



ARIZONA SCIENCE TEST

Computer-Based Sample Test Scoring Guide Grade 8 Science



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Prepared by the Arizona Department of Education

About the Sample Test Scoring Guide

The Arizona Science Test (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
- Title
- Domain (Reporting Category)
- Science and Engineering Practices (SEP) Group
- Content Standard
- SEP
- Crosscutting Concept (CC)
- Phenomenon
- TAGS
- Item Type
- Number of score points
- Static presentation of the item
- Static presentation of student response field (when appropriate)
- Answer key or scoring rubric

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 Grade 8 Science.

Grade 8 Science Sample Test

Item Number	1
Item Title	Jar Ecosystems
Domain (Reporting Category)	Earth and Space Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	7.E1U1.5
SEP	Develop and use models
Crosscutting Concepts (CC)	System and System Models
Phenomenon	Plants inside a closed glass terrarium can remain alive for a long period of time using only the resources within the terrarium.
TAGS	S3
Item Type	Match Table Grid

The table shows three observations about the terrarium. Select boxes to indicate whether the observed event resulted from a transfer of energy, a transfer of matter, or both.

Select **all** the correct answers for each observation. You may select more than one answer in each row.

Observation	Transfer of Energy	Transfer of Matter
Plants increased in size, producing new leaves and stems.	☒	☒
Sunlight caused the temperature to increase.	☒	☐
The number of water droplets decreased during the day.	☒	☒

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Scoring Rubric	
Score	Description
1	Both columns: Rows 1 & 3 Column 1 only: Row 2
0	The response is incorrect or irrelevant.

(1 Point)

Grade 8 Science Sample Test

Item Number	2
Item Title	Jar Ecosystems
Domain (Reporting Category)	Earth and Space Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Does not contribute
Content Standard	7.E1U1.5
SEP	Construct explanations and design solutions
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	Plants inside a closed glass terrarium can remain alive for a long period of time using only the resources within the terrarium.
TAGS	G3
Item Type	TPD—Multiple Choice and Multiple Choice

Note: This question has two parts – Part A

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

Part A

Which statement describes a conclusion the student can draw from observations of the terrarium?

- ☐ A. Plant roots capture more energy in the evening than in the morning.
- ☐ B. Plants use nutrients from the soil to produce energy that helps them grow.
- ☒ C. Energy from the sun helps water move from the plants and soil into the air inside the jar.
- ☐ D. Water is cycled from the top to the bottom of the jar as the temperature inside the jar increases.

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Note: This question has two parts(cont.) – Part B

Part B

Which statement describes evidence from the student's observations that supports the answer to Part A?

- ☐ A. The temperature inside the terrarium was higher during the day.
- ☐ B. The plants slowly increased in size over the month of observation.
- ☐ C. The plants produced enough energy from food to grow new stems and leaves.
- ☒ D. The amount of water that formed on the inside of the jar was greatest on sunny days.

(1 Point) Student selected the correct answer for each part.

Grade 8 Science Sample Test

Item Number	3
Item Title	Jar Ecosystems
Domain (Reporting Category)	Earth and Space Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Does not contribute
Content Standard	7.E1U1.5
SEP	Construct explanations and design solutions
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	Plants inside a closed glass terrarium can remain alive for a long period of time using only the resources within the terrarium.
TAGS	S3
Item Type	Multiple Response

Which statements best describe characteristics of the model ecosystem inside the terrarium shown in **Figure 1**?

Select **two** correct answers.

- ☐ A. Matter is lost in the form of heat as the plants grow in the model ecosystem.
- ☒ B. Sunlight is an input that drives changes in the model ecosystem.
- ☐ C. Water provides energy for the production of food by the plants.
- ☐ D. Matter is created as water moves from the soil into the air of the terrarium.
- ☒ E. Matter from water and soil gets recycled inside the jar but cannot leave the jar.

(1 Point)

Grade 8 Science Sample Test

Item Number	4
Item Title	Jar Ecosystems
Domain (Reporting Category)	Earth and Space Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	7.E1U1.5
SEP	Develop and use models
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	Plants inside a closed glass terrarium can remain alive for a long period of time using only the resources within the terrarium.
TAGS	G3
Item Type	Inline Choice

The student wrote a statement about the terrarium. Complete the sentences by selecting the correct answers from the drop-down menus.

During the daytime, the terrarium light energy, which the thermal energy in the terrarium. This change in energy within the terrarium.

