Multi-State Alternate Assessment

# Teacher Guide

# Science

# High School

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# 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.

# High School Sample Item Blueprint

<table>
<tr><th>Domain</th><th>EPE</th><th>Dimensions</th><th>Item Set Type</th><th>Item Position</th></tr>
<tr><td rowspan="3">Physical Science</td><td rowspan="3">HS-PS2-3.1<br>Use a model to identify how forces are acting in a collision system.<br><br>HS-PS2-3.2<br>Make a claim about how a particular device functions to minimize the forces on a macroscopic object during a collision.<br><br>HS-PS2-3.3<br>Select, evaluate, or change a design to a device that minimizes the forces on a macroscopic object during a collision.</td><td>SEP: Constructing Explanations and Designing Solutions<br>• Apply scientific ideas to solve a design problem, taking into account possible unanticipated effects.<br><br>Supporting:<br>Engaging in Argument from Evidence<br>Developing and Using Models</td><td rowspan="3">Cluster</td><td rowspan="3">1–3</td></tr>
<tr><td>DCIs:<br>PS2.A: Forces and Motion<br>• If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.<br><br>ETS1.A: Defining and Delimiting an Engineering Problem<br>• Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.<br><br>ETS1.C: Optimizing the Design Solution<br>• Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed.</td></tr>
<tr><td>CCC: Cause and Effect<br>• Systems can be designed to cause a desired effect.<br><br>Supporting:<br>Systems and System Models</td></tr>
</table>

| Domain | EPE | Dimensions | Item Set Type | Item Position |
|---|---|---|---|---|
| **Physical Science** | **HS-PS3-2.1**<br>Identify questions that would determine if an object's kinetic energy is changing or if an object's potential energy is changing in a system.<br>**HS-PS3-2.2**<br>Use models to show how energy changes when an object's position is moved or when the particles making up an object change their motion.<br>**HS-PS3-2.3**<br>Develop or use models to describe how energy is conserved at the macroscopic or particle level when energy is transferred or converted from one form to another. | **SEP: Developing and Using Models**<br>• Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.<br>***Supporting:***<br>**Asking Questions and Defining Problems**<br>**DCI: PS3.A: Definitions of Energy**<br>• Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.<br>• At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy. These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy associated with the configuration (relative position of the particles). In some cases, the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.<br>**CCC: Energy and Matter**<br>• Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. | Cluster | 4–6 |

| Domain | EPE | Dimensions | Item Set Type | Item Position |
|---|---|---|---|---|
| **Physical Science** | **HS-PS1-2.1**<br>Use provided information to complete a model of a chemical reaction.<br>**HS-PS1-2.2**<br>Use the periodic table as a model to identify or classify elements that will behave similarly in chemical reactions.<br>**HS-PS1-2.3**<br>Use the periodic table to construct an explanation for specific chemical reactions. | **SEP: Constructing Explanations and Designing Solutions**<br>• Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.<br>***Supporting:***<br>**Obtaining, Evaluating, and Communicating Information**<br>**Developing and Using Models**<br>**DCIs:**<br>**PS1.A Structure and Properties of Matter**<br>• The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states.<br>**PS1.B: Chemical Reactions**<br>• The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions.<br>**CCC: Patterns**<br>• Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.<br>***Supporting:***<br>**Energy and Matter** | Cluster | 7–9 |

<table>
<tr><th>Domain</th><th>EPE</th><th>Dimensions</th><th>Item Set Type</th><th>Item Position</th></tr>
<tr><td rowspan="3">Life Science</td><td rowspan="3">HS-LS4-1.1<br>Use the provided information to identify how organisms have changed over time.<br><br>HS-LS4-1.2<br>Use various types of data (DNA sequences, amino acid sequences, structures found in organisms, embryos, fossils) to draw conclusions about patterns of relatedness among organisms.<br><br>HS-LS4-1.3<br>Describe how patterns in data comparing structures found in organisms, embryos, and/or fossils are evidence for biological evolution and common ancestry of living things.</td><td>SEP: Obtaining, Evaluating, and Communicating Information<br>• Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).<br><br>Supporting:<br>Analyzing and Interpreting Data</td><td rowspan="3">Cluster</td><td rowspan="3">10–12</td></tr>
<tr><td>DCI: LS4.A: Evidence of Common Ancestry and Diversity<br>• Genetic information, like the fossil record, provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence.</td></tr>
<tr><td>CCC: Patterns<br>• Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.<br><br>Supporting:<br>Stability and Change</td></tr>
</table>

| Domain | EPE | Dimensions | Item Set Type | Item Position |
|---|---|---|---|---|
| **Life Science** | **HS-LS2-2.1**<br>Use the provided information to identify factors that affect population size and/or biodiversity.<br><br>**HS-LS2-2.2**<br>Interpret data to describe the effect of a factor in a specific ecosystem.<br><br>**HS-LS2-2.3**<br>Use mathematical representations (e.g., averages, trends, graphs) to explain how a specific factor affects the biodiversity or sizes of populations in ecosystems of different scales. | **SEP: Using Mathematics and Computational Thinking**<br>• Use mathematical representations of phenomena or design solutions to support and revise explanations.<br><br>***Supporting:***<br>**Obtaining, Evaluating, and Communicating Information**<br><br>**DCI: LS2.A: Interdependent Relationships in Ecosystems**<br>• Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.<br><br>**CCC: Scale, Proportion, and Quantity**<br>• Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.<br><br>***Supporting:***<br>**Cause and Effect** | Standalone | 13–15 |

| Domain | EPE | Dimensions | Item Set Type | Item Position |
|---|---|---|---|---|
| **Earth and Space Science** | **HS-ESS1-6.1**<br>Use data to identify patterns about ancient Earth materials, meteorites, or other planetary surfaces.<br>**HS-ESS1-6.2**<br>Ask questions about ancient Earth materials, meteorites, or other planetary surfaces that can be used to construct an account of Earth's formation and early history.<br>**HS-ESS1-6.3**<br>Use evidence (e.g., data about ancient Earth materials, meteorites, other planetary surfaces) to explain Earth's formation and early history. | **SEP: Constructing Explanations and Designing Solutions**<br>• Apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.<br>***Supporting:***<br>**Asking Questions and Defining Problems**<br>**Analyzing and Interpreting Data**<br>**DCI: ESS1.C: The History of Planet Earth**<br>• Although active geologic processes, such as plate tectonics and erosion, have destroyed or altered most of the very early rock record on Earth, other objects in the solar system, such as lunar rocks, asteroids, and meteorites, have changed little over billions of years. Studying these objects can provide information about Earth's formation and early history.<br>**CCC: Stability and Change**<br>• Much of science deals with constructing explanations of how things change and how they remain stable.<br>***Supporting:***<br>**Patterns** | Standalone | 16–18 |

