# The Pennsylvania System of School Assessment

## Science
## Item and Scoring Sampler

# SUPPLEMENT

2009–2010
Grade 8

Pennsylvania Department of Education Bureau of Assessment and Accountability 2009–2010

# SCIENCE

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# SCIENCE

## *INTRODUCTION*

The 2009–2010 Science Item and Scoring Sampler Supplement displays released items from the 2009 PSSA operational test. The sampler supplement is to be used in conjunction with the previous year's item sampler. The 2008–2009 Science Item and Scoring Sampler can be found on the PDE website at http://www.pde.state.pa.us/. Select the "Pre K–12 Schools" tab at the top of the page. Then select "Assessment" in the "Learn About" column to the left. Select "Resource Materials" in the "Learn About" column of the next page, and then scroll down to find the appropriate sampler. Alternately, you may type in or click this link to reach the location of the item samplers: http://www.pde.state.pa.us/a_and_t/cwp/view.asp?a=108&Q=73314&a_and_tNav=|680|&a_and_tNav=|

This item and scoring sampler supplement contains a science scenario, as well as multiple-choice and open-ended items. Each item is preceded by the Assessment Anchor and Eligible Content coding. The multiple-choice answer options are followed by a list of rationales. The correct answer is indicated by an asterisk. The table following each item displays the percentages of students who chose each answer option. The correct answer is also shaded in these tables. The table following each open-ended item indicates the students' performance at each score point. Sample student responses for each of the scoring levels are also included for the open-ended items.

# SCIENCE

## *MULTIPLE-CHOICE ITEMS*

**Note: All percentages listed in the tables below each item have been rounded.**

### A.1.1.2

**1.** Which question about the Allegheny River can **best** be answered through scientific inquiry?

A How many species of fishes are present in this river? *

B Will this river be a fun place to visit?

C Will fishing be a popular sport on this river in five years?

D How much money should be spent to manage this river?

A *Key: Using sampling-type investigations, it is possible to determine the number of species of fish that live in the river. This technique is used to help determine the health of the river.*

B *The term "fun" is a personal opinion and cannot be investigated scientifically.*

C *Involves personal opinion ("popular") and unobservable prediction ("in five years").*

D *The answer to this question depends on economics, personal preference, and perhaps some data from scientific investigations. The question is not answerable by scientific inquiry alone.*

| A | B | C | D |
|---|---|---|---|
| 76% | 5% | 11% | 8% |

### A.1.2.2

**2.** Which statement explains a long-term health effect of vaccinating people for a disease like influenza or malaria?

A The disease would be completely eliminated.

B The risk of contracting the disease would be reduced. *

C Body cells would mutate to produce a new disease strain.

D Vaccinated individuals would become carriers of the disease.

A *It is theoretically possible to eliminate a disease, as with smallpox. However, diseases with animal vectors, such as malaria, apparently cannot be controlled this way, and rapidly transmitted and evolving diseases like influenza are, at best, just contained by vaccinations.*

B *Key: The primary purpose of a vaccination is to reduce the risk of contracting a given disease.*

C *DNA mutates. Body cells do not mutate.*

D *If vaccinated individuals did become carriers, the vaccine would quickly be removed from the market.*

| A | B | C | D |
|---|---|---|---|
| 12% | 55% | 20% | 13% |

## A.2.1.5

**Use the table below to answer question 3.**

**Mass, Volume, and Density Measurements of Substances**

| Substance | Mass (g) | Volume ($cm^3$) | Density ($g/cm^3$) |
|---|---|---|---|
| copper | 5.0 | 0.56 | 8.93 |
| copper | 10.0 | 1.12 | 8.93 |
| zinc | 15.0 | 2.10 | 7.14 |
| zinc | 20.0 | 2.80 | 7.14 |
| lead | 25.0 | 2.20 | 11.36 |
| lead | 30.0 | 2.64 | 11.36 |

**3.** Which conclusion is supported by the data in the table?

A By increasing the mass of a substance, its density will increase.

B By increasing the mass of a substance, its volume will increase. *

C By increasing the volume of a substance, its mass will decrease.

D By increasing the volume of a substance, its density will decrease.

A *The mass of each substance was increased with no change in density.*

B *Key: With an increase in mass, there was a corresponding increase in volume of each substance.*

C *With an increase in volume, there was a corresponding increase, rather than decrease, in mass of each substance.*

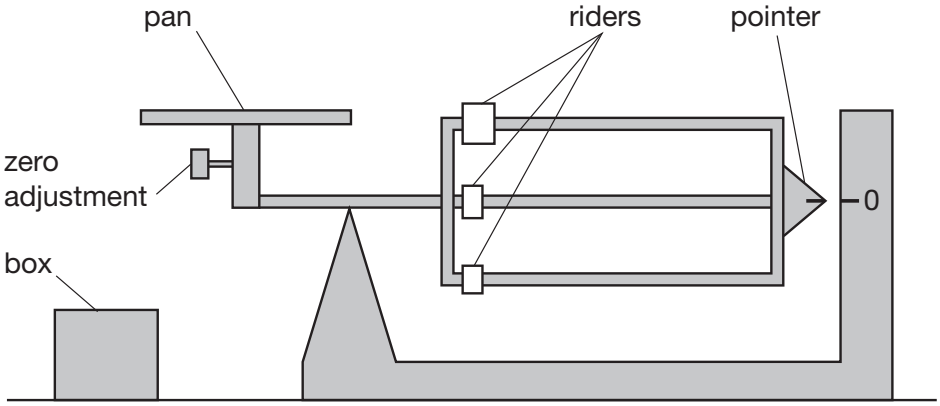
D *The volume of each substance was increased with no change in density.*

| A | B | C | D |
|---|---|---|---|
| 17% | 62% | 11% | 9% |

# SCIENCE

## A.2.2.1

**Use the diagram and steps below to answer question 4.**




**Using a Balance**

**Steps—Out of Order**

1. Read the measurement.
2. Place the box on the pan.
3. Slide the riders until the pointer lines up with the zero (0) line.
4. "Zero" the balance.

