Maryland School Assessment

Science

2011 Public Release

Grade 5

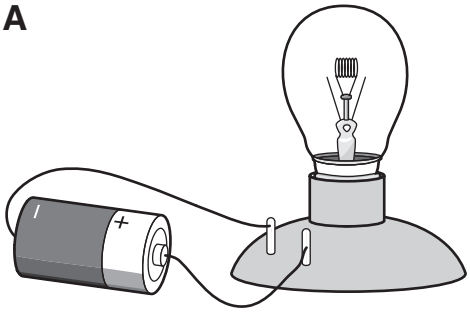
Part 1

Part 1

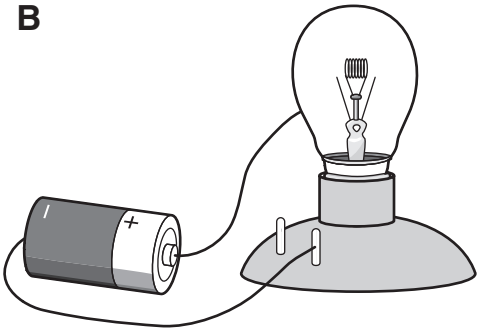
1 **Students are studying types of circuits.**

Which circuit below will cause the light bulb to produce light?

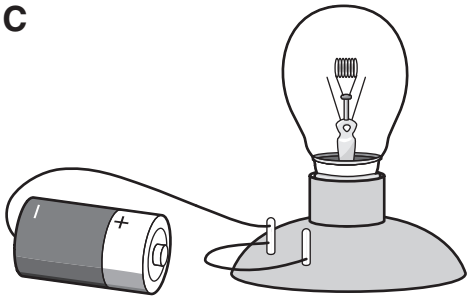
○ **A**



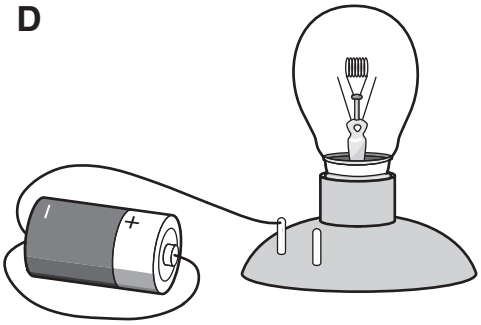
○ **B**



○ **C**



○ **D**



Part 1

2 **In Maryland, most bears have thick, dark fur.**

Which statement best explains how dark fur helps bears survive in the forests of Maryland?

- ○ **A** Dark fur is lightweight.
- ○ **B** Dark fur scares enemies.
- ○ **C** Dark fur helps bears hide.
- ○ **D** Dark fur keeps bears cool.

Part 1

Directions

Use the information below to answer Numbers 3 and 4.

A student filled three beakers, each with 50 milliliters of liquid water. The student cooled Beaker 1 to form ice. The student heated Beaker 2 to form water vapor (gas). Beaker 3 remained at room temperature.

3 **What process takes place when liquid water changes to a vapor (gas)?**

- ○ **A** condensation
- ○ **B** evaporation
- ○ **C** freezing
- ○ **D** melting

Part 1

4 **The student removed Beaker 1 from the freezer the next day. When the student turned the beaker over, a block of ice fell out and broke into small pieces.**

Which statement describes the relationship between the mass of the block of ice and the mass of the small pieces of ice?

- ○ **A** The mass of the block of ice was slightly greater because some of the small pieces melted.
- ○ **B** The mass of the block of ice was less than the total mass of the smaller pieces of ice.
- ○ **C** The mass of the block of ice was equal to the total mass of the smaller pieces of ice.
- ○ **D** The mass of the block of ice was greater than the total mass of the smaller pieces of ice.

Part 1

5 **Some objects are attracted by magnets.**

Which object is attracted by a magnet?

- ○ **A** an iron nail
- ○ **B** an ice cube
- ○ **C** a plastic knife
- ○ **D** a wooden ruler

6 **Planets in our solar system have different solar years.**

Which statement explains the cause of an Earth solar year?

- ○ **A** Earth rotates around the sun.
- ○ **B** Earth revolves around the sun.
- ○ **C** The sun rotates around Earth.
- ○ **D** The sun revolves around Earth.

