

THE UNIVERSITY OF THE STATE OF NEW YORK

# **GRADE 8**

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## **INTERMEDIATE-LEVEL TEST**

### **SCIENCE**

# **WRITTEN TEST**

SPRING 2008

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 36 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 Four different living organisms are shown below.



Ameba



Rabbit



Human



Tree

(Not drawn to scale)

Which statement is true for all of the organisms shown?

- (1) They carry out photosynthesis.
  - (2) They are multicellular.
  - (3) They contain at least one cell.
  - (4) They are consumers.
- 2 Running to escape danger is an action that requires the nervous system to coordinate the interaction of which two body systems?
- (1) digestive and endocrine
  - (2) muscular and skeletal
  - (3) reproductive and excretory
  - (4) circulatory and digestive

3 The diagrams below show two organisms.



(Not drawn to scale)

How are these two organisms classified?

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

4 Which system produces most of the hormones in the human body?

- (1) circulatory
- (2) digestive
- (3) endocrine
- (4) respiratory

5 Each body cell of a goldfish contains 94 chromosomes. How many chromosomes are contained in a goldfish sex cell?

- (1) 23
- (2) 47
- (3) 94
- (4) 188

6 The diagram below shows a green plant.



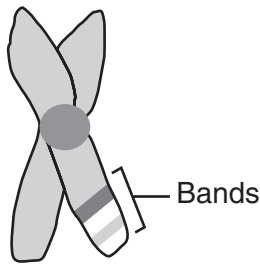
What is the main function of the plant structure labeled A?

- (1) reproduction
- (2) release of minerals
- (3) absorption of water
- (4) support

7 Which unit is used to express the amount of energy in food?

- (1) Calorie
- (2) degree Celsius
- (3) milliliter
- (4) gram

- 8 The drawing below represents a pair of chromosomes.



The area labeled “bands” shows the location of

- (1) egg cells
  - (2) sperm cells
  - (3) reproductive hormones
  - (4) specific genes
- 9 Many cars today are designed to get better gas mileage than those made in the past. This change resulted from a need to
- (1) recycle materials
  - (2) improve safety
  - (3) produce chemicals
  - (4) conserve resources
- 10 A scientist crosses two different varieties of corn to produce a single variety that has traits from both parents. This technique is an example of
- (1) competition
  - (2) natural selection
  - (3) selective breeding
  - (4) ecological succession
- 11 What is the nutrient source for some fungi?
- (1) sunlight
  - (2) oxygen
  - (3) carbon dioxide
  - (4) dead organisms
- 12 Which event is the best example of competition between species in a pond environment?
- (1) dragonflies landing on lily pads
  - (2) frogs and toads eating flies
  - (3) lizards and snakes lying in the sun
  - (4) hawks eating mice

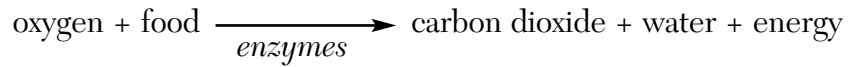
- 13 The diagram below shows a cross section of a bean seed.



The function of part X in the bean seed is to

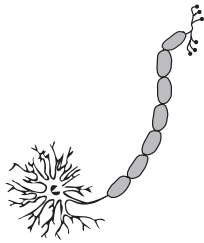
- (1) provide protection for the embryo
  - (2) provide nutrients for the embryo
  - (3) prevent mutations in the plant
  - (4) fight off infections in the plant
- 14 Grasses, shrubs, and trees are called producers because they make
- (1) water
  - (2) carbon dioxide
  - (3) minerals
  - (4) food
- 15 A broken bone heals through the process of
- (1) adaptation
  - (2) mutation
  - (3) cell division
  - (4) chemical digestion
- 16 Which substance do all living things require to survive?
- (1) blood
  - (2) water
  - (3) carbon dioxide
  - (4) organic soil
- 17 What advantage does a species that reproduces sexually have over a species that reproduces asexually?
- (1) There is greater variation among the offspring.
  - (2) The offspring are identical to the parents.
  - (3) Only one parent is necessary for reproduction.
  - (4) No sex cells are needed for reproduction.
- 18 What are produced in both the male and female reproductive systems in humans?
- (1) sperm
  - (2) nutrients
  - (3) fertilized eggs
  - (4) sex cells

19 Which life process is shown by the equation below?

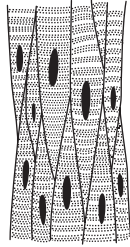


- (1) circulation
- (2) reproduction
- (3) locomotion
- (4) respiration

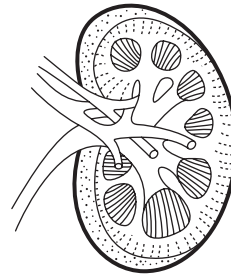
20 Which diagram below represents one type of human tissue? (The diagrams are not drawn to scale.)



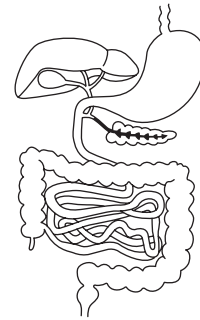
Nerve cell  
( 1 )



Muscle  
( 2 )

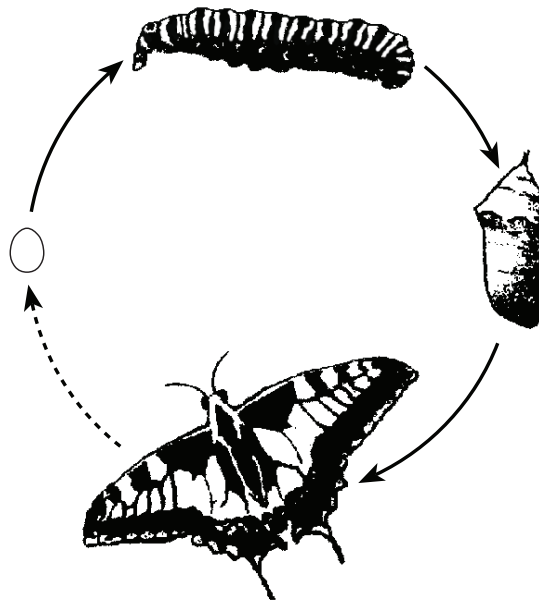


Kidney  
( 3 )



Digestive tract  
( 4 )