# Science Sample Items 1–3 (Cluster – Part 1 of 2)

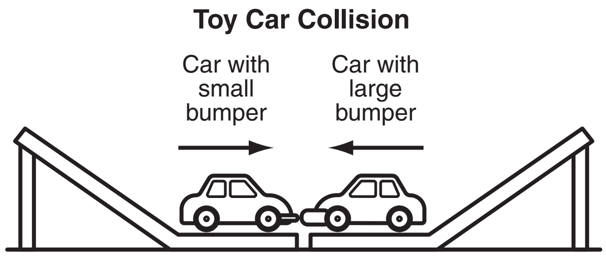
| | | |
|---|---|---|
| **Alignment** | **EPE HS-PS2-3.1 (Level 1):** Use a model to identify how forces are acting in a collision system.<br>**EPE HS-PS2-3.2 (Level 2):** Make a claim about how a particular device functions to minimize the forces on a macroscopic object during a collision.<br>**EPE HS-PS2-3.3 (Level 3):** Select, evaluate, or change a design to a device that minimizes the forces on a macroscopic object during a collision. | |
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| I can identify forms of energy.<br>I can identify forms of energy present in a system.<br>I can describe various forms of energy transfer.<br>I can describe the energy transfer that occurs in an everyday object or device.<br>I can identify which design or improvement will work best to transfer energy from one form to another. | **Model/Explore**<br>• Demonstrate two objects (such as toy cars, balls, playdough or clay balls, object into walls of different materials—can also apply clay to objects to demonstrate impact more clearly) colliding on a horizontal surface.<br>• Was there change in motion (speed, direction, both)?<br>• Did the shape of the object change (and when)?<br>**Engineer Cushioning Material**<br>• Create an egg drop with a parachute to keep the egg from breaking.<br>• Throughout this process, engage in group discussions and enlist students' help in determining assessment questions as they complete the different steps to assist in transfer of information from hands on to paper/pencil. Explain questions and answer them as they relate to the model.<br>• Have students create different bumpers on cars using recyclable materials to minimize impact.<br>• Go through the design proposal process.<br>• ID the problem, explain the purpose of the designed device, and propose a claim about what the design solution will be able to do.<br>• Sketch a solution and explain how the device is better than other existing objects.<br>• Present research (run test trials, etc.) and identify criteria and constraints.<br>• Make/present/provide a conclusion. | • Assistive technology<br>• Adaptive manipulatives<br>• Pre-teaching vocabulary; matching vocabulary word to graphical representation of definition<br>• Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations<br>• Multimedia presentations (e.g., book, storyboard, video, computer)<br>• Interactive whiteboards<br>• KWL chart<br>• Models<br>• Assistive technology<br>• Pre-teaching and providing visual vocabulary cards for support<br>• Collaborative grouping<br>• Academic conversation starters or sentence frames such as *The data show that . . . or I expect . . . to happen.*<br>• Graphic organizers for classifying<br>• Offering choices other than writing in a graphic organizer (dictating to a scribe, choice making, sorting words/ pictures/objects, etc.)<br>• Provided examples and models for students to follow<br>• Online simulations<br>• Rubrics |

| Science Sample Items 1–3 (Cluster – Part 1 of 2) | | |
|---|---|---|
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| | **Solving an Engineering Problem**<br>• Either complete 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.<br>• Work with students to figure out what the problem is and what it is preventing from happening.<br>• Propose a claim about what the design solution will be able to do.<br>• Conduct experiments with various design solutions (or watch videos) and document observations.<br>• Determine what design or improvement worked best and why.<br><br>**Least-to-Most Prompts**<br>• Increase support as needed until the student has completed the task appropriately.<br>• Include prompts such as gesturing, indirect/direct modeling, partial physical assistance, and full physical assistance from least to most.<br>• Always begin by providing the student an opportunity to answer/complete tasks correctly on their own.<br>• Always make certain the last prompt ensures the student responds correctly to the question/task to build understanding of expectations.<br>• Provide positive reinforcement for all correct responses.<br><br>**Sort to Understand**<br>• Provide task cards with relevant, real-world examples of forms of energy present in a system for students to sort.<br>• Provide task cards with examples of energy transfer that occurs in an everyday object or device for students to sort. | |

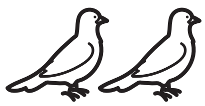
| Science Sample Items 1–3 (Cluster – Part 1 of 2) | | |
|---|---|---|
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| | **Energy Exploration**<br>• Students walk around/explore the classroom (or school etc.) and look/feel for clues of energy. When they find a source of energy, such as lights, intercom, heater, etc., they place an “energy card” (can be a sticky note or homemade card) on the item.<br>• When finished, have classroom discussion concerning the different forms of energy present and any that may have been missed.<br><br>**Energy Stations**<br>• Students visit different stations such as a car with a ramp, hand warmers, student knocking on a table or door, flashlight, fan, etc.<br>• At each station, students determine the type of energy present, draw a model of the energy transformation at the station, and explain how the energy is transferred at the station.<br><br>**Create**<br>• Students create a model/drawing/video/product demonstrating a source of energy in their home, bedroom, yard, park, etc. with a description of the transfer of energy (provide with options to draw, write about, make a video explaining, create a product with manipulatives, etc.). | |

## Item 1*

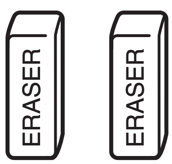
Here is a model that Sarah made for Experiment 1.




