ARIZONA SCIENCE TEST

AzSCI Item Specifications Grade Band 3–5

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Prepared by the Arizona Department of Education

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Introduction

The Arizona Statewide Achievement Assessment for Science (AzSCI) is Arizona's statewide science achievement test. AzSCI assesses the Arizona Science Standards (AzSS) adopted by the Arizona State Board of Education in 2018. AzSCI is a computer-based assessment that allows for the use of a variety of innovative item types where students can apply critical thinking skills to demonstrate a deeper understanding of the three dimensions of the Arizona Science Standards.

During the item-development process, all AzSCI items are written in accordance with the Item Specifications and are reviewed and approved by a committee of Arizona educators to confirm alignment and appropriateness for inclusion in the test. AzSCI item review committee members are generally representative of Arizona's geographic regions and culturally diverse population. Items are reviewed for the following kinds of bias: gender, racial, ethnic, linguistic, religious, geographic, and socioeconomic. Item reviews also include consideration of issues related to individuals with disabilities. Arizona community members also have an opportunity to review items for issues of potential concern to members of the community at large. Reviewers are asked to consider the variety of cultural, regional, philosophical, political, and religious backgrounds throughout Arizona, and then to determine whether the subject matter will be acceptable to Arizona students, families, and other members of Arizona communities.

The AzSCI Item Specifications provide resource documents that define the content and format of the test and test items for item writers and reviewers. Each Item Specifications document indicates the alignment of items with the Arizona Science Standards. It also serves to provide all stakeholders with information about the scope and function of assessment items. This document can also serve to assist educators in understanding how assessment items are developed in alignment with the standards for science. The AzSCI standard-level item specifications provide information about the development of items aligned to the Arizona Science Standards adopted in 2018. AzSCI is designed to reflect the importance of using evidence and reading complex texts outlined in the Arizona Science Standards. Any item specifications absent for standards listed in this document are excluded from the assessable standards. This document does not endorse the exclusion of the instruction of any grade-level content standards.

These item specifications for AzSCI are intended to provide information regarding standards, item formats, and response types. The descriptions of blueprints and cognitive complexity in this document are meant to provide an overview of the test. Item specifications are meant for the purposes of assessment, not instruction. They are not intended to be tools for instruction or the basis for curricula. AzSCI has a test blueprint that was developed by Arizona and is different from any other state or consortium test blueprint.

Standards Description

Purpose of the Arizona Science Standards

The Arizona Science Standards present a vision of what it means to be scientifically literate as well as college and career ready. These standards outline what all students need to know, understand, and be able to do by the end of high school and reflect the following shifts for science education:

- Organize standards around thirteen core ideas and develop learning progressions to coherently and logically build scientific literacy from kindergarten through high school.
- Connect core ideas, crosscutting concepts, and science and engineering practices to make sense of the natural world and understand how science and engineering are practiced and experienced.
- Focus on fewer, broader standards that allow for greater depth, more connections, deeper understanding, and more applications of content.

Core Ideas

AzSCI examines students' performance of scientific and engineering practices in the context of core ideas and crosscutting concepts. Although described separately, they generally function in concert. The ten core ideas for Knowing Science center on understanding the causes of phenomena in physical, Earth and space, and life science. The three core ideas for Using Science connect scientific principles, theories, and models; engineering and technological applications; and societal implications to the content knowledge in order to support that understanding.

Core Ideas for Knowing Science		Core Ideas for Using Science
Physical Science P1: All matter in the Universe is made of very small particles. P2: Objects can affect other objects at a distance. P3: Changing the movement of an object requires a net force to be acting on it. P4: The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event. **Earth and Space Science** E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate. E2: The Earth and our solar system are a very small part of one of many galaxies within the Universe. **Life Science** L1: Organisms are organized on a cellular basis and have a finite life span. L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms. L3: Genetic information is passed down from one generation of organisms to another. L4: The unity and diversity of organisms, living and extinct, is the result of evolution. *Adapted from ***Working with Big Ideas in Science Education***[2]		U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised. U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products. U3: Applications of science often have both positive and negative ethical, social, economic, and/or political implications.

Scientific and Engineering Practices (SEPs)

The science and engineering practices (SEPs) describe a robust process for how scientists investigate and build models and theories of the natural world or how engineers design and build. These practices reflect science and engineering as they are practiced and experienced.

The SEPs are grouped into eight categories, each describing how students should engage in the practices used by scientists and engineers. Students engage in all eight of the SEPs throughout each grade band. As students progress from the lower to the upper grades, the complexity and sophistication of the SEPs increase in order to reflect the progression in students' abilities to use each practice and in their increased understanding of the core ideas.

SEP	Science and Engineering Practice	SEP Reporting Category
INV	Planning and Carrying Out Investigations	Investigating
Q/P	Asking Questions and Defining Problems	Investigating
MCT	Using Mathematical and Computational Thinking	Investigating
DATA	Analyzing and Interpreting Data	Investigating**
MOD	Developing and Using Models	Sensemaking
E/S	Constructing Explanations and Designing Solutions	Sensemaking
ARG	Engaging in Argument from Evidence	Critiquing
INFO	Obtaining, Evaluating, and Communicating Information	Critiquing

**Assessment purpose only.

Crosscutting Concepts (CCCs)

Crosscutting concepts (CCCs) cross boundaries between science disciplines and provide an organizational framework to connect knowledge from various disciplines into a coherent and scientifically based view of the world. They build bridges between science and other disciplines and connect core ideas and practices throughout the fields of science and engineering. Their purpose is to provide a lens to help students deepen their understanding of the core ideas as they make sense of phenomena in the natural and designed worlds. The CCCs are applied across all domains of science and act as a mechanism for linking the different domains. Throughout each grade band, students will engage in all seven CCCs. As with the SEPs, the complexity and sophistication of the CCCs will increase as students increase their understanding of the core ideas while moving from the lower to the upper grades.

CCC	Crosscutting Concept	CCC	Crosscutting Concept
PAT	Patterns	E/M	Energy and Matter
C/E	Cause and Effect	S/F	Structure and Function
SPQ	Scale, Proportion, and Quantity	S/C	Stability and Change
SYS	System and System Models		

Coding and Navigating the Standards

Standard: Grade 3, Core Ideas L2 and U1, standard number 8

CCC: Bold CCCs indicate the CCCs that may be most appropriate for use with the standard.

