Teacher Guide

Science

Grade 5

Table of Contents

About This Guide

This MSAA Science Sample Item Teacher Guide can help educators use a subset of the sample items as a formative assessment tool, allowing educators to understand what students may be able to know and do based on these items, and how educators can respond to this information through instruction. This guide should be used in conjunction with the corresponding paper-based item PDF and Directions for Test Administration (DTA). The paper-based item PDF includes sample items for students to interact with and provide responses to. The DTA is for educators to follow to ensure proper administration of the sample items. All documents needed to use this tool can be found on the Sample Items page in the MSAA System year-round.

The MSAA Science items are aligned to the Extended Performance Expectations (EPEs). The EPEs serve as access points for the science content. The EPEs are what daily instruction of multidimensional science should be based on. The EPEs can be found at https://www.msaastates.com/ within the Standards link.

Guide Terminology

The MSAA Science Sample Item Teacher Guide for each grade includes the following:

- **Sample Item Blueprint Table.** A high-level overview of the items in each set that shows: the domain, standard (Extended Performance Expectation [EPE]), dimensions, item set type, and item position.
- **Item Set Information.** Information about item alignment, including learning targets, instructional strategies, and scaffolds and supports. The learning targets identified for each item set are displayed in order of complexity, starting with access points and increasing in complexity until the learning target aligns with the Level 3 EPE.
- **Student Item Thumbnail Image.** Item thumbnails are intended to help educators easily identify the specific items in the guide as they administer the sample items with the PDF of items and the DTA.

Item types, item sets, and dimensions addressed in the sample item guide include the following:

- **Selected-Response Items**
  - All science items are multiple choice. Students select one answer from three possible choices. The correct answer is identified with italicized font in the DTA under the “Record” section for each item.
- **Standalone Sets**
  - Contain three items (Level 1, Level 2, Level 3) authored to be a single EPE progression.
  - Items are independent of one another; each item includes its own stimulus text and optional graphic.
  - Presented in the following order: item stimulus, item question, three response options.
- **Cluster Sets**
  - Contain one shared stimulus (called a cluster stimulus) and six items: three items authored to one EPE progression and three items authored to a second EPE progression. A cluster stimulus is provided in both the DTA and paper-based item PDF prior to a cluster set. A cluster stimulus contains information that will be *shared* by more than one item. This can include a passage, informational text, graphics, and/or a diagram.
  - Items are independent of one another but are all related to the cluster stimulus science context.
  - Presented in the following order: the cluster stimulus (text and optional graphics); Level 1, Level 2, Level 3 items authored to the first EPE progression; Level 1, Level 2, Level 3 items authored to the second EPE progression. Each individual item repeats key information and graphics from the cluster stimulus, presents the item question, and then presents three response options.
- **Three Dimensions of Science Learning**
  - Science and Engineering Practices (SEPs). What students are expected to do.
  - Disciplinary Core Ideas (DCIs). What students are expected to know.
  - Crosscutting Concepts (CCCs). How students think and connect ideas.
    - The SEPs, DCIs, and CCCs are identified in the Sample Item Blueprint Table for each standard. The instructional strategies that are included in the item set information for each standard incorporate ideas on how to include the three dimensions into an educator’s daily instruction.

Introduction to Formative Assessment

It is important to remember that formative assessment is not a test. It is a process, a practice that is part of formative instruction. In effective formative instruction, educators use a variety of methods to determine what students understand and can do and adjust instruction accordingly.

Formative Assessment Data

Students and educators are the primary users of formative assessment data. These data have the greatest effect on learning and instruction because feedback for both student and educator occurs over a very short or nearly instantaneous time period. This allows for adjustments in instruction, reteaching, and additional practice with learning targets to occur.

How to Best Use the Science Sample Item Sets

The content in this section explains each component of the sample item sets and how they can best be incorporated into the classroom.

Science Sample Item Blueprint Table

The science blueprint table/overview should be used to help select the targeted EPE to be assessed, and the corresponding sample items that will provide the best evidence of student learning. The dimensions that correspond to each EPE are also identified. The table also indicates whether the associated item sets are standalone items or part of a cluster.

To obtain evidence of understanding for each grade-level standard, educators can

- Use item sets individually as the EPE is covered in class.
- Use the items in small groups to address a series of learning targets that focus on one standard.
- Use the entire sample item set to measure students' understanding of learning targets before, during, or after instruction.
- Use the items by level of complexity, starting with teaching to the Level 1 EPE, and once consistent accuracy is shown in response to instruction and the corresponding sample item, the educator can begin working toward the Level 2 EPE, and then the Level 3 EPE.
- Review sample item sets from lower grades to build understanding of prerequisite skills for a given standard.
- Review sample item sets from higher grades to know how standard and item information build from the target grade.
- Use the sample items as models to create additional items to assess the standards.

Next Steps for Formative Science Item Data

After obtaining data that serves as evidence of student understanding, educators should evaluate and interpret the data to identify gaps in student understanding.

Once gaps in understanding are identified, students need appropriate feedback and educators need to modify their instructional strategies to target those gaps.

After feedback is provided to students, educators should consider documenting the instructional modifications and supplementations provided to the students. Whether a student is undergoing relearning or learning a new concept, plans can be made, documented, and implemented on how best to scaffold that learning. Educators can use the learning targets to help guide which specific modifications, supplementations, and scaffolding will best support the student.

