New York NYSTP 2016 Grade 8 Science

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THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL SCIENCE TEST

WRITTEN TEST

JUNE 6, 2016

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 40 open-ended questions. Write your answers to these questions in the spaces provided in this test booklet.

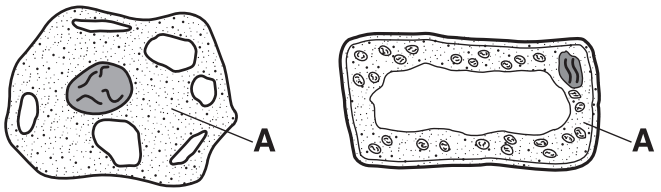
You may use a calculator to answer the questions on the test if needed.

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

1 The diagrams below represent two cells. Letter *A* represents a part of each cell.



Animal cell Plant cell

(Not drawn to scale)

Which part of the cell is labeled *A* in both diagrams?

(1) cell wall
(2) chromosome
(3) cytoplasm
(4) nucleus

2 A group of organs working together to perform a certain function is called

(1) a system
(2) a tissue
(3) an organism
(4) a cell

3 Which structure's main function is to produce food (sugar) in a plant?

(1) flower
(2) leaf
(3) root
(4) seed

4 Which two human body systems work together to perform locomotion?

(1) muscular and skeletal systems
(2) respiratory and endocrine systems
(3) reproductive and circulatory systems
(4) digestive and excretory systems

5 An organism that contains chloroplasts is able to produce food by the process of

(1) photosynthesis
(2) reproduction
(3) respiration
(4) digestion

6 Competition within a pack of wolves may increase if there is an increase in the

(1) amount of food available
(2) amount of oxygen available
(3) size of their population
(4) size of the area they inhabit

7 Which sequence lists the hereditary material found inside cells from the smallest unit to the largest unit?

(1) chromosome → gene → nucleus
(2) chromosome → nucleus → gene
(3) gene → nucleus → chromosome
(4) gene → chromosome → nucleus

8 A fox with thick fur would have a survival advantage over other foxes if

(1) there is more competition for food in the fox population
(2) the air temperature significantly decreases in winter
(3) a drought occurs, limiting the amount of water available
(4) a new disease appears that infects the foxes

9 Infants will often smile when they hear a parent's voice. In this situation, the parent's voice is considered

(1) a stimulus
(2) a response
(3) an adaptation
(4) a resource

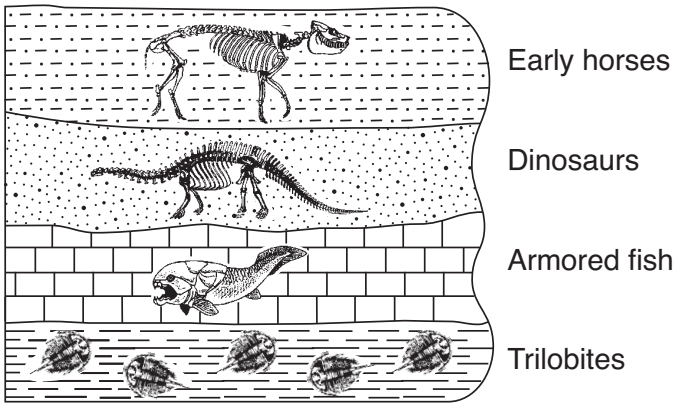
10 Which fertilization and development method is most typical of humans before birth occurs?

(1) external fertilization and external development
(2) external fertilization and internal development
(3) internal fertilization and external development
(4) internal fertilization and internal development

11 What is the main factor that prevents the growth of tropical plants in the northern part of the United States?

(1) predators
(2) pollutants
(3) overpopulation
(4) climate

12 The diagram below represents a cross section of four sedimentary rock layers containing fossil remains. The layers have *not* been overturned.