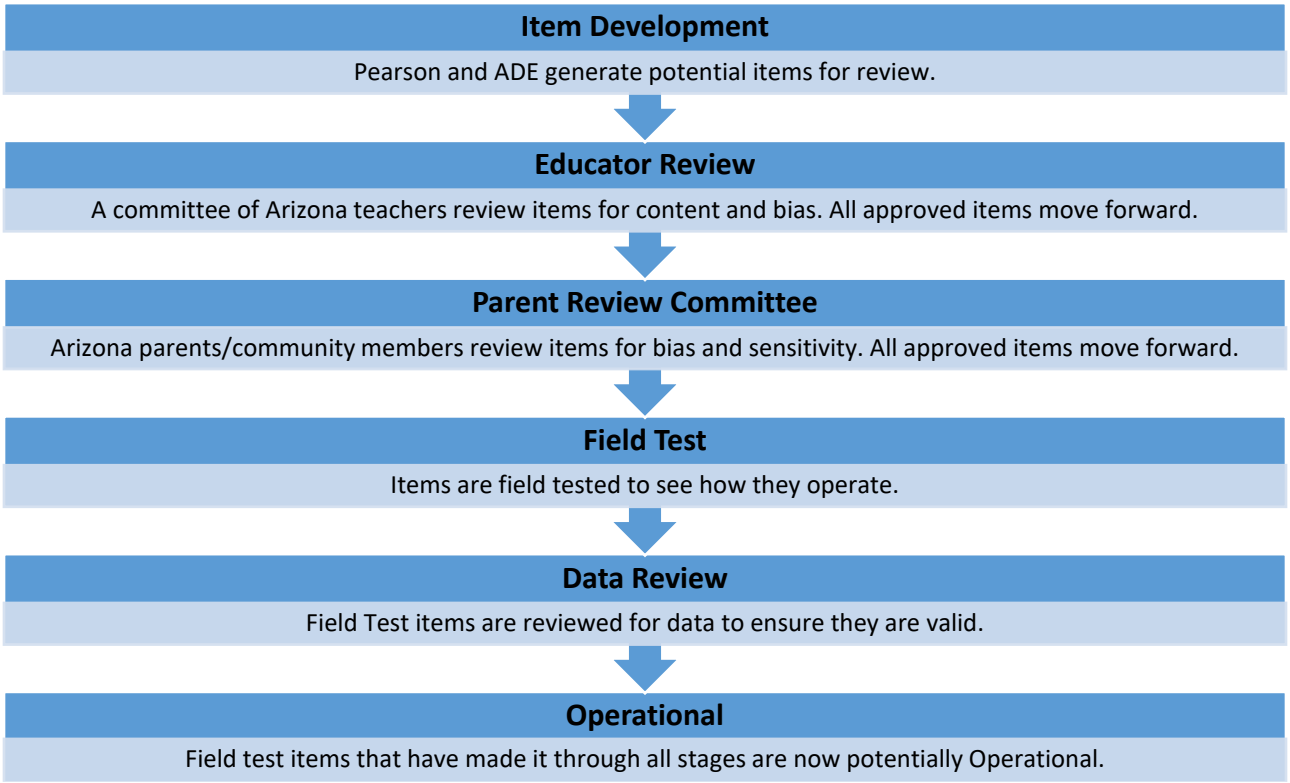
3.L2U1.8	Crosscutting Concepts & Background Information for Educators
Construct an argument from evidence that organisms are interdependent.	**Crosscutting Concepts:** Patterns, Cause and Effect, Scale, Proportion and Quantity; **Systems and System Models**; Energy and Matter; **Structure and Function**; Stability and Change[4] **Background Information:** **Animals** and **plants** alike generally need to take in air and water, animals must take in food, and plants need light and **minerals**; **anaerobic** life, such as **bacteria** in the gut, functions without air. Food provides animals with the materials they need for **body repair** and **growth** and is **digested** to release the **energy** they need to maintain body warmth and for motion. Plants acquire their material for growth chiefly from air and water and process matter they have formed to maintain their **internal conditions** (e.g., at night).[1 (p. 148)] Animals need food that they can break down, which comes either directly by eating plants (**herbivores**) or by eating animals (**carnivores**) which have eaten plants or other animals. Animals are ultimately dependent on plants for their survival. The relationships among organisms can be represented as food chains and food webs. Some animals are dependent on plants in other ways as well as for food, for example for shelter and, in the case of human beings, for clothing and fuel. Plants also depend on animals in various ways. For example, many flowering plants depend on insects for pollination and on other animals for dispersing their seeds.[2 (p. 27)]

SEP: Engaging in Argument from Evidence

Background Information: A guidance resource embedded into the standards document. This is the first step to deepen content knowledge and to make apparent the research behind the standard. The learning progression is supporting material and not the basis for assessment.

Item Development Process

AzSCI items go through a rigorous review before they are operational. When an item is "operational," it means that it is used to determine a student's score on the assessment. This is a description of the process every item must go through before it is operational on AzSCI.



Sample tests are available online for the science portion of AzSCI. To access the AzSCI Sample Tests, go to: https://home.testnav.com/, select "Arizona," and then select "Mic Check and Sample Tests."

Test Design and Blueprint Tables

AzSCI is a grade-band assessment where each of the Core Ideas is assessed in each grade band: 3–5, 6–8, and high school. The new assessment consists of a combination of independent and cluster items. AzSCI will ask students to do more than answer recall questions about science; they will apply the practices, or behaviors, of scientists and engineers to investigate each real-world phenomenon and design solutions to problems.

The 2018 Arizona Science Standards were developed using a three-dimensional approach to K–12 science education that captures students' interests and provides them with the necessary foundational knowledge for basic proficiency and continuing study in science.

AzSCI Blueprint

AzSCI identifies what it means to be proficient in science; it rests on a view of science as both a body of knowledge and an evidence-based, model- and theory-building enterprise that continually extends, refines, and revises knowledge. AzSCI reflects the three dimensions that are combined to form each standard and item. The construction of the AzSCI assessment is guided by the depth and rigor of the Arizona Science Standards. Items are created to address key components of the standards and assess a range of important skills. The AzSCI Blueprint provides an overview of the distribution of items on the AzSCI according to the standards. The standards for SEPs and CCCs are embedded within all AzSCI items. Further, the AzSCI blueprint outlines the Depth of Knowledge (replaced with the Task Analysis Guide in Science [TAGS]), SEP and CCC coverage, and distribution of items.

AzSCI Assessment Grade Band 3–5 Blueprint

Domain	Percent Range
Science and Engineering Practices and Crosscutting Concepts in Physical Sciences	40%–48%
Science and Engineering Practices and Crosscutting Concepts in Life Sciences	28%–36%
Science and Engineering Practices and Crosscutting Concepts in Earth and Space Sciences	20%–28%

Every standard in each grade band will be assessed over a three-year period.

SEP Coverage Practice	Percent Range
Investigating	20%–42%
Sensemaking	26%–42%
Critiquing	20%–34%

Investigating Practices	Sensemaking Practices	Critiquing Practices
Asking Questions and Defining Problems	Developing and Using Models	Engaging in Argument from Evidence
Planning and Carrying Out Investigations	Constructing Explanations and Designing Solutions	Obtaining, Evaluating, and Communication of Information
Using Mathematical and Computational Thinking		
Analyzing and Interpreting Data***		

****Assessment Reporting Categories for Science Engineering Practices (SEP) may vary.*

Cognitive Complexity

Conventional cognitive complexity models, such as Depth of Knowledge (DOK), evaluate based on individual cognitive actions (memorization, application, evaluation, and analysis). This works well with one-dimensional standards. This does not work as well with multidimensional standards, such as the Arizona Science Standards, because each dimension being assessed could have its own cognitive level. To sufficiently evaluate a student's range of proficiency, Arizona needed a scale that goes beyond a singular focus and takes into account three-dimensionality.

The Task Analysis Guide in Science (TAGS) was developed for classroom use to evaluate cognitive demand with integration of practices and content (see Tekkumsu-Kisa, Stein, & Schunn, *A Framework for Analyzing Cognitive Demand and Content-Practices Integration: Task Analysis Guide in Science [TAGS]*, 2015).

Arizona modified these models for the AzSCI assessment in order to more accurately recognize that cognitive demand increases as the number of integrated dimensions increases.

AZ Task Analysis Guide in Science

TAGS	Az TAGS Example	TAGS Coding	
		Students must use 2 Dimensions	Students must use 3 Dimensions
Doing Science Tasks: Students are required to DO science by using practices to DEVELOP an understanding of a scientific or engineering phenomenon. Students must develop a model, explanation or argument from raw data or information. Students must be able to determine which data or information is appropriate and how to use it.	Doing Science items will typically not direct the students to specific information to use. Students must look through all information/tabs to determine what information is relevant. *Use the information to explain the patterns observed.* OR *Which graph best represents the changes in X?*	D2	D3
Guided Science Tasks: Students use higher-level thinking to work through guided or scaffolded tasks. Students are told what information (model, data etc.) to use or are provided with information and then required to develop the actual answer.	Guided items will typically direct the students to the information to use (Tab 2, Graph 1, etc.), but the method for completing the task is left for the student to develop/ determine with minimal, if any, further instruction. *Based on Graph 1, which statement explains when X event will happen?*	G2	G3

Scripted Science Tasks: Students follow a script (defined actions or procedure) to complete a task.	Scripted items will typically direct the student to the information to use (Tab 1, Table 1, etc.) AND provide a set of well-defined actions or procedures to perform in order to complete a given task. Drag and drop (*Drag the arrows to complete the food chain*), hot spots, etc.	S2	S3

Item Sets and Item Types

An item set is a group of items that share the same stimulus centered on a specific science and/or engineering phenomenon. The AzSCI assessment uses two different types of item sets: independent and cluster. Sets of questions assess student application of knowledge across the domains of science for a comprehensive picture of student readiness for their next grade or course in science.