Grade 5 Sample Item Blueprint

Domain	EPE	Dimensions	Item Set Type	Item Position
Earth and Space Science	**5-ESS1-2.1** Identify or label a model that shows the positions of the Sun, the Moon, and Earth in the solar system. **5-ESS1-2.2** Use models or data to identify patterns of change related to the rotation of Earth, Earth's orbit around the Sun, and/or the Moon's orbit around Earth (e.g., length and direction of shadows, day and night, seasonal appearance of stars). **5-ESS1-2.3** Use models or data to predict or infer patterns of change related to the rotation of Earth, Earth's orbit around the Sun, and the Moon's orbit around Earth (e.g., length and direction of shadows, day and night, seasonal appearance of stars).	**SEP: Analyzing and Interpreting Data** • Represent data in graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships. ***Supporting:*** **Developing and Using Models** **DCI: ESS1.B: Earth and the Solar System** • The orbits of Earth around the Sun and of the Moon around Earth, together with the rotation of Earth about an axis between its North and South Poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the Sun, Moon, and stars at different times of the day, month, and year. **CCC: Patterns** • Similarities and differences in patterns can be used to sort, classify, communicate, and analyze simple rates of change for natural phenomena. ***Supporting:*** **Systems and System Models**	Standalone	1–3
	3-ESS2-1.1 Use observations to describe weather conditions. **3-ESS2-1.2** Use tables or graphical displays of data to describe patterns of typical weather conditions in a particular season. **3-ESS2-1.3** Use tables and/or graphical displays of data to predict patterns of typical weather conditions for a particular season.	**SEP: Analyzing and Interpreting Data** • Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. ***Supporting:*** **Planning and Carrying Out Investigations** **DCI: ESS2.D: Weather and Climate** • Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. **CCC: Patterns** • Patterns of change can be used to make predictions.	Standalone	4–6

Domain	EPE	Dimensions	Item Set Type	Item Position
Earth and Space Science	**5-ESS2-1.1** Use a model (diagram) to identify parts of various Earth systems (e.g., geosphere, hydrosphere, atmosphere, biosphere). **5-ESS2-1.2** Use a model to describe how any two Earth systems interact. **5-ESS2-1.3** Develop a model to show ways in which any two Earth systems interact.	**SEP: Developing and Using Models** • Use models to describe a scientific principle. **DCI: ESS2.A: Earth Materials and Systems** • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. **CCC: Systems and System Models** • A system can be described in terms of its components and their interactions.	Cluster	7–9
Physical Science	**5-PS3-1.1** Identify food chains or drawings of ecosystems that show the Sun as the common source of energy for ecosystems. **5-PS3-1.2** Use a model to describe or show the direction of energy transfer between two organisms (e.g., plant-animal, animal-animal) or between the Sun and a plant. **5-PS3-1.3** Use a model to describe or show how the energy animals obtain from food comes from the Sun.	**SEP: Developing and Using Models** • Use models to describe phenomena. **DCI: PS3.D: Energy in Chemical Processes and Everyday Life** • The energy released [from] food was once energy from the Sun that was captured by plants in the chemical process that forms plant matter (from air and water). *Note: ecosystems that derive energy from chemicals are excluded at the elementary level.* **CCC: Energy and Matter** • Energy can be transferred in various ways and between objects. ***Supporting:*** **Patterns**	Cluster	10–12

Domain	EPE	Dimensions	Item Set Type	Item Position
Physical Science	**4-PS3-4.1** Identify forms of energy present in a system. **4-PS3-4.2** Describe the energy transfer that occurs in an everyday object or device. **4-PS3-4.3** Identify which design or improvement will work best to transfer energy from one form to another.	**SEP: Constructing Explanations and Designing Solutions** • Apply scientific ideas to solve design problems. **DCIs:** **PS3.B: Conservation of Energy and Energy Transfer** • Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. **PS3.D: Energy in Chemical Processes and Everyday Life** • The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. **ETS1.A: Defining Engineering Problems** • Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. *(secondary)* **CCC: Energy and Matter** • Energy can be transferred in various ways and between objects.	Cluster	13–15

Domain	EPE	Dimensions	Item Set Type	Item Position
Physical Science	**5-PS1-2.1** Match the appropriate tools or standard units of measurement to physical quantities such as weight, time, temperature, or volume to complete a scientific task. **5-PS1-2.2** Use data to compare the weight of substances before and after they are heated, cooled, or mixed. **5-PS1-2.3** Measure, graph, or use mathematical relationships to show that the weight of substances (in standard units) does not change when they are heated, cooled, or mixed.	**SEP: Using Mathematics and Computational Thinking** • Measure and graph quantities such as weight to address scientific and engineering questions and problems. **DCIs:** **PS1.A: Structure and Properties of Matter** • The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. **PS1.B: Chemical Reactions** • No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) **CCC: Scale, Proportion, and Quantity** • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.	Cluster	16–18

Science Sample Items 1–3 (Standalone)

Alignment	**EPE 5-ESS1-2.1 (Level 1):** Identify or label a model that shows the positions of the Sun, the Moon, and Earth in the solar system. **EPE 5-ESS1-2.2 (Level 2):** Use models or data to identify patterns of change related to the rotation of Earth, Earth's orbit around the Sun, and/or the Moon's orbit around Earth (e.g., length and direction of shadows, day and night, seasonal appearance of stars). **EPE 5-ESS1-2.3 (Level 3):** Use models or data to predict or infer patterns of change related to the rotation of Earth, Earth's orbit around the Sun, and the Moon's orbit around Earth (e.g., length and direction of shadows, day and night, seasonal appearance of stars).

