Maryland School Assessment

Science

2015 Public Release

Grade 8

Part 1

Part 1

1 **Many scientists theorize that global warming will melt the polar ice caps.**

What would <u>most likely</u> happen if the polar ice caps melted?

- ○ **A** Ocean levels would increase.
- ○ **B** Human population would increase.
- ○ **C** Vegetation in water would decrease.
- ○ **D** Global precipitation would decrease.

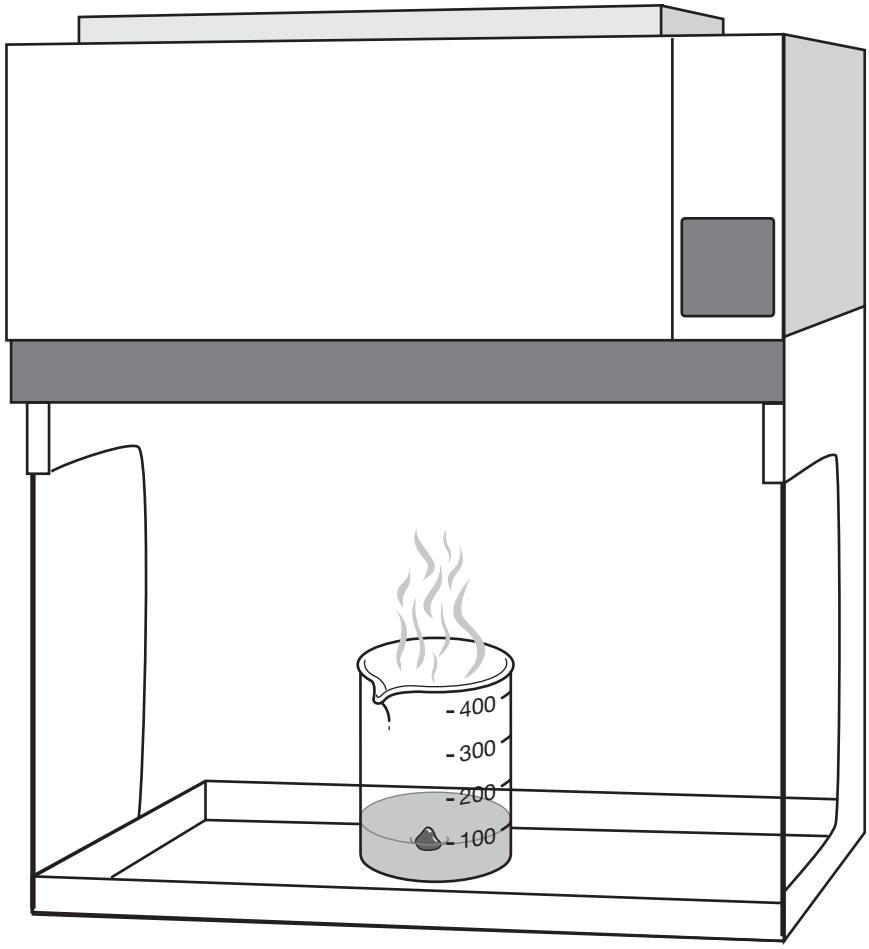
Part 1

Directions

Use the information below to answer Numbers 2 through 4.

Sodium and Water

Students watched a video of sodium metal (Na) reacting with water in a fume hood. The reaction occurred quickly and produced the compound sodium hydroxide (NaOH) and hydrogen gas (H_2). The reaction also gave off heat and sparks at times.



Part 1

2 **The compound sodium hydroxide (NaOH) is composed of**

- ○ **A** only one element
- ○ **B** only one molecule
- ○ **C** more than one element
- ○ **D** more than one molecule

3 **The element that would react with water in a similar way as sodium (Na) is**

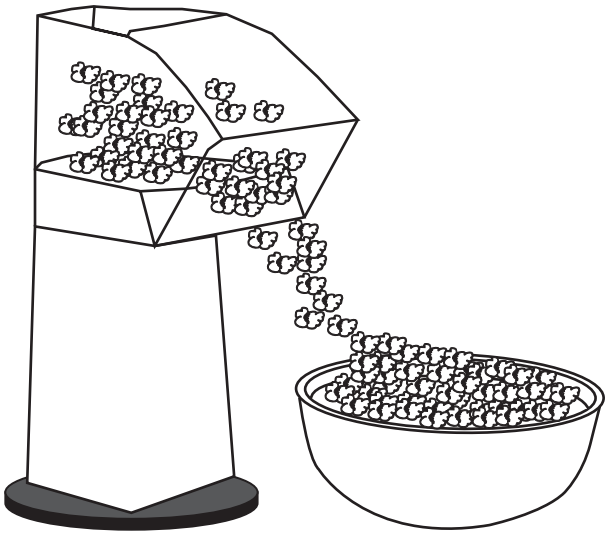
- ○ **A** aluminum (Al)
- ○ **B** copper (Cu)
- ○ **C** lead (Pb)
- ○ **D** potassium (K)

4 **When sodium (Na) reacts with water (H_2O), the properties of sodium**

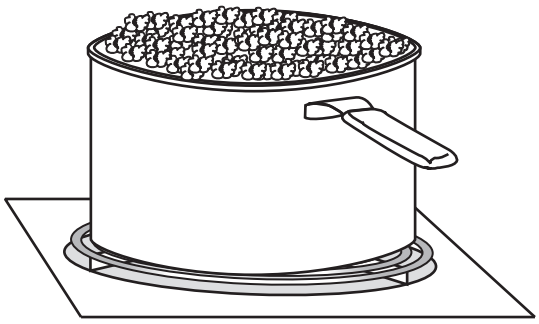
- ○ **A** remain the same after the reaction
- ○ **B** change when the compound is formed
- ○ **C** change to properties similar to hydrogen
- ○ **D** remain the same during the entire reaction

Part 1

5 **Students investigated different methods of making popcorn to determine which method produced the most popcorn. The students made popcorn in an air popper and in a pan with oil. They concluded that popcorn popped in oil produced better-tasting popcorn.**



Air Popped Corn



Oil Popped Corn

Explain why the conclusion reached by the students is <u>not</u> logical for this investigation. In your explanation, be sure to include

- **evidence obtained**
- **variables involved**

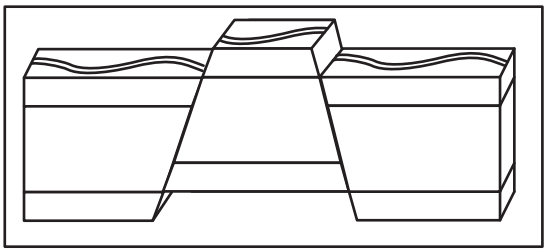
Part 1

Write your answer in the space provided.

