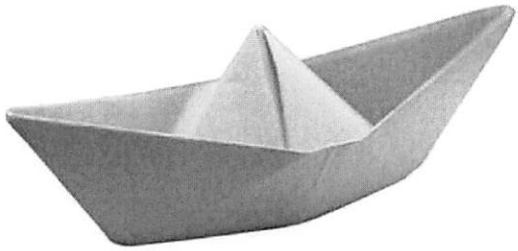
5th grade Science

Post Test - Science

Question 1 .

Shelley folded a piece of paper into a boat, like the one shown here.



Turning the paper into a boat is

- **A.** a physical change because no new substance is formed.
- **B.** a physical change because heat is produced.
- **C.** a chemical change because the boat will float.
- **D.** a chemical change because the paper is folded.

Question 2 .

A watershed is an area of land that drains into one water system. Healthy watersheds are important for providing clean water. Watersheds need a certain amount of groundwater to stay healthy. Water that is absorbed by the ground forms groundwater. Water that is not absorbed by the ground can run off into rivers and leave the watershed.

Based on this information, which practice would best help conserve the water in a watershed?

- **A.** removing most of the dams in the rivers of a watershed
- **B.** reducing the number and size of the farms that are found within a watershed
- **C.** covering more of the surface of the land with roadways or buildings
- **D.** decreasing the amount of land covered with waterproof surfaces like pavement

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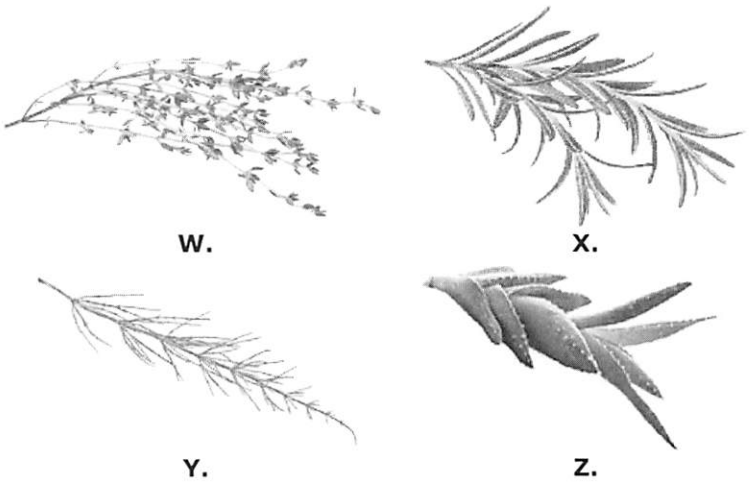
Question 3 .

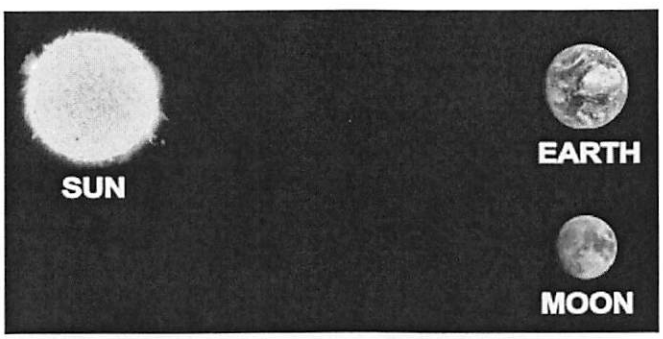
Deserts get very little rain. Plants that grow in deserts often have thick leaves. Thick leaves help plants hold onto water. Which leaves are likely from a plant that grows in deserts?



- **A.** Z
- **B.** X
- **C.** W
- **D.** Y

Question 4 .

Ayanna's friend tells her that there will be a lunar eclipse later today. Ayanna looks up the current positions of the Earth, Moon, and Sun, and she finds that they are in the positions shown below.



Why should Ayanna not believe that there will be a lunar eclipse today?

- **A.** The Moon is moving around the Earth in the wrong direction.
- **B.** The Earth and the Moon are on the same side of the Sun.
- **C.** The Earth is not positioned between the Sun and the Moon.
- **D.** The Moon is not blocking sunlight from hitting the Earth.

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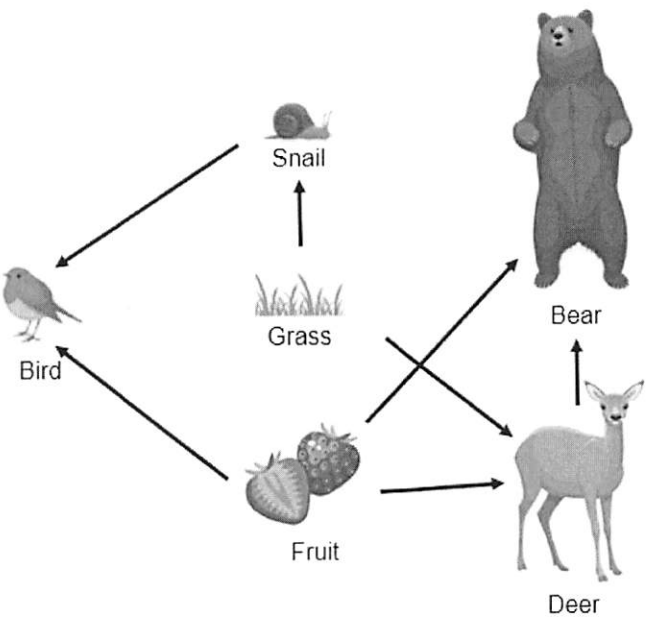
Question 5 .

The picture below shows a food web for a forest.

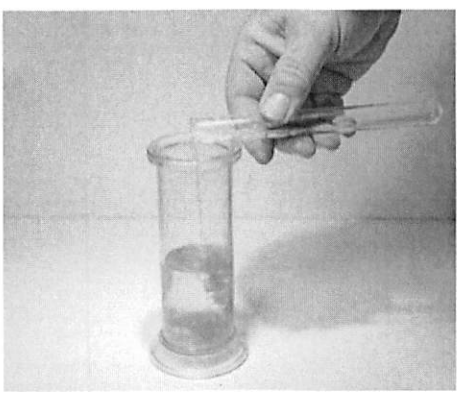


What would happen if more birds moved into the area?

- **A.** Bears would eat fewer deer.
- **B.** Snails would eat more grass.
- **C.** Snails would have more birds to eat.
- **D.** Deer would have less fruit to eat.

Question 6 .

In science class, Mr. Payne adds a clear solution from a test tube to a second clear solution.



What happened when the two solutions were mixed?

