

THE UNIVERSITY OF THE STATE OF NEW YORK

# **GRADE 8**

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## **INTERMEDIATE-LEVEL TEST**

### **SCIENCE**

# **WRITTEN TEST**

SPRING 2007

Name \_\_\_\_\_

School \_\_\_\_\_

The questions on this test measure your knowledge and understanding of science. The test has two parts. Both parts are contained in this test booklet.

Part I consists of 45 multiple-choice questions. Record your answers to these questions on the separate answer sheet. Use only a No. 2 pencil on your answer sheet.

Part II consists of 34 open-ended questions. Write your answers to these questions in the spaces provided in this test booklet.

You may use a calculator to answer the questions on the test if needed.

You will have two hours to answer the questions on this test.

**DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.**



## Part I

### DIRECTIONS

There are 45 questions on Part I of the test. Each question is followed by three or four choices, numbered 1 through 4. Read each question carefully. Decide which choice is the best answer. On the separate answer sheet, mark your answer in the row of circles for each question by filling in the circle that has the same number as the answer you have chosen.

Read the sample question below:

#### Sample Question

Earth gets most of its light from

- (1) the stars
- (2) the Sun
- (3) the Moon
- (4) other planets

The correct answer is **the Sun**, which is choice number **2**. On your answer sheet, look at the box showing the row of answer circles for the sample question. Since choice number **2** is the correct answer for the sample question, the circle with the number **2** has been filled in.

Answer all of the questions in Part I in the same way. Mark only one answer for each question. If you want to change an answer, be sure to erase your first mark completely. Then mark the answer you want.

You will not need scrap paper. You may use the pages of this test booklet to work out your answers to the questions.

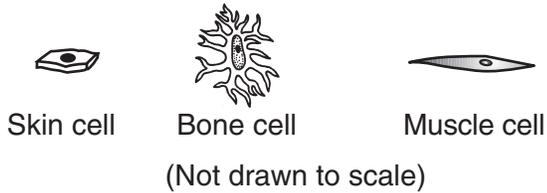
You may use a calculator if needed.

When you are told to start working, turn the page and begin with question 1. Work carefully and answer all of the questions in Part I.

When you have finished Part I, go right on to Part II. Answer all of the questions in Part II.

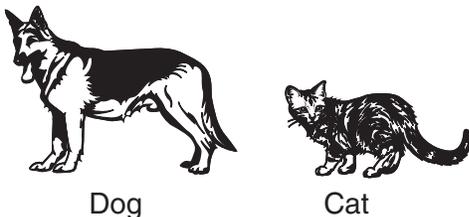
## Part I

1 Three different human cells are shown below.



Which process occurs in all of these cells?

- (1) metamorphosis
  - (2) locomotion
  - (3) reproduction
  - (4) photosynthesis
- 2 Which sequence correctly shows the levels of organization for structure and function in a human?
- (1) cell → tissue → organ → organ system
  - (2) organ system → cell → tissue → organ
  - (3) tissue → organ → organ system → cell
  - (4) cell → organ → tissue → organ system
- 3 Feathers, wings, and the hollow bones of birds are examples of
- (1) adaptations for flight
  - (2) responses to stimuli
  - (3) unnecessary body parts
  - (4) reproductive structures
- 4 The diagram below shows two different organisms, a dog and a cat.



Which phrase best describes the classification of these two organisms?

- (1) same kingdom, same species
- (2) same kingdom, different species
- (3) different kingdoms, different species
- (4) different kingdoms, same species

5 Asexually produced offspring are genetically

- (1) identical to the parent
- (2) different from the parent
- (3) different from each other
- (4) formed by two parents

6 Compared to the amount of hereditary information in a human body cell, how much hereditary information is contained in a human sex cell?

- (1) one-quarter the amount
- (2) one-half the amount
- (3) the same amount
- (4) twice the amount

7 Which group of organisms can show significant trait changes in the shortest period of time?

- (1) bacteria
- (2) birds
- (3) fish
- (4) reptiles

8 A plant produces tiny plants around the edges of its leaves. When these tiny plants fall to the ground, they take root and become new plants. This process is an example of

- (1) sexual reproduction
- (2) asexual reproduction
- (3) evolution
- (4) extinction

9 Which term describes an organism's ability to maintain a stable internal environment?

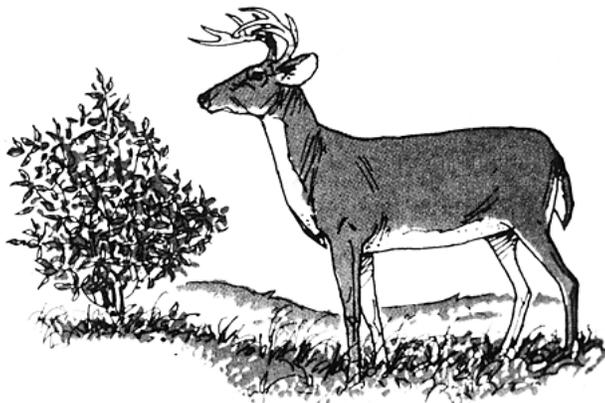
- (1) reproduction
- (2) extinction
- (3) locomotion
- (4) regulation

10 A research team wanted to produce a smaller variety of German shepherd dogs. They mated the smallest dogs from different litters for several generations. This is an example of which concept?

- (1) extinction
- (2) mutation
- (3) selective breeding
- (4) natural selection



16 The diagram below shows a deer and green plants.



Which statement best describes the relationship between the deer and the plants?

- (1) The deer supplies food and oxygen to the green plants.
- (2) The deer supplies food and carbon dioxide to the green plants.
- (3) The green plants supply food and carbon dioxide to the deer.
- (4) The green plants supply food and oxygen to the deer.

17 The table below shows the deer population in Arizona for a 30-year period.

**Deer Population in Arizona**

Year	Average Number of Deer per 1,000 Acres
1905	5.7
1915	35.7
1920	142.9
1925	85.7
1935	25.7

What is the most likely reason that the deer population decreased from 1920 to 1935?

- (1) There was less air pollution.
- (2) More water was available.
- (3) Fewer hunting licenses were issued.
- (4) There was increased competition for food.

18 Which unit is used to indicate the amount of energy in food?

- |            |             |
|------------|-------------|
| (1) ounce  | (3) calorie |
| (2) degree | (4) gram    |

19 All living organisms are dependent on plants because plants

- (1) produce carbon dioxide
- (2) remove oxygen from the air
- (3) are producers
- (4) are consumers

20 Which order of succession of natural communities would most likely occur in New York State?

- (1) grasses → trees → bushes
- (2) trees → bushes → grasses
- (3) bushes → grasses → trees
- (4) grasses → bushes → trees

21 The structures found in a living cell can be compared to the parts of a factory that produces cars. Which part of the factory is most similar to the nucleus of a living cell?