Which part of the model shows the forces acting on the cars?



A. birds




B. erasers

C. arrows

## Item 2*

Sarah reviews the results from Experiment 1.

**Experiment 1:**
**Amount of Damage after Collision**

| Car | Damage after Collision |
|---|---|
| Car with small bumper | Major |
| Car with large bumper | Minor |

Which claim can be made about the effect of large bumpers?

A. The large bumper caused the car to move faster.

B. The large bumper protected the car from damage.

C. The large bumper decreased the weight of the car.

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

## Item 3*

Sarah reviews the results from Experiment 1.

**Experiment 1:**
**Amount of Damage after Collision**

| Car | Damage after Collision |
|---|---|
| Car with small bumper | Major |
| Car with large bumper | Minor |

She then reviews the results from Experiment 3.

**Experiment 3:**
**Damage versus Bumper Size**

| Collision | Bumper Size | Damage after Collision |
|---|---|---|
| Car with small bumper collides with car with small bumper | Small | Major |
| | Small | Major |
| Car with small bumper collides with car with medium bumper | Small | Major |
| | Medium | Moderate |

Which bumper design **most** reduces force during a collision?

A. large bumper

B. small bumper

C. medium bumper

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

<table>
<tr><th colspan="3">Science Sample Items 4–6 (Cluster – Part 2 of 2)</th></tr>
<tr><td>Alignment</td><td colspan="2">EPE HS-PS3-2.1 (Level 1): Identify questions that would determine if an object’s kinetic energy is changing or if an object’s potential energy is changing in a system.<br><br>EPE HS-PS3-2.2 (Level 2): Use models to show how energy changes when an object’s position is moved or when the particles making up an object change their motion.<br><br>EPE HS-PS3-2.3 (Level 3): Develop or use models to describe how energy is conserved at the macroscopic or particle level when energy is transferred or converted from one form to another.</td></tr>
<tr><th>Learning Targets</th><th>Instructional Strategies</th><th>Scaffolds and Supports</th></tr>
<tr><td>I can define kinetic and potential energy.<br><br>I can ask questions to describe how kinetic energy changes in a system.<br><br>I can ask questions to describe how potential energy changes in a system.<br><br>I can explain that energy is conserved.<br><br>I can use a model to describe how energy changes when an object’s position is moved or when the particles making up an object change their motion.<br><br>I can develop a model to show how energy is conserved.</td><td>Explore<br>• Have students explore the relationship between energy and the state of matter by examining phase changes of water.<br><br>Model<br>• Demonstrate particle energy in each state by sketching a diagram.<br><br>Demonstration<br>• Demonstrate that a metal spoon in boiling water will transfer thermal energy into metal and then into the hand that touches it.<br>• Other examples to demonstrate this concept can be utilized to assist with transfer of information such as the outside of a bowl when hot water is poured into it or different objects familiar to the student that are made of metal and will provide similar results.<br><br>Least-to-Most Prompts<br>• Increase support as needed until the student has completed the task appropriately.<br>• Include prompts such as gesturing, indirect/direct modeling, partial physical assistance, and full physical assistance from least to most.<br>• Always begin by providing the student an opportunity to answer/complete tasks correctly on their own.<br>• Always make certain the last prompt ensures the student responds correctly to the question/task to build understanding of expectations.<br>• Provide positive reinforcement for all correct responses.</td><td>• Adaptive technology<br>• Adaptive manipulatives<br>• Paper and writing utensils<br>• Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations<br>• Multimedia presentations (e.g., book, storyboard, video, computer)<br>• Interactive whiteboards<br>• Choices (picture sorts, cut and paste, etc.)<br>• Pre-teaching and providing visual vocabulary cards with graphic representations for support<br>• Providing parts of a model; student organizes correctly<br>• Assistive technology<br>• Online simulations<br>• Graphic organizers (Venn diagrams etc.)<br>• Academic conversation starters or sentence frames such as The data show that . . . or I expect . . . to happen.</td></tr>
</table>

## Science Sample Items 4–6 (Cluster – Part 2 of 2)

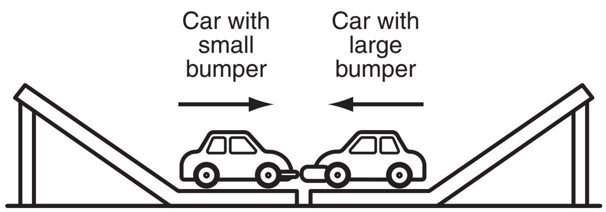
| Learning Targets | Instructional Strategies | Scaffolds and Supports |
|---|---|---|
| | **Sort to Understand**<br>• Provide relevant, real-world examples of potential and kinetic energy for students to sort.<br>• Can be sorted in a chart, on a mat, in a circle map, etc.<br>• Provide color coding if more supports are needed.<br><br>**Small Group/Stations**<br>• Define potential/kinetic energy.<br>• Work in a small group to complete a mini-lab or demonstration video with potential/kinetic energy.<br>• Complete a Venn diagram, comparing and contrasting potential and kinetic energy.<br><br>**Model**<br>• Students create a model of a craft stick catapult.<br>• Stack six craft sticks and secure with rubber bands on both sides.<br>• Add a stick, perpendicular to the stack (cross shaped), and secure with two rubber bands crossed in an X shape over the sticks to ensure they stay in position.<br>• Add the base stick to the catapult by attaching to one end of the launching stick with a rubber band, forming a V shape that includes the stack in the middle.<br>• Glue a bottle cap to the launching stick to hold a cotton ball/pom-pom ball.<br>• Explore the roles of potential and kinetic energies in the launching of the cotton ball/pom-pom ball.<br>• Launch the cotton ball/pom-pom by pushing the cup down farther at different distances.<br>• Explore when it lands farther, nearer, higher, lower, etc. in relation to launch position.<br>• Discussion: ask questions such as Where did the energy come from? When was it stored potential energy? When did it convert to kinetic energy? etc.<br>• Other models that can be incorporated are rubber band–powered cars, paper roller coasters, swinging pendulum, and many more. | • Simple statements that allow students to answer with “yes” or “no” using switches, eye gaze, or other modes of communication to demonstrate understanding<br>• Highlighted information within text<br>• Provided examples and models for students to follow<br>• Anchor charts for potential and kinetic energy |

| Science Sample Items 4–6 (Cluster – Part 2 of 2) | | |
|---|---|---|
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| | **Create**<br>• Students create a model/drawing/video/product demonstrating energy change with a description of the transfer of energy (provide with options to draw, write about, make a video explaining, create a product with manipulatives, etc.). Students will use potential, kinetic, and transfer of energy, e.g., diagram or video showing dominos falling and explaining the energy as it relates. | |

