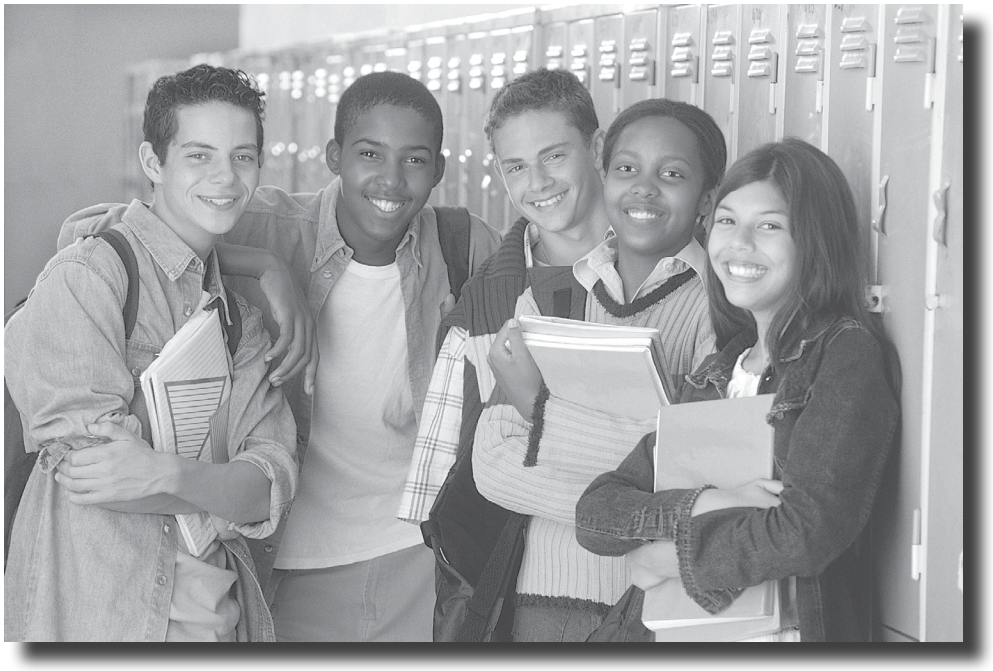
pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Science
Item and Scoring Sampler



2018–2019
Grade 8

Pennsylvania Department of Education Bureau of Curriculum, Assessment and Instruction—September 2018

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INFORMATION ABOUT SCIENCE

INTRODUCTION

The Pennsylvania Department of Education (PDE) provides districts and schools with tools to assist in delivering focused instructional programs aligned with the Pennsylvania Academic Standards (PAS). In addition to the PAS, these tools include Assessment Anchor documents, assessment handbooks, and content-based item and scoring samplers. Each Item and Scoring Sampler is a useful tool for Pennsylvania educators in preparing local instructional programs and can also be useful in preparing students for the statewide assessment.

This Item and Scoring Sampler is available in Braille format. For more information regarding Braille, call (717)-901-2238.

WHAT IS INCLUDED

This sampler contains test questions, or test "items," that have been written to align to the Assessment Anchors that are based on the PAS. The sample test questions model the types of items that will appear on an operational PSSA. Each sample test question has been through a rigorous review process to ensure alignment with the Assessment Anchors prior to being piloted in an embedded field test within a PSSA assessment and then used operationally on a PSSA assessment. Answer keys, scoring guidelines, and any related stimulus material are also included. Additionally, sample student responses are provided with each open-ended item to demonstrate the range of responses that students provided in response to these items.

PURPOSES AND USES

The items in this sampler may be used as models for creating assessment items at the classroom level, and they may also be copied and used as part of a local instructional program.[1] Classroom teachers may find it beneficial to have students respond to the open-ended items in this sampler. Educators can then use the item's scoring guideline and sample responses as a basic guide to score the responses, either independently or together with colleagues within a school or district. The sampler also includes the *General Description of Scoring Guidelines for Science Open-Ended Items* used to develop the item-specific guidelines. The general description of scoring guidelines can be used if any additional item-specific scoring guidelines are created for use within local instructional programs.[1]

ITEM FORMAT AND SCORING GUIDELINES

The multiple-choice (MC) questions have four answer choices. Each correct response to an MC question is worth one point.

Each open-ended (OE) item in science is scored using an item-specific scoring guideline based on a 0–2 point scale.

TESTING TIME AND MODE OF TESTING DELIVERY FOR THE PSSA

The PSSA is delivered in traditional paper-and-pencil format as well as in an online format. The estimated time to respond to a test question is the same for both methods of test delivery. During an official testing administration, students are given additional time as necessary to complete the test questions. The following table shows the estimated response time per item for each item type.

Science Item Type	MC	OE
Estimated Response Time (minutes)	1	5

[1] The permission to copy and/or use these materials does not extend to commercial purposes.

ITEM AND SCORING SAMPLER FORMAT

This sampler includes the test directions and scoring guidelines that appear in the PSSA science assessments. Each sample multiple-choice question is followed by a table that includes the alignment, the answer key, the depth of knowledge (DOK) level, the percentage[2] of students who chose each answer option, and a brief answer-option analysis or rationale. Each open-ended item is followed by a table that includes the item alignment, DOK, and mean student score. Additionally, each of the included item-specific scoring guidelines is combined with sample student responses representing each score point to form a practical, item-specific scoring guide. The *General Description of Scoring Guidelines for Science Open-Ended Items* used to develop the item-specific scoring guidelines should be used if any additional item-specific scoring guidelines are created for use within local instructional programs.

Example Multiple-Choice Question Information Table

Item Information	
Alignment	Assigned AAEC
Answer Key	Correct Answer
Depth of Knowledge	Assigned DOK
p-value A	Percentage of students who selected option A
p-value B	Percentage of students who selected option B
p-value C	Percentage of students who selected option C
p-value D	Percentage of students who selected option D
Option Annotations	Brief answer-option analysis or rationale

Example Open-Ended Item Information Table

Alignment	Assigned AAEC	**Depth of Knowledge**	Assigned DOK	**Mean Score**	

[2] All *p*-value percentages listed in the item information tables have been rounded.

SCIENCE TEST DIRECTIONS

On the following pages are the Science questions. There are two types of questions.

Multiple-Choice Questions:

Some questions will ask you to select an answer from among four choices. These questions will be found in your test booklet.

For the multiple-choice questions:

- Read each question, and choose the best answer.
- Record your choice in the answer booklet.
- Only one of the answers provided is the correct response.

Open-Ended Questions:

Other questions will require you to write your response. These questions will be found in your answer booklet.

For the open-ended questions:

- Be sure to read the directions carefully.
- If the question asks you to do two tasks, be sure to complete both tasks.
- If the question asks you to compare, be sure to compare. Also, if the question asks you to explain, describe, or identify, be sure to explain, describe, or identify.