- **A.** A new substance was formed, since mixing always forms a new substance.
- **B.** A new substance was formed, since the color was different from the original solutions.
- **C.** A new substance was not formed, since the container was not heated.
- **D.** A new substance was not formed, since the mixture remained liquid.

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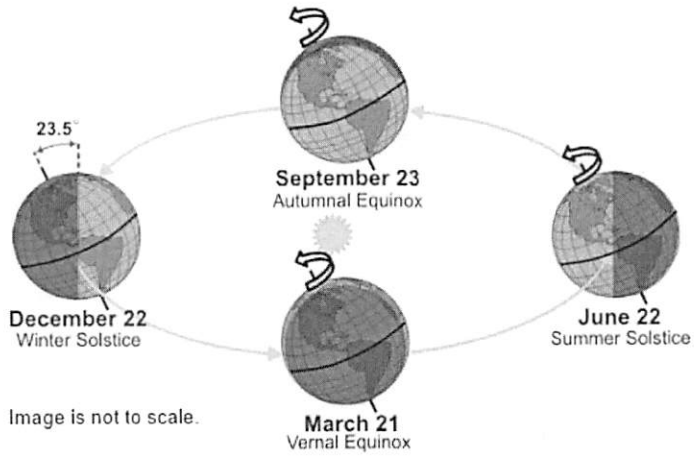
Question 7 .

The diagram below shows the position of the Earth in relation to the Sun at the beginning of each season.



Modified from image courtesy of NOAA

Based on the diagram, why are summer days longer than winter days in the Northern Hemisphere?

A. The Earth is much further from the Sun during summer than during winter.

B. The Northern Hemisphere is pointed toward the Sun during summer.

C. The Northern Hemisphere is pointed away from the Sun during summer.

D. The Earth is much closer to the Sun during summer than during winter.

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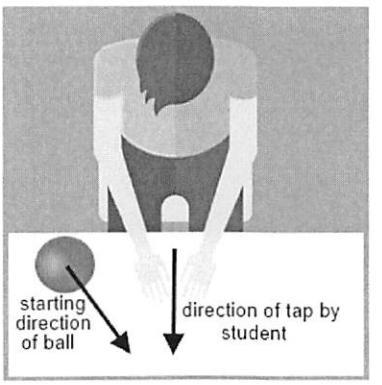
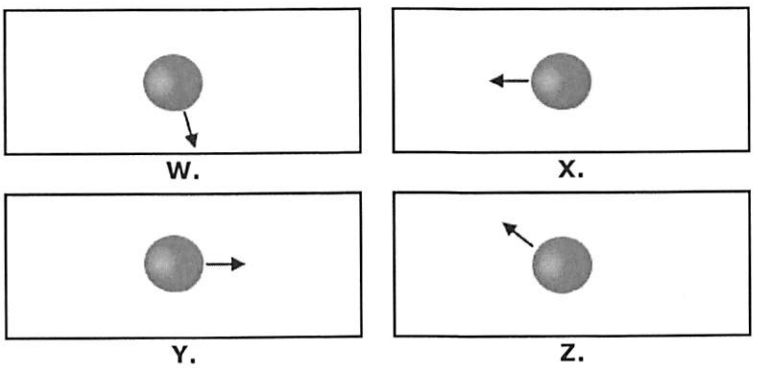
Question 8 .

The picture below shows a ball rolling across a table. A student taps the ball in the direction shown.



In which direction does the ball most likely move after the student taps the ball?



- **A.** X
- **B.** Y
- **C.** W
- **D.** Z

Question 9 .

Which of the following represents a non-contact force affecting the motion of an apple?

- **A.** an apple falling from a tree
- **B.** an apple rolled across a table
- **C.** an apple picked from a tree
- **D.** an apple tossed across a room

Question 10 .

Chantel stirred 50 grams of sugar into 200 mL of water at 25°C to make a sugar-water solution. What could Chantel do next to make the solution more concentrated?

- **A.** add 10 grams of sugar to the solution
- **B.** heat the solution to 35°C
- **C.** add 30 mL of water to the solution
- **D.** pour 20 mL of the solution down the drain

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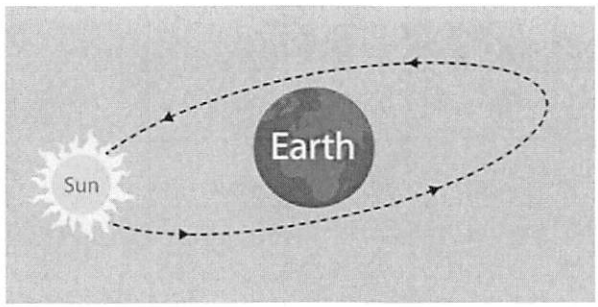
Question 11 .

Ancient astronomers Ptolemy and Aristotle believed that the Earth was the center of the Solar System. A simplified model of this idea is shown in the image below.

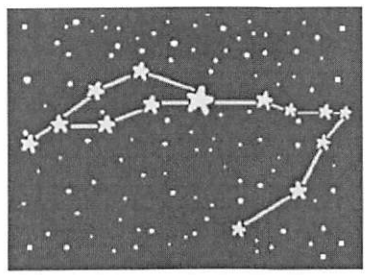


How has this understanding of the Solar System changed over time?

- **A.** Copernicus and Galileo demonstrated that the Moon is the center of the Solar System.
- **B.** Modern astronomers have found that the Earth orbits the Moon and both of these orbit the Sun.
- **C.** Copernicus and Galileo introduced the Sun-centered model, which is now supported by research.
- **D.** Modern astronomers have shown that the Sun orbits the Earth, but the other planets of the Solar System do not.

Question 12 .

Dean looks outside one autumn night during November. He sees the constellation Pisces and draws the picture below to represent it.



A few months later, it is winter, and Dean can no longer see the constellation Pisces in the night sky. When will he most likely be able to see it again?

- **A.** next autumn
- **B.** next spring
- **C.** next month
- **D.** next week

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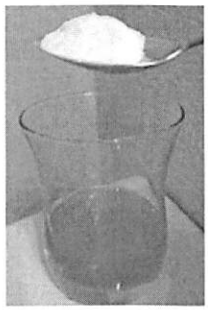
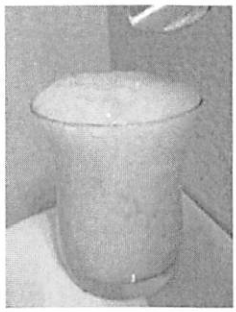
Question 13 .

Donna's teacher is about to pour a spoonful of baking soda into a cup of vinegar.



After the teacher pours the baking soda into the vinegar, the mixture starts to bubble.



What happens when the baking soda mixes with the vinegar?

- **A.** The vinegar turns into baking soda.
- **B.** A new substance forms.
- **C.** The baking soda turns into vinegar.
- **D.** The baking soda and the vinegar both stay the same.