Part 1

7 **A student had a mineral sample that was gray in color and had a hardness of 6. The mineral made a white streak when scraped on a ceramic plate.**

Color	Hardness	Streak	Mineral
Gray, black, or reddish brown	6	Red	Hematite
Black	6	Black	Magnetite
Red, reddish brown, brown, or black	6.5-7.5	White	Garnet
Gray or white	6-6.5	White	Feldspar

According to the table above, the mineral sample was <u>most likely</u>

- ○ **A** hematite
- ○ **B** magnetite
- ○ **C** garnet
- ○ **D** feldspar

Part 1

8 **Scientists have monitored the amount of acid rainfall in Frederick County, Maryland, since 1982.**

Humans in Frederick County are affected by acid rain because acid rain alters

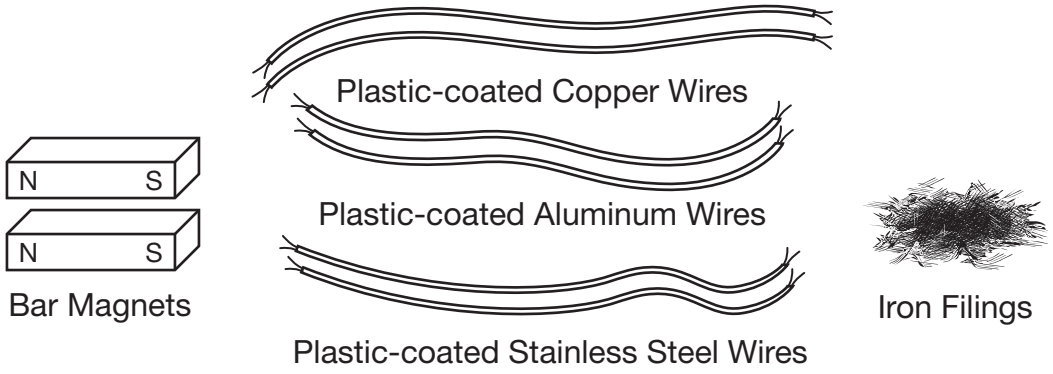
- ○ **A** wind patterns
- ○ **B** air temperatures
- ○ **C** the quality of water
- ○ **D** the amount of precipitation

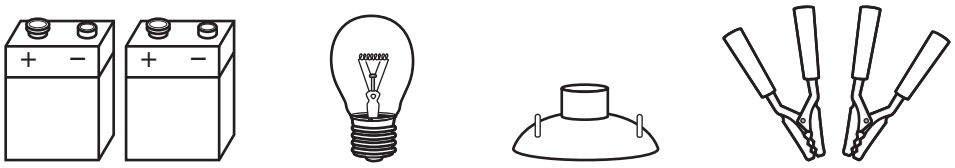
Part 1

Directions

Use the information below to answer Numbers 9 and 10.

A student purchased a science kit that contained these materials: 2 bar magnets, iron filings, 3 pairs of plastic-coated metal wires, 2 batteries, 1 light bulb, 1 base for a light bulb, and 2 electronic clips. The materials are shown in the diagram below.





Part 1

9 **The student tested the different types of wires to determine which type of wire made the light bulb glow brightest.**

What property of the wires was the student investigating?

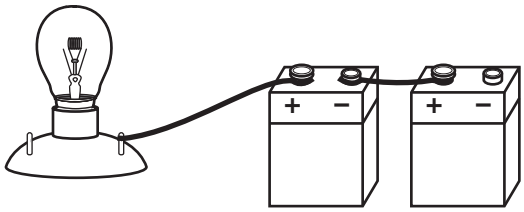
- ○ **A** strength
- ○ **B** flexibility
- ○ **C** ability to conduct electricity
- ○ **D** ability to be attracted by a magnet

Part 1

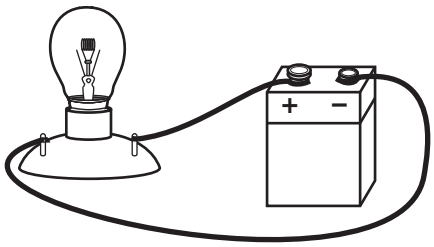
10 **The student used some of the supplies in the science kit to build a circuit.**

Which circuit would cause the light bulb to glow?

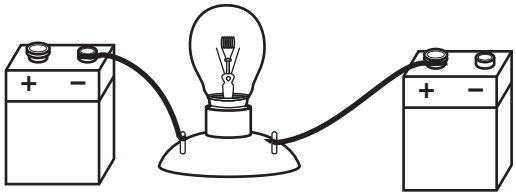
○ **A**



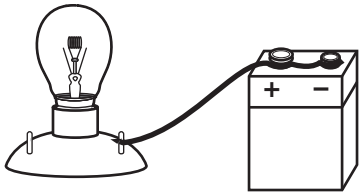
○ **B**



○ **C**



○ **D**



Part 1

11 **A hydrologist studies the location, movement, and quality of water.**

A hydrologist recognizes the importance that water exists as

- ○ **A** a solid, a liquid, and a gas (vapor)
- ○ **B** a solid and a liquid
- ○ **C** a solid and a gas (vapor)
- ○ **D** a solid only

Part 1

12 **The mountain chorus frog is an endangered species in Maryland.**

In addition to the loss of habitat, what most likely caused this frog population to decline?