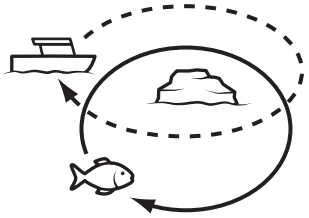
Learning Targets	Instructional Strategies	Scaffolds and Supports
I can identify the Sun, the Moon, and/or Earth from a model. I can use and label a model that shows the position of the Sun in the solar system. I can use and label a model that shows the position of the Moon in the solar system. I can use and label a model that shows the position of Earth in the solar system. I can use models to identify patterns of change related to: • the rotation of Earth (e.g., day and night), • Earth's orbit around the Sun (e.g., length and direction of shadows, seasonal appearance of stars), and/or • the Moon's orbit around Earth. I can use data to identify patterns of change related to: • the rotation of Earth (e.g., day and night), • Earth's orbit around the Sun (e.g., length and direction of shadows, seasonal appearance of stars), and/or • the Moon's orbit around Earth. I can use models to predict or infer patterns of change related to: • the rotation of Earth (e.g., day and night), • Earth's orbit around the Sun (e.g., length and direction of shadows, seasonal appearance of stars), and/or • the Moon's orbit around Earth.	**Discrete Trial** • Provide the student with pictures of the Sun, the Moon, and Earth. • Present the stimulus, "Show me [the Sun, the Moon, or Earth]," and do 10 trials of this. If needed, use a prompt hierarchy and fade away supports until students can identify the Sun, the Moon, and Earth independently when provided in a field of three. • Provide positive praise for correct identifications and prompted corrections for incorrect responses. **Models** • Provide students with various types of complete and incomplete models of the Sun, the Moon, and Earth. • Using fading prompts, ask students to label the Sun, the Moon, and Earth in the model. • Once students can label the Sun, the Moon, and Earth in the model, alter the model to have their positions unidentified. • Using fading prompts, ask students to complete the model by putting the Sun, the Moon, and Earth in the correct positions. • Continue this with various types of models for generalization. **Measure Shadows** • Students work with partners to measure their shadows outside at set increments throughout the day. • Students can stand in a designated spot (have footprints to stand on to ensure the same spot) and then draw their shadows in different colors of chalk to compare throughout the day. • Data can also be displayed in a graph. • After each measure, predict what will happen to the shadow at the next measuring time.	• Assistive technology • Adaptive manipulatives • Metersticks/yardsticks and chalk • Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during classroom discussions and journaling • Object replacements in physical models for 3D representations of the Sun, the Moon, and Earth • Laminated 2D models and accompanying graphics equipped with Velcro for repeated use • Predetermined prompt hierarchies for individual students • Content delivered using multimedia (e.g., book, storyboard, video, computer) • Highlighted information within a text • Picture icons on graphic organizers to support nonreaders and visual learners • Visual vocabulary cards • Interactive whiteboards • Choices (picture sorts, cut and paste, etc.)

Science Sample Items 1–3 (Standalone)		
Learning Targets	**Instructional Strategies**	**Scaffolds and Supports**
	Moon Phase Calendar • Provide students with a calendar for a month and cutouts of phases of the Moon. • Take a picture of the Moon at a certain time each night. • Show students the picture of the Moon from the night before and discuss what phase of the Moon it is. • Have students select the corresponding cutout and put it into that day on their Moon phase calendar. • Discuss the patterns noticed each day and make predictions for the next day/rest of the month. • At the end of the month, talk about the overall pattern of the phases of the Moon. **Kinesthetic Modeling** • Students/teachers use their bodies to model the revolution and rotation movements. This can be done with partners or as a class to model the position of the Sun, the position and movement of the Moon, and the position and movement of Earth.	

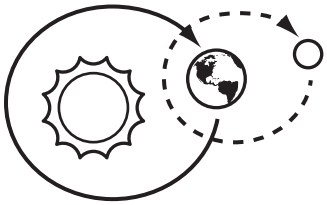
Item 1

Yuki wants to show the Sun, the Moon, and Earth in the solar system.

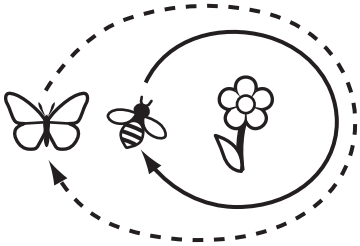
Which model should Yuki choose to show the positions of the Sun, the Moon, and Earth in the solar system?



A. A boat moves around a rock, and a fish moves around the rock.



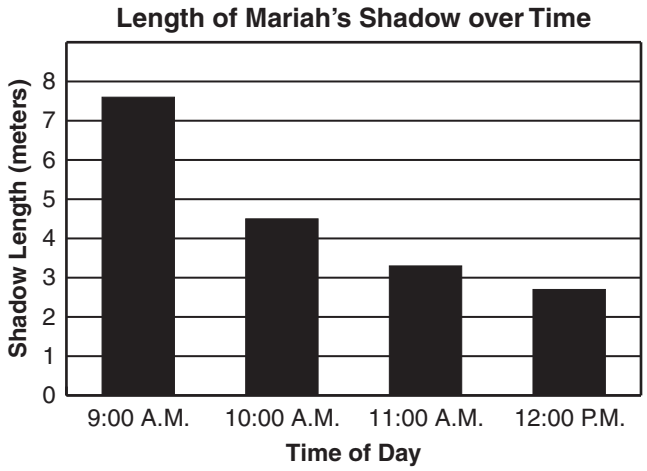
B. Earth moves around the Sun, and the Moon moves around Earth.



C. A butterfly moves around a bee and a flower, and the bee moves around the flower.

Item 2

At school, Mariah does an experiment. She stands outside and her teacher measures the length of her shadow. Every hour, Mariah goes back outside to the same place and her shadow length is measured. The bar graph shows Mariah's data.



Based on the bar graph, which statement describes the pattern in shadow length?