## Item 4*

Sarah wants to know whether the potential energy of the cars changes as the cars move down the ramp. Here is her model from Experiment 1.

**Toy Car Collision**




Which question will help Sarah find out how the potential energy of the cars changes?

A. What are the colors of the cars?

B. Is the surface of the ramp hot or cold?

C. How far do the cars move down the ramp?

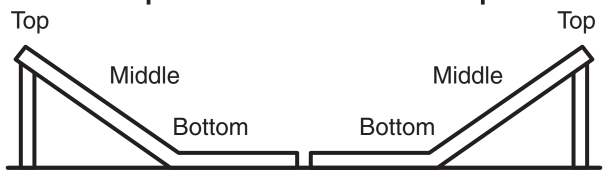
**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

## Item 5*

Sarah looks at her setup for Experiment 2. She wonders if the position of the cars on the ramps when they are released affects how much kinetic energy the cars have when they collide.

Her model shows three different positions on the ramps.

**Experiment 2: Positions Setup**




She also looks at how much damage occurred to the cars after the collision when the cars were released from different positions on the ramps.

**Experiment 2:**
**Damage versus Position on Ramps**

| Position of Cars on Ramps when Released | Damage to Car with Small Bumper after Collision |
|---|---|
| Top | Major |
| Middle | Moderate |
| Bottom | Minor |

Where should cars be released on the ramps in order to have the **most** kinetic energy when they collide?

A. top

B. middle

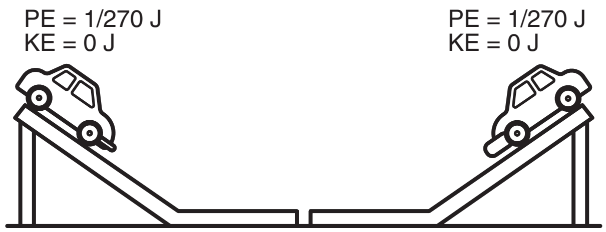
C. bottom

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

## Item 6*

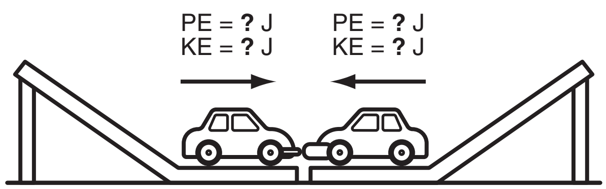
Sarah added the potential energy (PE) and kinetic energy (KE) values for each car to her model of the collision in Experiment 1. Her model shows that as cars move down the ramp, potential energy changes into kinetic energy. One part of her model shows the energy of the cars in Joules (J) before the collision.

**Experiment 1 before Collision**




The other part of Sarah's model shows that the energy of the cars in Joules (J) after the collision is unknown.

**Experiment 1 after Collision**




How should Sarah complete the model to show that there is no change in each car's total amount of energy?

A. show that the PE decreases and the KE increases for each car

B. show that the PE increases and the KE stays the same for each car

C. show that the PE doubles and the KE decreases by half for each car

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

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

<table>
<tr><td>Alignment</td><td colspan="2">EPE HS-PS1-2.1 (Level 1): Use provided information to complete a model of a chemical reaction.<br>EPE HS-PS1-2.2 (Level 2): Use the periodic table as a model to identify or classify elements that will behave similarly in chemical reactions.<br>EPE HS-PS1-2.3 (Level 3): Use the periodic table to construct an explanation for specific chemical reactions.</td></tr>
<tr><th>Learning Targets</th><th>Instructional Strategies</th><th>Scaffolds and Supports</th></tr>
<tr><td>I can define a chemical reaction.<br>I can list the indicators of a chemical reaction.<br>I can explain that atoms are conserved in chemical reactions.<br>I can use a model to explain a chemical reaction.<br>I can use the periodic table of the elements to identify or classify elements that are similar (and will thus behave similarly in chemical reactions).<br>I can use the periodic table to explain why a chemical reaction will occur.</td><td>Experiment<br>• Demonstrate/carry out experiments with vinegar and baking soda.<br>Coding<br>• Color (or other means of coding) a periodic table of the elements by groups: metals/metalloids/nonmetals.<br>Model<br>• Demonstrate a chemical reaction with ball-and-stick models to represent simple chemical bonds/reactions.<br>Hands-on/Small Group<br>• Do chemical reaction experiments (safe/nontoxic).<br>• Students can use property visual cards or cut and paste to label/list the properties of the material/object before the reaction.<br>• Use cards to label/list indicators they see occurring during the chemical reaction.<br>• Then use cards to label/list properties after the reaction—compare properties to see if properties changed.<br>Least-to-Most Prompts<br>• Increase support as needed until the student has completed the task appropriately.<br>• Include prompts such as gesturing, indirect/direct modeling, partial physical assistance, and full physical assistance from least to most.<br>• Always begin by providing the student an opportunity to answer/complete tasks correctly on their own.<br>• Always make certain the last prompt ensures the student responds correctly to the question/task to build understanding of expectations.<br>• Provide positive reinforcement for all correct responses.</td><td>• Adaptive technology<br>• Adaptive manipulatives<br>• Adapted/coded periodic table<br>• Ball-and-stick models<br>• Graphic organizers such as Frayer models/four square<br>• Providing a copy of the notes in “cloze” form<br>• Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations<br>• Assistive technology<br>• Pre-teaching and providing visual vocabulary cards with graphic representations for support<br>• Online simulations<br>• Interactive whiteboards<br>• Collaborative grouping<br>• Color-coded/highlighted informational resources<br>• Anchor charts on chemical change/indicators<br>• Academic conversation starters or sentence frames such as The data show that . . . or I expect . . . to happen.<br>• Cut and paste/sorted alternatives</td></tr>
</table>

| Science Sample Items 7–9 (Cluster – Part 1 of 2) | | |
|---|---|---|
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| | **Periodic Table**<br>• Use colored pencils etc. to create a graphic organizer of the periodic table to identify/classify elements so students can visually see how they are related.<br>• Utilize one of the many free interactive periodic tables online to explore reactivity or chemical reactions among elements. | |