- ○ **A** an increase in a food source
- ○ **B** more frog breeding grounds
- ○ **C** native wetlands preservation
- ○ **D** poisons dissolved in the water

STOP

Part 2

Part 2

Directions

Use the passage below to answer Numbers 13 through 15.

Vertical Farming in the Big Apple

Downtown Manhattan is hardly a place you would associate with agriculture. Rather, with its countless restaurants, cafes, shops and supermarkets this is a place of consumption.[1]

And so every morsel, every bite of food New Yorkers munch through every day must be trucked, shipped or flown in, from across the country, and across the world.

Now though, scientists at Columbia University are proposing an alternative. Their vision of the future is one in which the skyline of New York and other cities include a new kind of skyscraper: the "vertical farm."

The idea is simple enough. Imagine a 30-story building with glass walls, topped off with a huge solar panel.

On each floor there would be giant planting beds, indoor fields in effect.

There would be a sophisticated[2] irrigation system.

And so crops of all kinds and small livestock could all be grown in a controlled environment in the most urban of settings.

That means there would be no shipping costs, and no pollution caused by moving produce around the country.

It's all the brainchild of Columbia University Professor Dickson Despommier.

Part 2

Professor Despommier lists many advantages of this revolutionary kind of agriculture. They include:

- Year round crop production in a controlled environment
- All produce would be organic as there would be no exposure to wild parasites and bugs
- Elimination of environmentally damaging agricultural runoff
- Food being produced locally to where it is consumed

And, says the professor, vertical farming would allow some existing traditional farms to be returned to natural forests. Good news in a time of global warming.

The plan is to make the whole complex sustainable.[3]

Energy would come from a giant solar panel but there would also be incinerators[4] that would use the farm's waste products for fuel. All of the water in the entire complex would be recycled.

For now, vertical farms are a virtual concept.[5] But the scientists insist that the theory is sound.

All they need now, they say, is money to make this a reality.

[1]**consumption** – the act of eating or drinking
[2]**sophisticated** – highly developed
[3]**sustainable** – able to quickly replace what is used
[4]**incinerators** – containers used for burning
[5]**virtual concept** – not real; an idea explained by using a computer

Part 2

13 **Which material used in a vertical farm is made from a renewable natural resource?**

- ○ **A** copper wire
- ○ **B** steel beams
- ○ **C** fertilized soil
- ○ **D** plastic pipes

14 **A benefit of allowing farmland to be returned to natural forest would <u>most likely</u> be**

- ○ **A** more soil for crops
- ○ **B** fewer native plants
- ○ **C** decreased timber for building
- ○ **D** increased habitats for wildlife

Part 2

15 **Describe how humans would use renewable natural resources to grow crops in vertical farms. In your description, be sure to include**

- **the natural resources used**
- **the benefits of using renewable resources**

Write your answer in the space provided.

Part 2

16 **All organisms need food to survive.**

Which statement best describes the purpose of food for organisms?

- ○ **A** Food provides skin color.
- ○ **B** Food provides oxygen for life.
- ○ **C** Food provides water for energy.
- ○ **D** Food provides energy for growth.

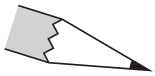
Part 2

Directions

Use the information and table below to answer Numbers 17 and 18.

Carbon is a pure element that is able to form different materials. The table below compares three forms of carbon.

FORMS OF CARBON

Name of Material	Use	Physical Properties
Diamond 	Jewelry, drill bits	Color: clear, yellow, gray Hardness: hardest naturally occurring material
Coal 	Fuel	Color: black, brown Hardness: may range from soft to hard, depending on the percent of water it contains
Graphite 	Pencils, steel production	Color: shiny gray Hardness: soft, may be chipped with a fingernail

Part 2

17 **Which set of physical properties best describes a diamond?**

- ○ **A** flexible, soft
- ○ **B** strong, not flexible
- ○ **C** strong, attracted by a magnet
- ○ **D** flexible, not attracted by a magnet

18 **Some substances in coal make coal weak and breakable. The four main types of coal are listed below.**

COAL

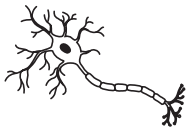
Type of Coal	Original Percent of Water (by mass)	Common United States Location
Anthracite	2–14	Pennsylvania
Bituminous	15–55	Kentucky, Pennsylvania, West Virginia
Lignite	65–75	Montana, North Dakota, Texas
Subbituminous	55–65	Alaska, Montana, Wyoming

Which type of coal is the strongest?

