

THE UNIVERSITY OF THE STATE OF NEW YORK

# GRADE 8

## INTERMEDIATE-LEVEL SCIENCE TEST

### WRITTEN TEST

JUNE 1, 2015

Student Name \_\_\_\_\_

School Name \_\_\_\_\_

**The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.**

Print your name and the name of your school on the lines above.

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 39 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 TURN THIS PAGE 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 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 Which sequence identifies the levels of organization of body structures in a human from simplest to most complex?

- (1) cell → organ → tissue → organ system
- (2) organ system → cell → tissue → organ
- (3) tissue → organ → organ system → cell
- (4) cell → tissue → organ → organ system

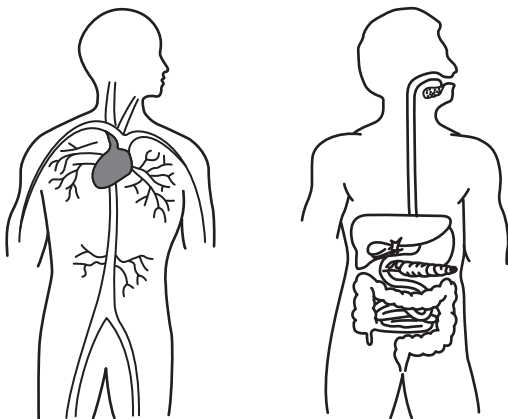
2 A student viewing a cell with a microscope observes a cell wall, a cell membrane, and a nucleus. The presence of these structures indicates that the student is looking at a cell from a

- (1) rabbit
- (2) carrot
- (3) worm
- (4) fly

3 Dogs and cats are animals that have many similar body structures but they do not mate with each other. These two animals are classified in

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

4 The diagrams below represent two systems of the human body.



(Not drawn to scale)

Which two systems are represented in the diagrams?

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

5 Which process is responsible for the growth and repair of human tissue?

- (1) evolution
- (2) germination
- (3) cell division
- (4) natural selection

6 The primary role of the endocrine system is to

- (1) produce hormones that regulate body functions
- (2) form chemicals that destroy microbes
- (3) break down food to release nutrients
- (4) supply red blood cells to carry oxygen

7 The photograph below shows three cats with differences in their fur length and patterns.



These differences are most likely due to

- (1) dietary habits
- (2) sexual reproduction
- (3) habitat destruction
- (4) damage from disease

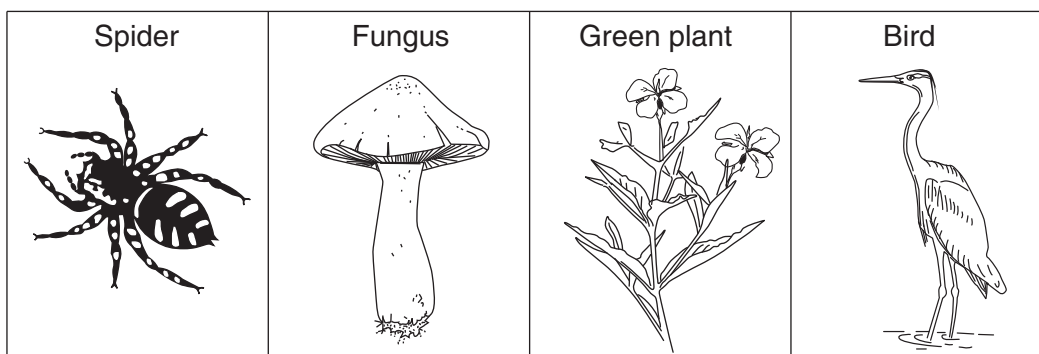
8 The hereditary material in corn plants can be altered by scientists so the plants produce more corn. Which term identifies this process?

- (1) environmental degradation
- (2) ecological succession
- (3) natural selection
- (4) genetic engineering

9 One function of a plant's seed is to

- (1) perform photosynthesis
- (2) provide food for early development
- (3) decompose dead organisms
- (4) reproduce sexually

10 The diagram below represents four organisms.

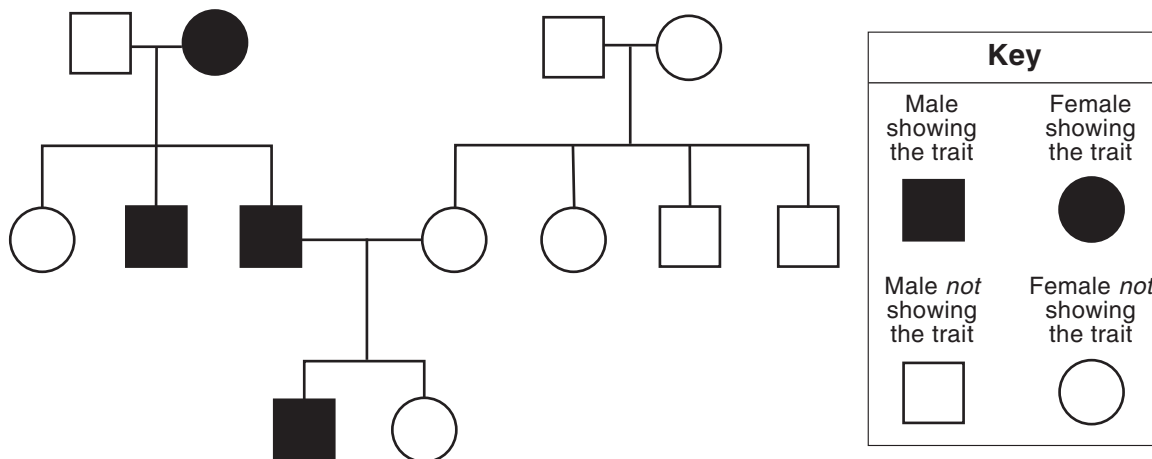


(Not drawn to scale)

How many of the organisms represented are multicellular?

- (1) one
- (2) two
- (3) three
- (4) four

Base your answers to questions 11 and 12 on the model below and on your knowledge of science. The model represents the transmission of a specific trait passed on from parents to their offspring.



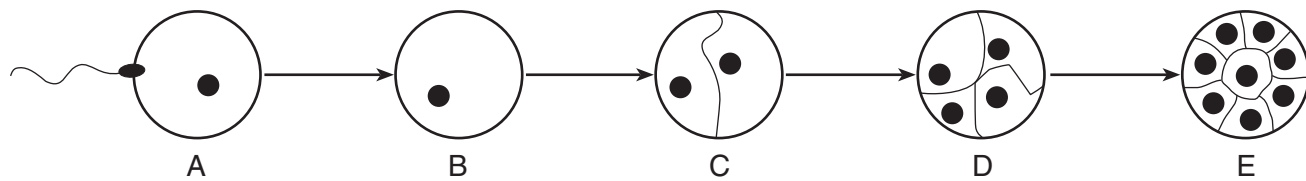
11 Which type of model is shown in the diagram?

- (1) food chain
- (2) pedigree chart
- (3) feedback system
- (4) life cycle

12 How many males in this model show the trait?

- (1) one
- (2) seven
- (3) three
- (4) four

Base your answers to questions 13 and 14 on the diagrams below and on your knowledge of science. Diagrams *A* through *E* represent five stages in a simplified model of sexual reproduction and development.



(Not drawn to scale)

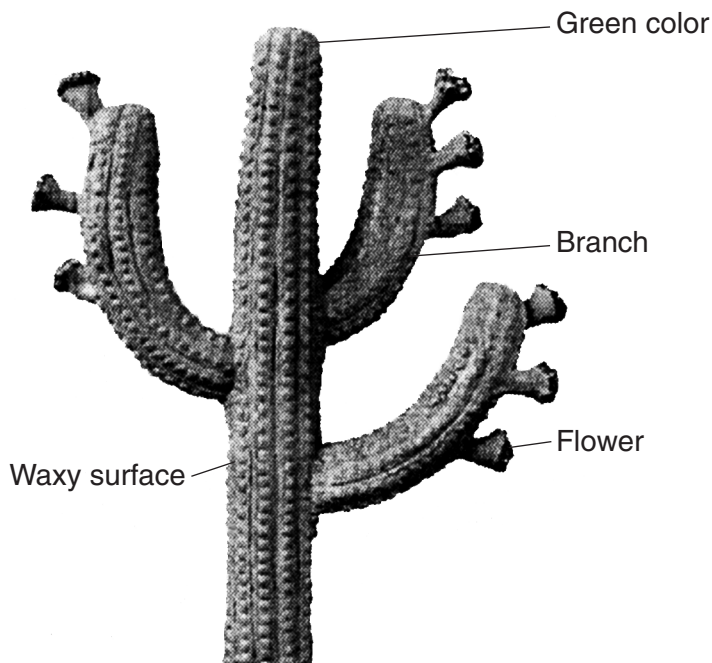
13 At which stage is fertilization occurring?

- |              |              |
|--------------|--------------|
| (1) <i>A</i> | (3) <i>C</i> |
| (2) <i>B</i> | (4) <i>E</i> |

14 Between which two stages does cell division first occur?

- |                           |                           |
|---------------------------|---------------------------|
| (1) <i>A</i> and <i>B</i> | (3) <i>C</i> and <i>D</i> |
| (2) <i>B</i> and <i>C</i> | (4) <i>D</i> and <i>E</i> |

15 The photograph below shows a cactus plant.



(Not drawn to scale)

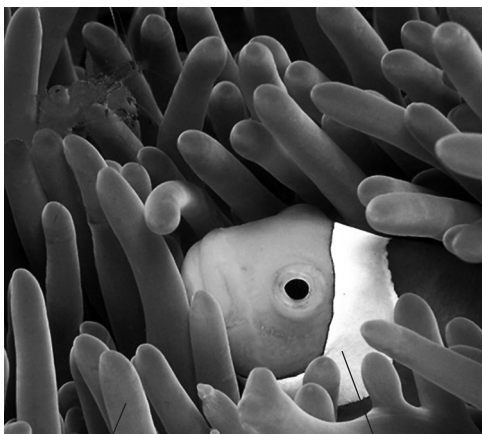
Which feature helps a cactus plant prevent water loss in a hot, dry desert environment?