- (1) a conveyor belt that transports materials
- (2) a storage bin that holds the pieces needed to assemble a car
- (3) the computer room that controls the assembly process
- (4) the generator that provides energy for the factory

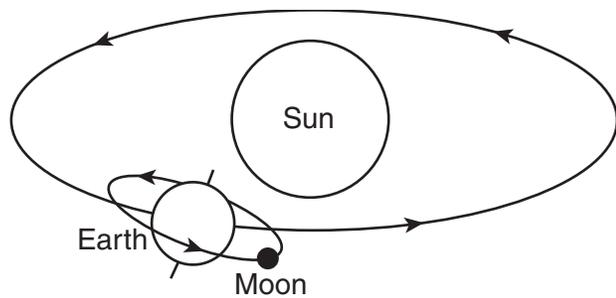
22 All rocks are composed of

- |             |              |
|-------------|--------------|
| (1) fossils | (3) metals   |
| (2) cells   | (4) minerals |

23 When placed in direct sunlight, which object will absorb the most visible light energy?

- (1) a piece of clear glass
- (2) a snowball
- (3) a shiny mirror
- (4) a black sweater

- 24 The illustration below shows the Moon orbiting Earth and Earth orbiting the Sun.



(Not drawn to scale)

Which force is responsible for these orbiting motions?

- (1) friction                      (3) magnetism  
(2) electricity                  (4) gravity
- 25 The Moon is visible to observers on Earth because of
- (1) reflected sunlight  
(2) absorbed light from Earth's atmosphere  
(3) gases in the Moon's interior  
(4) volcanic eruptions on the Moon's surface
- 26 The length of a year is equivalent to the time it takes for one
- (1) rotation of Earth  
(2) rotation of the Sun  
(3) revolution of Earth around the Sun  
(4) revolution of the Sun around Earth
- 27 What is one factor that contributes to seasons occurring in New York State?
- (1) the revolution of the Moon around Earth  
(2) the tilt of Earth on its axis  
(3) the rising and falling of ocean tides  
(4) the distance of Earth from the Sun
- 28 The movement of an air mass over Earth's surface causes
- (1) earthquake activity  
(2) local weather changes  
(3) global warming  
(4) ecological succession

- 29 Which two processes could result in the formation of high mountains with well-rounded peaks?
- (1) volcanic eruptions and global warming  
(2) earthquakes and tidal activity  
(3) collision of crustal plates and erosion  
(4) production of greenhouse gases and weathering

- 30 When carbon and oxygen combine chemically, the mass of the product is
- (1) greater than the mass of the carbon plus the mass of the oxygen  
(2) equal to the mass of the carbon plus the mass of the oxygen  
(3) equal to the mass of the carbon  
(4) less than the mass of the carbon

- 31 During which phase change is heat energy absorbed by a substance?
- (1) liquid to gas                  (3) liquid to solid  
(2) gas to solid                  (4) gas to liquid

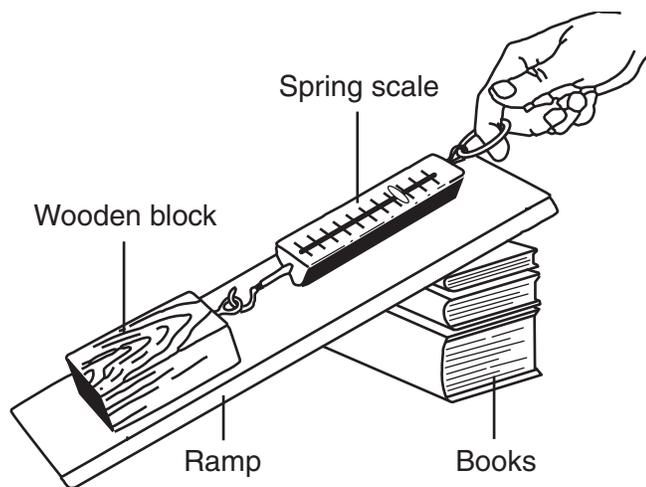
- 32 Moving water in a river is considered a renewable resource because it
- (1) carries dissolved oxygen  
(2) easily erodes sediments  
(3) is made of natural gas  
(4) can be recycled by nature over time

Base your answer to question 33 on the information below and on your knowledge of science.

A baseball strikes the roof of a car and dents it. The paint on the roof begins to crack and chip, exposing the metal. The exposed metal on the roof rusts, eventually causing a small hole in the roof.

- 33 Which event is a chemical change?
- (1) The baseball strikes the roof.  
(2) The roof of the car dents.  
(3) The paint cracks and chips.  
(4) The exposed metal rusts.

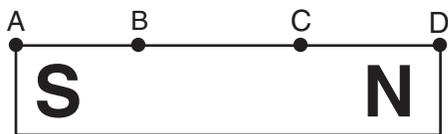
- 34 The diagram below shows a student using a spring scale to pull a wooden block up a ramp that is resting on a stack of books.



Which change would require more force to pull the wooden block up the ramp?

- (1) Have the student use two hands.
- (2) Reduce the mass of the wooden block.
- (3) Restack the books so the thinnest book is on the bottom.
- (4) Glue sandpaper to the surface of the ramp.

- 35 The diagram below shows a bar magnet. Points A, B, C, and D are locations on the magnet.



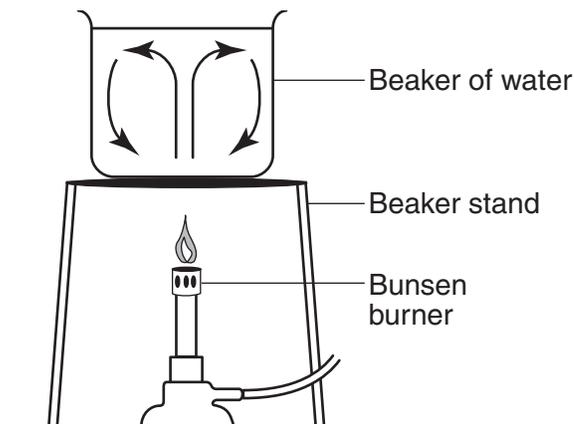
Which position on the bar magnet would have the strongest attraction to the north pole of another bar magnet?

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

- 36 Water at 20°C in an uncovered pan is evaporating very slowly. What could be done to the water to make it evaporate more quickly?

- (1) Cover it.
- (2) Heat it.
- (3) Place it in the dark.
- (4) Put salt in it.

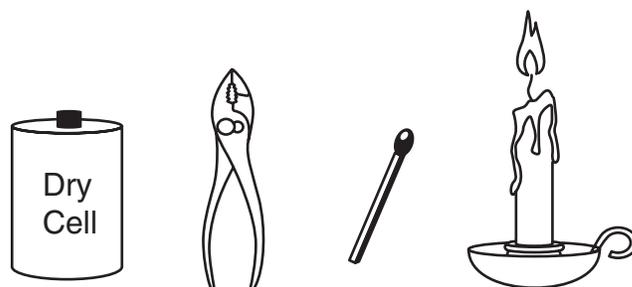
- 37 The diagram below shows a Bunsen burner heating a beaker of water on a beaker stand. The arrows represent the transfer of heat energy in the water.



Which process is primarily responsible for the transfer of heat indicated by the arrows in the beaker of water?