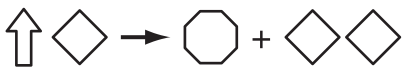
## Item 7*

Tamara wants to use a model to show how catalase helps break down hydrogen peroxide ($H_2O_2$) into water ($H_2O$) and two oxygen atoms ($O_2$) inside different organisms. She uses these shapes to represent oxygen (O) and hydrogen (H).

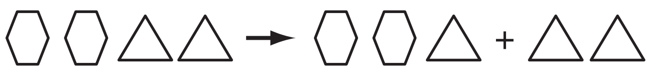
Oxygen (O) Hydrogen (H)

Which model shows the equation: $H_2O_2 \rightarrow H_2O + O_2$?

A. Model X



B. Model Y



C. Model Z

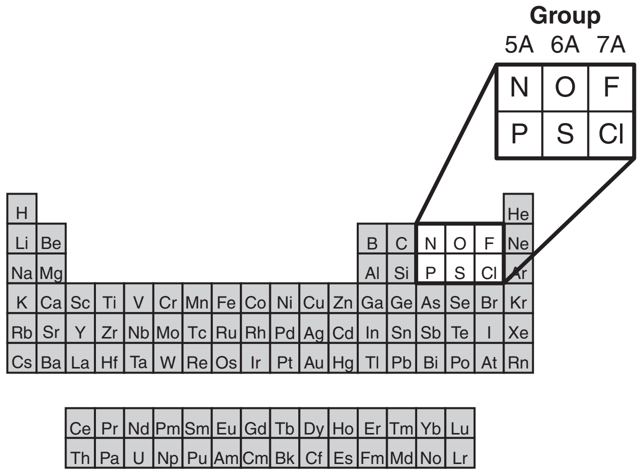
**Please note: The cluster stimulus for this cluster may be accessed in the sample items PDF and Directions for Test Administration.*

## Item 8*

Tamara knows that when hydrogen peroxide ($H_2O_2$) is broken down by catalase, oxygen (O) and hydrogen (H) react to form water ($H_2O$). She wonders if there are other elements that react like oxygen (O).

She looks at part of the periodic table.

**Part of the Periodic Table**




Which element will react **most** like oxygen (O) in a chemical reaction?

A. sulfur (S)

B. boron (B)

C. fluorine (F)

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

## Item 9*

Tamara learns that when elements react, a certain number of electrons are needed to fill the outer shell of the elements in order to be stable. When hydrogen peroxide ($H_2O_2$) is broken down by catalase, 2 hydrogen (H) atoms react with 1 oxygen (O) atom to form water ($H_2O$).

The data table shows electron information about hydrogen and oxygen.

**Electron Information for Hydrogen and Oxygen**

| Element | Number of Electrons in Outer Shell | Number of Electrons Needed to be Stable |
|---|---|---|
| Hydrogen (H) | 1 | 2 |
| Oxygen (O) | 6 | 8 |

Based on the data table, how do 2 H atoms and 1 O atom react to form $H_2O$ in the catalase reaction?

A. After reacting, H has 1 electron and O has 6 electrons in their outer shells.

B. After reacting, H has 2 electrons and O has 1 electron in their outer shells.

C. After reacting, H has 2 electrons and O has 8 electrons in their outer shells.

**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 HS-LS4-1.1 (Level 1):** Use the provided information to identify how organisms have changed over time.<br>**EPE HS-LS4-1.2 (Level 2):** Use various types of data (DNA sequences, amino acid sequences, structures found in organisms, embryos, fossils) to draw conclusions about patterns of relatedness among organisms.<br>**EPE HS-LS4-1.3 (Level 3):** Describe how patterns in data comparing structures found in organisms, embryos, and/or fossils are evidence for biological evolution and common ancestry of living things. | |
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| I can identify how an organism changed over time.<br>I can identify patterns of relatedness among organisms.<br>I can use various types of data to draw conclusions about patterns of relatedness among organisms.<br>I can compare structures found in organisms, embryos, and/or fossils.<br>I can identify patterns in common ancestry of living things.<br>I can describe how patterns in data comparing structures found in organisms, embryos, and/or fossils are evidence for biological evolution and common ancestry of living things. | **Explained Reading**<br>• Pair students with reading material.<br>• Student 1 reads the first paragraph aloud to student 2.<br>• Student 2 summarizes the paragraph that was read.<br>• Both students write a one-sentence summary in the margin.<br>• Roles switch for each paragraph until the reading is complete.<br>**Exploration**<br>• Students are put into groups.<br>• Groups are provided different sets of animal images. For example, sets can include animals such as hawk, ostrich, and chicken; chicken, whale, and frog; or frog, cat, and human.<br>• Students will document similarities.<br>• Students will document differences.<br>• Discussion points can include noting that animals sometimes have similar structures serving similar functions, animals sometimes have more differences than similarities, and sometimes animal similarities serve different functions.<br>• Groups can report on their observations.<br>• An extension activity would be to provide students with three prehistoric animals (fossils) and let them make a claim about the relationship of the three animals based on observations on comparative anatomy. | • Adaptive technology<br>• Adaptive manipulatives<br>• Supplementary text to reinforce concepts (possibly lower Lexile levels to assist with comprehension)<br>• Color-coded/highlighted informational resources<br>• Graphic organizers<br>• Offering choices other than writing in a graphic organizer (dictating to a scribe, choice making, sorting words/pictures/objects, etc.)<br>• Providing a copy of the notes in “cloze” form<br>• Academic conversation starters or sentence frames such as *The data show that . . . or I expect . . . to happen.*<br>• Cut and paste/sorted alternatives<br>• Collaborative grouping<br>• Interactive whiteboards<br>• Content delivered using multimedia (e.g., book, storyboard, video, computer)<br>• Picture icons to accompany words to support nonreaders<br>• Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations<br>• Pre-teaching and providing visual vocabulary cards with graphic representations for support<br>• KWL chart |