- |                 |                  |
|-----------------|------------------|
| (1) green color | (3) waxy surface |
| (2) flowers     | (4) branches     |

- 16 Nutrients enter the bloodstream during the process of
- |                 |                 |
|-----------------|-----------------|
| (1) locomotion  | (3) elimination |
| (2) respiration | (4) absorption  |

Base your answers to questions 17 and 18 on the information below about two animals, the sea anemone and the clownfish, and on your knowledge of science.

Clownfish are tiny, omnivorous fish that find shelter from predators in the poisonous tentacles of sea anemones. The sea anemones sting their prey to capture food, but the clownfish are not hurt by the stinging tentacles. The clownfish clean the tentacles of the sea anemone and scare off butterfly fish, which consume sea anemones.



Sea anemone tentacle

Clownfish

- 17 The relationship between the sea anemone and clownfish is best described as
- |                 |               |
|-----------------|---------------|
| (1) competitive | (3) predatory |
| (2) beneficial  | (4) harmful   |
- 18 The clownfish is classified as an omnivore because it eats
- |                                |
|--------------------------------|
| (1) both plants and animals    |
| (2) neither plants nor animals |
| (3) only plants                |
| (4) only animals               |

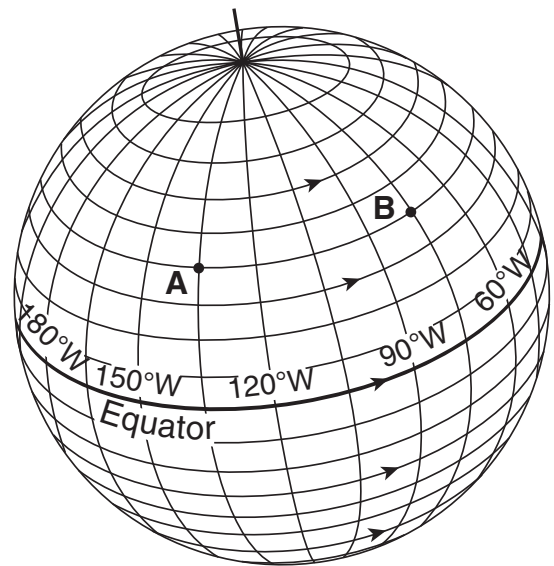
- 19 Which type of organism converts wastes and dead materials into nutrients that can be used by plants?
- |               |                |
|---------------|----------------|
| (1) carnivore | (3) decomposer |
| (2) herbivore | (4) producer   |

- 20 All of the different organisms interacting in a pond make up
- |                  |                     |
|------------------|---------------------|
| (1) a community  | (3) the water cycle |
| (2) a population | (4) the habitat     |

- 21 Which factor is most likely to cause the number of rabbits living in an area to increase?
- |                     |                     |
|---------------------|---------------------|
| (1) less water      | (3) lack of shelter |
| (2) fewer predators | (4) limited food    |

- 22 One positive effect of recycling aluminum cans to manufacture new beverage containers is
- |                                  |
|----------------------------------|
| (1) conserving Earth's resources |
| (2) creating acid rain           |
| (3) warming Earth's atmosphere   |
| (4) increasing the ozone layer   |

- 23 The diagram below represents a portion of Earth's latitude/longitude system. A and B are locations on Earth's surface. The arrows show the direction of Earth's rotation.



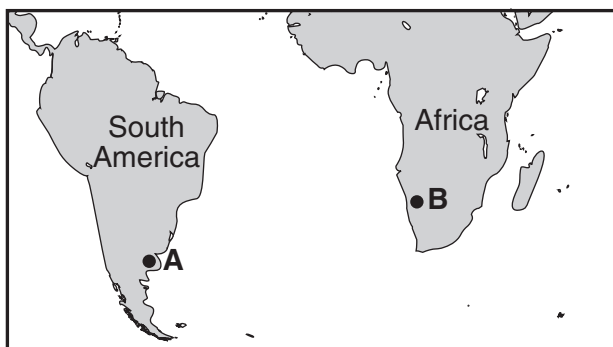
- If it is noon at location A, then at location B it is
- |             |               |
|-------------|---------------|
| (1) morning | (3) afternoon |
| (2) noon    | (4) midnight  |

- 24 The length of one day on Earth is determined by how long it takes
- (1) the Moon to revolve once
  - (2) the Moon to rotate once
  - (3) Earth to rotate once
  - (4) Earth to revolve once

- 25 When Earth's shadow falls on the Moon, the shadow causes a
- (1) high tide
  - (2) low tide
  - (3) lunar eclipse
  - (4) Moon phase

- 26 Earth's hydrosphere is a layer of
- (1) rock
  - (2) air
  - (3) lava
  - (4) water

- 27 The map below shows the current positions of South America and Africa. Points A and B represent areas on the two continents where scientists have discovered fossils of the same animal species.



How does the Theory of Plate Tectonics explain the location of these fossils?

- (1) The continents were once joined together.
  - (2) The animals were able to swim from one continent to the other.
  - (3) Humans transported the animals from point A to point B.
  - (4) The animals developed independently on both continents.
- 28 All living and nonliving material is composed of
- (1) air
  - (2) elements
  - (3) water
  - (4) soil

- 29 Which change is the best example of a physical change?
- (1) a cookie baking
  - (2) paper burning
  - (3) ice cream melting
  - (4) a nail rusting

- 30 Elements on the Periodic Table of the Elements are classified into categories such as
- (1) rocks and minerals
  - (2) molecules and atoms
  - (3) mixtures and compounds
  - (4) metals and nonmetals

- 31 Which type of energy is transferred by vibrational waves?
- (1) nuclear
  - (2) light
  - (3) chemical
  - (4) sound

- 32 Which device directly converts chemical energy into electrical energy?
- (1) solar-powered calculator
  - (2) wood-burning stove
  - (3) battery-powered flashlight
  - (4) wind-powered sailboat

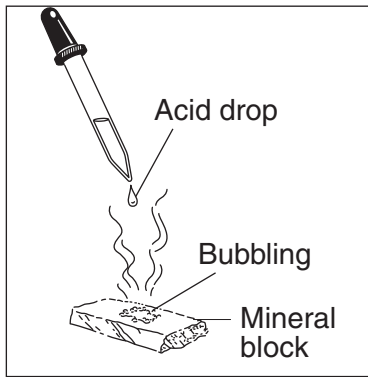
- 33 Heat transfer by conduction occurs when molecules
- (1) flow as currents through liquids
  - (2) form waves that travel through space
  - (3) become less dense and rise
  - (4) collide with other molecules

- 34 Which energy source is *nonrenewable*?
- (1) sunlight
  - (2) biomass
  - (3) wind
  - (4) fossil fuel

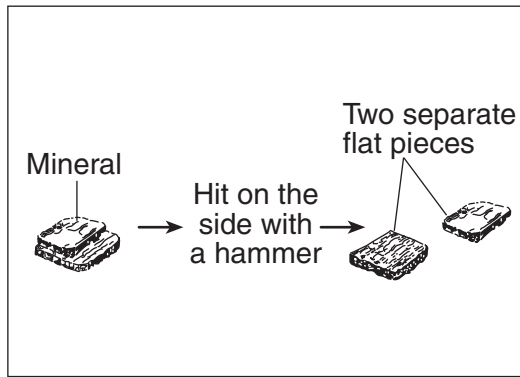
- 35 Scientists have created trains that use magnets to make the trains float above the tracks as they travel. These trains float because
- (1) the track is waxed
  - (2) the like poles repel
  - (3) the train has a low density
  - (4) a chemical change occurs



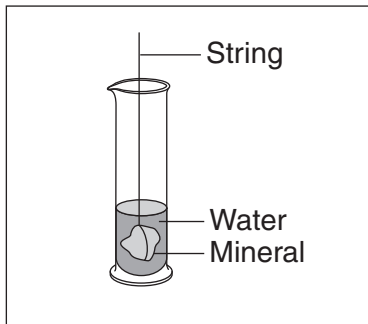
36 Which diagram represents a chemical reaction used to identify a mineral?



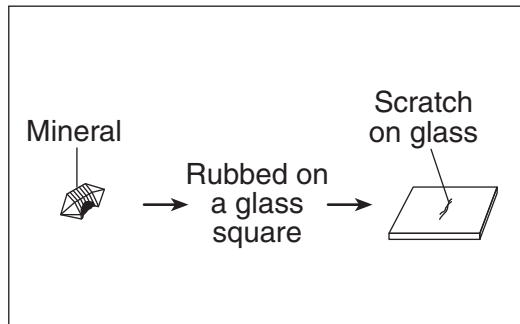
(1)



(3)

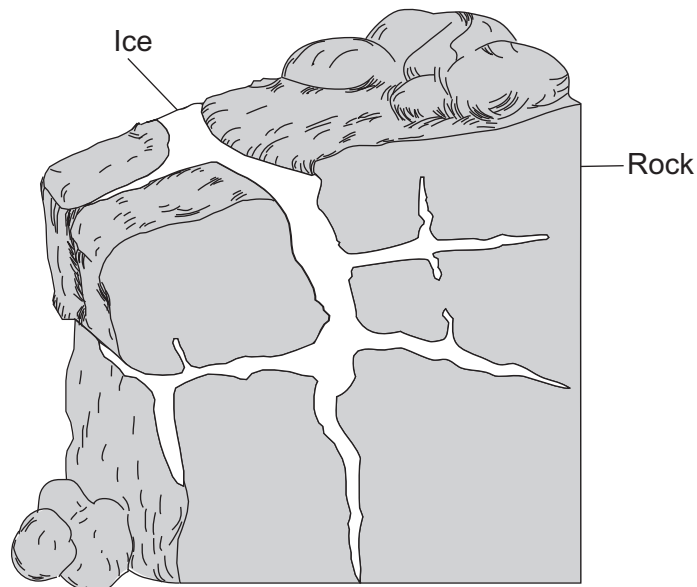


(2)



(4)

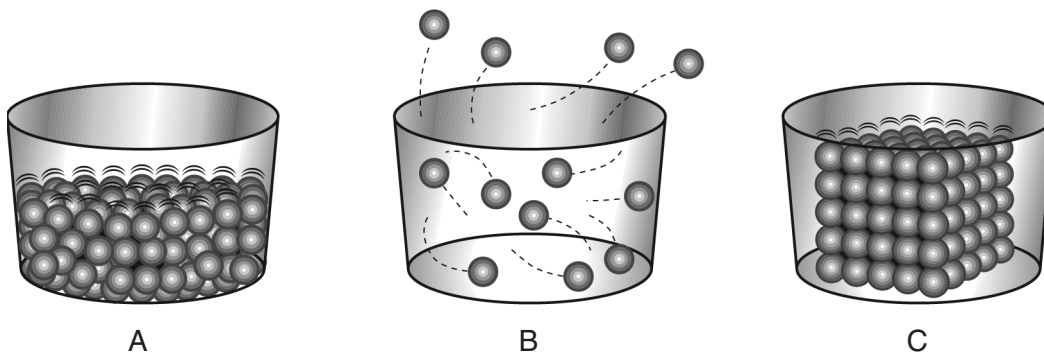
37 The diagram below represents how rock is affected when water enters cracks in rock, freezes, and becomes ice.