- (1) conduction
- (2) convection
- (3) radiation
- (4) condensation

- 38 Which object represents a simple machine?



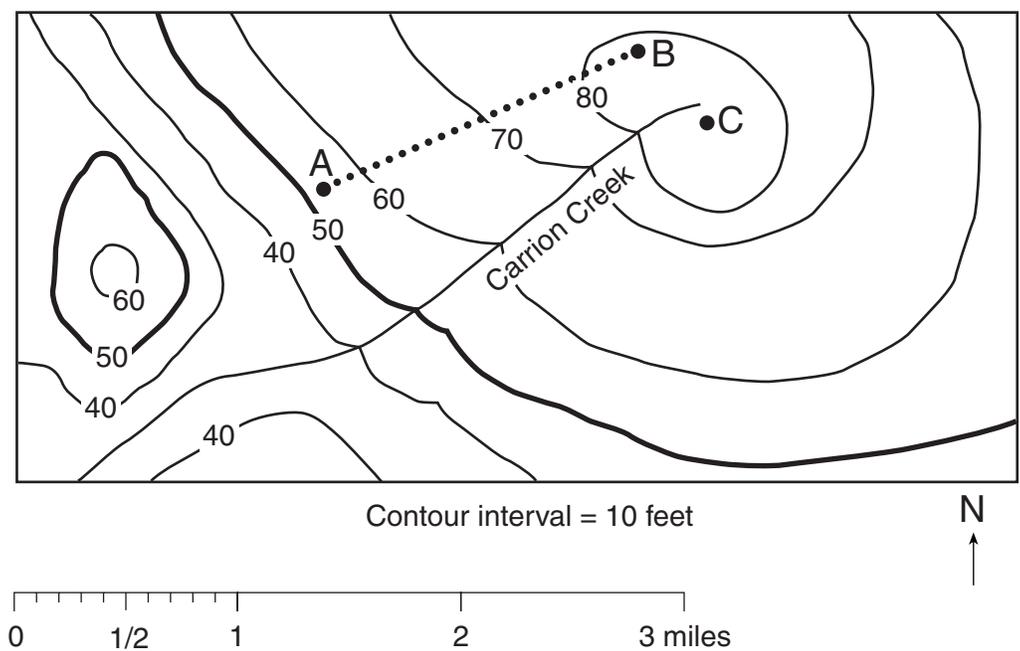
Battery                  Pliers                  Match                  Candle

- (1)
- (2)
- (3)
- (4)

- 39 The Moon has the greatest effect on Earth's

- (1) year
- (2) seasons
- (3) ocean tides
- (4) daylight hours

Base your answers to questions 40 and 41 on the topographic map below, which shows the elevation of land in feet above sea level. Points A, B, and C are locations on the map.



40 A camper walked from point A to point B by taking a path shown by the dotted line. What is the approximate distance the camper walked?

- (1) 1.5 miles
- (2) 2.5 miles
- (3) 3.0 miles
- (4) 3.5 miles

41 What is a possible elevation of point C?

- (1) 75 feet
- (2) 85 feet
- (3) 95 feet
- (4) 105 feet

42 The data table below compares cars and light trucks in regard to gas mileage and the amount of gases released into the environment (emissions).

**Data Table**

Type of Vehicle	Average Gas Mileage (miles per gallon)	Average Nitrogen Oxide Emissions (grams per mile)	Average Carbon Dioxide Emissions (pounds per mile)
Cars	27.5	0.4	0.72
Light trucks*	20.7	0.8	0.95

\*Light trucks include sport utility vehicles, minivans, and pickup trucks.

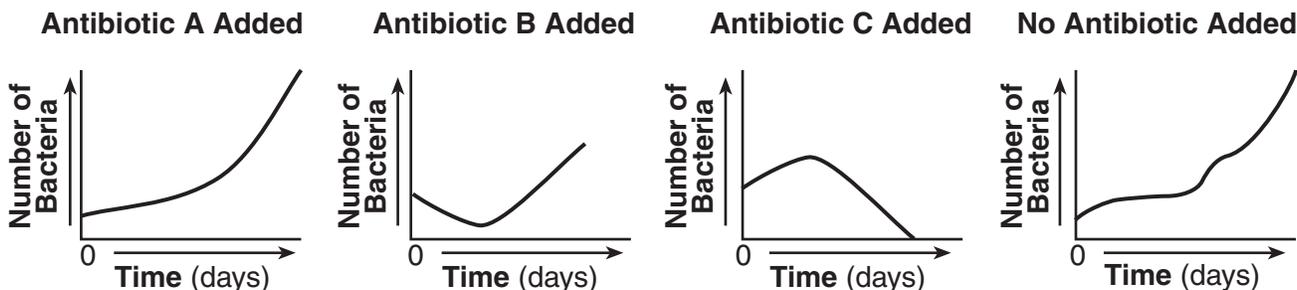
Based on the information in the table, which conclusion can be made about light trucks?

- (1) They get more average miles per gallon than cars.
- (2) They have become more popular than cars in recent years.
- (3) They produce less nitrogen oxide and carbon dioxide emissions than cars.
- (4) They have a greater negative impact on the environment than cars.

Base your answers to questions 43 and 44 on the information and graphs below and on your knowledge of science.

Some species of bacteria are harmful. Antibiotics are chemicals that kill bacteria. Some bacteria are resistant to antibiotics and are not killed by these chemicals. Over time, the resistant bacteria can reproduce and create populations that are not affected by antibiotics.

The graphs below show the results of a controlled experiment that measured the population of one species of bacteria that had been grown in four containers under identical conditions. Different antibiotics were added to three of the four containers.



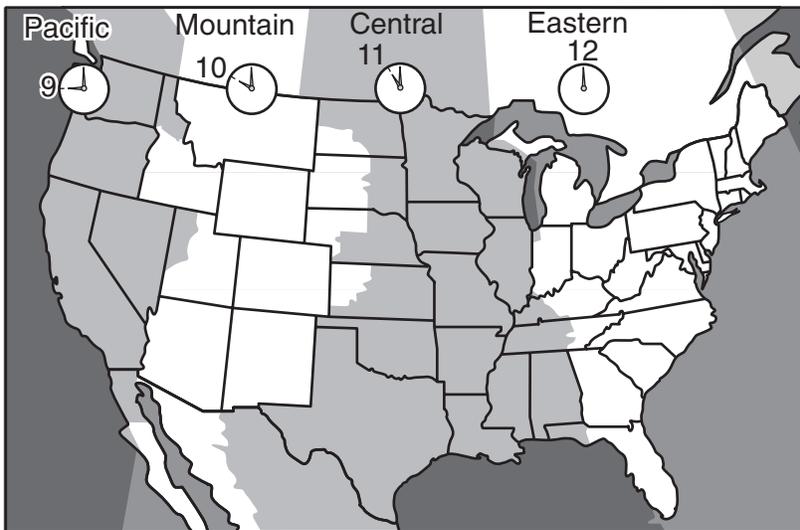
43 Which conclusion about this species of bacteria is best supported by the information in the graphs?

