

Maryland School Assessment

Science

2008 Public Release

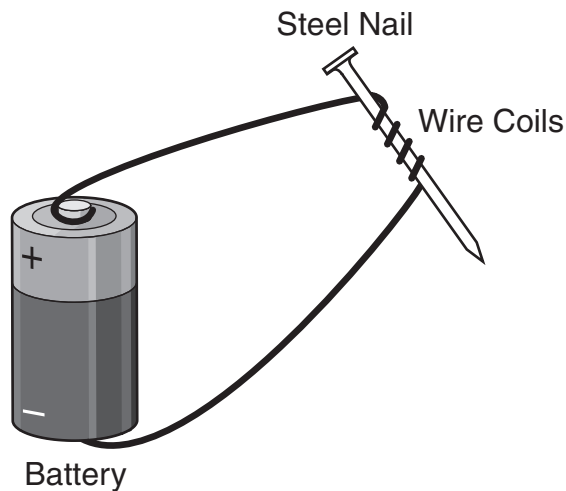
Grade 8

Part 1



Part 1

- 1 An electromagnet is shown below.

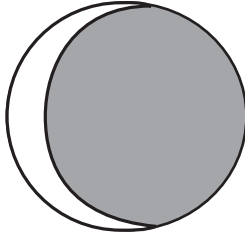


Which change would decrease the strength of the electromagnet?

- A using an iron nail
- B using an additional battery
- C using more wire coils around the nail
- D using fewer wire coils around the nail

Part 1

- 2 The diagram below shows the moon in one of its crescent phases.



Which statement best explains the cause of the phases of the moon?

- A The sun hides part of the surface of the moon.
- B The sun, the moon, and Earth are in a straight line in space.
- C Only part of the illuminated moon is visible from Earth.
- D Only the light from the back side of the sun is reflected by the moon.

- 3 A student pushed a large rubber ball on a flat, frictionless surface. The ball rolled at a speed of 1 meter per second.

Which statement best describes the motion of the ball when the student stopped pushing the ball?

- A The ball accelerated.
- B The ball did not move.
- C The ball changed direction.
- D The ball continued to move in the same direction.

Part 1

Directions

Use the technical passage below to answer Numbers 4 through 6.

Fill 'Er Up . . . With Soybeans and Corn

I'm sure you've heard someone complain about rising gas prices. Well, someday they might not have to worry so much about it. Agricultural Research Service scientists are studying other fuel sources that could eventually replace petroleum fuel.

At ARS's Beltsville Agricultural Research Center in Beltsville, Maryland, scientists are testing to see if government vehicles can use fuel made from soybeans, corn, animal fats, waste greases—like used frying oil—or other crops.

These tests are part of an effort to cut back on petroleum products—and to create more uses for U.S. crops. If the project works, more soybeans or corn will be needed to make crop-based fuel, or biofuel. This could be good for U.S. farmers because the more corn and soybeans people need, the more farmers are able to sell.

Another good thing about crop-based fuel is that it burns cleaner and produces less soot, the black smoke that comes from cars and trucks. Crop-based fuels may help engines run cleaner, decreasing vehicle repairs.

The Beltsville center is ARS's largest research facility. A total of 140 tractors, trucks, and other vehicles, including snowplows, are gassed up with "B20," a mix of 20 percent modified soybean oil and 80 percent regular diesel fuel.

The ARS National Visitor Center bus, which is used for Beltsville farm tours, runs on crop-based fuel. This bus was the first ARS vehicle to fill up on soybean-based fuel.

One disadvantage to using crop-based fuel is that it costs more than regular diesel fuel. However, the price may drop if people use it more.



Part 1

- 4 Which human activity has the most positive impact on the environment?
- A using cropland to feed cattle
 - B selling soybeans at a high price
 - C recycling cooking oils to produce biofuels
 - D reducing the number of acres of corn planted
- 5 If the demand for biofuels increases, how might the environment be positively affected?
- A There would be less air pollution.
 - B Farming equipment would produce more pollution.
 - C Carbon dioxide levels in the air would increase.
 - D Natural habitats would be converted to cropland.



