects.	SPI 0407.12.2 Determine how an electrically charged material interacts with other objects.	Not addressed
GLE 0407.12.3 Explain how electricity in a simple circuit requires a complete loop through which current can pass.	✓0407.12.3 Describe how electricity passes through a simple circuit that includes a battery, wire, switch, and bulb.	SPI 0407.12.3 Determine the path of an electrical current in a simple circuit.	Not addressed

