



ARIZONA SCIENCE TEST

Computer-Based  
Sample Test  
Scoring Guide  
High School Science



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Prepared by the Arizona Department of Education

## About the Sample Test Scoring Guide

The AzSCI Sample Test Scoring Guides provide details about the items, student response types, correct responses, and related scoring considerations for AzSCI Sample Test items.

Within this guide, each item is presented with the following information:

- Item number
- Domain (Reporting Category)
- Science and Engineering Practices (SEP) Group (Reporting Category)
- Content Standard
- SEP
- Crosscutting Concepts (CC)
- Phenomenon
- TAGS
- Item Type

The items included in this guide are representative of the kinds of items that students can expect to experience when taking the computer-based test for AzSCI High School Science.

AzSCI items are aligned to at least two of the three multidimensional science standards. Each item will be aligned to a content standard and either a science and engineering practice (SEP) or a crosscutting concept (CC), some items may be aligned to both an SEP and a CC. Item information may vary due to alignment requirements; for example, AzSCI items will only contribute to a student's SEP Group score if it is aligned to the SEP listed within the standard text, as noted within this field. Items not aligned to a dimension (SEP Group, SEP, and CC) will be left blank.

Item Number	1
Item Title	Insect Population Declines
Domain ( <i>Reporting Category</i> )	Life Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.L2U3.18
SEP	Analyzing and Interpreting Data
Crosscutting Concepts (CC)	Patterns
Phenomenon	The biodiversity of insects on nature preserves in western Europe has been steadily declining for over 20 years.
TAGS	G3
Item Type	Inline Choice

Based on the data shown in **Figure 1** and **Figure 2**, explain whether the creation of the nature reserve is serving its intended purpose. Complete the sentences by selecting the correct answers from the drop-down menus.

During the 25-year study, plant biodiversity

decreased



while the insect abundance

decreased



. These results indicate that the nature

reserve is

not protecting



the environment.

Score	Scoring Rubric
1	During the 25-year study, plant biodiversity <b>decreased</b> while insect abundance <b>decreased</b> . this indicates that the nature reserve is not <b>protecting</b> the environment.
0	The response is incorrect or irrelevant.

Item Number	2
Item Title	Insect Population Declines
Domain ( <i>Reporting Category</i> )	Life Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	Critiquing
Content Standard	HS.L2U3.18
SEP	Obtaining, Evaluating, and Communication of Information
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	The biodiversity of insects and plants on nature reserves in western Europe has steadily declined for over 25 years.
TAGS	G3
Item Type	Multiple Response

Aphids are small insects that eat many types of plants. Scientists have a theory that when pesticides are used, they reduce local populations of insects that prey on aphids. They also theorize that after long periods of exposure to pesticides, some species of predator insects can disappear completely. Based on these two theories, predict how the use of pesticides would affect the biodiversity in the nature reserve?

Select **two** correct answers.

- A. Aphids would have few predators and would outcompete other insects.
- B. Large aphid populations would attract new predators to the nature reserve.
- C. Aphids would use up the resources that are necessary for the survival of plants.
- D. Large aphid populations would increase the biomass of plants in the nature reserve.
- E. Large aphid populations would contribute to a reduction in the number of plant species.

(1 Point)

Item Number	3
Item Title	Insect Population Declines
Domain ( <i>Reporting Category</i> )	Life Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.L2U1.19
SEP	Constructing Explanations and Designing Solutions
Crosscutting Concepts (CC)	Systems and System Models
Phenomenon	The biodiversity of insects and plants on nature reserves in western Europe has steadily declined for over 25 years.
TAGS	G3
Item Type	Multiple Choice

This question has **two** parts. First answer Part A. Then answer Part B.

### Part A

Which statement **best** describes why the scientists would expect to see a reduction in insect biodiversity on the nature reserve during the 25-year study?

- A. The size of the reserve was continually reduced.
- B. Loss of plant populations led to fewer habitats for insects.
- C. The diversity of plants as a food source in the reserve decreased.
- D. Changes in temperature affected the ability of the insects to reproduce.

**Part B**

Which evidence **best** supports the answer to Part A?

- A. The average biomass of insects decreased by 20% over the course of the study.
- B. The plant biodiversity on the nature reserve decreased by about 50% during the study.
- C. The biodiversity of insects remained stable until the total number of insects began to decline.
- D. The populations of some types of plants decreased while that of other types of plants increased.