The collection of water inside the terrarium shows that matter is as energy flows in the system.

Scoring Rubric	
Score	Description
1	During the daytime, the terrarium absorbs light energy, which increases the thermal energy in the terrarium. This change in energy helps water move within the terrarium. The collection of water inside the terrarium shows that matter is recycled as energy flows in the system.
0	The response is incorrect or irrelevant.

(1 Point)

Grade 8 Science Sample Test

Item Number	5
Item Title	Jar Ecosystems
Domain (Reporting Category)	Life Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	6.L2U1.14
SEP	Develop and use models
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	Plants inside a closed glass terrarium can remain alive for a long period of time using only the resources within the terrarium.
TAGS	S3
Item Type	Gap Match

The student constructs another terrarium with rocks, soil, and plants, but this time earthworms are added to the ecosystem. Earthworms release nutrients into the soil. The student adds water, seals the lid, and places the terrarium where it is exposed to sunlight. In what ways will the addition of earthworms **most likely** affect the terrarium ecosystem?

Move the correct answer to each box. Not all answers will be used.

Even though the earthworms will benefit the plants by providing nutrients, they will also compete with the plants for limited water.

Scoring Rubric	
Score	Description
1	Even though the earthworms will benefit the plants by providing nutrients , they will also compete with the plants for limited water .
0	The response is incorrect or irrelevant.

(1 Point)

Grade 8 Science Sample Test

Item Number	6
Item Title	Jar Ecosystems
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Does not contribute
Content Standard	8.P4U1.3
SEP	Develop and use models
Crosscutting Concepts (CC)	N/A
Phenomenon	Plants inside a closed glass terrarium can remain alive for a long period of time using only the resources within the terrarium.
TAGS	S2
Item Type	TPD—Hot Spot and Inline Choice

Note: This question has two parts –Part A

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

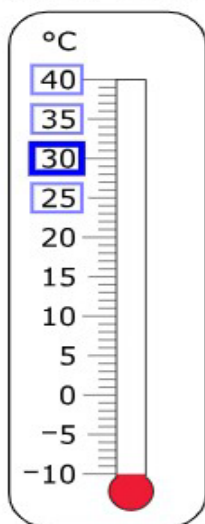
Part A

The water in the spray bottle has a temperature of 25°C. The thermometer in the terrarium reads 30°C, and a thermometer in the room where the terrarium is located reads 25°C. The temperature outdoors is 40°C.

What is the temperature of the water vapor inside the terrarium?

Select the correct answer.

Temperature of Water Vapor



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Note: This question has two parts(cont.)–Part B

Part B

Construct an explanation for your answer to Part A.

Move the correct answer to each box. Not all answers will be used.

The temperature of the water vapor demonstrates that an object with

a higher

temperature will

heat

an object with a lower

temperature until the objects reach

the same

temperature.

Scoring Rubric	
Score	Description
1	Students select: Part A: Student selects the 30° hot spot on the thermometer. Part B: The temperature of the water vapor demonstrates that an object with a higher temperature will heat an object with a lower temperature until the objects reach the same temperature.
0	The response is incorrect or irrelevant.

(1 Point) Student selected the correct answer for each part.

Grade 8 Science Sample Test

Item Number	7
Item Title	Carbon Cycle
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	8.P1U1.1
SEP	Develop and use models
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	Matter and energy involved in sustaining grasshoppers move through the biosphere through the carbon cycle.
TAGS	S3
Item Type	Multiple Choice

Which statement **best** describes the chemical reaction shown in **Figure 1**?

- ☒ A. Glucose is broken down into smaller molecules to be used by the body.
- ☐ B. Food is produced using chemical compounds and energy from the sun.
- ☐ C. Compounds are broken down to produce oxygen for the organism to breathe.
- ☐ D. Energy for movement is released by the breakdown of carbon as atoms are rearranged.

(1 Point)

Grade 8 Science Sample Test

Item Number	8
Item Title	Carbon Cycle
Domain (Reporting Category)	Life Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	6.L2U1.14
SEP	Develop and use models
Crosscutting Concepts (CC)	System and System Models
Phenomenon	Matter and energy involved in sustaining grasshoppers move through the biosphere through the carbon cycle.
TAGS	S3
Item Type	Gap Match Table

Use the model in **Figure 2** to show how carbon cycles through an ecosystem. Starting with “A grasshopper molts its exoskeleton,” put the remaining events in the correct order from top to bottom.