- ○ **A** anthracite
- ○ **B** bituminous
- ○ **C** lignite
- ○ **D** subbituminous

Part 2

19 **Multicellular organisms are composed of cells that vary in appearance.**



Nerve Cell

Muscle Cell

Skin Cell

What is the <u>most likely</u> reason cells in organisms have different shapes?

- ○ **A** to work at similar rates
- ○ **B** to perform similar roles
- ○ **C** to work at different rates
- ○ **D** to perform different roles

20 **The snowshoe hare sheds its fur twice a year. In the summer, the fur of the hare is brown. In the winter, the fur is white.**

Which of these statements <u>best</u> explains the advantage of shedding fur?

- ○ **A** Shedding fur keeps the hare clean.
- ○ **B** Shedding fur helps the hare move quickly.
- ○ **C** Shedding fur keeps the hare's home warm.
- ○ **D** Shedding fur helps the hare blend into its habitat.

Part 2

Directions

Use the information below to answer Numbers 21 and 22.

Students studied the natural resources of Maryland. The students recorded their findings in the data table below.

NATURAL RESOURCES OF MARYLAND

Resource	Type	Use
Plants	Renewable	Provide food
Coal	Nonrenewable	Produce electricity

21 **What is a harmful result of burning coal?**

- ○ **A** air pollution
- ○ **B** soil erosion
- ○ **C** evaporation
- ○ **D** condensation

22 **Trees and bushes are renewable natural resources.**

What is a positive result of planting trees and bushes along streams and rivers?

- ○ **A** Trees and bushes increase fish habitats.
- ○ **B** Trees and bushes reduce erosion of soil.
- ○ **C** Trees and bushes increase water temperatures.
- ○ **D** Trees and bushes reduce the population of rodents.

Part 2

23 **A student prepared a presentation to show how water changes the surface of Earth.**

Which presentation would best demonstrate how water changes the surface of Earth?

- ○ **A** a diagram of a river food web
- ○ **B** a graph of the amount of rainfall on a lake
- ○ **C** a picture of fog covering a mountain valley
- ○ **D** a model of a stream flowing down a hillside

STOP

Part 3

Part 3

Directions

Use the information and data table below to answer Numbers 24 through 26.

Students tested several samples of rocks and minerals. The students used the table below to identify the samples.

ROCK AND MINERAL PROPERTIES

Name	Minerals	Color	Luster	Hardness	Streak
Bauxite	Gibbsite, diaspore, boehmite	Reddish brown, white, tan, yellow	Nonmetallic	1–3	White
Calcite	Calcite	Colorless	Nonmetallic	3	White
Pink granite	Feldspar, mica, quartz	Gray, black, pink, dark green, colorless	Nonmetallic	3–7	White
Talc	Talc	Pale green	Nonmetallic	1	White
Topaz	Topaz	Colorless	Nonmetallic	8	White
Zorite	Zorite	Pink	Nonmetallic	4	White

Part 3

24 **Two groups of students tested the same mineral sample. One group identified the mineral as calcite. The other group identified the mineral as topaz.**

Which test would best identify the sample?

- ○ **A** color
- ○ **B** luster
- ○ **C** hardness
- ○ **D** streak

25 **One of the samples the students tested was pink, was nonmetallic, had a hardness of 4, and produced a white streak.**

The sample was most likely

- ○ **A** bauxite
- ○ **B** calcite
- ○ **C** talc
- ○ **D** zorite

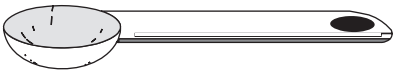
26 **Rocks made of many minerals have**

- ○ **A** a certain color and luster
- ○ **B** a certain size and shape
- ○ **C** various physical properties
- ○ **D** only one physical property

Part 3

27 **Measuring spoons are used to measure matter. A metal measuring spoon and a plastic measuring spoon are shown below.**

Metal Measuring Spoon



Plastic Measuring Spoon

Compare the two measuring spoons. In your comparison, be sure to include

- **the physical properties of each measuring spoon**

Part 3

Write your answer in the space provided.

Metal Measuring Spoon

Plastic Measuring Spoon

Part 3

Directions

Use the passage below to answer Numbers 28 through 30.

Rusty Crayfish: A Small Invader Causing Big Problems

The rusty crayfish originated in the Ohio River Basin. This invader species began to spread into the Great Lakes regions. They compete with the native crayfish and also, greatly decrease the amount of vegetation, thereby impacting entire food webs.

The rusty crayfish have a large eating capacity when consuming aquatic[1] plants. In addition, they eat aquatic insects. When the rusty crayfish reproduce, they can lay 50–575 eggs at one time.

