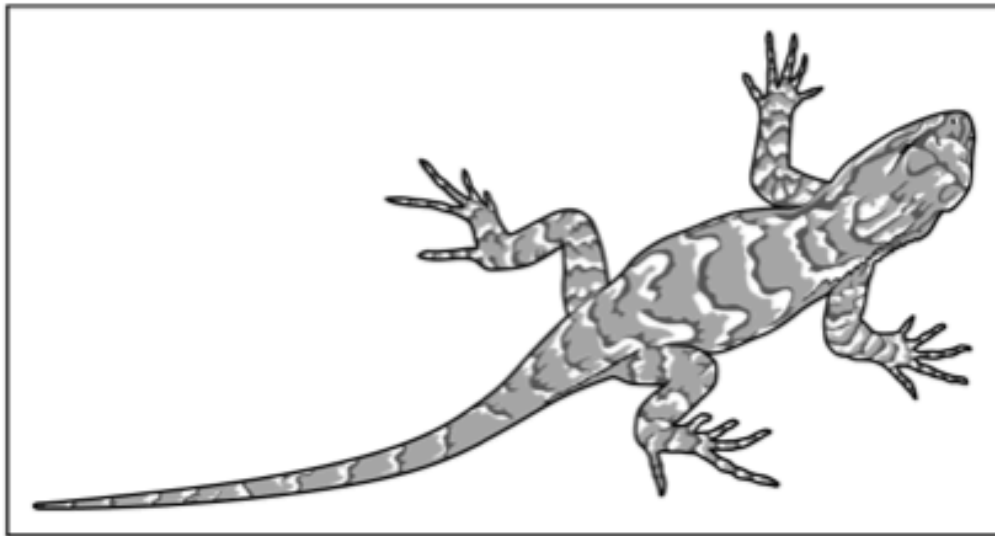


**Item # 1**

A type of lizard and a classification key are shown.



**Classification Key**

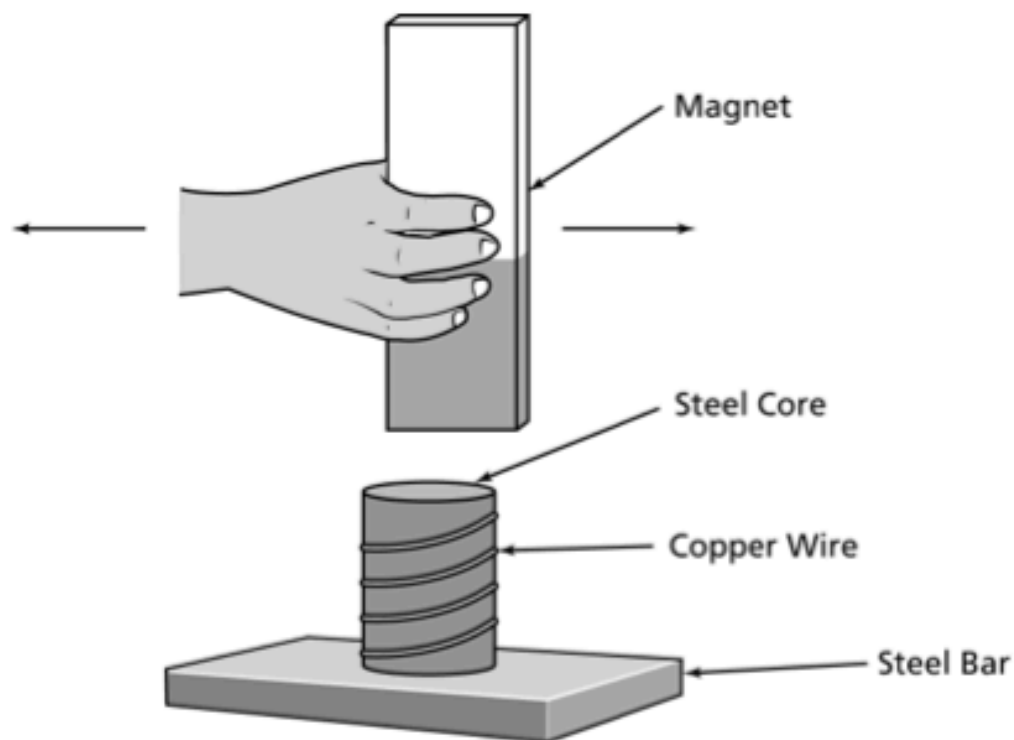
1. No legs .....	legless lizard
Four legs .....	go to 2
2. Thick tail that is shorter than its body .....	Gila monster
Thin or long tail.....	go to 3
3. Body covered in spots .....	small-spotted lizard
Body covered in lines or cross bands.....	go to 4
4. Five long stripes along length of body .....	five-lined skink
Pattern of light and dark wavy bands across back .....	eastern fence lizard

Based on the classification key, what lizard is shown?