GENERAL DESCRIPTION OF SCORING GUIDELINES FOR SCIENCE OPEN-ENDED ITEMS

2 Points

- The response demonstrates a *thorough* understanding of the scientific content, concepts, and procedures required by the task(s).
- The response provides a clear, complete, and correct response as required by the task(s). The response may contain a minor blemish or omission in work or explanation that does not detract from demonstrating a *thorough* understanding.

1 Point

- The response demonstrates a *partial* understanding of the scientific content, concepts, and procedures required by the task(s).
- The response is somewhat correct with *partial* understanding of the required scientific content, concepts, and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

0 Points

- The response provides *insufficient* evidence to demonstrate any understanding of the scientific content, concepts, and procedures as required by the task(s) for that grade level.
- The response may show only information copied or rephrased from the question or *insufficient* correct information to receive a score of 1.

Special Categories within zero reported separately:

Blank.....Blank, entirely erased, entirely crossed out, or consists entirely of whitespace

Refusal.....Refusal to respond to the task

Off Task.....Makes no reference to the item but is not an intentional refusal

Foreign Language.....Written entirely in a language other than English

Illegible.....Illegible or incoherent

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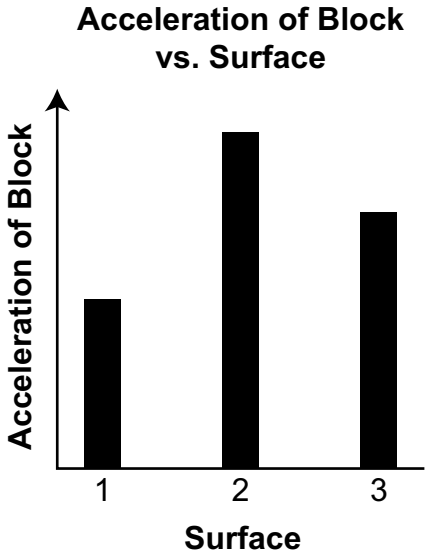
MULTIPLE-CHOICE QUESTIONS

1. Use the graph below to answer the question.



A student applies identical forces to a block placed on three different surfaces. The student compares the acceleration of the block for each surface. Which inference about surface 1 is **best** supported by the results?

A. It has the steepest downward tilt.

B. It helps the block accelerate the greatest.

C. It increases the effect of the force of gravity.

D. It produces the greatest friction with the block.

Item Information	
Alignment	S8.A.1.1.3
Answer Key	D
Depth of Knowledge	2
p-value A	15%
p-value B	12%
p-value C	19%
p-value D	54% (correct answer)
Option Annotations	A. If the surface had the steepest downward tilt, it would yield the greatest acceleration. B. The block accelerates the least on surface 1. C. The weight of the block on each surface does not change. D. Key: The block accelerates the least on surface 1 due to the force of friction.

2. What is an unintended negative effect that long-term pesticide use can have on the targeted environment?

A. The amount of food the pests need to survive will be reduced.

B. The pests that survive can develop resistance to the pesticides.

C. The number of animals that compete for resources with the pests can increase.

D. The amount of pesticide needed to eliminate the pests will be reduced over time.

Item Information	
Alignment	S8.A.1.2.2
Answer Key	B
Depth of Knowledge	2
p-value A	16%
p-value B	51% (correct answer)
p-value C	20%
p-value D	13%
Option Annotations	A. Pesticide use does not reduce the amount of food available to pests. B. Key: Prolonged pesticide use can result in resistance in the target population. C. Pesticide use does not increase the populations of species in competition with the pests. D. The amount of pesticide needed will likely stay the same or increase over time.

3. During the Carboniferous period, which occurred about 300 million years ago, the oxygen content of Earth's atmosphere was much higher than it is today. Which organisms were **most likely** responsible for the atmospheric conditions 300 million years ago?

A. fungi

B. plants

C. land animals

D. decomposer bacteria

Item Information	
Alignment	S8.A.1.3.3
Answer Key	B
Depth of Knowledge	2
p-value A	12%
p-value B	58% (correct answer)
p-value C	11%
p-value D	19%
Option Annotations	A. Fungi do not produce oxygen as a by-product of respiration. B. Key: Green plants produce oxygen as a by-product of photosynthesis. C. Land animals produce carbon dioxide as a by-product of respiration. D. Decomposer bacteria do not produce oxygen as a by-product of respiration.

4. Many bird species in Pennsylvania, such as the bluebird and golden-winged warbler, thrive in younger forests and open spaces. How would timber harvesting **most likely** affect the sustainability of these bird species?

A. It would increase the number of favorable habitats.

B. It would reduce the number of edible insect species.

C. It would produce forests that contain mostly mature trees.

D. It would remove debris that provides protection from predators.

Item Information	
Alignment	S8.A.1.3.4
Answer Key	A
Depth of Knowledge	2
p-value A	35% (correct answer)
p-value B	25%
p-value C	15%
p-value D	25%
Option Annotations	A. Key: These particular species prefer younger forests and open spaces. B. It would likely increase the number of insects that these bird species prefer. C. Timber harvesting would reduce the number of mature trees. D. Debris could provide hiding areas and protection from predators for these bird species.

5. A student designs an experiment to determine the spectrum of color produced by different light sources. Which variable should be held constant in the student's experiment?

A. the light source used

B. the brightness of the spectrum

C. the prism through which the light passes

D. the colors produced by each light source

Item Information	
Alignment	S8.A.2.1.3
Answer Key	C
Depth of Knowledge	2
p-value A	21%
p-value B	24%
p-value C	41% (correct answer)
p-value D	14%
Option Annotations	A. The light source is the independent variable in this experiment. B. The brightness of the spectrum is a dependent variable in this experiment. C. Key: The prism should be a constant variable to determine the light spectrum that results from different light sources. D. The colors produced by each light source are dependent variables in this experiment.

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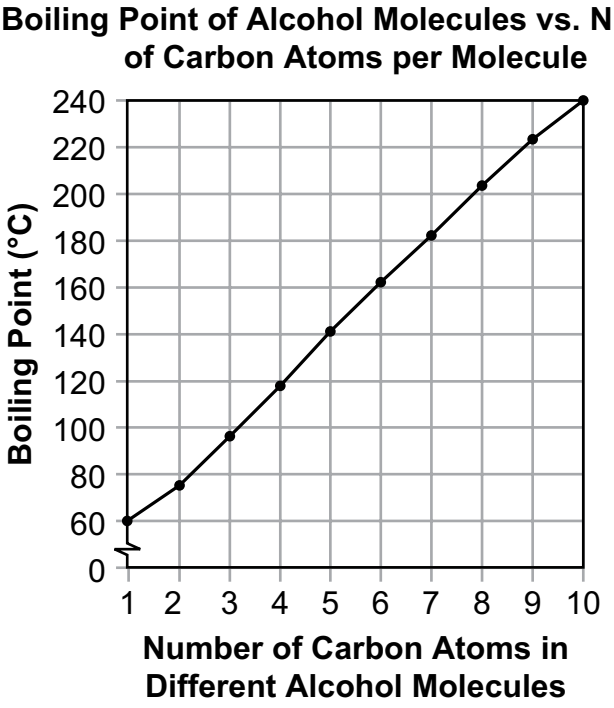
6. Use the graph below to answer the question.