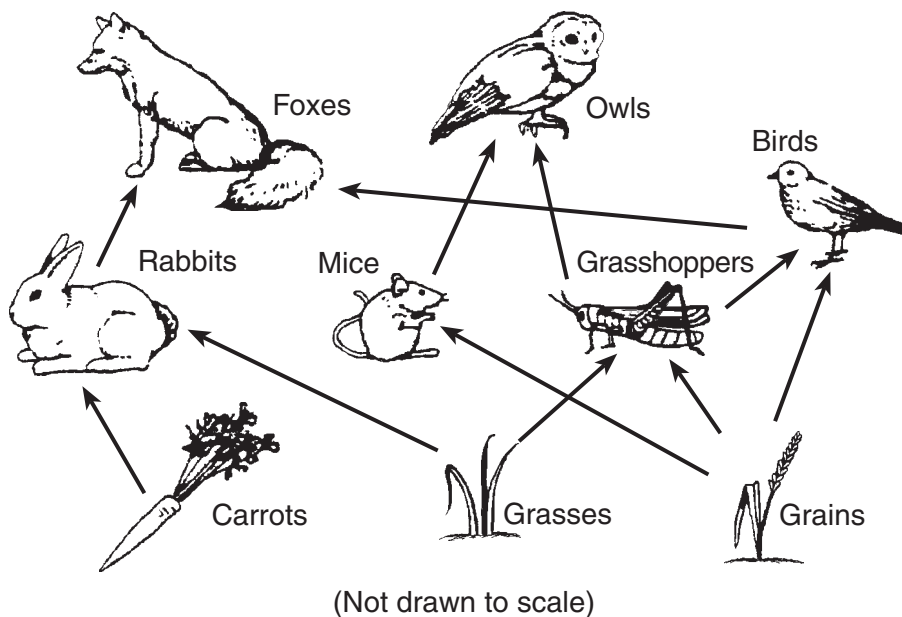
21 Which process is shown in the diagram below?



(Not drawn to scale)

- (1) evolution
- (2) migration
- (3) photosynthesis
- (4) metamorphosis

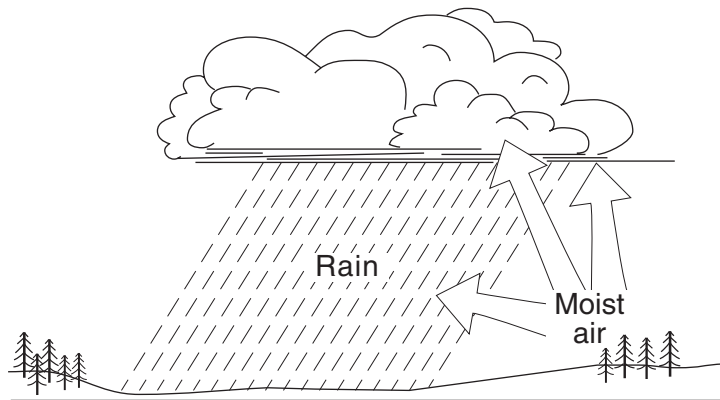
22 The diagram below shows a food web for a community.



Which organisms in the diagram are carnivores?

- (1) rabbits and birds
- (2) carrots and grasses
- (3) grasshoppers and mice
- (4) foxes and owls

23 The diagram below shows a material being cycled between the living and nonliving environments.



Which material is being cycled?

- (1) carbon dioxide
- (2) nitrogen
- (3) oxygen
- (4) water

24 Which information would probably be most helpful to someone trying to identify a mineral sample?

- (1) location and mass of the sample
- (2) shape and texture of the sample
- (3) hardness and streak of the sample
- (4) color and size of the sample

25 In which type of rock is the fossil imprint of a fern leaf most likely to be found?

- (1) igneous
- (2) metamorphic
- (3) sedimentary
- (4) volcanic

26 Studies of earthquake waves have helped scientists determine the

- (1) structure of Earth's interior
- (2) depth of the oceans
- (3) cause of dinosaur extinction
- (4) age of Earth

27 An object accelerates at 3 meters per second<sup>2</sup> when a 10-newton (N) force is applied to it. Which force would cause this object to accelerate at 6 meters per second<sup>2</sup>?

- (1) 5 N
- (2) 10 N
- (3) 20 N
- (4) 30 N

28 Which statement would most likely be included in a news report about an approaching hurricane?

- (1) Open the windows to equalize air pressure.
- (2) Install snow tires and check the antifreeze in the car radiator.
- (3) Evacuate low-lying areas near the coast.
- (4) Expect wind speed to decrease for the next several hours.

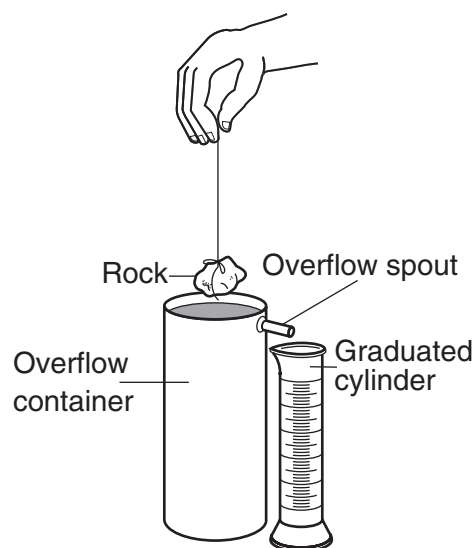
29 The surface of Earth is covered mostly by

- (1) solid rock
- (2) molten rock
- (3) ice
- (4) water

30 Part of the east coast of South America and the west coast of Africa have matching fossils within the same series of rock layers. This provides evidence that these two continents were once

- (1) separated by a much larger ocean
- (2) joined together as one landmass
- (3) located near the North Pole
- (4) in a different hemisphere

31 The diagram below shows a rock suspended above an overflow container filled with water up to the overflow spout. A graduated cylinder is positioned next to the container to collect water that comes out of the overflow spout.



Which property of the rock can be directly determined when the rock is placed in the overflow container?

- (1) mass
- (2) density
- (3) volume
- (4) hardness

32 A sudden change in the weather at a certain location is most likely caused by

- (1) the arrival of an air mass
- (2) a severe earthquake
- (3) a high ocean tide
- (4) an eclipse of the Moon



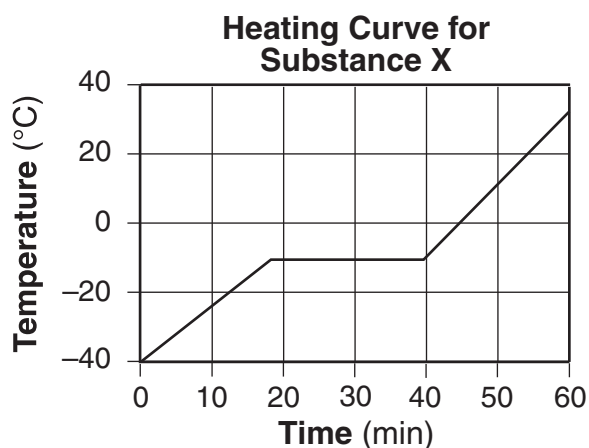
33 Which process is an example of a physical change?

