California Assessment of Student Performance and Progress

California Science Test Practice Test Scoring Guide

High School
CAST Practice Test Scoring Guide—High School

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Introduction to Practice Test Scoring Guide

This California Science Test (CAST) practice test scoring guide offers details about the items, student response types, correct responses, and related scoring considerations for the practice test items. These items have been selected to show some of the new approaches to measuring the California Next Generation Science Standards (CA NGSS) that can be found in the assessment. The practice test items are not fully representative of all possible item types included in the CAST. The practice test covers a selection of items from performance expectations assessed in high school.

This scoring guide should be used alongside the online practice tests, which can be accessed at http://www.caaspp.org/practice-and-training/index.html. Annotated responses are also available to help explain the rationale for each score point on selected constructed response items from the practice test at https://www.caaspp.org/ta-resources/practice-training.html.

The following information is presented in a metadata table. Metadata contains specific information about each item including the alignment of the item with the CA NGSS standards.

- **Item**: The question number that corresponds to the question as it appears in the practice test
- **Key**: Represents the correct answer(s) to the item or question and includes the score point value for the item and its parts (Items are worth either one or two points. For some technology-enhanced items, a screen capture of the correct answers is included. Exemplars and rubrics are provided for constructed response items.)
- **Performance Expectations (PE) Code**: References the standards that describe what students should know and be able to do
- **Science and Engineering Practices (SEP)**: Descriptions of behaviors that students engage in as they investigate the natural world and design solutions
- **Disciplinary Core Ideas (DCI)**: Essential ideas in the science disciplines that all students should understand
- **Crosscutting Concepts (CCC)**: Interdisciplinary skills students should exhibit that unify the study of science and engineering through common application across fields
- **Item-Level Claim Statement (ILCS)**: A brief statement that illustrates how an item aligns with the PE
## Example of Metadata

<table>
<thead>
<tr>
<th>Item</th>
<th>Key</th>
<th>PE</th>
<th>SEP</th>
<th>DCI</th>
<th>CCC</th>
<th>ILCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A (1 point)</td>
<td>HS-LS4-4</td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>LS4.C Adaptation</td>
<td>2. Cause and Effect</td>
<td>Construct an explanation based on evidence for how natural selection leads to changes in traits in populations.</td>
</tr>
<tr>
<td>Item</td>
<td>Key</td>
<td>PE</td>
<td>SEP</td>
<td>DCI</td>
<td>CCC</td>
<td>ILCS</td>
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<td>------</td>
</tr>
</tbody>
</table>
| 1    | First drop-down menu: increase  
Second drop-down menu: natural selection (1 point) | HS-LS4-4 | 6. Constructing Explanations and Designing Solutions | LS4.C Adaptation | 2. Cause and Effect | Construct an explanation based on evidence for how natural selection leads to changes in traits in populations. |
| 2    | B   | (1 point)               | HS-PS1-2 | 6. Constructing Explanations and Designing Solutions | PS1.A Structure and Properties of Matter | 1. Patterns | Select the ionic compound that can be formed in a reaction with Br₂, based on the number of valence electrons. |
| 3    | Two-point item:  
Part A: decrease by about 50% (1 point)  
Part B: B (1 point) | HS-ESS3-3 | 5. Using Mathematics and Computational Thinking | ESS3.C Human Impacts on Earth Systems | 7. Stability and Change | Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. |
| 4    | Picture with eight A₂B molecules (1 point) | HS-PS1-7 | 5. Using Mathematics and Computational Thinking | PS1.B Chemical Reactions | 5. Energy and Matter | Predict the number of molecules of A₂B that will form from the complete reaction of A₂ and AB. |
Item metadata table continuation showing items 5–6

<table>
<thead>
<tr>
<th>Item</th>
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<th>ILCS</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>C</td>
<td>(1 point)</td>
<td>HS-ESS2-5</td>
<td>ESS2.C The Roles of Water in Earth's Surface Processes</td>
<td>6. Structure and Function</td>
<td>Identify the design that will provide the best evidence to determine the amount and type of sediment entering the stream.</td>
</tr>
</tbody>
</table>

Exemplars and rubric for item 6:

2 point

Exemplar(s):

Based on the table, it looks like the glucose molecules were stored in glycogen within 6 hours. And by the end of the 18-hour time period, the glucose was all used up by the cells for energy or stored in the glycogen.