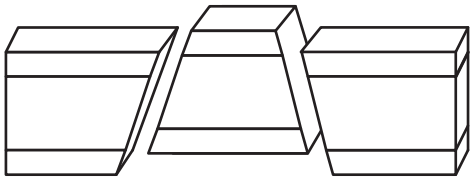
Part 1

6 **Students compared two different geological models.**

Model 1
Poster of Rock Movement



Model 2
Foam Rubber Blocks



Which model is <u>best</u> used to show an earthquake?

- ○ **A** Model 2 because there are layers of rock
- ○ **B** Model 1 because the fault lines are visible
- ○ **C** Model 2 because the pieces are moveable
- ○ **D** Model 1 because there are details shown

Part 1

7 **Chromosomes contain the genetic information of an organism. Fruit flies reproduce by sexual reproduction. Most of the cells of a fruit fly have 8 chromosomes.**

Which statement best explains the source of the chromosomes in a normal fertilized fruit fly egg?

- ○ **A** The egg cell contains all 8 chromosomes.
- ○ **B** The sperm cell contains all 8 chromosomes.
- ○ **C** The sperm cell provides 4 chromosomes and the egg cell provides 4 chromosomes.
- ○ **D** The egg cell provides 4 chromosomes and 4 sperm cells each provide 1 chromosome.

Part 1

8 **Fossil fuel consumption has increased steadily since the 1830s. In 2006, fossil fuels provided most of the energy for 6.6 billion people worldwide. With the population expected to grow to 9.4 billion by 2050, fossil fuel consumption should continue to increase.**

Explain the impact of population growth and increased energy demands on the supply of fossil fuels. In your explanation, be sure to include

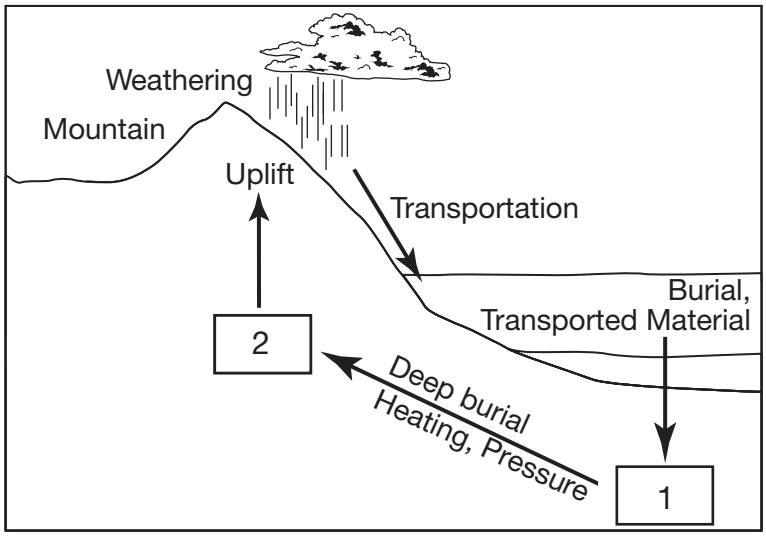
- **how the supply of fossil fuel is affected**
- **possible solutions to the increasing demand for fossil fuels**

Part 1

Write your answer in the space provided.

Part 1

9 **Part of the rock cycle is shown in the diagram below.**



The change that occurred to the rock between Steps 1 and 2 in this part of the rock cycle was

- ○ **A** sedimentary rock changed to igneous rock
- ○ **B** igneous rock changed to sedimentary rock
- ○ **C** metamorphic rock changed to igneous rock
- ○ **D** sedimentary rock changed to metamorphic rock