- (1) wood burning
- (2) iron rusting
- (3) ice melting
- (4) milk souring

34 Which statement best describes the energy changes that occur while a child is riding on a sled down a steep, snow-covered hill?

- (1) Kinetic energy decreases and potential energy increases.
- (2) Kinetic energy increases and potential energy decreases.
- (3) Both potential energy and kinetic energy decrease.
- (4) Both potential energy and kinetic energy increase.

35 The graph below shows the heating curve for substance X.



At approximately which temperature does a phase change begin?

- (1)  $-30^{\circ}\text{C}$
- (2)  $-10^{\circ}\text{C}$
- (3)  $0^{\circ}\text{C}$
- (4)  $18^{\circ}\text{C}$

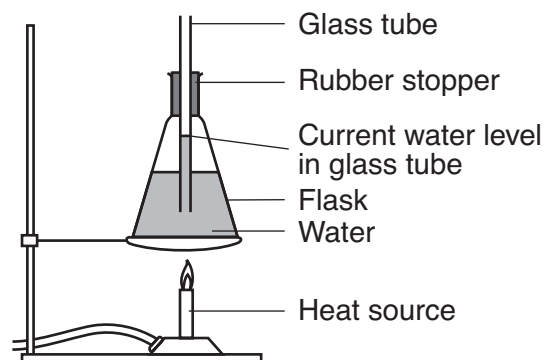
36 Which example best demonstrates the process of conduction?

- (1) A piece of paper is torn in half.
- (2) Warmed air rises above a lit candle.
- (3) A metal spoon gets warm when used to stir hot soup.
- (4) Sunlight brightens a dark room.

37 All matter is made up of

- (1) cells
- (2) atoms
- (3) molecules
- (4) compounds

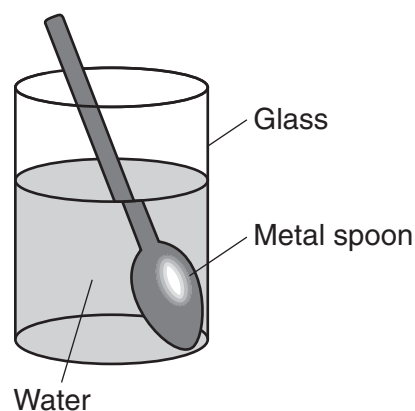
38 The diagram below shows water being heated in a flask. The flask has a rubber stopper with a glass tube extending through it. The current level of the water in the glass tube is indicated. The temperature of the water is  $25^{\circ}\text{C}$ .



If heating continues, the water in the glass tube will most likely

- (1) turn into a solid
- (2) become more dense
- (3) move into the flask
- (4) rise higher in the tube

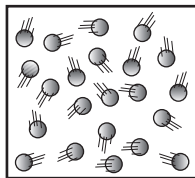
39 The diagram below shows a metal spoon in a glass of water.



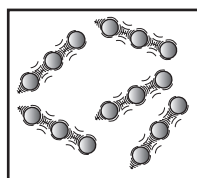
Which process causes the metal spoon to appear split or broken?

- (1) absorption
- (2) refraction
- (3) convection
- (4) reflection

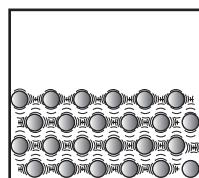
40 The diagram below shows a model of a sample of gas particles at room temperature.



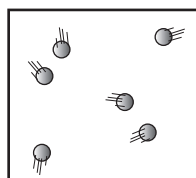
Which diagram best shows the results of removing heat from this sample until it freezes?



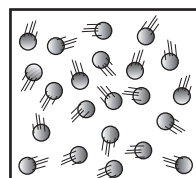
(1)



(2)

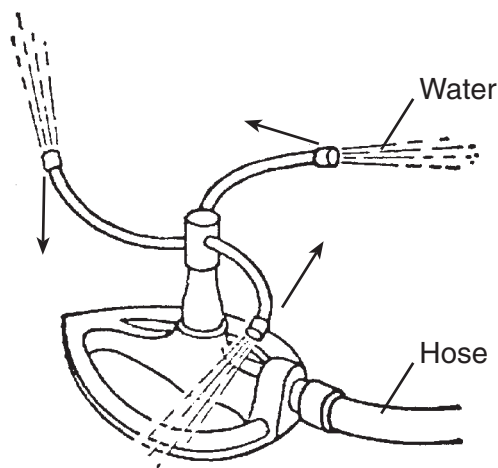


(3)



(4)

41 The diagram below shows a spinning water sprinkler. Water comes through a hose and is sprayed by the sprinkler.



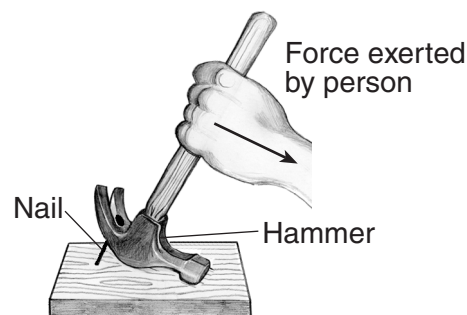
Which principle best explains why the sprinkler spins?

- (1) Every action has an equal and opposite reaction.
- (2) Solid substances are usually more dense than liquid substances.
- (3) Energy is released when water condenses.
- (4) Most substances expand when heated and contract when cooled.

42 The gravitational force between the Moon and Earth depends on

- (1) their masses, only
- (2) their diameters, only
- (3) their masses and how far apart they are
- (4) their diameters and how far apart they are

43 The diagram below shows a hammer being used by a person to remove a nail from a piece of wood.



The hammer is being used as which type of simple machine?

- |                    |            |
|--------------------|------------|
| (1) wheel and axle | (3) lever  |
| (2) inclined plane | (4) pulley |

- 44 The data table below shows changes in four different measurements as a human develops from birth to adulthood. Each measurement is expressed as a percentage of the adult value.