Independent Item Set	Cluster Item Set
Aligns to at least one standard	Aligns to at least one standard
Three or more associated items	Five associated items
Items must function independently and do not need to be related.	All five items will be placed on the same form and should work together to show understanding of the phenomena.
Stimulus has a maximum of two tabs. (Tabs are labeled as Figures/Tables).	Stimulus has a maximum of four tabs (Tabs are labeled as Figures/Tables).
Answers to items may be found in figures, tables, and the text surrounding the figures and tables.	Answers to items may be found in figures, tables, and the text surrounding the figures and tables.

Standalone Item
Aligns to one standard
Discrete item that may be any item type
Item functions independently and is not related to other items.
Item is displayed on full screen, without a separate stimulus.
Answers to items may be found in figures, tables, and the text surrounding the figures and tables.

Item Types

AzSCI assessments are composed of item formats that include traditional multiple-choice response items (MC) and technology-enhanced response items (TEI).

For paper-based assessments, TEIs will be modified so that they can be key-entered and scored electronically.

Item Type	Specifications
Multiple Choice (MC)	Four image, math, or text-based choices with a single correct choice
Multiple Response (MR)	Five to six image, math, or text-based choices with two or three correct choices (No partial credit)
Inline Choice	Multiple drop-down menus are used within a range of text to provide several options consisting of words or phrases.
Bar Graph	Vertical bar graph
Point Graph	Points are plotted on a graph.
Hot Spot	Object Selection, Graphic Change. One or more images or portions of an image are selected.
Match	Responses are dragged into text gaps.
Gap Match	Drag and Drop. Responses are dragged into categories.
Graphic Gap Match	Graphic Gap Match interactions are drag and drop that include responses that are images.
Gap Match - Table	Responses are dragged into a table grid.
Match-Table Grid	Responses are indicated by selecting radio buttons or checkboxes within a table grid.
Two-Part Independent (TPI)	Any combination of item types. Two-part independent items will be weighted as two points, one point awarded for each part. TPI items ask the student to demonstrate a deeper understanding of the standard by completing two separate thought processes.
Two-Part Dependent (TPD)	Any combination of item types. Two-part dependent items will be weighted as one point (no partial credit). TPD items ask students to demonstrate their understanding of the standard by selecting a claim in Part A and identifying supporting evidence in Part B. Correctly answering Part B is dependent on correctly answering Part A and is part of the same thought process.

Universal Tools

The following tools will be available in the online test administration platform to assist each student while taking the AzSCI.

Text to Speech: Text to speech is available to all students who take the AzSCI assessment in the online platform.

Answer Eliminator: Students can use this tool to cross out answers they believe are incorrect.

Notepad: Allows students to take notes on each item screen.

Ruler: Students measure objects on the screen using either a standard or metric ruler.

Highlighter: Students select words on the screen to highlight.

Zoom: If pictures and words on the screen are too small, students can make them larger using buttons on the keyboard.

Protractor: Students measure angles on the screen using the protractor tool.

Calculator:

Grade 5: A four-function calculator is permitted on AzSCI. The Desmos four-function calculator is embedded in the online AzSCI test.

Grades 8 and 11: A scientific calculator is permitted on AzSCI. The scientific calculator should include these functions: standard four functions (addition, subtraction, multiplication, and division), decimal, change sign (+/-), parentheses, square root, and π. They may NOT include: any problem-solving or programming capabilities, place values, or inequalities. Sample acceptable calculator: TI-30X IIS or similar. The Desmos Scientific calculator is embedded in the online AzSCI test.

Exhibits: Exhibits are information sheets available to help students answer some questions. The AzSCI assessment will provide the AzSCI Periodic Table of the Elements (https://www.azed.gov/sites/default/files/2020/10/AzSCI%20Periodic%20Table%20of%20the%20Elements-horizontal.pdf) on both the Grade 8 and Grade 11 assessments. The Grade 11 assessment will also have the AzSCI Formula Reference Guide (https://www.azed.gov/sites/default/files/2021/09/AZSci%20HS%20Reference%20Guide_w_Disclaimer_9.21.2021.pdf) available to assist students on questions that require the use of a specific formula. This document is NOT intended to dictate information that should be taught as part of Arizona Science Standards or curriculum. This reference sheet is intended to cover a list of all potential HS symbols, equations, terminology, and formulas that students may encounter on the AzSCI assessment.

AZ Grades 3–5 Item/Standard Specifications

3.P2U1.1

Standard	**Ask questions and investigate** the relationship between light, objects, and the human eye
SEPs	**Asking Questions and Defining Problems** **Planning and Carrying Out Investigations**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models;** Energy and Matter; **Structure and Function;** Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Ask questions about the relationship between light, objects, and the human eye. Use evidence from observations to ask questions or demonstrate understanding of how light waves affect vision and objects.	• Gap Match • Inline Choice • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • recognize the relationship between light, objects, and the human eye **SEP** • identify questions about what would happen if a variable changed • identify problems that can be solved • identify appropriate methods and/or tools for collecting data • plan and conduct an investigation, with support, to produce data to serve as evidence	The student is able to • identify the relationship between light, objects, and the human eye **SEP** • apply questions about what would happen if a variable changed • apply problems that can be solved • define a simple design problem that can be solved that includes minimal criteria and constraints • ask questions that can be investigated • apply appropriate methods and/or tools for collecting data • identify variables that changed in an investigation

Proficient	Highly Proficient
The student is able to • demonstrate how light waves affect vision and objects **SEP** • ask questions about what would happen if a variable is changed • identify testable and non-testable questions • ask questions that can be investigated and predict outcomes based on patterns • describe problems that can be solved • define a simple design problem that can be solved that includes several criteria for success and constraints • plan and conduct an investigation, with support, to produce data to collect appropriate evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate appropriate methods and/or tools for collecting data • make observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test-design solution • describe predictions about effects of changing variables • test two different models of the same proposed object, tool, or process to determine which best meets desired outcome	The student is able to • predict how light waves will affect vision and objects **SEP** • analyze questions about what would happen if a variable changed • use prior knowledge to analyze problems that can be solved • ask questions and analyze predictions • define and analyze a simple design problem that can be solved that includes several criteria for success and constraints • plan and conduct an investigation independently to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate predictions about effects of changing variables • make and evaluate observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test design solution

3.P2U1.2

Standard	**Plan and carry out an investigation** to explore how sound waves affect objects at varying distances.
SEPs	**Planning and Carrying Out Investigations**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models;** Energy and Matter; **Structure and Function;** Stability and Change
Assessment Boundaries	The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Answer questions about sound and air particle motion. Explain how changes in an investigation will affect the wavelength or amplitude of a sound wave. Revise experimental procedures to investigate how sound waves travel. Identify the variables in an experiment designed to investigate how sound waves travel. Based on observations, predict how sound waves will affect objects at varying distances.	• Gap Match • Graphic Gap Match • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • recognize that sound is caused by vibrations **SEP** • identify appropriate methods and/or tools for collecting data • plan and conduct an investigation, with support, to produce data to serve as the basis for evidence	The student is able to • identify how sound travels **SEP** • apply appropriate methods and/or tools for collecting data • identify variables that changed in an investigation
Proficient	**Highly Proficient**
The student is able to • demonstrate how sound waves travel and interact with objects at varying distances **SEP** • plan and conduct an investigation, with support, to produce data to collect appropriate evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate appropriate methods and/or tools for collecting data • make observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test-design solution • describe predictions about effects of changing variables • test two different models of the same proposed object, tool, or process to determine which best meets desired outcome	The student is able to • predict how sound waves will travel and interact with objects at varying distances **SEP** • plan and conduct an investigation independently to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate predictions about effects of changing variables • make and evaluate observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test design solution