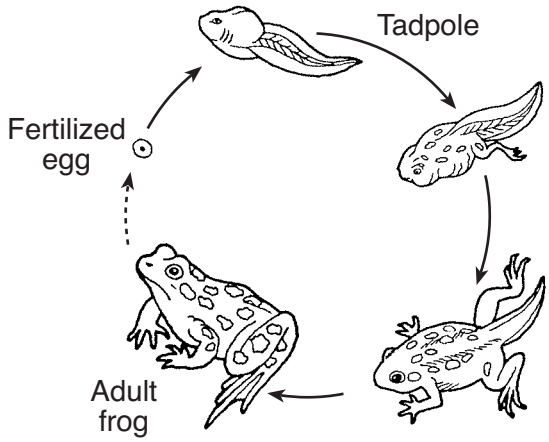


(Not drawn to scale)

Which type of fossil is found in the most recently formed sedimentary rock layer?

(1) early horses
(2) dinosaurs
(3) armored fish
(4) trilobites

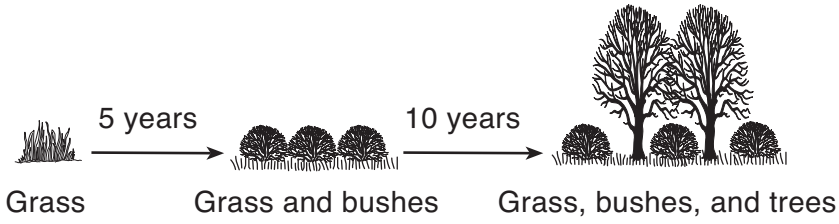
13 The diagram below represents the changes in the body structure of a frog as it goes through its life cycle.



The changes shown are best described as

(1) competition
(2) metamorphosis
(3) dynamic equilibrium
(4) evolution

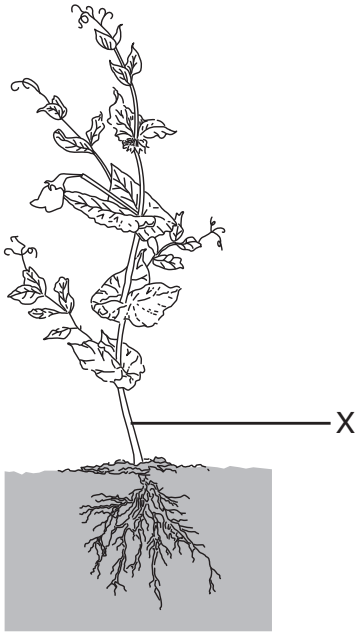
14 The diagram below represents changes in the main types of plant species found in a specific area over a 15-year period.



Which process is represented in the diagram?

(1) water cycle
(2) feedback system
(3) environmental degradation
(4) ecological succession

15 The diagram below represents a plant. One plant structure is labeled *X*.



The main function of structure *X* is to

(1) produce seeds
(2) attract insects
(3) support the plant
(4) protect the plant from disease

16 The data table below shows the number of Calories provided by one serving of four food items.

Data Table

Food Item (one serving)	**Number of Calories**
boiled egg	82
hamburger	347
ice cream	240
low-fat milk	121

One serving of which food item on the data table provides the most energy?

(1) boiled egg
(2) hamburger
(3) ice cream
(4) low-fat milk

17 A puggle is a type of dog first produced by mating two other types of dog, a pug and a beagle. This process is an example of

(1) asexual reproduction
(2) genetic engineering
(3) selective breeding
(4) natural selection

18 The information below describes a relationship between a type of fish known as a goby and a species of blind shrimp.

The shrimp digs a hole that provides shelter for itself and the goby fish. The goby fish lives at the opening to the hole and watches for predators. When a predator swims by, both organisms quickly move farther into the hole for safety.

The relationship between these two organisms is best described as

(1) competitive
(2) harmful
(3) beneficial
(4) predatory

19 Which activity involves only a physical change?

(1) grinding coffee beans
(2) baking cookies
(3) acid bubbling on rock
(4) exploding fireworks