Due to their hyper-appetite, rusty crayfish greatly decrease the amount and diversity[2] of plants in aquatic areas, increase competition with native crayfish, and consume an abnormal amount of other aquatic species. When the rusty crayfish invade, they are disrupting[3] the entire ecosystem.

Part 3

The decreased amount of diversity in vegetation affects the population of many other aquatic species in the surrounding ecosystem. Plant beds provide a habitat for invertebrates[4] as well as shelter for many different species of fish. When vegetation is disturbed, all of the species which rely on it have a harder time surviving.

Rusty crayfish displace the native species of crayfish from the aquatic ecosystems it invades. In a study of 150 lakes and streams that had been invaded by the rusty crayfish, seventy-five percent had no native crayfish remaining. The displacement occurs through competition for food. Because the "rusty" is so aggressive, natives get beat out when feeding and soon their population greatly decreases.

As aquatic species disappear, disruption of the food web occurs, which affects all the species in an ecosystem. By introducing rusty crayfish to new ecosystems, they have a great potential to crumble.

[1]**aquatic** – in water
[2]**diversity** – variety, mixture
[3]**disrupting** – change
[4]**invertebrates** – no backbones

Part 3

28 **Which statement is best supported by evidence from the passage?**

- ○ **A** Rusty crayfish consume native crayfish.
- ○ **B** Rusty crayfish are larger than native crayfish.
- ○ **C** Native crayfish lay more eggs than rusty crayfish.
- ○ **D** Native crayfish are less aggressive than rusty crayfish.

29 **What role does the rusty crayfish have in a food web?**

- ○ **A** consumer
- ○ **B** decomposer
- ○ **C** producer
- ○ **D** scavenger

30 **Which tool would best help people notice the differences in physical features between a rusty crayfish and a native crayfish?**

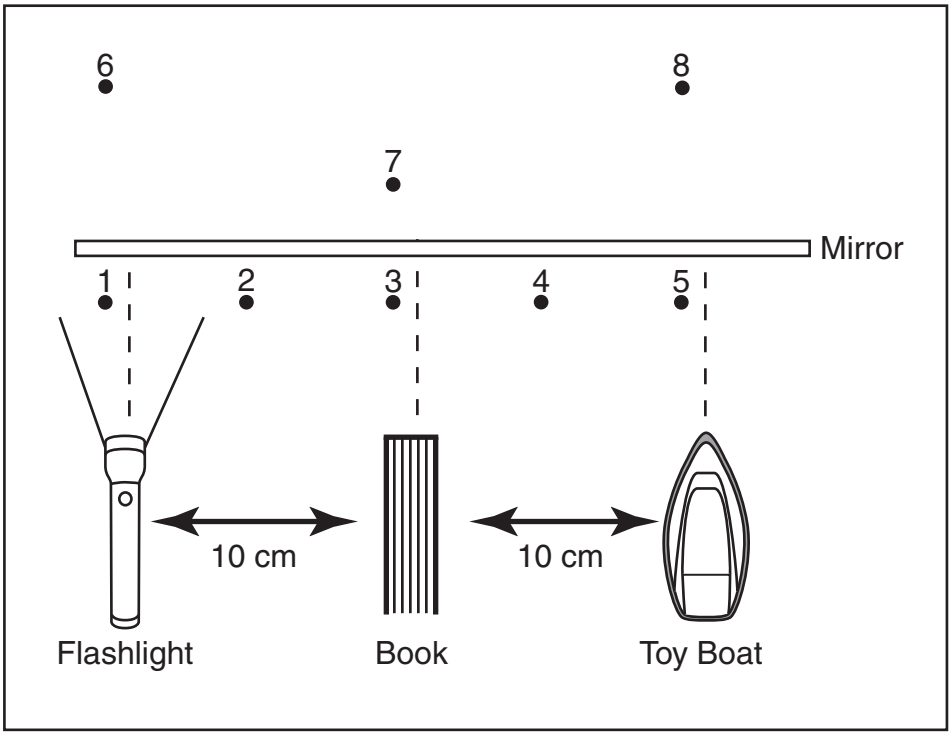
- ○ **A** a balance
- ○ **B** a hand lens
- ○ **C** a thermometer
- ○ **D** a graduated cylinder

Part 3

Directions

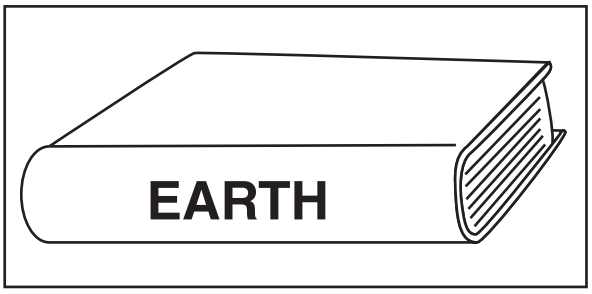
Use the information below to answer Numbers 31 and 32.