3.P4U1.3

Standard	**Develop and use models** to describe how light and sound waves transfer energy.
SEPs	**Developing and Using Models**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models;** Energy and Matter; **Structure and Function;** Stability and Change
Assessment Boundaries	At this grade level, no attempt is made to give a precise or complete definition of energy.
Stimulus Materials	Models, Figures, Diagrams

Task Demand	Common Item Formats
Identify the form of energy being used in a model. Use a model to demonstrate how light and sound waves transfer energy. Explain how energy transfer will affect objects when sound waves and light waves have varying amplitudes. Predict how energy transfer will affect objects at various distances when sound waves and light waves transfer energy to the objects.	• Bar Graph • Gap Match • Gap Match - Table • Graphic Gap Match • Hot Spot • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify that sound and light are forms of energy **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon	The student is able to • recognize that light and sound travel in waves **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system
Proficient	**Highly Proficient**
The student is able to • describe how light and sound waves transfer energy **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect relationships in a system	The student is able to • predict energy transfer in various situations **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution

3.E1U1.4

Standard	**Construct an explanation** describing how the Sun is the primary source of energy impacting Earth Systems.
SEPs	**Constructing Explanations and Designing Solutions**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models;** Energy and Matter; **Structure and Function;** Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Models, Figures, Diagrams

Task Demand	Common Item Formats
Explain that the primary source of energy in an ecosystem is the sun. Identify how ecosystems are affected by varying amounts of energy from the sun. Explain how changes in the environment caused by humans can affect Earth's systems. Understand that the sun is the primary source of energy for all organisms in a food web.	• Hotspot • Inline Choice • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify that the sun is the primary source of energy for Earth **SEP** • identify observed relationships • identify the best design solution from given information • identify scientific ideas that solve design problems	The student is able to • identify the Earth's systems impacted by energy from the sun **SEP** • use evidence to support an explanation or design a solution to a problem • describe a solution to a problem based on how well it meets criteria and constraints • describe scientific ideas that solve design problems
Proficient	**Highly Proficient**
The student is able to • demonstrate how energy from the sun impacts Earth's systems **SEP** • construct an explanation of observed relationships • use evidence to construct and support an explanation or design a solution to a problem • identify the evidence that supports particular points in an explanation • apply scientific ideas to solve design problems • generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution	The student is able to • understand how human processes change how energy from the sun impacts Earth systems **SEP** • analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • demonstrate and justify how the evidence supports an explanation

3.L1U1.5

Standard	**Develop and use models** to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.
SEPs	**Developing and Using Models**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; Energy and Matter; **Structure and Function**; Stability and Change
Assessment Boundaries	Stress at this grade level focus is on understanding the macroscale systems and their function, not microscopic processes.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify the function of various structures in plants and animals. Use a model to explain how various internal and external structures function to aid in growth, survival, behavior, and reproduction. Explain how various structures work together to perform specific functions.	• Gap Match - Table • Graphic Gap Match • Hot Spot • Inline Choice • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify structures and functions in plants and animals **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon	The student is able to • describe specific structures in plants and animals that serve various functions for survival **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system
Proficient	**Highly Proficient**
The student is able to • demonstrate that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect relationships in a system	The student is able to • demonstrate that living things have different systems that all work together to perform specific functions **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution

3.L1U1.6

Standard	**Plan and carry out investigations** to demonstrate ways plants and animals react to stimuli.
SEPs	**Planning and Carrying Out Investigations**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models;** Energy and Matter; **Structure and Function;** Stability and Change
Assessment Boundaries	Stress at this grade level focus is on understanding the macroscale systems and their function, not microscopic processes.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify investigations that can be completed to demonstrate that stimuli can affect plants and animals. Analyze results from an investigation to determine how plants and animals react to stimuli. Plan an investigation that can be used to demonstrate that plants and animals react to stimuli.	• Gap Match - Table • Hot Spot • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify stimuli that can affect plants and animals **SEP** • identify appropriate methods and/or tools for collecting data • plan and conduct an investigation, with support, to produce data to serve as the basis for evidence	The student is able to • describe how stimuli can affect plants and animals **SEP** • apply appropriate methods and/or tools for collecting data • identify variables that changed in an investigation
Proficient	**Highly Proficient**
The student is able to • demonstrate ways plants and animals react to stimuli **SEP** • plan and conduct an investigation, with support, to produce data to collect appropriate evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate appropriate methods and/or tools for collecting data • make observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test-design solution • describe predictions about effects of changing variables • test two different models of the same proposed object, tool, or process to determine which best meets desired outcome	The student is able to • demonstrate how some types of stimuli can result in permanent changes in animals **SEP** • plan and conduct an investigation independently to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate predictions about effects of changing variables • make and evaluate observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test design solution

3.L2U1.7

Standard	**Develop and use system models** to describe the flow of energy from the Sun to and among living organisms.
SEPs	**Developing and Using Models**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models;** Energy and Matter; **Structure and Function;** Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Use a model to demonstrate energy transfer in an ecosystem. Use a model as evidence to support a claim about the flow of energy among living organisms. Develop a model to demonstrate how energy from the sun is transferred through an ecosystem.	• Gap Match • Graphic Gap Match • Hot Spot • Inline Choice • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • recognize that all energy for living organisms comes from the sun **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon	The student is able to • describe how energy from the sun is used by living organisms **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system
Proficient	**Highly Proficient**
The student is able to • demonstrate the flow of energy from the sun to and among living organisms **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect relationships in a system	The student is able to • demonstrate how energy is transferred through ecosystems and recognize that a change on one level will affect other parts of the ecosystem **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution

3.L2U1.8

Standard	**Construct an argument from evidence** that organisms are interdependent.
SEPs	**Engaging in Argument from Evidence**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models;** Energy and Matter; **Structure and Function;** Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Describe how organisms in an ecosystem are related. Use evidence to support claims that organisms in an ecosystem are interdependent. Make claims about how the availability of resources in an ecosystem can affect the organisms in that ecosystem. Predict how changes in an ecosystem will affect the population of organisms in that ecosystem.	• Match • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify relationships between organisms **SEP** • identify arguments based on the evidence presented	The student is able to • describe how organisms are interdependent **SEP** • compare arguments based on the evidence presented • use data to identify claims
Proficient	**Highly Proficient**
The student is able to • using evidence, argue that organisms are interdependent **SEP** • evaluate arguments based on the evidence presented • distinguish among facts and reasoned judgment based on research findings • construct and/or support an argument with evidence, data, and/or a model • use data to evaluate claims about cause and effect • make a claim about the merit of a solution to a problem by citing relevant evidence	The student is able to • demonstrate how energy is transferred through ecosystems and recognize that a change on one level will affect other parts of the ecosystem **SEP** • refine arguments based on an evaluation of the evidence presented • evaluate solutions to problems by citing relevant evidence about how it meets criteria and constraints

4.P4U1.1

Standard	**Develop and use a model** to demonstrate how a system transfers energy from one object to another even when the objects are not touching.
SEPs	**Developing and Using Models**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment Boundaries	• At this grade level, no attempt is made to give a precise or complete definition of energy. • The fact that plants capture energy from sunlight is introduced at this grade level, but details of photosynthesis are not.
Stimulus Materials	Models, Figures, Diagrams