Part 1

- 6** A city might switch from buses that burn fossil fuel to buses that burn B20 diesel fuel. The data table below shows the average kilometers per liter (kpL) of a bus burning B20 diesel and of a bus burning fossil fuel for a seven-month period. The B20 diesel fuel costs more than the fossil fuel.

Fuel Type	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
B20	2.0 kpL	1.8 kpL	1.9 kpL	1.9 kpL	1.9 kpL	2.0 kpL	1.9 kpL
Fossil	2.0 kpL	2.0 kpL	1.9 kpL	2.0 kpL	1.9 kpL	2.0 kpL	1.9 kpL

Evaluate the best type of fuel to use in the city buses. In your evaluation, be sure to include

- **advantages and disadvantages for each fuel**
- **supporting evidence from the data table and the technical passage**

Part 1

Write your answer in the space provided.

B20 fuel

Fossil Fuel

Part 1

Directions

Use The Periodic Table of the Elements and the information below to answer Numbers 7 through 9.

In class, students investigated patterns of elements in The Periodic Table of the Elements. Their teacher pointed out a few properties of some common elements. Helium is the lightest inert gas in air. Magnesium burns with a bright white flame. Gold and silver are dense metals. Table salt (sodium chloride) is a combination of two reactive elements. Some properties of common elements are shown in the data table below.

PROPERTIES OF SOME COMMON ELEMENTS

Element	Symbol	Atomic Number	State of Matter at Room Temperature
Helium	He	2	Gas
Chlorine	Cl	17	Gas
Gold	Au	79	Solid
Magnesium	Mg	12	Solid
Silver	Ag	47	Solid
Sodium	Na	11	Solid

Part 1

7 Which of these elements is a highly reactive metal like sodium (Na)?

- A** silver (Ag)
- B** helium (He)
- C** chlorine (Cl)
- D** magnesium (Mg)

8 Which statement correctly describes a pattern in the data table, based on the state of matter of the elements at room temperature?

- A** Gases are usually nonmetals.
- B** Reactive elements are usually gases.
- C** Solids always have large atomic numbers.
- D** Metals always have large atomic numbers.

9 Which statement best explains what happens to the atoms in gold (Au) when the temperature of the metal increases?

- A** The atoms move more slowly.
- B** The atoms move more quickly.
- C** The motion of the atoms stays the same.
- D** The motion of the atoms becomes very orderly.



Part 1

Directions

Use the information below to answer Numbers 10 and 11.

Fossils of tree ferns as old as 400 million years have been found in rocks. These ancient ferns lived in swampy, lowland forests and reproduced asexually by producing spores. The ferns were much taller than other plants living at the same time. These extinct tree ferns have modern-day relatives that grow in the tropics.

- 10** Ancient ground plants competed with ancient tree ferns for resources in swampy areas.

For which resource were the tree ferns best able to compete?

- A** air
- B** shelter
- C** sunlight
- D** water

- 11** Today, many tree ferns have a life cycle that now includes a sexual phase as well as an asexual phase. An egg and a sperm unite to form a fertilized egg.

In a fertilized egg, what percentage of the genetic information comes from the sperm?

- A** 25%
- B** 50%
- C** 75%
- D** 100%



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Part 2

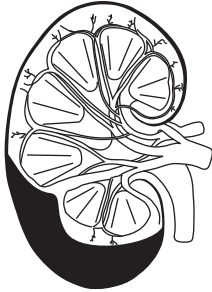


Part 2

- 12 Kidneys are bean-shaped organs that filter waste from the bloodstream.

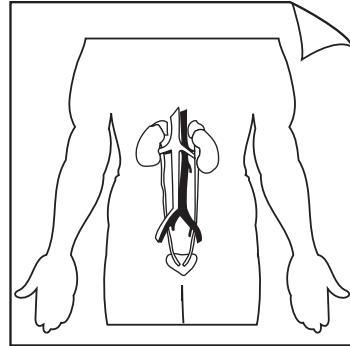
Which model best demonstrates how a kidney functions?