**4.** Which sequence shows the correct order to measure the mass of the box?

A 2, 1, 4, 3

B 2, 3, 4, 1

C 4, 1, 2, 3

D 4, 2, 3, 1 *

A *Placing the box on the pan follows zeroing the balance.*

B *Although many students avoid zeroing the balance, this should be the first step.*

C *Zeroing the balance is the first step required; however, one could not read the measurement without placing the box on the pan.*

D *Key: Zeroing the balance is the first step required to get an accurate reading. This is followed by adding the mass, moving the riders, and finally, reading the measurement.*

| A | B | C | D |
|---|---|---|---|
| 10% | 24% | 12% | 54% |

**A.2.2.3**

**5.** Which of the following describes one way scientists use seismographs?

A to view distant stars and planets

B to measure the masses of objects

C to help record atmospheric temperature changes

D to help determine the composition of Earth's interior *

A *Spectrographs are used to analyze star spectra, but they are not related to seismographs.*

B *The mass of an object is measured with a balance.*

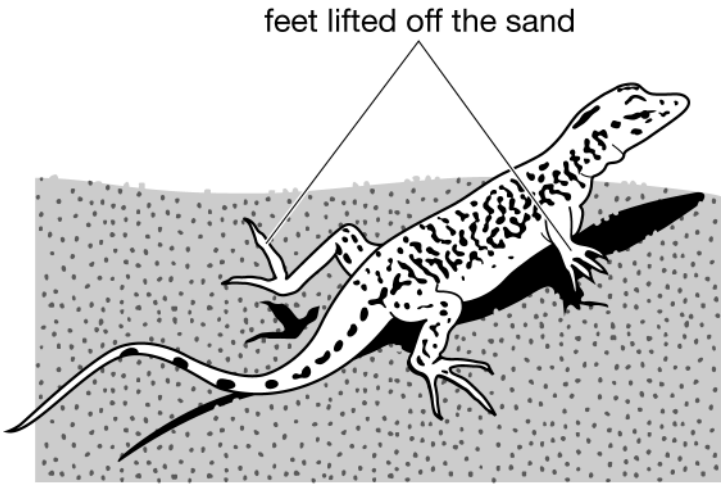
C *Records of temperature changes would be kept on a computer equipped with a temperature probe.*

D *Key: Seismographs are used for a variety of things, including determining the composition of Earth's interior.*

| A | B | C | D |
|---|---|---|---|
| 13% | 16% | 26% | 45% |

### A.3.1.3

**Use the figure below to answer question 6.**




**6.** When a desert lizard is on hot sand, nerves in its foot send a message to the brain. The brain analyzes this information and sends a message back through the nerves in the foot. This message tells the foot to move off the hot sand. Once the foot has moved off the hot sand, a message is relayed back to the brain. In this example, what is the first message sent to the brain?

A input *

B output

C process

D feedback

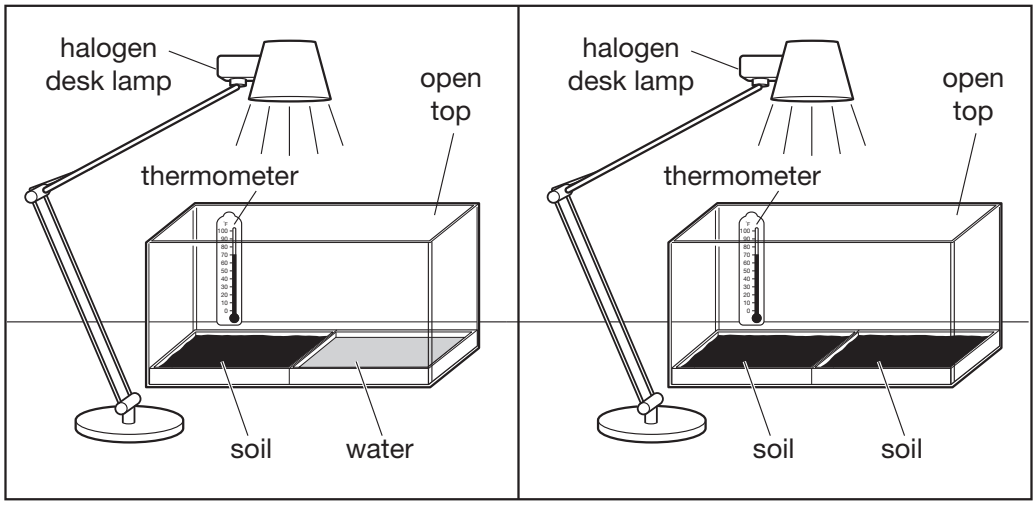
A *Key: Input is the message that tells the lizard the sand is hot.*
B *Output is the message that tells the foot to move.*
C *The process is the various steps required to complete the activity.*
D *Feedback will occur when the foot cools off.*

| A | B | C | D |
|---|---|---|---|
| 61% | 10% | 15% | 14% |

## A.3.2.1

**Use the model diagrams below to answer question 7.**

**Models of Two Different Regions on Earth**




**7.** The diagrams show models of two different systems that represent different regions on Earth. Which question would these models **most likely** help students answer?