Which geologic process is represented in the diagram?

- (1) faulting
- (2) weathering
- (3) metamorphism
- (4) volcanism

38 The diagrams below represent three phases of matter, labeled A, B, and C.



(Not drawn to scale)

Which table correctly identifies the phases of matter represented by the diagrams?

A	liquid
B	gas
C	solid

( 1 )

A	solid
B	liquid
C	gas

( 2 )

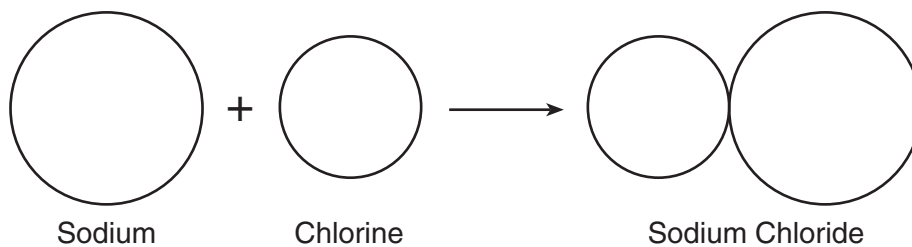
A	solid
B	gas
C	liquid

( 3 )

A	liquid
B	solid
C	gas

( 4 )

39 The diagram below represents a sodium atom bonding to a chlorine atom to form sodium chloride.

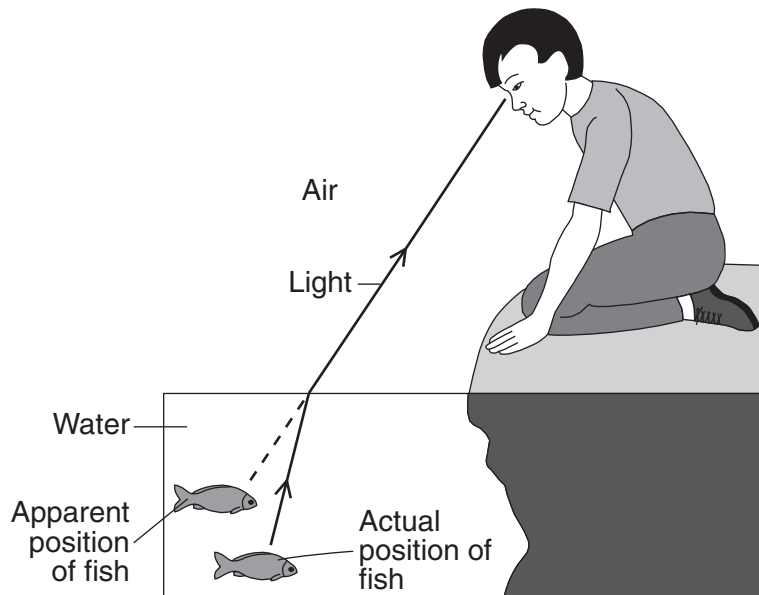


(Not drawn to scale)

Which statement is supported by this diagram?

- (1) Sodium chloride is an element.
- (2) Sodium chloride is a mixture.
- (3) Sodium chloride is a compound.
- (4) Sodium chloride is composed of only one atom.

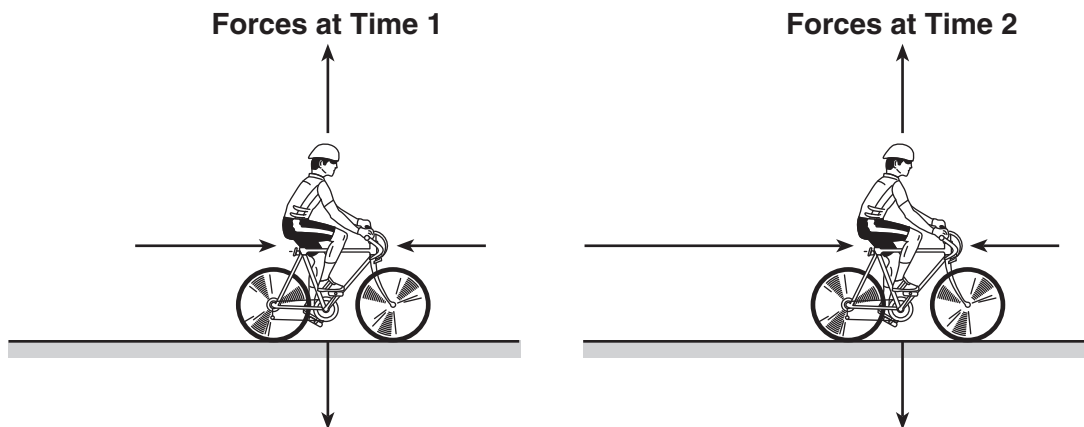
40 The diagram below represents a person looking at a fish in the water.



The actual position of the fish is different from the apparent position of the fish because as light travels from the water into the air, the light is

- (1) refracted
- (2) reflected
- (3) transmitted
- (4) absorbed

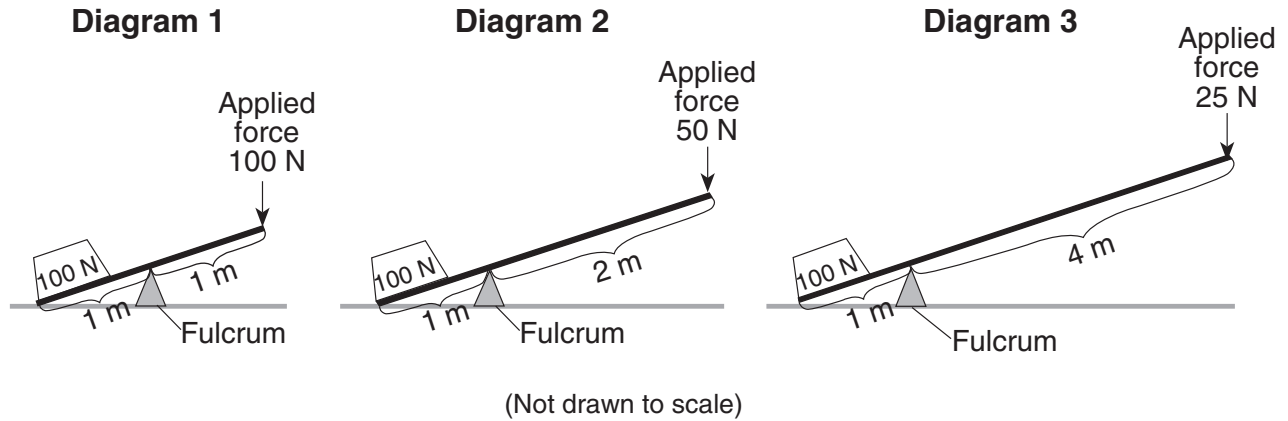
41 The arrows in the diagram below represent the forces acting on a moving bicycle at two different times, time 1 and time 2. The length of each arrow represents the amount of force being applied.



As a result of the change in the forces from time 1 to time 2, the bicyclist will

- (1) move slower in a forward direction
- (2) move in a backward direction
- (3) move faster in a forward direction
- (4) stop moving

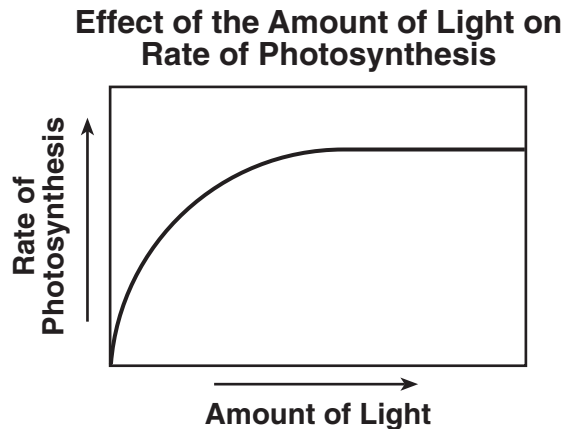
42 The sequence of diagrams 1, 2, and 3 below represents different levers being used to lift a 100-newton (N) weight. The distance in meters (m) from the fulcrum to the applied force is different in each diagram.



How many meters from the fulcrum to the applied force would allow this weight to be lifted using only 10 N of applied force?

