Maryland School Assessment

Science

2012 Public Release

Grade 8

Part 1

Part 1

1 **Fossil fuels are common sources of energy.**

What type of pollution is most often associated with burning fossil fuels?

- ○ **A** air
- ○ **B** land
- ○ **C** noise
- ○ **D** water

Part 1

Directions

Use the technical passage below to answer Numbers 2 through 5.

Nature's Bug Zappers

Bats

Just the word makes some people cringe.[1] However, bats are probably the most misunderstood animals. Despite what movies, television and literature would have you believe, bats don't terrorize the night.

Bats are incredibly important not only to our natural world but to our economy. As primary predators of night-flying insects, bats help to control many of our most annoying pests. A single little brown bat can catch 1,200 mosquito-sized insects in an hour. Big brown bats consume costly crop pests including cucumber beetles, June beetles, leafhoppers, cutworm moths and corn earworm moths.

Bats are not blind. Those that do hunt in the dark have developed a system to help detect objects. These bats produce sounds at high frequencies. By listening to the echoes of these sounds, bats are able to discern[2] objects. This is known as echolocation. Using the reflected sounds, they form pictures in their brains just like we do by interpreting reflected light with our eyes.

What's Happening to Bats?

Disturbance by people is a major cause of decline in many bat populations. They are also threatened by loss of feeding or roosting habitat, usually wooded areas near water sources. Disturbing a maternity colony[3] can cause mothers to drop their young or move them to a less suitable site. Disturbance during hibernation wakes bats, causing them to burn the precious fat reserves they have stored for the winter. Even responsible cave explorers can inadvertently[4] disturb bats at critical times of the year.

As traditional roosts in trees and caves have been destroyed, many bats seek shelter in man-made structures. Scientists have studied the roosting requirements of bats in order to provide artificial homes. Some bats use these bat houses quite successfully.

[1]**cringe** – shrink away, flinch
[2]**discern** – see clearly
[3]**maternity colony** – a group of female bats with offspring
[4]**inadvertently** – accidently

Part 1

2 **Which type of organism would most likely compete with bats for food?**

- ○ **A** birds that consume seeds
- ○ **B** insects that consume leaves
- ○ **C** mosquitoes that consume blood
- ○ **D** amphibians that consume insects

3 **Which human activity has resulted in the construction of artificial bat homes?**

- ○ **A** destroying bat habitats
- ○ **B** disturbing bat hibernation
- ○ **C** disrupting bat echolocation
- ○ **D** decreasing bat food supply

4 **Bats produce high-frequency sounds and then listen for echoes of these sounds bouncing off objects.**

The high-frequency sound waves that bats produce most likely have

- ○ **A** long wavelengths
- ○ **B** short wavelengths
- ○ **C** vibrating wavelengths
- ○ **D** alternating wavelengths

Part 1

5 **A student concluded that bats are dangerous and should be avoided. The student stated that bats eat insects, drink blood, and carry diseases. The student also stated that bats are like birds and that bats hunt at night because they are blind.**

Evaluate the student's conclusion about bats. In your evaluation, be sure to include

- **differences between fact and opinion**

Part 1

Write your answer in the space provided.

GO ON

Part 1

6 **A pharmaceutical company published experimental data showing that a new medication improved cholesterol levels in the people who participated in the study.**

Which professional most likely did not contribute to developing this medication?

- ○ **A** a chemist
- ○ **B** a biologist
- ○ **C** a geologist
- ○ **D** a physician

Part 1

Directions

Use the information below to answer Numbers 7 through 9.

The early Greeks are credited with many valid concepts in astronomy. Some of their theories were correct; some were later proven incorrect. One theory was that Earth was the center of the universe and that other planets circled Earth. The Greeks thought Earth did not move because its movement was not obvious from the surface of the planet. The Greeks also believed that an invisible sphere surrounding our planet contained the stars. This sphere rotated, explaining the apparent movement of constellations over time.

Part 1

7 **The Milky Way galaxy has spiraling arms.**

The spiraling arms of the Milky Way galaxy are part of a

- ○ **A** large sphere of rotating stars
- ○ **B** small sphere of rotating stars
- ○ **C** large rotating disk of stars
- ○ **D** small rotating disk of stars

Part 1

8 **Which celestial motion is responsible for the phases of the moon?**

- ○ **A** the moon revolving around Earth
- ○ **B** Earth revolving around the sun
- ○ **C** the moon rotating on its axis
- ○ **D** Earth rotating on its axis

9 **Early Greeks also developed theories about the relationship between the moon and Earth.**

Why is the same side of the moon always visible from Earth?