OR

The glucose was stored in the glycogen at the beginning, to use for energy later, and by the end it was all used up or stored.

Rubric:

The response includes that glucose is incorporated into or stored in the glycogen.

AND

Rubric continues on the next page.
Rubric continues from previous page.

The response includes that within the first 6 hours, glucose was stored or broken down into glycogen and by the end of the 18-hour time period, the glucose was used up by the cells for energy or stored in the glycogen.

NOTE: If time is not mentioned (particular hours) credit should be given based on the response if the understanding is that over time the glucose was used up.

1 point

Exemplar(s):

The glucose was being used by the glycogen within the first 6 hours.

OR

By the time it was over after 18 hours, the glucose was turned into glycogen.

OR

Based on the data in the table, the glycogen was metabolizing the glucose between hour 6 and hour 12, then it was all gone.

OR

The glucose was used up by the cells for energy.

Rubric:

The response includes that glucose is incorporated into or stored in the glycogen.

OR

The response includes that within 6 hours the glucose was stored in or broken down into glycogen and by the end of the 18 hours, the glucose was used up or stored in the glycogen.

Rubric continues on the next page.
Exemplar(s):

Glucose combined with the glycogen.

OR

It looks like it stayed the same during the first 12 hours.

OR

The glucose dissolved in the petri dish.

OR

The glucose became radioactive.

OR

I don't know; I was never taught this.

Rubric:

Rubric continues on the next page.
Rubric continues from previous page.

0-point should be awarded if a student attempts to answer the prompt but the response is incorrect or too vague (insufficient information provided) to receive credit.

A score of 0 should also be given to responses that consist only of:

No relevant content provided

- no response is provided (e.g., blank)
- random keystrokes or nonsense verbiage
- punctuation mark(s) (e.g., “.”)

Student’s opinion of the test

Direct copy of the stimulus without any attempt to answer

Opinions or comments about random topics

I don’t know, IDK (without further elaboration)

Responses that go on to provide an answer to the prompt should be scored based on the relevant part of the response.
<table>
<thead>
<tr>
<th>Item</th>
<th>Key</th>
<th>PE</th>
<th>SEP</th>
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<th>ILCS</th>
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</thead>
<tbody>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>8. Obtaining, Evaluating and Communicating Information</td>
<td>ESS1.A The Universe and Its Stars</td>
<td>5. Energy and Matter</td>
<td>Describe how factors such as composition and temperature affect the rate of nuclear fusion and energy production.</td>
</tr>
<tr>
<td></td>
<td>Row 1: High-mass stars</td>
<td>HS-ESS1-3</td>
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<td></td>
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<tr>
<td></td>
<td>Row 2: Low-mass stars</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Row 3: High-mass stars</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Row 4: Low-mass stars, High-mass stars</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Row 5: High-mass stars (1 point)</td>
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### Item metadata table continuation showing items 10–12