- (1) 20
- (2) 10
- (3) 8
- (4) 4

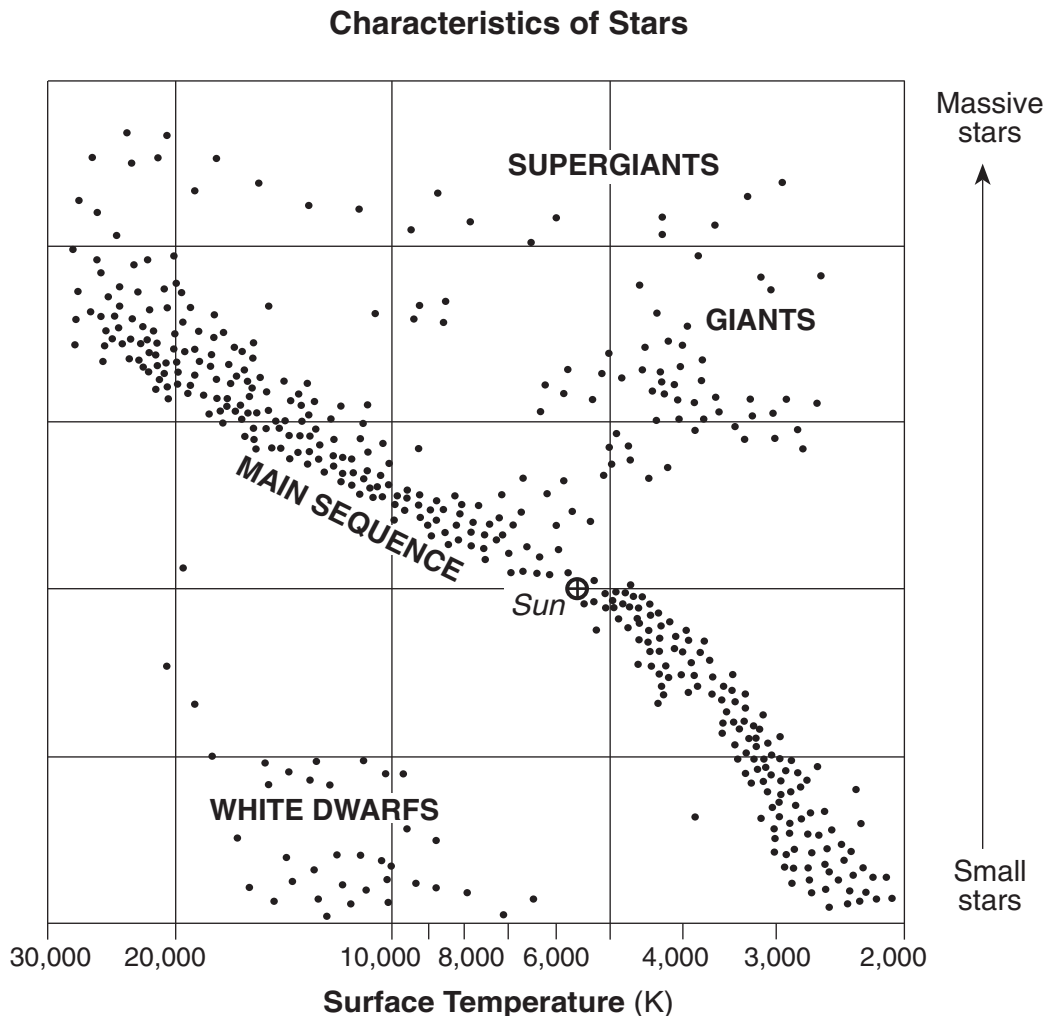
43 The graph below shows the relationship between the amount of light received by a plant and its rate of photosynthesis.



As the amount of light received by this plant increases, its rate of photosynthesis

- (1) decreases, then increases
- (2) decreases, and then remains the same
- (3) increases, then decreases
- (4) increases, and then remains the same

- 44 The graph below shows the relative sizes and surface temperatures of four groups of stars. The surface temperature of the stars is measured in Kelvin (K). The Sun is part of the main sequence group.



According to the graph, the Sun is best described as

- (1) massive sized, with a surface temperature of approximately 20,000 K
  - (2) massive sized, with a surface temperature of approximately 10,000 K
  - (3) average sized, with a surface temperature of approximately 8,000 K
  - (4) average sized, with a surface temperature of approximately 6,000 K
- 45 A student writes in a laboratory notebook:

I placed a piece of iron in a beaker of water and the iron sank to the bottom of the beaker.

What the student wrote in the laboratory notebook is an example of a(n)

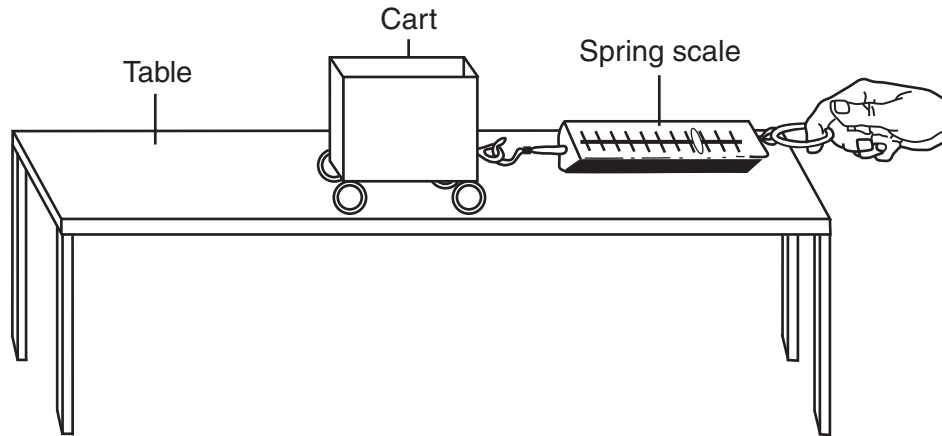
- |                 |                |
|-----------------|----------------|
| (1) observation | (3) inference  |
| (2) prediction  | (4) hypothesis |
-

## Part II

*Directions (46–84):* Record your answers in the space provided below each question.

Base your answers to questions 46 through 48 on the information below and on your knowledge of science.

The diagram below represents a student using a spring scale to pull a toy cart across a level table.



(Not drawn to scale)

The student pulled the cart across the table five times. Each time, the student used more force. Force is measured in newtons (N) on the spring scale. The student then calculated the acceleration of the cart, measured in meters per second squared ( $\text{m/s}^2$ ). The results are shown in the data table.

**Data Table**

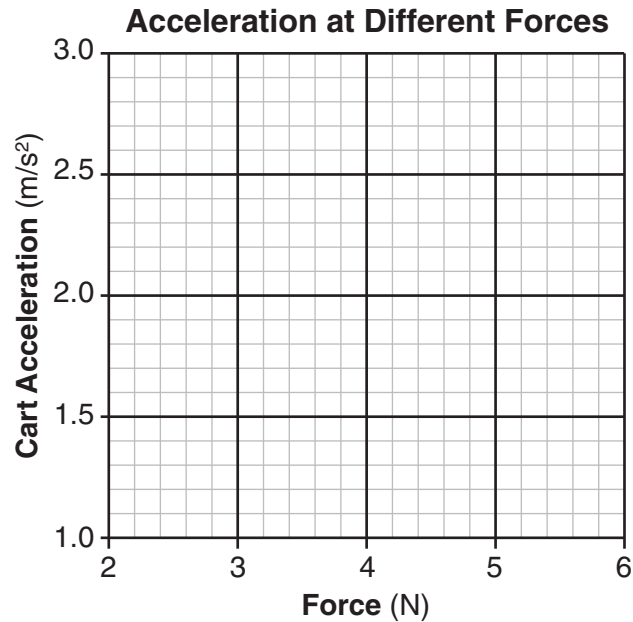
<b>Force (N)</b>	<b>Cart Acceleration (<math>\text{m/s}^2</math>)</b>
3.0	1.5
3.6	1.8
4.2	2.1
4.8	2.4
5.4	2.7

46 Determine the mass of the cart, using the equation below. [1]

$$\text{Force (newton)} = \text{mass (kg)} \times \text{acceleration (m/s}^2\text{)}$$

Mass of cart = \_\_\_\_\_ **kg**

47 Based on the data in the table, construct a line graph on the grid below. Use an **X** to plot the acceleration of the cart for each force shown. Connect the **Xs** with a solid line. [1]

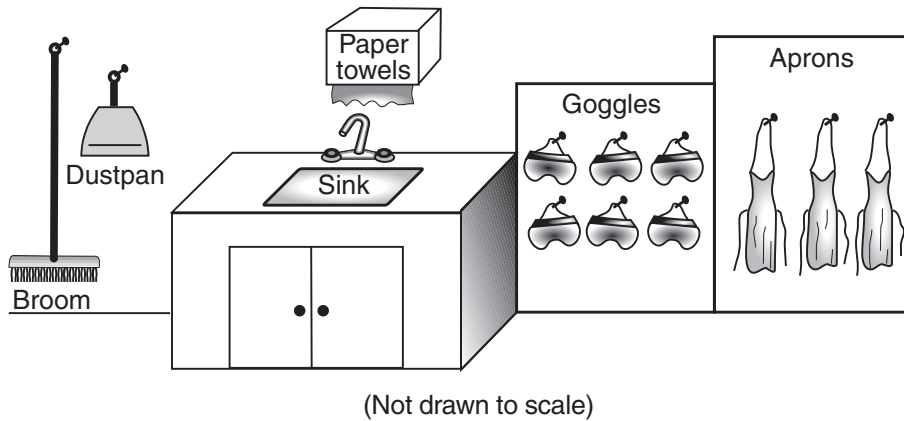


48 Based on the graph, predict the acceleration of the cart if the student were to perform the same experiment again using 2 N of force. [1]

\_\_\_\_\_ m/s<sup>2</sup>

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49 The diagram below represents part of a science classroom. Several items are labeled.