| Science Sample Items 10–12 (Cluster – Part 2 of 2) | | |
|---|---|---|
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| | **Sort to Learn**<br>• The teacher provides students with a set of cards with organisms.<br>• Students will sort the cards based on shared characteristics.<br>• Students will formulate a claim about the relationship between the species in each group.<br>• Complexity in terms of organisms, number of groups, and number of organisms can be differentiated.<br><br>**Least-to-Most Prompts**<br>• Increase support as needed until the student has completed the task appropriately.<br>• Include prompts such as gesturing, indirect/direct modeling, partial physical assistance, and full physical assistance from least to most.<br>• Always begin by providing the student an opportunity to answer/complete tasks correctly on their own.<br>• Always make certain the last prompt ensures the student responds correctly to the question/task to build understanding of expectations.<br>• Provide positive reinforcement for all correct responses.<br><br>**Observation Stations**<br>• Before beginning stations, brainstorm as a class about some of the similarities and differences between humans and a list of organisms such as a chicken, whale, snapping turtle, and cow. How might scientists determine how closely they are related?<br>• Students predict how recently humans shared a common ancestor with the organisms talked about.<br>• Stations should be set up with a chart including the Cytochrome c amino acid sequence in humans and an organism (different organism for each station). To eliminate cognitive load, only one comparison should be at each station. | |

| Science Sample Items 10–12 (Cluster – Part 2 of 2) | | |
|---|---|---|
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| | • The teacher models, noting where the amino acid sequence of the organism differs from that of the human sequence.<br>• Students rotate through stations with partners to note where the amino acid sequence of the organism differs from that of the human sequence.<br>• Students will create a table to note how many differences exist between humans and each organism (can differentiate the creation of the table in terms of what medium and how much each student needs to create independently). This can be differentiated to meet individual student needs by providing a table where students can fill in all or parts of the information based on necessary scaffolds. A word bank can also be provided for support.<br>• Note to students that species that recently shared a common ancestor have more similarities than the ones that last shared a common ancestor long ago. Provide a visual timeline to assist with difficulty understanding elapsed time.<br>• Discussion questions: Based on your data, to which organisms are humans most closely related? To which organisms are humans most distantly related? What is your evidence for this claim? Does your answer match your previous prediction?<br>• Exit slip: How does amino acid sequence data help infer evolutionary relationships among organisms? | |

## Item 10*

Tamara looks at the catalase protein data table.

**Size of Catalase Protein in Organisms**

| | Size of Catalase Protein |
|---|---|
| **Ancestral Organism** | Large |
| **Present-Day Organism** | Small |

How did this organism change over time?

A. The organism can move faster.

B. The organism can make louder noises.

C. The organism has smaller catalase proteins.

## Item 11*

Tamara wonders how the presence of catalase in different organisms can show evidence of those organisms being related. She looks at the information in the data table.

**Partial Catalase Amino Acid Sequences**

| Organism | Catalase Amino Acid Sequence |
|---|---|
| Dog | ○ □ ☆ ◺ |
| Cow | ○ □ ☆ ⬠ |
| Fungus | ○ □ ♡ ⏢ |

Based on the amino acid data table, which organism is **most** closely related to the cow?

A. dog

B. fungus

C. chicken

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

## Item 12*

Tamara wonders how DNA information about catalase can provide further information about organisms and common ancestry. She looks at the information in the catalase DNA data table.

**Partial Catalase DNA Sequences**

| Organism | Catalase DNA Sequence |
|---|---|
| Fly | ACA GAA TTC |
| Mouse | CGT CCG TCC |
| Monkey | CGC CAT GGC |

Tamara claims it is more likely that a mouse shares an earlier common ancestor with a monkey than with a fly.

What information from the catalase DNA data table supports Tamara's claim?