- ○ **A** The far side of the moon does not reflect sunlight.
- ○ **B** The moon stays in one location while Earth revolves around it.
- ○ **C** The period of rotation and the period of revolution for the moon are about the same.
- ○ **D** The moon rotates clockwise on its axis while Earth rotates counterclockwise on its axis.

Part 1

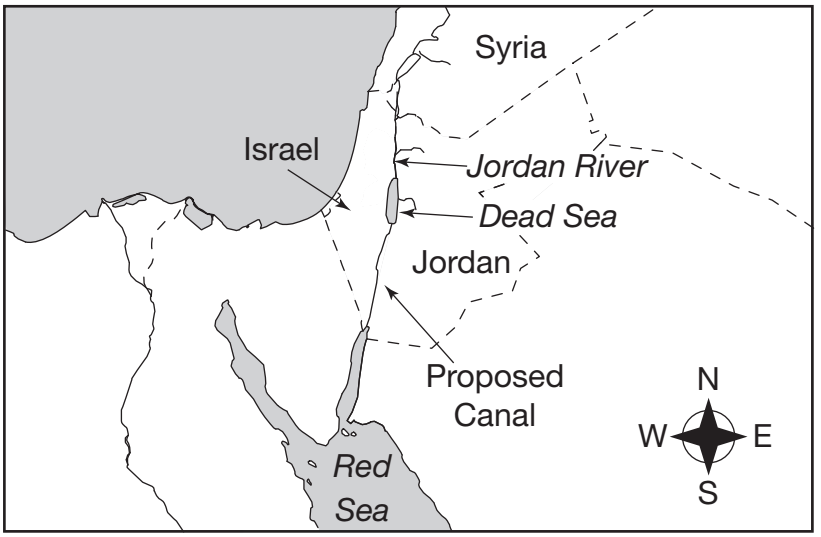
Directions

Use the information and map below to answer Numbers 10 and 11.

Red-Dead Canal

The water in the Dead Sea is some of the saltiest water in the world. The only major river that flows into the Dead Sea is the Jordan River. Israel, Syria, and Jordan use much of the fresh water from the Jordan River for agricultural purposes. Because so little of the river water actually flows into the Dead Sea, the water level of the Dead Sea is decreasing. Much of the river water that enters the sea evaporates quickly because of the warm climate, leaving behind salts and minerals. The decreasing water level and the leftover salts and minerals have negatively affected the Dead Sea environment.

A canal that would carry salt water from the Red Sea to the Dead Sea might restore increased water levels in the Dead Sea and benefit the surrounding environment. The altered ecology might also help to generate tourism revenue. Scientists worry, however, that a saltwater canal might leak and pollute underground sources of fresh water in the region.



Part 1

10 **The natural process that is <u>most</u> affected by the decreased water levels in the Dead Sea is**

- ○ **A** the water cycle
- ○ **B** mountain building
- ○ **C** tectonic plate movement
- ○ **D** convection currents in the ocean

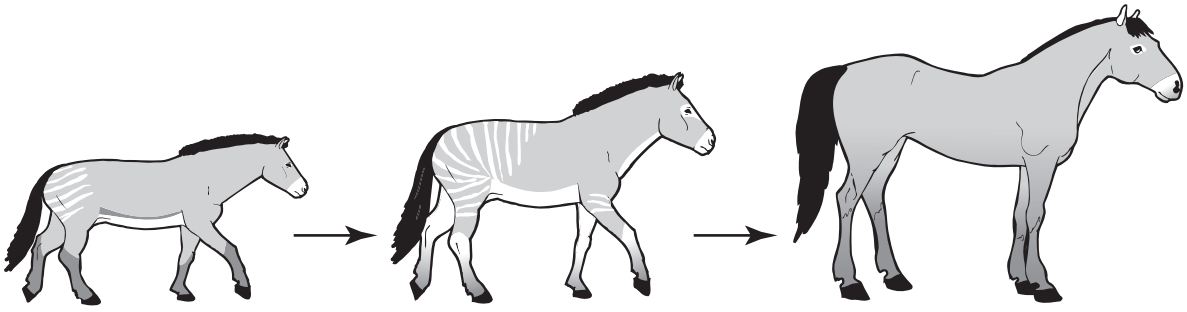
11 **Salt water leaking from the canal would <u>most likely</u> cause**

- ○ **A** a decrease in Red Sea tourism
- ○ **B** a decrease in freshwater sources
- ○ **C** an increase in the human population in the area
- ○ **D** an increase in the amount of crops that are harvested

Part 2

Part 2

12 **The modern horse (*Equus*) and two of its direct ancestors are shown in the diagram below.**



Merychippus *Pliohippus* *Equus*

Which statement best explains how changes occurred leading from one species to the next?