Part 1

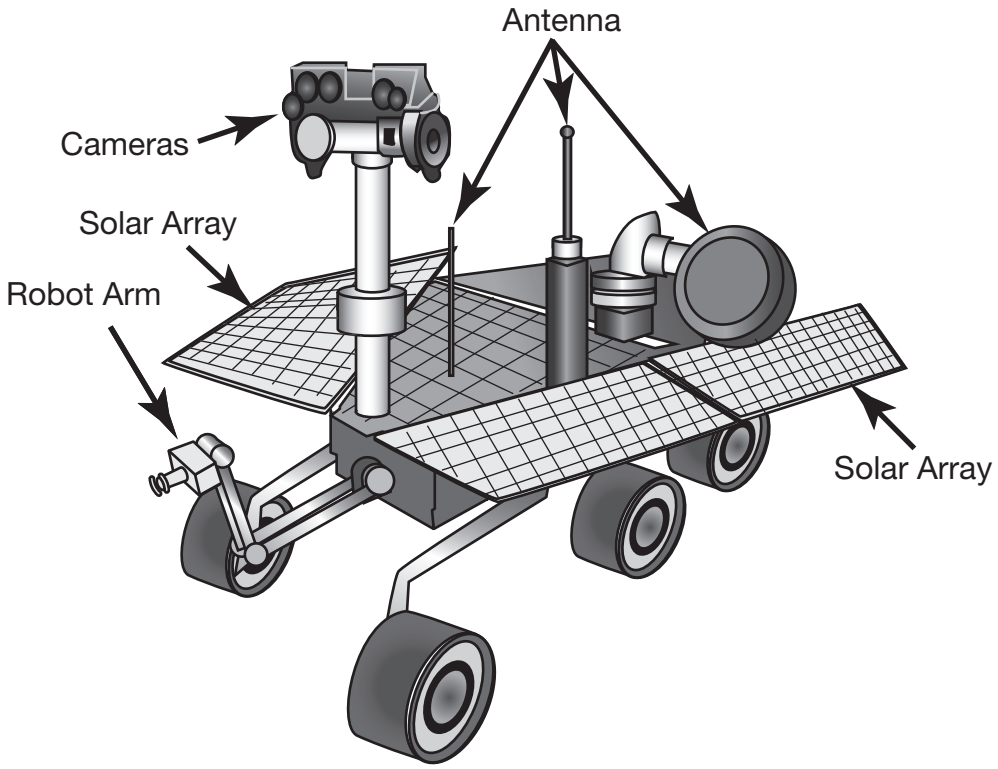
Directions

Use the information below to answer Numbers 10 and 11.

The Mars Lander

In 2004, two robots called rovers landed on the surface of Mars. Scientists using remote control units on Earth were able to start the robots exploring the surface of Mars. One rover, named Opportunity, was still moving across the Martian surface in 2011, which lasted more than seven years longer than expected.

The rovers used solar-powered cells on solar arrays that were able to generate 140 units of power using the weak Martian sunlight which filters through the thin atmosphere. The power was stored in rechargeable batteries that could be used at night.



Part 1

10 **Heat energy is most likely transferred to Opportunity's internal instruments during the cold Martian nights by**

- ○ **A** conduction
- ○ **B** convection
- ○ **C** radiation
- ○ **D** reflection

11 **Opportunity generates power using cells in an array which converts solar energy to electrical energy.**

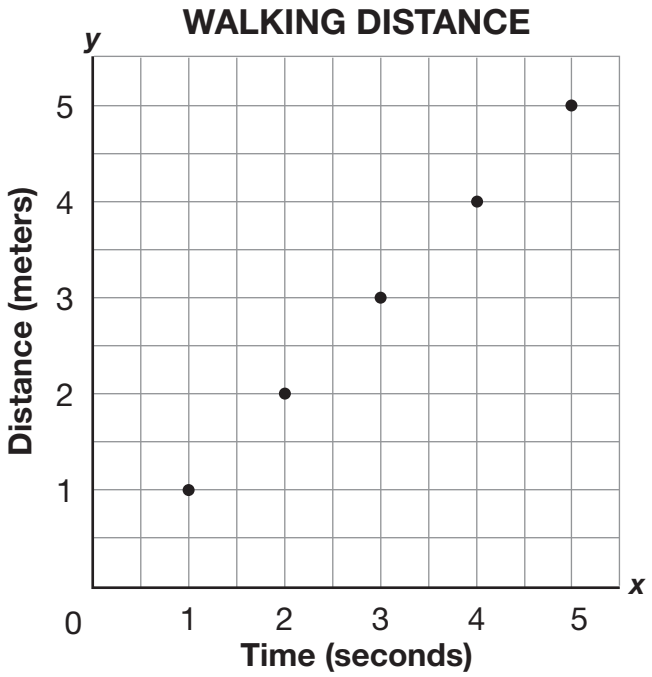
How is energy transferred from the sun to the rover?

- ○ **A** conduction
- ○ **B** convection
- ○ **C** radiation
- ○ **D** reflection

Part 2

Part 2

12 **A student walked around the track at school and recorded the time every meter. The student constructed the graph below using the data.**



Which type of motion is represented in the graph?

- ○ **A** accelerated
- ○ **B** constant
- ○ **C** periodic
- ○ **D** variable

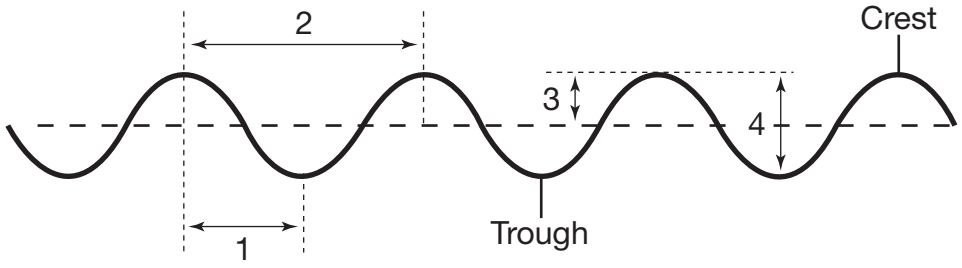
Part 2

Directions

Use the information below to answer Numbers 13 and 14.

Ocean Waves

Ocean waves are generated by natural forces such as wind, earthquakes, and tides. A simple water wave is shown in the diagram below.

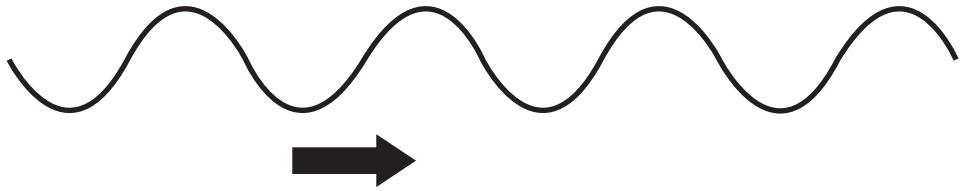


13 **The number in the diagram that represents the wavelength is**

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

Part 2

14 **The arrow in the ocean wave diagram below represents the direction of the transfer of**