- A** Gila monster
- B** small-spotted lizard
- C** five-lined skink
- D** eastern fence lizard

**Item # 2**

A student makes a closed loop of copper wire around a steel core. The student moves a magnet back and forth over the steel core, as shown in the picture.



Which of these happens when the student moves the magnet?

- A Light is produced.
- B Sound is produced.
- C Current is generated.
- D Matter is created.

**item # 3**

The mass and volume of five objects made of different metals are shown below.

**Metal Data**

Metal	Mass (g)	Volume (mL)
Silver	104.9	10
Gold	193.0	10
Lead	113.4	10
Iron	78.7	10
Aluminum	27.0	10

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$
$$D = \frac{m}{V}$$

Which metal object listed in the data table has a density closest to that of silver?

- A Gold
- B Lead
- C Iron
- D Aluminum

**Item # 4**

Which of these is most likely the result of a chemical reaction?

- A solids broken down into smaller pieces
- B liquids brought to a boil
- C formation of white crystals as water evaporates
- D formation of iron oxide as metal rusts

**Item # 5**

The table lists some adaptations of four birds.

**Bird Adaptations**

Bird	Beak	Feet	Other
1	Short and hooked for tearing	Sharp claws for grasping	Soft feathers allow for quiet flight
2	Flat and rounded for straining	Webbed toes for paddling	Oil-covered feathers repel water
3	Long and pointed for drilling	Two toes in front and two toes in back for climbing	Strong neck muscles for rapid head movement
4	Long and thin for drinking	Three toes in front and one long toe in back for perching	Wings beat rapidly to allow hovering

According to the table, which bird is best adapted to a marsh habitat?

- A Bird 1
- B Bird 2
- C Bird 3
- D Bird 4

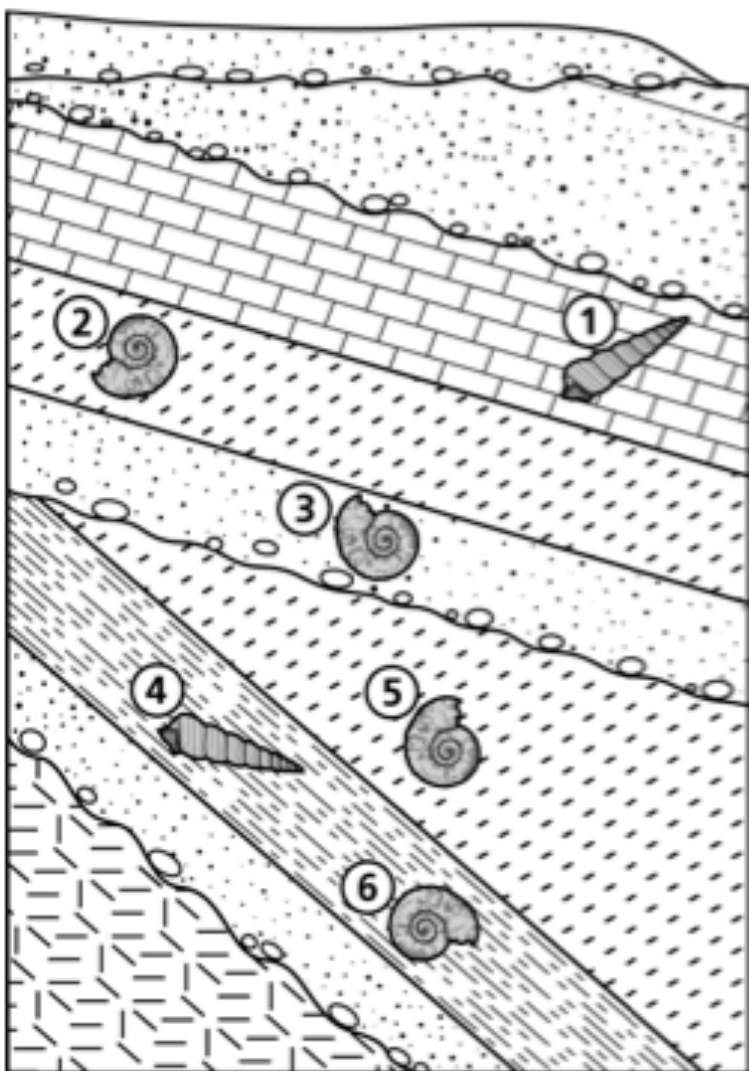
**Item # 6**

Which of these molecules is made up of only one element?

- A** oxygen,  $O_2$
- B** water,  $H_2O$
- C** carbon dioxide,  $CO_2$
- D** sodium chloride,  $NaCl$

**Item # 7**

The diagram shows layers of rock that contain fossils.