Task Demand	Common Item Formats
Revise a model to improve or change how energy transfers between two objects. Identify a model that explains student observations about energy transfer. Analyze a model to describe movement of energy.	• Gap Match • Gap Match - Table • Graphic Gap Match • Hot Spot • Inline Choice • Match • Multiple Choice • Multiple Select • Point Graph • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify situations involving energy transfer **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon	The student is able to • describe energy transfer in various situations including via electric transfer **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system
Proficient	**Highly Proficient**
The student is able to • demonstrate how energy is transferred within a system whether objects are touching or not touching **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect relationships in a system	The student is able to • predict energy transfer in various situations **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution

4.P4U1.2

Standard	**Develop and use a model** that explains how energy is moved from place to place through electric currents.
SEPs	**Developing and Using Models**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment Boundaries	At this grade level, no attempt is made to give a precise or complete definition of energy.
Stimulus Materials	Models, Figures, Diagrams

Task Demand	Common Item Formats
Use a model to describe how energy moves between two objects. Identify a model that explains the movement of energy by electric currents. Analyze a model to describe movement of energy. Identify limitations of a revised model.	• Gap Match • Gap Match - Table • Graphic Gap Match • Inline Choice • Match • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify that electric current is an energy transfer **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon	The student is able to • describe energy transfer in various situations including via electric transfer **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system
Proficient	**Highly Proficient**
The student is able to • identify how energy is transferred through different systems using electric current **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect relationships in a system	The student is able to • predict energy transfer in various situations **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution

4.P2U1.3

Standard	**Develop and use a model** to demonstrate magnetic forces.
SEPs	**Developing and Using Models**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment Boundaries	Not applicable
Stimulus Materials	Models, Figures, Diagrams

Task Demand	Common Item Formats
Use a model to describe how magnetic forces interact between two objects. Analyze a model to describe how distance affects magnetic force. Describe how a proposed magnetic device works. Predict how changing the strength of a magnet will affect the force of the magnet.	• Gap Match - Table • Graphic Gap Match • Hot Spot • Inline Choice • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify examples of magnetic force **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon	The student is able to • describe how magnetic forces affect objects **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system
Proficient	**Highly Proficient**
The student is able to • predict how magnetic forces will interact with objects **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect relationships in a system	The student is able to • justify how magnetic forces interact with objects **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution

4.P4U3.4

Standard	**Engage in argument from evidence** on the use and impact of renewable and nonrenewable resources to generate electricity.
SEPs	**Engaging in Argument from Evidence**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment Boundaries	• At this grade level, no attempt is made to give a precise or complete definition of energy. • The fact that plants capture energy from sunlight is introduced at this grade level, but details of photosynthesis are not.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify sources of renewable and nonrenewable energy. Use evidence to support claims about renewable and nonrenewable sources of energy. Compare arguments about the impact of renewable and nonrenewable sources of energy. Support an argument with evidence about renewable and nonrenewable sources of energy.	• Inline Choice • Match • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify renewable and nonrenewable resources used to generate electricity **SEP** • identify arguments based on the evidence presented	The student is able to • demonstrate how renewable and nonrenewable resources are used to generate electricity **SEP** • compare arguments based on the evidence presented • use data to identify claims
Proficient	**Highly Proficient**
The student is able to • using evidence, describe and justify the impact of renewable and nonrenewable resources to generate electricity **SEP** • evaluate arguments based on the evidence presented • distinguish among facts and reasoned judgment based on research findings • construct and/or support an argument with evidence, data, and/or a model • use data to evaluate claims about cause and effect • make a claim about the merit of a solution to a problem by citing relevant evidence	The student is able to • evaluate the impact of renewable and nonrenewable resources to generate electricity **SEP** • refine arguments based on an evaluation of the evidence presented • evaluate solutions to problems by citing relevant evidence about how it meets criteria and constraints

4.E1U1.5

Standard	**Use models** to explain seismic waves and their effect on the Earth.
SEPs	**Developing and Using Models**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Revise a model that describes seismic waves. Use a model to infer information about the effect seismic waves have on Earth. Use a model to connect geologic processes on Earth. Identify a model that shows how seismic waves move through Earth.	• Gap Match • Inline Choice • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • describe seismic waves **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon	The student is able to • recognize how seismic waves move through Earth **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system
Proficient	**Highly Proficient**
The student is able to • demonstrate seismic waves and their effect on Earth **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect relationships in a system	The student is able to • predict the properties or movements of seismic waves **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution

4.E1U1.6

Standard	**Plan and carry out an investigation** to explore and explain the interactions between Earth's major Systems and the impact on Earth's surface materials and processes.
SEPs	**Planning and Carrying Out Investigations**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify variables that should be measured to provide evidence that Earth's surface has changed. Evaluate the procedure of an investigation to determine if Earth's surface has changed. Evaluate a prediction about the effect of interactions between Earth's major systems on Earth's surface.	• Gap Match – Table • Match • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify Earth's major systems **SEP** • identify appropriate methods and/or tools for collecting data • plan and conduct an investigation, with support, to produce data to serve as the basis for evidence	The student is able to • identify or describe ways that Earth's major systems can affect Earth's surface materials and/or processes **SEP** • apply appropriate methods and/or tools for collecting data • identify variables that changed in an investigation
Proficient	**Highly Proficient**
The student is able to • demonstrate the interactions between Earth's major systems and the impact on Earth's surface materials and/or processes **SEP** • plan and conduct an investigation, with support, to produce data to collect appropriate evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate appropriate methods and/or tools for collecting data • make observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test-design solution • describe predictions about effects of changing variables • test two different models of the same proposed object, tool, or process to determine which best meets desired outcome	The student is able to • predict how Earth's major systems will impact Earth's surface materials and/or processes **SEP** • plan and conduct an investigation independently to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate predictions about effects of changing variables • make and evaluate observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test design solution

4.E1U1.7

Standard	**Develop and/or revise a model** using various rock types, fossil location, and landforms to show evidence that Earth's surface has changed over time.
SEPs	**Developing and Using Models**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify a model that shows how Earth's surface is constantly changing. Use a model to describe how geologic processes have changed Earth's surface. Describe how to revise a model that shows geologic processes that change Earth's surface. Analyze a model to connect geologic processes to explain how Earth's surface has changed over time.	• Gap Match • Graphic Gap Match • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • recognize that Earth's surface is constantly changing **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon	The student is able to • describe the geologic processes that change Earth's surface **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system
Proficient	**Highly Proficient**
The student is able to • demonstrate how different geologic processes interact to shape and change Earth's surface **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect relationships in a system	The student is able to • connect geologic processes to explain how Earth's surface has changed over time **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution

4.E1U1.8

Standard	**Collect, analyze, and interpret data** to explain weather and climate patterns.
SEPs	**Analyzing and Interpreting Data**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify the differences between weather and climate data. Identify data that demonstrates how weather and climate affect Earth's surface. Interpret data to describe how Earth's surface changes over time. Analyze data in tables to demonstrate how weather and climate affect Earth's surface.	• Graphic Gap Match • Hot spot • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • differentiate between weather and climate **SEP** • identify data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) • describe and/or compare quantitative data points, and display the data using simple graphs • identify appropriate graphical representation of data	The student is able to • understand how geographic features affect weather and/or climate **SEP** • represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) • identify data that explains a phenomenon using logical reasoning, mathematics, and/or computation
Proficient	**Highly Proficient**
The student is able to • demonstrate weather and/or climate patterns **SEP** • represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and identify patterns that indicate relationships • analyze and interpret data to make sense of phenomena using logical reasoning, mathematics, and/or computation • compare and contrast data sets from different groups in order to describe similarities and differences in findings • analyze data to refine a problem statement or the design of a proposed object, tool, or process • use data to evaluate and refine design solutions	The student is able to • predict weather and/or climate patterns **SEP** • represent and analyze data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and explain patterns that indicate relationships • compare and contrast data sets from different groups in order to identify flaws that could affect accurate conclusions