A

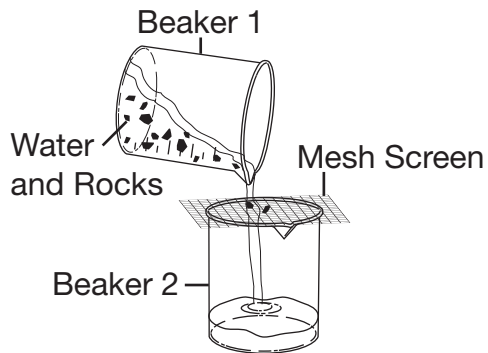


Kidney

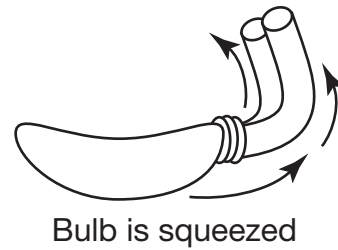
B



C



D



Part 2

13 The solar system containing Earth consists of a sun and planets.

Which statement best describes the motion of the planets in our solar system?

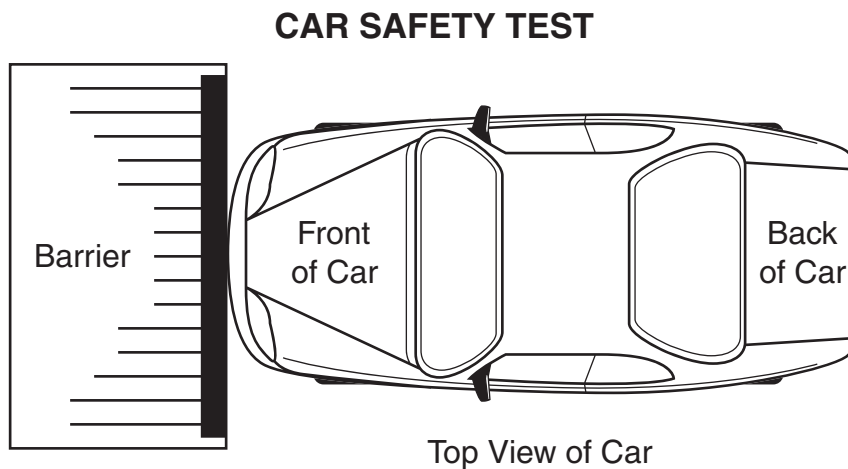
- A** The planets rotate around the sun.
- B** The sun rotates around the planets.
- C** The planets revolve around the sun.
- D** The sun revolves around the planets.

Part 2

Directions

Use the information and the picture below to answer Numbers 15 through 17.

Engineers tested the safety of a new model of car. The engineers designed safety tests and collected data from those tests. One test is pictured below.



- 15** An apple was placed on the back seat of the car. The car was then accelerated toward the barrier at 60 kilometers per hour (kph).

Which statement best describes the motion of the apple immediately after the car hit the barrier?

- A** The apple moved forward at 30 kph.
- B** The apple moved forward at 60 kph.
- C** The apple moved backward at 30 kph.
- D** The apple moved backward at 60 kph.

Part 2

16 How do engineers accurately predict what would happen in a real car crash?

- A** Engineers review one trial on a computer.
- B** Engineers do one trial using many cameras.
- C** Engineers do several trials to verify the results are consistent.
- D** Engineers do several trials at a speed faster than the posted speed limit.

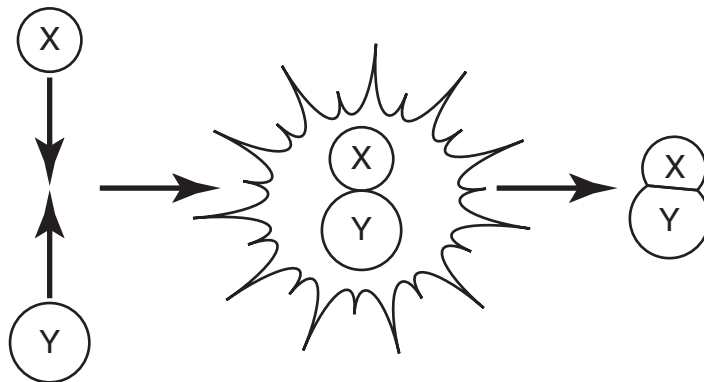
17 Which part of a car transforms chemical energy into electrical energy?

- A** the brakes
- B** the battery
- C** the wheels
- D** the accelerator



Part 2

18 Elements X and Y react to form compound XY.



How is compound XY different from elements X and Y?