A flashlight and a toy boat are placed on a table in front of a plane mirror. Each object is the same distance from the mirror. A large book is placed halfway between the flashlight and the boat. The diagram below shows a top view of the objects on the table.



Part 3

31 **This book is placed flat on the table.**



The title of the book, when it is reflected in the plane mirror, will look like

○ **A** EARTH

○ **B** HTЯAƎ

○ **C** ƎAЯTH

○ **D** ƎARTH

32 **The book is 5.0 centimeters wide.**

The reflection of the book in the plane mirror shows that the width of the book is

○ **A** 1.0 centimeter

○ **B** 2.5 centimeters

○ **C** 5.0 centimeters

○ **D** 10.0 centimeters

Part 3

33 **Some objects conduct electricity.**

Which object is the best conductor of electricity?

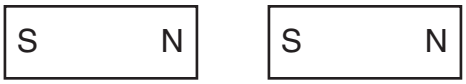
- ○ **A** a metal fork
- ○ **B** a wood spoon
- ○ **C** a plastic comb
- ○ **D** a rubber eraser

Part 3

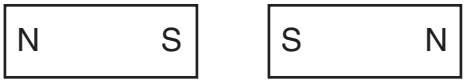
34 **Magnets are often repelled by each other.**

Which pair of magnets will repel each other with the greatest force?

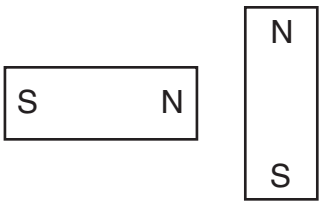
○ **A**



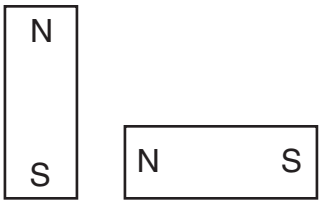
○ **B**



○ **C**



○ **D**



Part 3

35 **Animal wastes contain bacteria that make organisms sick. These wastes are often washed into water supplies by storms.**

How might a pet owner prevent these bacteria from polluting water supplies?

- ○ **A** Brush the pet daily to remove bacteria.
- ○ **B** Feed pets food that produces less waste.
- ○ **C** Bag the pet waste and throw it in the trash.
- ○ **D** Wash the pet with shampoo to kill the bacteria.

Part 4

Part 4

36 **A teacher carefully places some objects into very hot water.**

After one minute, which item is most likely too hot to touch?

- ○ **A** a cloth napkin
- ○ **B** a metal spoon
- ○ **C** a plastic pencil
- ○ **D** a wooden stick

Part 4

Directions

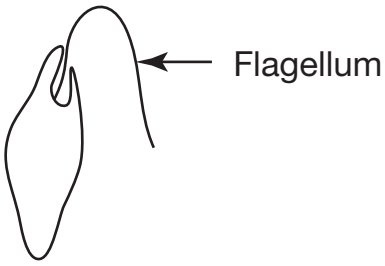
Use the information and data table below to answer Numbers 37 through 39.

A student performed an investigation on green single-celled organisms called *Euglena*. Two samples of *Euglena* were placed in two different containers of water taken from the same source. One sample of *Euglena* was kept in a dark area. The other sample of *Euglena* was kept in a lighted area. The student recorded the observations in the table below.

OBSERVATIONS OF EUGLENA

Sample 1: In Dark Area	Sample 2: In Lighted Area
Uses a flagellum to move	Uses a flagellum to move
Takes in other organisms	Moves toward light
Some divide into two small organisms	Some divide into two small organisms
Various sizes	Various sizes

EUGLENA



Part 4

37 **What is the primary source of energy used by *Euglena* in Sample 2?**

- ○ **A** food
- ○ **B** oxygen
- ○ **C** sunlight
- ○ **D** water

38 **Which statement best compares the needs of the single-celled *Euglena* to the needs of multicellular organisms?**

- ○ **A** Both *Euglena* and multicellular organisms need energy to survive.
- ○ **B** Neither *Euglena* nor multicellular organisms need energy to survive.
- ○ **C** *Euglena* need energy to survive, but multicellular organisms do not need energy to survive.
- ○ **D** *Euglena* do not need energy to survive, but multicellular organisms do need energy to survive.