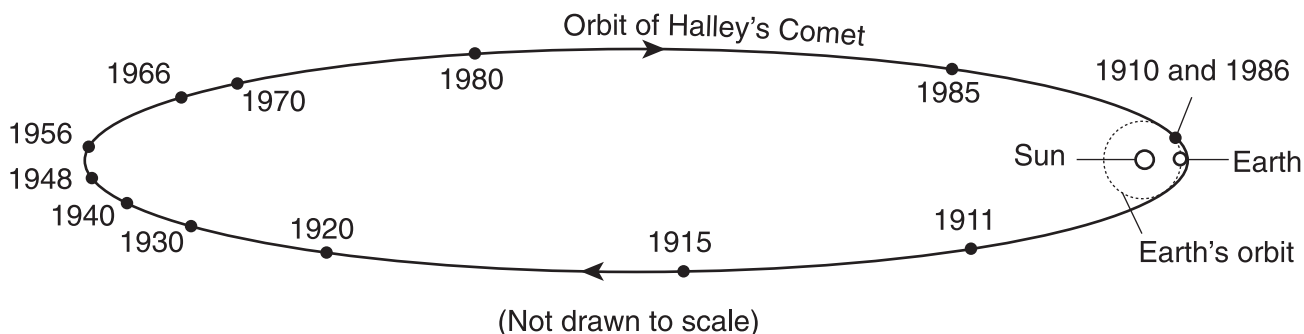
**Data Table**

Measurement	Percentage of Adult Value (%)		
	Birth	5 Years	Adult
brain weight	25	90	100
head size	60	90	100
height	30	65	100
total body weight	5	30	100

According to the table, which measurement shows the greatest percentage increase from birth to age 5?

- (1) brain weight  
 (2) head size  
 (3) height  
 (4) total body weight

- 45 The diagram below shows the orbit of Halley's Comet around the Sun as viewed from space. Earth's orbit is also shown.



The only years shown in which Halley's Comet could be viewed from Earth without the use of a telescope were 1910 and 1986. What is the next year in which Halley's Comet will be visible from the Earth without the use of a telescope?

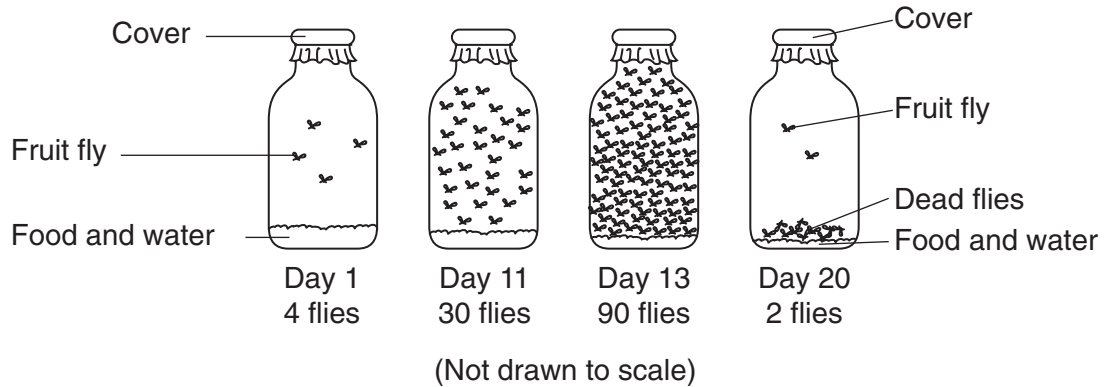
- (1) 2010  
 (2) 2062  
 (3) 2086  
 (4) 2110

## Part II

*Directions* (46–81): Record your answers in the space provided below each question.

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

The diagram below shows the results of a fruit fly activity that took place over a 20-day period. On day 1, four fruit flies were placed in a jar containing food and water. The jar had a cover that allowed enough air exchange for the fruit flies to survive, but would not allow them to escape or other flies to enter. The number of flies observed in the jar during the 20-day period is shown.



46 Identify the process responsible for the population change that occurred from day 1 to day 13. [1]

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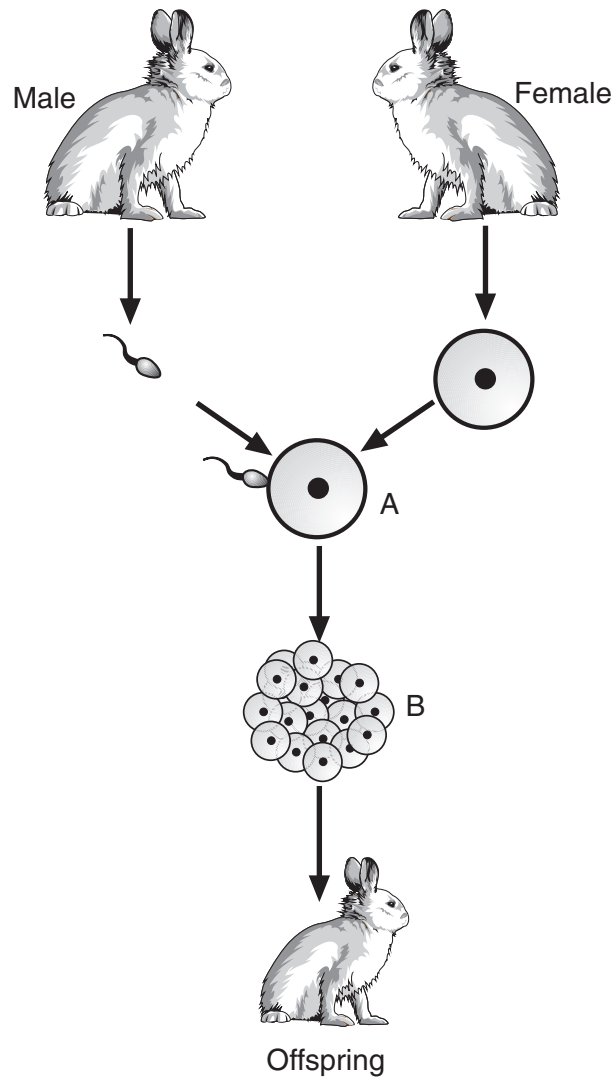
47 State *one* possible reason why many of the fruit flies died from day 13 to day 20. [1]

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Base your answers to questions 48 and 49 on the diagram below and on your knowledge of science. The diagram shows information about the sexual reproduction and development of rabbits.



(Not drawn to scale)

48 Identify the process occurring at *A*. [1]

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49 Identify the process occurring at *B*. [1]

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Base your answers to questions 50 and 51 on the information about blood groups below.

Human blood is classified into four blood types: A, B, AB, and O. An offspring's blood type is determined by genes passed on from the offspring's parents. Each parent gives an offspring one gene for blood type. The combination of the two genes determines the offspring's blood type.

There are three genes, *A*, *B*, and *o*, that are responsible for the four blood types. The table below shows how these three genes interact to produce the four blood types.

**Determination of Blood Type**

Genes from Parents		Genes of Offspring	Blood Type of Offspring
Mother	Father		
<i>A</i>	<i>A</i>	<i>AA</i>	A
<i>A</i>	<i>o</i>	<i>Ao</i>	A
<i>A</i>	<i>B</i>	<i>AB</i>	AB
<i>B</i>	<i>B</i>	<i>BB</i>	B
<i>o</i>	<i>B</i>	<i>Bo</i>	B
<i>o</i>	<i>o</i>	<i>oo</i>	O

50 The Punnett square below shows the probability of blood types in the offspring of two parents. One parent's blood type genes are *AB* and the other parent's blood type genes are *Ao*.