Choose *two* labeled items from the diagram and explain how each is used to keep students safe. [1]

Item 1: \_\_\_\_\_

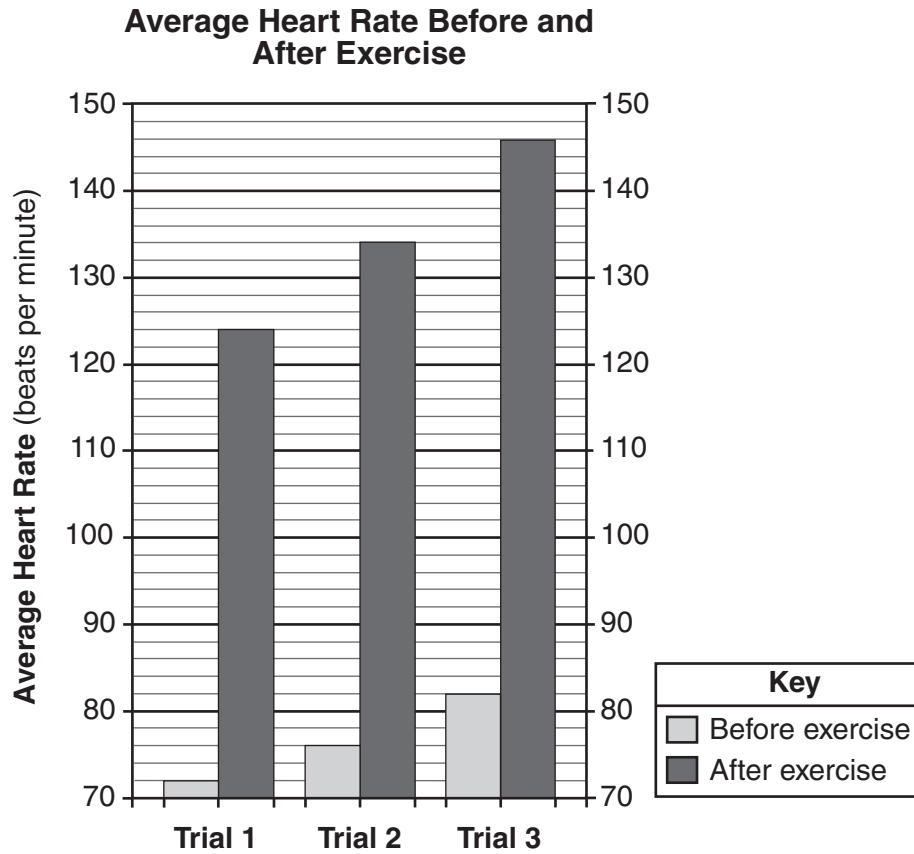
Explanation: \_\_\_\_\_

Item 2: \_\_\_\_\_

Explanation: \_\_\_\_\_

Base your answers to questions 50 through 52 on the information and bar graph below and on your knowledge of science.

A group of science students have been learning how the human circulatory system reacts during exercise. The students measured their heart rates both before and after they ran five laps around the school gym. This was repeated two more times, with a 5-minute rest period between each trial. The average heart rates of the students are shown in the bar graph.



50 Use the data from the bar graph to complete the data table below [1]

**Data Table**

Trial	Heart Rate Before Exercise (beats per minute)	Heart Rate After Exercise (beats per minute)
1		
2		
3		



51 State the general relationship between exercise and heart rate in humans. [1]

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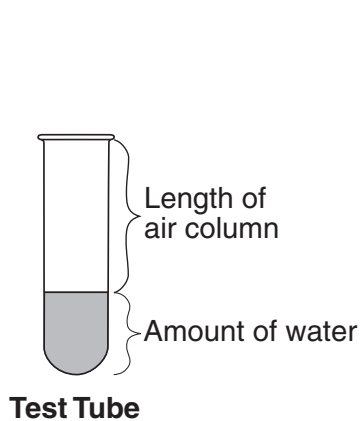
52 Identify *one* way the students could have measured their heart rates. [1]

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Base your answers to questions 53 and 54 on the information below and on your knowledge of science.

A group of students investigated how the length of a column of air inside a test tube affects the pitch of a sound produced by blowing across the top of the test tube. Pitch refers to how high or low a sound is. The length of the air column was varied by pouring different amounts of water into five test tubes. The pitch produced by each test tube was ranked on a scale of 1–5, with 1 being the lowest pitch and 5 being the highest pitch. The results of the investigation are shown in the data table below.



**Pitch of Sound Produced by Different Lengths of Air Columns**

Test Tube	Length of Air Column (cm)	Pitch of Sound
A	2.0	5
B	5.0	4
C	7.0	3
D	10.0	2
E	15.0	1

53 Identify the dependent variable in this investigation. [1]

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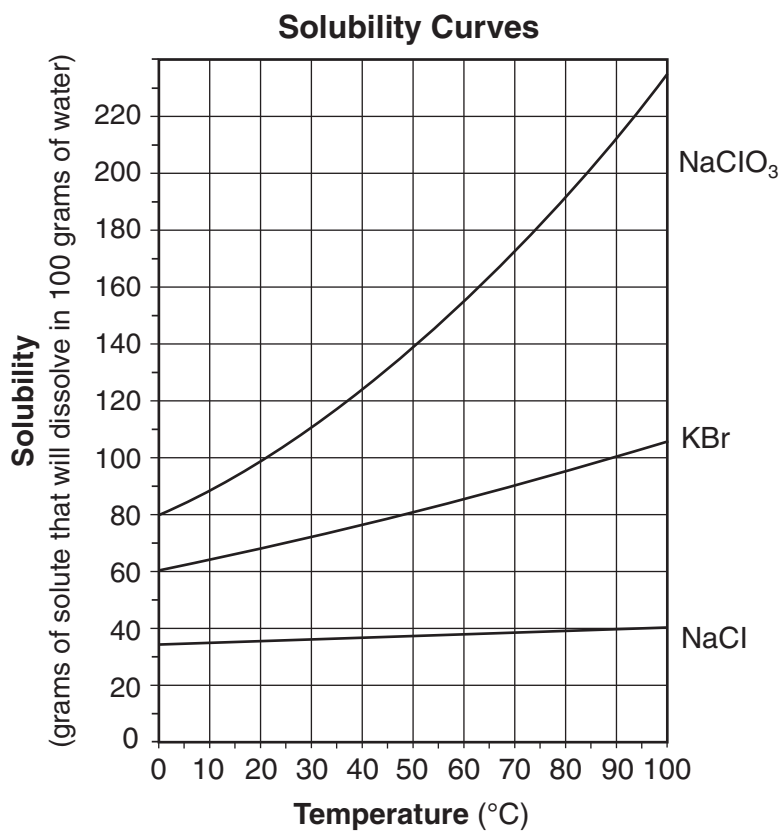
54 Identify *one* source of error that might have influenced the results of this investigation. [1]

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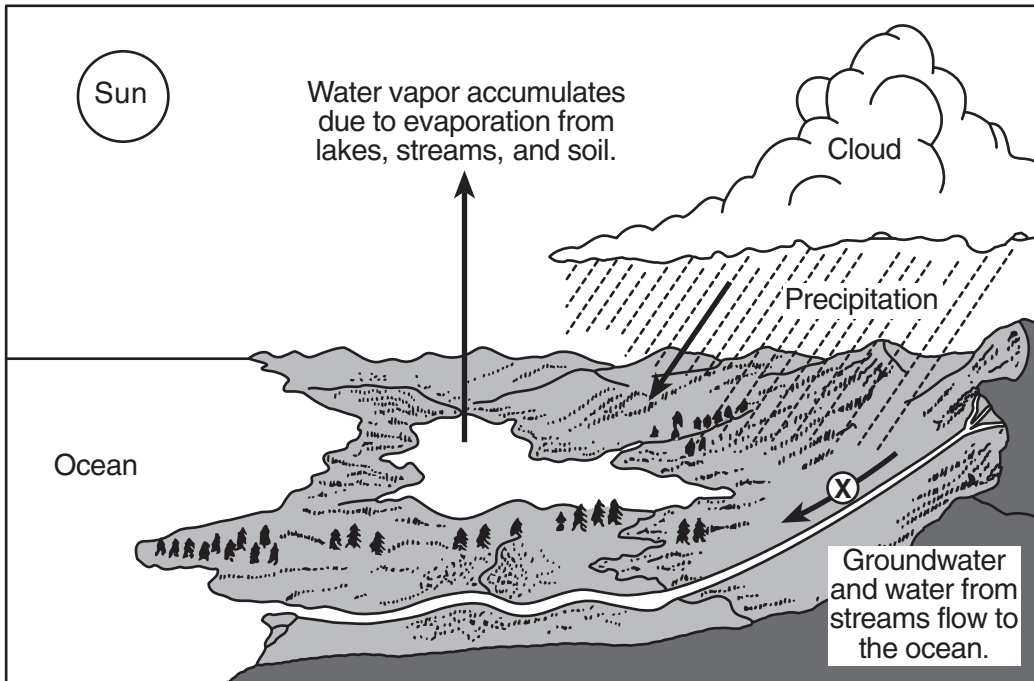
55 The graph below shows the solubility of three substances in 100 grams of water at various temperatures.



How many grams of KBr will dissolve in 100 grams of water at 60°C? [1]

\_\_\_\_\_ g

Base your answers to questions 56 through 58 on the diagram below and on your knowledge of science. The diagram represents some processes that are part of the water cycle. Arrow X represents a water cycle process.