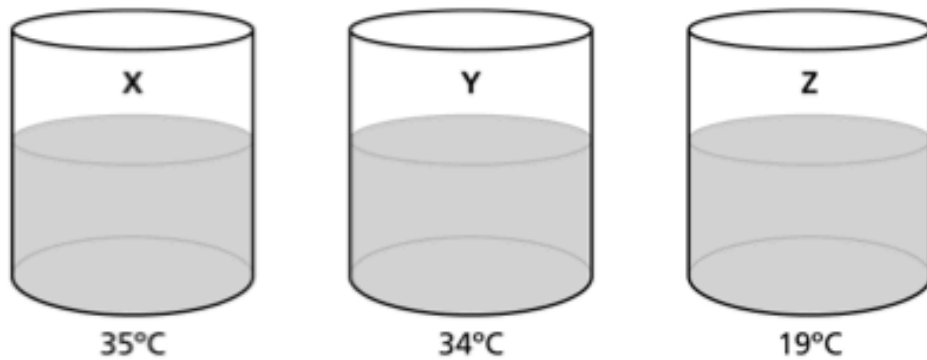


Which fossils are most likely similar in age?

- A 1 and 2
- B 2 and 3
- C 4 and 5
- D 4 and 6

**Item # 8**

Students placed three containers of water outside in full sunlight for one hour.



The students measured the water temperature in each container after the one-hour time period. How can the students find out if an error was made when measuring the water temperature?

- A** wait to record the data until all three containers have the same temperature
- B** measure the water temperature in each container a second time
- C** calculate the average temperature of the three containers of water
- D** repeat the temperature investigation using larger containers of water

Item # 9

The device below is used to measure electric current.



Which of these is most likely used with the device to produce an electric current?



A



B



C

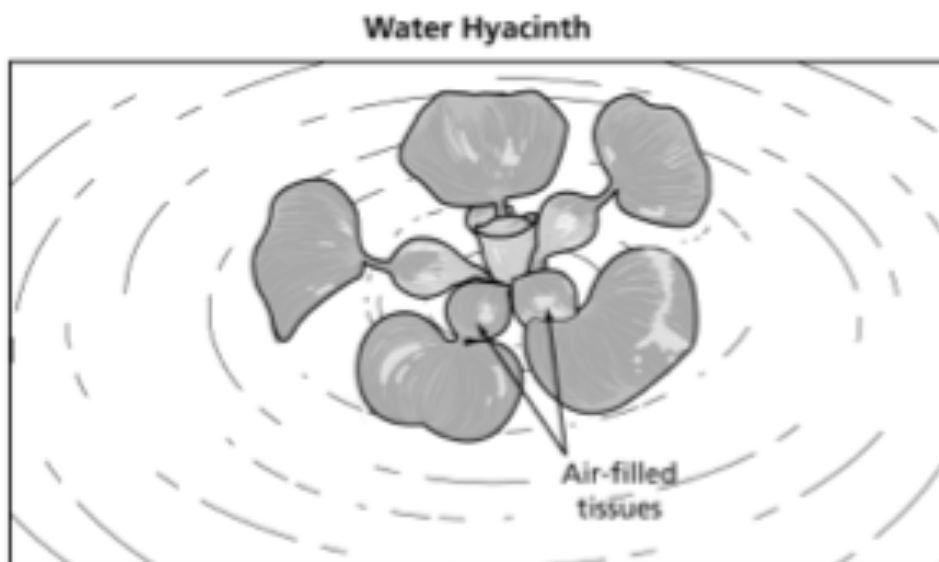


D



**Item # 10**

The picture shows a water hyacinth that has special air-filled tissues in its stems.



Which of these is the most likely environment for a water hyacinth?

- A the surface of a lake
- B the mud at the bottom of a pond
- C tree branches in a marsh
- D sand near an ocean

**Item # 11**

Prosthetic devices, such as robotic legs, help improve the quality of life for many individuals with physical limitations. Which type of technology best describes a prosthetic device?

- A nuclear technology
- B automotive technology
- C space technology
- D assistive technology



**Item # 14**

The jar below contains two types of beans.



Which statement best explains why this jar contains a mixture?

- A** The ingredients keep their individual properties.
- B** There are multiple ingredients.
- C** There are different elements in the beans.
- D** The beans are similar in size.

**Item # 15**

Water vapor, dust particles, oxygen, ozone, nitrogen, and argon are some of the materials that make up the atmosphere of Earth. Which element is found in trace amounts in the atmosphere of Earth?

- A helium
- B calcium
- C iron
- D aluminum

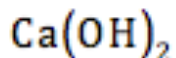
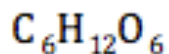
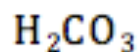
**Item # 16**

Which statement best compares pure water and lemonade?

- A Water and lemonade are both mixtures.
- B Water and lemonade are both compounds.
- C Water is a mixture, and lemonade is a compound.
- D Water is a compound, and lemonade is a mixture.