	<i>A</i>	<i>B</i>
<i>A</i>	<i>AA</i>	<i>AB</i>
<i>o</i>	<i>Ao</i>	<i>Bo</i>

Based on this Punnett square, identify the expected percentage of offspring in each of the four blood types. [1]

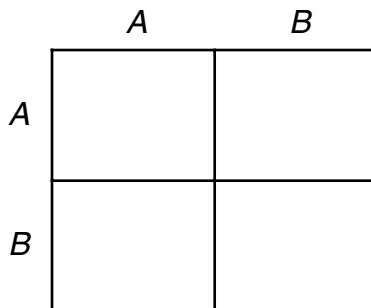
Blood type A: \_\_\_\_\_ %

Blood type AB: \_\_\_\_\_ %

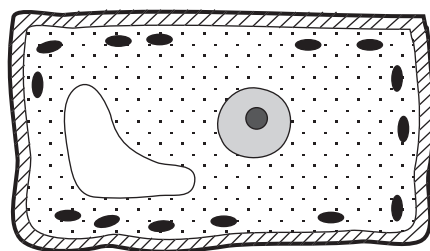
Blood type B: \_\_\_\_\_ %

Blood type O: \_\_\_\_\_ %

51 Complete the Punnett square below, which shows a cross between two parents whose genes for blood type are *AB*. [1]



Base your answers to questions 52 and 53 on the diagram below and on your knowledge of science. The diagram shows a typical plant cell and some of its parts.



**Plant cell**

Key	
	Cell membrane
	Cell wall
	Large vacuole
	Nucleus
	Chloroplast

52 Which cell part directs the activities of the cell? [1]

\_\_\_\_\_

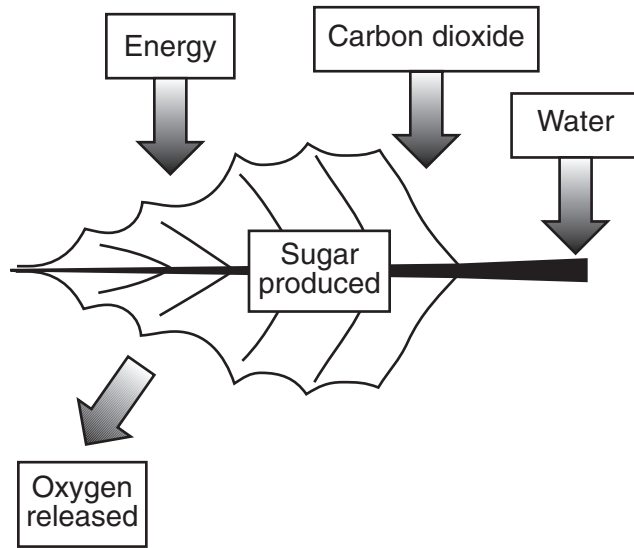
53 Identify *two* cell parts that indicate this diagram represents a plant cell and *not* an animal cell. [1]

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

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

\_\_\_\_\_

Base your answers to questions 54 and 55 on the diagram below and on your knowledge of science. The diagram shows a process that occurs in the leaf of a tree and other organisms containing chlorophyll. Energy, carbon dioxide, and water are taken in by the leaf and oxygen and sugar are produced.



54 Identify the process represented by this diagram. [1]

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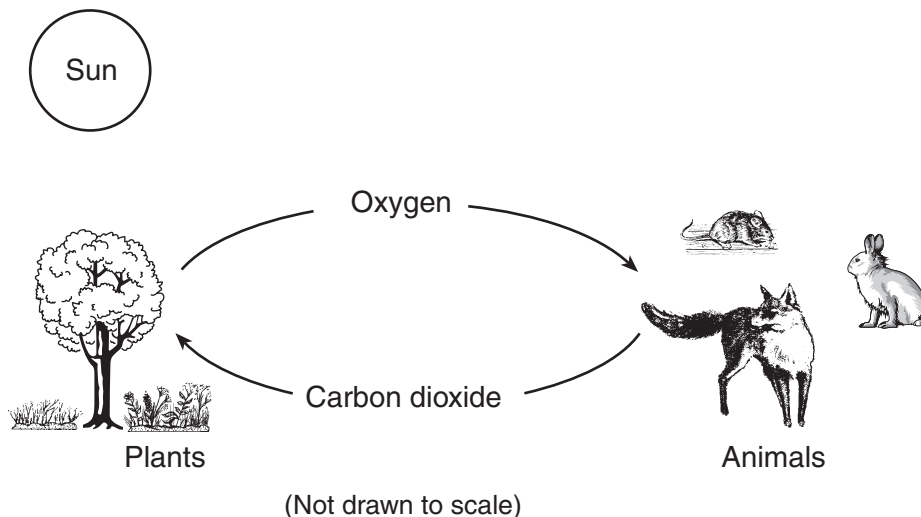
55 What form of energy is taken in by the leaf? [1]

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56 The diagram below represents gas exchange between several different organisms.



The animals in the diagram are dependent on the plants for oxygen. Identify *one* other way in which animals are dependent on plants. [1]

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Base your answers to questions 57 and 58 on the diagram below and on your knowledge of science. The diagram shows wind turbines that are used to generate electricity.



57 Describe *one* advantage (other than cost) of using wind turbines rather than burning fossil fuels to produce electricity. [1]

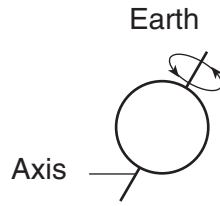
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58 Describe *one disadvantage* (other than cost) of using wind turbines rather than burning fossil fuels to produce electricity. [1]

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59 The diagram below shows Earth as viewed from space.



What motion of Earth is represented by the arrow in the diagram? [1]

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Base your answers to questions 60 through 62 on the information below and on your knowledge of science.

The Moon orbits Earth in a regular and predictable motion.