- ○ **A** energy
- ○ **B** force
- ○ **C** matter
- ○ **D** speed

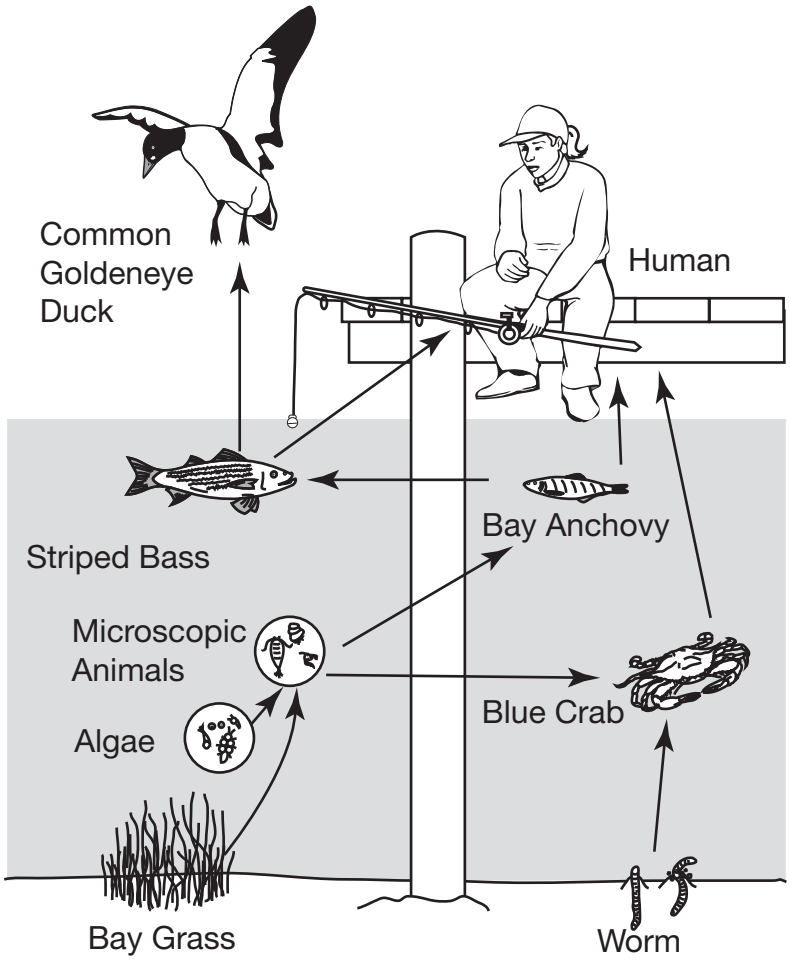
Part 2

Directions

Use the information below to answer Numbers 15 through 17.

The Chesapeake Bay is the largest estuary ecosystem in the United States. Organisms living there have developed food webs in which they depend upon one another for energy. A partial Chesapeake Bay food web is shown below.

PARTIAL FOOD WEB



Part 2

15 **Which two organisms are most likely to compete for the same resources in this food web?**

- ○ **A** bay grasses and blue crab
- ○ **B** algae and microscopic animals
- ○ **C** bay anchovies and striped bass
- ○ **D** common goldeneye duck and human

Part 2

16 **The amount of dissolved oxygen in the water needed by several organisms found in the Chesapeake Bay is shown in the table below.**

AMOUNT OF DISSOLVED OXYGEN

Organism	Amount of Dissolved Oxygen Needed (milligrams per liter)
Striped bass	6
Bay anchovy	3
Blue crab	3
Worms	1

If the oxygen level in the water dropped below 3 milligrams per liter of water, blue crabs would <u>most likely</u>

○ **A** relocate to the shore

○ **B** move closer to plants

○ **C** decrease in population

○ **D** increase rapidly in size

Part 2

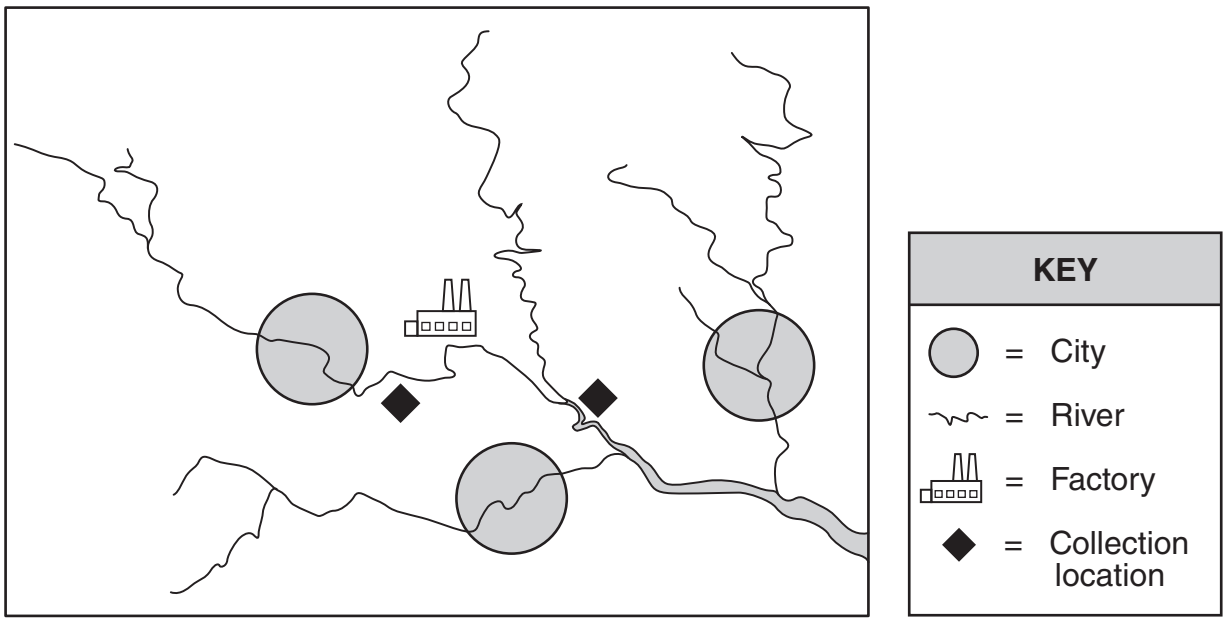
17 **The common goldeneye duck and striped bass share many similar structures. However, they belong to different animal groups.**

Which system is most different in these groups of animals?