A. The sequences of the fly and the mouse are most alike.

B. The sequences of the monkey and the fly are most alike.

C. The sequences of the mouse and the monkey are most alike.

**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 (Standalone)

<table>
<tr><td>Alignment</td><td colspan="2">EPE HS-LS2-2.1 (Level 1): Use the provided information to identify factors that affect population size and/or biodiversity.<br>EPE HS-LS2-2.2 (Level 2): Interpret data to describe the effect of a factor in a specific ecosystem.<br>EPE HS-LS2-2.3 (Level 3): Use mathematical representations (e.g., averages, trends, graphs) to explain how a specific factor affects the biodiversity or sizes of populations in ecosystems of different scales.</td></tr>
<tr><th>Learning Targets</th><th>Instructional Strategies</th><th>Scaffolds and Supports</th></tr>
<tr><td>I can identify factors that might cause changes in population size.<br>I can identify factors that might cause changes in biodiversity.<br>I can interpret data to explain how a factor might cause a change in an ecosystem.<br>I can use mathematical information (averages and or trends from a data table, graphs) to explain how a factor affects the population size or biodiversity in an ecosystem.</td><td>Analyze a Graph<br>• Provide students with a graph handout to explain predator-prey interactions.<br>• Students use a graphic organizer to sort their ideas.<br>Anticipation Guide<br>• Students consider a scenario and make a prediction based on their current knowledge.<br>• Once they make a prediction, they are invested in whether they are correct and why. Students watch computer simulations to see the correct cause-effect relationships in the ecosystem.<br>Computer Simulation<br>• Use a computer simulation (or handout) to investigate the cause-and-effect relationships in an ecosystem.<br>• Using the results of a computer simulation or handout, students interpret the data and construct an explanation of their observations.<br>Sketch a Model<br>• Students sketch a model of a food chain and/or food web to demonstrate the complex interactions found within the ecosystem.<br>Explore<br>• Provide students with an internet scavenger hunt to explore.<br>Exploration<br>• Provide students with different tools to represent bird beaks.<br>• Students will each use their provided “beak” to attempt to pick up items that are representative of seeds such as pom-pom balls, dried beans, marbles, etc.</td><td>• Adaptive technology<br>• Adaptive manipulatives<br>• Paper and writing utensils<br>• Multimedia presentations (e.g., book, storyboard, video, computer)<br>• Interactive whiteboards<br>• Choices (picture sorts, cut and paste, etc.)<br>• Pre-teaching and providing visual vocabulary cards with graphic representations for support<br>• Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations<br>• Graphic organizers<br>• Assistive technology<br>• Collaborative grouping<br>• Supplementary text to reinforce concepts (possibly lower Lexile levels to assist with comprehension)<br>• Color-codeed/highlighted informational resources/key takeaways in text<br>• Read-aloud texts<br>• Anchor charts<br>• Graphic organizers such as Frayer models/four square<br>• Providing a copy of the notes in “cloze” form<br>• Academic conversation starters or sentence frames such as The data show that . . . or I expect . . . to happen.</td></tr>
</table>

## Science Sample Items 13–15 (Standalone)

| Learning Targets | Instructional Strategies | Scaffolds and Supports |
|---|---|---|
| | **Discuss to Understand**<br>• Small groups<br>• Provide each group with an organism and several scenarios.<br>• Students will discuss how the different factors in each scenario will affect their organism.<br>• Come back together as a whole group and discuss.<br><br>**Guest Speaker**<br>• Have a guest speaker such as a scientist etc. to speak on these issues with students and answer questions.<br><br>**Issues, Evidence, and You**<br>• This approach encourages students to consider the implications/factors as they relate to changes in population sizes. Working individually or in small groups, students read a scientific text; brainstorm scenarios, evidence, and implications; and create a product to capture discussion.<br><br>**Task Analysis**<br>• Present information about an organism or a population of an organism.<br>• Identify factors that may change biodiversity/population size.<br>• Identify the facts that may impact such.<br>• Input those findings into a "cause and effect" diagram.<br><br>**Least-to-Most Prompts**<br>• Increase support as needed until the student has completed the task appropriately.<br>• Include prompts such as gesturing, indirect/direct modeling, partial physical assistance, and full physical assistance from least to most.<br>• Always begin by providing the student an opportunity to answer/complete tasks correctly on their own.<br>• Always make certain the last prompt ensures the student responds correctly to the question/task to build understanding of expectations.<br>• Provide positive reinforcement for all correct responses. | |

## Item 13

The data table shows how snakes affect the percent of rabbits that survive in an area.

**How Many Rabbits Survive?**

| Snakes | No Snakes |
|---|---|
| 78% | 100% |

Based on the data table, which factor affects how many rabbits survive?

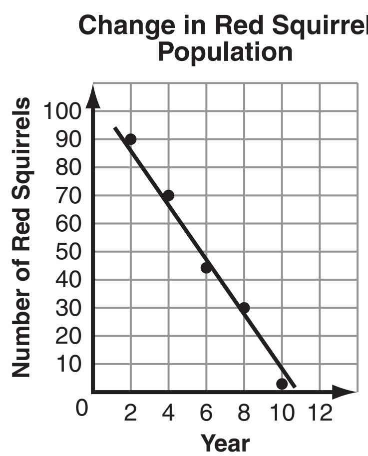
A. cars

B. plants

C. snakes

## Item 14

Red squirrels were the only kind of squirrel on an island for many years. People later brought gray squirrels to the island. The graph shows how the red squirrel population changed after gray squirrels were put on the island.




According to the graph, how did gray squirrels affect the population of red squirrels?

A. Red squirrels increased in number.

B. Red squirrels decreased in number.

C. Red squirrels had larger places to live.

## Item 15

Maria learned that animals attack some birds' nests. This data table shows how the thickness of the forest affects how often a nest is attacked.

**Forest Thickness and Nest Attacks**

| Forest Thickness (%) | Nests Attacked per Day (%) |
|---|---|
| 10 | 9 |
| 30 | 8 |
| 50 | 6 |
| 70 | 4 |
| 90 | 2 |

Which explanation is supported by the data in the data table?