- ○ **A** Individuals of each species adapted to differences in environmental conditions.
- ○ **B** Individuals of each species learned traits and passed them on to the offspring.
- ○ **C** Sudden environmental changes caused each species to develop in one generation.
- ○ **D** Small structural changes in each species were passed on to offspring over many generations.

Part 2

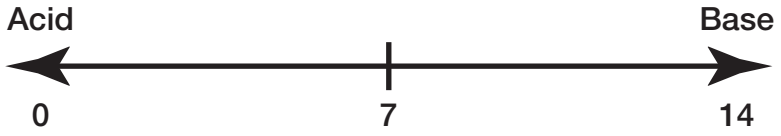
Directions

Use the information below to answer Numbers 13 through 15.

Unknown Liquid Demonstrations

A science teacher played a short video of two demonstrations that used the same unknown clear liquid.

Demonstration 1: The teacher in the video placed one drop of the unknown clear liquid onto a piece of pH paper. The pH paper turned red, indicating a pH of 2.



Demonstration 2: The teacher in the video placed a beaker containing a copper penny under an operating fume hood, which safely removes gases. With the fume hood running, the teacher placed one drop of the unknown clear liquid on the copper penny. A dark red gas and a blue liquid immediately formed.

13 **The chemical property of copper shown in the second demonstration is identified as**

- ○ **A** a reaction with acid
- ○ **B** the formation of rust
- ○ **C** a reaction with oxygen
- ○ **D** the formation of a base

Part 2

14 **The students recorded data from both demonstrations in the table shown below.**

UNKNOWN LIQUID DEMONSTRATIONS

	?
pH Paper	
Copper Penny	

The best title for the second column is

- ○ **A** Materials Used
- ○ **B** Gases Released
- ○ **C** Liquids Produced
- ○ **D** Demonstration Results

15 **The unknown clear liquid used in the demonstrations is best classified as**

- ○ **A** a weak acid
- ○ **B** a weak base
- ○ **C** a strong acid
- ○ **D** a strong base

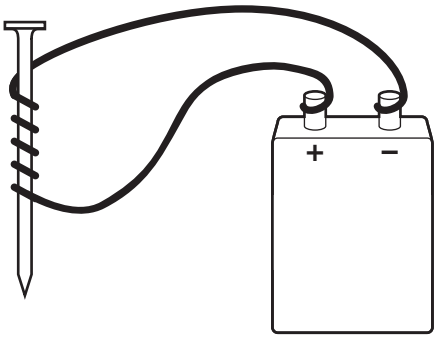
Part 2

16 **Some coal mining occurs underground and does not disturb the overlying land.**

How might coal mining that occurs underground be <u>less</u> harmful to the environment than surface mining?

- ○ **A** Underground coal mining increases pollution.
- ○ **B** Underground coal mining reduces habitat loss.
- ○ **C** Underground coal mining increases forest growth.
- ○ **D** Underground coal mining reduces animal populations.

17 **A teacher builds an electromagnet using a nail, a battery, and five coils of wire wrapped around the nail, as shown below.**