56 What is the source of energy for the water cycle? [1]

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57 Which process changes the water vapor into water droplets that form the cloud? [1]

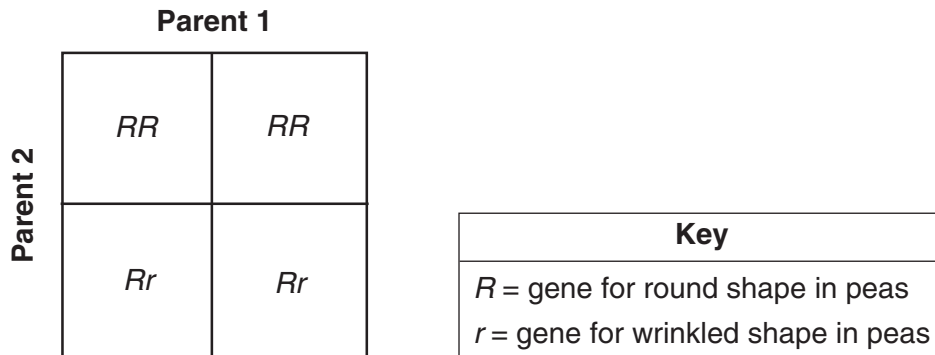
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58 Which process in the water cycle is represented by arrow X, where water flows over land to the ocean? [1]

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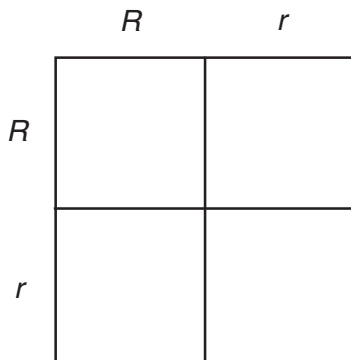
Base your answers to questions 59 and 60 on the Punnett square below and on your knowledge of science. The Punnett square represents a cross between two parent pea plants. The gene for round shape ( $R$ ) is dominant over the gene for wrinkled shape ( $r$ ).



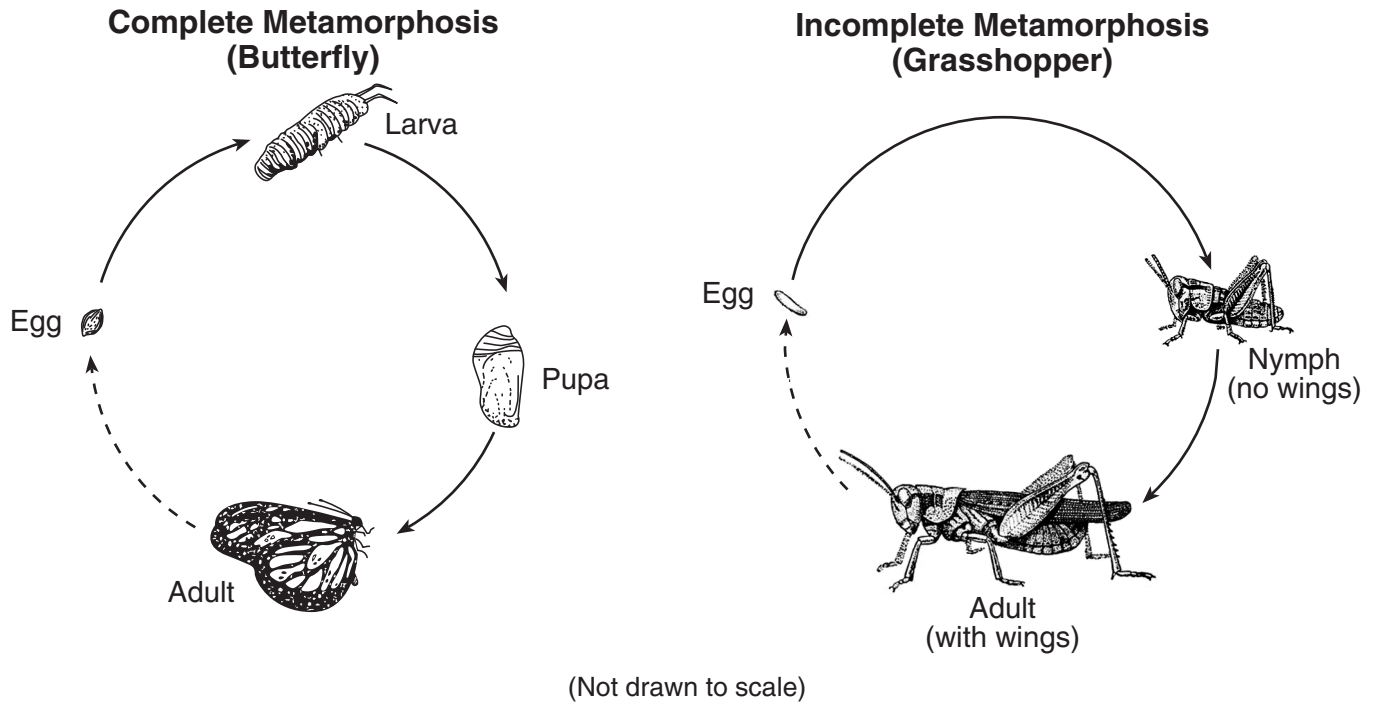
59 What percentage of the offspring will have a round shape? [1]

\_\_\_\_\_ %

60 Complete the Punnett square below to show the probability of the results of crossing two  $Rr$  parents. [1]



61 The diagrams below represent different types of metamorphosis (complete and incomplete) occurring in the life cycles of two insects. The stages of development are labeled in both life cycles.



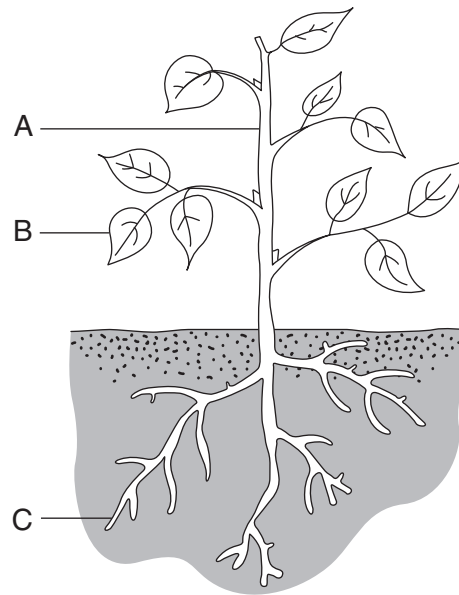
Based on the diagrams, describe *one* way complete metamorphosis is different from incomplete metamorphosis. [1]

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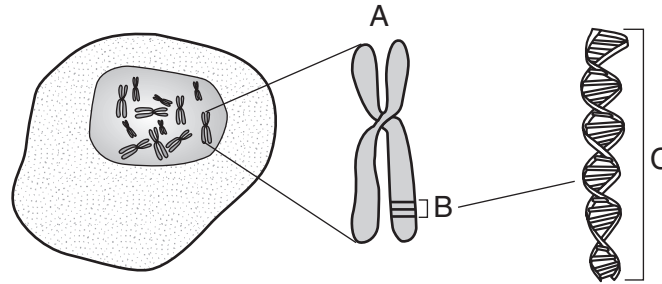
62 The diagram below represents a plant. Three plant structures are labeled A, B, and C.



Complete the chart below by identifying the structures and describing *one* function of each. The structure and function for A is shown. [2]

Label	Structure	One Function of the Structure
A	stem	supports the plant
B		
C		

63 The diagram below represents a simple animal cell. To the right of the cell, two cell structures have been enlarged and labeled *A* and *B*. A portion of structure *B* has been enlarged and labeled *C*.



A description of each cell structure is provided in the chart below. Complete the chart by identifying *each* cell structure. The name for structure *A* is shown. [1]

Letter	Description of Cell Structure	Name of Cell Structure
A	thread-like structure found in the nucleus that contains many units of hereditary information	chromosome
B	a single unit of hereditary information	
C	double-stranded molecule composed of genetic material	

64 The diagram below represents a bird, fertilized eggs, and a nest.



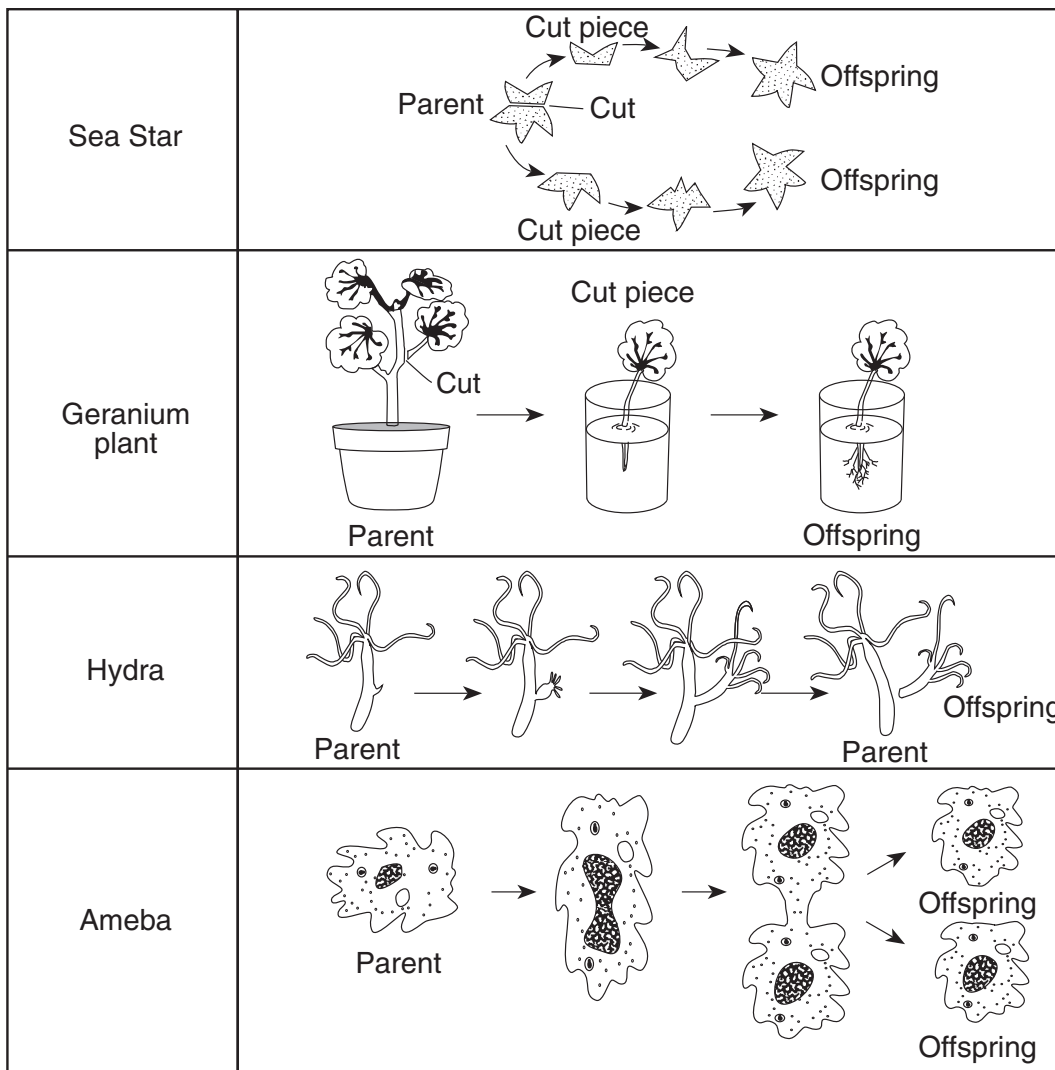
Do birds exhibit mainly internal development or external development? Circle the correct answer and give *one* piece of evidence to support your answer. [1]

Circle one:      internal      external

Evidence: \_\_\_\_\_

\_\_\_\_\_

Base your answers to questions 65 and 66 on the diagram below and on your knowledge of science. The diagram represents the production of new offspring in four different types of organisms.