- (1) Antibiotic A continuously slowed the growth.
- (2) Antibiotic B was *least* effective in controlling the growth.
- (3) Antibiotic C was most effective in controlling the growth.
- (4) Antibiotics A and B slowed the growth.

44 The control in this experiment is represented by the container with

- |                        |                         |
|------------------------|-------------------------|
| (1) antibiotic A added | (3) antibiotic C added  |
| (2) antibiotic B added | (4) no antibiotic added |

45 The map below shows the four major time zones in the continental United States.



If it is 9 a.m. in the Eastern Time Zone, what time is it in the Pacific Time Zone?

- |            |            |
|------------|------------|
| (1) 3 a.m. | (3) 6 p.m. |
| (2) 6 a.m. | (4) 9 p.m. |

**Part II**

*Directions* (46–79): Record your answers in the spaces provided below each question.

Base your answers to questions 46 and 47 on the passage below and on your knowledge of science.

A student adds sugar to a cup of iced tea and a cup of hot tea. She notices that the time needed for the sugar to dissolve in each cup is different. She thinks this has something to do with the temperature of the tea. She wants to design an experiment to see if she is correct.

46 Write a hypothesis based on the student’s observations. [1]

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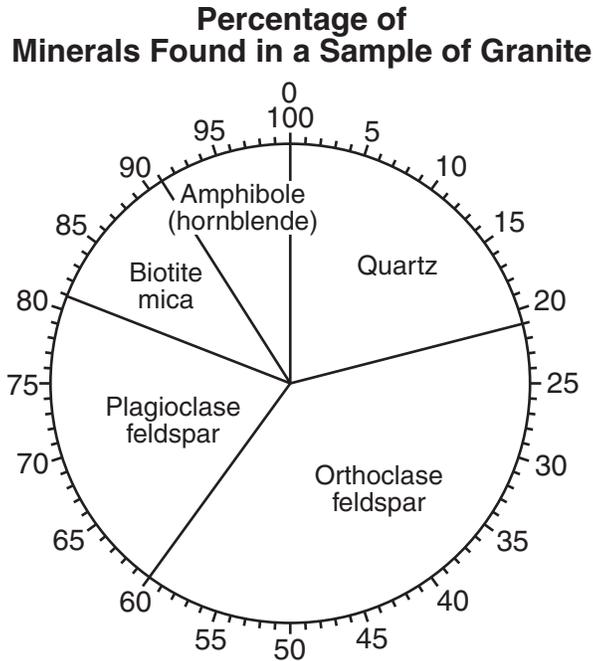
47 Identify *two* variables that should be held constant in an experiment to test this hypothesis. [2]

(1) \_\_\_\_\_

(2) \_\_\_\_\_

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48 The graph below shows the percentage of five minerals found in a sample of the igneous rock granite.



Determine the percentage of orthoclase feldspar in this sample of granite. [1]

\_\_\_\_\_ %

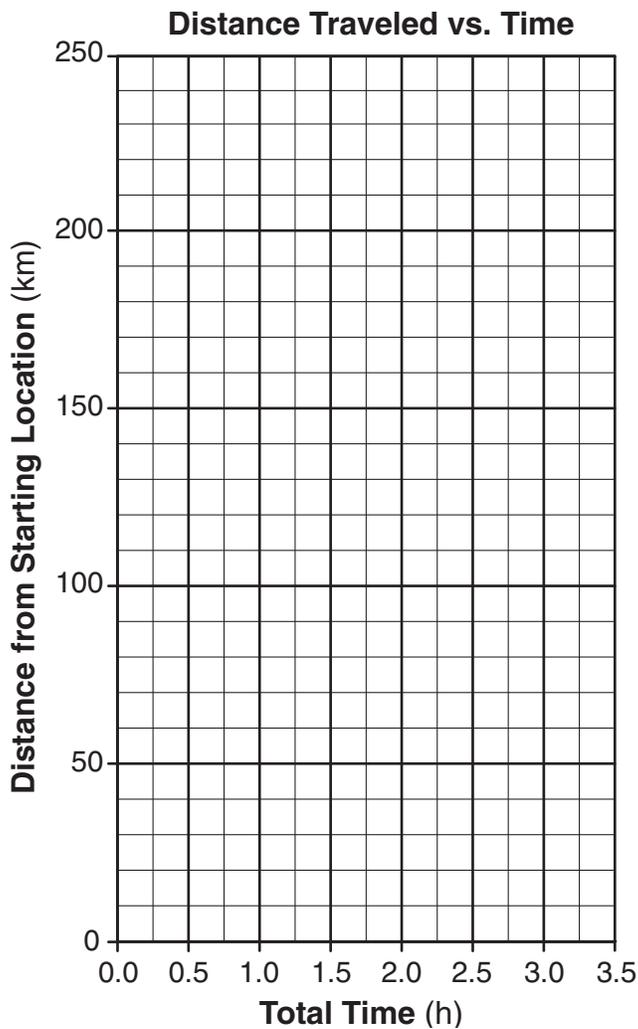
Base your answers to questions 49 and 50 on the information and table below and on your knowledge of science.

A car traveled a total distance of 240 kilometers between 8:00 a.m. and 11:00 a.m. The data table below shows the car's distance from the starting location at 0.5-hour intervals during the trip.

**Distance Traveled vs. Time**

<b>Time</b>	<b>Total Time (hours)</b>	<b>Distance from Starting Location (kilometers)</b>
8:00	0.0	0
8:30	0.5	55
9:00	1.0	90
9:30	1.5	90
10:00	2.0	142
10:30	2.5	200
11:00	3.0	240

49 On the grid below, make a graph using the data in the table. Place an **X** to show the distance from the starting location of the car for each 0.5-hour interval. Connect the **X**s with a line. [2]