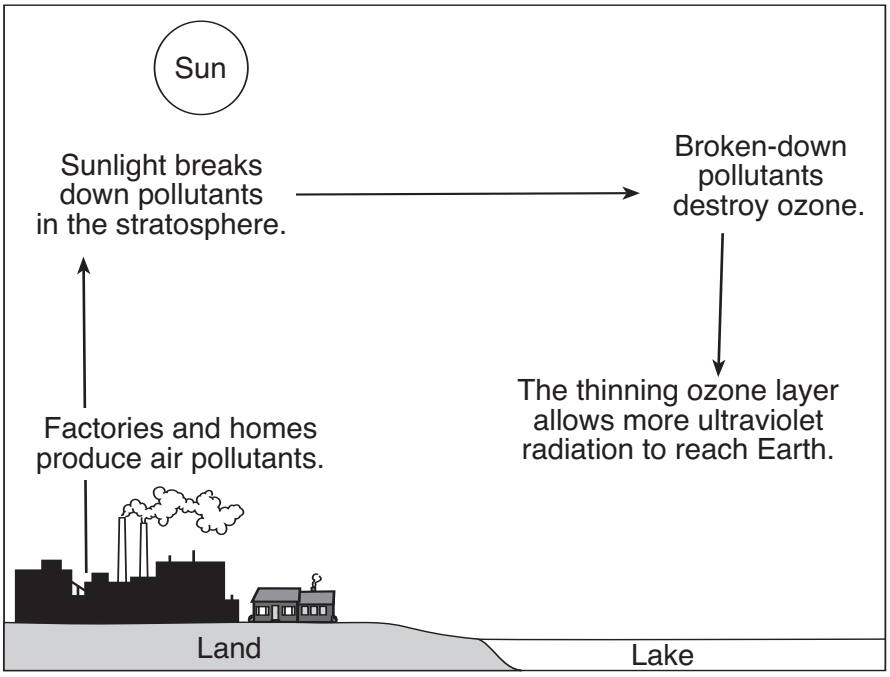
20 Compared to the volume of Earth, the volume of the Sun is approximately

(1) the same
(2) 100 times greater
(3) 1,000 times greater
(4) 1,000,000 times greater

21 Gravity is the primary force responsible for

(1) the reflection of sound energy
(2) the flow of electricity in a closed circuit
(3) keeping planets in orbit around the Sun
(4) refracting light energy

22 The diagram below represents the effects of certain types of pollutants on the atmosphere.

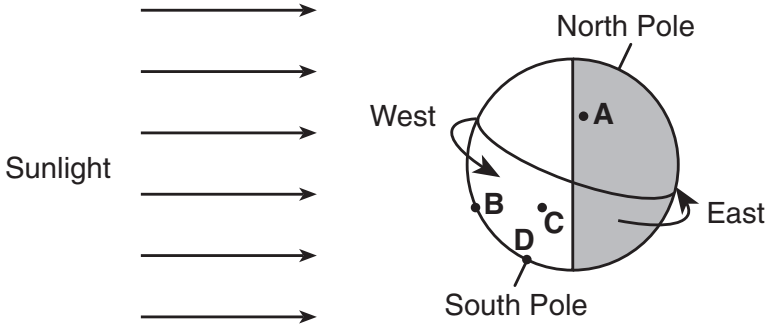


(Not drawn to scale)

The best title for the diagram is

(1) Ozone Depletion
(2) Greenhouse Effect
(3) Water Pollution
(4) Renewable Energy

23 The diagram below represents Earth at one position in its rotation. Points *A*, *B*, *C*, and *D* represent locations on the surface of Earth.

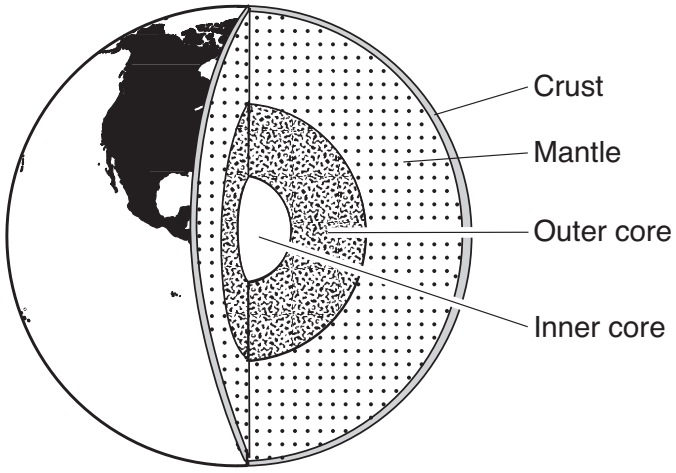


(Not drawn to scale)

Which location will enter darkness next as Earth's rotation continues?

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

Base your answers to questions 24 and 25 on the diagram below and on your knowledge of science. The diagram represents Earth's crust and interior layers.