- ○ **A** circulatory
- ○ **B** digestive
- ○ **C** reproductive
- ○ **D** respiratory

Part 2

18 **Students wanted to know if a factory was polluting nearby rivers. The students collected water samples from two locations along the rivers. They measured the pollution levels of the samples. The map shows the area surrounding the factory.**



Which of these actions should the students complete before concluding that the factory is polluting the rivers?

- ○ **A** Measure the depth of the water in several locations.
- ○ **B** Discuss statewide pollution causes with a geologist.
- ○ **C** Take multiple measurements at the collection locations.
- ○ **D** Report the findings of their study to the local newspaper.

Part 2

19 **Chromosomes, thread-like structures located inside the nucleus of animal and plant cells, contain the genetic information for organisms. The number of chromosomes for some species is given in the table below.**

NUMBER OF CHROMOSOMES BY SPECIES

Species	Number of Chromosomes
Apple	34
Cat	38
Horse	64
Human	46
Tomato	24

How many chromosomes are transferred from each parent horse to a colt?

○ **A** 128

○ **B** 64

○ **C** 32

○ **D** 16

Part 2

Directions

Use the technical passage below to answer Numbers 20 through 22.

Power of Urine Runs a Battery

Scientists have developed a way to turn urine into electricity.

Cheap, disposable, and renewable, urine-powered batteries may be the perfect power source for disposable healthcare test kits called biochips,[1] the researchers say.

"We are striving to develop cheap, disposable credit card-sized biochips for disease detection," said battery developer Ki Bang Lee. "Our battery can be easily integrated into such devices, supplying electricity upon contact with biofluids[2] such as urine."

Scientists around the world are clamoring to design inexpensive biochips to quickly test for a variety of diseases. But no one has been able to make a similarly small and inexpensive power source.

Lee and his team of researchers at Singapore's Institute of Bioengineering and Nanotechnology have tackled this problem by using the very substance being tested—urine—to power the test.

To make the battery, Lee and his team soaked a piece of paper in copper chloride and then sandwiched it between strips of magnesium and copper. Then they laminated[3] the credit card-sized unit between transparent plastic films.

When a drop of urine is added to the copper chloride paper, a chemical reaction takes place and produces electricity, which is harnessed[4] by the battery. A few drops will generate about 1.5 volts, the same as a AA battery. The battery needs to be developed further to make it commercially viable.[5]

"Our urine-activated battery would be integrated into biochip systems for healthcare diagnostic[6] applications," Lee said.

Lee and his team also found that they could alter the battery's performance—voltage, power, or duration—by adjusting the design or materials.

Part 2

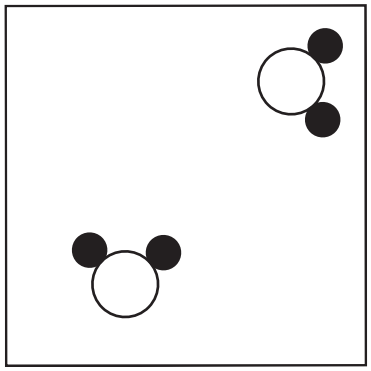
The chemical composition of urine indicates a person's general health and is widely used in diagnostic tests. For instance, doctors measure the concentration of the sugar glucose to determine whether someone is diabetic.

Lee predicts that one day people will be able to monitor their own health at home using biochips powered by this type of battery.

[1]**biochips** – very small, thin storage units that use biological molecules to process data
[2]**biofluids** – biological liquids
[3]**laminated** – plastic-coated
[4]**harnessed** – collected and made use of
[5]**viable** – having a reasonable chance of succeeding
[6]**diagnostic** – to identify by signs or symptoms

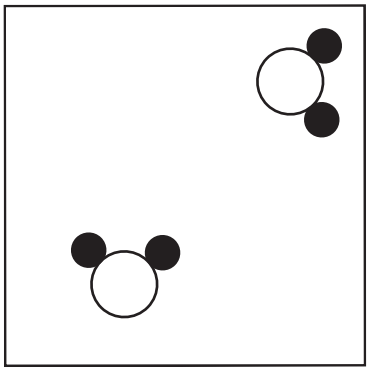
Part 2

20 **The diagram below represents water molecules.**

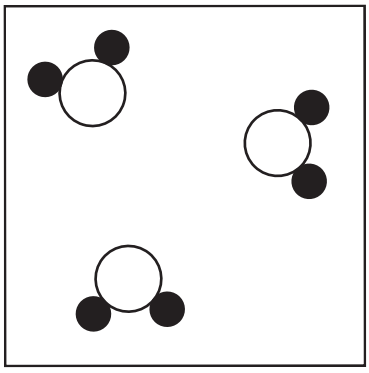


Which diagram represents a chemical change in the water molecules?

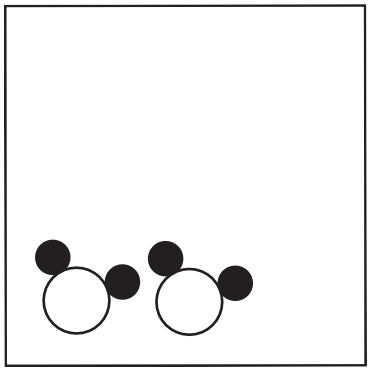
○ **A**



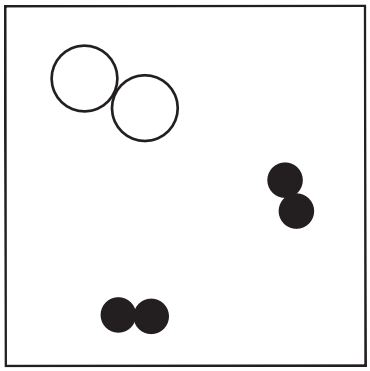
○ **B**



○ **C**



○ **D**



Part 2

21 **A group of students compared copper, an element the scientists used in the urine-powered battery, to copper bromide, a compound made within the battery.**

AN ELEMENT AND A COMPOUND

Substance	State of Matter at Room Temperature	Color	Boiling Point (°C)
Copper	Solid	Orangish brown	2,567
Copper bromide	Solid	Yellowish green	900

When copper reacts to form copper bromide, the copper's

○ **A** mass increases

○ **B** properties change

○ **C** atomic number changes

○ **D** number of atoms increases

Part 2

22 **Doctors use urine to evaluate a person's health. A healthy person's urine has a pH of about 6.0.**

A person had urine with a pH of 5.7. The person's doctor recommended some dietary actions to normalize the pH of the urine.