(1 point)

Item Number	4
Item Title	Cholera
Domain ( <i>Reporting Category</i> )	Life Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.L2U3.18
SEP	Construct Explanations and Design Solutions
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	The bacterium that causes cholera is naturally present in the environment and is a threat to public health. Changes in climate may produce environmental conditions that trigger cholera disease outbreaks. Some scientists have developed a method that uses satellite data to anticipate cholera outbreaks.
TAGS	G3
Item Type	Multiple Choice

Some human activities can lead to changes in water sources that allow for the rapid reproduction of algae and the copepods that carry *V. cholerae*. These activities can lead to the spread of cholera and can also result in the loss of healthy water environments in the ecosystem.

Which statement **best** describes why biodiversity in the ecosystem is likely affected?

- A. The algae and the copepods attract large predators that would not normally be found in the ecosystem.
- B. The algae and the copepods deplete resources, making the resources unavailable to other organisms in the ecosystem.
- C. The overproduction of algae increases the availability of sunlight, benefiting submerged organisms in the ecosystem.
- D. The *V. cholerae* on the copepods cause salinity to increase, affecting the other marine organisms in the ecosystem.

(1 point)

Item Number	5
Item Title	Cholera
Domain ( <i>Reporting Category</i> )	Life Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.L1U1.20
SEP	Construct Explanations and Design Solutions
Crosscutting Concepts (CC)	Structure and Function
Phenomenon	The bacterium that causes cholera is naturally present in the environment and is a threat to public health. Changes in climate may produce environmental conditions that trigger cholera disease outbreaks.
TAGS	G3
Item Type	Multiple Choice

A student wants to develop a model to show the portion of the human cell that is affected by *V. cholerae* and how the bacteria affect homeostasis in the cell. Which statement **best** describes how the bacteria affect homeostasis in the cell?

- A. The bacteria cause a mutation within cells that results in decreased water absorption, which alters the cell's function.
- B. The bacteria alter the function of the mitochondria so that cells do not have the energy required to perform the cellular processes needed for survival.
- C. The bacteria inject their DNA into the host cell, and the new genetic material takes over the cell's machinery to create more bacteria.
- D. The bacteria poke holes in the cell membrane, allowing the cell contents to leak out, which causes the cell to lose its shape and be unable to function as a part of a tissue.

(1 point)



Item Number	6
Item Title	Bottle Rocket Activity
Domain ( <i>Reporting Category</i> )	Physical Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.P3U1.6
SEP	Developing and Using Models
Crosscutting Concepts (CC)	Structure and Function
Phenomenon	A rocket is pushed up against Earth's gravitational field before falling back down to Earth's surface.
TAGS	S3
Item Type	Gap Match Table

Use **Figure 1** to analyze the interactions in the bottle rocket activity.

Determine whether each interaction involves a contact force or a noncontact force.

Move the answers to the correct boxes.

Score	Scoring Rubric
1	Student selects: Air pump on air; Air on water; Water on rocket, and Air drag on rocket for the "Contact Force" box and the two events involving gravity in the "Noncontact Force" box.
0	The response is incorrect or irrelevant.

Item Number	7
Item Title	Bottle Rocket Activity
Domain ( <i>Reporting Category</i> )	Physical Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	Sensemaking
Content Standard	HS.P3U1.6
SEP	Analyzing and Interpreting Data
Crosscutting Concepts (CC)	Patterns
Phenomenon	A rocket is pushed up against Earth's gravitational field before falling back down to Earth's surface.
TAGS	G3
Item Type	Inline Choice, Multiple Choice

This question has **two** parts. First answer Part A. Then answer Part B.

### Part A

Based on the data in **Table 1**, which conclusion about Rocket A is **most likely** valid?

- A. The pressure inside the rocket was lower than the outside pressure and was therefore ideal for the achieved height.
- B. The initial ratio of water volume to air inside the rocket was ideal for it to reach the greatest height.
- C. The air in the rocket was retained until the rocket reached its greatest height.
- D. The amount of water in the rocket was ideal for keeping all forces balanced while it reached its greatest height.

**Part B**

Explain why Rocket A goes higher than Rocket D before starting to come down.

Complete the sentence by selecting the correct answers from the drop-down menus.

Rocket A experiences a greater  acting on it over a longer period of time due to a smaller  pulling the rocket downward.

Score	Scoring Rubric
1	Part A: Student selects option B. Part B: Rocket A experiences a greater <b>net force</b> acting on it over a longer period of time due to a smaller <b>gravitational force</b> pulling the rocket downward.
0	The response is incorrect or irrelevant.