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<th>DCI</th>
<th>CCC</th>
<th>ILCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>C</td>
<td>HS-ESS2-1</td>
<td>2.</td>
<td>ESS2.A Earth Materials and Systems</td>
<td>7. Stability and Change</td>
<td>Describe how a model illustrates or explains the internal and surface processes that produced a geological feature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Developing and Using Models</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>HS-PS2-1</td>
<td>4.</td>
<td>PS2.A Forces and Motion</td>
<td>2. Cause and Effect</td>
<td>Identify the relationship between mass and acceleration.</td>
</tr>
<tr>
<td>11</td>
<td>C</td>
<td></td>
<td>Analyzing and Interpreting Data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>C</td>
<td>HS-PS3-5</td>
<td>2.</td>
<td>PS3.C Relationship Between Energy and Forces</td>
<td>2. Cause and Effect</td>
<td>Evaluate a model of a capacitor with an electric field to identify actions that will change the energy in the system.</td>
</tr>
<tr>
<td>Item</td>
<td>Key</td>
<td>PE</td>
<td>SEP</td>
<td>DCI</td>
<td>CCC</td>
<td>ILCS</td>
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</tr>
<tr>
<td>13</td>
<td></td>
<td>First, third, and fourth options (1 point)</td>
<td>HS-LS4-6</td>
<td>5. Using Mathematics and Computational Thinking</td>
<td>LS4.D Biodiversity and Humans</td>
<td>2. Cause and Effect</td>
</tr>
</tbody>
</table>
| 14   |     | Two-point item:  
Part A: C (1 point)  
Part B: First drop-down menu: less  
Second drop-down menu: increases (1 point) | HS-ESS3-5 | 4. Analyzing and Interpreting Data | ESS3.D Global Climate Change | 7. Stability and Change | Predict changes to the Arctic sea ice based on probability and describe the patterns shown in the data over time. |
| 15   |     | First drop-down menu: the same as  
### Item metadata table continuation showing items 16–18

<table>
<thead>
<tr>
<th>Item</th>
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<th>ILCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>First drop-down menu: increases  &lt;br&gt;Second drop-down menu: speeds up (1 point)</td>
<td>HS-ESS1-4</td>
<td>5. Using Mathematics and Computational Thinking</td>
<td>ESS1.B Earth and the Solar System</td>
<td>3. Scale, Proportion, and Quantity</td>
<td>Evaluate how a comet’s acceleration and/or force of attraction between the Sun and comet change with respect to the change in the comet’s distance and/or mass.</td>
</tr>
<tr>
<td>18</td>
<td>D (1 point)</td>
<td>HS-PS2-3</td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>PS2.A Forces and Motion</td>
<td>2. Cause and Effect</td>
<td>Select the design solution that best meets the provided criteria about momentum and force during a collision.</td>
</tr>
</tbody>
</table>
### Item metadata table continuation showing items 19–21

<table>
<thead>
<tr>
<th>Item</th>
<th>Key</th>
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<th>SEP</th>
<th>DCI</th>
<th>CCC</th>
<th>ILCS</th>
</tr>
</thead>
</table>
| 19   | First drop-down menu: wind turbines  
     Second drop-down menu: released during manufacturing  
     Third drop-down menu: solar panels (1 point) | HS-ETS1-3 | 6. Constructing Explanations and Designing Solutions | ETS1.B Developing Possible Solutions | N/A | Select the best alternative solution from among multiple solutions of renewable resources, based on their strengths and weaknesses, in providing electricity. |
| 20   | Third and fourth options (1 point) | HS-LS1-3  
| 21   | First drop-down menu: ecological succession  
Item metadata table continuation showing items 22–23

<table>
<thead>
<tr>
<th>Item</th>
<th>Key</th>
<th>PE</th>
<th>SEP</th>
<th>DCI</th>
<th>CCC</th>
<th>ILCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td></td>
<td></td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>ETS1.C Optimizing the Design Solution</td>
<td>N/A</td>
<td>Match the described solutions to a provided list of broken-down criteria/constraints in order to reduce air pollution within the community.</td>
</tr>
</tbody>
</table>

Two-point item:
**Part A:**
- **Row 1:** Long time to implement change
- **Row 2:** Requires change in people’s behaviors, Provides benefits in a short time period
- **Row 3:** Requires change in people’s behaviors, Provides benefits in a short time period (1 point)