A How do bodies of water affect the average daily high temperature of a region? *

B When does the hottest time of the day occur for regions at different latitudes?

C What effect does the ocean have on the amount of rainfall for a region?

D Where are desert regions located on a continent in relation to bodies of water?

A *Key: The temperature readings over the soil should reflect the effects of nearby water on land temperatures.*

B *Since the lamp is always in the same place, this would not reflect changes in latitude where the Sun would appear at different heights during the hottest times of the day.*

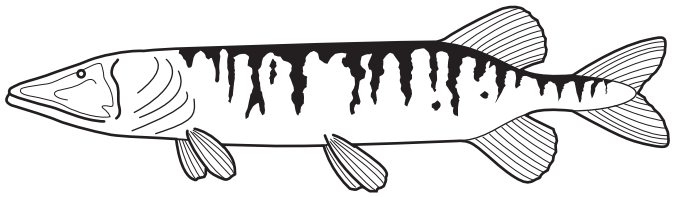
C *The water may represent the ocean, but there is no means of measuring any precipitation in the given setup.*

D *Since the humidity of the soil is not taken, there would be no way to answer this question, even if the setup were larger.*

| A | B | C | D |
|---|---|---|---|
| 66% | 15% | 8% | 11% |

### B.1.1.1

**Use the picture below to answer question 8.**



**8.** How is this fish adapted for weedy areas in freshwater lakes?

A The upper fin of the fish looks like waves of water.

B The lower fins of the fish look like the legs of a turtle.

C The stripes of the fish look like plants in the water. *

D The front of the fish looks like the surface of a rock.

A *The upper fin of this fish is short and does not resemble a wave.*

B *The lower fins may look like turtle legs to some students, but this does not explain how this would help the fish in weedy areas.*

C *Key: The stripes on this fish would camouflage this fish in weedy areas.*

D *Appearing to be like a rock would not be helpful in a weedy area.*

| A | B | C | D |
|---|---|---|---|
| 4% | 8% | 81% | 6% |

### B.2.2.2

**9.** Which statement **best** describes a dominant gene?

A It is the gene that produces mutations.

B It is the gene that produces desirable traits.

C It is the gene that masks a recessive gene. *

D It is the gene that is masked by a recessive gene.

A *A mutation may or may not be dominant or may have no effect.*

B *Desirable traits may be due to complete dominance, incomplete dominance, codominance, or any of the many types of genetic combinations.*

C *Key: Dominant genes, in effect, prevent the recessive allele (gene) from being expressed.*

D *Recessive genes can be masked by dominant genes.*

| A | B | C | D |
|---|---|---|---|
| 8% | 26% | 55% | 10% |

### B.3.3.3

**10.** Which statement describes how recycling aluminum cans positively affects the environment?

A Recycling uses energy.

B Recycling makes solid waste.

C Recycling conserves mineral resources. *

D Recycling produces air pollution.

A *Recycling does use energy and using energy generally has negative effects. Recycling may use more or less energy than that required to obtain the original material.*

B *Recycling materials often leaves some solid wastes that must be disposed of, which is a negative effect.*

C *Key: Recycling materials prevents mining new resources; thus, it conserves mineral resources.*

D *Recycling requires energy. The sources of that energy release air pollutants, which would be a negative effect.*

| A | B | C | D |
|---|---|---|---|
| 7% | 7% | 79% | 6% |

**C.1.1.2**

**Use the table below to answer question 11.**

**Densities of Substances**

| Substance | Density (grams/cm$^3$) |
|---|---|
| plastic X | 1.38 |
| plastic Y | 0.90 |
| water | 1.00 |

**11.** A student is given a mixture of 200 plastic beads that all look alike. Each bead is made from one of two types of plastic: plastic X or plastic Y. Which statement describes what will happen when the mixture of beads is placed in water?

A Both kinds of plastic beads will float in the water.

B Both kinds of plastic beads will sink in the water.

C Plastic X beads will float in the water and plastic Y beads will sink.

D Plastic X beads will sink in the water and plastic Y beads will float. *

A *In order for both beads to float, both would have to be less dense than water.*

B *In order for both beads to sink, both would have be more dense than water.*

C *Plastic X beads would have to have a density less than water in order to float. Plastic Y beads would have to have a density greater than water in order to sink.*

D *Key: Plastic X beads have a density greater than water, so they sink. Plastic Y beads have a density less than water, so they float.*

| A | B | C | D |
|---|---|---|---|
| 8% | 5% | 12% | 75% |

### C.2.2.1

**12.** Which energy source can be described as having the **greatest** impact on Earth's living environments?

A moving air

B moving water

C the Sun *

D geothermal

A *Moving air is "wind," which is an energy source, but it has less impact than the Sun.*