The graph shows a relationship between the number of carbon atoms in different alcohol molecules and the boiling point of each alcohol molecule. Which statement **best** describes this relationship?

A. Increasing the boiling point causes the number of carbon atoms per molecule to increase.

B. Increasing the boiling point causes the number of carbon atoms per molecule to decrease.

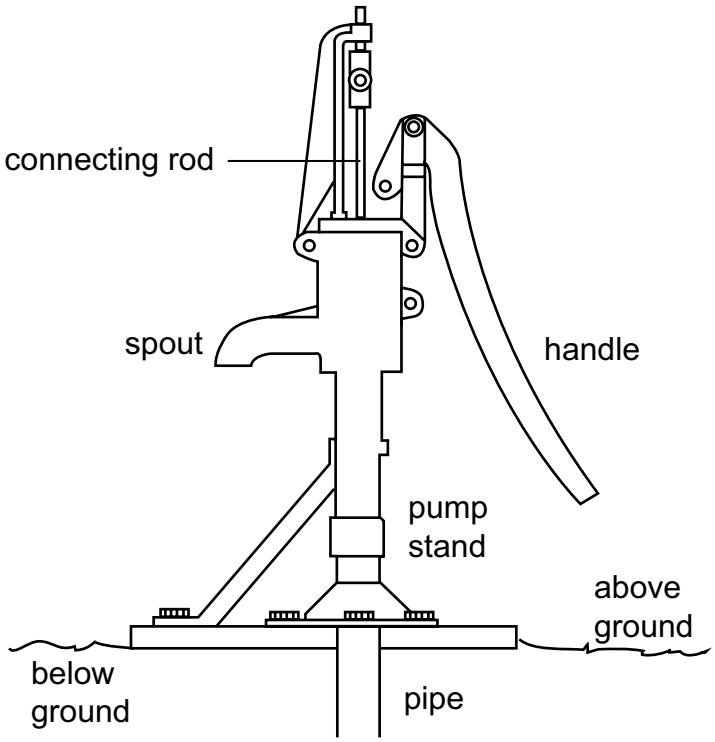
C. Increasing the number of carbon atoms per molecule causes the boiling point to increase.

D. Increasing the number of carbon atoms per molecule causes the boiling point to decrease.

Item Information	
Alignment	S8.A.2.1.4
Answer Key	C
Depth of Knowledge	2
p-value A	35%
p-value B	9%
p-value C	50% (correct answer)
p-value D	6%
Option Annotations	A. The boiling point is dependent on the number of carbon atoms present. B. The boiling point is dependent on the number of carbon atoms present. C. Key: An increase in the number of carbon atoms results in an increase in the boiling point. D. An increase in the number of carbon atoms results in an increase, not decrease, in the boiling point.

7. Use the diagram below to answer the question.

Hand Pump



The diagram shows a type of hand pump used to bring water up from below the ground. Which flaw in the pump keeps it from functioning properly?

A. The connecting rod is not located above the spout.

B. The handle is disconnected from the connecting rod.

C. The connecting rod is not attached to the pump stand.

D. The handle gives too small of a mechanical advantage.

Item Information	
Alignment	S8.A.2.1.6
Answer Key	B
Depth of Knowledge	3
p-value A	9%
p-value B	66% (correct answer)
p-value C	15%
p-value D	10%
Option Annotations	A. The location of the connecting rod should not affect the function of the pump. B. Key: The handle is not attached to the connecting rod, which is needed to draw water up the pump to the spout. C. The connecting rod does not need to be connected to the stand to function. D. The length of the handle is sufficient to provide a mechanical advantage.

8. A student studied the concept of order in the human body. Which statement **best** summarizes how part of the human body is ordered?

A. Cells are organized to form tissues.

B. Tissues are organized to form cells.

C. Organ systems work together to form tissues.

D. Tissues work together to form organ systems.

Item Information	
Alignment	S8.A.3.1.2
Answer Key	A
Depth of Knowledge	2
p-value A	57% (correct answer)
p-value B	9%
p-value C	13%
p-value D	21%
Option Annotations	A. Key: Groups of cells form tissues. B. Tissues are organized to form organs. C. Organ systems work together to keep the body functioning. D. Tissues are organized to form organs.

9. Use the chart below to answer the question.

Behaviors of Freshwater and Saltwater Fish

Freshwater Fish	Saltwater Fish
do not drink water	drink seawater
produce large amounts of dilute urine	produce very little urine

A biologist compares the behaviors of some fish that live in habitats with different amounts of salt. How do the behaviors shown **most likely** help these fish survive in their environments?

A. by maintaining a water balance inside and outside their bodies

B. by allowing them to conserve heat as water temperature changes

C. by helping them adjust their mass to improve movement through water

D. by providing energy to their body cells in water with low levels of oxygen

Item Information	
Alignment	S8.B.2.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	51% (correct answer)
p-value B	13%
p-value C	18%
p-value D	18%
Option Annotations	A. Key: These behaviors keep the saltwater fish from losing too much water and the freshwater fish from taking on too much water. B. Holding or releasing water would not regulate body temperature. C. Fish use swim bladders or manual propulsion to move through water. D. Both saltwater and freshwater fish absorb oxygen through their gills and pump it to their body cells through blood.

10. Which statement **best** explains why a food web more completely represents the flow of energy through an ecosystem than a food chain does?

A. Most ecosystems have too many organisms to fit into a food chain.

B. More energy flows through most ecosystems than a single food chain can show.

C. Relationships between organisms usually change quickly enough to make food chains inaccurate.

D. There are more relationships between organisms than can be shown in a single food chain.

Item Information	
Alignment	S8.B.3.1.1
Answer Key	D
Depth of Knowledge	2
p-value A	16%
p-value B	26%
p-value C	18%
p-value D	40% (correct answer)
Option Annotations	A. The number of relationships, rather than the number of organisms, is the issue with a food chain. B. Energy flow can be shown in both food chains and food webs. C. Changes in relationships would equally affect food webs and food chains. D. Key: Multiple relationships among organisms can more easily be represented with a food web.

11. How can an increase in the diversity of producer and decomposer populations **most likely** affect the stability of an ecosystem?