50 Give *one* possible explanation for the car's distance from the starting location at 9:00 a.m. and at 9:30 a.m. [1]

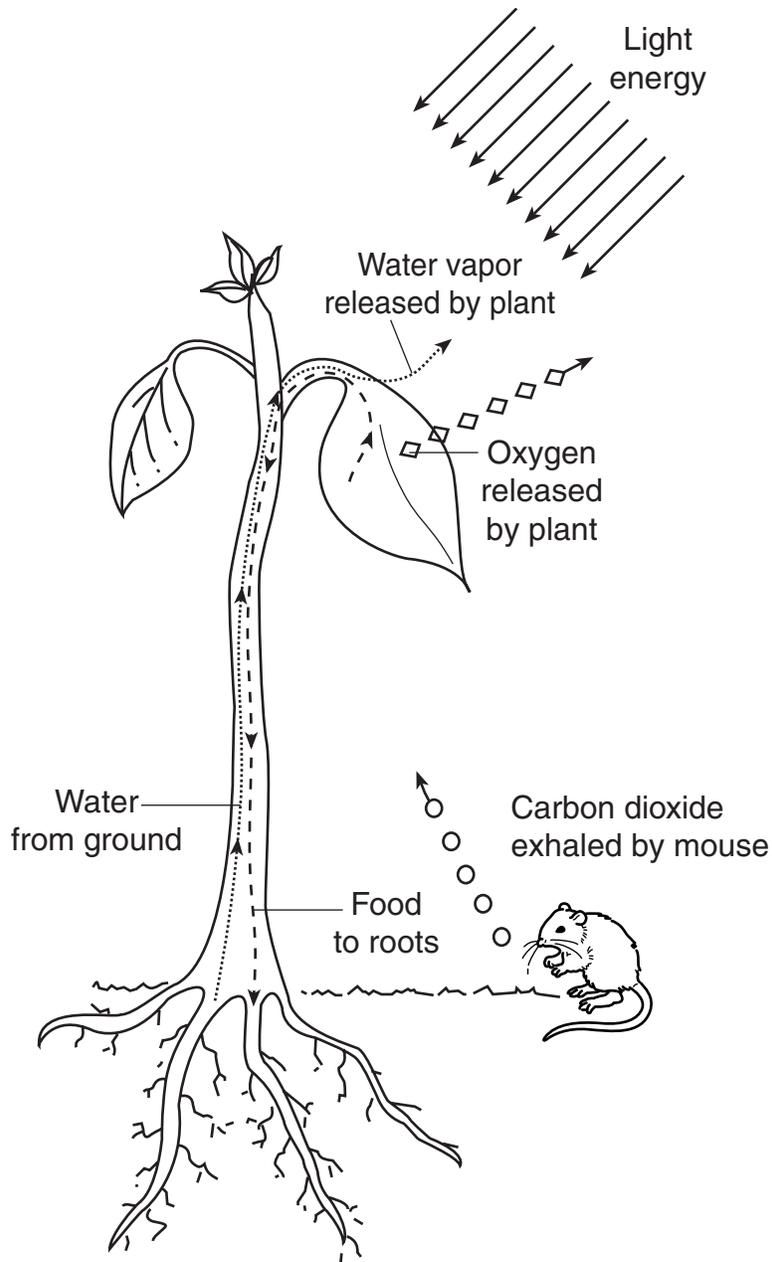
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51 The diagram below shows a green plant carrying on photosynthesis.



(Not drawn to scale)

Identify *two* things shown in the diagram that the plant needs for photosynthesis to occur. [1]

(1) \_\_\_\_\_

(2) \_\_\_\_\_

Base your answers to questions 52 and 53 on the information below and on your knowledge of science.

In pea plants, the green-pod gene ( $G$ ) is dominant over the yellow-pod gene ( $g$ ).

52 *a* Two pea plants with green pods,  $Gg \times GG$ , were crossed. Complete the Punnett square below to show the results of this cross. [1]

	$G$	$g$
$G$		
$G$		

*b* What percentage of the offspring produced by this cross will most likely have green pods? [1]

\_\_\_\_\_ %

53 Show the genetic makeup of two parent pea plants whose offspring would all have yellow pods. [1]

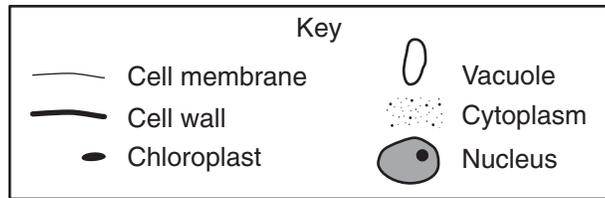
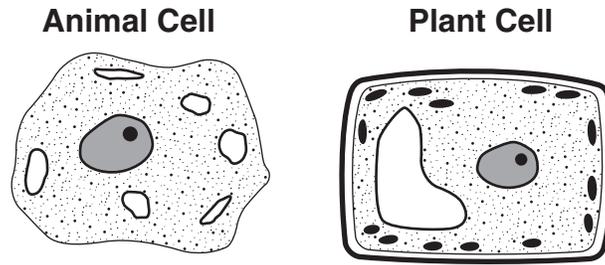
\_\_\_\_\_  $\times$  \_\_\_\_\_

\_\_\_\_\_

54 Humans have several organ systems that allow them to carry on all life activities. Complete the chart below by identifying *one* organ system that is responsible for each life activity listed. The first row has been completed as an example. [3]

Life Activity	Human Organ System
breaking down large food molecules into smaller molecules	digestive system
exchanging gases between the blood and the environment	
removing liquid and gaseous wastes from the body	
transporting needed materials to the cells and carrying wastes away from cells	
producing offspring	
moving the body	

Base your answers to questions 55 through 57 on the diagrams and key below and on your knowledge of science. The diagrams show two cells and some of their structures.



55 List *two* structures that are found in both plant and animal cells. [1]

(1) \_\_\_\_\_

(2) \_\_\_\_\_

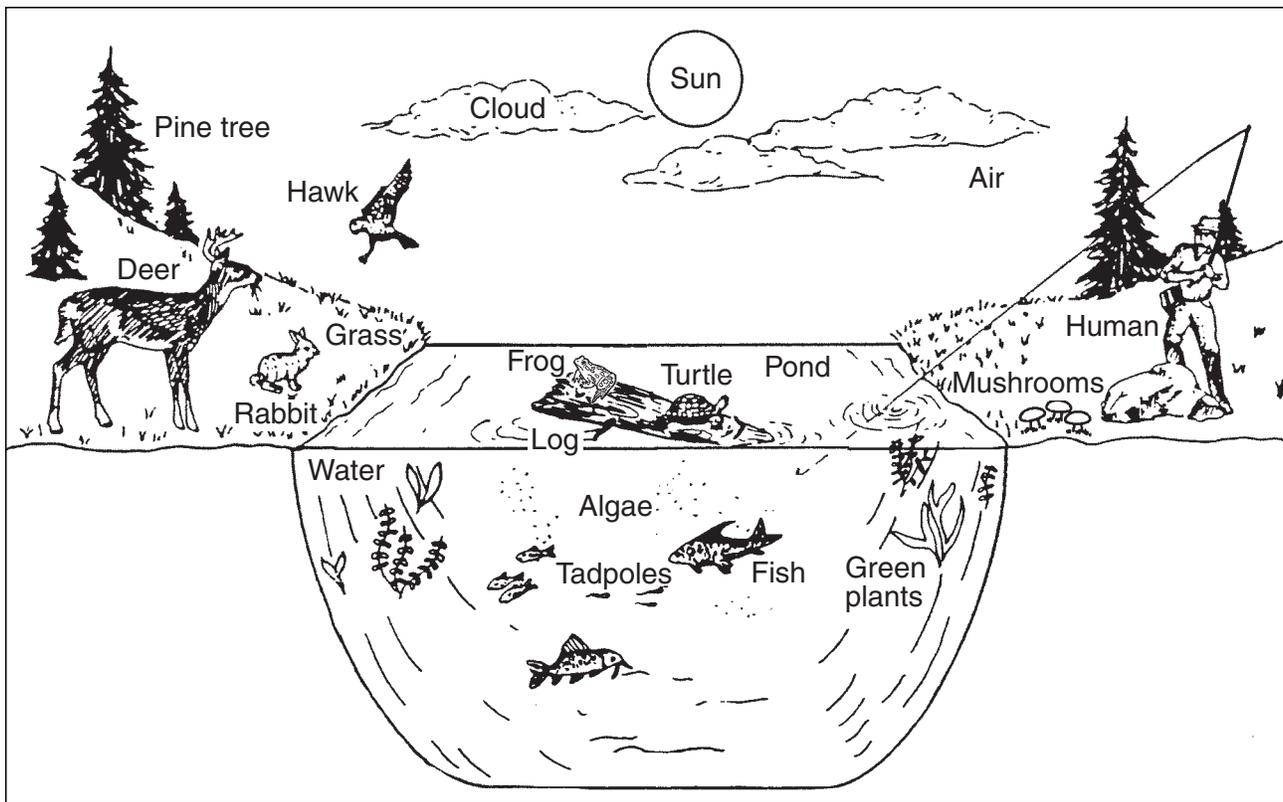
56 Which structure shown in the plant cell diagram is the site of photosynthesis? [1]