A. The shadows appear longer in length throughout the day.

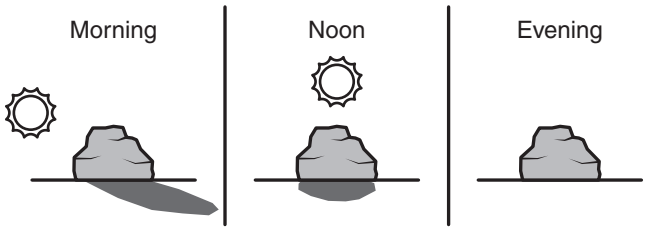
B. The shadows appear the same length throughout the day.

C. The shadows appear shorter in length throughout the day.

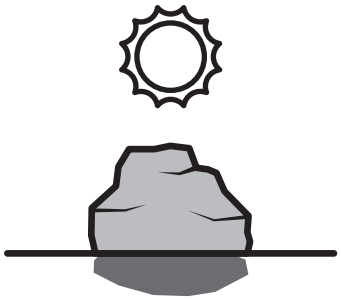
Item 3

In the morning, Naya sees a large rock from her classroom window and notices that it casts a shadow. At noon, she sees the rock again from her classroom window and notices that the shadow has changed direction. Naya wonders what direction the shadow will be facing later in the evening after school.

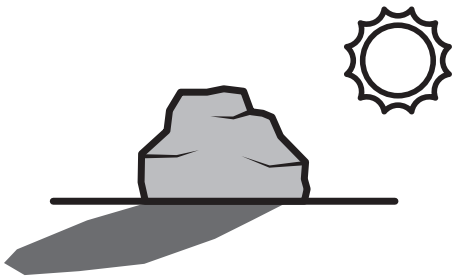
She makes an incomplete model of the Sun shining on the rock and the direction of the rock's shadow throughout the day.



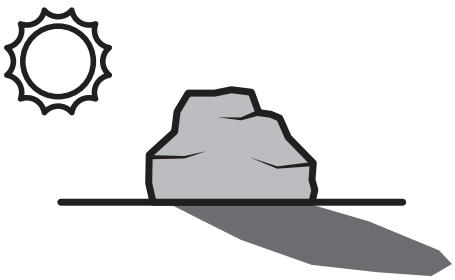
Which diagram shows the direction of the rock's shadow in the evening?



A. The Sun is above the rock and the shadow points in front of the rock.



B. The Sun is to the right of the rock and the shadow points to the left of the rock.



C. The Sun is to the left of the rock and the shadow points to the right of the rock.

Science Sample Items 4–6 (Standalone)

Alignment	**EPE 3-ESS2-1.1 (Level 1):** Use observations to describe weather conditions. **EPE 3-ESS2-1.2 (Level 2):** Use tables or graphical displays of data to describe patterns of typical weather conditions in a particular season. **EPE 3-ESS2-1.3 (Level 3):** Use tables and/or graphical displays of data to predict patterns of typical weather conditions for a particular season.	
Learning Targets	**Instructional Strategies**	**Scaffolds and Supports**
I can identify different weather conditions. I can use observations to describe weather conditions. I can use tables of data to describe patterns of typical weather conditions in a particular season. I can use graphical displays of data to describe patterns of typical weather conditions in a particular season. I can use tables of data to predict patterns of typical weather conditions for a particular season. I can use graphical displays of data to predict patterns of typical weather conditions for a particular season.	**Graphic Organizers** • Students can sort pictures of the same weather conditions (e.g., provide students with five pictures of different rainy days and five pictures of different sunny days and students sort pictures into a T-chart). • Students can complete a web/bubble map that focuses on a weather condition in the middle and complete the web portion with all types of facts about that weather condition. • Students can sort typical weather conditions for a particular season (e.g., snow and colder temperatures in the winter). **Weather Journal** • Students can keep weather journals. • Students will go outside and observe the weather daily to record in their journals. • Start with things like recording temperature and observations (sunny, rainy, snowy, cloudy, etc.), then as mastery of those topics occur, add more difficult things such as sky and wind conditions, wind speed, etc. • Have an accessible thermometer directly outside the window of the classroom (if the classroom has a window) to make it more convenient specifically on poor weather days. • Have discussions comparing the previous day's weather to the current day, and what they think the next day's weather will be. **Weather Graphs** • In a large bar graph or pictograph posted in the classroom, fill in a square of the graph that correlates to each day's weather (sunny, rainy, snowy, cloudy, etc.) for a month. Discuss the data shown in the graph daily by asking questions and making predictions.	• Assistive technology • Adaptive graphing and other mathematical manipulatives • Calculator • Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during classroom discussions and journaling • Content delivered using multimedia (e.g., book, storyboard, video, computer) • Highlighted information within a text • Picture icons on graphic organizers to support nonreaders and visual learners • Visual vocabulary cards • Interactive whiteboards • Choices (picture sorts, cut and paste, etc.)

Science Sample Items 4–6 (Standalone)		
Learning Targets	**Instructional Strategies**	**Scaffolds and Supports**
	• In a large line graph posted in the classroom, fill in a data point daily for the temperature for a month. Discuss the data shown in the line graph by asking questions and making predictions about the temperature for the month. • Start the day by telling students you want to see how the temperature and/or weather changes throughout the day. Collect the data about weather/temperature first thing in the morning in a graph, then every hour after that until the end of the day. Each hour, talk about the trends in data and what they predict will happen at the next hour. At the end of the day, discuss the overall trend of the day's weather data, and make predictions for the following day. **KWL Chart** • Prior to a lesson, ask students what they **K**now about weather conditions. • Then ask students what they **W**ant to know about weather and typical weather patterns (these can be pre-populated by the teacher and students can select the topics) and populate this portion of the chart. • After the lesson, ask students what they **L**earned about weather and weather patterns.	