**Item # 17**

Formulas for four different compounds are shown.



What element is in all four compounds?

- A carbon
- B oxygen
- C hydrogen
- D chlorine

**Item # 18**

In which state of matter do the particles of a substance move at the slowest speed?

- A gas
- B liquid
- C solid
- D plasma

**Item # 19**

A functioning electromagnet causes

- A the movement of electrons.
- B magnetic fields to become smaller.
- C electrons to change into protons.
- D nonmetal objects to become magnetic.

**Item # 20**

The table below shows four different populations of bacteria and the percentages that are resistant to different antibiotics.

**Percentage of Bacterial Population Resistant to Antibiotic**

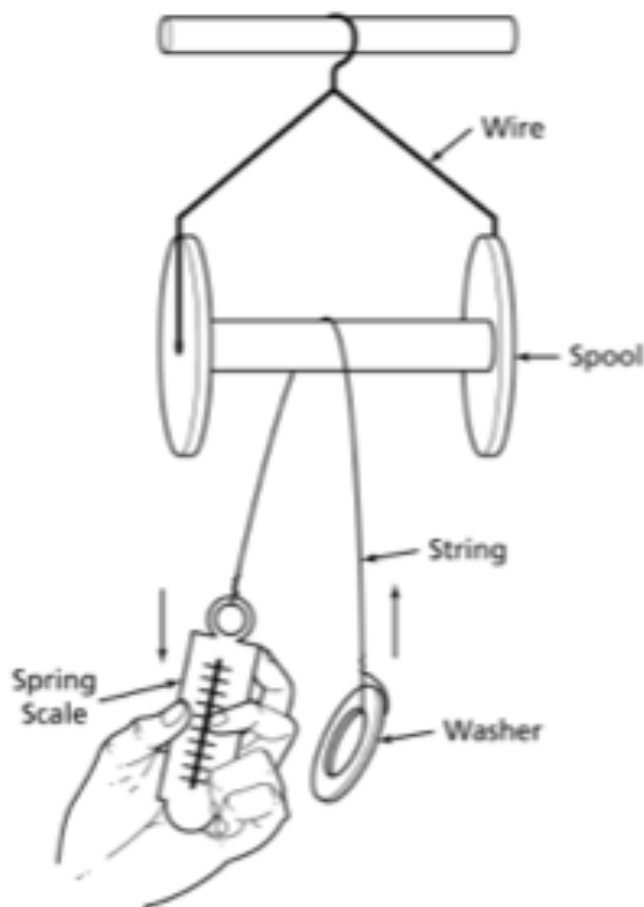
Population	Antibiotic W	Antibiotic X	Antibiotic Y	Antibiotic Z
1	9.3%	17.1%	0.0%	30.1%
2	18.1%	46.9%	18.4%	0.0%
3	0.0%	95.1%	1.6%	82.0%
4	0.0%	3.3%	26.6%	4.1%

If all four populations start with the same number of bacteria, which population will have the greatest number of survivors when treated with Antibiotic Y?

- A 1
- B 2
- C 3
- D 4

Item # 21

A student builds a simple pulley using a spool, some wire, and some string. The student tests the strength of the string using a spring scale. The diagram below shows that when the student pulls the spring scale down, the washer is lifted up.



Which is the best way for the student to determine the largest mass the pulley can lift before the string breaks?

- A lift a washer off the ground from various heights
- B lift a washer off the ground using different types of string
- C lift many washers of increasing masses off the ground
- D lift many washers made from different materials off the ground

**Item # 22**

A bronchodilator is a type of medicine used by people with asthma. This type of medicine quickly relaxes tightened muscles around airways to allow air to flow through. This medicine is best described as

- A an assistive product.
- B an adaptive product.
- C an electronic product.
- D a magnetic product.

**Item # 23**

The atmosphere of Earth is a mixture of different gases. What are the two most abundant gases in Earth's atmosphere?

- A hydrogen and carbon dioxide
- B carbon dioxide and nitrogen
- C hydrogen and oxygen
- D nitrogen and oxygen

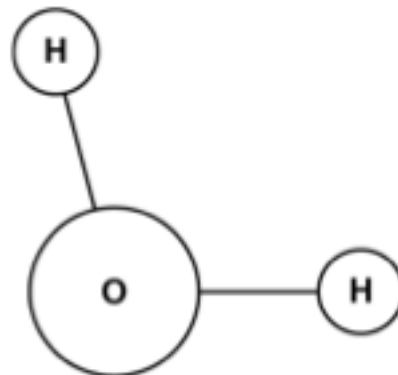
**Item # 24**

NASA is developing a new deep-space telescope to replace the Hubble Space Telescope. Which will best help NASA determine whether the new telescope is an improvement over the Hubble Space Telescope?