Item Number	8
Item Title	Bottle Rocket Activity
Domain ( <i>Reporting Category</i> )	Physical Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.P2U1.5
SEP	Developing and Using Models
Crosscutting Concepts (CC)	Systems and System Models
Phenomenon	A rocket is pushed up against Earth’s gravitational field before falling back down to Earth’s surface.
TAGS	S3
Item Type	Graphic Gap Match

Based on the data in **Table 1**, compare the rate of acceleration, net force, and effect of gravitational acceleration for Rocket A and Rocket B during launch.

Move the correct answer to each box. Each answer may be used more than once.

Identical   Higher   Lower

Score	Scoring Rubric
1	Rocket A: Acceleration: High; Net Force: High; Gravitational Acceleration: Identical Rocket B: Acceleration: Low; Net Force: Low; Gravitational Acceleration: Identical
0	The response is incorrect or irrelevant.

Item Number	9
Item Title	Bottle Rocket Activity
Domain ( <i>Reporting Category</i> )	Physical Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	Sensemaking
Content Standard	HS.P3U1.6
SEP	Analyzing and Interpreting Data
Crosscutting Concepts (CC)	Patterns
Phenomenon	A rocket is pushed up against Earth's gravitational field before falling back down to Earth's surface.
TAGS	G3
Item Type	, Line Graph, Inline Choice

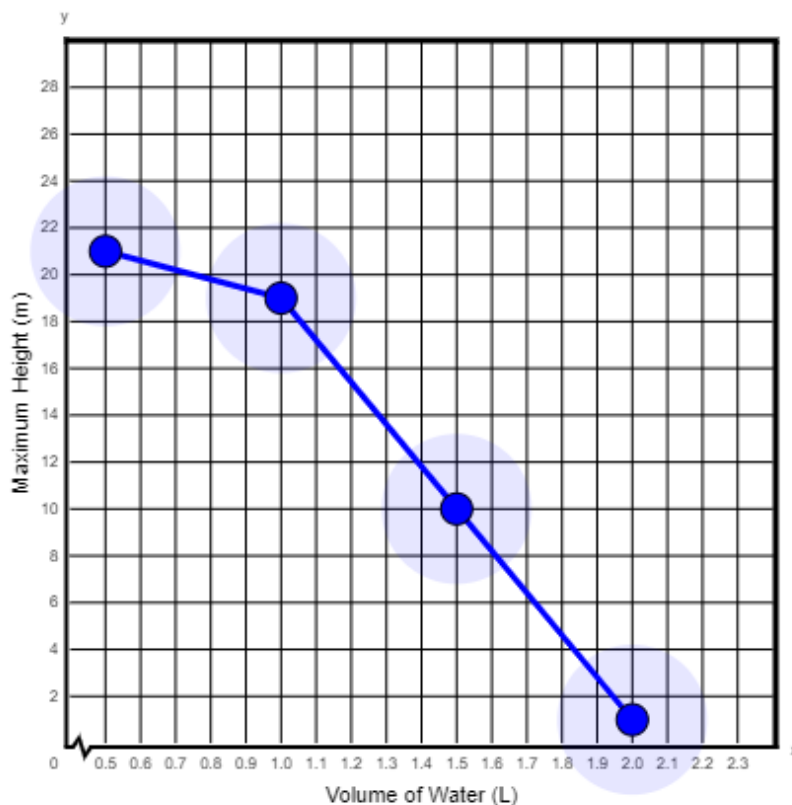
This question has **two** parts. First answer Part A. Then answer Part B.

### Part A

Use the data in **Table 1** to graph the relationship between the volume of water and maximum height of the bottle rockets.

Select a location on the coordinate grid to plot each data point from the table. A line segment will connect the points.

**Height vs. Volume of Water**



**Part B**

Explain the relationship between the volume of water and maximum height of the bottle rockets. Complete the sentences by selecting the correct answers from the drop-down menus.