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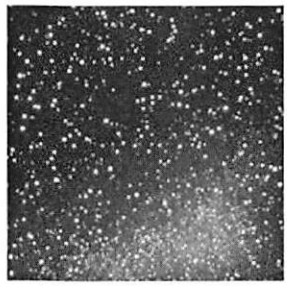
Question 14 .

The pictures show the Sun and the stars as someone might see them from Earth.

Sun



Stars

Why does the Sun look so much larger than the stars?

- **A.** The Sun is many times larger than any other star.
- **B.** The Sun burns brighter than any other star.
- **C.** It is daytime when the Sun is out but nighttime when we see the stars.
- **D.** The Sun is much closer to the Earth than the stars are.

Question 15 .

Malik has water and olive oil in a glass. The olive oil is floating on top of the water. He stirs the liquids to mix them. Malik watches the mixture and sees drops of oil floating back to the surface. The image below shows the drops of olive oil in water.

Which statement best describes what happens to the physical properties of the oil when it is mixed with the water?

- **A.** The color stays the same and the density changes.
- **B.** The color and density both change.
- **C.** The color and density both stay the same.
- **D.** The color changes and the density stays the same.

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Question 16 .

Jerome and his sister wanted to make a seasoned solution before they added vegetables and noodles to make soup. First, Jerome added 30 grams of soup mix to the 500 grams of water. Then, he weighed out and added 10 grams of table salt to dissolve into the mixture. What will the total mass of the soup be when the mixture is finished before cooking?

- **A.** The seasoned solution will have a mass of 540 grams because that is the mass of the soup mix, the water, and the table salt combined.
- **B.** The seasoned solution will have a mass greater than 540 grams because matter is created when the table salt and soup mix dissolve in the water.
- **C.** The seasoned solution will have a mass of 510 grams since soup mix does not completely dissolve in water.
- **D.** The seasoned solution will have a mass of 500 grams because matter is lost when the table salt and soup mix dissolve in the water.

Question 17 .

An object is placed on a table. A magnet is slowly moved toward it. The object moves away from the magnet.

The object is most likely

- **A.** a piece of glass.
- **B.** a copper coin.
- **C.** an iron nail.
- **D.** another magnet.

Question 18 .

A fish, a wooden block, an egg, and a rock are placed in a container filled with water. None of the objects are moving.

Based on the positions of the objects in the container, which item has the lowest density?

- **A.** block
- **B.** fish
- **C.** rock
- **D.** egg

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Question 19 .

Mars is smaller than Earth, and it has less gravity.

Scientists take measurements on a certain object as it falls from a certain height on Earth. If the same object falls from the same height on Mars, how will its fall be different?

A. It will fall more quickly and hit the ground with more kinetic energy.

B. It will fall more quickly and hit the ground with less kinetic energy.

C. It will fall more slowly and hit the ground with less kinetic energy.

D. It will fall more slowly and hit the ground with more kinetic energy.

Question 20 .

Jamie has two glasses of water at 20°C and two glasses of water at 40°C. She also has two sugar cubes and two spoonfuls of loose sugar crystals. Each spoonful of sugar contains the same amount of sugar as one of the cubes.

Jamie puts the sugar in the water as shown in the table below.

Glass	Water	Sugar
1	20°C	cube
2	20°C	spoonful
3	40°C	cube
4	40°C	spoonful

In which glass will the sugar dissolve most quickly?

A. glass 1

B. glass 2

C. glass 4

D. glass 3

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Answers

1. A
2. D
3. A
4. C
5. D
6. B
7. B
8. C
9. A
10. A
11. C
12. A
13. B
14. D
15. C
16. A
17. D
18. A
19. C
20. C

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Explanations

15. When the olive oil is mixed with water, a mixture is created. In some mixtures, the physical properties of the ingredients do not change.

the color and density both stay the same.

16. Matter is neither created or destroyed when it is combined. The weight of a mixture will always equal the sum of its parts. In this case all of the ingredients mixed together make the seasoned solution. Therefore, **the seasoned solution should have a mass of 540 grams because that is the mass of the soup mix, the water, and the table salt combined.**

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The Solar System

Question 1 .

Directions: Drag each name to the correct location on the diagram.

The diagram below shows the planets in the Solar System in order from closest to the Sun to farthest. Match each planet with its name.

Earth Jupiter Mars Mercury Neptune Saturn Uranus

Venus

Question 2 .

Directions: Select each correct location on the image.

Which are the inner planets of the Solar System?

Question 3 .

Which movement of the Earth causes the pattern of day and night?

A. the Moon moving around the Earth

B. the Earth spinning on its axis

C. the Earth moving around the Sun

D. the Earth getting closer to and farther from the Sun

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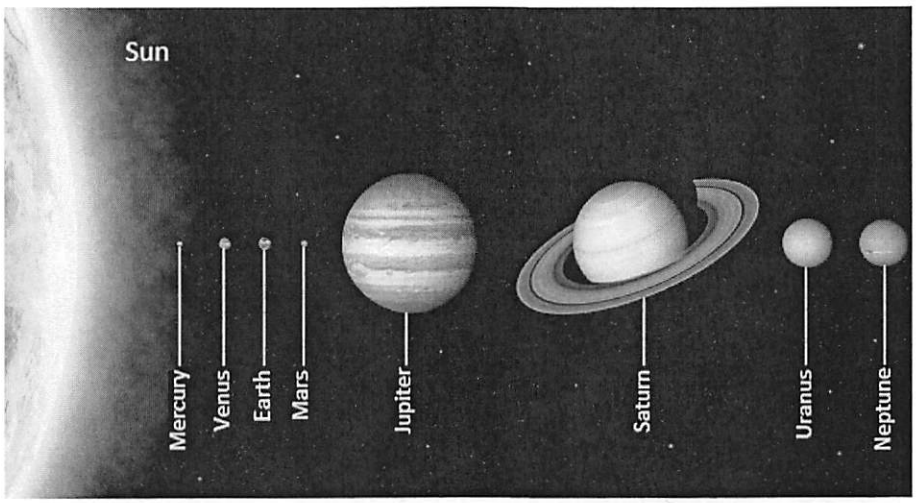
Question 4 .

The diagram below shows one way to model the Solar System.



What is a limitation of this model?

- **A.** It does not correctly show the relative distance of each planet from the Sun.
- **B.** It does not correctly show the relative sizes of the planets.
- **C.** It does not include all of the major planets in the Solar System.
- **D.** It does not correctly show the order of the planets.

Question 5 .

Which planets have rocky surfaces?