A. Stability would increase because more light energy would be available.

B. Stability would increase because more populations would be supported.

C. Stability would decrease because fewer nutrients would be returned to the soil.

D. Stability would decrease because less energy would be available to consumers.

Item Information	
Alignment	S8.B.3.2.2
Answer Key	B
Depth of Knowledge	2
p-value A	13%
p-value B	47% (correct answer)
p-value C	19%
p-value D	21%
Option Annotations	A. The availability of light energy from the Sun would stay the same. B. Key: Increased species populations would result in greater ecosystem stability as there would be less risk of roles within the ecosystem being unfilled if an ecological disturbance were to occur. C. Increased species diversity would not likely result in fewer nutrients being returned to the soil. D. The amount of available energy within an ecosystem would not likely decrease with an increase in the diversity of producers and decomposers.

12. Use the chemical equation below to answer the question.

Formation of Carbon Dioxide

$$C + O_2 \rightarrow CO_2$$

Which statement **best** describes the chemicals in the reaction?

A. C and O_2 are reactants, and CO_2 is a product.

B. C and O_2 are products, and CO_2 is a reactant.

C. C and CO_2 are products because they contain carbon.

D. C, O_2, and CO_2 are all reactants because they are involved in a reaction.

Item Information	
Alignment	S8.C.1.1.3
Answer Key	A
Depth of Knowledge	2
p-value A	62% (correct answer)
p-value B	21%
p-value C	8%
p-value D	9%
Option Annotations	A. Key: Carbon and oxygen (reactants) combine in the chemical reaction to form carbon dioxide (product). B. Carbon and oxygen are reactants, not products, in the chemical reaction shown. Carbon dioxide is a product, not a reactant. C. The presence of carbon in a substance does not define it as a product. D. Reactants undergo a chemical change in a chemical reaction, whereas products are the result of the chemical reaction.

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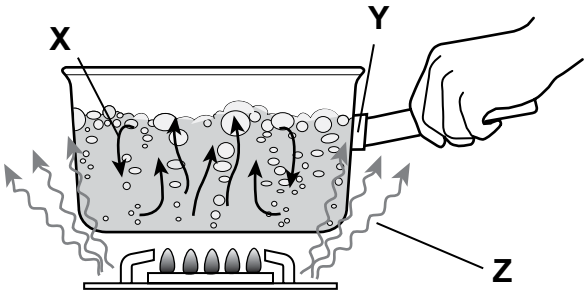
13. Use the drawing below to answer the question.

Water Heating over a Stove



Which labels correctly identify energy transfers in the drawing?

A. X: conduction
Y: convection
Z: radiation

B. X: convection
Y: conduction
Z: radiation

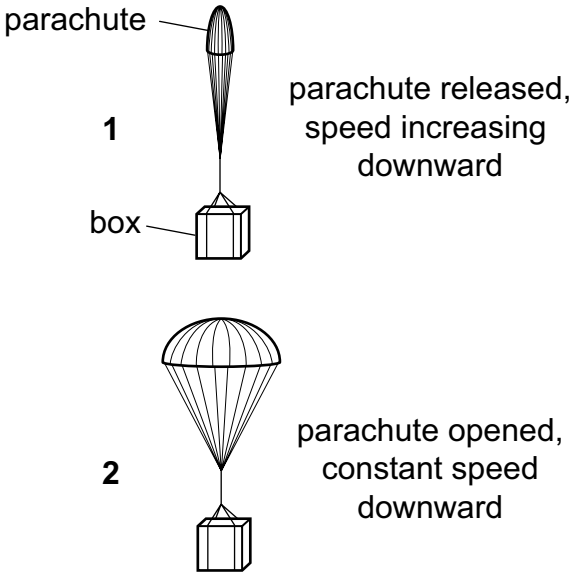
C. X: radiation
Y: conduction
Z: convection

D. X: conduction
Y: radiation
Z: convection

Item Information	
Alignment	S8.C.2.1.2
Answer Key	B
Depth of Knowledge	2
p-value A	24%
p-value B	54% (correct answer)
p-value C	12%
p-value D	10%
Option Annotations	A. X shows heat being transferred from areas of higher temperature to areas of lower temperature; it is convection, not conduction. Y shows heat being transferred between substances in direct contact; it is conduction, not convection. Z correctly shows heat being transferred through electromagnetic waves (radiation). B. Key: X shows heat being transferred from areas of higher temperature to areas of lower temperature (convection). Y shows heat being transferred between substances in direct contact (conduction). Z shows heat being transferred through electromagnetic waves (radiation). C. X shows heat being transferred from areas of higher temperature to areas of lower temperature; it is convection, not radiation. Y correctly shows heat being transferred between substances in direct contact (conduction). Z shows heat being transferred through electromagnetic waves; it is radiation, not convection. D. X shows heat being transferred from areas of higher temperature to areas of lower temperature; it is convection, not conduction. Y shows heat being transferred between substances in direct contact; it is conduction, not radiation. Z shows heat being transferred through electromagnetic waves; it is radiation, not convection.

14. Use the diagram below to answer the question.

Parachute Drop



Which statements **best** explain the forces acting on the parachute and box at points 1 and 2?

A. Point 1: Gravitational force is greater than air resistance force.
Point 2: Gravitational force is equal to air resistance force.

B. Point 1: Gravitational force is less than air resistance force.
Point 2: Gravitational force is equal to air resistance force.

C. Point 1: Gravitational force is greater than air resistance force.
Point 2: Gravitational force is less than air resistance force.

D. Point 1: Gravitational force is less than air resistance force.
Point 2: Gravitational force is greater than air resistance force.

Item Information	
Alignment	S8.C.3.1.1
Answer Key	A
Depth of Knowledge	3
p-value A	42% (correct answer)
p-value B	12%
p-value C	33%
p-value D	13%
Option Annotations	A. Key: At point 1, the box has acceleration in the downward direction, indicating that the gravitational force is greater than the air resistance force. At point 2, the acceleration is zero, indicating that the two forces are balanced. B. If gravitational force were less than air resistance force, the box would have accelerated in the upward direction at point 1. C. If gravitational force were less than air resistance force, the box would have accelerated in the upward direction at point 2. D. If gravitational force were less than air resistance force, the box would have accelerated in the upward direction at point 1. If gravitational force were greater than air resistance force, the box would have accelerated in the downward direction at point 2.

15. Soil at the shore of Lake Erie in Pennsylvania has a high sand and gravel content. Which of the following is a characteristic of this type of soil?

A. extreme acidity

B. rapid water drainage

C. extensive producer biomass

D. significant depth before hitting bedrock

Item Information	
Alignment	S8.D.1.1.3
Answer Key	B
Depth of Knowledge	2
p-value A	14%
p-value B	44% (correct answer)
p-value C	19%
p-value D	23%
Option Annotations	A. Extreme acidity is not a characteristic of soil with high sand and gravel content. B. Key: Soil with high sand and gravel content is porous, which allows water to drain rapidly. C. Soil with high sand and gravel content is not ideal for plant growth and would have limited biomass from these organisms. D. The depth of the bedrock is not determined by the soil type.