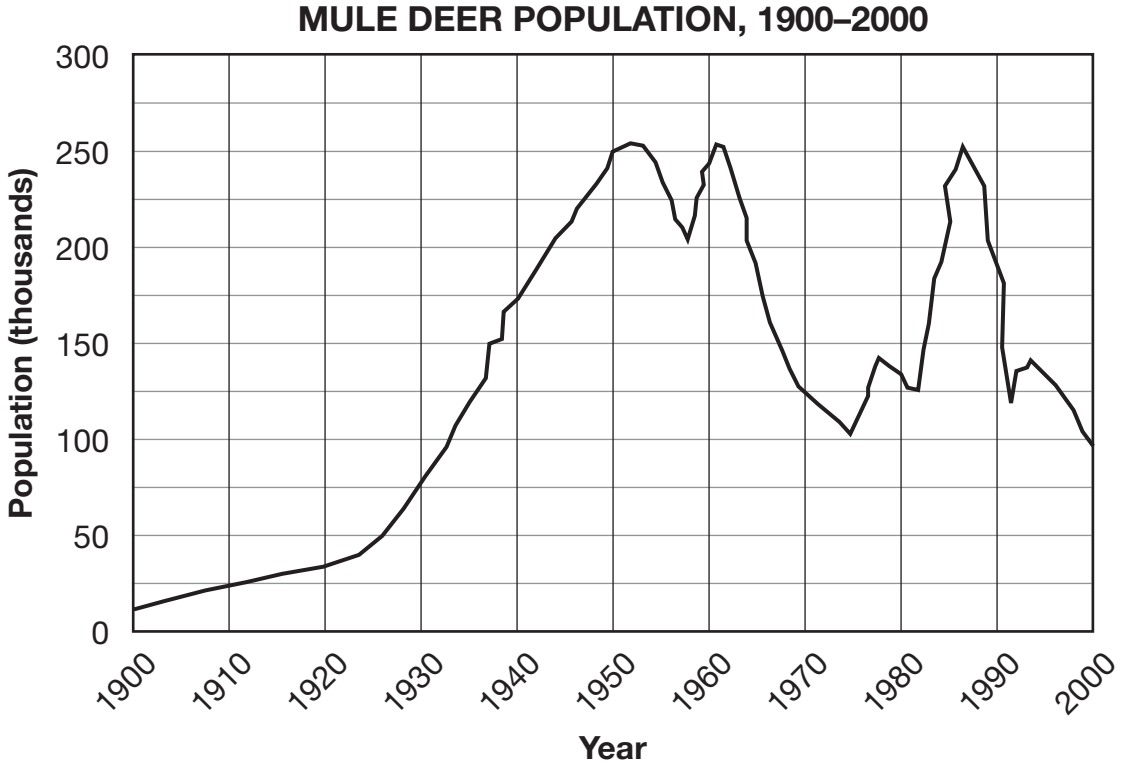


Which change to the electromagnet would produce the strongest magnetic field?

- ○ **A** 1 battery and 2 coils of wire
- ○ **B** 1 battery and 20 coils of wire
- ○ **C** 2 batteries and 2 coils of wire
- ○ **D** 2 batteries and 20 coils of wire

Part 2

18 **The number of organisms an environment can support depends on the availability of environmental resources. Changes in the mule deer population in Nevada from 1900-2000 are shown in the graph below.**



During which years did the mule deer population <u>most likely</u> experience the greatest decrease of environmental resources?

- ○ **A** 1930-1950
- ○ **B** 1956-1960
- ○ **C** 1960-1970
- ○ **D** 1976-1980

Part 2

19 **Students conducted four investigations measuring the distance a toy car traveled when different amounts of mass and force were applied to the toy car. The students performed several trials for each investigation. The data table below shows the average distance the car traveled in each investigation.**

Investigation	Mass Added to the Car (grams)	Force Applied to the Car (Newtons)	Average Distance Traveled (meters)
1	0	1	8
2	0	2	14
3	10	1	5
4	10	2	9

Explain how changes in mass and force affect the average distance traveled by the toy car. In your explanation, be sure to include

- **how force affected the average distance traveled in each trial**
- **how mass affected the average distance traveled in each trial**
- **supporting evidence from the data**

Part 2

Write your answer in the space provided.

Force and Distance

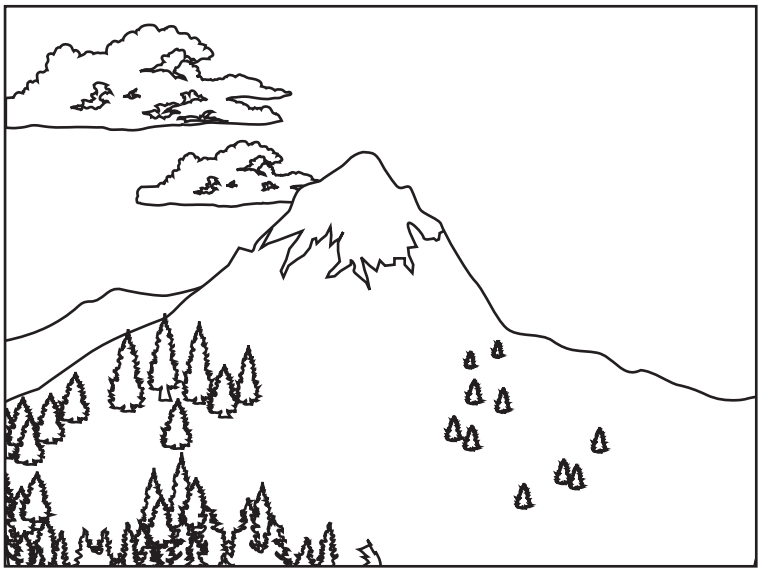
Mass and Distance

Part 2

Directions

Use the information below to answer Numbers 20 through 22.

There are many snow-capped mountains around the world.



The elevation of this mountain is nearly 3,048 meters. The summer climate in the area is generally cool and rainy. Summer temperatures reach 21°C. During many months of the year, the day and night temperatures vary significantly. The weather changes quickly. Approximately 300 centimeters of snow usually covers the ground from November until May.