1	A grasshopper molts its exoskeleton.
2	Decay occurs.
3	Carbon dioxide is released into the atmosphere.
4	Plants take in carbon dioxide from the atmosphere.
5	Plants produce glucose.
6	The grasshopper takes in carbon molecules.

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(Continued)

Scoring Rubric	
Score	Description
1	From top to bottom: 1. A grasshopper molts its exoskeleton. 2. Decay occurs. 3. Carbon dioxide is released into the atmosphere. 4. Plants take in carbon dioxide from the atmosphere. 5. Plants produce glucose. 6. The grasshopper takes in carbon molecules.
0	The response is incorrect or irrelevant.

(1 Point)

Grade 8 Science Sample Test

Item Number	9
Item Title	Carbon Cycle
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	8.P1U1.1
SEP	Develop and use models
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	Matter and energy involved in sustaining grasshoppers move through the biosphere through the carbon cycle.
TAGS	S3
Item Type	Match Table Grid

The process of cell respiration shown in **Figure 1** includes several events. Determine whether each event in the table is part of the process or **not** part of the process.

Select **all** the correct answers.

Event	Part of the Process	NOT Part of the Process
Some molecules are released during respiration.	☒	☐
Atoms combine to form new molecules.	☒	☐
Molecules keep their same arrangements.	☐	☒
Added energy causes atoms to break down.	☐	☒

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Scoring Rubric	
Score	Description
1	Part of the process: Rows 1 & 2 Not part of the process: Rows 3 & 4
0	The response is incorrect or irrelevant.

(1 Point)

Grade 8 Science Sample Test

Item Number	10
Item Title	Carbon Cycle
Domain (Reporting Category)	Life Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Does not contribute
Content Standard	6.L2U1.14
SEP	Engage in argument from evidence
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	Matter and energy involved in sustaining grasshoppers move through the biosphere through the carbon cycle.
TAGS	G2
Item Type	Multiple Choice

A student makes a claim that an atom of carbon in a grasshopper's body could once have been an atom in the body of a prehistoric animal. Which evidence **best** supports this claim?

- ☐ A. Figure 2 shows that grasshoppers molt their exoskeletons.
- ☐ B. Figure 1 shows that carbon is present when energy is produced.
- ☐ C. Figure 1 shows that carbon atoms are used in more than one type of molecule.
- ☒ D. Figure 2 shows that carbon continually circulates through the ground, the atmosphere, and living things.

(1 Point)

Grade 8 Science Sample Test

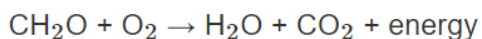
Item Number	11
Item Title	Carbon Cycle
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	8.P1U1.1
SEP	Develop and use models
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	Matter and energy involved in sustaining grasshoppers move through the biosphere through the carbon cycle.
TAGS	G3
Item Type	TPI—Multiple Choice and Multiple Response

Note: This question has two parts –Part A

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

Part A

The equation shows a reaction that occurs during the decomposition of a grasshopper's body.



formaldehyde + oxygen → water + carbon dioxide + energy

In which way does this process compare to the cell respiration process in **Figure 1**?

- ☐ A. Both processes release extra oxygen into the atmosphere.
- ☐ B. One process is the reverse of the other process.
- ☒ C. Both processes result in the same types of molecules being produced.
- ☐ D. One process produces larger molecules than the other process.

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Note: This question has two parts(cont.) – Part B

Part B

Which statements about both the decay and cell respiration processes are true?

Choose **two** correct answers.

- ☐ A. Atoms are broken down to produce energy.
- ☒ B. No atoms are lost during the chemical reaction.
- ☐ C. New atoms are produced through chemical change.
- ☐ D. Different types of atoms are needed for each new substance.
- ☒ E. Atoms are rearranged to form different compounds.

(2 Points) Student selected the correct answer for each part.

Grade 8 Science Sample Test

Item Number	12
Item Title	Floating Magnets
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Does not contribute
Content Standard	7.P3U1.3
SEP	Construct explanations and design solutions
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	A floating magnet is acted upon by both gravitational and magnetic forces.
TAGS	G3
Item Type	Multiple Choice

Which sentence should a student include when constructing an explanation of why the red magnet is **not** floating in Setup B in **Figure 1**?