39 **Which tool did the student most likely use to observe the *Euglena*?**

- ○ **A** goggles
- ○ **B** hand lens
- ○ **C** telescope
- ○ **D** microscope

Part 4

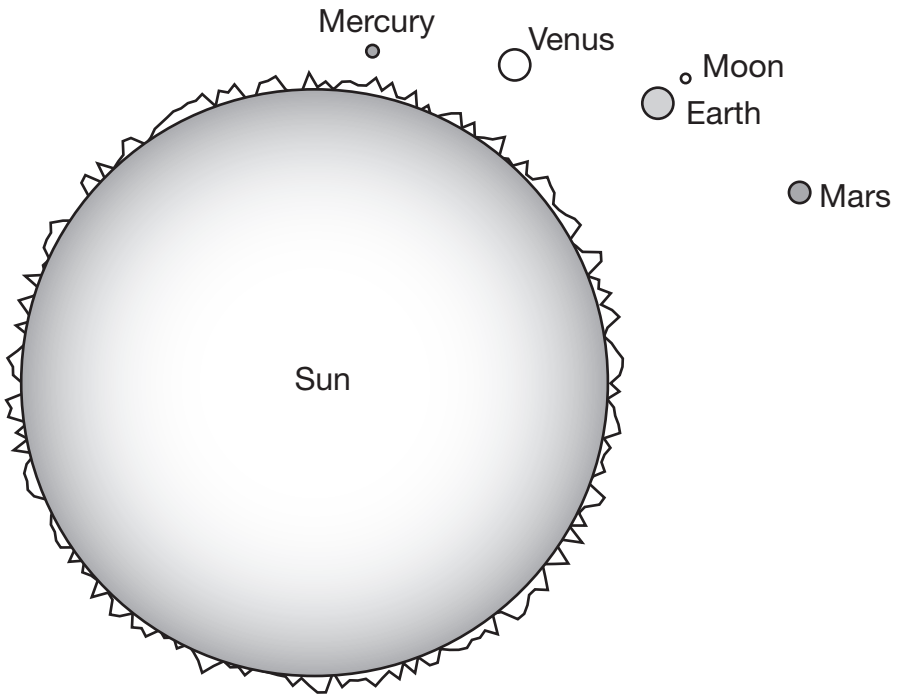
40 **A student heated a pan of soup on a stove. While stirring the soup with a metal spoon, the student noticed the spoon became very warm.**

What is the <u>most likely</u> reason the spoon became warm?

- ○ **A** The stirring action heated the spoon.
- ○ **B** Warm air in the room heated the spoon.
- ○ **C** Heat from the soup was transferred to the spoon.
- ○ **D** The student's hand transferred heat to the spoon.

Part 4

41 **This diagram shows the sun, some planets, and a moon.**



not drawn to scale

The closest star to Earth is

- ○ **A** Mercury
- ○ **B** the moon
- ○ **C** the sun
- ○ **D** Venus

Part 4

42 **The average precipitation for several months for Virginia Beach, Virginia, and Baltimore, Maryland, is shown in the table below.**

AVERAGE PRECIPITATION (CM)

Month	Virginia Beach, VA	Baltimore, MD
Jan.	9.8	8.8
May	9.2	10.6
Jul.	12.9	10.1
Nov.	7.2	8.8

Compare the data to identify which location receives the greatest amount of precipitation. In your comparison, be sure to include

- **an analysis of the data**
- **other information needed**

Part 4

Write your answer in the space provided.

Part 4

43 **Wind changes the surface of Earth.**

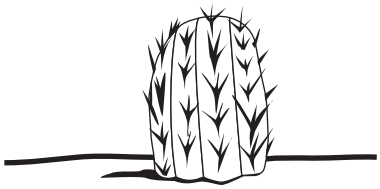
Which of these land formations is a result of transportation and deposition by wind?

- ○ **A** a delta
- ○ **B** a glacier
- ○ **C** a sand dune
- ○ **D** a mountain peak

Part 4

44 **Some plants live in very dry conditions, such as a desert.**

Plant 1



Plant 2

The plant <u>best</u> adapted to survive in a desert climate is

- ○ **A** Plant 2, because the spines attract insects
- ○ **B** Plant 1, because the leaves provide shade for the roots
- ○ **C** Plant 1, because the leaves are far away from the hot soil
- ○ **D** Plant 2, because the spines allow less water to evaporate