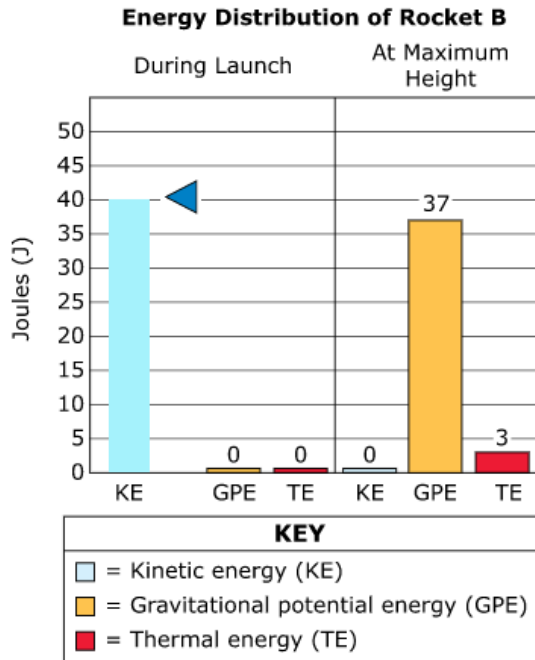
The rocket with  liters of water had the most net force, and the net force increased as the  decreased.

Score	Scoring Rubric
1	Part A: Student plots these four points: (0.5, 21), (1.0, 19), (1.5, 10), (2.0, 1). Part B: The rocket with 0.5 liters of water had the most net force, and the thrust increased as the <b>volume of water</b> decreased.
0	The response is incorrect or irrelevant.

Item Number	10
Item Title	Bottle Rocket Activity
Domain ( <i>Reporting Category</i> )	Physical Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.P4U1.8
SEP	Developing and Using Models
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	A rocket is pushed up against Earth’s gravitational field before falling back down to Earth’s surface.
TAGS	S3
Item Type	Slider

Based on the information in **Table 1** and **Figure 2**, determine the amount of kinetic energy Rocket B has during its launch.

Use the arrow to drag the kinetic energy bar to show the correct value.



Score	Scoring Rubric
1	Students adjust the kinetic energy bar to 40 J.
0	The response is incorrect or irrelevant.

Item Number	11
Item Title	Predictable Universal Patterns
Domain ( <i>Reporting Category</i> )	Earth and Space Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	Sensemaking
Content Standard	HS.E2U1.15
SEP	Constructing Explanations and Designing Solutions
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	Observable and predictable patterns occur in space.
TAGS	G3
Item Type	Multiple Choice

Which statement describes the direct results of the events shown in **Figure 1**?

- A. Nuclear fusion results in planet formation.
- B. Nuclear fusion results in the emission of light.
- C. Nuclear fusion results in star formation.
- D. Nuclear fusion results in the absorption of heat.

(1 point)



Item Number	12
Item Title	Predictable Universal Patterns
Domain ( <i>Reporting Category</i> )	Earth and Space Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	Sensemaking
Content Standard	HS.E2U1.15
SEP	Constructing Explanations and Designing Solutions
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	Observable and predictable patterns occur in space.
TAGS	G3
Item Type	Multiple Response

Using **Figure 1** and **Figure 4**, predict the most likely outcomes that will result when our sun reaches the end of the proton-proton fusion process.

Select **three** correct answers.

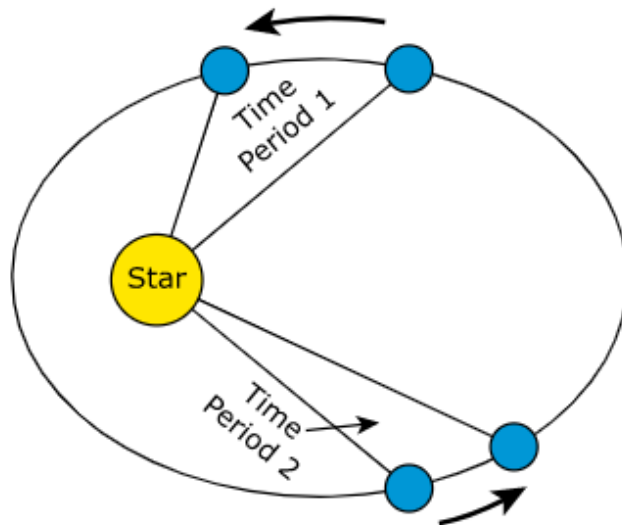
- A. The production of light by the sun will cease.
- B. The chemical composition of the sun's core will begin to change.
- C. The sun will begin to transform into a planetary nebula.
- D. The sun will continue to produce heavier elements.
- E. The circumference of the sun will change.
- F. The sun will have more total energy to continue fusion processes.