- A** The mass of compound XY is greater than the combined masses of elements X and Y.
- B** The volume of compound XY is less than the combined volumes of elements X and Y.
- C** The physical properties of compound XY have changed from those of elements X and Y.
- D** The reactivity of compound XY is greater than the reactivity of elements X and Y.



Part 2

- 19 Students conducted an investigation to determine if mold grows on only certain types of bread. The students dripped water on four types of bread and covered the damp bread with plastic wrap. Each piece of bread was placed in a different dark area. The data table below shows the information the students collected after four days.

BREAD MOLD GROWTH

Type of Bread	Water (milliliters)	Temperature (°Celsius)	Presence of Mold
Rye	5	1	No
Sourdough	5	22	Yes
White	5	24	Yes
Wheat	5	40	Yes

Which of these changes should the students make to their investigation to develop a valid conclusion?

- A Use only two types of bread.
- B Drip more water on each piece of bread.
- C Keep all the bread at the same temperature.
- D Place some of the pieces of bread in a lighted area.

Part 2

20 Heat is transferred from one object to another object.

What is an example of heat transferred by radiation?

- A** coffee warming a cup
- B** hot air warming a room
- C** the sun warming the moon
- D** a hot plate warming a beaker



Part 2

Directions

Use the information below to answer Numbers 21 through 23.

The data table below shows the time of sunrise and sunset in four different cities on May 2. Each city is located within the same time zone of the United States.

TIMES OF SUNRISE AND SUNSET ON MAY 2

City	Sunrise	Sunset	Total Daylight Minutes
1	6:43 A.M.	7:53 P.M.	790
2	5:38 A.M.	7:45 P.M.	847
3	5:14 A.M.	10:24 P.M.	1,030
4	6:12 A.M.	7:58 P.M.	826

21 On which of these days will the total hours of daylight be the greatest in each of the four cities?

- A** January 28
- B** March 21
- C** June 21
- D** November 30

Part 2

22 Which fact best explains why the four cities will have different sunrise times on May 3?

- A** The tilt of the axis in Earth's orbit affects sunrise times.
- B** The rotation of Earth causes the cycle of days and nights.
- C** The rotation of Earth causes seasonal differences in the northern latitudes.
- D** The distance of Earth from the sun results in differences in sunrise times.

23 Which statement best describes the sunlight that affects the Northern Hemisphere on May 2?

- A** Earth is positioned on the hottest side of the sun during the spring.
- B** Earth is closer to the sun on this date than at any other time of year.
- C** The tilt of Earth on its axis causes sunlight to strike this area most directly.
- D** The position of Earth in its orbit causes sunlight to strike the area indirectly.



Part 3



Directions

Use the information to answer Numbers 24 through 26.

Over the last 150 years, the use of fossil fuels has increased, resulting in more carbon dioxide and other greenhouse gases in the atmosphere. Some scientists think that these atmospheric gases will result in global warming. Scientists have recorded data on global temperature changes and have predicted possible changes in sea level that may affect Maryland residents.

24 Which action helps reduce global warming?

- A developing highways
- B driving large vehicles
- C using renewable power sources
- D using electricity from coal burning power plants

25 Using fossil fuels in the United States will most likely contribute to rising sea levels globally by

- A increasing oxygen levels
- B decreasing oxygen levels
- C increasing carbon dioxide levels
- D decreasing carbon dioxide levels



Part 3

26 Which result of global warming will most negatively affect coastal residents in Maryland?

- A loss of shore land
- B erosion of mountains
- C decrease in average temperature
- D increase in the size of the polar ice caps



27 Rossby waves are slow-moving, long ocean waves.

What feature of a Rossby wave would change if the wavelength was doubled?

- A** The amplitude would double.
- B** The frequency would double.
- C** The amplitude would decrease by half.
- D** The frequency would decrease by half.



29 Leaf cells are one type of tree cell.

Which process occurs in a growing leaf cell?