- **A.** Mars, Uranus, and Neptune
- **B.** Venus, Earth, and Mars
- **C.** Jupiter, Saturn, and Neptune
- **D.** Earth, Jupiter, and Saturn

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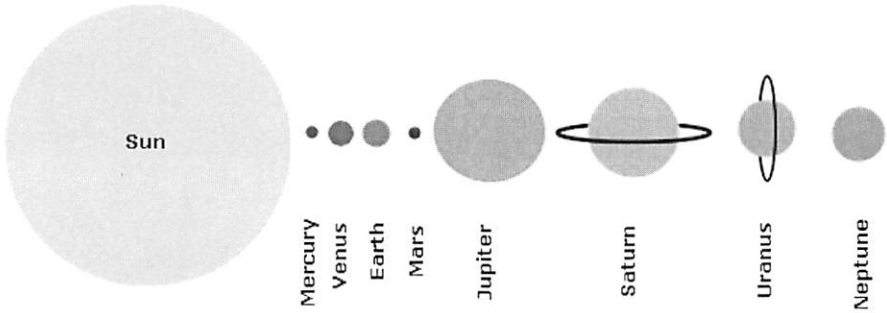
Question 6 .

The picture below shows a model of the Solar System.



What does the model show correctly about the Solar System?

- **A.** the speed that the planets orbit the Sun
- **B.** the exact distance of each planet from the Sun
- **C.** the locations of the planets in order from the Sun
- **D.** the size, to scale, of the orbits of the planets around the Sun

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Answers

1. --
2. --
3. B
4. A
5. B
6. C

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Explanations

1. The diagram below has each planet correctly matched with its name.

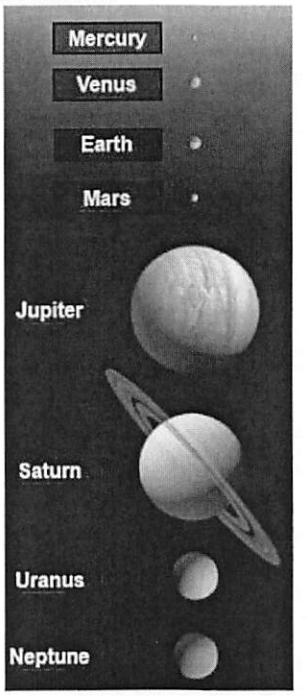

Image courtesy IAU/Martin Kornmesser

In this diagram, the sizes of the planets are to scale. The distances are not to scale.

2. The inner planets of the Solar System are the four planets that are nearest to the Sun: **Mercury**, **Venus**, **Earth**, and **Mars**.

3. The Earth moves around the Sun and spins on its axis. The movement that causes the pattern of day and night is **the Earth spinning on its axis.** The side of the Earth that faces toward the Sun is experiencing day. As the Earth rotates, this side of the Earth moves to face away from the Sun. When this side faces away from the Sun, it is experiencing night.

4. All models have strengths and limitations. A limitation of the model of the Solar System shown is that **it does not correctly show the relative distance of each planet from the Sun.** The model does, however, show all of the planets in the correct order from the Sun. It also correctly represents the relative sizes of the planets.

5. The planets with rocky surfaces are Mercury, **Venus, Earth, and Mars**. These planets are closest to the Sun.

   The planets that do not have rocky surfaces are Jupiter, Saturn, Uranus, and Neptune. These planets are farthest from the Sun.

6. The model shows **the locations of the planets in order from the Sun.**

   All of the planets orbit the Sun, and the order of planets starting with the closest to the Sun is:

   Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune

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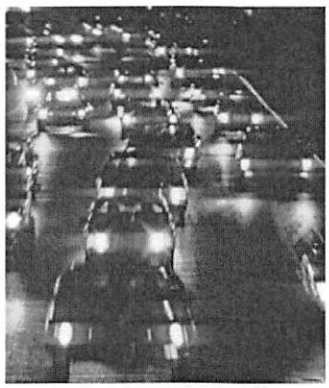
The Sun & Constellations

Question 1 .

Kyle was riding in the car at night. He noticed that the headlights of other cars seemed to get larger as they came closer to him.



How are the headlights of the cars similar to the stars and the Sun?

- **A.** The Sun appears smaller because it is closer to Earth.
- **B.** The Sun is larger than all of the other stars in the galaxy.
- **C.** The Sun appears larger because it is closer to Earth.
- **D.** The Sun is smaller than all of the other stars in the galaxy.

Question 2 .

Why do other stars appear so much dimmer than the Sun?

- **A.** All the other stars are much farther away from us than the Sun.
- **B.** All the other stars are much smaller than the Sun.
- **C.** The Sun is much hotter than all the other stars.
- **D.** The Sun is much brighter than all the other stars.

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Question 3 .

A star chart of the Northern Hemisphere is shown below.

Star charts can be used

- **A.** to determine the density of stars.
- **B.** to locate and identify star patterns.
- **C.** to determine the mass of stars.
- **D.** to determine the temperature of stars.

Question 4 .

A sailor is in a sailboat on the ocean at night and cannot see land. She wants to know the direction of true north. Without knowing her position, how can she use astronomy to find true north?

- **A.** locate the stars that reflect light from the Moon
- **B.** measure the angle between the Sun and the Moon
- **C.** use a telescope to see the direction the stars face
- **D.** find the position of the North Star in the sky

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Question 5 .

This is a photo of the constellation Orion. Orion can be seen from most places in the world at some point during the year. Orion is not seen from the same place all year long because

- **A.** the Earth orbits the Sun, changing the night view from Earth.
- **B.** Orion orbits the Sun, changing its position relative to the Earth.
- **C.** Orion orbits the Earth like the Moon does.
- **D.** the Earth rotates, making Orion visible during the day from some places and during the night from others.

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Answers

1. C
2. A
3. B
4. D
5. A

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Explanations

1. A source of light may be very bright up close, but appear to be dim when it is far away. The other stars in the sky are very large and bright, just like the Sun. **The Sun appears larger and brighter because it is closer to the Earth.**

2. **All the other stars are much farther away from us than the Sun.** It takes many years for the light from even the closest stars to reach the Earth. For stars that are even farther away, it can take billions of years for their light to reach the Earth.

3. A star chart is a map of the night sky that is divided into sections so that it can be used to **locate and identify star patterns.**

4. Stars can be used for navigation at night. With the proper tools and charts, experienced navigators can use the positions of the stars in the sky to find their exact location.

   Even without advanced tools and charts, the North Star (Polaris) can be used to locate true north. This star is directly above the North Pole, so its apparent position in the sky does not change as the Earth rotates. As a result, true north is always directly toward the North Star. Therefore, the sailor can find the position of true north by **finding the position of the North Star in the sky.**

5. Because Earth orbits the Sun, the view of the night sky from Earth at any place on the planet changes throughout the year. Orion is located in such a position in space that it can be seen, at some time during the year, from just about anywhere.