Item 4

Sofia observes a tree bending as air blows on it outside.

Which word can Sofia use to describe the weather?

A. foggy

B. windy

C. sleepy

Item 5

This data table shows winter weather conditions in New York in 2015.

Winter Weather Conditions in New York

Weather Condition	Data
Average snowfall	43 cm
Average temperature	31°F

Based on the data table, which sentence **best** describes winter in New York?

A. It has few windy days.

B. It is warm with lots of rain.

C. It is cold with lots of snow.

Item 6

This data table shows the high temperatures for a town in Alaska in the spring and fall. Data for June, July, and August are missing.

High Temperatures for a Town in Alaska

Month	High Temperature (°F)
April	46
May	52
June	**?**
July	**?**
August	**?**
September	50
October	47
November	38
December	35

Based on the data table, which range of high temperatures is expected for the summer?

A. between 20° and 29°F

B. between 40° and 49°F

C. between 60° and 69°F

Science Sample Items 7–9 (Cluster – Part 1 of 2)

Alignment	**EPE 5-ESS2-1.1 (Level 1):** Use a model (diagram) to identify parts of various Earth systems (e.g., geosphere, hydrosphere, atmosphere, biosphere). **EPE 5-ESS2-1.2 (Level 2):** Use a model to describe how any two Earth systems interact. **EPE 5-ESS2-1.3 (Level 3):** Develop a model to show ways in which any two Earth systems interact.

Learning Targets	Instructional Strategies	Scaffolds and Supports
I can define Earth systems. I can define geosphere, hydrosphere, atmosphere, and biosphere. I can use a model to identify the geosphere. I can use a model to identify the hydrosphere. I can use a model to identify the atmosphere. I can use a model to identify the biosphere. I can use a model to describe how any two Earth systems interact. I can develop a model to show ways in which any two Earth systems interact.	**Earth Systems Stations** • Set up four stations around the room. Each station should be a different Earth system including geosphere, hydrosphere, biosphere, and atmosphere. In each station, include items and/or pictures of things found in that system. • Provide students with time to rotate through each station and come up with their own definition of each of the Earth systems. This can be completed individually, in pairs, or in small groups. • Come back together as a class and determine a definition for each while explicitly discussing components and characteristics of each. • Discuss how each system impacts or influences the others. • Following the discussion, divide students back up into stations and direct them to choose an interaction between their station and another. • Students will document this interaction by creating a model/drawing/video/product demonstrating the interaction. • As a follow-up activity, students can be provided with one or more scenarios of interactions between Earth's systems. They explain which systems are involved and how they are interacting. **KWL Chart** • Prior to the lesson, ask students what they **K**now about Earth's systems and how they are connected, and populate that portion of the chart. • Then ask students what they **W**ant to know about Earth's systems and how they are connected (these can be pre-populated by the teacher and students can select the topics) and populate this portion of the chart. • After the lesson, ask students what they **L**earned about Earth's systems and how they are connected or interact.	• Assistive technology • Adaptive manipulatives • Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations • Content delivered using multimedia (e.g., book, storyboard, video, computer) • Laminated 2D models and accompanying graphics equipped with Velcro for repeated use • Highlighted information within a text • Picture icons on graphic organizers to support nonreaders and visual learners • Visual vocabulary cards • Interactive whiteboards • Collaborative grouping • Choices (picture sorts, cut and paste, etc.) • Online simulations • Provided examples and models for students to follow

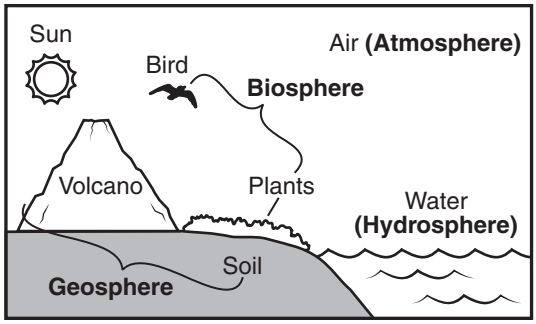
Science Sample Items 7–9 (Cluster – Part 1 of 2)		
Learning Targets	**Instructional Strategies**	**Scaffolds and Supports**
	Sort to Understand • Provide task cards of relevant, real-world examples of items found in Earth's four systems for students to sort. • Provide students with the four Earth systems in which to sort the items. • Can be sorted in a chart, on a mat, in a circle map, etc. • Provide color coding if more support is needed. **Least-to-Most Prompts** • Increase support as needed until the student has completed the task appropriately. • Include prompts such as gesturing, indirect/direct modeling, partial physical assistance, and full physical assistance from least to most. • Always begin by providing the student an opportunity to answer/complete tasks correctly on their own. • Always make certain the last prompt ensures the student responds correctly to the question/task to build understanding of expectations. • Provide positive reinforcement for all correct responses. **Explained Reading** • Pair students with reading material. • Student 1 reads the first paragraph aloud to student 2. • Student 2 summarizes the paragraph that was read. • Both students write a one-sentence summary in the margin. • Roles switch for each paragraph until the reading is complete. **Pre-teach Vocabulary** • Students are provided the meanings of the vocabulary words before they encounter them.	