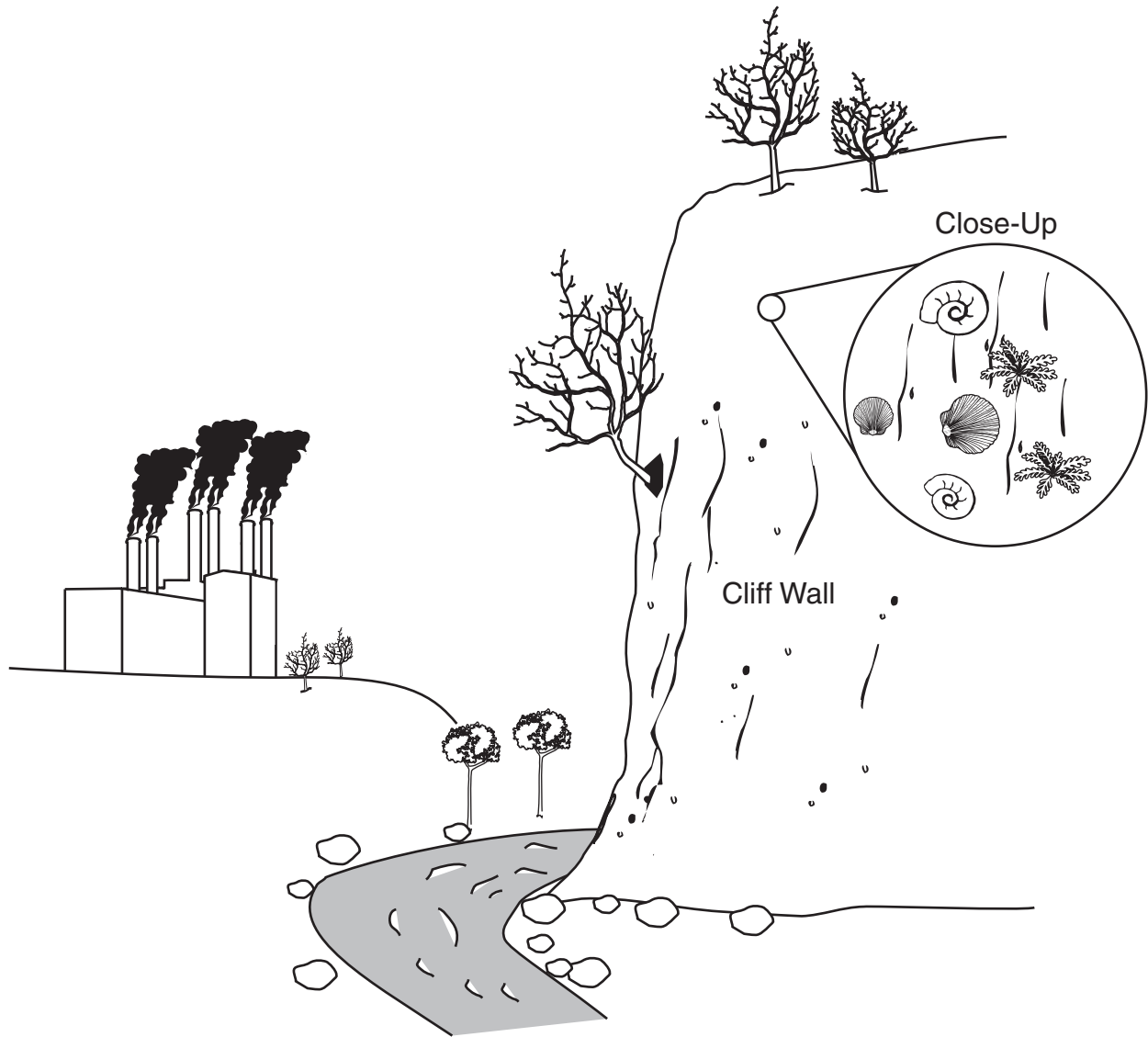
- A** evolution
- B** adaptation
- C** sugar production
- D** sexual reproduction



Part 3

Directions

Use the picture below to answer Numbers 30 through 32.



Part 3

30 Each spring, a crevice in the cliff wall widens and deepens.

What is the best explanation for how physical weathering causes the crevice to widen and deepen?

- A** Winds deposit sand into the crevice.
- B** Water freezes and expands in the crevice.
- C** Snow melts and evaporates between the rocks in the crevice.
- D** Air pollution in the area causes a reaction that widens the crevice.