4.E1U3.9

Standard	**Construct and support an evidence-based argument** about the availability of water and its impact on life.
SEPs	**Constructing Explanations and Designing Solutions** **Engaging in Argument from Evidence**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Support an argument with evidence about the impact of availability of water on life. Identify arguments about the importance of water on Earth. Use data to explain how the effects of natural hazards from water can be minimized. Evaluate solutions for minimizing the effects of natural hazards from water.	• Gap Match • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • recognize the importance of water on Earth **SEP** • identify observed relationships • identify the best design solution from given information • identify scientific ideas that solve design problems • identify arguments based on the evidence presented	The student is able to • identify water sources found on Earth **SEP** • use evidence to support an explanation or design a solution to a problem • describe a solution to a problem based on how well it meets criteria and constraints • describe scientific ideas that solve design problems • compare arguments based on the evidence presented • use data to identify claims
Proficient	**Highly Proficient**
The student is able to • using evidence, argue the impact of the availability of water on life **SEP** • construct an explanation of observed relationships • use evidence to construct and support an explanation or design a solution to a problem • identify the evidence that supports particular points in an explanation • apply scientific ideas to solve design problems • generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • evaluate arguments based on the evidence presented • distinguish among facts and reasoned judgment based on research findings • construct and/or support an argument with evidence, data, and/or a model	The student is able to • make a prediction about future water availability **SEP** • analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • demonstrate and justify how the evidence supports an explanation • refine arguments based on an evaluation of the evidence presented • evaluate solutions to problems by citing relevant evidence about how it meets criteria and constraints

• use data to evaluate claims about cause and effect • make a claim about the merit of a solution to a problem by citing relevant evidence	

4.E1U2.10

Standard	**Define problem(s) and design solution(s)** to minimize the effects of natural hazards.
SEPs	**Asking Questions and Defining Problems** **Constructing Explanations and Designing Solutions**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify preventable damage caused by natural hazards. Use prior knowledge to predict how to minimize the effect of natural hazards. Define a problem with how geologic processes change the Earth's surface. Predict how methods to minimize the effects of natural hazards will change Earth's surface.	• Gap Match • Inline Choice • Match • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify natural hazards **SEP** • identify questions about what would happen if a variable changed • identify problems that can be solved • identify observed relationships • identify the best design solution from given information • identify scientific ideas that solve design problems	The student is able to • identify ways humans can reduce the impact of natural hazards **SEP** • apply questions about what would happen if a variable changed • apply problems that can be solved • define a simple design problem that can be solved that includes minimal criteria and constraints • ask questions that can be investigated • use evidence to support an explanation or design a solution to a problem • describe a solution to a problem based on how well it meets criteria and constraints • describe scientific ideas that solve design problems

Proficient	Highly Proficient
The student is able to • design a solution to minimize the impact of natural hazards **SEP** • ask questions about what would happen if a variable is changed • identify testable and non-testable questions • ask questions that can be investigated and predict outcomes based on patterns • describe problems that can be solved • define a simple design problem that can be solved that includes several criteria for success and constraints • construct an explanation of observed relationships • use evidence to construct and design a solution to a problem • identify the evidence that supports particular points in an explanation • apply scientific ideas to solve design problems • generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution	The student is able to • make a prediction about future natural hazards **SEP** • analyze questions about what would happen if a variable changed • use prior knowledge to analyze problems that can be solved • ask questions and analyze predictions • define and analyze a simple design problem that can be solved that includes several criteria for success and constraints • analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • demonstrate and justify how the evidence supports an explanation

4.L4U1.11

Standard	**Analyze and interpret** environmental **data** to demonstrate that species either adapt and survive or go extinct over time.
SEPs	**Analyzing and Interpreting Data**
CCCs	Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models**; **Energy and Matter**; Structure and Function; **Stability and Change**
Assessment	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify data that shows that species can adapt and survive or go extinct. Based on data, demonstrate that species either adapt and survive or go extinct over time. Explain patterns, based on evidence, that demonstrate how natural selection affects organisms.	• Hot spot • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify that species can adapt and survive, or go extinct **SEP** • identify data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) • describe and/or compare quantitative data points, and display the data using simple graphs • identify appropriate graphical representation of data	The student is able to • give examples of species that have adapted and/or gone extinct **SEP** • represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) • identify data that explains a phenomenon using logical reasoning, mathematics, and/or computation
Proficient	**Highly Proficient**
The student is able to • demonstrate how species either adapt and survive, or go extinct over time **SEP** • represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and identify patterns that indicate relationships • analyze and interpret data to make sense of phenomena using logical reasoning, mathematics, and/or computation • compare and contrast data sets from different groups in order to describe similarities and differences in findings • analyze data to refine a problem statement or the design of a proposed object, tool, or process • use data to evaluate and refine design solutions	The student is able to • use qualitative or quantitative data to describe how species either adapt and survive or go extinct over time **SEP** • represent and analyze data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and explain patterns that indicate relationships • compare and contrast data sets from different groups in order to identify flaws that could affect accurate conclusions

5.P1U1.1

Standard	**Analyze and interpret data** to explain that matter of any type can be subdivided into particles too small to see and, in a closed system, if properties change or chemical reactions occur, the amount of matter stays the same.
SEPs	**Analyzing and Interpreting Data**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify data that can be used to support the claim that in a chemical reaction the amount of matter stays the same. Analyze data that can be used to identify open and closed systems. Interpret data to demonstrate that all matter is made up of particles too small to be seen.	• Gap Match • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • recognize that the amount of matter undergoing change remains stable **SEP** • identify data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) • describe and/or compare quantitative data points, and display the data using simple graphs • identify appropriate graphical representation of data	The student is able to • demonstrate that the amount of matter undergoing change remains stable **SEP** • represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) • identify data that explains a phenomenon using logical reasoning, mathematics, and/or computation

Proficient	Highly Proficient
The student is able to • use quantitative data to support the claim that the amount of matter undergoing change remains stable • demonstrate that all matter is made up of particles too small to be seen **SEP** • represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and identify patterns that indicate relationships • analyze and interpret data to make sense of phenomena using logical reasoning, mathematics, and/or computation • compare and contrast data sets from different groups in order to describe similarities and differences in findings • analyze data to refine a problem statement or the design of a proposed object, tool, or process • use data to evaluate and refine design solutions	The student is able to • use quantitative data to defend the claim that the amount of matter undergoing change remains stable • demonstrate that all matter is made up of particles too small to be seen **SEP** • represent and analyze data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and explain patterns that indicate relationships • compare and contrast data sets from different groups in order to identify flaws that could affect accurate conclusions

5.P1U1.2

Standard	**Plan and carry out investigations** to demonstrate that some substances combine to form new substances with different properties and others can be mixed without taking on new properties.
SEPs	**Planning and Carrying Out Investigations**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Make observations in an experiment to allow the differentiation of physical and chemical properties. Produce data that demonstrates that either a chemical reaction or a physical change has occurred. Identify the effects of changing the amounts of reactants in a chemical reaction. Evaluate observations used to demonstrate that either a chemical reaction or a physical change has occurred.	• Bar Graph • Gap Match • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify physical and chemical properties **SEP** • identify appropriate methods and/or tools for collecting data • plan and conduct an investigation, with support, to produce data to serve as the basis for evidence	The student is able to • differentiate between physical and chemical properties • identify when chemical/ physical properties change **SEP** • apply appropriate methods and/or tools for collecting data • identify variables that changed in an investigation
Proficient	**Highly Proficient**
The student is able to • differentiate between physical changes and chemical reactions • identify evidence of physical changes and chemical reactions **SEP** • plan and conduct an investigation, with support, to produce data to collect appropriate evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate appropriate methods and/or tools for collecting data • make observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test-design solution • describe predictions about effects of changing variables • test two different models of the same proposed object, tool, or process to determine which best meets desired outcome	The student is able to • demonstrate how evidence supports that either a physical change or chemical reaction has occurred **SEP** • plan and conduct an investigation independently to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered • evaluate predictions about effects of changing variables • make and evaluate observations and/or measurements to produce data to provide appropriate evidence to explain a phenomenon or test design solution