A. Thick forests allow nests to be hidden better, so they have fewer nests attacked each day.

B. Thick forests have more places for birds to make nests, so they have more nests attacked each day.

C. Thick forests have more places for predators to hide, so they have more nests attacked per day.

<table>
<tr><th colspan="3">Science Sample Items 16–18 (Standalone)</th></tr>
<tr><td>Alignment</td><td colspan="2">EPE HS-ESS1-6.1 (Level 1): Use data to identify patterns about ancient Earth materials, meteorites, or other planetary surfaces.<br>EPE HS-ESS1-6.2 (Level 2): Ask questions about ancient Earth materials, meteorites, or other planetary surfaces that can be used to construct an account of Earth’s formation and early history.<br>EPE HS-ESS1-6.3 (Level 3): Use evidence (e.g., data about ancient Earth materials, meteorites, other planetary surfaces) to explain Earth’s formation and early history.</td></tr>
<tr><th>Learning Targets</th><th>Instructional Strategies</th><th>Scaffolds and Supports</th></tr>
<tr><td>I can define meteorite.<br>I can identify patterns in<br>• ancient Earth materials,<br>• meteorites, or<br>• other planetary surfaces (composition, presence or lack of craters, etc.).<br>I can use data from<br>• ancient Earth materials,<br>• meteorites, or<br>• other planetary surfaces to describe Earth’s formation and early history.</td><td>Reading<br>• Students read a short text (or text is read aloud) about the Cretaceous-Tertiary extinction due to an asteroid impact. Sixty-five million years ago, more than three-fourths of all plant and animal species living on Earth became extinct. There are patterns in the fossil record and impact on Earth’s surface that provide evidence of this event.<br>Observe and Analyze<br>• Students examine photographs of planetary surfaces (heavily cratered, minimally cratered, no craters, etc.). Students sort the examples based on patterns.<br>Interpret a Graph<br>• Students interpret a graph of the composition of various meteorites compared to the composition of Earth’s crust. This information is used to compare and contrast the compositions.<br>Create a Timeline<br>• Students work in small groups to create a timeline of Earth’s history.<br>• Students are provided with choices in terms of how they choose to create their timeline including, but not limited to, manipulatives, movie, PPT/slideshow, paper, digital, etc.<br>Timeline Card Sort<br>• Students are provided with cards that include time, events, and evidence.<br>• Students match events cards to time cards.<br>• Students match the evidence cards to the event/time pair.</td><td>• Adaptive technology<br>• Adaptive manipulatives<br>• Text for reading or read-aloud related to K-T extinction event to highlight or color code<br>• Graph of meteorite compositions vs. Earth’s crust composition<br>• Offering choices other than writing in a graphic organizer (dictating to a scribe, choice making, sorting words/pictures/objects, etc.)<br>• Picture icons to accompany words to support nonreaders<br>• Interactive whiteboards<br>• Content delivered using multimedia (e.g., book, storyboard, video, computer)<br>• Prepared objects, pictures, words, sentence strips, or recorded communication supports to provide access to content and facilitate responses during model demonstrations<br>• Assistive technology<br>• Providing a word bank with visual supports<br>• Physical models<br>• Pre-teaching and providing visual vocabulary cards with graphic representations for support<br>• Demonstrations using all types of models to cater to different learning styles<br>• Graphic organizers such as Frayer models/four square</td></tr>
</table>

| Science Sample Items 16–18 (Standalone) | | |
|---|---|---|
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| | **Pre-teach Vocabulary**<br>• Students are provided the meanings of the vocabulary words before they encounter them.<br><br>**KWL Chart**<br>• Prior to a lesson, ask students what they **K**now about Earth's formation and early history, and populate that portion of the chart.<br>• Then ask students what they **W**ant to know about Earth's formation and early history (these can be pre-populated by the teacher and students can select the topics) and populate this portion of the chart.<br>• After the lesson, ask students what they **L**earned about Earth's formation and early history.<br><br>**Schema Mapping**<br>• Reserve a space on the wall, board, anchor chart, etc. for the schema map with a picture of the topic for visual connection.<br>• Record student schema, or prior knowledge, about the topic on one color of sticky note and place in the designated space.<br>• During the lesson, reading, or unit, record all new learning on a new color of sticky note.<br>• If this new learning expands on prior knowledge, place the schema statement under the new learning attached to the new sticky note.<br>• If any of the prior learning is a misconception, move this to the designated "misconception" area and discuss as it is discovered in the lesson, reading, or unit.<br><br>**Least-to-Most Prompts**<br>• Increase support as needed until the student has completed the task appropriately.<br>• Include prompts such as gesturing, indirect/direct modeling, partial physical assistance, and full physical assistance from least to most.<br>• Always begin by providing the student an opportunity to answer/complete tasks correctly on their own.<br>• Always make certain the last prompt ensures the student responds correctly to the question/task to build understanding of expectations.<br>• Provide positive reinforcement for all correct responses. | • Providing a copy of the notes in "cloze" form<br>• Academic conversation starters or sentence frames such as *The data show that . . . or I expect . . . to happen.*<br>• Supplementary text to reinforce concepts (possibly lower Lexile levels to assist with comprehension) |

| Science Sample Items 16–18 (Standalone) | | |
|---|---|---|
| **Learning Targets** | **Instructional Strategies** | **Scaffolds and Supports** |
| | **Models**<br>• Provide students with various models and graphical representations to symbolize patterns in ancient Earth materials, meteorites, or other planetary surfaces.<br>• Provide relevant, real-world examples using multimedia presentations.<br>• Pause often to model how to ask questions about patterns in ancient Earth materials, meteorites, or other planetary surfaces and provide detailed descriptions in answers. | |

## Item 16

Alya learns that the soil on the Moon contains elements from the Sun. The data table lists information about the Moon and the Sun.

**Moon Soil**

| Type of Elements in Moon Soil | Is the Element from the Sun? |
|---|---|
| Helium (He) | Yes |
| Neon (Ne) | Yes |

What do the data show about elements?

A. There are many clouds around Earth.

B. It is fun to play outside when it is raining.

C. Elements travel from the Sun to the Moon.

## Item 17

Dante learns that Earth is made up of elements that can be classified as either heavy or light. He finds a data table that lists information about heavy and light elements and their location inside Earth.

**Types of Elements inside Earth**

| Type of Element | Sinks or Floats? | Earth Layer Location |
|---|---|---|
| Heavy | Sinks | Core |
| Light | Floats | Crust |

Dante also learns that the core is a layer deep in the center of Earth, while the crust is a layer on Earth's surface.

Which question can be answered by using these data?

A. How did the layers of Earth form?

B. Are there many elements that float?

C. Why do scientists study the universe?

## Item 18

Sam learns that some craters on Earth were caused millions of years ago by asteroid impacts. He finds data that compare the estimated crater size millions of years ago to the current size of different craters. The data table lists some of the data.

**Comparing Sizes of Craters over Time**

| Crater Name | Estimated Crater Size Millions of Years Ago (kilometers) | Current Size of Crater (kilometers) |
|---|---|---|
| Chesapeake Bay | 85 | 40 |
| Kara | 120 | 65 |
| Acraman | 90 | 40 |

Sam also learns that currently there are few craters on Earth's surface.

How do Sam's data help explain why there are few craters?

A. The asteroids that struck Earth make craters of different sizes.

B. The craters become smaller over time as Earth's surface is changed.

C. The size of craters decreases as fewer asteroids impact Earth's surface.

msaa

Multi-State Alternate Assessment