**Part B:** A (1 point)
### Item metadata table continuation showing item 24

<table>
<thead>
<tr>
<th>Item</th>
<th>Key</th>
<th>PE</th>
<th>SEP</th>
<th>DCI</th>
<th>CCC</th>
<th>ILCS</th>
</tr>
</thead>
</table>

- **Part A:**
  - **Row 1:** Photosynthesis Input
  - **Row 2:** Photosynthesis Input
  - **Row 3:** Photosynthesis Output
  - **Row 4:** Photosynthesis Output

- **Part B:**
  - **Row 1:** Cellular Respiration Output
  - **Row 2:** Cellular Respiration Output
  - **Row 3:** Cellular Respiration Input
  - **Row 4:** Cellular Respiration Input
Item metadata table continuation showing item 25

<table>
<thead>
<tr>
<th>Item</th>
<th>Key</th>
<th>PE</th>
<th>SEP</th>
<th>DCI</th>
<th>CCC</th>
<th>ILCS</th>
</tr>
</thead>
</table>

Exemplars and rubric for item 25

2 point

Exemplar(s):

The kinetic energy of the ball at the bottom of the building is the same as the potential energy at the top of the building. The potential energy needs to be divided by the mass of the tennis ball and the acceleration due to gravity (g) to find the height of the building.

OR

In the system, kinetic energy at the bottom of the fall is equal to the gravitational potential energy so \( \frac{1}{2}mv^2 = mgh \) where \( m \) is mass, \( v \) is velocity, \( g \) is acceleration due to gravity, and \( h \) is the height of the building, so just solve for \( h \) and you can find the height of the building.

Rubric continues on the next page.
Rubric continues from previous page.

Rubric:

The response includes that the kinetic energy of the tennis ball at the bottom of the building is equal to the gravitational potential energy of the tennis ball at the top of the building.

AND

The response includes that gravitational potential energy at the top of the building can be divided by the mass and acceleration due to gravity to find the height of the building.

1 point

Exemplar(s):

The kinetic energy of the ball at the bottom of the building is the same as the potential energy at the top of the building.

OR

The PE at the top is the same as the KE at the bottom when the ball hits.

OR

I can divide the potential energy by the mass of the ball and gravity if I want to find how tall the building is.

Rubric:

The response includes that the kinetic energy of the tennis ball at the bottom of the building is equal to the gravitational potential energy of the tennis ball at the top of the building.

Rubric continues on the next page.
Rubric continues from previous page.

OR

The response includes that gravitational potential energy at the top of the building can be divided by the mass and acceleration due to gravity to find the height of the building.

0 point

Exemplar(s):

The potential energy is 0 at the top of the building and it will be 0 when the ball hits the ground.

OR

I would just measure the building with a meter stick.

OR

I would time how long it takes for the ball to hit the ground.

OR

As the ball goes down the building, the potential energy increases.

OR

I don’t know; I was never taught this.

Rubric continues on the next page.
Rubric continues from previous page.

Rubric:

0-point should be awarded if a student attempts to answer the prompt but the response is incorrect or too vague (insufficient information provided) to receive credit

A score of 0 should also be given to responses that consist only of:

No relevant content provided

- no response is provided (e.g., blank)
- random keystrokes or nonsense verbiage
- punctuation mark(s) (e.g., “.”)

Student’s opinion of the test

Direct copy of the stimulus without any attempt to answer

Opinions or comments about random topics

I don’t know, IDK (without further elaboration)

Responses that go on to provide an answer to the prompt should be scored based on the relevant part of the response.