B *Water power is an energy source, but it has less impact than the Sun.*

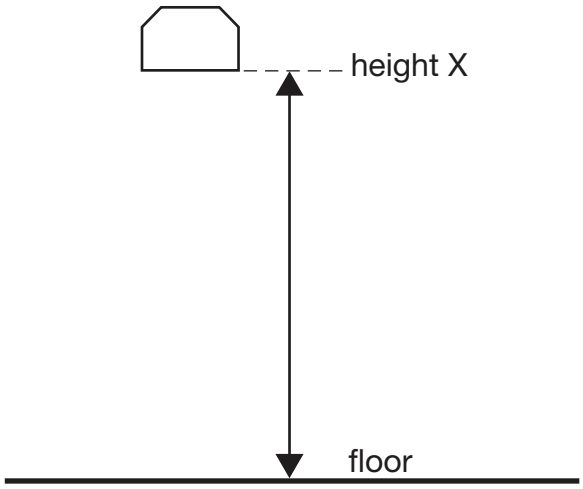
C *Key: The Sun is the direct source of energy for all photosynthetic organisms. It is indirectly the source of energy for all organisms in food chains with photosynthetic organisms as the producers.*

D *Some organisms can use energy from compounds released by geothermal activity, but this energy source appears to have little impact on the vast majority of living organisms.*

| A | B | C | D |
|---|---|---|---|
| 11% | 10% | 70% | 9% |

### C.3.1.2

**Use the diagram below to answer question 13.**




**13.** An object is lifted into the air and dropped. Which statement **best** describes the object's energy as it falls through the air from the stationary position at height X?

A At height X, the energy is potential, which changes to kinetic as the object falls. *

B At height X, the energy is kinetic, which changes to potential as the object falls.

C At height X, the energy is potential and kinetic, and the object loses potential energy as it falls.

D At height X, the energy is potential and kinetic, and the object loses kinetic energy as it falls.

**C.3.1.2** *(continued)*

A *Key: Potential energy is converted to kinetic energy as an object falls.*

B *The object has its greatest potential energy at X. The potential energy is converted to kinetic energy as the object falls.*

C *The object at height X does not have kinetic energy until it is dropped.*

D *The object at height X does not have kinetic energy until it is dropped. The object gains, not loses, kinetic energy as it falls.*

| A | B | C | D |
|---|---|---|---|
| 62% | 15% | 12% | 10% |

**D.1.3.4**

**14.** Which type of moving water provides the **best** environment for organisms that decompose dead organic matter?

A a steep mountain stream that flows when snow melts in the spring

B a shallow river with cold, clear water and a sandy bottom

C a slow-moving river with a wide, open channel *

D a rapidly moving stream with a narrow, steep channel

A *Few decomposers are found in mountain streams due to the cold and swift water.*

B *Clear water and a sandy bottom indicate that little organic matter is available, and therefore few decomposers would be found.*

C *Key: Compared to the other bodies of water, this river has the best conditions for decomposition, as organic material would become trapped in the slower moving areas of the river.*

D *A stream with a narrow steep channel is likely to be confined in a rocky area with little available organic matter for decomposition.*

| A | B | C | D |
|---|---|---|---|
| 11% | 26% | 43% | 19% |

### D.3.1.1

**15.** Which statement describes two factors that have the **greatest** influence on tides?

A Earth rotates on its axis once each day, and the gravity of the Moon causes the oceans to bulge. *

B Earth rotates on its axis once each year, and the gravity of the Moon causes the oceans to bulge.

C Earth revolves around the Sun once each year, and the gravity of Earth causes the oceans to bulge.

D Earth revolves around the Sun once each day, and the gravity of the Sun causes the oceans to bulge.

A *Key: The gravitational force between Earth and the Moon and the rotation of Earth are the main factors that cause ocean tides. The Sun is responsible to a lesser degree.*

B *Earth completes one rotation on its axis every 24 hours, rather than once a year.*

C *Earth completes one revolution around the Sun each year, but this does not account for the twice-daily tides.*

D *Earth does revolve around the Sun, but the revolution takes one year. The Sun does affect the tides, but not as much as the Moon.*

| A | B | C | D |
|---|---|---|---|
| 57% | 14% | 16% | 14% |

### D.3.1.2

**16.** Which planet has the **greatest** role in changing the direction of a comet's path?

A Earth, because of its atmosphere of nitrogen and carbon dioxide

B Mars, because of its position near the asteroid belt

C Jupiter, because of its strong gravitational force *

D Saturn, because of its significant ring structure

A *The thickness or composition of a planet's atmosphere does not greatly affect the path of a comet.*

B *Mars is a small plant and would have little effect on a comet unless it came extremely close to the planet. Its position near the asteroid belt would have no effect on a comet's path.*

C *Key: Jupiter is very massive and easily affects the path of objects that pass by.*

D *Saturn's rings would have little effect on a comet. Saturn would have an effect because it is so massive, but not as great an effect as Jupiter.*

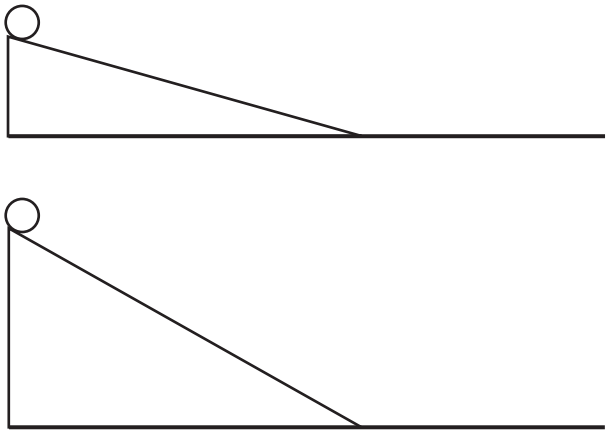
| A | B | C | D |
|---|---|---|---|
| 15% | 14% | 65% | 7% |