DIETARY ACTIONS THAT AFFECT URINE pH

Action	Urine Property
Consuming too much salt	More acidic
Not eating for hours	More acidic
Not drinking enough water	More acidic
Eating mainly fruits and vegetables	More basic
Eating a lot of protein	More acidic
Taking stomach antacids	More basic

Describe the dietary actions the person might make to bring the pH of the urine to 6.0. In your description, be sure to include

- **the acidic, basic, and neutral values of the pH scale**
- **whether the person's urine is acidic, basic, or neutral**
- **how each dietary action in the table would affect the pH of the person's urine**

Part 2

Write your answer in the space provided.

Part 3

Part 3

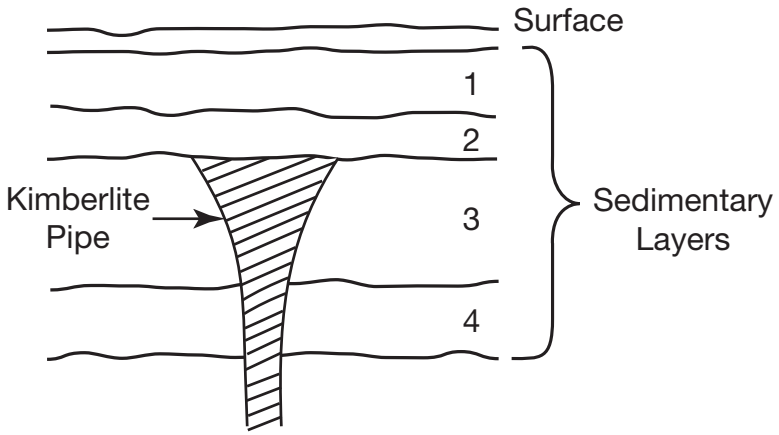
Directions

Use the information and diagram below to answer Numbers 23 and 24.

Kimberlite Pipes

Kimberlite pipes are geological formations that originate in the upper mantle. Kimberlite pipes form when magma moves up through the crust of Earth. The magma breaks and pushes aside other rock layers, making a carrot-shaped structure. Some kimberlite pipes erupt at the surface of Earth before cooling.

Many diamonds are found in the kimberlite pipes. These diamonds are formed in the mantle and are moved upward by the formation of the pipe.



Part 3

23 **A scientist studied the diagram of the kimberlite pipe. The scientist concluded that sedimentary layers 3 and 4 formed before the kimberlite pipe was formed.**

Which statement best supports this conclusion?

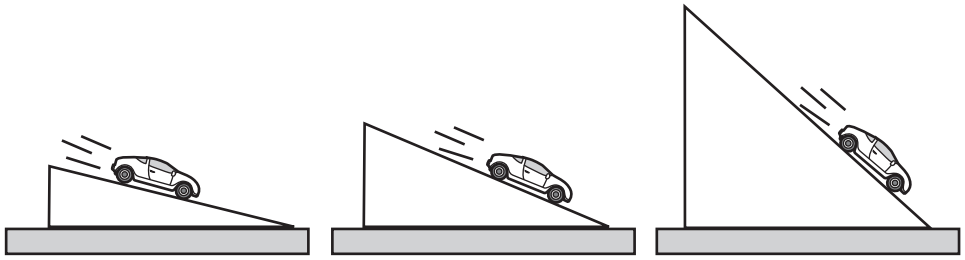
- ○ **A** The pipe extends through both layers 3 and 4.
- ○ **B** The pipe and layers 3 and 4 have the same fossils.
- ○ **C** Sedimentary rock has less mass than igneous rock.
- ○ **D** Sedimentary rock forms more slowly than igneous rock forms.

24 **The material found in a kimberlite pipe is best classified as igneous rock because the kimberlite pipe**

- ○ **A** forms from magma
- ○ **B** includes several layers
- ○ **C** includes valuable minerals
- ○ **D** forms at the surface of Earth

Part 3

25 **A student released a toy car down three different ramps.**



Ramp 1 Ramp 2 Ramp 3

Explain the relationship between the potential energy and the kinetic energy of the car as it rolls down each ramp. In your explanation, be sure to include

- **the amount and source of the potential energy at the top and bottom of the 3 ramps**
- **the amount and source of the kinetic energy at the top and bottom of the 3 ramps**

Part 3

Write your answer in the space provided.

Potential Energy

Kinetic Energy

Part 3

26 **Fruit flies reproduce by sexual reproduction.**

What percent of genes does a fertilized egg of a fruit fly receive from one parent?

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

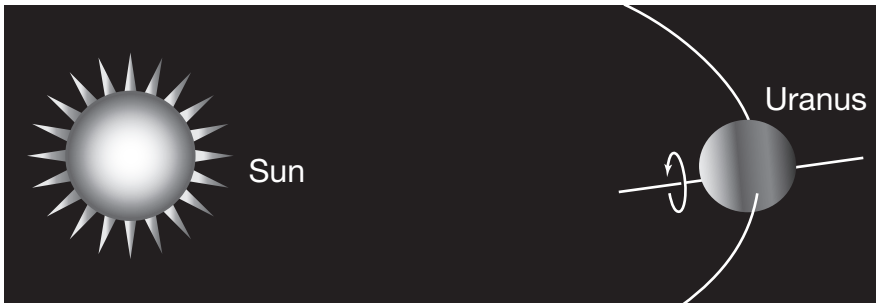
Part 3

Directions

Use the information below to answer Numbers 27 through 29.