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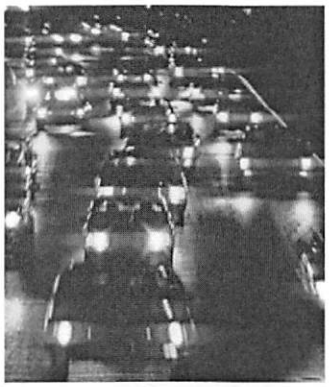

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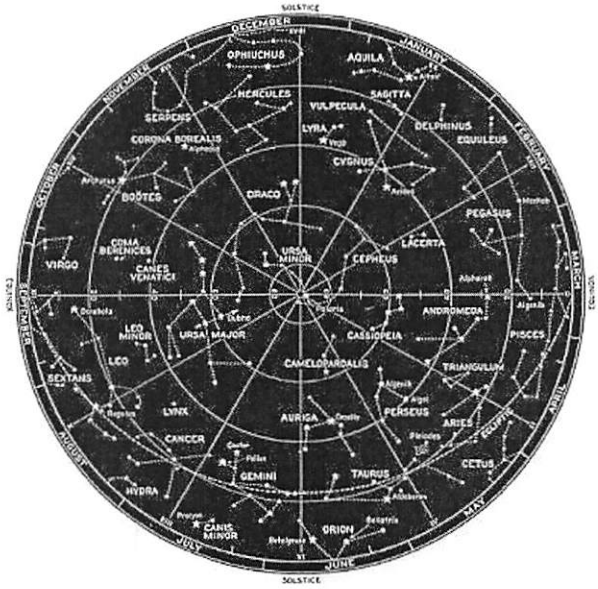

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Answers

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3. B
4. D
5. A

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3. A star chart is a map of the night sky that is divided into sections so that it can be used to **locate and identify star patterns.**

4. Stars can be used for navigation at night. With the proper tools and charts, experienced navigators can use the positions of the stars in the sky to find their exact location.

   Even without advanced tools and charts, the North Star (Polaris) can be used to locate true north. This star is directly above the North Pole, so its apparent position in the sky does not change as the Earth rotates. As a result, true north is always directly toward the North Star. Therefore, the sailor can find the position of true north by **finding the position of the North Star in the sky.**

5. Because Earth orbits the Sun, the view of the night sky from Earth at any place on the planet changes throughout the year. Orion is located in such a position in space that it can be seen, at some time during the year, from just about anywhere.

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Earth, Sun & Moon System

Question 1 .

Directions: Select the correct image.

Which of the images below shows the positions of the Earth, Moon, and Sun during a solar eclipse?

Question 2 .

The image below shows the Sun, Earth, and Moon in alignment. The image is not drawn to scale.

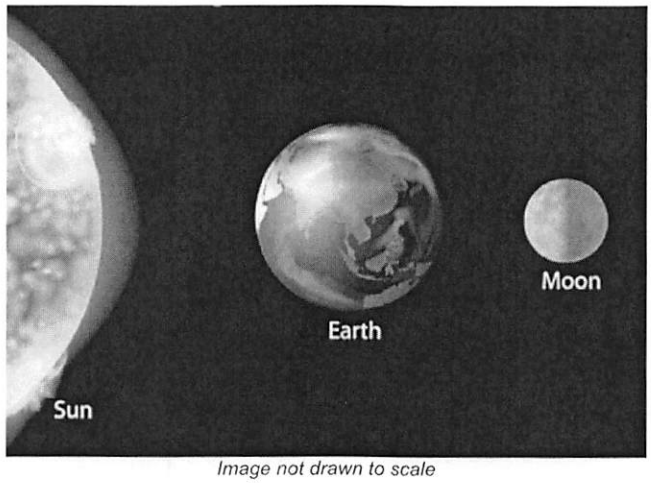

Image not drawn to scale

In what phase would the Moon appear to a viewer from Earth during this alignment?

- **A.** full moon
- **B.** crescent moon
- **C.** new moon
- **D.** half moon

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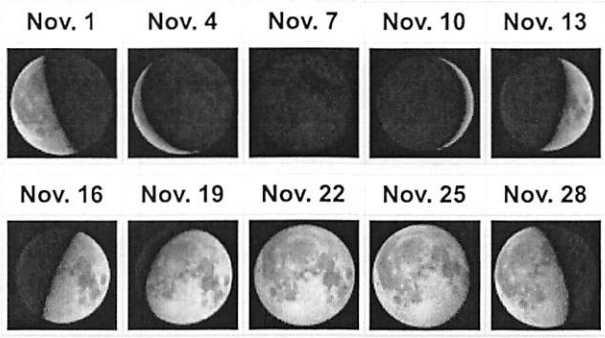
Question 3 .

A certain spacecraft can observe the positions and motions of the Sun, Earth, and Moon. Which observation can it only make once each year?

- **A.** The Moon travels around the Sun.
- **B.** The Moon travels around the Earth.
- **C.** The Moon goes through all its phases.
- **D.** The Moon rotates on its axis.

Question 4 .

While researching Moon phases, Akiva found images of what the Moon looked like for several days in November one year.



Images courtesy of NASA

On which day was the Moon most directly in between the Earth and the Sun?

- **A.** November 1
- **B.** November 7
- **C.** November 16
- **D.** November 22

Question 5 .

Which of the following best summarizes the views of Aristotle and Ptolemy versus the views of Copernicus and Galileo on solar system models?

- **A.** All four of these astronomers favored a Sun-centered solar system model.
- **B.** All four of these astronomers favored an Earth-centered solar system model.
- **C.** Aristotle and Ptolemy made Earth-centered models that were complicated and based on ancient Greek teachings. Later in history, Copernicus and Galileo worked with simpler, Sun-centered models that led to the modern solar system model.
- **D.** Copernicus and Galileo made Earth-centered models that were complicated and based on ancient Greek teachings. Later in history, Aristotle and Ptolemy worked with simpler, Sun-centered models that led to the modern solar-system model.

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Answers

1. --
2. A
3. A
4. B
5. C

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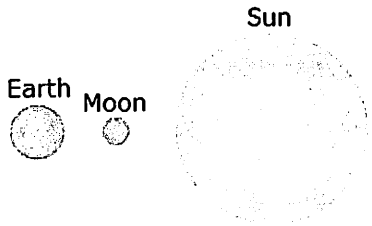
Explanations

1. The image below shows the positions of the Earth, Moon, and Sun during a solar eclipse.



During a solar eclipse, the Moon is between the Earth and the Sun and prevents some of the Sun's light from reaching the Earth.