Rubric continues on the next page.
### Item metadata table continuation showing items 26–28

<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td>26</td>
<td>D (1 point)</td>
<td>HS-LS4-5</td>
<td>7. Engaging in Argument from Evidence</td>
<td>LS4.C Adaptation</td>
<td>2. Cause and Effect</td>
<td>Describe the conditions under which a claim about temperature effect on sugar maple tree distribution can be supported.</td>
</tr>
<tr>
<td>27</td>
<td>Third and fourth options (1 point)</td>
<td>HS-ESS1-6</td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>ESS1.C The History of Planet Earth</td>
<td>7. Stability and Change</td>
<td>Identify the roles of various earth processes (e.g., plate tectonics and erosion) in the preservation and destruction of evidence about Earth history.</td>
</tr>
<tr>
<td>28</td>
<td>B (1 point)</td>
<td>HS-PS1-3</td>
<td>3. Planning and Carrying Out Investigations</td>
<td>PS1.A Structure and Properties of Matter</td>
<td>1.Patterns</td>
<td>Identify and explain which procedure best compares the strengths of the forces of attraction between particles in a variety of solid substances.</td>
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</table>
## Item metadata table continuation showing items 29–30

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<tbody>
<tr>
<td>29</td>
<td><strong>Row 1</strong>: Change parameter&lt;br&gt;<strong>Row 2</strong>: Keep parameter constant&lt;br&gt;<strong>Row 3</strong>: Keep parameter constant&lt;br&gt;<strong>Row 4</strong>: Keep parameter constant (1 point)</td>
<td>HS-LS4-6</td>
<td>5. Using Mathematics and Computational Thinking</td>
<td>LS4.C Adaptation</td>
<td>2. Cause and Effect</td>
<td></td>
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</tr>
<tr>
<td>30</td>
<td>First and fourth options (1 point)</td>
<td>HS-PS2-2</td>
<td>5. Using Mathematics and Computational Thinking</td>
<td>PS2.A Forces and Motion</td>
<td>4. Systems and System Models</td>
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</table>

**Item 29**

5. Using Mathematics and Computational Thinking

**LS4.C Adaptation**

Identify the parameters that need to stay or be changed to maintain a diatom population that detects water quality when adding homes to the surrounding area.

**Item 30**

5. Using Mathematics and Computational Thinking

**PS2.A Forces and Motion**

Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
Item metadata table continuation showing item 31

<table>
<thead>
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<th>Item</th>
<th>Key</th>
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<tr>
<td></td>
<td>Row 2: Faucet (source)</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Row 3: Drain (sink)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Row 4: Faucet (source)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Row 5: Drain (sink) (1 point)</td>
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<td>Item</td>
<td>Key</td>
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<td>DCI</td>
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### Item metadata table continuation showing items 33–35

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<th>CCC</th>
<th>ILCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>Crossing over during meiosis (1 point)</td>
<td>HS-LS3-2</td>
<td>7. Engaging in Argument from Evidence</td>
<td>LS3.B Variation of Traits</td>
<td>2. Cause and Effect</td>
<td>Describe that crossing over is responsible for all of the variation in this rabbit species.</td>
</tr>
<tr>
<td>34</td>
<td>C (1 point)</td>
<td>HS-LS3-1</td>
<td>1. Asking Questions and Defining Problems</td>
<td>LS3.A Inheritance of Traits</td>
<td>2. Cause and Effect</td>
<td>Select the question that challenges the argument about phenotype and genotype connections in this rabbit species.</td>
</tr>
<tr>
<td>35</td>
<td>First, second, and fifth options (1 point)</td>
<td>HS-LS3-1</td>
<td>1. Asking Questions and Defining Problems</td>
<td>LS3.A Inheritance of Traits</td>
<td>2. Cause and Effect</td>
<td>Select questions that address the relationship between a chromosome and gene expression in this rabbit species.</td>
</tr>
</tbody>
</table>
### Item metadata table continuation showing items 36–38