Science Sample Items 7–9 (Cluster – Part 1 of 2)		
Learning Targets	**Instructional Strategies**	**Scaffolds and Supports**
	Graphic Organizers in a Group Activity • Define Earth's systems, geosphere, hydrosphere, atmosphere, and biosphere. • Create a large bubble map with one system in each bubble and arrows pointing to and from each system to the other three systems. • During discussion, utilizing guiding questions, graphic representations, and already-created choices as necessary, complete the web including what items are included in each system as well as how each interact with the others (this can be noted along the arrows). **Discuss to Understand** • Break students into four groups and place each group in a corner of the classroom. • Provide each group a label of one of the four Earth's systems. • Students discuss what items are included in their system as well as how their system interacts with other systems. • Each group reports out to the class for discussion. • Utilize conversation frames as necessary. • An extension of this activity is to provide students in each group with materials to build a model of their system demonstrating how their system interacts with the other three systems. **Models** • Provide students with various types of complete and incomplete models of Earth's systems including what makes up each system as well as interactions among them. • Using fading prompts, ask students to label, complete, and develop models of Earth's systems, items that make up the systems, and interactions among the systems in a model (partial when necessary). Differentiate the models based on the diverse needs of the students. • Continue this with various types of models for generalization.	

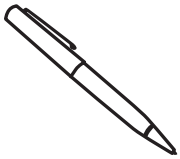
Item 7*

Arjun looks at the model of a volcanic island.

Volcanic Island Systems Model

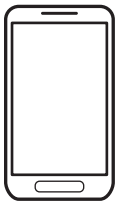


What part of the model is included in the hydrosphere?



A. pen

B. water



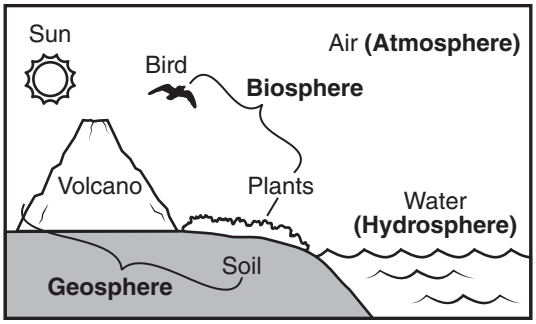
C. phone

**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

Item 8*

Arjun looks at the volcanic island model and wonders how the systems on an island interact.

Volcanic Island Systems Model



Which statement describes how the biosphere and the geosphere interact in the volcanic island model?

A. The motor helps a car to move.

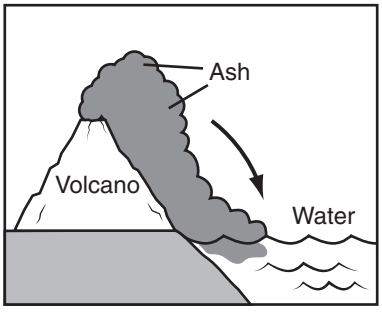
B. The soil gives plants a place to grow.

C. The air cools the water down with wind.

Item 9*

Arjun wants to make a model to show how ash released from a volcano on an island affects the atmosphere.

Effect of Volcanic Ash on the Atmosphere Model



What should Arjun do to the model to show how the atmosphere and geosphere interact?

A. Draw tiny living things in the water eating the ash.

B. Draw lines in the air to show wind moving the ash.

C. Draw clouds raining in the sky and mixing with the ash.

**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

Science Sample Items 10–12 (Cluster – Part 2 of 2)

Alignment	**EPE 5-PS3-1.1 (Level 1):** Identify food chains or drawings of ecosystems that show the Sun as the common source of energy for ecosystems. **EPE 5-PS3-1.2 (Level 2):** Use a model to describe or show the direction of energy transfer between two organisms (e.g., plant-animal, animal-animal) or between the Sun and a plant. **EPE 5-PS3-1.3 (Level 3):** Use a model to describe or show how the energy animals obtain from food comes from the Sun.

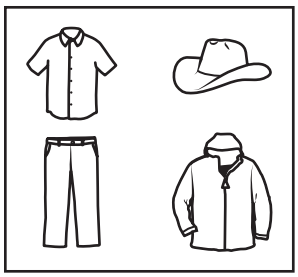
Learning Targets	Instructional Strategies	Scaffolds and Supports
I understand how energy flows in a food chain. I can identify food chains or drawings of ecosystems that show the Sun as the common source of energy for ecosystems. I can identify where the Sun belongs in a food chain as a source of energy. I can use a model to show and/or describe the direction of energy transfer between two organisms (e.g., plant-animal, animal-animal) or between the Sun and a plant. I can use a model to describe or show how the energy animals obtain from food comes from the Sun.	**Aquatic Environment Simulation** • Create an environment (with snails, duckweed, pond water, sticks, etc.) that receives plenty of sunlight. • Watch over a few-week period to see how the different systems interact and flow together. • Create food webs based on observations. **Graphic Organizers** • Students can sort pictures into producers and consumers to begin to understand roles in ecosystems. • Students can complete a web/bubble map that focuses on the Sun in the middle and complete the web portion with all types of organisms to show that the Sun is the common source for all ecosystems. **Food Chain Centers** • Each center can have information about a different ecosystem or different organisms presented in multiple manners (text, song, video, live model, etc.) • Each center will have blank food chain templates. • After learning at each center, students move the cards into the templates to show how energy moves in the food chain. • After centers, teachers can discuss what all centers had in common—the Sun. **Model** • Assign each student as part of the food chain (with a picture to hold). • Put them in order as a model. • Switch up student roles in the model and allow students to put themselves in order (with assists and prompts as needed). • Take pictures of the different models to hang in the classroom as examples for students.	• Assistive technology • Adaptive manipulatives • Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations • Content delivered using multimedia (e.g., book, storyboard, video, computer) • Highlighted information within a text • Picture icons on graphic organizers to support nonreaders and visual learners • Visual vocabulary cards • Interactive whiteboards • Collaborative grouping • Choices (picture sorts, cut and paste, etc.)