# SCIENCE

## *FIRST OPEN-ENDED ITEM*

### A.2.1.2

**Use the figures below to answer question 17.**



**17.** An experiment is set up to investigate how different ramps affect a ball's speed.

**Part A:** Create a question that could be tested using these two ramps.

_____

_____

_____

_____

**Part B:** State a hypothesis that could scientifically test the question.

_____

_____

_____

_____

| Sampler Sequence | Scorepoint 2 | Scorepoint 1 | Scorepoint 0 |
|---|---|---|---|
| 17 | 50% | 34% | 16% |

## *ITEM-SPECIFIC SCORING GUIDELINE*

**Item #17**

**This item is reported under Category A, The Nature of Science.**

**Assessment Anchor:**

A.2.1– Apply knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems.

**Specific Eligible Content addressed by this item:**

A.2.1.2– Use space/time relationships, define concepts operationally, raise testable questions, or formulate hypotheses.

**Scoring Guide:**

Part A: Create a question that could be tested using these two ramps.

Part B: State a hypothesis that could scientifically test the question.

| Score | In response to this item, the student— |
|---|---|
| 2 | demonstrates a *thorough* understanding of using space/time relationships to raise testable questions or formulate a hypothesis by creating a question that could be tested using the two ramps **and** by formulating a hypothesis that could scientifically test the question. The response is clear, complete, and correct. |
| 1 | demonstrates a *partial* understanding of using space/time relationships to raise testable questions by creating a question that could be tested using the two ramps **or** by formulating a hypothesis that could scientifically test the question. The response may contain some work that is incomplete or unclear. |
| 0 | provides *insufficient* evidence to demonstrate any understanding of the content being tested. |
| Non-scorable | BLK (blank) – No response or written refusal to respond or response too brief to determine response<br>OT – Off task/topic<br>LOE – Response in a language other than English<br>IL – Illegible |

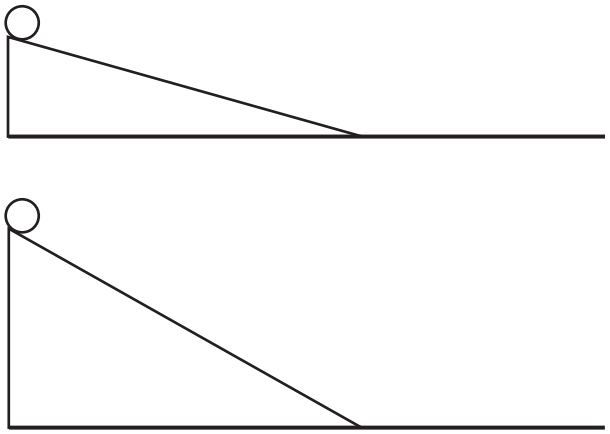
**Note: No deductions should be taken for misspelled words or grammatical errors.**

## *FIRST OPEN-ENDED ITEM RESPONSES*

**Response Score: 2 points**

**A.2.1.2**

**Use the figures below to answer question 17.**



**17.** An experiment is set up to investigate how different ramps affect a ball's speed.

**Part A:** Create a question that could be tested using these two ramps.

Which ball will travel the farthest after rolling down the ramp provided?

**Part B:** State a hypothesis that could scientifically test the question.

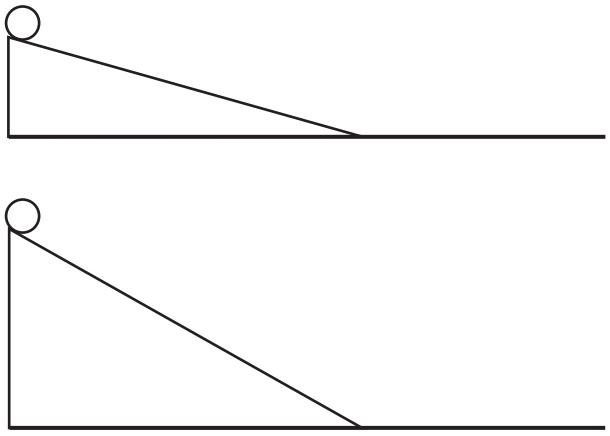
The ball with the steeper ramp will go farther because the ramp is steeper and then the ball would generate more speed.

The student creates a testable question ("Which ball will travel the farthest . . ."), and states a hypothesis that could scientifically test the question ("The ball with the steeper ramp will go farther because the ramp is steeper and then the ball would generate more speed").

**Response Score: 1 point**

**A.2.1.2**

**Use the figures below to answer question 17.**



**17.** An experiment is set up to investigate how different ramps affect a ball's speed.

**Part A:** Create a question that could be tested using these two ramps.

Which ball, when dropped off the ramp, will have a greater speed?