(Not drawn to scale)

65 Which evidence from the diagram indicates that all four of the organisms shown are reproducing asexually? [1]

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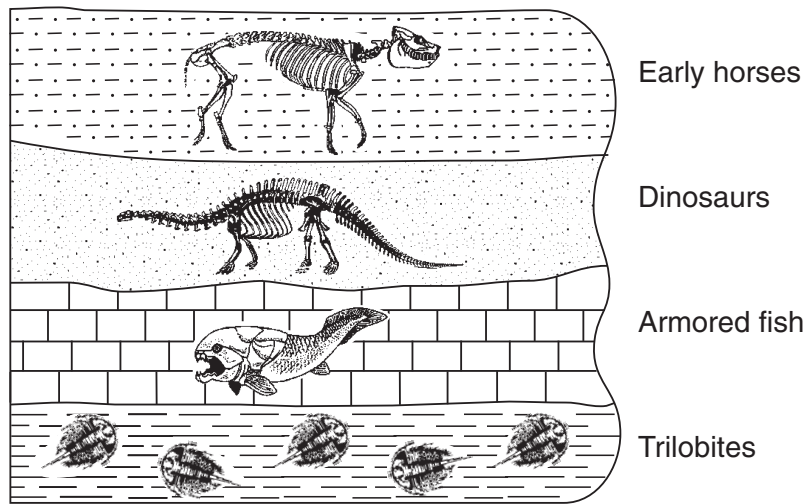
66 If the parent hydra has 32 chromosomes, how many chromosomes does the hydra offspring have? [1]

\_\_\_\_\_ chromosomes

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Base your answers to questions 67 and 68 on the diagram below and on your knowledge of science. The diagram represents a cross section of rock layers containing some fossils of organisms that have become extinct. The rock layers have *not* been overturned.



(Not drawn to scale)

67 Explain how the diagram indicates that the trilobites are older than the other fossils shown. [1]

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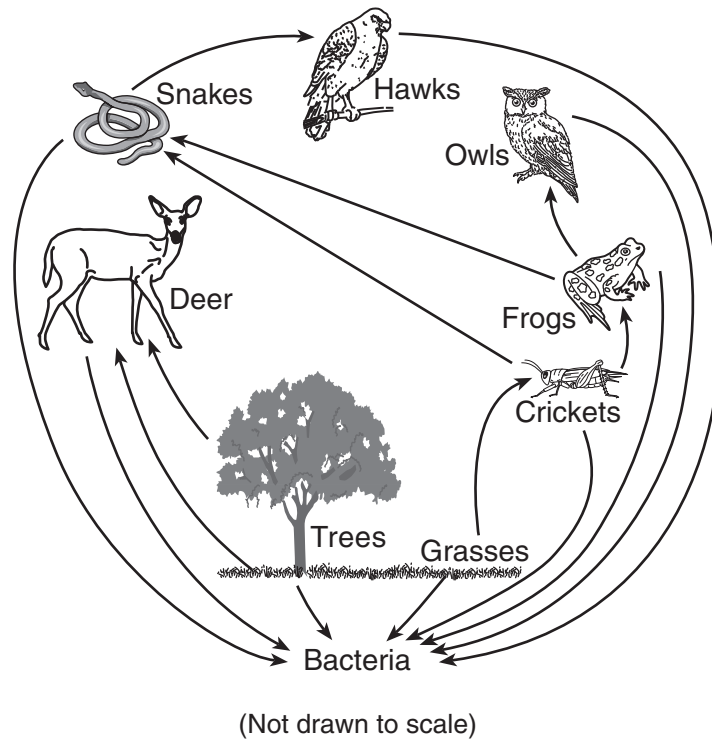
68 Identify *one* factor that has caused some species to become extinct. [1]

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Base your answers to questions 69 and 70 on the food web below and on your knowledge of science.



69 Identify *one* producer labeled in this food web. [1]

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70 Explain why the frog population would most likely *decrease* if there were a *decrease* in the cricket population. [1]

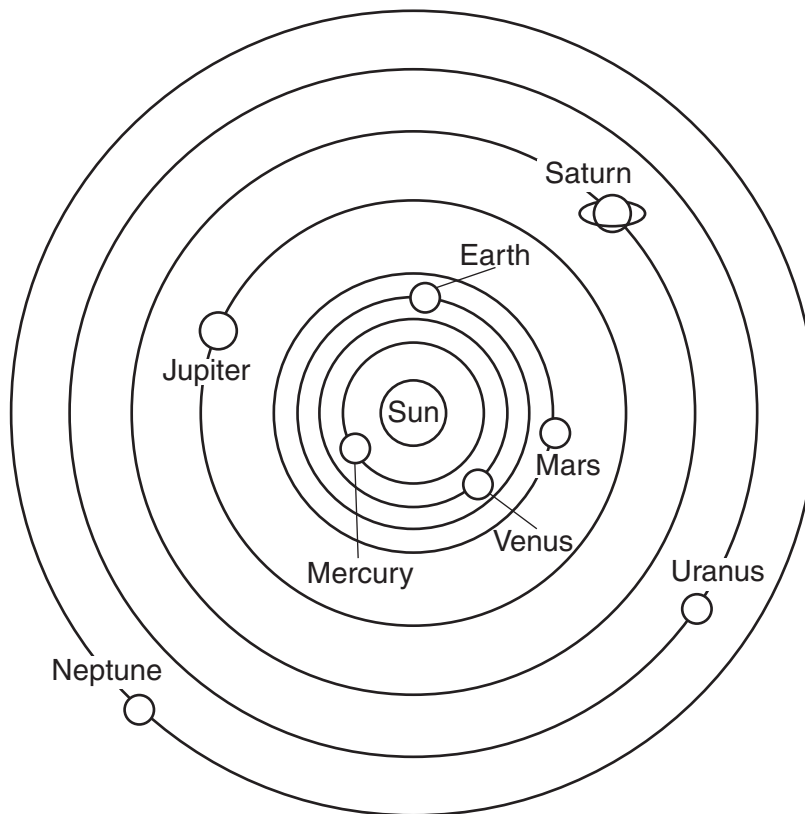
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Base your answers to questions 71 through 73 on the diagram below and on your knowledge of science. The diagram represents the orbits of the planets around the Sun in our solar system.



(Not drawn to scale)

71 List *two* objects *not* shown in the diagram that are also part of our solar system. [1]

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

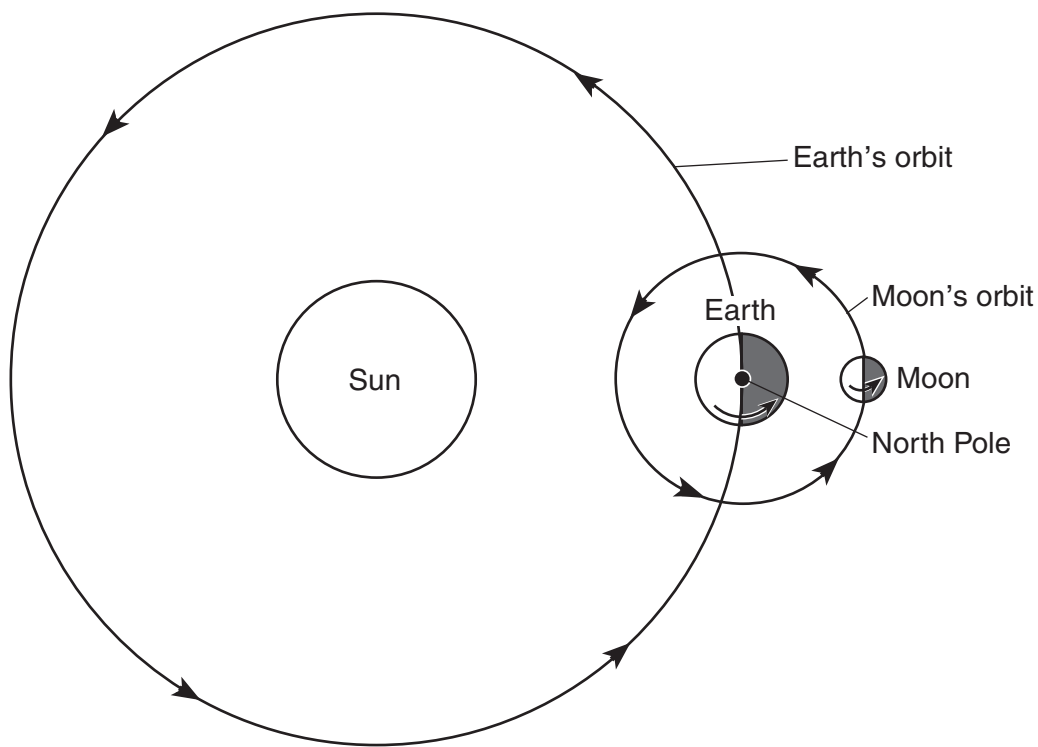
72 Explain why Uranus takes longer than Mars to revolve around the Sun. [1]

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

73 Earth is closer to the Sun in December than it is in June. Explain why warmer air temperatures and summer occur in the Northern Hemisphere in June rather than in December. [1]

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

Base your answers to questions 74 through 77 on the diagram below and on your knowledge of science. Arrows on the diagram represent the direction of the Moon's rotation and revolution and Earth's rotation and revolution.