- A comparing the capabilities of the new telescope to those of the Hubble Space Telescope
- B interviewing scientists about their opinion on the new telescope and the Hubble Space Telescope
- C researching different types of lenses that can be used in space telescopes
- D analyzing how much it costs to build space telescopes

**Item # 25**

The diagram shows the structure of a water molecule.



Each circle in the diagram represents

- A** a cell.
- B** an atom.
- C** a compound.
- D** a mixture.



**Item # 26**

A bat and a classification key are shown.



**Classification Key**

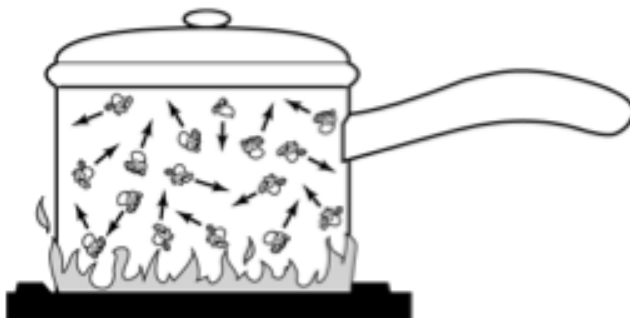
- |   |                                 |
|---|---------------------------------|
| 1. Short, broad ears.....               | Go to 2                         |
| Long, rabbit-like ears.....             | Go to 3                         |
| 2. Fur is all one color.....            | <i>Tadarida brasiliensis</i>    |
| Fur is three different colors.....      | <i>Pipistrellus subflavus</i>   |
| 3. Triangular-shaped nose.....          | <i>Macrotus californicus</i>    |
| Round nose with lumps on both sides.... | <i>Corynorhinus rafinesquii</i> |

Based on the classification key, which bat is shown in the picture?

- A *Tadarida brasiliensis*
- B *Pipistrellus subflavus*
- C *Macrotus californicus*
- D *Corynorhinus rafinesquii*

**Item # 27**

Kernels of popcorn are popping in a kettle.



The movement of the kernels models the movement of molecules in which type of substance?

- A a cold substance
- B a gaseous substance
- C a solid substance
- D a jellylike substance

**item # 28**

Which combination of substances will produce a compound?

- A sodium and chlorine
- B sugar and water
- C salt and pepper
- D dressing and salad

**Item # 29**

Which adaptation is most helpful to a plant living in an area with frequent periods of drought?

- A bright flowers
- B waxy coatings
- C broad leaves
- D smooth stems

**Item # 30**

When current flows through a circuit, how do the properties of the circuit change?

- A The density of the circuit decreases.
- B The number of atoms in the circuit decreases.
- C The magnetic force of the circuit increases.
- D The atomic number of the circuit increases.

**Item # 31**

Solutions can be acidic, basic, or neutral. The table below shows some properties of four solutions.

**Solution Properties**

Solution	pH	Color
1	2.2	None
2	10.5	White
3	4.5	Blue
4	7.0	None

Which solution is neutral?

- A 1
- B 2
- C 3
- D 4

**Item # 32**

A student pours some cooking oil into a bottle that contains water. The student shakes the bottle. The combination of cooking oil and water is best described as

- A an element.
- B a particle.
- C a mixture.
- D a compound.

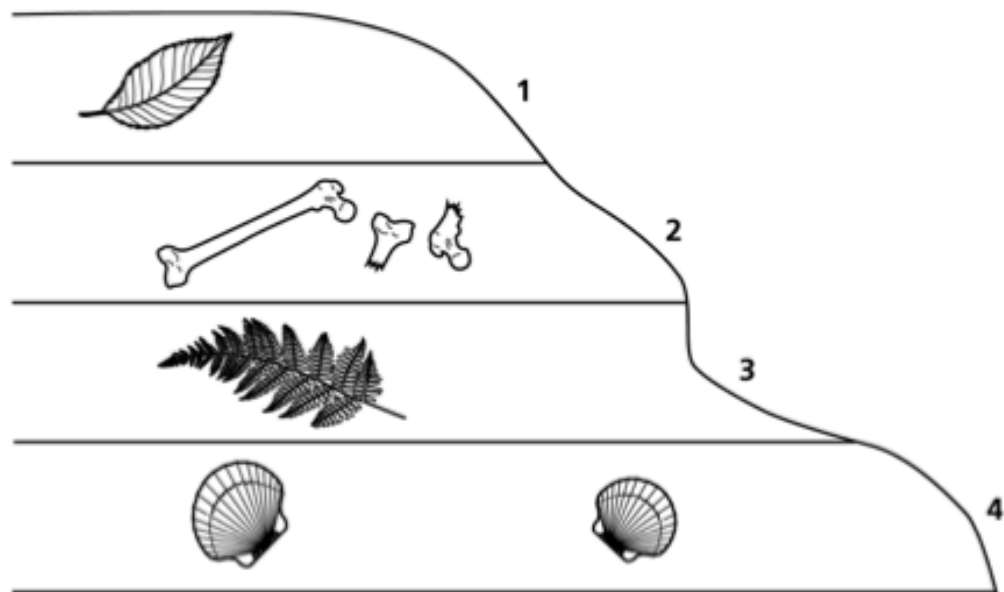
**Item # 33**

Which use of recent technology has had hazardous results on the environment?