5.P2U1.3

Standard	**Construct an explanation** using evidence to demonstrate that objects can affect other objects even when they are not touching.
SEPs	**Constructing Explanations and Designing Solutions**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Use evidence to describe how magnetic forces affect objects. Construct an explanation that demonstrates how forces interact with objects at a distance. Support, with evidence, an explanation about how magnetic forces affect objects. Predict, based on evidence, how forces interact with objects at a distance.	• Gap Match • Graphic Gap Match • Hot Spot • Inline Choice • Match • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify types of noncontact forces **SEP** • identify observed relationships • identify the best design solution from given information • identify scientific ideas that solve design problems	The student is able to • identify examples of forces that act at a distance **SEP** • use evidence to support an explanation or design a solution to a problem • describe a solution to a problem based on how well it meets criteria and constraints • describe scientific ideas that solve design problems
Proficient	**Highly Proficient**
The student is able to • demonstrate, using evidence, how forces interact with objects at a distance **SEP** • construct an explanation of observed relationships • use evidence to construct and support an explanation or design a solution to a problem • identify the evidence that supports particular points in an explanation • apply scientific ideas to solve design problems • generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution	The student is able to • predict how forces interact with objects at a distance **SEP** • analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • demonstrate and justify how the evidence supports an explanation

5.P3U1.4

Standard	**Obtain, analyze, and communicate evidence** of the effects that balanced and unbalanced forces have on the motion of objects.
SEPs	**Obtaining, Evaluating, and Communicating Information**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	• Qualitative and conceptual forces, but not quantitative addition of forces, are used at this level. • Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Use simple scientific text to identify motion related to existing forces. Summarize the effects of balanced and unbalanced forces on motion. Evaluate a solution to control motion proposed in complex scientific text.	• Gap Match • Gap Match - Table • Graphic Gap Match • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • distinguish between balanced and unbalanced forces **SEP** • read and comprehend simple scientific texts and/or other reliable media	The student is able to • identify effects of balanced and unbalanced forces on motion **SEP** • read and comprehend simple scientific texts and/or other reliable media and summarize scientific and technical ideas • communicate scientific and/or technical information in tables, diagrams, and charts
Proficient	**Highly Proficient**
The student is able to • demonstrate how balanced and unbalanced forces affect motion **SEP** • read and comprehend short but complex texts and summarize scientific and technical ideas and describe how they are supported by evidence • compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices	The student is able to • evaluate a solution to control motion **SEP** • read and comprehend short but complex texts to summarize scientific and technical ideas to describe patterns and evidence about phenomena

5.P3U2.5

Standard	**Define Problems** and **design solutions** pertaining to force and motion.
SEPs	**Asking Questions and Defining Problems** **Constructing Explanations and Designing Solutions**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	• Qualitative and conceptual forces, but not quantitative addition of forces, are used at this level. • Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify motion related to existing forces. Use evidence to explain that an object's motion is affected by its mass. Construct an explanation that demonstrates how balanced and unbalanced forces affect motion. Analyze and evaluate solutions to control motion.	• Gap Match - Table • Graphic Gap Match • Hot Spot • Inline Choice • Match • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify motion related to existing forces **SEP** • identify questions about what would happen if a variable changed • identify problems that can be solved • identify observed relationships • identify the best design solution from given information • identify scientific ideas that solve design problems	The student is able to • recognize that an object's motion is affected by its mass **SEP** • apply questions about what would happen if a variable changed • apply problems that can be solved • define a simple design problem that can be solved that includes minimal criteria and constraints • ask questions that can be investigated • use evidence to support an explanation or design a solution to a problem • describe a solution to a problem based on how well it meets criteria and constraints • describe scientific ideas that solve design problems

Proficient	Highly Proficient
The student is able to • predict motion based on an object's mass and the applied force **SEP** • ask questions about what would happen if a variable is changed • identify testable and non-testable questions • ask questions that can be investigated and predict outcomes based on patterns • describe problems that can be solved • define a simple design problem that can be solved that includes several criteria for success and constraints • construct an explanation of observed relationships • use evidence to construct and design a solution to a problem • identify the evidence that supports particular points in an explanation • apply scientific ideas to solve design problems • generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution	The student is able to • revise or propose a solution to a problem based on known forces and desired motion **SEP** • analyze questions about what would happen if a variable changed • use prior knowledge to analyze problems that can be solved • ask questions and analyze predictions • define and analyze a simple design problem that can be solved that includes several criteria for success and constraints • analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • demonstrate and justify how the evidence supports an explanation

5.P4U1.6

Standard	**Analyze and interpret data** to determine how and where energy is transferred when objects move.
SEPs	**Analyzing and Interpreting Data**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	At this grade level, no attempt is made to give a precise or complete definition of energy.
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Identify data that shows energy transfer has occurred. Analyze and interpret data to show energy transfer has occurred. Compare and contrast data sets to predict the types of energy transfer in various situations.	• Gap Match • Graphic Gap Match • Hot Spot • Inline Choice • Match • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify situations involving energy transfer **SEP** • identify data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) • describe and/or compare quantitative data points, and display the data using simple graphs • identify appropriate graphical representation of data	The student is able to • describe energy transfer in various situations including via electric transfer **SEP** • represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) • identify data that explains a phenomenon using logical reasoning, mathematics, and/or computation
Proficient	**Highly Proficient**
The student is able to • demonstrate how energy is transferred within a system whether objects are moving or not moving **SEP** • represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and identify patterns that indicate relationships • analyze and interpret data to make sense of phenomena using logical reasoning, mathematics, and/or computation • compare and contrast data sets from different groups in order to describe similarities and differences in findings • analyze data to refine a problem statement or the design of a proposed object, tool, or process • use data to evaluate and refine design solutions	The student is able to • predict energy transfer in various situations **SEP** • represent and analyze data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) and explain patterns that indicate relationships • compare and contrast data sets from different groups in order to identify flaws that could affect accurate conclusions

5.E2U1.7

Standard	**Develop, revise, and use models** based on evidence to **construct explanations** about the movement of the Earth and Moon within our solar system.
SEPs	**Developing and Using Models** **Constructing Explanations and Designing Solutions**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Analyze models that demonstrate how gravity affects the movement of Earth. Develop a model that demonstrates the movement of Earth and the moon. Identify a model that shows how Earth and the moon move within the solar system. Use evidence to describe how long it takes for the moon and Earth to complete their orbit. Construct an explanation about the rotation and revolution of Earth in our solar system.	• Graphic Gap Match • Hot Spot • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify that the Earth and moon move within the solar system **SEP** • revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that represents a phenomenon • identify observed relationships • identify the best design solution from given information • identify scientific ideas that solve design problems	The student is able to • describe how long it takes for the moon and Earth to complete its orbit **SEP** • develop and revise, with support, a model that shows relationships among variables for frequent and regular occurring events • identify a model that uses an analogy, example, or abstract representation to describe a scientific principle or design solution • identify a model that predicts a phenomenon • identify a model to explain cause-and-effect relationships in a system • use evidence to support an explanation or design a solution to a problem • describe a solution to a problem based on how well it meets criteria and constraints • describe scientific ideas that solve design problems

Proficient	Highly Proficient
The student is able to • demonstrate the movement (rotation and revolution) of Earth and the moon within our solar system **SEP** • identify limitations of models • develop and/or revise, with support, a model based on evidence • develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution • develop and/or use models to describe and/or predict phenomena • develop a diagram and explain a proposed object, tool, or process • use a model to explain cause-and-effect • relationships in a system • construct an explanation of observed relationships • use evidence to construct and support an explanation or design a solution to a problem • identify the evidence that supports particular points in an explanation • apply scientific ideas to solve design problems • generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution	The student is able to • demonstrate how the movement of Earth and the moon impact each other **SEP** • analyze limitations of models • independently develop and/or revise a model based on evidence • analyze models using an analogy, example, or abstract representation to describe a scientific principle or design solution • analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • demonstrate and justify how the evidence supports an explanation