Part 2

20 **While studying mountain geology, a scientist uncovered many marine fossils.**

The presence of marine fossils on the mountain supports the conclusion that the mountain area was once

- ○ **A** flooded
- ○ **B** a volcano
- ○ **C** part of a grassland
- ○ **D** covered by an ocean

21 **As the snow on a mountain melts, water travels down the mountain and seeps into the soil and the pores of rocks.**

Water contained in the soil and the pores of rocks is referred to as

- ○ **A** runoff
- ○ **B** water vapor
- ○ **C** precipitation
- ○ **D** groundwater

22 **Water is easily trapped in cracks and layers of mountain rock. Alternating high and low temperatures affect the water, which freezes and thaws many times.**

Which process causes changes to the rocks due to repeated freezing and thawing of trapped water?

- ○ **A** chemical weathering
- ○ **B** physical weathering
- ○ **C** wind deposition
- ○ **D** wind erosion

Part 3

Part 3

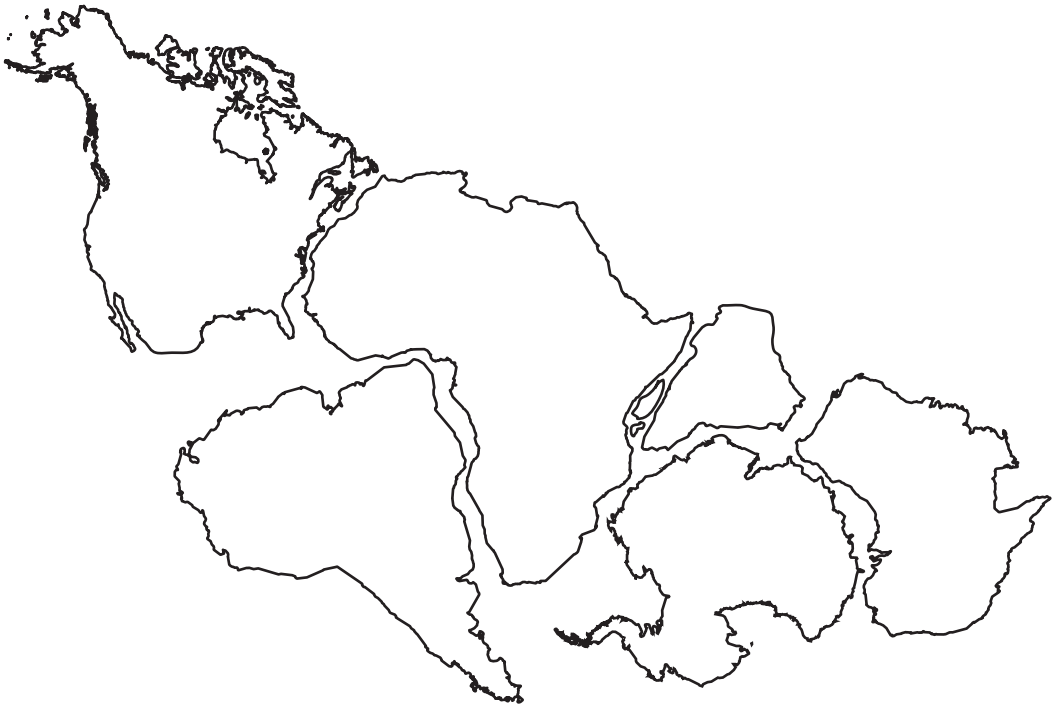
23 **All living things are composed of cells.**

Which action is not accomplished by repeated cell division?

- ○ **A** a plant developing new leaves
- ○ **B** a broken bone growing back together
- ○ **C** a plant using sunlight to make its own food
- ○ **D** an eight-pound baby growing into a 100-pound teenager

Part 3

24 **The continents of Earth fit together like a puzzle. The east coast of South America fits closely with the west coast of Africa.**



Explain why the continents of Earth appear to fit together like a puzzle. In your explanation, be sure to include

- **the process responsible for the current position of continents**
- **other supporting evidence**

Part 3

Write your answer in the space provided.

Part 3

Directions

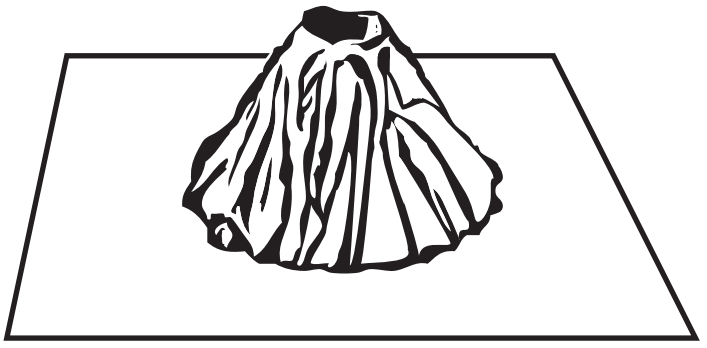
Use the information below to answer Numbers 25 through 27.