\_\_\_\_\_

57 Which cell structure shown in the diagrams contains genetic material? [1]

\_\_\_\_\_  
\_\_\_\_\_

Base your answers to questions 58 and 59 on the diagram below and on your knowledge of science. The diagram represents an ecosystem.



(Not drawn to scale)

58 Identify *one* producer shown in the diagram. [1]

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59 What is the original source of energy for this ecosystem? [1]

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60 The four types of organisms listed below obtain their energy from different food sources.

- carnivore
- herbivore
- omnivore
- decomposer

The chart below lists four specific organisms and describes the diet of each. Complete the chart by placing the correct term from the list above in the blank spaces. The first row has been completed as an example. [2]

<b>Organism</b>	<b>Diet</b>	<b>Type of Organism</b>
white-tailed deer	eats grasses and other plant parts	herbivore
Alaskan brown bear	eats wild berries, leaves, fish, and small rodents	
shelf fungus	absorbs nutrients from the wood of dead trees	
African lion	eats antelope and other grazing mammals	

61 The data table below shows two physical properties of the minerals quartz and amphibole (hornblende).

**Data Table**

Mineral	Physical Property	
	Streak	Luster
quartz	colorless	shiny
amphibole (hornblende)	greenish black	shiny

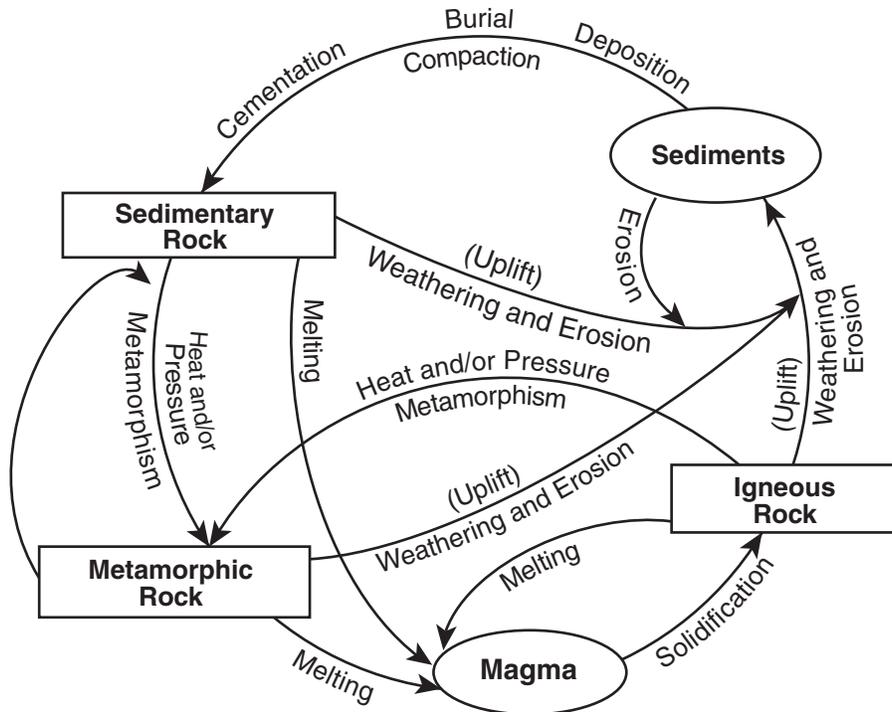
Select the physical property from the table that can distinguish quartz from amphibole and describe a procedure that can be used to test this property. [1]

Physical property: \_\_\_\_\_

Procedure: \_\_\_\_\_

62 A diagram of the rock cycle is shown below.

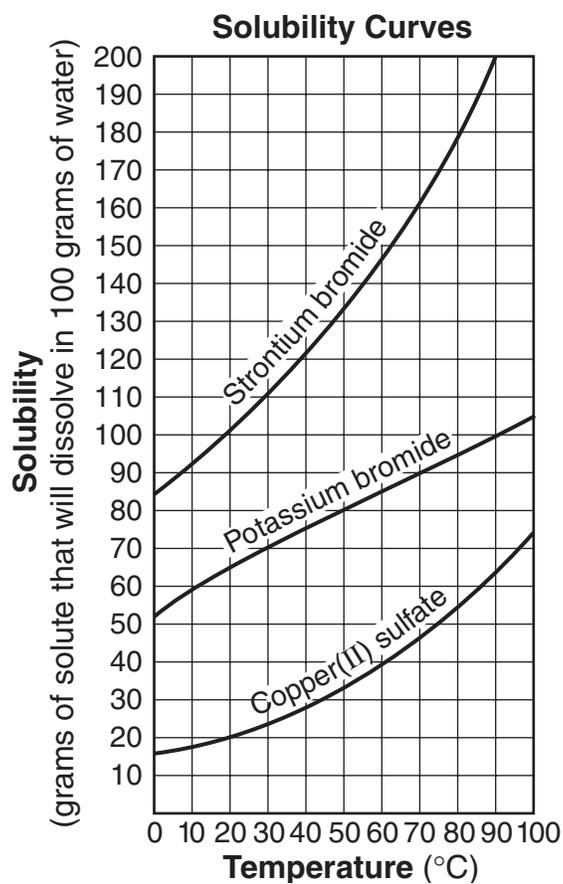
**Rock Cycle in Earth's Crust**



Identify *two* processes most directly involved in the formation of an igneous rock. [1]