Part 4

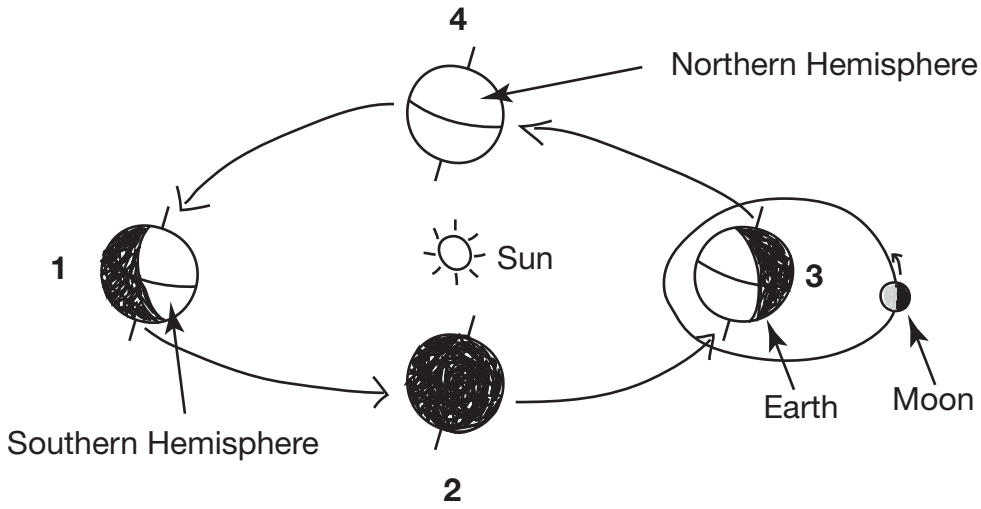
Directions

Use the information and diagram below to answer Numbers 45 and 46.

A student built a model of Earth and the moon. The student used the items listed below to make the model.

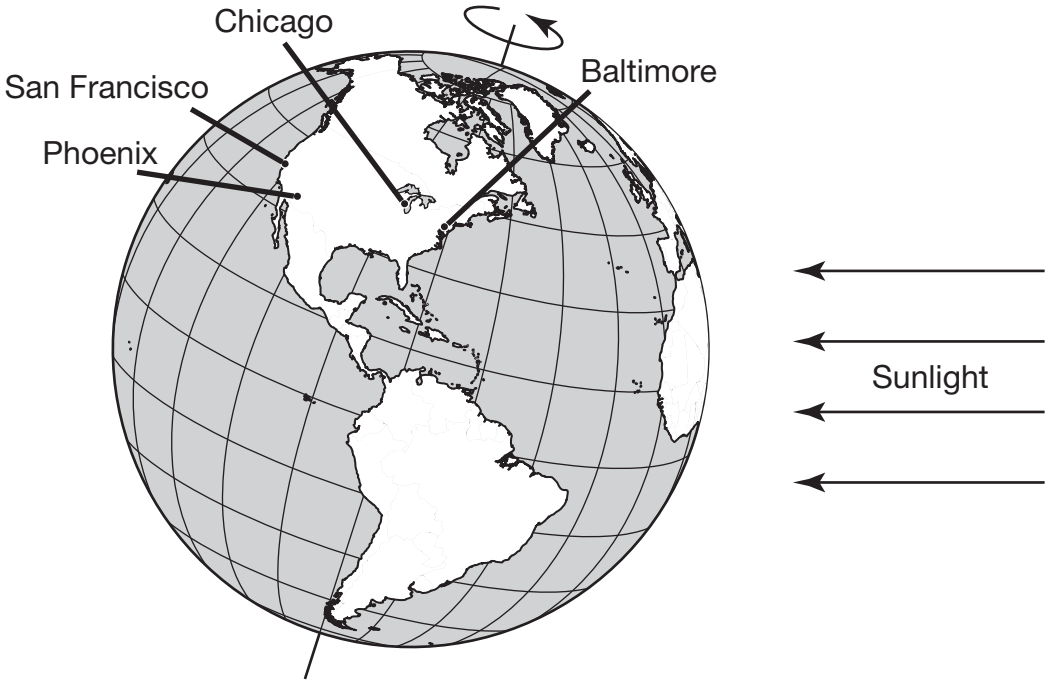
- **flashlight (the sun)**
- **small foam ball (the moon)**
- **large foam ball with a wooden rod through center (Earth with axis)**
- **rubber band placed around the middle of the large foam ball (the equator of Earth)**

The student used the model to show the different positions of Earth and the moon as they move around the sun. The student recorded their observations and numbered the positions of Earth on the drawing below.



Part 4

45 **The diagram below represents the movement of Earth on its axis.**



Which of these four cities will receive sunlight first each day?

- ○ **A** San Francisco
- ○ **B** Phoenix
- ○ **C** Chicago
- ○ **D** Baltimore

Part 4

46 **One rotation of Earth on its axis takes**

- ○ **A** 1 day
- ○ **B** 1 week
- ○ **C** 1 month
- ○ **D** 1 year

STOP

Acknowledgements

"Vertical Farming in the Big Apple" by Jeremy Cooke from BBC News, June 19, 2007 from BBC News at bbc.co.uk.news.

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