Making a Volcano

Students made a model of a volcano using a tray, a small paper cup, clay, baking soda, food coloring, dish soap, and vinegar (acetic acid). First, they placed the paper cup on a large tray and covered the cup with clay to make it look like a volcano. Then, the students placed 10 grams of baking soda into the cup. Next, they added five drops of both food coloring and dish soap to 30 milliliters of vinegar. Finally, the students poured the vinegar mixture into the cup.

Immediately, bubbles and foam erupted from the model volcano. The students observed the model and recorded their observations of the changes in the substances that made the model volcano.

MODEL VOLCANO



Part 3

25 **A chemical property of baking soda demonstrated in this investigation is that baking soda**

- ○ **A** reacts with acids
- ○ **B** reacts with oxygen
- ○ **C** forms during an acid-base reaction
- ○ **D** forms during the decomposition of water

26 **Which statement best describes evidence that a chemical reaction occurred in this investigation?**

- ○ **A** The solid mixed with the liquid released a gas.
- ○ **B** The total mass of the substances remained constant.
- ○ **C** The solid mixed with the liquid absorbed heat energy.
- ○ **D** The volume of the vinegar and baking soda increased.

27 **A student repeated the investigation. However, nothing happened in the volcano model. The student concluded that baking soda and vinegar do not react chemically.**

The student would make a more informed conclusion by performing the investigation with

- ○ **A** multiple trials
- ○ **B** different kinds of vinegar
- ○ **C** controlled temperature conditions
- ○ **D** greater amounts of baking soda and vinegar

Part 3

28 **Common soaps are often basic.**

Which of these is a property of a chemical base?

- ○ **A** sour taste
- ○ **B** pH equal to 6
- ○ **C** turns litmus paper blue
- ○ **D** forms bubbles with limestone

Part 3

Directions

Use the information below to answer Numbers 29 through 31.

Ethanol is a type of alcohol made from plants. Sugarcane and corn, which are both used in foods such as cereals and breads, are used to make ethanol. Burning ethanol provides a clean source of energy because the products of ethanol are water and carbon dioxide. Therefore, mixing ethanol with gasoline reduces harmful waste products.

In the 1970s, many Brazilians drove cars with engines that used an ethanol-gasoline mixture. This alternative fuel conserved the limited supply of gasoline available at that time. In the 1990s, gasoline became cheaper than ethanol, and Brazilians returned to driving more gasoline-fueled cars. Recently, Brazilians started driving more cars that use an ethanol-gasoline mixture.

Part 3

29 **Ethanol is a good alternative fuel because it**

- ○ **A** reduces air pollution
- ○ **B** increases biodiversity
- ○ **C** reduces sound pollution
- ○ **D** increases ozone emissions

30 **Which group would benefit most if drivers in the United States fueled their vehicles with an ethanol-gasoline mixture?**

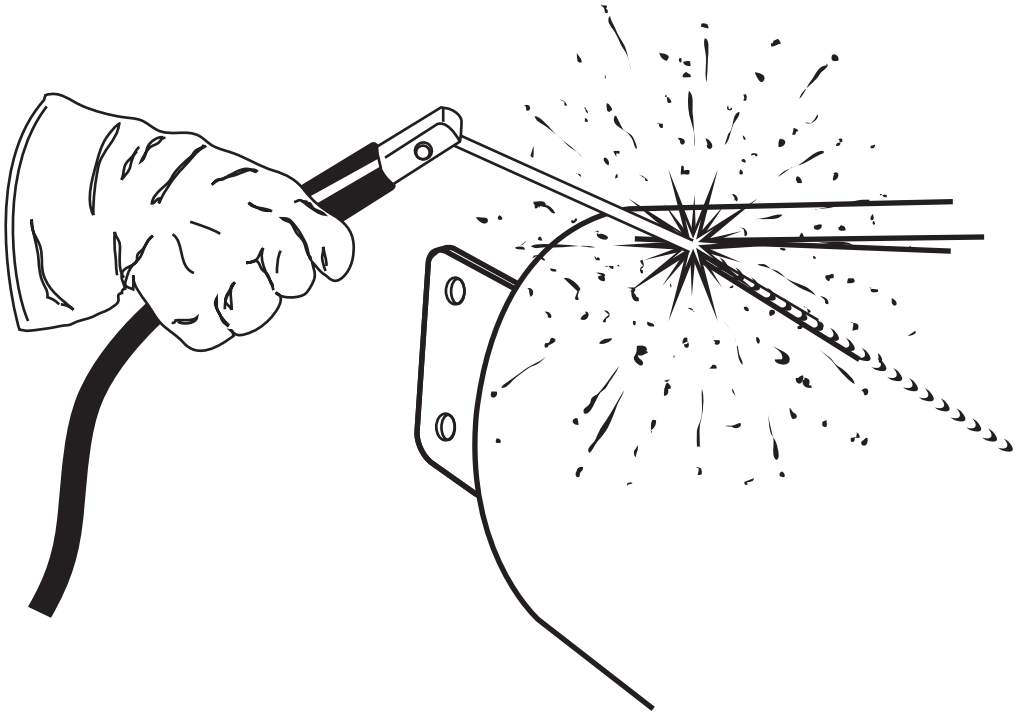
- ○ **A** crop farmers
- ○ **B** oil companies
- ○ **C** grocery stores
- ○ **D** car manufacturers