31 The picture shows a close-up view of fossils found within the cliff wall.

This cliff is most likely composed of

- A** igneous rock
- B** molten rock
- C** metamorphic rock
- D** sedimentary rock

32 Why do scientists study fossils?

- A** to learn how the planet was formed
- B** to study how organisms changed over time
- C** to observe how drought affected the landscape
- D** to understand how weathering affected rock layers

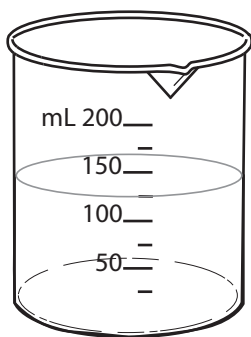


Part 3

Directions

Use the information below to answer Numbers 33 and 34.

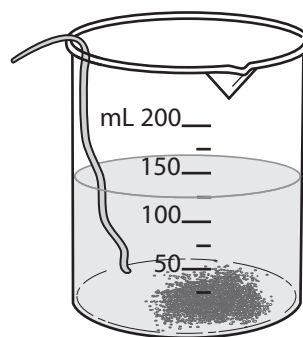
Silver nitrate (AgNO_3) a colorless powder, consists of the metallic element silver (Ag) and two non-metallic elements, nitrogen and oxygen (N and O). Silver nitrate mixed with water (H_2O) forms a clear solution. When a piece of copper wire (Cu) is put into a silver nitrate solution, the clear solution turns blue. A silvery white substance forms on the wire and falls to the bottom of the solution.



Silver Nitrate Solution



Copper Wire



Blue Solution



Part 3

33 What is the best method for separating the silvery white substance from the liquid in the beaker?

- A** absorption
- B** chromatography
- C** condensation
- D** filtration

34 Which statement best explains why silver nitrate (AgNO_3) is classified as a compound?

- A** Silver nitrate contains a metal.
- B** Silver nitrate chemically reacts with copper.
- C** Silver nitrate forms when three elements chemically combine.
- D** Silver nitrate forms a solution when mixed with water.

35 Biologists conduct investigations to learn about living organisms.

Which method helps reduce bias during an investigation?

- A** developing a hypothesis after collecting data in the investigation
- B** limiting the amount of background research before the investigation
- C** designing an investigation with repeated trials during the investigation
- D** obtaining other opinions concerning what should happen during the investigation



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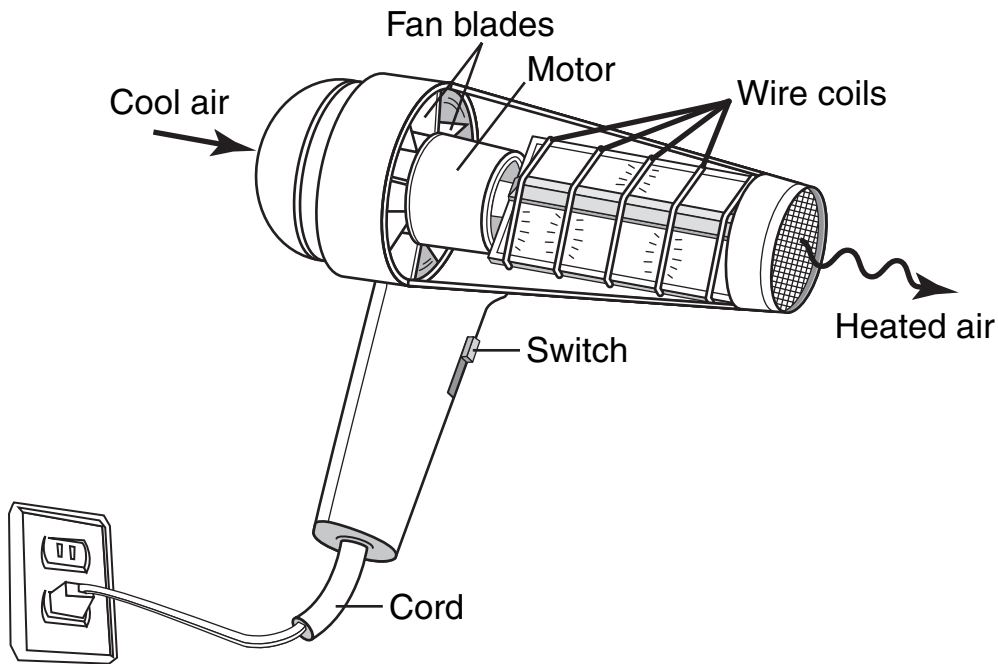
Part 4



Directions

Use the information below to answer Numbers 36 and 37.