- A building outdoor furniture using recycled plastics
- B identifying areas on Earth using a global positioning system (GPS)
- C disposing of unwanted cell phone batteries in landfills
- D searching online information using a personal digital device

**Item # 34**

Layers of rock are exposed, as shown below.



The fern fossil in Layer 3 was dated to be 32 million years old. What can be inferred about the shell fossils?

- A The organisms with the shells lived before the fern.
- B The organisms with the shells were more common than the other fossils.
- C The organisms with the shells lived around the same time as the organisms with the bones.
- D The organisms with the shells were more complex than the other fossils.

**Item # 35**

Which of these best describes the effect the sun's gravity has on the movement of planets in the solar system?

- A It determines the direction in which planets rotate on their axes.
- B It gives the initial push that makes planets revolve around the sun.
- C It holds planets in a particular orbit around the sun.
- D It pulls some planets closer to each other and pushes others farther away.

**Item # 36**

Students in a science lab heated a liquid and then allowed the liquid to cool. They recorded their observations about how the liquid changed in the chart.

**Liquid Heating Observations**

Property	Before Applying Heat	After Applying Heat	After Allowing to Cool
State of Matter	Liquid	Liquid	Liquid
Color	None	None	None
Clearness	Transparent	Transparent	Transparent
Other Observations	None	Bubbles appeared at sides of container	Bubbles disappeared
Temperature	25°C	60°C	25°C

Which of these best describes the changes that happened when the liquid was heated and then cooled?

- A The changes were physical because the liquid remained the same substance.
- B The changes were chemical because the state of matter stayed the same.
- C The changes were physical because the liquid remained colorless and clear.
- D The changes were chemical because the temperature increased and decreased.

**Item # 37**

An orange juice company produces a new variety of orange juice by adding calcium citrate to the juice. The original orange juice had a pH of 3.88. The new orange juice has a pH of 4.18. Which statement best describes the change to the orange juice?

- A The new orange juice is more acidic than the original orange juice.
- B The new orange juice is less acidic than the original orange juice.
- C The new orange juice is now a base.
- D The new orange juice is now neutral.

**Item # 38**

The existence of the planet Neptune was mathematically predicted before it was directly observed through a telescope in 1846. The prediction was based on the fact that the observed orbital path of Uranus was different from its expected path. Which characteristic of a planet would most directly affect the orbits of nearby objects in the solar system?

- A its density
- B its volume
- C its magnetic field
- D its gravitational field

**Item # 39**

A student is writing a report on the benefits of biodiversity. The student begins with the following two points.

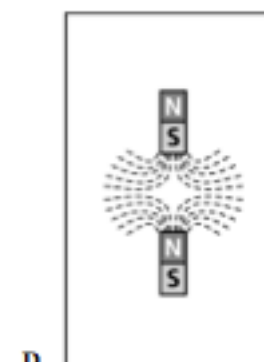
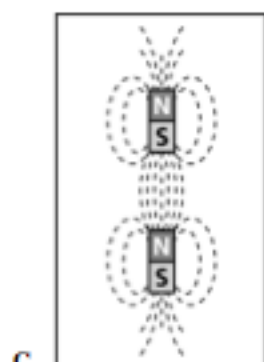
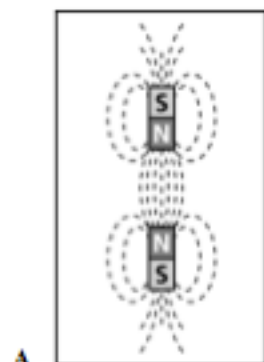
1. Biodiversity provides people with natural products that produce food, medicine, and household goods.
2. A biodiverse environment can help keep the air, water, and soil clean.
3. ?

Which statement would be the best addition to the student's report?

- A Disease can decrease biodiversity in an ecosystem.
- B Biodiversity improves the overall health of an ecosystem.
- C Biodiversity will become less important as human populations grow.
- D Environments with high biodiversity are less susceptible to pollution.