31 **How might an increased use of alternative fuel in Brazil affect people in other countries?**

- ○ **A** Consumers in other countries would buy larger cars.
- ○ **B** Farmers in other countries would increase seed production.
- ○ **C** Workers in other countries would walk instead of driving cars.
- ○ **D** Children in other countries would have increased respiratory problems.

Part 3

32 **In 1850, James Prescott Joule, inventor of arc welding, stated that energy does not disappear when transformed in a machine.**



Joule showed that some mechanical energy is always transformed into

- ○ **A** electrical energy
- ○ **B** chemical energy
- ○ **C** heat energy
- ○ **D** light energy

Part 3

33 **A group of students plans to build a model of a local pond habitat.**

Which model best represents an environment similar to a pond?

- ○ **A** a sealed plastic bottle containing insects and algae from a pond
- ○ **B** a classroom aquarium containing plants and animals bought from a store
- ○ **C** a classroom aquarium containing fresh water, non-native plants, and non-native animals
- ○ **D** a small plastic outdoor pool containing fresh water, native plants, and native animals

Part 4

Part 4

34 **Sodium (Na) and chlorine (Cl) are two reactive and dangerous elements. Chlorine is a halogen gas that can cause respiratory damage and sodium is an alkali metal that reacts violently with water.**

What happens to the properties of sodium and chlorine when they react to form sodium chloride (NaCl), common table salt?

- ○ **A** The properties of both sodium and chlorine change.
- ○ **B** The properties of both sodium and chlorine remain the same.
- ○ **C** The properties of sodium are different but chlorine remains a dangerous gas.
- ○ **D** The properties of sodium remain the same but the properties of chlorine change.

Part 4

Directions

Use the information below to answer Numbers 35 through 37.

The human body is composed of different systems made of specialized cells, tissues, and organs. Each of these structures has a specific function that aids in the survival of the human species.

35 **Which organs are used in reproduction?**

- ○ **A** brain, spinal cord, and eyes
- ○ **B** lungs, esophagus, and heart
- ○ **C** mouth, stomach, and gallbladder
- ○ **D** ovaries, uterus, and fallopian tubes

36 **What is the primary function of the excretory system?**

- ○ **A** to digest food
- ○ **B** to help in defense
- ○ **C** to eliminate waste
- ○ **D** to enable movement

Part 4

37 **Explain how the circulatory system and respiratory system interact to support an organism's survival. In your explanation, be sure to include**

- **similarities in the functions of the systems**
- **differences in the functions of the systems**

Write your answer in the space provided.

Part 4

Directions

Use the technical passage below to answer Numbers 38 through 40.

Learning to Live With the Laws of Motion

Freed from the grip of Earth's gravity, astronauts find themselves in a living physics textbook. Russian cosmonaut Yuri Gagarin, during his pioneering first orbit of the Earth in 1961, was the first to experience the practical effects. He put down his pencil while writing out his log. Obeying Newton's first law—the same principle of uniform motion that keeps the planets moving around the sun—the pencil floated out of reach: Gagarin had to complete his log by speaking into a tape recorder. Nowadays astronauts keep equipment in place with Velcro® or bungee[1] straps.

Newton's Second Law states that force is needed to accelerate or decelerate a body. In practice this means astronauts must learn how to push themselves carefully through their spacecraft, or else they will simply float around helplessly. And once astronauts get moving they have to remember to stop themselves as they near where they want to be. Otherwise they'll keep going until they hit something—or someone. First-timers tend to collect a lot of bruises.

Newton's third law states that for every action there is an equal and opposite reaction. This, too, has very apparent consequences for astronauts: if they so much as try to turn a screw without anchoring themselves to a wall, they'll find themselves twisting instead. The reaction from even the mildest of actions—typing at a computer keyboard, say—will send an astronaut floating away.

It's not that the laws of motion are any different on Earth than in space. But Earth's gravitational field has such an overwhelming force it masks their precise effects. And gravity is integral to all sorts of phenomena that we take for granted. For example, the air in our homes circulates naturally: hot air rises because it is lighter than cool air, and convection currents form. In orbit, nothing is lighter than anything else, so ordinary convection currents can't exist. Without a ventilation fan, sleeping astronauts would suffocate in the carbon dioxide that accumulated around their faces.