<table>
<thead>
<tr>
<th>Item</th>
<th>Key</th>
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<th>SEP</th>
<th>DCI</th>
<th>CCC</th>
<th>ILCS</th>
</tr>
</thead>
</table>
| 36   | First drop-down menu: color gene  
Second drop-down menu: gray-pointed  
(1 point) | HS-LS3-2  | 7. Engaging in Argument from Evidence | LS3.B Variation of Traits  | 2. Cause and Effect  | Describe how the environmental conditions will impact the expression of the trait in this rabbit species. |
| 37   | C  
(1 point) | HS-LS3-1  | 1. Asking Questions and Defining Problems | LS3.A Inheritance of Traits  | 2. Cause and Effect  | Select a scientifically correct question that challenges the conclusions about the offspring phenotypes in this rabbit species. |
| 38   | Exemplars and rubric provided below. | HS-LS3-2  | 7. Engaging in Argument from Evidence | LS3.B Variation of Traits  | 2. Cause and Effect  | Explain that genetic variation depends on both environmental and genetic factors in this rabbit species. |

**Exemplars and rubric for item 38:**

**2 point**

**Exemplar(s):**

Genetic factors can affect point color variation because the color shown depends on the alleles that are inherited. Environmental factors can affect point color variation because it depends on the temperature that the rabbit is exposed to because temperature influences the expression of its inherited alleles, changing the point color.

*Rubric continues on the next page.*
Rubric continues from previous page.

Rubric:

The response includes that genetic factors affect point color variation because the specific phenotype expressed (black or gray) depends partly on the alleles that are inherited.

AND

The response includes that environmental factors can affect point color variation because the temperature that the rabbit is exposed to will influence the expression of its inherited alleles, thus altering its phenotype.

1 point

Exemplar(s):

Genes can affect the color that is expressed because it depends partly on what alleles are inherited.

OR

The environment affects the color of the rabbit because the temperature that the rabbit lives in can make the color change.

OR

The temperature change caused the rabbits points to change color.

OR

It’s in the traits because of the alleles that are inherited from the parents.

Rubric continues on the next page.
Rubric continues from previous page.

**Rubric:**

The response includes that genetic factors affect point color variation because the specific phenotype expressed (black or gray) depends partly on the alleles that are inherited.

OR

The response includes that environmental factors can affect point color variation because the temperature that the rabbit is exposed to will influence the expression of its inherited alleles, altering its phenotype.

**0 point**

**Exemplar(s):**

The rabbit’s genes affect point color variation more than the environment.

OR

The rabbit’s genes and the environment both affect the point color in the rabbits.

OR

It has to be the genes because how can temperature make a rabbit change its color.

OR

Rubric continues on the next page.
Rubric continues from previous page.

I don’t know; I was never taught this.

Rubric:

0-point should be awarded if a student attempts to answer the prompt but the response is incorrect or too vague (insufficient information provided) to receive credit.

A score of 0 should also be given to responses that consist only of:

No relevant content provided

• no response is provided (e.g., blank)
• random keystrokes or nonsense verbiage
• punctuation mark(s) (e.g., “.”)

Student’s opinion of the test

Direct copy of the stimulus without any attempt to answer

Opinions or comments about random topics

I don’t know, IDK (without further elaboration)

Responses that go on to provide an answer to the prompt should be scored based on the relevant part of the response.