60 Approximately how long does it take for one complete cycle of the Moon's phases to occur? [1]

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61 What is the major force that keeps the Moon in its orbit around Earth? [1]

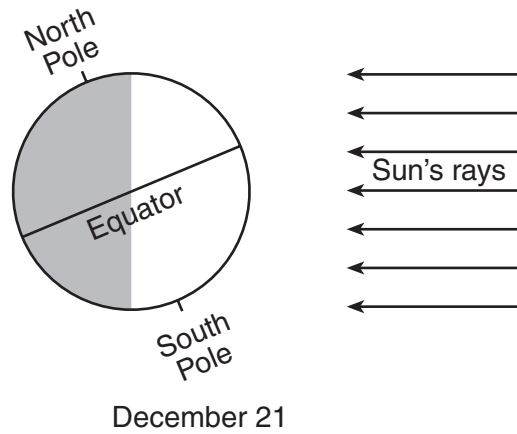
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62 Identify *one* observable event, other than the Moon's phases, caused by the Moon orbiting Earth. [1]

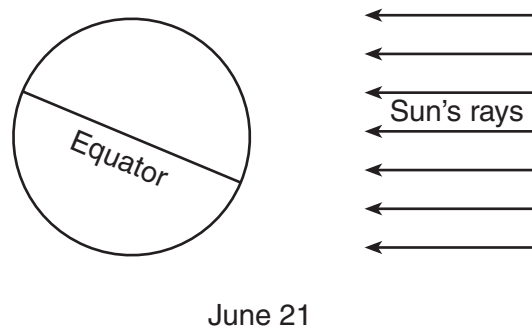
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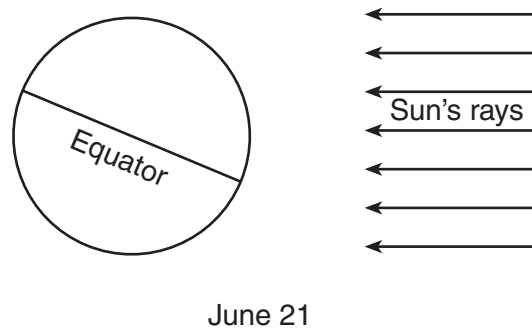
Base your answers to questions 63 and 64 on the diagram below and on your knowledge of science. The diagram shows the position of Earth in relation to the Sun on December 21, which is the first day of winter in the Northern Hemisphere. The shaded area represents the portion of Earth experiencing nighttime.



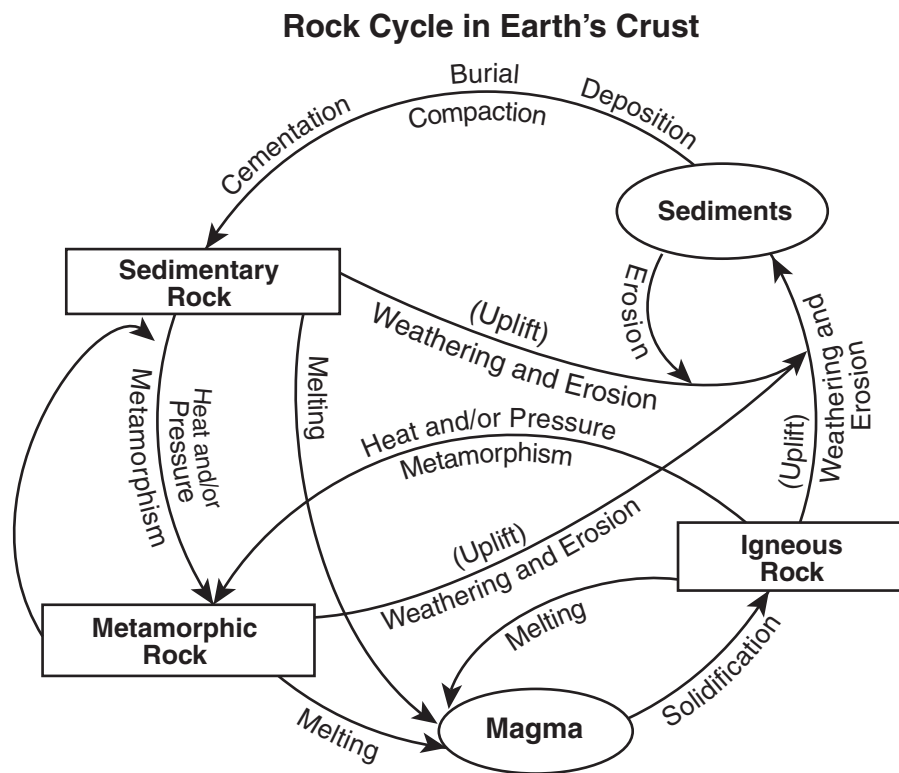
63 The diagram below shows Earth in relation to the Sun on June 21, which is the first day of summer in the Northern Hemisphere. Draw and label the positions of the North and South Poles on the diagram. [1]



64 On the diagram below, shade the portion of Earth experiencing nighttime on June 21. [1]



Base your answers to questions 65 and 66 on the diagram below and on your knowledge of science. The diagram shows the rock cycle in Earth's crust.



65 What type of rock forms directly from magma? [1]

\_\_\_\_\_

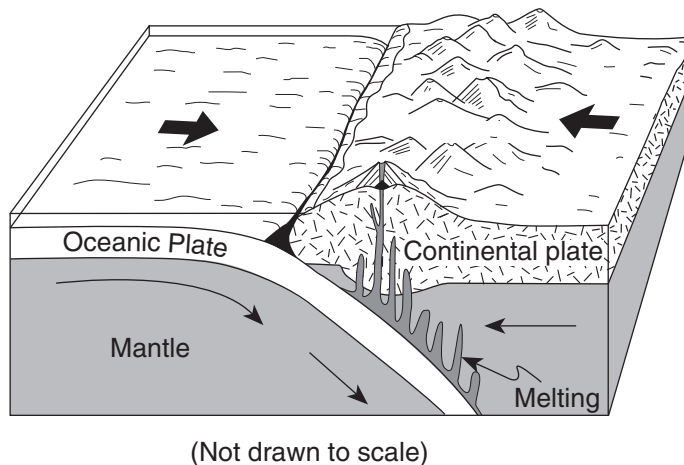
66 Identify *two* processes required for the formation of a sedimentary rock. [1]

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

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

\_\_\_\_\_

Base your answers to questions 67 and 68 on the diagram below and on your knowledge of science. The diagram shows a boundary between crustal plates. The arrows show the direction of plate movement.



67 What theory is used to explain the movement of crustal plates? [1]

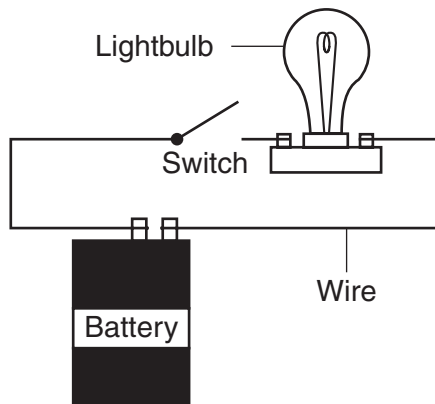
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68 Identify *one* geologic event that often occurs near this type of crustal plate boundary. [1]

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69 The diagram below shows a lightbulb, battery, and switch connected by wires.