The hair dryer in the cross section diagram below transforms one type of energy into other types of energy.



36 Wire coils in the hair dryer become hot when in use.

What energy transformation occurs in the wire coils?

- A** electrical to heat
- B** heat to mechanical
- C** chemical to mechanical
- D** mechanical to electrical

37 What part of the hair dryer changes electrical energy into mechanical energy?

- A** motor
- B** switch
- C** wire coils
- D** fan blades



38 Earthquakes and volcanic eruptions occur both on land and in water.

Earthquakes and volcanic eruptions most often occur

- A** near plate boundaries
- B** on large pieces of land
- C** in large bodies of water
- D** in regions near the equator

39 Students are investigating the physical properties of three solid mixtures by placing each solid mixture in liquid water.

What physical property are the students testing?

- A** solubility
- B** conductivity
- C** boiling point
- D** melting point

Directions

Use the technical passage below to answer Numbers 40 through 42.

The Good, the Bad, and the Algae

While the name “algae bloom” might sound like something pretty and delicate, algae blooms are not sweet-smelling flowers that blossom in the Chesapeake Bay. In fact, they have much to do with the nature of algae and the way people use the land around them.

What Are Algae Blooms?

When nutrients are present in excessive amounts, algae grow rapidly. Their numbers can double in a day. Population explosions of algae are known as blooms.

Because different species thrive as waters vary from warm to cold and fresh to salty, algae blooms occur throughout the Bay and throughout the year. However most blooms appear in summer, when sunlight and nutrients are plentiful.

Depending on the species, blooms can form scum, clumps or mats that float near the surface or grow on the bottom. Blooms in the Chesapeake are most often greenish, red, or brown.

How Are Blooms Harmful?

While higher organisms—such as zooplankton, clams, oysters, minnows and menhaden—eat algae, blooms provide a large surplus of food. Some species low in nutritional value can weaken the organisms that eat them. When algae die, they sink to the bottom. Their decomposition uses more oxygen than they produced when living. The grim result is that blooms rob water of the dissolved oxygen that fish, shellfish, and other aquatic creatures need to survive. Blooms block the sunlight needed by bay grasses, which produce oxygen and provide habitats for fish and shellfish. Some blooms produce poisonous substances called toxins. Toxins can weaken or kill fish, harm land animals that drink contaminated water, and cause skin irritations and stomach problems in humans.

How Can We Control Blooms?

Restoring forests and wetlands is a way to reduce the flow of nutrients into waterways. The trees and vegetation soak up nutrients much like a sponge, acting as nutrient-storage devices. Planting forested or vegetative buffers along waterways also helps slow runoff, allowing more nutrient-laden water to filter through the ground. Restoring populations of algae-eating organisms, particularly oysters and menhaden, is yet another important way to counteract algae blooms in the Chesapeake.

40 Why might the animals in a bay be affected by large numbers of dead algae?

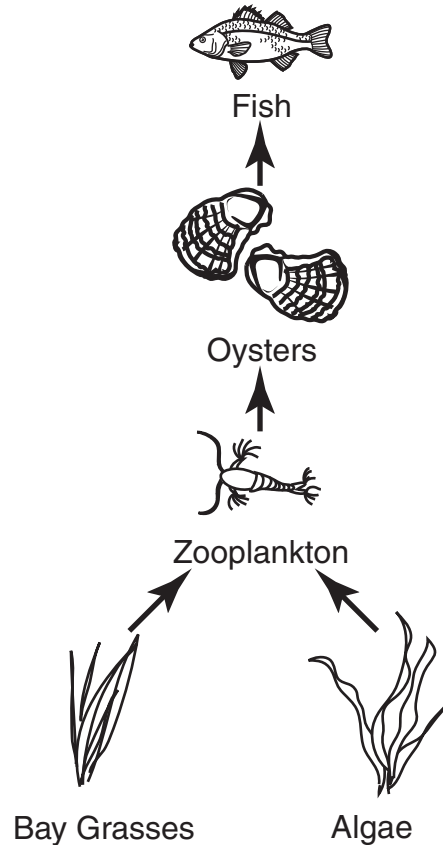
- A The animals have less oxygen.
- B The animals have less nutrients.
- C The animals are at risk of algal infections.
- D The animals are at risk of freezing in the winter.