2. The Moon does not produce any light of its own. "Moonlight" is actually light from the Sun that is reflected by the Moon. The Moon appears to change shape because it reflects a different amount of light depending on where it is.

In the image, the Earth is in between the Moon and the Sun. So, the side of the Moon that can be seen from Earth is facing the Sun. As a result, this side of the Moon is lit up by the Sun. When this happens, a viewer on Earth sees a **full moon**.

3. The Earth revolves around the Sun once each year. The Moon revolves around the Earth once each month.

Because the Earth is constantly traveling around the Sun, the Moon also moves around the Sun while it is orbiting the Earth. As a result, **the Moon travels around the Sun** once each year.

4. When the Moon is between the Earth and the Sun, the Sun's light hits the part of the Moon that faces away from the Earth. Because of this, the Moon appears dark from Earth. This Moon phase is called a new moon.

Based on the images that Akiva found in his research, the new moon occurred on **November 7**.

5. In general, earlier astronomers like Aristotle and Ptolemy thought the Earth was at the center of everything. Earth-centered models of the solar system had to be very complicated to explain observations in the sky.

Later, astronomers like Copernicus and Galileo made Sun-centered models that were simpler and better explained motions in the sky.

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Earth's Seasons

Question 1 .

Directions: Drag each label to the correct location on the diagram.

The diagram below shows the positions of the Earth and Sun during different times of the Earth year. Each position represents the first day of a particular season.

Use the labels to correctly identify the season that the Northern Hemisphere is beginning to experience in each position.

fall summer winter spring

Question 2 .

It takes the Earth _____ to complete one revolution around the Sun.

A. one month

B. one hour

C. one day

D. one year

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Question 3 .

Directions: Select the correct answer from each drop-down menu.

The Earth's axis of rotation is tilted. Because of this, the amount of sunlight an area on the planet receives each day varies depending on the time of year. These variations result in four distinct seasons.

The diagram below shows the Earth at one particular point in its yearly revolution around the Sun.

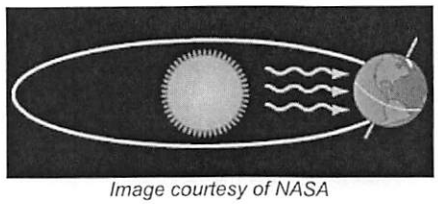

Image courtesy of NASA

When the Earth is in the position shown above, the Southern Hemisphere experiences the beginning of [▾] because that hemisphere is tilted [▾] the Sun.

Question 4 .

Directions: Select the correct diagram.

The Earth's axis of rotation is tilted. Because of this, the amount of sunlight a point on the surface receives each day varies depending on the time of year. These variations result in four distinct seasons.

The diagrams below show the Earth at four different points in its yearly revolution around the Sun. Which of the below positions will result in maximum daylight hours and the warmest temperatures for the Northern Hemisphere?

Question 5 .

During the winter, days are _____ than in the summer.

- **A.** shorter
- **B.** brighter
- **C.** slower
- **D.** longer

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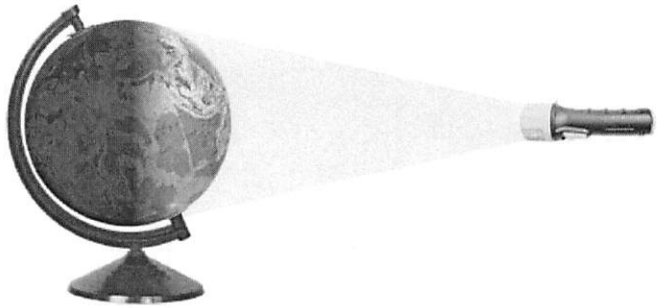
Question 6 .

Julio is using a globe and a flashlight to model what causes the seasons. To represent winter in the Northern Hemisphere, he positions the globe and flashlight as shown.



How should Julio adjust his model to represent summer in the Northern Hemisphere?

- **A.** He should move the flashlight upward so that it shines down onto the Northern Hemisphere.
- **B.** He should put the globe on the other side of the flashlight and turn the flashlight around.
- **C.** He should make the flashlight brighter and move it closer to the globe.
- **D.** He should spin the globe on its tilted axis so that the other half of it is lit.

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Answers

1. --
2. D
3. --
4. --
5. A
6. B

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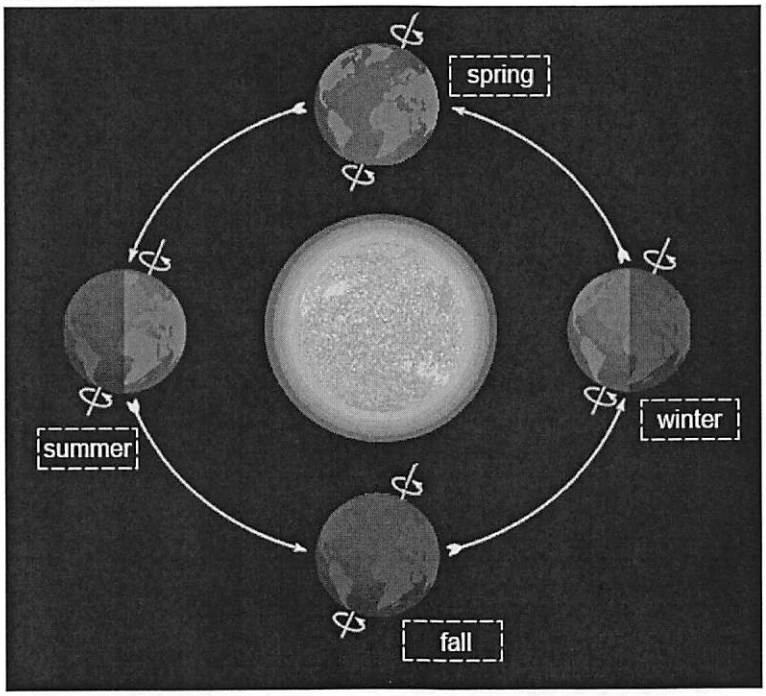
Explanations

1. The constant change of Earth's orientation relative to the Sun causes the change of seasons on Earth. When a part of the Earth points more toward the Sun, that part of the Earth receives more heat. That part of the world receives the most heat when summer begins. When the Earth is on the opposite side of the Sun, that same part of the world is having winter.
Spring and summer occur between summer and winter. During the spring and fall equinoxes, Earth's axis is neither tilted toward nor away from the Sun. Therefore, there are twelve hours of daylight and twelve hours of night everywhere on Earth. Spring occurs after winter and fall occurs after summer in the diagram.
A correctly filled out diagram is shown below:



2. It takes the Earth **one year** to complete one revolution around the Sun.

   The Earth follows an orbit around the Sun, which takes 365 days to complete. Planets that are closer to the Sun take less time to revolve around the Sun than do planets that are farther away from the Sun.