5.E2U1.8

Standard	**Obtain, analyze, and communicate evidence** to support an explanation that the gravitational force of Earth on objects is directed toward the planet's center.
SEPs	**Obtaining, Evaluating, and Communicating Information**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Comprehend simple scientific text stating that gravity pulls objects toward the center of Earth. Summarize that gravitational force is acting on everything on Earth. Describe evidence that demonstrates how gravity affects the movement and location of Earth and the moon. Identify claims supported by evidence that describe the role of gravitational force on objects on Earth.	• Graphic Gap Match • Inline Choice • Hot Spot • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • recognize that gravity pulls objects towards the center of Earth **SEP** • read and comprehend simple scientific texts and/or other reliable media	The student is able to • identify that gravitational force is acting on everything on Earth **SEP** • read and comprehend simple scientific texts and/or other reliable media and summarize scientific and technical ideas • communicate scientific and/or technical information in tables, diagrams, and charts
Proficient	**Highly Proficient**
The student is able to • using evidence, demonstrate the role of gravitational force on objects on Earth **SEP** • read and comprehend short but complex texts and summarize scientific and technical ideas and describe how they are supported by evidence • compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices	The student is able to • demonstrate how gravity impacts the movement and location of the Earth and the moon **SEP** • read and comprehend short but complex texts to summarize scientific and technical ideas to describe patterns and evidence about phenomena

5.L3U1.9

Standard	**Obtain, evaluate, and communicate information** about patterns between the offspring of plants, and the offspring of animals (including humans); **construct an explanation** of how genetic information is passed from one generation to the next.
SEPs	**Obtaining, Evaluating, and Communicating Information** **Constructing Explanations and Designing Solutions**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Comprehend simple scientific text about, and identify patterns of similar traits within, a species. Communicate information in graphs about patterns among the offspring of plants and animals. Summarize the patterns in the offspring of plants and animals.	• Bar Graph • Gap Match • Inline Choice • Match • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify patterns of similar traits within a species **SEP** • read and comprehend simple scientific texts and/or other reliable media • identify observed relationships • identify the best design solution from given information • identify scientific ideas that solve design problems	The student is able to • describe patterns among the offspring of plants and animals (including humans) **SEP** • read and comprehend simple scientific texts and/or other reliable media and summarize scientific and technical ideas • communicate scientific and/or technical information in tables, diagrams, and charts • use evidence to support an explanation or design a solution to a problem • describe a solution to a problem based on how well it meets criteria and constraints • describe scientific ideas that solve design problems

Proficient	Highly Proficient
The student is able to • evaluate patterns among the offspring of plants and animals (including humans) • construct an explanation of how genetic information is passed from one generation to the next **SEP** • read and comprehend short but complex texts and summarize scientific and technical ideas and describe how they are supported by evidence • compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices • construct an explanation of observed relationships • use evidence to construct and support an explanation or design a solution to a problem • identify the evidence that supports particular points in an explanation • apply scientific ideas to solve design problems • generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution	The student is able to • predict changes in an environment that can affect the development of the traits in a population of organisms **SEP** • read and comprehend short but complex texts to summarize scientific and technical ideas to describe patterns and evidence about phenomena • analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • demonstrate and justify how the evidence supports an explanation

5.L3U1.10

Standard	**Construct an explanation** based on evidence that the changes in an environment can affect the development of the traits in a population of organisms.
SEPs	**Constructing Explanations and Designing Solutions**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Use evidence to predict how changes in an environment will affect the development of the traits in a population of organisms. Construct an explanation that demonstrates how changes in an environment can affect the development of the traits in a population of organisms. Identify the differences in traits among species that live in different habitats/environments.	• Gap Match • Gap Match – Table • Inline Choice • Match • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify differences in traits among species that live in different habitats or environments **SEP** • identify observed relationships • identify the best design solution from given information • identify scientific ideas that solve design problems	The student is able to • demonstrate the differences in traits among species that live in different habitats or environments **SEP** • use evidence to support an explanation or design a solution to a problem • describe a solution to a problem based on how well it meets criteria and constraints • describe scientific ideas that solve design problems
Proficient	**Highly Proficient**
The student is able to • demonstrate how changes in an environment can affect the development of the traits in a population of organisms **SEP** • construct an explanation of observed relationships • use evidence to construct and support an explanation or design a solution to a problem • identify the evidence that supports particular points in an explanation • apply scientific ideas to solve design problems • generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution	The student is able to • predict changes in an environment that can affect the development of the traits in a population of organisms **SEP** • analyze and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution • demonstrate and justify how the evidence supports an explanation

5.L4U3.11

Standard	**Obtain, evaluate, and communicate evidence** about how natural and human-caused changes to habitats or climate can impact populations.
SEPs	**Obtaining, Evaluating, and Communicating Information**
CCCs	**Patterns;** Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment Boundaries	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Use simple scientific text to identify beneficial and/or harmful changes to an organism's habitat. Communicate information about natural and human-caused changes to habitats or climate. Summarize how natural selection affects organisms.	• Bar Graph • Gap Match • Gap Match – Table • Hot Spot • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • identify beneficial and/or harmful changes to an organism's habitat **SEP** • read and comprehend simple scientific texts and/or other reliable media	The student is able to • describe natural and human-caused changes to habitats or climate **SEP** • read and comprehend simple scientific texts and/or other reliable media and summarize scientific and technical ideas • communicate scientific and/or technical information in tables, diagrams, and charts
Proficient	**Highly Proficient**
The student is able to • demonstrate how natural or human-caused changes to habitats or climate can impact populations **SEP** • read and comprehend short but complex texts and summarize scientific and technical ideas and describe how they are supported by evidence • compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices	The student is able to • demonstrate how natural selection affects organisms • demonstrate factors that can impact natural selection **SEP** • read and comprehend short but complex texts to summarize scientific and technical ideas to describe patterns and evidence about phenomena

5.L4U3.12

Standard	**Construct an argument based on evidence** that inherited characteristics can be affected by behavior and/or environmental conditions.
SEPs	**Engaging in Argument from Evidence**
CCCs	Patterns; Cause and Effect; **Scale, Proportion and Quantity**; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change
Assessment	Not applicable
Stimulus Materials	Figures, Graphs, Tables

Task Demand	Common Item Formats
Support an argument with evidence about how inherited characteristics can be affected by behavior and/or environmental conditions. Identify arguments about how inherited characteristics can be affected by behavior and/or environmental conditions. Make a claim about the merit of a solution for minimizing the impact of human-caused environmental changes on natural selection. Refine an argument about how natural selection affects organisms.	• Gap Match • Inline Choice • Match – Table Grid • Multiple Choice • Multiple Select • Two-Part Dependent • Two-Part Independent

Performance Level Descriptors

Minimally Proficient	Partially Proficient
The student strives to • understand that inherited characteristics can be affected by behavior and/or environmental conditions **SEP** • identify arguments based on the evidence presented	The student is able to • distinguish the difference between inherited characteristics that are affected by behavior or environmental conditions **SEP** • compare arguments based on the evidence presented • use data to identify claims
Proficient	**Highly Proficient**
The student is able to • using evidence, argue how inherited characteristics can be affected by behavior and/or environmental conditions **SEP** • evaluate arguments based on the evidence presented • distinguish among facts and reasoned judgment based on research findings • construct and/or support an argument with evidence, data, and/or a model • use data to evaluate claims about cause and effect • make a claim about the merit of a solution to a problem by citing relevant evidence	The student is able to • demonstrate how natural selection affects organisms • demonstrate factors that can impact natural selection **SEP** • refine arguments based on an evaluation of the evidence presented • evaluate solutions to problems by citing relevant evidence about how it meets criteria and constraints

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