\_\_\_\_\_ and \_\_\_\_\_

63 The graph below shows the solubility curves for three solid substances.

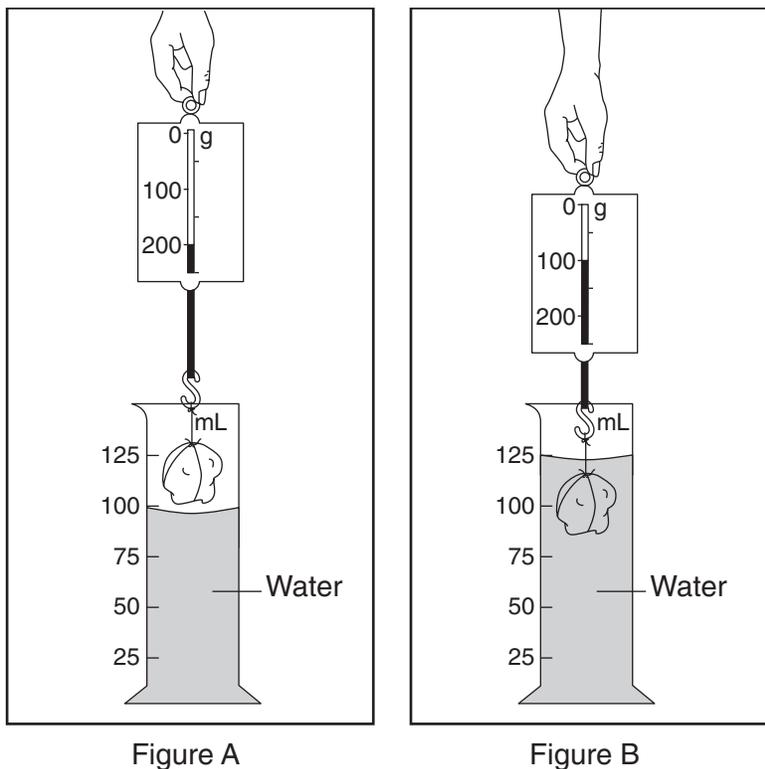


As the water temperature is increased from 30°C to 90°C, how many more grams of potassium bromide will dissolve in 100 grams of water? [1]

\_\_\_\_\_ g

Base your answers to questions 64 and 65 on the information and diagram below and on your knowledge of science.

A rock hanging from a spring scale is being lowered into a graduated cylinder containing water. Figure A shows the reading on the spring scale before the rock is lowered into the water. Figure B shows the reading on the spring scale when the rock is in the water. The reading on the spring scale in figure A is greater than the reading on the spring scale in figure B.



64 Explain why the spring scale shows a greater reading in figure A than in figure B. [1]

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65 Explain why placing the rock in the water causes the water level to rise. [1]

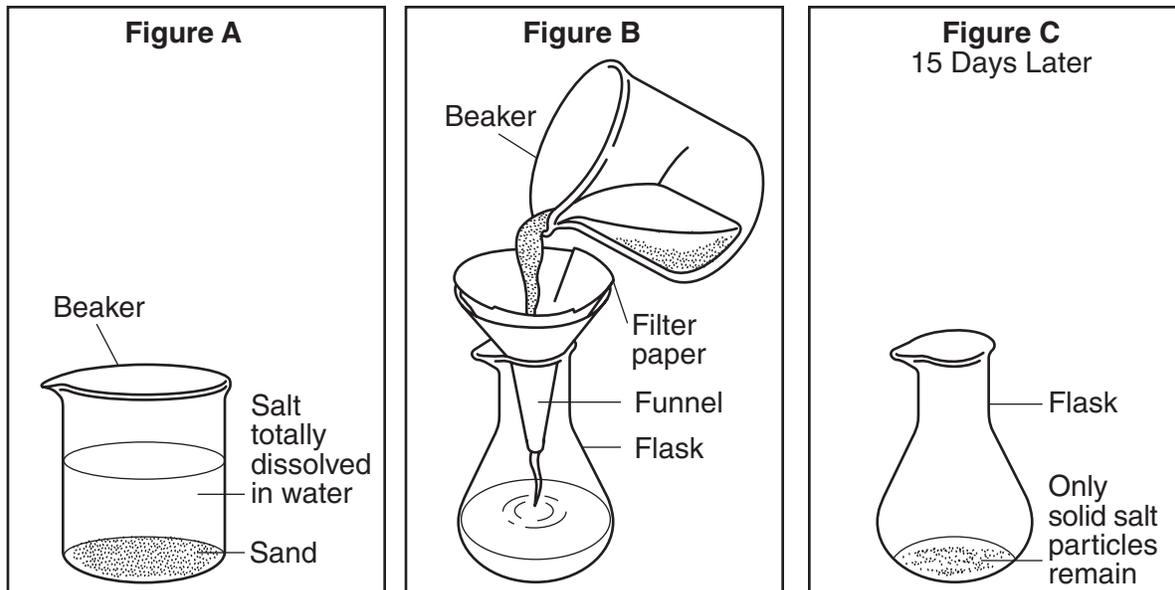
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Base your answers to questions 66 through 68 on the information and diagrams below and on your knowledge of science.

Figure A shows a beaker containing water, sand, and salt. The salt is totally dissolved in the water. Figure B shows the contents of the beaker being poured through filter paper in a funnel over a flask. Figure C shows the same flask after sitting at room temperature for 15 days. After 15 days, the flask contains only solid salt particles.



66 Identify the soluble material, the insoluble material, and the solvent in the beaker in figure A. [1]

Soluble material: \_\_\_\_\_

Insoluble material: \_\_\_\_\_

Solvent: \_\_\_\_\_

67 Explain why the contents of the flask in figure B are classified as a mixture. [1]

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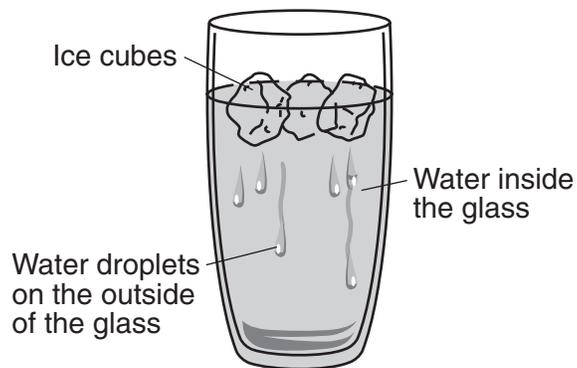
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68 Explain why only solid salt particles remain in the flask in figure C. [1]

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Base your answers to questions 69 and 70 on the diagram below and on your knowledge of science. The diagram shows a glass partially filled with water and ice cubes.



69 Explain why water droplets have formed on the outside of the glass. [1]

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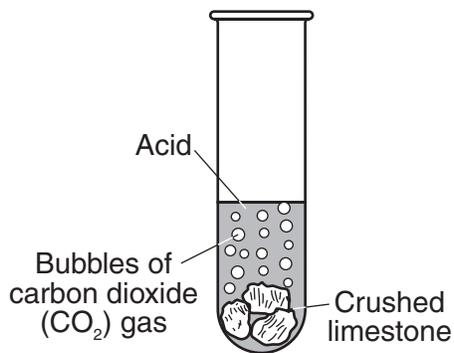
70 What evidence in the diagram indicates that ice has a lower density than water? [1]

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Base your answers to questions 71 and 72 on the diagram below and on your knowledge of science. The diagram shows how crushed limestone in a test tube reacts when acid is added.