3. The Southern Hemisphere experiences **summer** when it is tilted **toward** the Sun. This is because the hemisphere receives sunlight more directly in that position. And while it is summer in the Southern Hemisphere, it is winter in the Northern Hemisphere.

4. When the Earth is at position shown below, the Northern Hemisphere is tilted toward the Sun and will receive sunlight more directly than at any other time of the year.

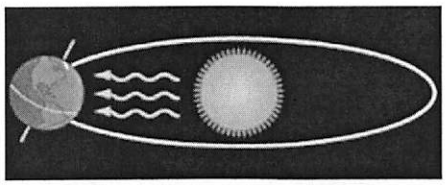


Image courtesy of NASA

   This position corresponds to the beginning of summer in the Northern Hemisphere and is when that hemisphere experiences maximum daylight hours and warm temperatures.

5. The number of daylight hours changes during the year. It is usually cooler in the winter than in the summer. One reason for this is, in the winter, the days are shorter than in the summer.

   The other main reason for cooler winters is that the Sun is lower in the sky than in the summer. This means that less direct sunlight is reaching the ground, and this makes it cooler.

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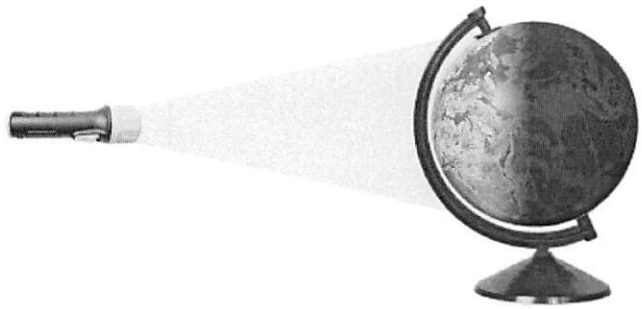
6. The seasons are caused by the tilt of Earth's axis and by its revolution around the Sun. When the North Pole is tilted away from the Sun, it is winter in the Northern Hemisphere. When the Earth travels around to the other side of the Sun, the North Pole will be tilted toward the Sun, and it will be summer in the Northern Hemisphere.

The best way for Julio to model summer in the Northern Hemisphere is to **put the globe on the other side of the flashlight and turn the flashlight around**, as shown below.



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Conserving Earth's Natural Resources

Question 1 .

Soil tilling is a farming practice where farmers mix or turn over the soil between growing seasons. Soil tilling can have the following effects:

- It makes the soil more compact, which reduces the amount of water that it can absorb.
- It decreases the number of microbes and earthworms in the soil, which makes the soil less fertile.
- It breaks apart clumps in the top layer of soil, which makes the soil more likely to erode.

No-till farming is an alternative farming practice. In this practice, farmers do not till the soil between growing seasons. What is a benefit of no-till farming?

- **A.** It allows more soil to be transported from farms to surrounding environments.
- **B.** It can make farms more productive by decreasing the growth of microbes.
- **C.** It increases the amount of water released as surface runoff by farms.
- **D.** It can help conserve Earth's soil and water while increasing soil fertility.

Question 2 .

Plastic decomposes very slowly in a landfill. Some plastic can last for thousands of years. Which of the following could help solve the problem of plastic filling up a landfill?

- **A.** use fabric bags instead of plastic bags for groceries
- **B.** use a washable bottle to drink out of
- **C.** put used plastic in the recycle bin
- **D.** all of these

Question 3 .

The data table below displays information about the amount of precipitation, such as rain, that a community received.

Precipitation Totals

Average precipitation each year	41 cm
Measured precipitation for 2008	19 cm

Which of the following would most likely have been a response by the community to the amount of precipitation it received in 2008?

- **A.** The community may have asked residents to let their taps run constantly.
- **B.** The community may have asked residents to clean and refill their swimming pools.
- **C.** The community may have put restrictions on how residents could use water.
- **D.** The community may have decided to open a car washing business.

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Question 4 .

A city just discovered that the levels of pollutants in the lake near the city's center are very high.

Which solution should the city choose to keep the lake water from becoming more polluted?

A. Increase how frequently the water in the lake is tested for pollutants.

B. Promote the use of pesticides to reduce insect life in the lake.

C. Improve the water waste management near rivers flowing into the lake.

D. Prohibit all public access to the lake and surrounding land.

Question 5 .

Which of the following can affect a watershed?

A. Pollution and pesticides that are carried by water can harm plants and animals.

B. The sediment that is moved by the water can be deposited elsewhere.

C. Minerals and gases that are absorbed by draining water can enter water sources.

D. all of these

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Answers

1. D
2. D
3. C
4. C
5. D

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Explanations

1. Tilling increases soil erosion and reduces the amount of water that can be absorbed by the soil. This means tilling causes soil and water to be lost to the environment. As a result, farmers have to use more of these resources. No-till farming prevents these losses, so no-till farming **can help conserve Earth's soil and water**.

   Tilling can also make the soil less fertile by removing some microbes and earthworms. No-till farming helps the soil keep the microbes and animals it needs to be productive. So, no-till farming also **increases soil fertility.**

2. People can keep plastic out of the landfill in **all of these** ways.

   - Reduce the need for plastic by using fabric bags.
   - Reuse a washable drinking bottle instead of disposable ones.
   - Recycle any plastic that cannot be reused instead of putting it in the garbage.

3. In 2008, the community received less than half the amount of precipitation it usually receives. The community would have been able to use this information to predict a water shortage. The community would have more than likely responded to the water shortage by placing **restrictions on how residents could use water**.

4. Better management of waste water will help prevent waste ending up in lakes and decrease water pollution as a whole. So, the best solution to keep the lake water from becoming more polluted is to **improve the water waste management near rivers flowing into the lake.**

5. Watersheds can be impacted by many things. Humans can impact watersheds because they use pesticides and create pollution, which can enter the water. **Pollution and pesticides that are carried by water can harm plants and animals.** In addition, **minerals and gases that are absorbed by draining water can enter water sources** and impact the quality of the water. Also, **the sediment that is moved by the water can be deposited elsewhere**, changing the structure of the land.

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Design Solutions for Manmade & Natural Disasters

Question 1 .

Mr. Benedict's class was working on an engineering design problem. Here are three of their solutions:

- Louise made a very strong model house. All of its parts were held strongly together.
- Edgardo made a flexible tower. It could bend and twist without breaking.
- Beau made a building with springs between it and the ground.

Mr. Benedict's students were most likely trying to design buildings that could stand going through

- **A.** a tsunami.
- **B.** a volcanic eruption.
- **C.** an earthquake.
- **D.** a flood.