16. Erie, Pennsylvania, experiences lake-effect snow in the fall when cold winds from the northwest move across warmer lake water. The air absorbs water vapor from the lake and then deposits it as snow to the east and southeast of the lake. During some winters, the surface of Lake Erie freezes solid. Which statement describes how this event would **most likely** change lake-effect snow in Erie, Pennsylvania?

A. Winds blowing from the lake and into Erie would stop because the lake cannot lose heat when frozen.

B. The weather in Erie would include excessive snow, wind, and freezing temperatures because the lake would be unable to absorb energy from the air.

C. Condensation would increase, producing an increase in the amount of snowfall in Erie because the lake would remain at a constant temperature when frozen.

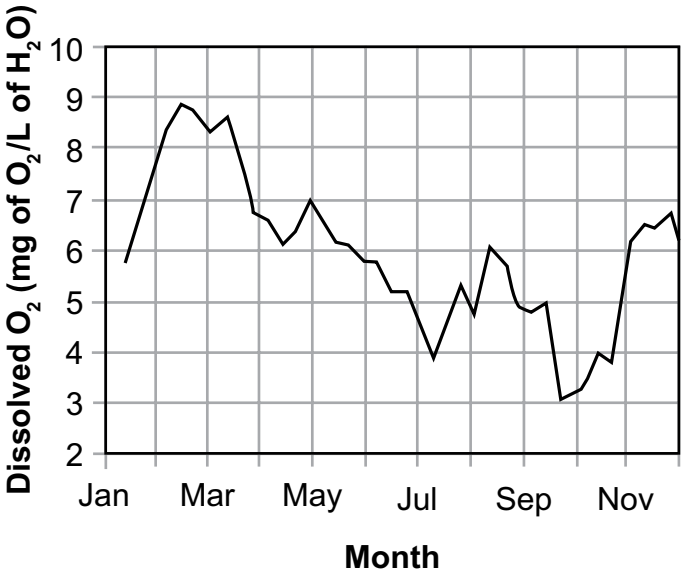
D. Evaporation from the lake would essentially stop, causing less water to be in the surrounding air, which would result in a decrease in the amount of snowfall in Erie.

Item Information	
Alignment	S8.D.1.3.1
Answer Key	D
Depth of Knowledge	3
p-value A	11%
p-value B	25%
p-value C	22%
p-value D	42% (correct answer)
Option Annotations	A. The winds do not stop when the lake freezes. B. There would be less snow, not more, because evaporation from the surface of the lake would decrease when the lake freezes. C. Condensation does not impact lake-effect snow. D. Key: Less snow would fall as the amount of evaporation from the surface of the lake decreases.

OPEN-ENDED ITEM

17. Use the information below to answer the question.

Dissolved Oxygen (O_2) Levels over Time at the ACE Basin



Dissolved Oxygen (O_2) Requirements for Some Organisms

Organism	Minimum Dissolved O_2 Requirement (mg/L)
bass	5
hake	4
crab	3
shark	2
halibut	1

Scientists measured dissolved oxygen levels at the Ashepoo, Combahee, and Edisto (ACE) Basin National Estuarine Research Reserve.

Part A: Based on the data shown in the graph and the data table, predict which organism(s) would likely survive year-round in the ACE Basin.

_____

Part B: Describe a possible reason for the changes in dissolved oxygen levels observed in the ACE Basin throughout the year.

_____

_____

_____

AFTER YOU HAVE CHECKED YOUR WORK, CLOSE YOUR ANSWER BOOKLET AND TEST BOOKLET SO YOUR TEACHER WILL KNOW YOU ARE FINISHED.

SCORING GUIDE

#17 Item Information

Alignment	S8.A.2.1.5	**Depth of Knowledge**	3	**Mean Score**	0.82

Item-Specific Scoring Guideline

Score	Description
2	The response demonstrates a *thorough* understanding of how to use evidence from investigations to clearly communicate and support conclusions by • predicting which organism(s) would likely survive year-round in the ACE Basin **AND** • describing a possible reason for the changes in dissolved oxygen levels observed in the ACE Basin throughout the year. The response is clear, complete, and correct.
1	The response demonstrates a *partial* understanding of how to use evidence from investigations to clearly communicate and support conclusions by • predicting which organism(s) would likely survive year-round in the ACE Basin **OR** • describing a possible reason for the changes in dissolved oxygen levels observed in the ACE Basin throughout the year. The response may contain some work that is incomplete or unclear.
0	The response provides *insufficient* evidence to demonstrate any understanding of how to use evidence from investigations to clearly communicate and support conclusions.

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

Responses that will receive credit:

Part A (1 point):

- crab
- shark
- halibut

Part B (1 point):

- The amount of dissolved oxygen levels observed in the ACE Basin throughout the year could vary based on the flow of water (volume and velocity) into the basin (high water flow brings greater dissolved oxygen and drought is related to lower dissolved oxygen levels).
- The amount of dissolved oxygen levels observed in the ACE Basin throughout the year could vary based on the temperature changes, which in turn could affect the ecosystem dynamics.
- The amount of dissolved oxygen levels observed in the ACE Basin throughout the year could vary based on the types and numbers of organisms in this body of water. (Plants remove oxygen during respiration and return oxygen during photosynthesis, while bacteria and fungi use oxygen during decomposition.)
- The amount of dissolved oxygen levels observed in the ACE Basin throughout the year could vary based on the amount of respiration that occurs at different times of the year.
- The amount of solids or suspended solids affects the levels of dissolved oxygen in water, and oxygen is more easily dissolved into water with low levels of dissolved or suspended solids.
- The amount of dissolved oxygen levels observed in the ACE Basin throughout the year may be affected by the amount of organic wastes present. Decomposition of these wastes occurs in response to increased activity by decomposers, which consumes oxygen in the system.