- ☒ A. The combined magnetic and gravitational forces acting on the red magnet are equal to the force that the base is applying to the magnet.
- ☐ B. The combined magnetic and gravitational forces acting on the red magnet are less than the force that the base is applying to the magnet.
- ☐ C. The combined gravitational force, magnetic force, and force applied by the base are acting on the red magnet in the same direction.
- ☐ D. The combined magnetic force and force applied by the base oppose the gravitational force acting on the red magnet.

(1 Point)

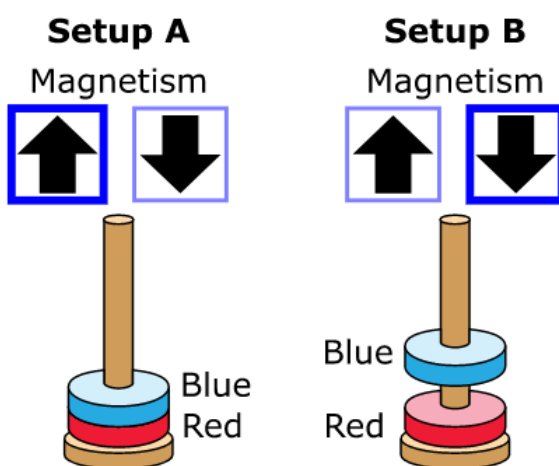
Grade 8 Science Sample Test

Item Number	13
Item Title	Floating Magnets
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	7.P2U1.2
SEP	Develop and use models
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	A floating magnet is acted upon by both gravitational and magnetic forces.
TAGS	S3
Item Type	Hot Spot

A magnetic force acts on the red magnet in Setup A and Setup B. The arrows in the diagram represent possible directions of the magnetic force from the blue magnet.

For each setup, select the arrow that represents the direction of the magnetic force acting on the red magnet from the blue magnet.

Select only **one** arrow for **each** setup.



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(Continued)

Scoring Rubric	
Score	Description
1	For Setup A the blue magnet pulls up (up arrow) on the red magnet. For Setup B the blue magnet pushes down (down arrow) on the red magnet.
0	The response is incorrect or irrelevant.

(1 Point)

Grade 8 Science Sample Test

Item Number	14
Item Title	Floating Magnets
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Investigating
Content Standard	7.P2U1.1
SEP	Analyze and Interpret Data
Crosscutting Concepts (CC)	Patterns
Phenomenon	A floating magnet is acted upon by both gravitational and magnetic forces.
TAGS	S3
Item Type	Point Graph

The force required, in newtons (N), to make the two groups of magnets in each trial touch is shown in **Table 2: Force Required to Make Magnet Groups Touch**.