Science Sample Items 10–12 (Cluster – Part 2 of 2)		
Learning Targets	**Instructional Strategies**	**Scaffolds and Supports**
	Least-to-Most Prompts • Provide positive praise for correct identifications and prompted corrections for incorrect responses. • Increase support as needed until the student has completed the task appropriately.	

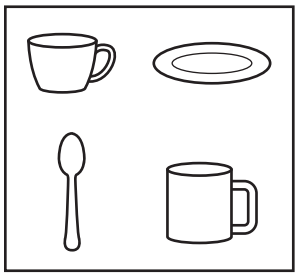
Item 10*

Arjun learns that birds and plants, such as shrubs, live in a volcanic island ecosystem. He wonders where the energy for a volcanic island comes from to support these living things.

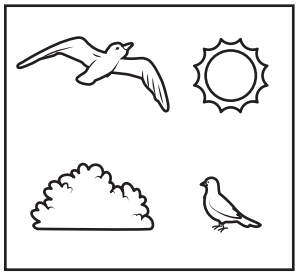
Which model shows the source of energy for a volcanic island ecosystem?



A. A hat is next to a shirt, a jacket, and pants.



B. A plate is placed near a teacup, a mug, and a spoon.



C. The Sun is shining on a large bird, a small bird, and a shrub.

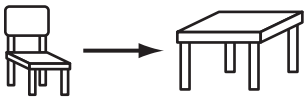
**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

Item 11*

Arjun looks at the model about energy flow in a volcanic island ecosystem.

Energy Flow Model

Which model shows an object or organism receives its energy from plants?



A. from a chair to a desk

B. from a plant to a horse

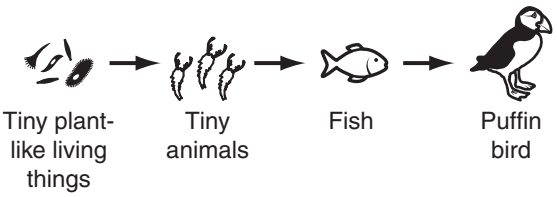
C. from a horse to the Sun

**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

Item 12*

Arjun makes a model to show how energy flows in a volcanic island ecosystem. His model shows energy flowing from tiny plant-like living things in the water, to tiny animals living in the water, to a fish, and then to a puffin bird.

Energy Flow in Volcanic Island Ecosystem Model



What should Arjun add to his model to show the source of energy for all the organisms that live in or around the water?

A. the Sun

B. the Moon

C. the Earth

**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

Science Sample Items 13–15 (Cluster – Part 1 of 2)

Alignment	
	EPE 4-PS3-4.1 (Level 1): Identify forms of energy present in a system. **EPE 4-PS3-4.2 (Level 2):** Describe the energy transfer that occurs in an everyday object or device. **EPE 4-PS3-4.3 (Level 3):** Identify which design or improvement will work best to transfer energy from one form to another.

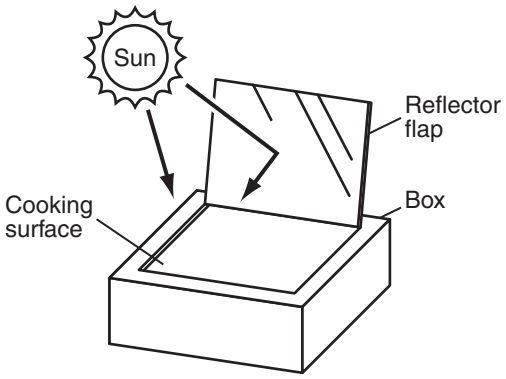
Learning Targets	Instructional Strategies	Scaffolds and Supports
I can define energy. I can identify forms of energy. I can identify forms of energy present in a system. I can describe various forms of energy transfer. I can describe the energy transfer that occurs in an everyday object or device. I can identify which design or improvement will work best to transfer energy from one form to another.	**Demonstrations and/or Experiments** • Pause frequently to ask students for observations, what they think happened, and what can be changed in the experiment to change the outcome (e.g., hitting the tuning fork harder makes the sound louder). Examples: Tuning fork (kinetic energy into sound energy), bouncing a ball (potential energy into kinetic energy and back again), hand-crank radio (kinetic energy into electrical and sound energy). **KWL Chart** • Prior to a lesson, ask students what they **K**now about energy, and populate that portion of the chart. • Then ask students what they **W**ant to know about energy and/or energy transfer (these can be pre-populated by the teacher and students can select the topics) and populate this portion of the chart. • After the lesson, ask students what they **L**earned about energy and/or how energy is transferred in various ways and between objects. • **Solving an Engineering Problem** • Either do a demonstration or show a video of a demonstration that has an obvious problem or flaw related to energy being able to be transferred from place to place by electricity, which can be used to produce motion, sound, heat, or light. • Work with students to figure out what the problem is and what it is preventing from happening. • Propose a claim about what the design solution will be able to do. • Conduct experiments with various design solutions (or watch videos) and document observations. • Determine what design or improvement worked best and why.	• Assistive technology • Adaptive manipulatives • Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations • KWL chart • Content delivered using multimedia (e.g., book, storyboard, video, computer) • Models • Highlighted information within a text • Picture icons on graphic organizers to support nonreaders and visual learners • Visual vocabulary cards • Interactive whiteboards • Collaborative grouping • Choices (picture sorts, cut and paste, etc.)

Science Sample Items 13–15 (Cluster – Part 1 of 2)		
Learning Targets	**Instructional Strategies**	**Scaffolds and Supports**
	Explore with Observation Stations • Get hands-on experience with different centers focusing on different forms of transferred energy. **Energy Search** • Go for a walk throughout the school to search for examples of different types of energy transfers.	