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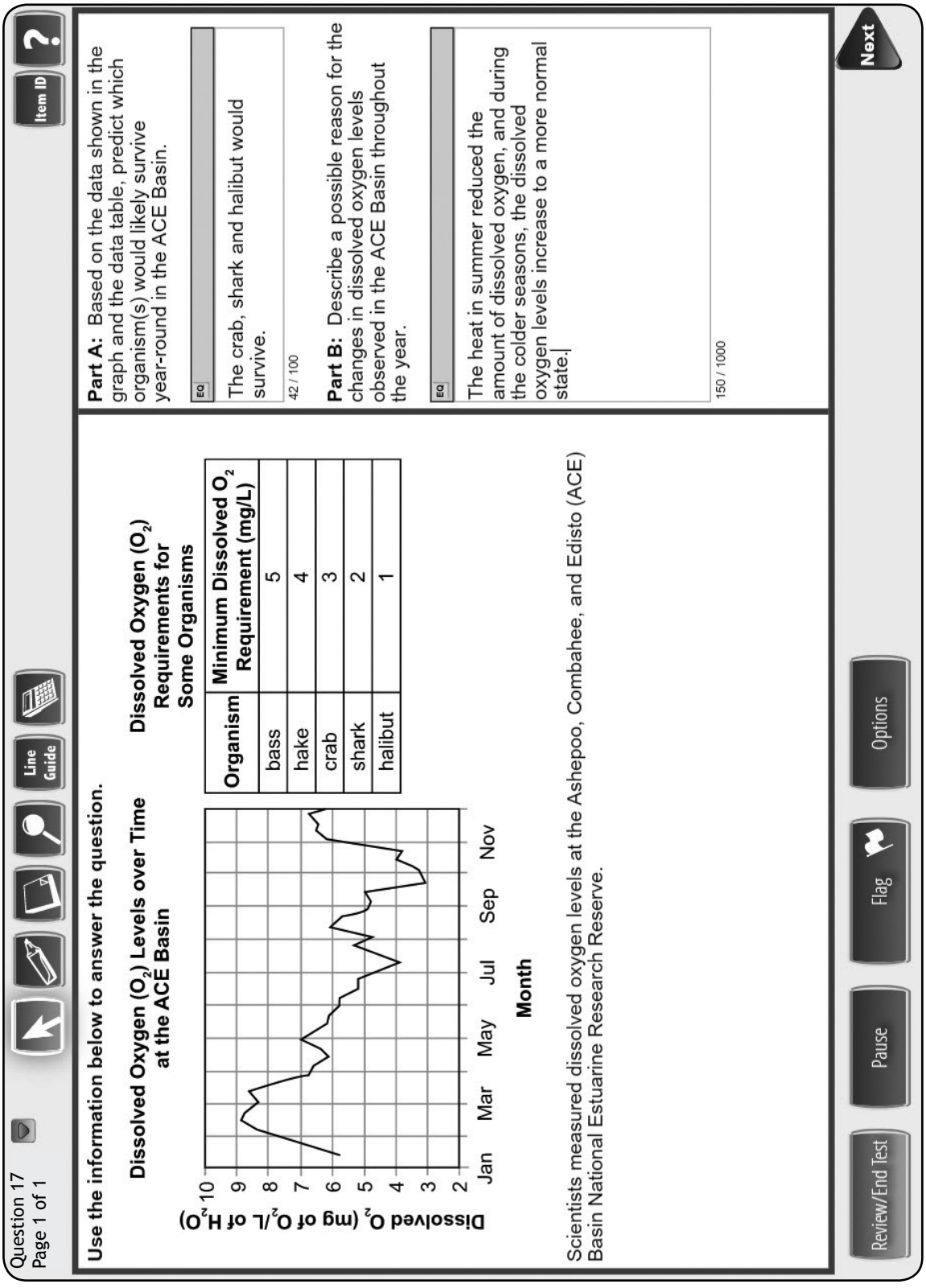
STUDENT RESPONSE

Response Score: 2 points



This response demonstrates a *thorough* understanding of how to use evidence from investigations to clearly communicate and support conclusions. In part A, the response (*"The crab, shark and halibut would survive"*) accurately predicts which organisms would likely survive year-round in the ACE Basin based on the data shown in the graph. In part B, the response (*"The heat in the summer reduced the amount of dissolved oxygen, and during the colder seasons, the dissolved oxygen levels increased to a more normal state"*) describes a possible reason for the changes in dissolved oxygen levels throughout the year. The response is clear, complete, and correct.

STUDENT RESPONSE

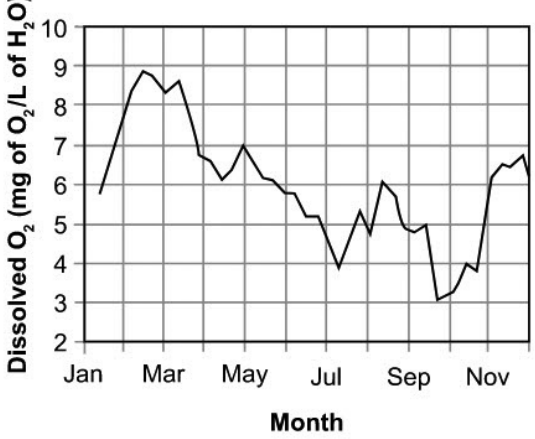
Response Score: 1 point

Question 17
Page 1 of 1

Line Guide | Item ID | ?

Use the information below to answer the question.

Dissolved Oxygen (O_2) Levels over Time at the ACE Basin



Dissolved Oxygen (O_2) Requirements for Some Organisms

Organism	Minimum Dissolved O_2 Requirement (mg/L)
bass	5
hake	4
crab	3
shark	2
halibut	1

Scientists measured dissolved oxygen levels at the Ashepoo, Combahee, and Edisto (ACE) Basin National Estuarine Research Reserve.

Part A: Based on the data shown in the graph and the data table, predict which organism(s) would likely survive year-round in the ACE Basin.

EQ

Bass and Hake

13 / 100

Part B: Describe a possible reason for the changes in dissolved oxygen levels observed in the ACE Basin throughout the year.

EQ

because the population of wildlife is growing.

46 / 1000

Review/End Test | Pause | Flag | Options | Next

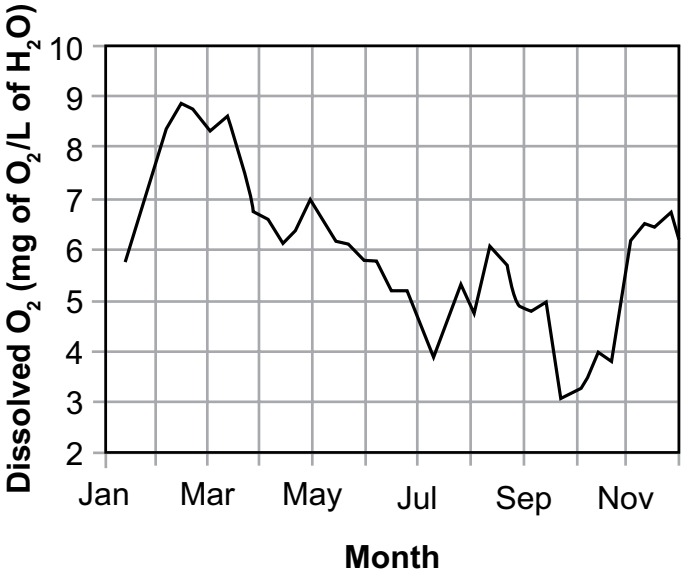
This response demonstrates a *partial* understanding of how to use evidence from investigations to clearly communicate and support conclusions. In part A, the predictions of which organisms would likely survive year round in the ACE Basin (*"Bass and Hake"*) are incorrect based on the minimum dissolved oxygen levels shown in the graph and receive no credit. In part B, the prediction (*"because the population of wildlife is growing"*) describes a possible reason for changes in dissolved oxygen levels observed in the ACE Basin throughout the year.