Question 2 .

A science class is studying how flooding during a hurricane can affect an area. During a flood, water can get into a building and ruin the floor and walls. The class has decided to try and find materials that will reduce the damage flooding can do to a building. They will then use the materials to design a model to put in front of buildings to stop the water. Which of these would best show that a model is successful?

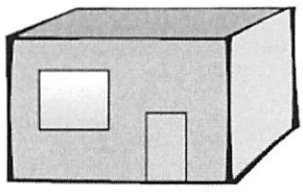
- **A.** The model can stop water from entering a building.
- **B.** The model can be finished in less than five days.
- **C.** The model only costs ten dollars to make.
- **D.** The model can move water into another building nearby.

Question 3 .

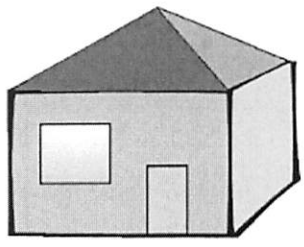
Felicity's class designed roofs for model houses. Each roof was tested to see:

- how much material was used. This is how much the roof "cost."
- how hard a large fan had to blow on the model to lift the roof (or the house).
- how much shaved ice could be sprinkled on top of the model without the roof falling in.

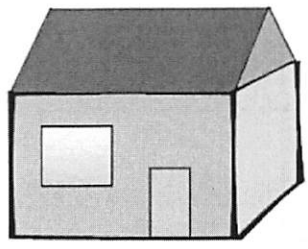
The models that best fit the criteria are below.



Erica's roof cost the least.



Felicity's roof could stand the most wind.



Andrew's roof could take the most ice.

Where would Felicity's roof be the best design?

- **A.** places where floods are common
- **B.** places where hurricanes are common
- **C.** places where snowstorms are common
- **D.** places where droughts are common

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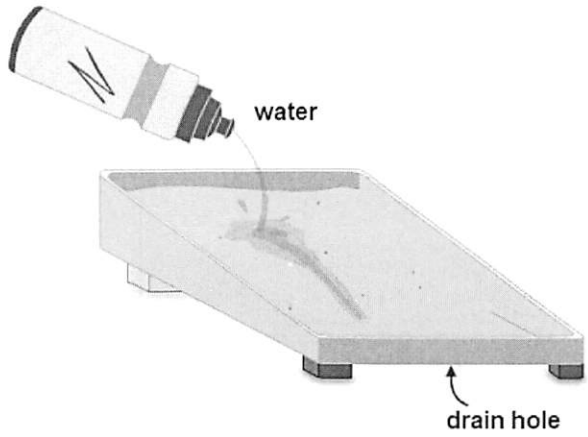
Question 4 .

The playground at a school floods when it rains. This damages the playground and keeps students from playing outside. Students and teachers at the school are designing a solution to reduce the amount of flooding at the playground.

To find the best solution, they build a model of their playground using a sediment tray. They fill the sediment tray with sand from their playground and pour water onto it from a water bottle. The flood water is then collected and measured from the drain hole in their design.



The students and teachers test many different solutions, such as blocking the water with a wall and covering the sand with grass. How will the students and teachers know when their solution is successful?

- **A.** when less water is collected from the drain hole
- **B.** when the water bottle has no more water in it
- **C.** when the sand is completely dry
- **D.** when the playground is rebuilt

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Question 5 .

A city located on a coastline wants to prepare in case there is an oil spill. Several characteristics of the city are shown below.

- The wind blows strongly from the ocean toward the land.
- The temperature changes from warm to cold on the ocean surface rapidly and often.
- Grasses were recently planted on the beach area to reduce erosion.

The city looks at four different types of cleanup methods to prepare for an oil spill. They only have enough money for one type of cleanup method. There is also a college nearby with scientists. The scientists will help by trying to improve the method the city chooses.

The city must choose from the oil spill cleanup types shown.

Cleanup Method	Description	Advantage	Disadvantage
1	It shrinks oil spills to small droplets of water.	It helps small organisms decompose the oil.	It can be toxic to certain marine organisms.
2	Fires are set to oil layers floating on water to "burn off" the oil.	It is easy to keep the cleanup in a smaller area, and easy to start.	It produces smoke which can pollute the air.
3	Heavy machinery is used to scrape up or collect oil from the shore.	It is inexpensive and releases few chemicals into the water.	Large machinery on the coast can damage coastlines.
4	Tiny marine organisms are added to the ocean to decompose the oil.	It is inexpensive and uses a natural process.	The temperature and amount of nutrients in the water must be just right.

What method and action should the city take to best prepare for any type of oil spill that happens?

A. They should choose method 3 and design a way to more quickly bring the machinery to the coast.

B. They should choose method 1 and design a way to reduce possible toxic effects.

C. They should choose method 4 and design a way to make the tiny organisms decompose one specific type of oil.

D. They should choose method 2 and design a way to more quickly start the fires.

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Answers

1. C
2. A
3. B
4. A
5. B

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Explanations

1. All three of these buildings were designed to stand **an earthquake.** A strong building that is held together well is less likely to come apart if it is shaken. A flexible tower can bend as the ground moves instead of breaking. The right kind of springs can smooth out sudden motions. A strong building would not help in a flood. A building on springs would not help in a tsunami. No kind of building can stand up to lava from a volcano.

2. It would be best to test if **the model can stop the water from entering a building.** The most important part of the model is that it protects the building. If the students want flooding to be stopped, they need to make sure their model can prevent water from entering into a building and causing damage.

3. Houses can be designed to help us deal with weather hazards such as floods, snowstorms, and hurricanes. The kind of roof Felicity made is used in **places where hurricanes are common** because it is very hard for wind to tear that kind of roof off the house.

   Andrew's style of roof is used in many places where there is rain or snow. The slope of the roof lets snow slide off it.

   Erica's kind of roof is mostly used in very dry places.

4. The students and teachers are trying to reduce the flooding at their playground. To determine the best solution they built a model using a sediment tray. The sediment tray collects the flood water though the drain hole. So, the teachers and students will know the flooding has been reduced and that their design is successful **when less water is collected from the drain hole.**

5. The city is in a windy area. So if method 2 is used, smoke could be blown onto the city. This would pollute the air in the city.

   The city has grasses just planted to reduce erosion. So method 3 could destroy the grass, which could increase erosion.

   The surface temperature of the ocean close to the area can change from warm to cold rapidly. Method 4 requires the temperature to stay at a temperature that is just right. Changes in temperature would not allow the tiny organisms to decompose the oil.

   So, **they should choose method 1 and design a way to reduce possible toxic effects.** The chemicals may be toxic, but the scientists from the college may be able to help decrease this effect.

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