Similarly, weightless flames behave very differently from their Earth-bound counterparts. Instead of a flickering column of hot gas, a flame in orbit is a small blue sphere.

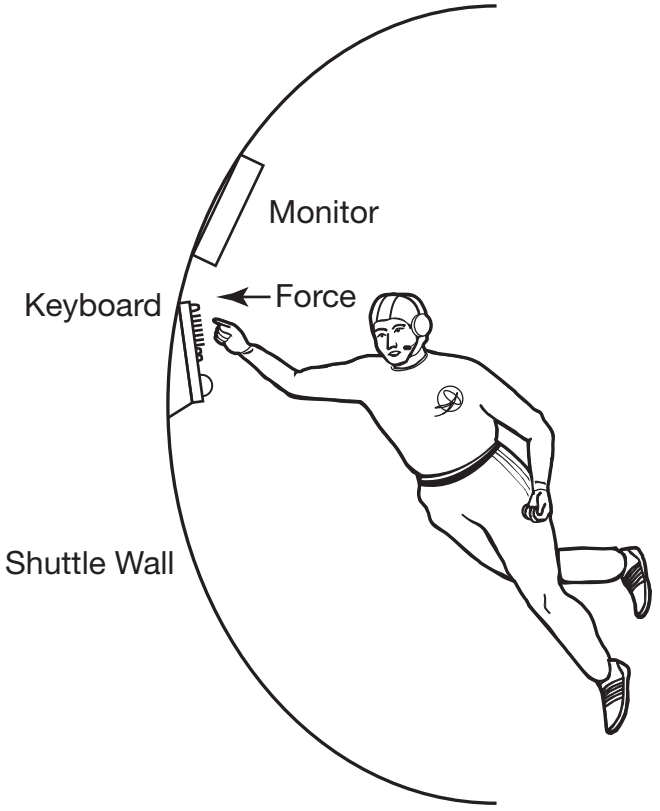
[1]**bungee** – an elastic rope

Part 4

38 **If no additional forces are applied to an astronaut moving in space, the astronaut will**

- ○ **A** continue moving in the same direction at a constant speed
- ○ **B** change direction but continue moving at a constant speed
- ○ **C** move in the same direction but at a faster speed
- ○ **D** change direction and move at a faster speed

39 **An astronaut applies a force to a keyboard that is attached to the wall of a space shuttle.**



After the astronaut applies the force to the keyboard, the astronaut moves

○ **A** faster and upward

○ **B** at a uniform speed and downward

○ **C** at a uniform speed and away from the keyboard

○ **D** faster and toward the keyboard at a constant rate

Part 4

40 **A secured object in an orbiting spacecraft remains at rest unless acted upon by**

- ○ **A** an electrical force
- ○ **B** an external force
- ○ **C** a magnetic force
- ○ **D** a frictional force

Part 4

41 **The Periodic Table of the Elements is arranged so that elements with similar characteristics are in the same column.**

Which element is a highly reactive metal?

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

Part 4

Directions

Use the information and the table below to answer Numbers 42 and 43.

A group of students used lab equipment to investigate 25 milliliters each of three different liquids. The students then researched additional information about the three liquids. The results of the investigations and research are shown in the table below.

THREE LIQUIDS

Liquid	Color	Size of a Molecule Compared to a Water Molecule	Volume at Room Temperature (mL)	Mass (g)	Melting Point (°C)	Boiling Point (°C)
Water	Colorless	Same	25	25	0	100
Olive oil	Light yellow	Much larger	25	22.5	−6	300
Rubbing alcohol	Colorless	Larger	25	19.5	−89	82

42 **The masses for equal volumes of the three liquids are different because the liquids**

- ○ **A** react differently
- ○ **B** are different colors
- ○ **C** contain different atoms
- ○ **D** melt at different temperatures

43 **Which change occurs when heat energy is added to the liquids?**

- ○ **A** The liquids change mass.
- ○ **B** The liquids change state of matter.
- ○ **C** The molecules in the liquids become larger.
- ○ **D** The molecules in the liquids become lighter.

Part 4

44 **Use the following data table to answer Number 44.**

Organism	Respiration	Reproduction	Circulation	Skeleton
1	Through a moist outer surface	Asexual	Closed	Internal
2	Through gills	Sexual	Closed	Internal
3	Through holes in outer surface	Sexual	Open	External
4	Through lungs	Sexual	Closed	Internal
5	Through an outer surface	Asexual	None	None

According to the data table, which two organisms are <u>most</u> closely related?

○ **A** 1 and 2

○ **B** 1 and 5

○ **C** 2 and 4

○ **D** 4 and 5

Acknowledgements

“Learning to Live With the Laws of Motion” from the European Space Agency (ESA).