STUDENT RESPONSE

Response Score: 0 points

17. Use the information below to answer the question.

Dissolved Oxygen (O_2) Levels over Time at the ACE Basin



Dissolved Oxygen (O_2) Requirements for Some Organisms

Organism	Minimum Dissolved O_2 Requirement (mg/L)
bass	5
hake	4
crab	3
shark	2
halibut	1

Scientists measured dissolved oxygen levels at the Ashepoo, Combahee, and Edisto (ACE) Basin National Estuarine Research Reserve.

Part A: Based on the data shown in the graph and the data table, predict which organism(s) would likely survive year-round in the ACE Basin.

bass and hake

Part B: Describe a possible reason for the changes in dissolved oxygen levels observed in the ACE Basin throughout the year.

the graph shows that it goes up and down

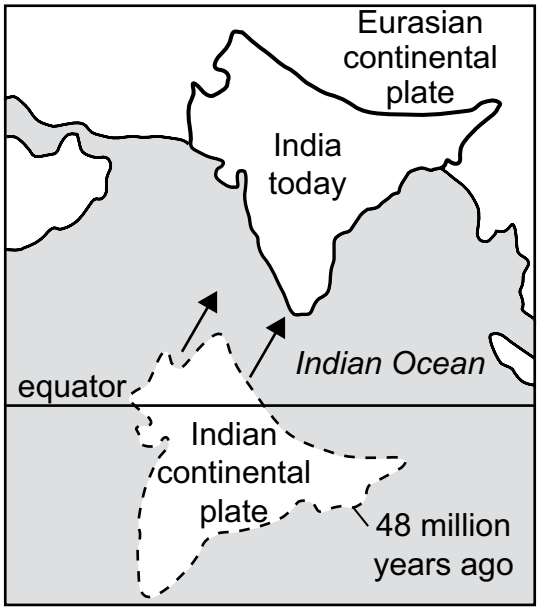
AFTER YOU HAVE CHECKED YOUR WORK, CLOSE YOUR ANSWER BOOKLET AND TEST BOOKLET SO YOUR TEACHER WILL KNOW YOU ARE FINISHED.

This response provides *insufficient* evidence to demonstrate any understanding of how to use evidence from investigations to clearly communicate and support conclusions. In part A, the predictions of which organisms would survive year round in the ACE Basin (*"Bass and Hake"*) are incorrect based on the minimum dissolved oxygen levels shown in the graph and receive no credit. In part B, the response (*"the graph shows that it goes up and down"*) describes changes in the graph without describing a possible reason for the changes in the dissolved oxygen levels observed and does not receive any credit.

OPEN-ENDED ITEM

18. Use the diagram below to answer the question.

Movement of the Indian Continental Plate



The diagram illustrates the movement of the Indian continental plate and its eventual collision with the Eurasian continental plate.

Part A: Describe the natural process that moved the Indian continental plate from its location 48 million years ago to its current location.

Part B: Describe the results of the collision between the Indian continental plate and the Eurasian continental plate.

AFTER YOU HAVE CHECKED YOUR WORK, CLOSE YOUR ANSWER BOOKLET AND TEST BOOKLET SO YOUR TEACHER WILL KNOW YOU ARE FINISHED.

STOP

SCORING GUIDE

#18 Item Information

Alignment	S8.D.1.1.2	**Depth of Knowledge**	2	**Mean Score**	0.58

Item-Specific Scoring Guideline

Score	Description
2	The response demonstrates a *thorough* understanding of natural processes that change Earth's surface (e.g., landslides, volcanic eruptions, earthquakes, mountain building, new land being formed, weathering, erosion, sedimentation, soil formation) by • describing the natural process that moved the Indian continental plate from its location 48 million years ago to its current location **AND** • describing the results of the collision between the Indian continental plate and the Eurasian continental plate The response is clear, complete, and correct.
1	The response demonstrates a *partial* understanding of natural processes that change Earth's surface (e.g., landslides, volcanic eruptions, earthquakes, mountain building, new land being formed, weathering, erosion, sedimentation, soil formation) by • describing the natural process that moved the Indian continental plate from its location 48 million years ago to its current location **OR** • describing the results of the collision between the Indian continental plate and the Eurasian continental plate The response may contain some work that is incomplete or unclear.
0	The response provides *insufficient* evidence to demonstrate any understanding of the concept being tested.

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

Responses that will receive credit:

Part A (1 point):

- The natural process that moved the Indian plate is convection currents in Earth's mantle.
- The Indian plate is moved by a conveyor-belt type motion of sub-lithospheric material below Earth's surface.
- The movement of the Indian plate is due to the differences in density of extremely hot molten rock rising in Earth's interior, then cooling and sinking. The sinking motion drags the rest of the plate downward with the force of gravity.
- The Indian plate moved by continental drift.
- The Indian plate moved by shifting tectonic plates.
- Other reasonable description of the movement of Earth's tectonic plates, resulting from convection currents, due to differences in density, within Earth's mantle

Part B (1 point):

- A result of the collision between the Indian continental plate and the Eurasian continental plate was an immense amount of force that caused the uprising of the Himalayan mountain range.
- A result of the collision between the Indian continental plate and the Eurasian continental plate was the subduction of the Indian plate underneath the Eurasian plate which forced the Eurasian plate upward causing the Himalayas to form.

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STUDENT RESPONSE

Response Score: 2 points

PART A

Question 18
Page 1 of 2

Item ID

Use the diagram below to answer the question.

Movement of the Indian Continental Plate

The diagram illustrates the movement of the Indian continental plate and its eventual collision with the Eurasian continental plate.

Part A: Describe the natural process that moved the Indian continental plate from its location 48 million years ago to its current location.

Plate Tectonics slowly shifted it there. The convection currents of the Earth move the Indian continental plate to the position.

128/1000

Review/End Test | Pause | Flag | Options | Back | Next

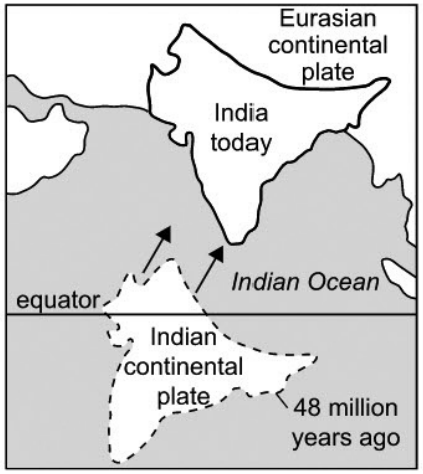
Question 18
Page 2 of 2

Line Guide

Item ID

Use the diagram below to answer the question.