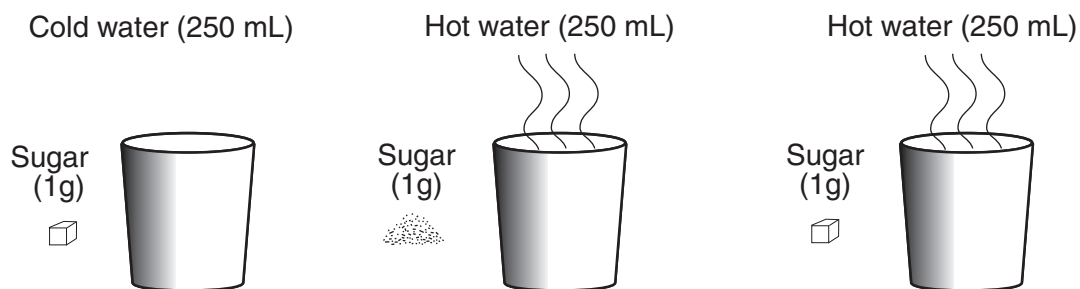


Explain why the lightbulb is *not* lit when the switch is in the position shown. [1]

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70 The diagrams below show three situations in which sugar will dissolve in water.



Identify *two* variables that affect the rate at which the sugar will dissolve in the water. [2]

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

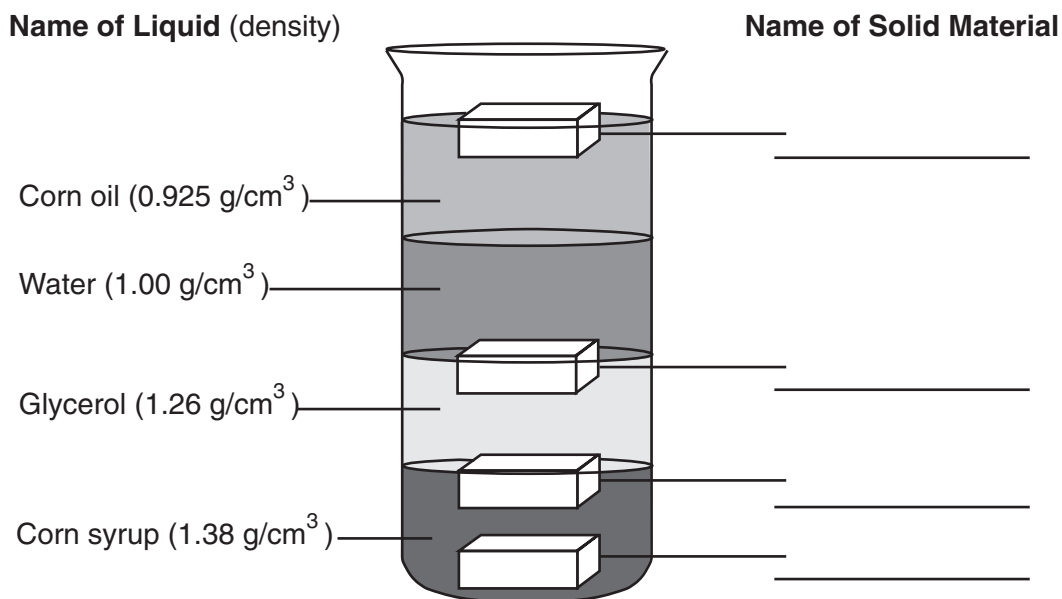
(2) \_\_\_\_\_

71 The beaker shown below contains four liquids of different densities. The blocks shown in the beaker represent four different solid materials. The table below shows the densities of the four solid materials.

**Density of Solid Materials**

Solid Material	Density (g/cm <sup>3</sup> )
copper	8.90
plastic	1.17
rubber	1.34
wood	0.71

Indicate where each of the four solid materials would be located by writing the name of each solid material in the space provided. [2]

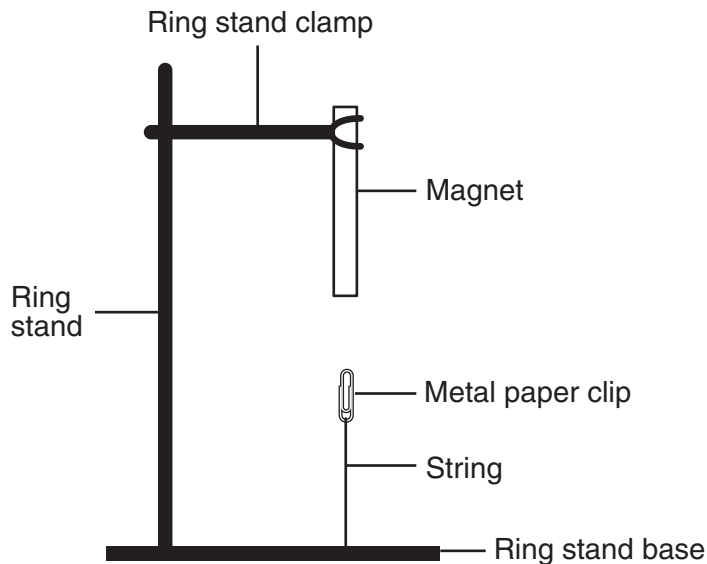


72 A beaker contains table salt dissolved in water. Describe *one* method a student could use to separate the salt from the solution. [1]

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Base your answers to questions 73 and 74 on the diagram below and on your knowledge of science. The diagram shows a metal paper clip attached to the base of a ring stand with a string. A magnet is attached to the ring stand with a clamp.



73 What would happen to the metal paper clip if the string were cut? [1]

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74 Explain how this diagram would be different if the paper clip was made of plastic. [1]