Item # 40

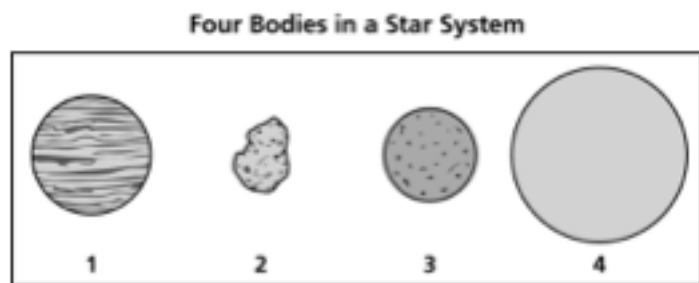
Which illustration of two magnets correctly shows their magnetic fields?





**Item # 41**

The diagram below shows the shapes and relative sizes of four bodies in a star system. All four bodies have the same density.

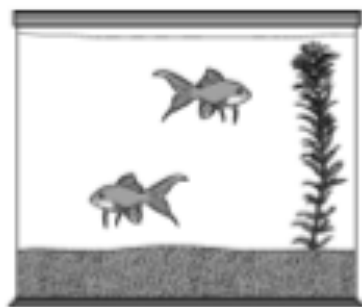


If all four bodies were the same distance from their star, which would have the greatest gravitational attraction to that star?

- A 1
- B 2
- C 3
- D 4

**Item # 42**

The aquarium shown contains water, fish, a plant, and gravel.

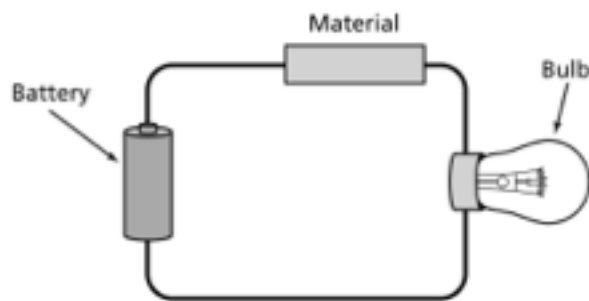


Which of these describes all matter inside the aquarium?

- A All matter is in a liquid state.
- B All matter is in a solid state.
- C All matter is made of atoms.
- D All matter is made of cells.

**Item # 43**

Students built the circuit below to test whether various materials were electrical conductors. The students placed four different materials, one at a time, into the circuit and recorded their observations in the table.

**Data Table**

Material	Does Bulb Light?	Conductor?
1	No	No
2	No	No
3	No	No
4	No	No

The students concluded that none of the materials conducted electricity. Which additional step would be most appropriate for determining whether there was a problem with their experimental setup?

- A test a material that is known to prevent electricity from flowing
- B test a material that is known to allow electricity to flow
- C add a second battery to the circuit and repeat the experiment
- D remove the bulb from the circuit and repeat the experiment

**Item # 44**

The list below describes both chemical and physical changes in matter.

1. Pink powder is mixed with water to produce raspberry lemonade.
2. Vinegar and baking soda are combined to produce gas bubbles.
3. Oxygen bonds with iron and releases heat.
4. Salt is added to an ice cube to make the cube melt faster.

In which two examples did a chemical change take place?

- A 1 and 2
- B 1 and 3
- C 2 and 3
- D 3 and 4

**Item # 45**

A student was studying physical and chemical changes. The student performed a two-step process and recorded the results of the steps in the chart.

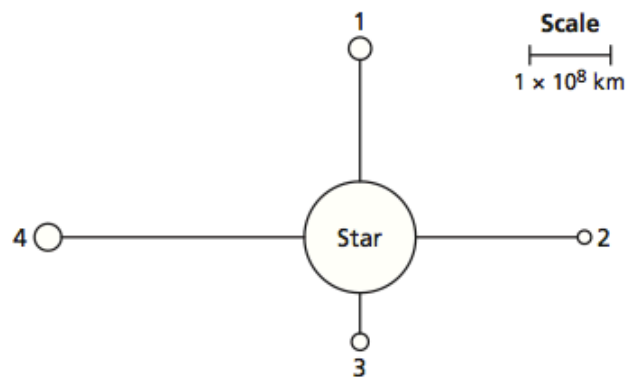
Step 1		Step 2	
<b>Action:</b> Heat a white solid	<b>Result:</b> A white liquid is produced	<b>Action:</b> Cool the white liquid	<b>Result:</b> A white solid is produced

Based on the information in the chart, how should the student classify the actions of the steps?

- A Step 1 and Step 2 were both chemical changes.
- B Step 1 and Step 2 were both physical changes.
- C Step 1 was a chemical change, and Step 2 was a physical change.
- D Step 1 was a physical change, and Step 2 was a chemical change.

## Item 46

Scientists observe a distant star and the four planets that orbit the star. They determine that the four planets have different diameters, but approximately the same mass. This star system is represented by the diagram below.



Which planet has the greatest gravitational attraction to the star?