Uranus

Uranus is a giant ice planet, much larger and farther from the sun than Earth. Uranus's axis of rotation is tilted more than 90°.



not drawn to scale

Part 3

27 **Uranus is part of a group of celestial objects that are in**

- ○ **A** the same galaxy as Earth
- ○ **B** a different universe than Earth
- ○ **C** a different solar system than Earth
- ○ **D** the same asteroid belt orbiting the sun

28 **The length of a day on Uranus is approximately 17.2 hours.**

Uranus has a shorter day than Earth because Uranus

- ○ **A** is farther from the sun
- ○ **B** rotates faster on its axis
- ○ **C** has a greater tilt to its axis
- ○ **D** revolves at a faster rate around the sun

29 **Which pattern of planetary motion is <u>most</u> similar between Earth and Uranus?**

- ○ **A** size of orbit
- ○ **B** shape of orbit
- ○ **C** time of revolution
- ○ **D** direction of rotation

Part 3

30 **Most farmers use fertilizers on their cornfields.**

Which statement best explains why farmers should not use excess amounts of fertilizers?

- ○ **A** Fertilizers may wash into streams.
- ○ **B** Fertilizers may be used by weeds.
- ○ **C** Fertilizers may evaporate into the air.
- ○ **D** Fertilizers may come from natural materials.

Part 4

Part 4

31 **Students study human body structure to learn how the body functions.**

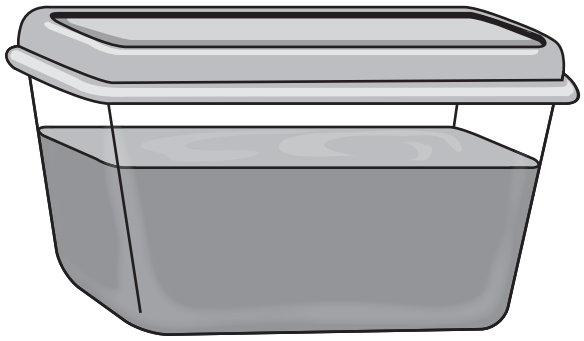
Which life-size model would best represent the size, shape, and location of human internal organs?

- ○ **A** a two-dimensional upper body diagram with magnetic stickers of the organs
- ○ **B** a three-dimensional plastic upper body with removable parts
- ○ **C** a two-dimensional detailed wall poster
- ○ **D** a three-dimensional paper body

Part 4

32 **A student placed a container of soup in a freezer. After a few hours, the soup became solid.**

SOUP



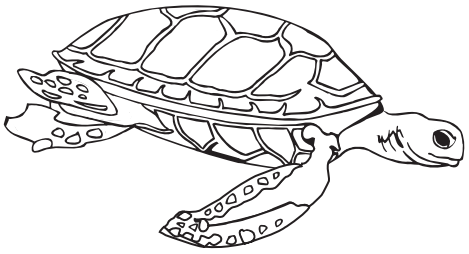
The soup changed to a solid because

- ○ **A** heat energy was added to the soup
- ○ **B** heat energy was removed from the soup
- ○ **C** the kinetic energy of the molecules increased
- ○ **D** the potential energy of the molecules increased

Part 4

33 **The two organisms shown in the diagram below are classified into different groups.**

Organism A



Organism B

The feature that <u>best</u> determines Organism A and Organism B are placed in different groups is

- ○ **A** the multicellular body
- ○ **B** the method of growth
- ○ **C** the ability to reproduce
- ○ **D** the method of obtaining food