Table 2: Force Required to Make Magnet Groups Touch

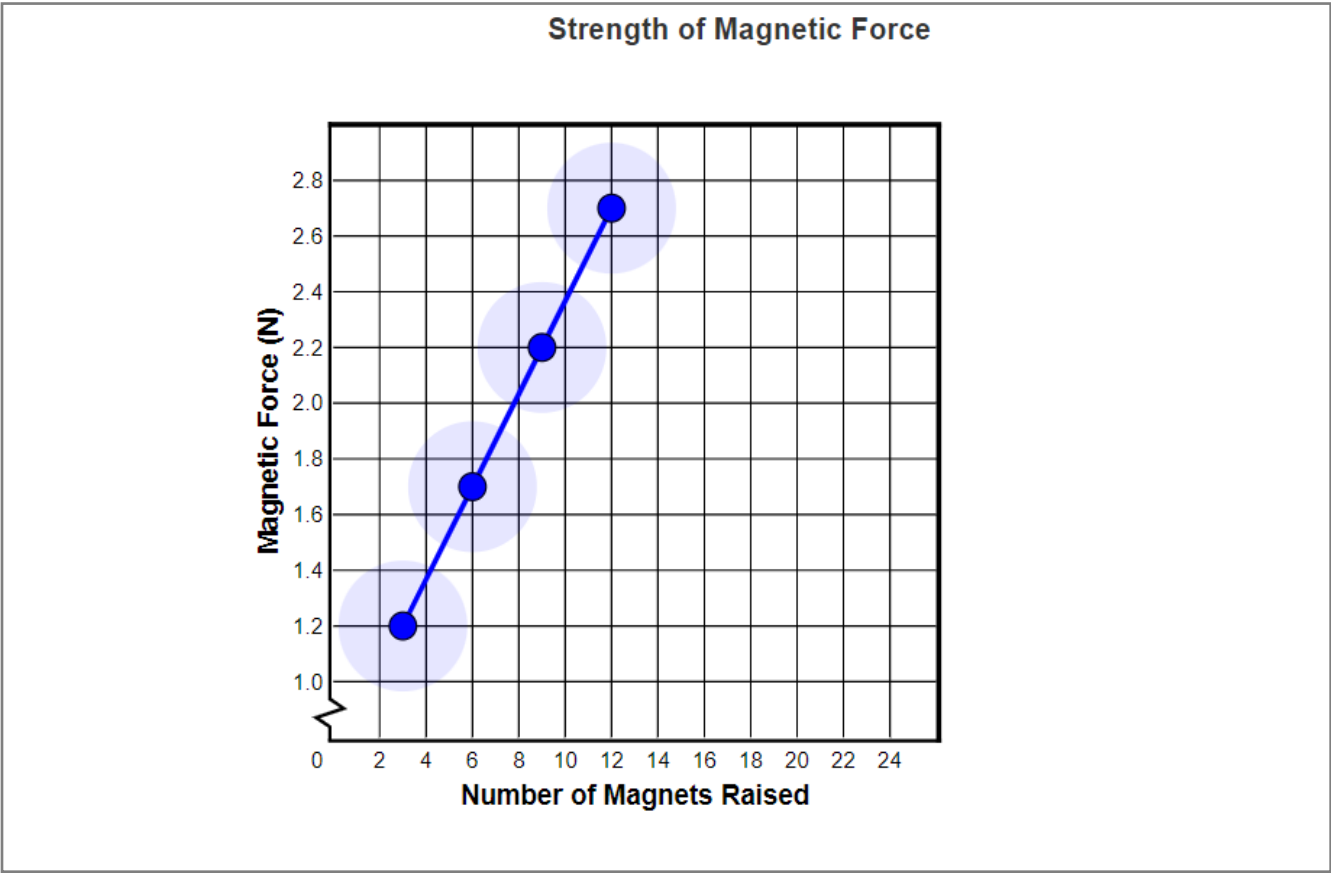
Trial	Force Required (N)
1	1.2
2	1.7
3	2.2
4	2.7

Use the data in **Table 1** and **Table 2** to show the magnetic force needed to raise the magnets in each trial.

Plot a location on the coordinate grid for each of the **four** data points from the table. A line segment will connect the points.

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(Continued)



Scoring Rubric	
Score	Description
1	Student plots points (3, 1.2), (6, 1.7), (9, 2.2), and (12, 2.7).
0	The response is incorrect or irrelevant.

(1 Point)

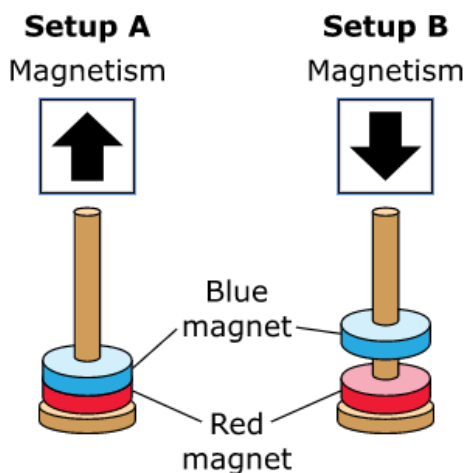
Grade 8 Science Sample Test

Item Number	15
Item Title	Floating Magnets
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	7.P2U1.2
SEP	Develop and use models
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	A floating magnet is acted upon by both gravitational and magnetic forces.
TAGS	S3
Item Type	Graphic Gap Match

A magnetic force exerted from the blue magnet acts on the red magnet in both Setup A and Setup B. The arrows in the diagram represent possible directions of the magnetic force from the blue magnet.

For each setup, select the arrow that represents the direction of the magnetic force acting on the red magnet from the blue magnet.

Move the correct arrow to each box.



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Scoring Rubric	
Score	Description
1	For Setup A, students select the "Up" arrow For Setup B, students select the "Down" arrow
0	The response is incorrect or irrelevant.