**Part B:** State a hypothesis that could scientifically test the question.

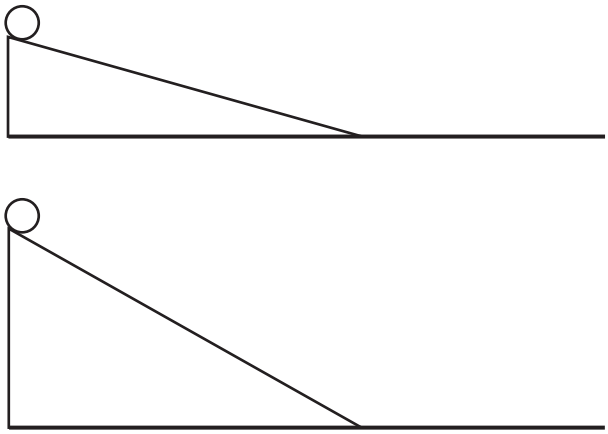
My hypothesis is the second ramp (or the one on the bottom's) ball will have a greater time and distance

In this response, a question is created for part A ("greater speed"), but the hypothesis for part B involves "time and distance," instead of speed. Part B receives no credit.

**Response Score: 0**

**A.2.1.2**

**Use the figures below to answer question 17.**



**17.** An experiment is set up to investigate how different ramps affect a ball's speed.

**Part A:** Create a question that could be tested using these two ramps.

Are the 2 angles different?

**Part B:** State a hypothesis that could scientifically test the question.

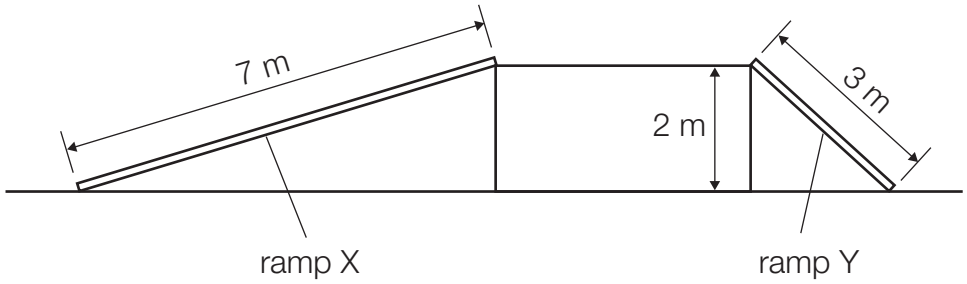
It is different than 2 angles before.

The student does not create a testable question for part A, and part B is not a hypothesis.

## *SECOND OPEN-ENDED ITEM*

### C.3.1.3

**Use the diagram below to answer question 18.**




**18.** A worker needs to move a box of heavy equipment from the ground to a platform 2 meters high. Rather than lift the box, the worker can use one of two ramps. Ramp X is 7 meters long and ramp Y is 3 meters long.

**Part A:** Why would a worker use a ramp rather than lift the box?

**Part B:** Choose either ramp X (7 meters long) or ramp Y (3 meters long) and explain the benefits of using that ramp instead of the other ramp.

| Sampler Sequence | Scorepoint 2 | Scorepoint 1 | Scorepoint 0 |
|---|---|---|---|
| 18 | 25% | 39% | 36% |

## *ITEM-SPECIFIC SCORING GUIDELINE*

**Item #18**

**This item is reported under Category C, Physical Sciences.**

**Assessment Anchor:**

C.3.1– Describe the effect of multiple forces on the movement, speed, or direction of an object.

**Specific Eligible Content addressed by this item:**

C.3.1.3– Explain that mechanical advantage helps to do work (physics) by either changing a force or changing the direction of the applied force (e.g., simple machines, hydraulic systems).

**Scoring Guide:**

Part A: Why would a worker use a ramp rather than lift the box?

Part B: Choose either ramp X (7 meters long) or ramp Y (3 meters long) and explain the benefits of using that ramp instead of the other ramp.

| Score | In response to this item, the student— |
|---|---|
| 2 | demonstrates a *thorough* understanding of mechanical advantages produced by simple machines by explaining why a worker would use a ramp rather than lift a box **and** by explaining the benefits of choosing one ramp over the other. The response is clear, complete, and correct. |
| 1 | demonstrates a *partial* understanding of mechanical advantages produced by simple machines by explaining why a worker would use a ramp rather than lift a box **or** by explaining the benefits of choosing one ramp over the other. The response may contain some work that is incomplete or unclear. |
| 0 | provides *insufficient* evidence to demonstrate any understanding of the content being tested. |
| Non-scorable | BLK (blank) – No response or written refusal to respond or response too brief to determine response<br>OT – Off task/topic<br>LOE – Response in a language other than English<br>IL – Illegible |

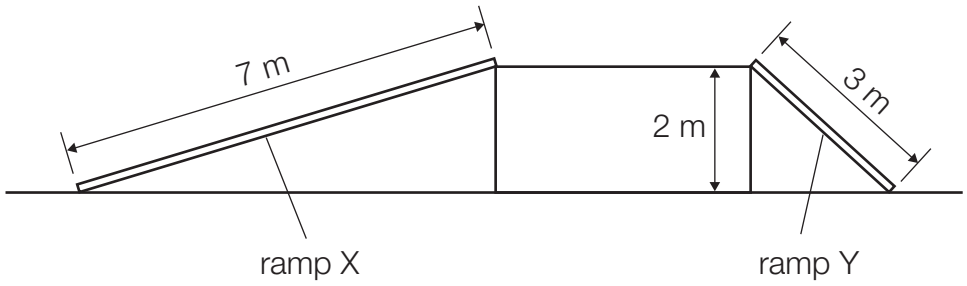
**Note: No deductions should be taken for misspelled words or grammatical errors.**

## *SECOND OPEN-ENDED ITEM RESPONSES*

**Response Score: 2 points**

**C.3.1.3**

**Use the diagram below to answer question 18.**




**18.** A worker needs to move a box of heavy equipment from the ground to a platform 2 meters high. Rather than lift the box, the worker can use one of two ramps. Ramp X is 7 meters long and ramp Y is 3 meters long.