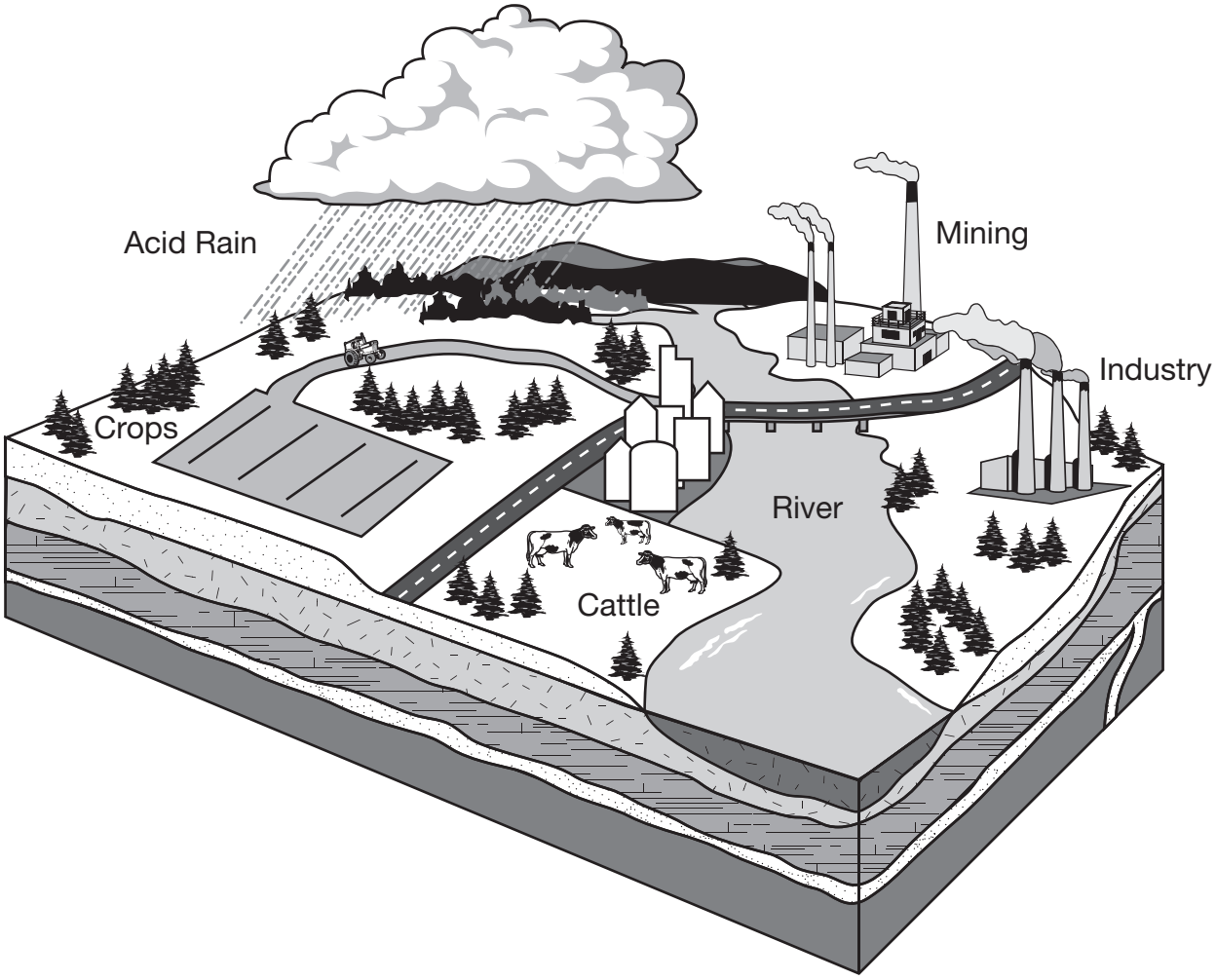
Part 4

Directions

Use the information below to answer Numbers 34 through 36.

Water

Water is an important natural resource. Surface water is located in glaciers, lakes, and rivers. Some sources of water pollution are shown in the diagram below.



Part 4

34 **How does pollution of surface water affect rivers?**

- ○ **A** The amount of water increases.
- ○ **B** The number of floods decreases.
- ○ **C** The quality of the water decreases.
- ○ **D** The quantity of organisms increases.

35 **Rivers and lakes sometimes receive an excessive amount of nutrients that increase algae and plant growth.**

Which type of human activity contributes most directly to the increase in nutrients?

- ○ **A** allowing landfill leakage
- ○ **B** use of pesticides
- ○ **C** use of fertilizers
- ○ **D** allowing oil spills

36 **An increase in human population would most likely cause Earth's freshwater supply to**

- ○ **A** increase and become less polluted
- ○ **B** decrease and become less polluted
- ○ **C** increase and become more polluted
- ○ **D** decrease and become more polluted

Part 4

37 **Data in tables may also be presented in graphs.**

Which type of data would best be displayed on a circle graph?

- ○ **A** the distance of the planets from the sun
- ○ **B** the depths of the major oceans on Earth
- ○ **C** the amount of rainfall each day for a month
- ○ **D** the percent of various materials in solid waste

Part 4

38 **Heat transfer is part of everyday life.**

Which of these examples involving heat transfer occurs mainly by conduction?

- ○ **A** The sun warms the ground.
- ○ **B** A hot oven warms a cold kitchen.
- ○ **C** A campfire warms a person's hands.
- ○ **D** Hot soup warms a metal spoon handle.

Part 4

Directions

Use the diagram and information below to answer Numbers 39 through 41.

The universe is extremely large and contains many galaxies. Earth is part of a solar system that is located in the Milky Way galaxy. The approximate location of Earth and the solar system is shown in the diagram below.

MILKY WAY GALAXY

Part 4

39 **Most of the celestial objects in the Milky Way that can be seen by observers are**

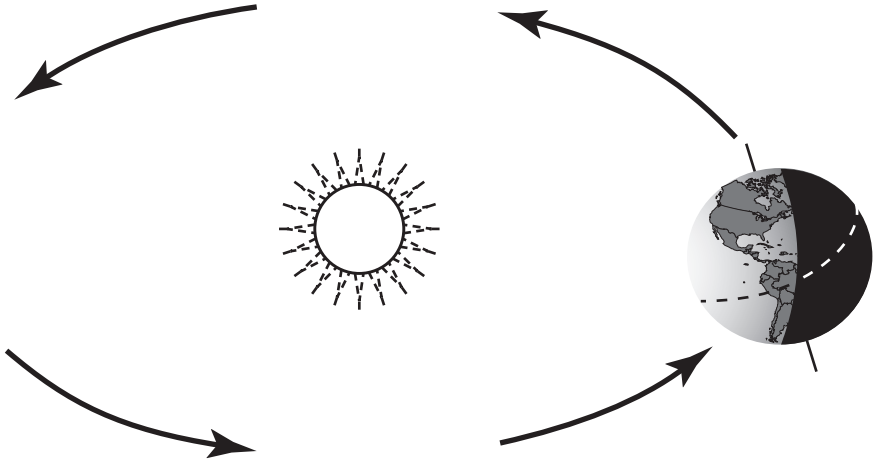
- ○ **A** comets
- ○ **B** moons
- ○ **C** planets
- ○ **D** stars

40 **The inner planets of our solar system orbit the sun**

- ○ **A** at the same speed as the outer planets
- ○ **B** at a slower speed than the outer planets
- ○ **C** in the same direction as the outer planets
- ○ **D** in the opposite direction from the outer planets

Part 4

41 **Earth is tilted on its axis as shown in the diagram below.**



The tilt of Earth on its axis causes the

- ○ **A** phases of the moon
- ○ **B** wind currents during day and night
- ○ **C** water currents in the Atlantic Ocean
- ○ **D** seasons in the northern and southern hemisphere

STOP

Acknowledgements

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Based on research from Freeman et.al Science 313:831 (2006)