Movement of the Indian Continental Plate



The diagram illustrates the movement of the Indian continental plate and its eventual collision with the Eurasian continental plate.

Part B: Describe the results of the collision between the Indian continental plate and the Eurasian continental plate.

The collision caused the Himalayan mountains.

45/1000

Review/End Test | Pause | Flag | Options | Back | Next

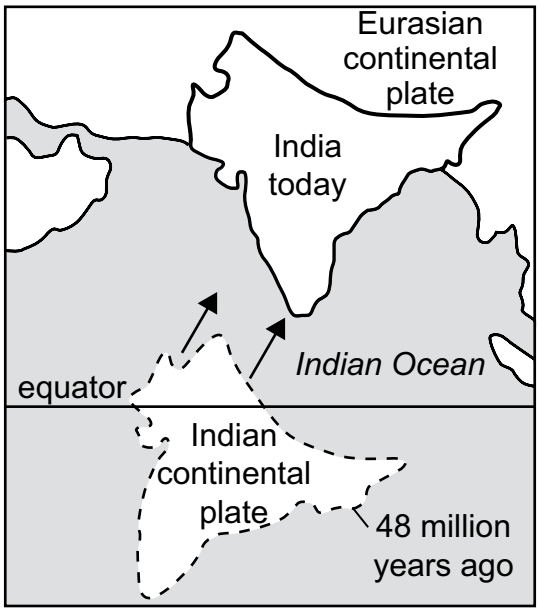
This response demonstrates a *thorough* understanding of natural processes that change Earth's surface. In part A, the response (*"Plate Tectonics slowly shifted it there, convection currents"*) describes a natural process that moved the Indian continental plate from its location 48 million years ago to its current location. Part B accurately describes the results of the collision between the Indian continental plate and the Eurasian continental plate (*"The collision caused the Himalayan mountains"*). The response is clear, complete, and correct.

STUDENT RESPONSE

Response Score: 1 point

18. Use the diagram below to answer the question.

Movement of the Indian Continental Plate



The diagram illustrates the movement of the Indian continental plate and its eventual collision with the Eurasian continental plate.

Part A: Describe the natural process that moved the Indian continental plate from its location 48 million years ago to its current location.

It moved up into the Eurasian continental plate.

Part B: Describe the results of the collision between the Indian continental plate and the Eurasian continental plate.

As a result of the collision, the Himilayan mountains were formed in North India

AFTER YOU HAVE CHECKED YOUR WORK, CLOSE YOUR ANSWER BOOKLET AND TEST BOOKLET SO YOUR TEACHER WILL KNOW YOU ARE FINISHED.

STOP

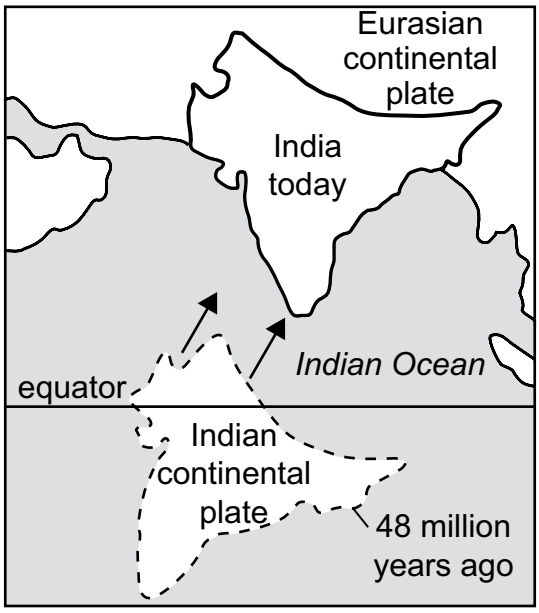
This response demonstrates a *partial* understanding of natural processes that change Earth's surface. In part A, the response (*"It moved up into the Eurasian continental plate"*) does not describe the natural process that moved the continental plate from its location 48 million years ago to its current location and receives no credit. In part B, the response accurately describes the results of the collision between the Indian continental plate and the Eurasian continental plate (*"the Himilayan mountains were formed"*).

STUDENT RESPONSE

Response Score: 0 points

18. Use the diagram below to answer the question.

Movement of the Indian Continental Plate



The diagram illustrates the movement of the Indian continental plate and its eventual collision with the Eurasian continental plate.

Part A: Describe the natural process that moved the Indian continental plate from its location 48 million years ago to its current location.

An earthquake happened and cawed it to float away.

Part B: Describe the results of the collision between the Indian continental plate and the Eurasian continental plate.

It caused a new island to form.

AFTER YOU HAVE CHECKED YOUR WORK, CLOSE YOUR ANSWER BOOKLET AND TEST BOOKLET SO YOUR TEACHER WILL KNOW YOU ARE FINISHED.

STOP

This response provides *insufficient* evidence to demonstrate any understanding of natural processes that change Earth's surface. In part A, the response (*"An earthquake happened and caused it to float away"*) does not describe the natural process that moved the continental plate from its location 48 million years ago to its current location and does not receive credit. In part B, the response (*"It caused a new island to form"*) does not describe the results of the collision between the Indian continental plate and the Eurasian continental plate and receives no credit.

SAMPLE ITEM SUMMARY

MULTIPLE-CHOICE

Sample Number	Alignment	Answer Key	Depth of Knowledge	*p*-values A	*p*-values B	*p*-values C	*p*-values D
1	S8.A.1.1.3	D	2	15%	12%	19%	54%
2	S8.A.1.2.2	B	2	16%	51%	20%	13%
3	S8.A.1.3.3	B	2	12%	58%	11%	19%
4	S8.A.1.3.4	A	2	35%	25%	15%	25%
5	S8.A.2.1.3	C	2	21%	24%	41%	14%
6	S8.A.2.1.4	C	2	35%	9%	50%	6%
7	S8.A.2.1.6	B	3	9%	66%	15%	10%
8	S8.A.3.1.2	A	2	57%	9%	13%	21%
9	S8.B.2.1.1	A	2	51%	13%	18%	18%
10	S8.B.3.1.1	D	2	16%	26%	18%	40%
11	S8.B.3.2.2	B	2	13%	47%	19%	21%
12	S8.C.1.1.3	A	2	62%	21%	8%	9%
13	S8.C.2.1.2	B	2	24%	54%	12%	10%
14	S8.C.3.1.1	A	3	42%	12%	33%	13%
15	S8.D.1.1.3	B	2	14%	44%	19%	23%
16	S8.D.1.3.1	D	3	11%	25%	22%	42%

OPEN-ENDED

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	S8.A.2.1.5	2	3	0.82
18	S8.D.1.1.2	2	2	0.58

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PSSA Grade 8 Science
Item and Scoring Sampler