**Part A:** Why would a worker use a ramp rather than lift the box?

a ramp requires less force to move the box. Therefore it is easier on the worker and is easies to move.

**Part B:** Choose either ramp X (7 meters long) or ramp Y (3 meters long) and explain the benefits of using that ramp instead of the other ramp.

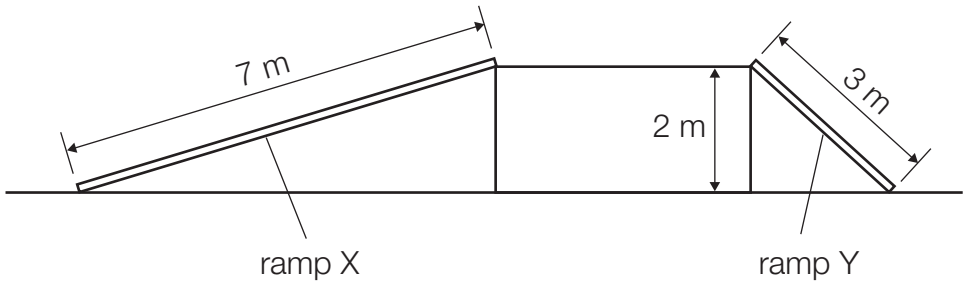
Ramp X would be best because it requires less force to move the box up it. If you increase the distance of the ramp, you decrease the amount of force needed to move it.

The student explains why a worker would use a ramp (". . . requires less force to move the box. . . "), and explains the benefit of one ramp over the other ("Ramp X . . . If you increase the distance of the ramp, you decrease the amount of force needed to move it").

**Response Score: 1 point**

**C.3.1.3**

**Use the diagram below to answer question 18.**




**18.** A worker needs to move a box of heavy equipment from the ground to a platform 2 meters high. Rather than lift the box, the worker can use one of two ramps. Ramp X is 7 meters long and ramp Y is 3 meters long.

**Part A:** Why would a worker use a ramp rather than lift the box?

With the ramp you can get the item(s) to the platform quicker than the lift box.

**Part B:** Choose either ramp X (7 meters long) or ramp Y (3 meters long) and explain the benefits of using that ramp instead of the other ramp.

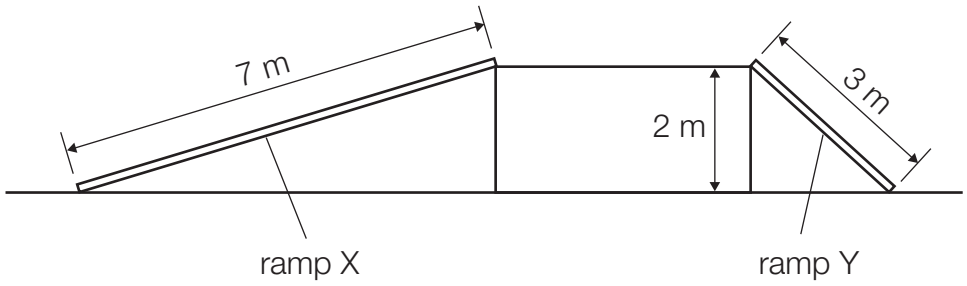
I would use ramp X (7 meters Long), because it is Longer therefore takes less effort to go across/up. The other ramp is too steep and requires alot more effort.

The student incorrectly explains the benefit of using a ramp as "quicker." In part B, the student correctly explains the benefit of using ramp X (". . . because it is longer therefore takes less effort . . .").

**Response Score: 0**

**C.3.1.3**

**Use the diagram below to answer question 18.**




**18.** A worker needs to move a box of heavy equipment from the ground to a platform 2 meters high. Rather than lift the box, the worker can use one of two ramps. Ramp X is 7 meters long and ramp Y is 3 meters long.

**Part A:** Why would a worker use a ramp rather than lift the box?

A Ramp takes less work to move something up a ramp.

**Part B:** Choose either ramp X (7 meters long) or ramp Y (3 meters long) and explain the benefits of using that ramp instead of the other ramp.

Ramp Y is shorter and takes less work. The ramp is not that high off of the ground.

The student incorrectly answers that "less work" is needed when using a ramp instead of lifting the box. The work (distance × force) is the same whether lifting the box or using the ramp. Part B repeats the incorrect answer.

# SCIENCE SCENARIO

**Directions: Use the information presented on pages 24 and 25 to answer questions 19 through 22.**

## Cloud Study

As part of a school project, a student records the types of clouds observed in the sky near the student's home for five days. These data are shown in the table below.