Item 13*

Alma's solar cooker uses energy from the Sun to heat food.

Solar Cooker



What type of energy comes from the Sun?

A. rain

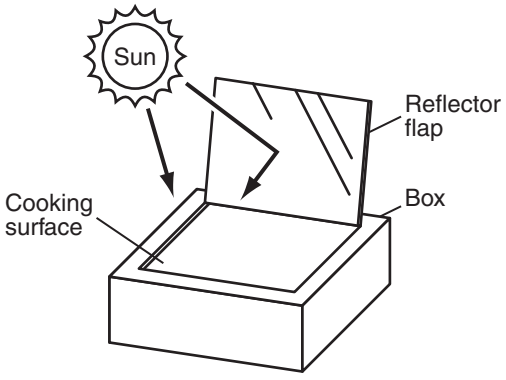
B. cold

C. light

Item 14*

When the solar cooker is placed in the sun, it warms up the food inside.

Solar Cooker



How does the energy from the Sun change form when the solar cooker warms up food?

A. from light to heat

B. from heat to light

C. from sound to cold

**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

Item 15*

Alma tests paper of different colors to see which one melts ice fastest. Alma's results are listed in the data table.

What Color Paper Melts Ice Fastest?

Paper Color	Time It Takes to Melt Ice Cube (minutes)
Red	35
Green	39
Blue	37

Based on Alma's results, which color material will make the solar cooker heat food fastest?

A. red

B. green

C. blue

**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

Science Sample Items 16–18 (Cluster – Part 2 of 2)

Alignment	**EPE 5-PS1-2.1 (Level 1):** Match the appropriate tools or standard units of measurement to physical quantities such as weight, time, temperature, or volume to complete a scientific task. **EPE 5-PS1-2.2 (Level 2):** Use data to compare the weight of substances before and after they are heated, cooled, or mixed. **EPE 5-PS1-2.3 (Level 3):** Measure, graph, or use mathematical relationships to show that the weight of substances (in standard units) does not change when they are heated, cooled, or mixed.

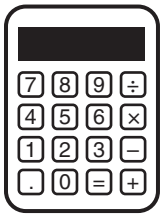
Learning Targets	Instructional Strategies	Scaffolds and Supports
I can match the appropriate tools to their function in completing a scientific task. I can match the appropriate standard units of measurement to physical quantities such as weight, time, temperature, or volume. I can use data to compare the weight of substances before and after they are heated, cooled, or mixed. I can measure mathematical relationships to show that the weight of substances (in standard units) does not change when they are heated, cooled, or mixed. I can graph mathematical relationships to show that the weight of substances (in standard units) does not change when they are heated, cooled, or mixed. I can use mathematical relationships to show that the weight of substances (in standard units) does not change when they are heated, cooled, or mixed.	**Demonstrations and/or Experiments** • Show students a substance and record what they see and what it weighs. • Heat or cool the substance, and record observations of what changes occurred or did not occur. • Compare the weight of the substance tracked before and after the experiment. Emphasize that the weight remained the same. • Input recorded information about weight into a graph to mathematically display the lack of increase or decrease in weight. **Graphic Organizers** • Use a T-chart to sort pictures of tools that can be used to measure certain substances or objects. • Create a web with a measurement tool in the center, where students fill in the rest with objects/substances that can be measured with that tool. **Explore with Observation Stations** • Get hands-on experience with different centers focusing on different substances that can be heated, cooled, and mixed or explored with different measurement tools. • Practice graphing values using different materials (wiki sticks, spaghetti, rulers, yardsticks, chalk, etc.) **I Have, Who Has?** • "I have __, Who has __?" game where each student gets a card that has a picture of a measurement tool and a question on it. The teacher asks students a "who has" question, and a student with a card with the picture that answers the question says, "I have __." The same student then asks the question "Who has __?" (e.g., I have a tool that can measure volume. Who has a tool that can measure time?)	• Assistive technology • Adaptive mathematical manipulatives • Calculator • Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations • Content delivered using multimedia (e.g., book, storyboard, video, computer) • Highlighted information within a text • Picture icons on graphic organizers to support nonreaders and visual learners • Visual vocabulary cards • Interactive whiteboards • Collaborative grouping • Choices (picture sorts, cut and paste, etc.)

Item 16*

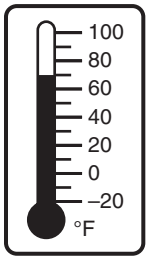
Alma places her solar cooker in the sun. She wants to know the temperature inside the cooker.

Which tool can Alma use to measure the temperature inside the solar cooker?

A. television



B. calculator



C. thermometer

Item 17*

Alma weighs some solid pieces of cheese. Then, she melts the cheese in her solar cooker and weighs the melted cheese. The data table shows the weights Alma measured.

Weight of Cheese

Weight of Solid Pieces of Cheese	Weight of Melted Cheese
50 grams	50 grams

How does the weight of the melted cheese compare to the weight of the solid cheese?

A. The cooker is easy to put together.

B. The solid and melted cheese weigh the same.

C. The melted cheese weighs more than the solid cheese.

**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

Item 18*

Alma decides to try another food in her solar cooker. She weighs a marshmallow. Then, she melts the marshmallow in her solar cooker. The data table shows Alma's observations.

Weight of One Marshmallow

Marshmallow	Weight (grams)
Before Melting	7
After Melting	

What is the weight of the marshmallow after it melts?

A. 5 grams

B. 7 grams

C. 9 grams

**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*


msaa
Multi-State Alternate Assessment