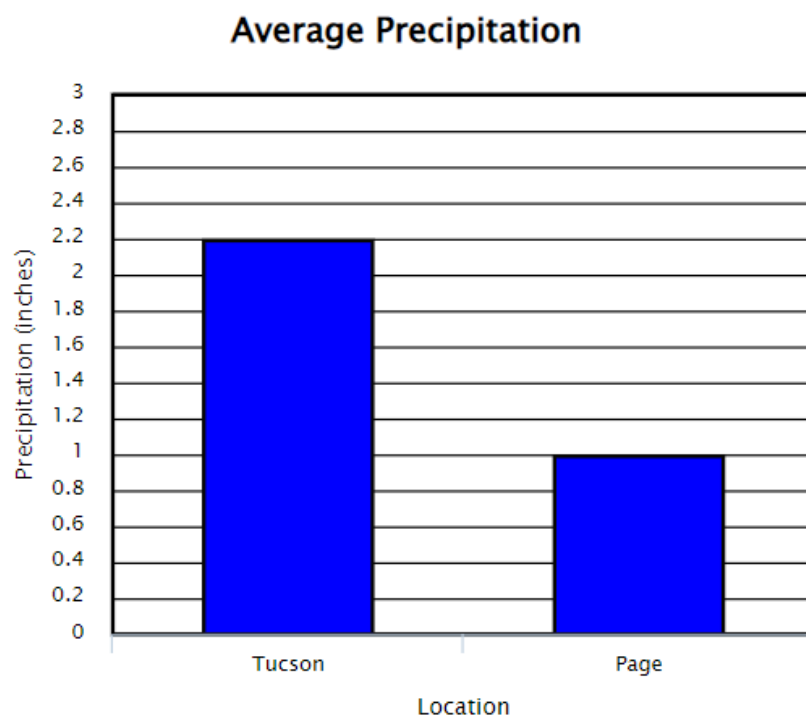
(1 Point)

Grade 8 Science Sample Test

Item Number	16
Item Title	Drought!
Domain (Reporting Category)	Earth and Space Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Critiquing
Content Standard	8.E1U3.7
SEP	Obtain, Evaluate, and Communicate Information
Crosscutting Concepts (CC)	N/A
Phenomenon	Long-range forecasts predicted continued drought in Arizona in 2019, despite higher than normal precipitation in late 2018.
TAGS	S2
Item Type	Bar Graph

Use the data in **Table 1** to create a bar graph that shows the average precipitation for the month that flooding is **most likely** to occur in each city.

Drag the top of each bar to the correct height.



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Scoring Rubric	
Score	Description
1	Student raises bar for Tucson to 2.2 and the bar for Page to 1.0 .
0	The response is incorrect or irrelevant.

(1 Point)

Grade 8 Science Sample Test

Item Number	17
Item Title	Drought!
Domain (Reporting Category)	Earth and Space Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Does not contribute
Content Standard	7.E1U2.7
SEP	Develop and Use Models
Crosscutting Concepts (CC)	N/A
Phenomenon	Long-range forecasts predicted continued drought in Arizona in 2019, despite higher than normal precipitation in late 2018.
TAGS	S2
Item Type	Match

Predicting accurate changes in climate over large areas of land for long periods of time has improved with the advancements in technology. Determine whether each tool does or does not help create the models shown in **Figure 2** and **Figure 3**.

Move the answers to the correct boxes.

Helps Create the Models

Computer
(stores/shares data)

Internet
(shares data)

Satellite
(measures large area)

Does Not Help Create the Models

Anemometer
(wind speed)

Barometer
(atmospheric pressure)

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(Continued)

Scoring Rubric	
Score	Description
1	Helps Create the Models: Students select choice Computer, Internet, Satellite Do Not Help Create the Models: Students select choices Anemometer, Barometer
0	The response is incorrect or irrelevant.

(1 Point)

Grade 8 Science Sample Test

Item Number	18
Item Title	Planet Diameters
Domain (Reporting Category)	Earth and Space Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Investigating
Content Standard	6.E2U1.7
SEP	Analyze and Interpret Data
Crosscutting Concepts (CC)	Patterns
Phenomenon	A student notices significant differences when comparing diameters between the inner four planets.
TAGS	G3
Item Type	Multiple Choice

Students review data about the diameters of the inner planets. The students recorded the diameter of each planet in the table shown.

Planet	Planet Diameter (km)
Mercury	4,880
Venus	12,104
Earth	12,756
Mars	6,792

Based on the data table, which statement **best** compares the diameters of the inner planets?