41 Which human activity would most likely reduce the number of algae blooms in a bay?

- A converting marshland to cropland
- B adding trees along stream banks
- C building shopping centers on paved areas
- D increasing the amount of fertilizers used for growing crops



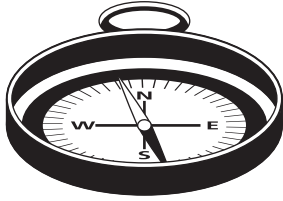
- 42 During one year the algae population decreases in the Chesapeake Bay. Below is a partial Chesapeake Bay food chain.



Explain how a large decrease in the algae population will most likely impact the bay ecosystem. In your explanation, be sure to include

- the roles of the organisms in the partial Chesapeake Bay food chain
- the possible effects of a decrease in the algae population on the plant and animal populations

- 43 Hikers often use a compass and a map to determine their location. The needle on a compass moves and aligns with the magnetic field of Earth because the needle is magnetized.



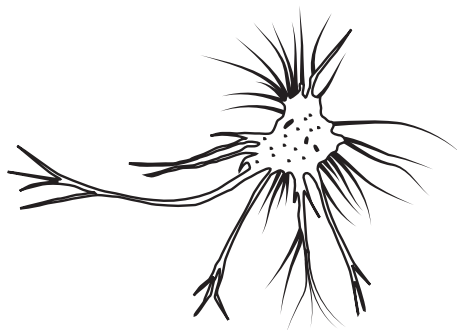
Which action most likely affects the accuracy of a compass?

- A changing hiking speed
- B moving to a high altitude
- C changing hiking speed and direction
- D moving close to overhead power lines

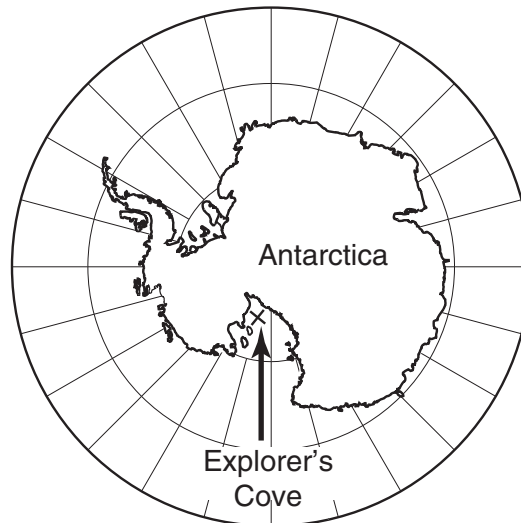
Directions

Use the information and diagrams below to answer Numbers 44 through 46.

Astrammia rara is a unicellular organism that is several millimeters long. This organism lives on the ocean floor of Antarctica in an area called Explorer's Cove. *Astrammia rara* builds a shell by cementing grains of sand from the ocean floor together. The organism either absorbs nutrients from the water or eats other organisms on the ocean floor. The offspring of *Astrammia rara* have genes identical to the parent. Below is a diagram of an *Astrammia rara* and a map showing where the organism lives.



Astrammia rara



(not drawn to scale)

44 Asexual reproduction by *Astrammina rara*

- A involves an egg and a sperm
- B requires a male and a female
- C reduces the variation in the offspring
- D increases the variation in the offspring

45 Which statement best describes how genetic information is passed to the offspring of *Astrammina rara*?

- A The genetic information comes from the egg.
- B The genetic information comes from the sperm.
- C All of the genetic information comes from one parent.
- D Half of the genetic information comes from one parent.

46 Which of the following reasons best explains why *Astrammina rara* builds a shell?

- A to grind food
- B to attract a mate
- C to absorb sunlight
- D to blend with the ocean floor



Acknowledgements

Fill 'Er Up....With Soybeans and Corn Please." Courtesy: United States Department of Agriculture.

"The Good, the Bad and the Algae." Courtesy of the Maryland Department of Natural Resources - www.maryland.gov