**Types of Clouds**

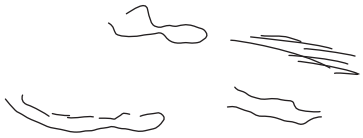
| Day | Observations |
|---|---|
| Monday | wispy clouds that curl in thin streams |
| Tuesday | puffy clouds that are mostly small and move slowly through the sky |
| Wednesday | a layer of light grayish cloud that covers the entire sky |
| Thursday | thin, wispy clouds that curl in thin streams |
| Friday | very tall, puffy gray clouds that move quickly across the sky |

# SCIENCE SCENARIO

**Directions: Use the information presented on pages 24 and 25 to answer questions 19 through 22.**

The student also decides to sketch the clouds observed. The sketches are shown in the table below.

**Daily Cloud Sketches**

| | |
|---|---|
| Monday |  |
| Tuesday |  |
| Wednesday |  |
| Thursday |  |
| Friday |  |

# SCIENCE SCENARIO

## *MULTIPLE-CHOICE ITEMS*

**Directions: Use the information presented on pages 24 and 25 to answer questions 19 through 22.**

### A.2.2.3

**19.** When the student's parent heard about the cloud project, the parent gave the student a barometer and explained that it can help the student make weather predictions. How can this instrument help the student make weather predictions?

A It measures pressure changes. *

B It measures temperature changes.

C It measures cloud precipitation.

D It measures wind speed.

A *Key: Barometers are used to measure air pressure, and changes in air pressure generally indicate changes in the weather.*

B *Temperature changes are measured using thermometers.*

C *Precipitation is measured using rain gauges.*

D *Wind speed is measured using an anemometer.*

| A | B | C | D |
|---|---|---|---|
| 47% | 14% | 20% | 20% |

### D.2.1.3

**20.** According to the student's observations, on which days would precipitation **most likely** have occurred?

A Monday and Tuesday

B Monday and Thursday

C Wednesday and Thursday

D Wednesday and Friday *

A *The clouds on Monday are cirrus clouds followed by light cumulus clouds on Tuesday. Neither of these is likely to cause precipitation.*

B *Both Monday and Thursday are clear days with some cirrus clouds, so rain is not likely.*

C *Slow rains seem likely for Wednesday, but the cirrus clouds on Thursday would not cause noticeable precipitation.*

D *Key: Wednesday is likely to have slow rains, while Friday is likely to have thunderstorms.*

| A | B | C | D |
|---|---|---|---|
| 6% | 11% | 9% | 74% |

# SCIENCE SCENARIO

**Directions: Use the information presented on pages 24 and 25 to answer questions 19 through 22.**

### D.1.3.1

**21.** Which physical process caused the clouds observed by the student to form from water vapor in the air?

A condensation *

B distillation

C evaporation

D sublimation

A *Key: Water vapor is invisible. Condensation is required for droplets to form that make up clouds.*

B *Distillation is a method used to separate mixtures of substances with different boiling points.*

C *Evaporation forms water vapor, which is an invisible gas.*

D *Sublimation is a process that causes a solid to change to a gaseous state without going through the liquid phase. If sublimation occurred within a cloud, it would become invisible water vapor.*

| A | B | C | D |
|---|---|---|---|
| 42% | 7% | 45% | 6% |

### A.2.2.2

**22.** On a particular day, the student notices that the sky is filled with clouds of many different sizes. The student counts the number of big clouds, medium clouds, and little clouds, and records the number of each type. According to which quantity did the student organize the clouds?

A elevation

B water content

C temperature

D relative volume *

A *In order to organize the clouds, by elevation, the elevation above the land would have to be measured.*

B *The darkness of the clouds might indicate water content, but the darkness was not recorded.*

C *The temperature of the clouds would have to be recorded with some type of aerial probe in order to group the clouds by temperature.*

D *Key: Because the student recorded size, this is an indication of relative volume.*

| A | B | C | D |
|---|---|---|---|
| 18% | 24% | 8% | 49% |

# SCIENCE

## *SUMMATIVE DATA TABLE*

### Multiple-Choice Items

| Sampler Sequence | A | B | C | D |
|---|---|---|---|---|
| **1** | 76% | 5% | 11% | 8% |
| **2** | 12% | 55% | 20% | 13% |
| **3** | 17% | 62% | 11% | 9% |
| **4** | 10% | 24% | 12% | 54% |
| **5** | 13% | 16% | 26% | 45% |
| **6** | 61% | 10% | 15% | 14% |
| **7** | 66% | 15% | 8% | 11% |
| **8** | 4% | 8% | 81% | 6% |
| **9** | 8% | 26% | 55% | 10% |
| **10** | 7% | 7% | 79% | 6% |
| **11** | 8% | 5% | 12% | 75% |
| **12** | 11% | 10% | 70% | 9% |
| **13** | 62% | 15% | 12% | 10% |
| **14** | 11% | 26% | 43% | 19% |
| **15** | 57% | 14% | 16% | 14% |
| **16** | 15% | 14% | 65% | 7% |

### Open-Ended Items

| Sampler Sequence | Scorepoint 2 | Scorepoint 1 | Scorepoint 0 |
|---|---|---|---|
| **17** | 50% | 34% | 16% |
| **18** | 25% | 39% | 36% |

### Science Scenario Multiple-Choice Items

| Sampler Sequence | A | B | C | D |
|---|---|---|---|---|
| **19** | 47% | 14% | 20% | 20% |
| **20** | 6% | 11% | 9% | 74% |
| **21** | 42% | 7% | 45% | 6% |
| **22** | 18% | 24% | 8% | 49% |

# Science
# Grade 8
# Item and Scoring Sampler Supplement