- ☐ A. The diameter of Venus is larger than the diameter of Earth but smaller than the individual diameters of Mercury and Mars.
- ☒ B. The diameter of Venus is larger than the individual diameters of Mercury and Mars but smaller than the diameter of Earth.
- ☐ C. The diameter of Venus is larger than the individual diameters of Earth and Mars but smaller than the diameter of Mercury.
- ☐ D. The diameter of Venus is larger than the diameter of Mars but smaller than the individual diameters of Mercury and Earth.

(1 Point)

Grade 8 Science Sample Test

Item Number	19
Item Title	Rates of Photosynthesis
Domain (Reporting Category)	Life Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	7.L2U1.12
SEP	Construct Explanations and Design Solutions
Crosscutting Concepts (CC)	Cause and Effect
Phenomenon	A student notices that different amounts of light reaching a plant can affect the rate of photosynthesis.
TAGS	G3
Item Type	Multiple Choice

Scientists conducted an experiment using a plant with purple leaves called purple bok choi. Some of the plants were grown in a poorly-lit environment. Some of the plants were grown in a well-lit environment. Both sets of plants were grown for a period of 15 days. The table shows the scientists' observations.

Environment	Observations
Poorly lit	• Shorter plants • Fewer purple leaves • Absorbs less carbon dioxide • Releases less oxygen
Well lit	• Taller plants • More purple leaves • Absorbs more carbon dioxide • Releases more oxygen

Which statement **best** explains the result of the scientists' experiment?

- ☐ A. Bok choi grown in the poorly-lit environment were equally able to perform photosynthesis.
- ☐ B. Bok choi grown in the poorly-lit environment were not able to perform photosynthesis.
- ☒ C. Bok choi grown in the well-lit environment were better able to perform photosynthesis.
- ☐ D. Bok choi grown in the well-lit environment were less able to perform photosynthesis.

(1 Point)

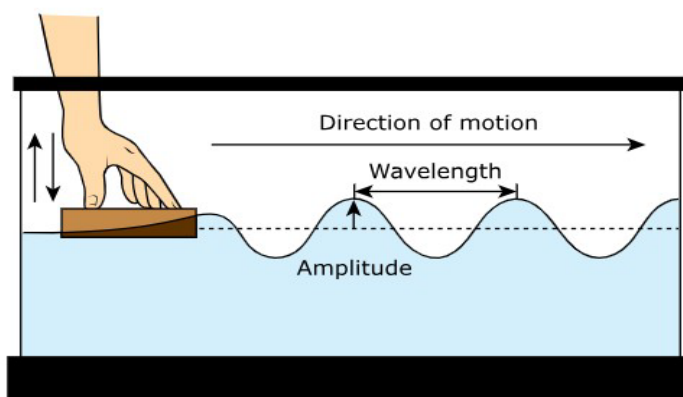
Grade 8 Science Sample Test

Item Number	20
Item Title	Waves in a water tank
Domain (Reporting Category)	Physical Science
Science and Engineering Practices (SEP) Group (Reporting Category)	Sensemaking
Content Standard	8.P4U1.4
SEP	Develop and Use Models
Crosscutting Concepts (CC)	Energy and Matter
Phenomenon	A teacher makes waves in a water tank using a floating board. A student notices that a water wave changes its pattern when the teacher changes how hard board floating board is pushed.
TAGS	G3
Item Type	TPD - Multiple Choice and Multiple Choice

Note: This question has two parts – Part A

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

A teacher makes an even wave pattern in a water tank by pushing a floating board at a constant, steady rhythm. The figure shows the wave pattern that is present in the water tank.



While keeping the rhythm steady, the teacher pushes harder on the floating board.

Part A

Which change to the wave pattern in the figure will be observed?

- ☐ A. The wave will move slower across the tank.
- ☐ B. The wave will move faster across the tank.
- ☐ C. The wave will be shorter.
- ☒ D. The wave will be taller.

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Note: This question has two parts(cont.) – Part B

Part B

Which statement **best** explains the answer to Part A?

- ☒ A. Pushing harder on the floating board will add energy to the wave and cause the amplitude to change.
- ☐ B. Pushing harder on the floating board will add energy to the wave and cause the wavelength to change.
- ☐ C. Pushing harder on the floating board will remove energy from the wave and cause the amplitude to change.
- ☐ D. Pushing harder on the floating board will remove energy from the wave and cause the wavelength to change.

(1 Point)