Additional annotated samples for this prompt can be found at https://www.caaspp.org/ta-resources/practice-training.html.
<table>
<thead>
<tr>
<th>Item</th>
<th>Key</th>
<th>PE</th>
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<th>DCI</th>
<th>CCC</th>
<th>ILCS</th>
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<tbody>
<tr>
<td>39</td>
<td>First and second options (1 point)</td>
<td>HS-PS1-6</td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>PS1.B Chemical Reactions</td>
<td>7. Stability and Change</td>
<td>Identify the scientific principles that support the effectiveness of the changes to meet the criteria required by the engineer in manufacturing fertilizer.</td>
</tr>
<tr>
<td>40</td>
<td>First drop-down menu: 84 Second drop-down menu: 18 (1 point)</td>
<td>HS-PS1-7</td>
<td>5. Using Mathematics and Computational Thinking</td>
<td>PS1.B Chemical Reactions</td>
<td>5. Energy and Matter</td>
<td>Select the mathematical representation that predicts the mass of the other component based on a chemical reaction.</td>
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<tr>
<td>41</td>
<td>B (1 point)</td>
<td>HS-PS1-7</td>
<td>5. Using Mathematics and Computational Thinking</td>
<td>PS1.B Chemical Reactions</td>
<td>5. Energy and Matter</td>
<td>Select the mathematical relationships that best demonstrate that atoms are conserved in the chemical reaction.</td>
</tr>
<tr>
<td>42</td>
<td>First drop-down menu: decrease Second drop-down menu: right Third drop-down menu: exothermic (1 point)</td>
<td>HS-PS1-6</td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>PS1.B Chemical Reactions</td>
<td>7. Stability and Change</td>
<td>Select the change that best meets the criteria and justifies the change in temperature necessary for increasing the amount of fertilizer manufactured.</td>
</tr>
<tr>
<td>Item</td>
<td>Key</td>
<td>PE</td>
<td>SEP</td>
<td>DCI</td>
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<tr>
<td>43</td>
<td><strong>Row 1:</strong> Disadvantage</td>
<td>HS-PS1-6</td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>PS1.B Chemical Reactions</td>
<td>7. Stability and Change</td>
<td>Identify the advantages and disadvantages for each change in fertilizer production.</td>
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<td><strong>Row 2:</strong> Disadvantage</td>
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<td></td>
<td><strong>Row 3:</strong> Advantage</td>
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<td></td>
<td><strong>Row 4:</strong> Advantage (1 point)</td>
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<td>44</td>
<td>Exemplars and rubric provided below.</td>
<td>HS-PS1-6</td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>PS1.B Chemical Reactions</td>
<td>7. Stability and Change</td>
<td>Identify or describe the scientific principles that support the effectiveness of the change to meet the criteria to maintain equilibrium.</td>
</tr>
</tbody>
</table>
High School Practice Test Items

Exemplars and rubric for item 44:

2 point

Exemplar(s):

An increase in pressure would increase how often molecules collide. The reaction will reduce the effect of this by shifting the equilibrium to the right to make more NH₃ because there are fewer molecules on the right side of the equation.

Rubric:

The response includes that an increase in pressure would increase the frequency of collisions between the reactant molecules. AND

The response indicates that a system at equilibrium will adjust to reduce the effects of any changes, so the equilibrium will shift right to produce more ammonia or NH₃ to reduce the overall pressure of the system.

1 point

Exemplar(s):

An increase in pressure would increase the number of collisions between molecules.

OR

The reaction will adjust to reduce the effects of the increase in pressure by shifting the equilibrium to the right and to produce more NH₃. The equilibrium will shift to the right producing more ammonia.

Rubric:

*Rubric continues on the next page.*
Rubric continues from previous page.

The response indicates that an increase in pressure would increase the frequency of collisions between the reactant molecules.

OR

The response indicates that a system at equilibrium will adjust to reduce the effects of any changes, so the equilibrium will shift right to produce more ammonia or NH₃ to reduce the overall pressure of the system.

0 point

Exemplar(s):

The percent yield of ammonia at equilibrium would not be affected by an increase in pressure.

OR

There will be more ammonia.

OR

An increase in pressure would decrease the number of collisions between molecules.

OR

The equilibrium will shift to the left, producing less ammonia/NH₃

OR

*YTT%$#D

Rubric continues on the next page.
Rubric continues from previous page.

OR

I don't know; I was never taught this.

Rubric:

0-point should be awarded if a student attempts to answer the prompt but the response is incorrect or too vague (insufficient information provided) to receive credit

A score of 0 should also be given to responses that consist only of:

No relevant content provided

- no response is provided (e.g., blank)
- random keystrokes or nonsense verbiage
- punctuation mark(s) (e.g., “.”)