(1 point)

Item Number	13
Item Title	Predictable Universal Patterns
Domain ( <i>Reporting Category</i> )	Earth and Space Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	Sensemaking
Content Standard	HS.E2U1.16
SEP	Constructing Explanations and Designing Solutions
Crosscutting Concepts (CC)	Proportion, Quantity, and Scale
Phenomenon	Observable and predictable patterns occur in space.
TAGS	G3
Item Type	Inline Choice

**Figure 5: Two Orbital Positions** shows a planet orbiting a star during two different 50-day periods. Explain why the sections for the two time periods have the same area.

**Figure 5: Two Orbital Positions**



Complete the sentences by selecting the correct answers from the drop-down menus.

During Time Period 1, the planet moves  it does

during Time Period 2. This occurs because gravity from

is  during Time Period 1

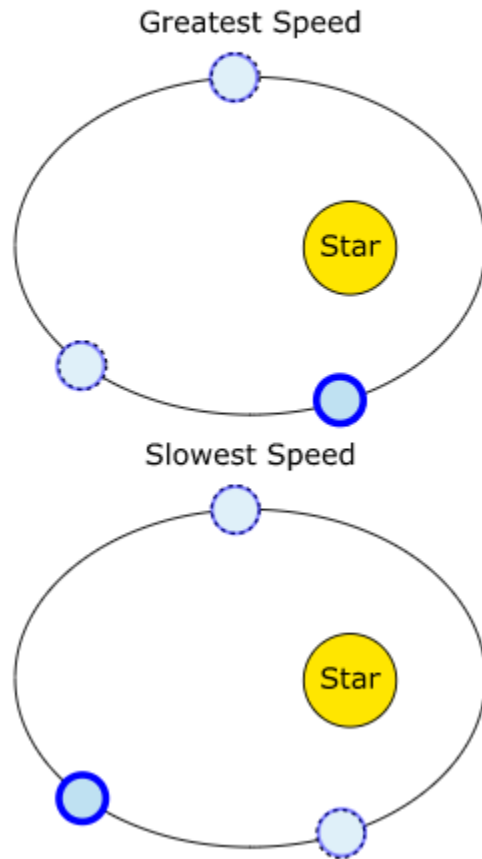
than it is during Time Period 2.

Score	Scoring Rubric
1	During Time Period 1, the planet moves faster than it does during Time Period 2. This occurs because gravity from the star is stronger during Time Period 1 than it is during Time Period 2.
0	The response is incorrect or irrelevant.

Item Number	14
Item Title	Predictable Universal Patterns
Domain ( <i>Reporting Category</i> )	Earth and Space Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.E2U1.16
SEP	Developing and Using Models
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	Observable and predictable patterns occur in space.
TAGS	G3
Item Type	Hot Spot

Each diagram shows a star with a planet orbiting it. Of the positions shown, identify **one** location where the planet is moving with the greatest speed and **one** location where the planet is moving with the slowest speed.

Select the correct planet position for each diagram.



Score	Scoring Rubric
1	Greatest speed: position closest to and below the star. Slowest speed: position farthest from star on the left.
0	The response is incorrect or irrelevant.

Item Number	15
Item Title	Predictable Universal Patterns
Domain ( <i>Reporting Category</i> )	Earth and Space Science
Science and Engineering Practices (SEP) Group ( <i>Reporting Category</i> )	<i>Item will not contribute to SEP Group score.</i>
Content Standard	HS.E2U1.17
SEP	Engaging in Argument from Evidence
Crosscutting Concepts (CC)	Scale, Proportion, and Quantity
Phenomenon	Observable and predictable patterns occur in space.
TAGS	G3
Item Type	Multiple Choice

This question has **two** parts. First answer Part A. Then answer Part B.

### Part A

Based on the data shown in **Figure 3**, which statement is correct?

- A. The farther a galaxy is from the Milky Way, the lower the recessional velocity of the galaxy.
- B. The farther a galaxy is from the Milky Way, the greater the recessional velocity of the galaxy.
- C. The distance that a galaxy is from the Milky Way does not affect the recessional velocity of the galaxy.
- D. The closer a galaxy is to the Milky Way, the greater the recessional velocity of the galaxy.

**Part B**

Which of these is evidence that supports the answer to Part A?

- A. Figure 3 does not account for multiple galaxies.
- B. Figure 3 shows a relationship between recessional velocity and distance.
- C. Figure 3 shows that galaxies closer to each other have a greater recessional velocity.
- D. Figure 3 shows that galaxies farther from each other have a greater recessional velocity.

(1 Point)