(Not drawn to scale)

74 Circle *one* motion of the Moon and *one* motion of Earth that allow an observer in New York State to see one cycle of the phases of the Moon. [1]

Circle one:      Moon's rotation      Moon's revolution

Circle one:      Earth's rotation      Earth's revolution

75 Circle the Moon phase that would be visible to an observer in New York State at night when the Moon is in the position shown in the diagram above. [1]

Circle one:

Moon Phases



76 Explain why the Moon at this position is visible in the sky, even though it does not emit its own light. [1]

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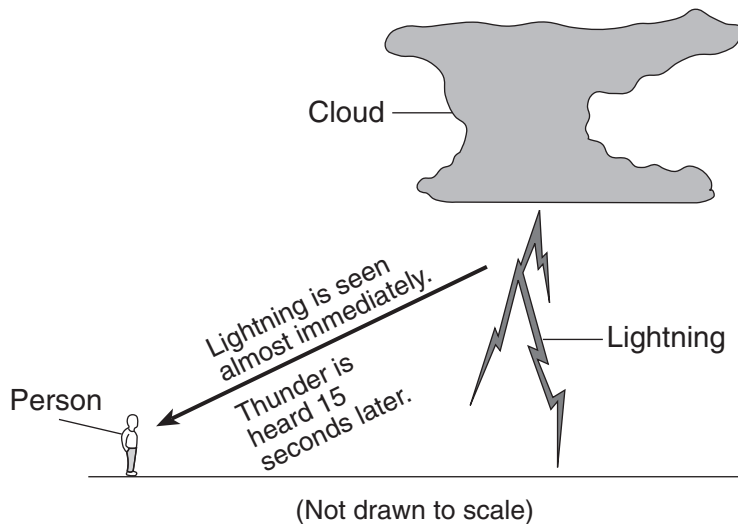
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77 What is the approximate amount of time the Moon takes to complete one cycle of phases and return to the same phase as shown in the diagram? Include units in your answer. [1]

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Base your answers to questions 78 through 80 on the diagram below and on your knowledge of science. The diagram represents a person who heard thunder 15 seconds after seeing lightning.



78 If it takes 5 seconds for the sound of thunder to travel 1 mile, how many miles was the person from the lightning bolt? [1]

\_\_\_\_\_ **miles**

79 Explain why the person heard the thunder after seeing the lightning. [1]

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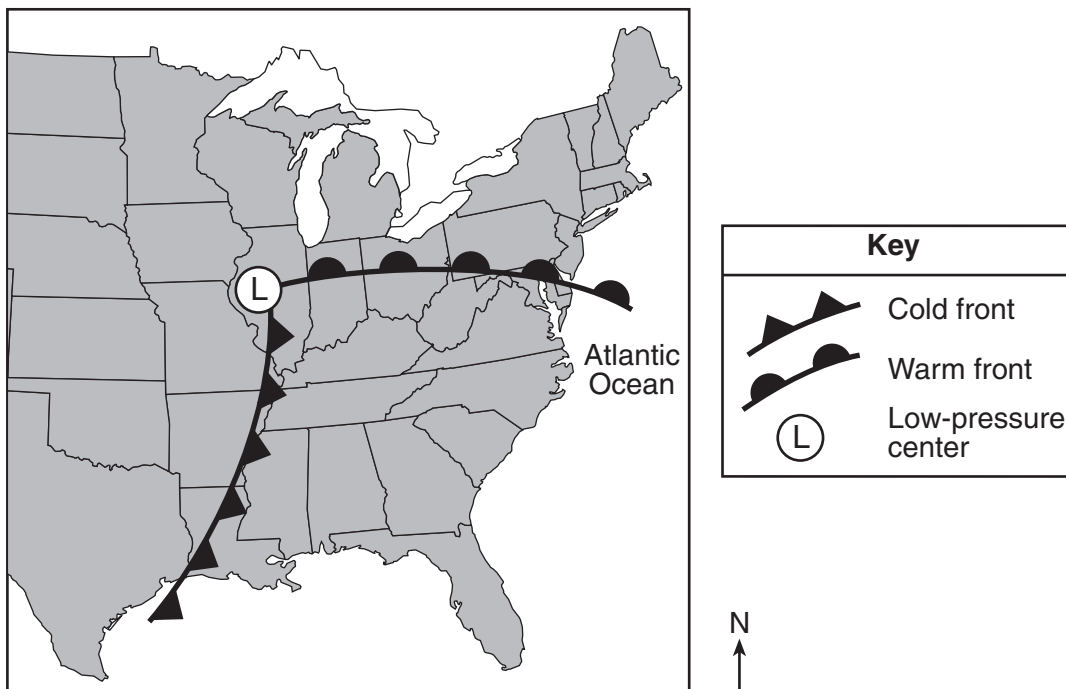
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80 Describe *one* action a person should take to stay safe from the approaching thunderstorm. [1]

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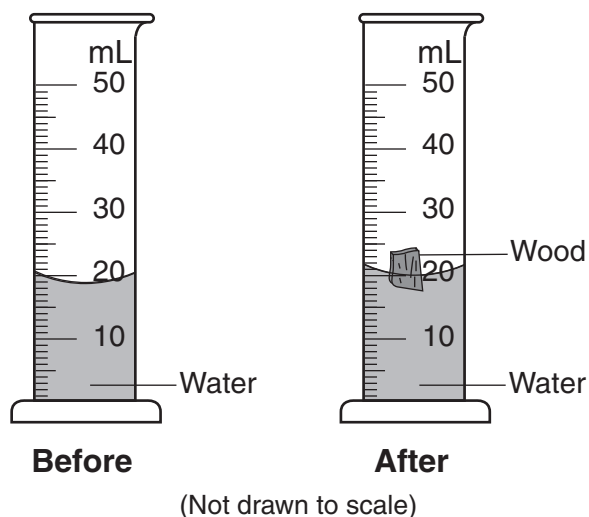
81 The map below shows the center of a low-pressure system (L) over the United States and the fronts associated with the low-pressure system.



Identify *one* weather condition likely to occur along the fronts of this low-pressure system. [1]

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82 A student attempted to find the volume of a piece of wood using water displacement. The diagram below represents a graduated cylinder of water before and after the piece of wood was placed in it.



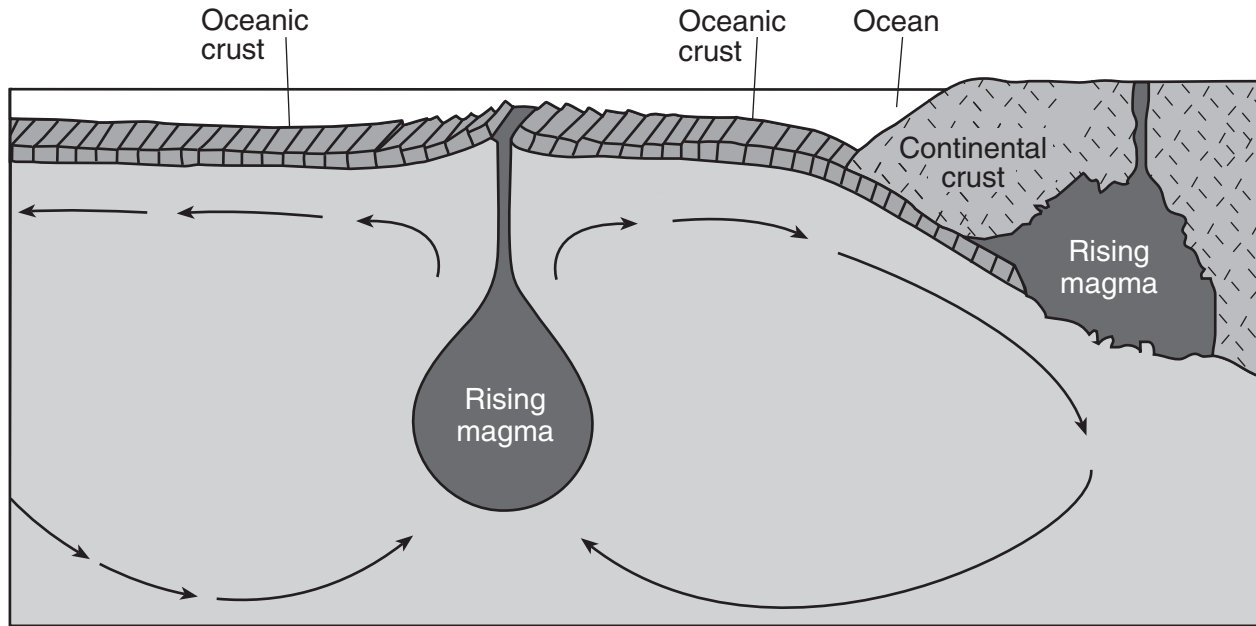
Explain why finding the amount of water displaced will *not* help the student find the correct volume of this piece of wood. [1]

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Base your answers to questions 83 and 84 on the diagram below and on your knowledge of science. The diagram represents a cross section of a portion of Earth's interior. The arrows in the diagram represent a heat-transfer process that moves tectonic plates across Earth's surface.

83 On the cross section below, draw an **X** centered on *one* location on Earth's surface where volcanoes are most likely to form. [1]

**Cross Section of Earth's Interior**



(Not drawn to scale)

84 Identify the heat-transfer process represented by the arrows in the diagram. [1]

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# GRADE 8 INTERMEDIATE-LEVEL SCIENCE

## For Teacher Use Only

### Part II Credits

Question	Maximum Credit	Credit Allowed
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	2	
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	
80	1	
81	1	
82	1	
83	1	
84	1	
<b>Total</b>	<b>40</b>	