Student’s opinion of the test

Direct copy of the stimulus without any attempt to answer

Opinions or comments about random topics

I don’t know, IDK (without further elaboration)

Responses that go on to provide an answer to the prompt should be scored based on the relevant part of the response.
### Item metadata table continuation showing items 45–48

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<tbody>
<tr>
<td>45</td>
<td>D</td>
<td>HS-ESS1-1</td>
<td>2. Developing and Using Models</td>
<td>ESS1.A The Universe and Its Stars</td>
<td>Identify the type of star of the Sun on the main sequence of an HR diagram, relating its position to luminosity.</td>
<td></td>
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</tbody>
</table>
| 46   | First drop-down menu: 527  
Second drop-down menu: 6,000 | HS-ESS1-1 | 2. Developing and Using Models | PS3.D Energy in Chemical Processes and Everyday Life | Identify the location of the Sun on the main sequence of an HR diagram, relating its position to luminosity. |
| 47   | First drop-down menu: increases  
Second drop-down menu: decreases  
OR  
First drop-down menu: decreases  
| 48   | Exemplars and rubric provided below. | HS-ESS1-4 | 5. Using Mathematics and Computational Thinking | ESS1.B Earth and the Solar System | Explain from data the eccentricity of orbital paths of planets as they revolve around the Sun. |
Exemplars and rubric for item 48:

2 point

Exemplar(s):

The shape of the orbital path is an ellipse because the distance between the planet and the Sun increases and decreases as the planet goes around the Sun.

OR

I learned that the shape of a planets orbital path is an oval shape because the planet gets closer and then farther away as it makes its way around the Sun.

OR

As the planet moves farther away from the sun the shape changes and when it gets closer to the sun it changes again, so it’s not circular

Rubric:

The response includes that the orbital path is an ellipse or oval shape

AND

The response includes that the distance between the Sun and the planet increases and decreases throughout the planet’s orbital path.

1 point

Exemplar(s):

Rubric continues on the next page.
Rubric continues from previous page.

The shape of the planets orbital path is an oval.

OR

The planets orbital path is an ellipse.

OR

Because the distance between the planet and the Sun increases and decreases as the planet goes around the Sun.

OR

The orbital path of the planet changes in shape as it gets closer or farther away from the Sun.

Rubric:

The response includes only that the shape of the orbital path is an ellipse or oval.

OR

The response includes only that the distance between the planet and sun increases or decreases throughout the planet’s orbital path.

0 point

Exemplar(s):

The orbital path is a circle because it goes around the sun.

OR

Rubric continues on the next page.
The distance between the planet and the sun stays constant.

OR

I don't know; I was never taught this.

Rubric:

0-point should be awarded if a student attempts to answer the prompt but the response is incorrect or too vague (insufficient information provided) to receive credit.

A score of 0 should also be given to responses that consist only of:

No relevant content provided

- no response is provided (e.g., blank)
- random keystrokes or nonsense verbiage
- punctuation mark(s) (e.g., “.”)

Rubric continues on the next page.
Rubric continues from previous page.

Student's opinion of the test

Direct copy of the stimulus without any attempt to answer

Opinions or comments about random topics

I don't know, IDK (without further elaboration)

Responses that go on to provide an answer to the prompt should be scored based on the relevant part of the response.

Additional annotated samples for this prompt can be found at https://www.caaspp.org/ta-resources/practice-training.html.
## Item metadata table continuation showing item 49

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<tr>
<td>49</td>
<td>Two-point item:</td>
<td>HS-ESS1-2</td>
<td>6. Constructing Explanations and Designing Solutions</td>
<td>ESS1.A The Universe and Its Stars</td>
<td>5. Energy and Matter</td>
<td>Explain the redshift pattern as indicating that more distant stars are moving away.</td>
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<tr>
<td></td>
<td>Part A: A (1 point)</td>
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<td>Part B: First drop-down menu: moving away from the student’s location</td>
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<td>Second drop-down menu: expanding (1 point)</td>
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