- A** Planet 1
- B** Planet 2
- C** Planet 3
- D** Planet 4

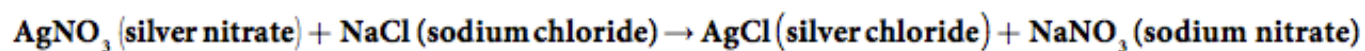
Item 47

Which process is most suitable for the direct measurement of mass?

- F** using an electronic scale and expressing the results in newtons per meter
- G** using a spring scale and expressing the results in ounces
- H** using a barometer and expressing the results in pounds per square inch
- J** using a balance and expressing the results in kilograms

## Item 48

The formula below represents a chemical reaction.

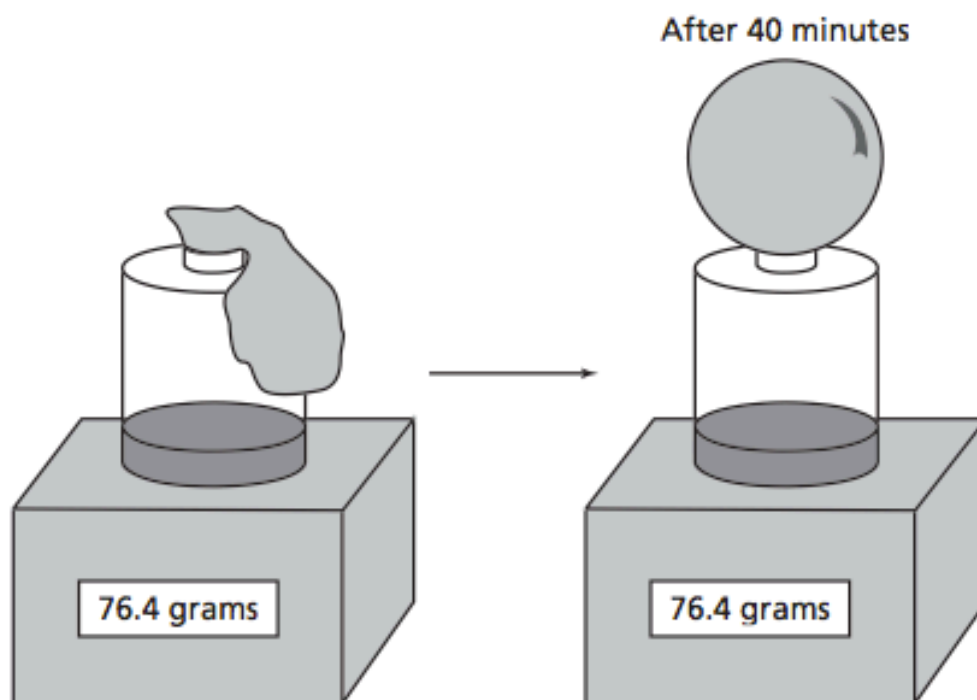


Which substance is a product of this reaction?

- A** Ag (silver)
- B** Na (sodium)
- C** NaCl (sodium chloride)
- D** AgCl (silver chloride)

## Item 49

A student adds 5 grams of baking soda to 50 grams of vinegar in a container and quickly attaches a balloon to the top of the bottle. The student's investigation is shown below.



**What occurred in this investigation?**

- F** The reaction produces heat, which causes the plastic of the balloon to soften and change shape.
- G** The reaction in the container produces gas, which causes the balloon to inflate.
- H** The outside air pressure pushes on the container and forces air inside the balloon.
- J** The air molecules from the container move into the balloon and form a solid substance.

Item 50

A substance has a mass of 45 grams(g) and a volume of 15 cubic centimeters (cm<sup>3</sup>).

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$
$$D = \frac{m}{V}$$

What is the density of the substance?

- A** 3 g/cm<sup>3</sup>
- B** 30 g/cm<sup>3</sup>
- C** 60 g/cm<sup>3</sup>
- D** 675 g/cm<sup>3</sup>



Item 51

Scientists are designing a new antacid. The purpose of an antacid is to neutralize stomach acid. Which tool would best help scientists determine if the new antacid is effective in neutralizing stomach acid?

- F** litmus paper
- G** thermometer
- H** graduated cylinder
- J** microscope

Item 52

**A student pulls on a rubber band with both hands and then releases it. The rubber band travels across the room. The student repeats this procedure several times. Which tool should the student use to measure the distance the rubber band travels?**

- F** electronic balance
- G** spring scale
- H** meter stick
- J** protractor

Item 53

A certain species of rabbit exhibits different fur colors depending on the season. The table below shows some data collected on this rabbit species during the summer.

**Summer Rabbit  
Population Data**

<b>Rabbit Fur Color</b>	<b>Percentage of Population</b>
Gray	37%
Brown	52%
Black	10%
White	1%

Populations of rabbits with which fur color will increase the most during winter months with deep snow cover?

- F** Gray
- G** Brown
- H** Black
- J** White