71 List *one* observation that shows a chemical change is occurring in the diagram. [1]

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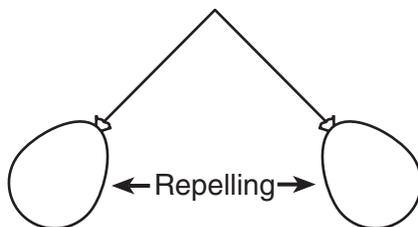
72 What environmental problem in New York State makes limestone a poor choice to use on the outside of a building? [1]

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73 A student attached two balloons to equal lengths of string and tied them to the same point. The student observed that the balloons repelled each other, as shown in the diagram below.

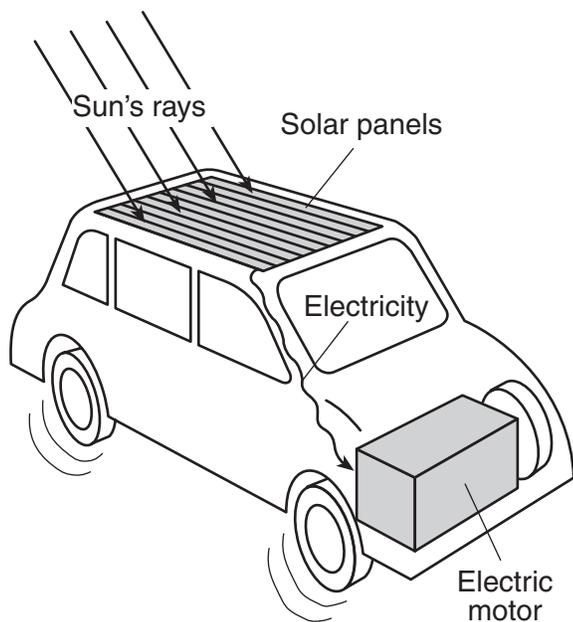


In terms of electrical charges, explain why the balloons repelled each other. [1]

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Base your answers to questions 74 and 75 on the diagram of a moving car below and on your knowledge of science. The diagram shows energy transformations.



74 What is the sequence of the energy transformations represented in the diagram? [1]

- A mechanical → chemical → solar
- B solar → electrical → mechanical
- C mechanical → electrical → solar
- D solar → chemical → electrical

Circle one:    A            B            C            D

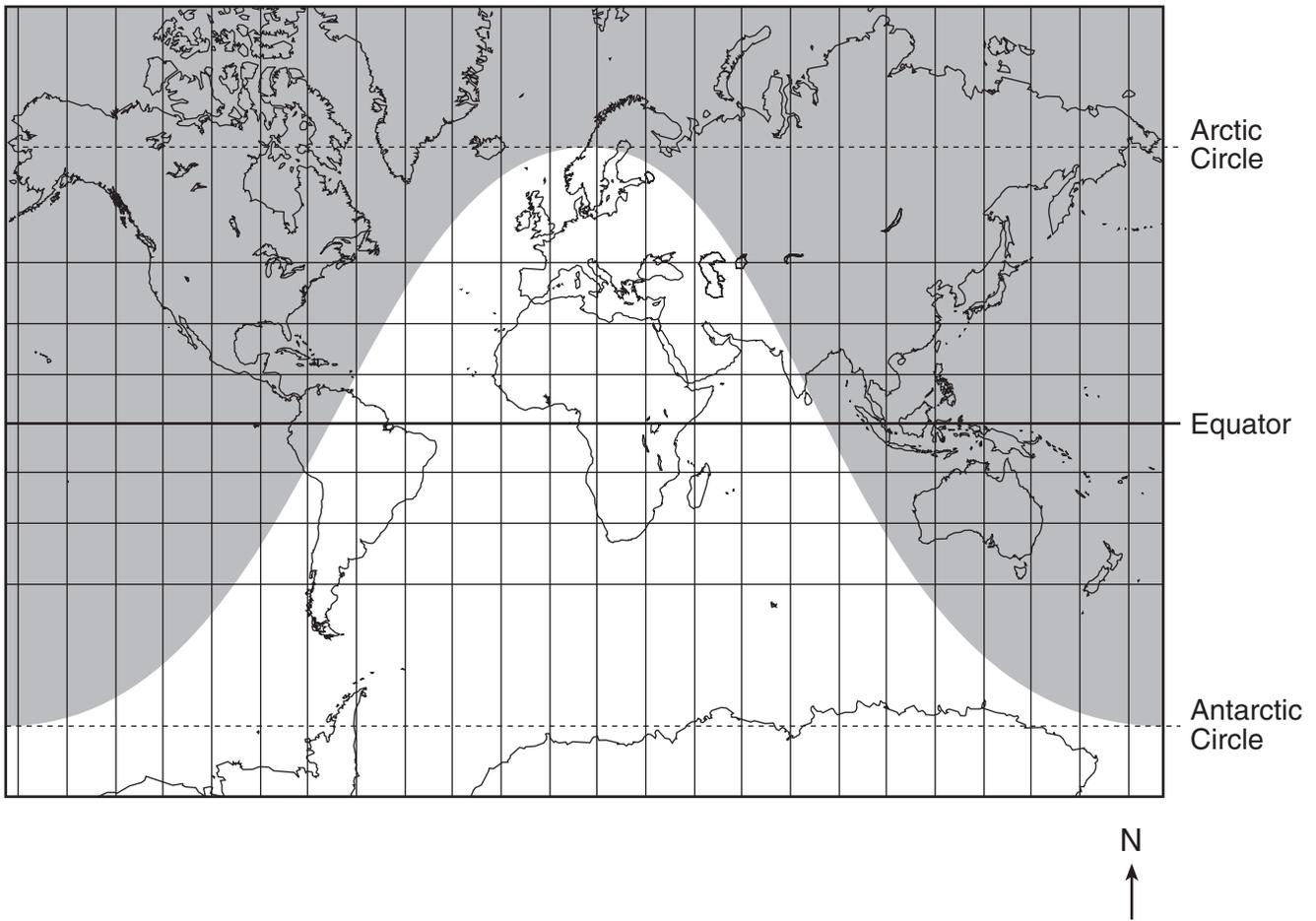
75 State *one* advantage to the environment of using the car shown in the diagram instead of a car powered by fossil fuel. [1]

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Base your answers to questions 76 through 79 on the map below. The shaded portion of the map indicates areas of night and the unshaded portion indicates areas of daylight at a certain hour on December 21.



76 Why is there more daylight shown on the map south of the equator? [1]

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77 Explain how the areas of daylight and night would be different if the map represented June 21 instead of December 21. [1]

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78 What type of coordinate system is represented by the horizontal and vertical lines shown on the map? [1]

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79 What causes the lighted portion on the map to move westward during the day represented? [1]

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**For Teacher Use Only**  
**Part II Credits**

<b>Question</b>	<b>Maximum Credit</b>	<b>Credit Allowed</b>
46	1	
47	2	
48	1	
49	2	
50	1	
51	1	
52	2	
53	1	
54	3	
55	1	
56	1	
57	1	
58	1	
59	1	
60	2	
61	1	
62	1	
63	1	
64	1	
65	1	
66	1	
67	1	
68	1	
69	1	
70	1	
71	1	
72	1	
73	1	
74	1	
75	1	
76	1	
77	1	
78	1	
79	1	
<b>Total</b>	<b>40</b>	