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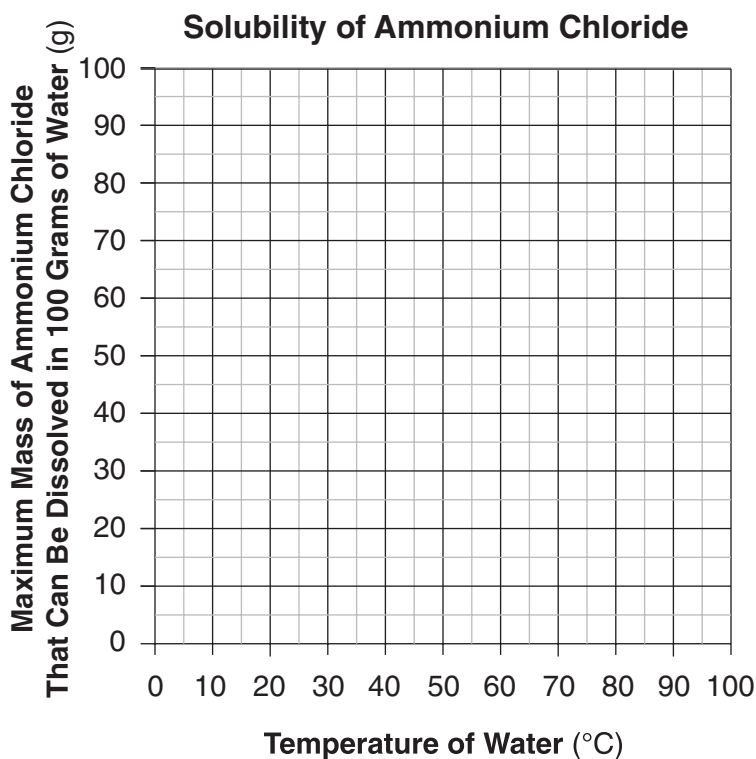
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Base your answers to questions 75 through 77 on the data table below, which shows the maximum mass of ammonium chloride that can be dissolved in 100 grams of water at various temperatures.

**Data Table**

<b>Water Temperature (°C)</b>	<b>Maximum Mass of Ammonium Chloride That Can Be Dissolved in 100 Grams of Water (g)</b>
0	30
20	37
40	46
60	55
80	65
100	76

75 Construct a line graph on the grid below. Use an **X** to plot the maximum mass of ammonium chloride that can be dissolved in 100 grams of water at each water temperature shown in the data table. Connect the **Xs** with a line. [2]





76 What is the maximum mass of ammonium chloride that can be dissolved in 100 grams of water at a temperature of 70°C? [1]

\_\_\_\_\_ **grams**

77 State the relationship between water temperature and the maximum mass of ammonium chloride that can be dissolved in 100 grams of water? [1]

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78 A science class did an experiment to find out whether right-handed people catch better with the right hand than with the left hand. Five right-handed students each tried to catch a ball 20 times using the right hand and 20 times using the left hand. The results are shown below.

**Catching Experiment Results**

<b>Student</b>	<b>Number of Catches with Right Hand Out of 20 Tries</b>	<b>Number of Catches with Left Hand Out of 20 Tries</b>
A	19	15
B	20	13
C	17	12
D	19	16
E	20	14
<b>Average Number of Catches per Student</b>	<b>19</b>	<b>14</b>

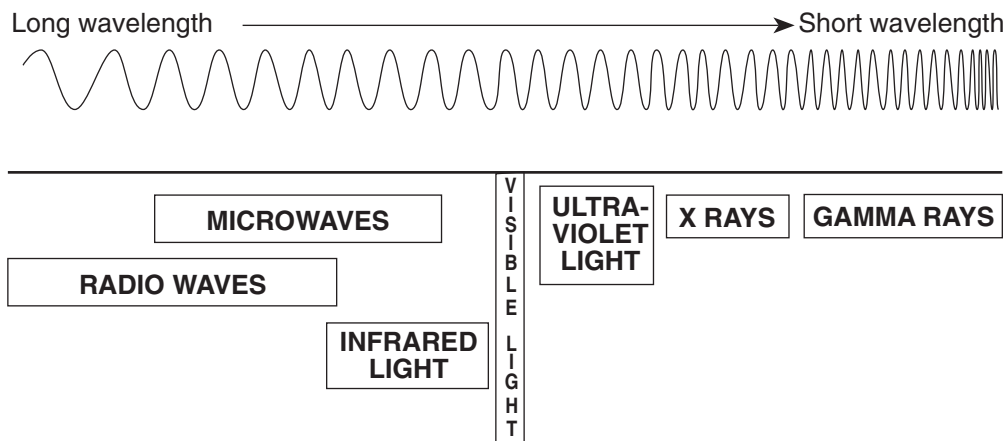
Identify *two* factors that should have been held constant in this experiment. [2]

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

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

Base your answers to questions 79 and 80 on the diagram below and on your knowledge of science. The diagram shows various forms of electromagnetic energy.

### Electromagnetic Spectrum



(Not drawn to scale)

79 Four forms of electromagnetic energy are listed below:

- visible light
- ultraviolet light
- x rays
- microwaves

In the chart below, list these four forms of electromagnetic energy in order from the longest wavelength to the shortest wavelength. [1]

Wavelength	Form of Electromagnetic Energy
Longest Wavelength	
↓	
Shortest Wavelength	

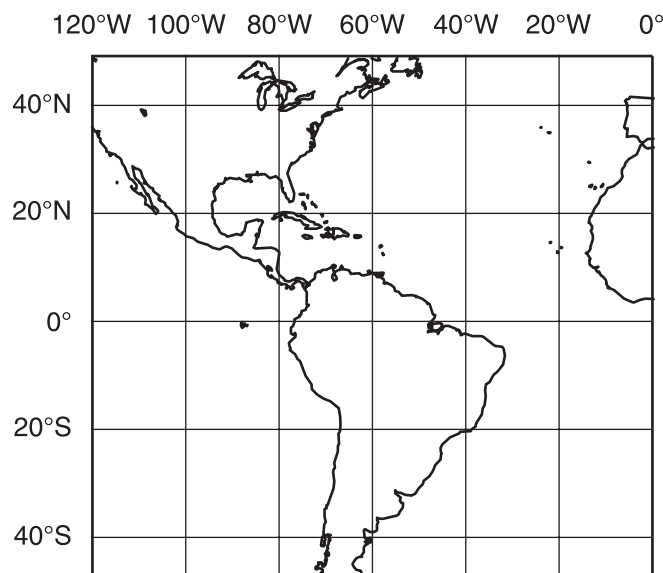
80 Four forms of electromagnetic energy are listed below:

- visible light
- ultraviolet light
- x rays
- microwaves

Complete the chart below by identifying the form of electromagnetic energy from the list that is described by each fact. Use each form of energy only once. [1]

<b>Facts About Forms of Electromagnetic Energy</b>	<b>Form of Electromagnetic Energy</b>
may cause sunburn	
used to detect broken bones	
made up of various colors	
used for cooking food	

81 Place an **X** on the map below to indicate a location at 20° S 60° W. [1]



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

<b>Question</b>	<b>Maximum Credit</b>	<b>Credit Allowed</b>
46	1	
47	1	
48	1	
49	1	
50	1	
51	1	
52	1	
53	1	
54	1	
55	1	
56	1	
57	1	
58	1	
59	1	
60	1	
61	1	
62	1	
63	1	
64	1	
65	1	
66	1	
67	1	
68	1	
69	1	
70	2	
71	2	
72	1	
73	1	
74	1	
75	2	
76	1	
77	1	
78	2	
79	1	
80	1	
81	1	
<b>Total</b>	<b>40</b>	