(Not drawn to scale)

24 Which evidence has led scientists to conclude that there are different layers within Earth's interior?

(1) analysis of earthquake wave data
(2) measurement of Earth's diameter
(3) rock samples taken from Earth's core
(4) temperatures taken within each layer

25 Which Earth layer contains convection currents that are believed to be responsible for the movement of Earth's tectonic plates?

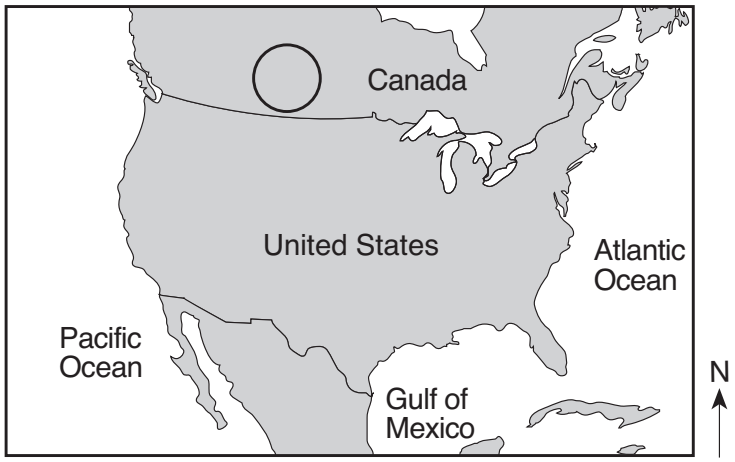
(1) crust
(2) mantle
(3) outer core
(4) inner core

---

26 The relatively thin layer of rock at Earth's surface is called the

(1) atmosphere
(2) hydrosphere
(3) lithosphere
(4) hemisphere

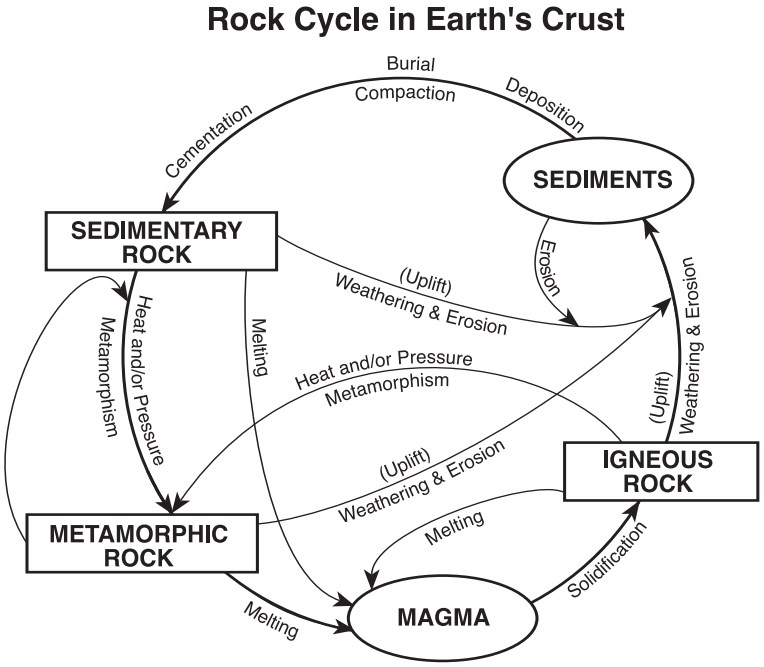
27 The circle on the map below represents the area where an air mass formed over Canada.



Which characteristics best describe this air mass?

(1) warm and dry
(2) warm and moist
(3) cold and dry
(4) cold and moist

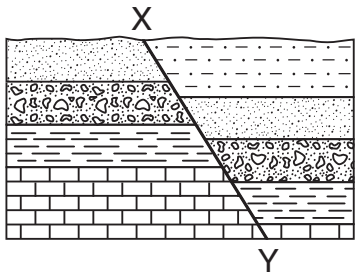
28 The diagram below illustrates the rock cycle in Earth's crust.



According to the diagram, what will form when sedimentary rock is exposed to heat and/or pressure?

(1) magma
(2) sediments
(3) igneous rock
(4) metamorphic rock

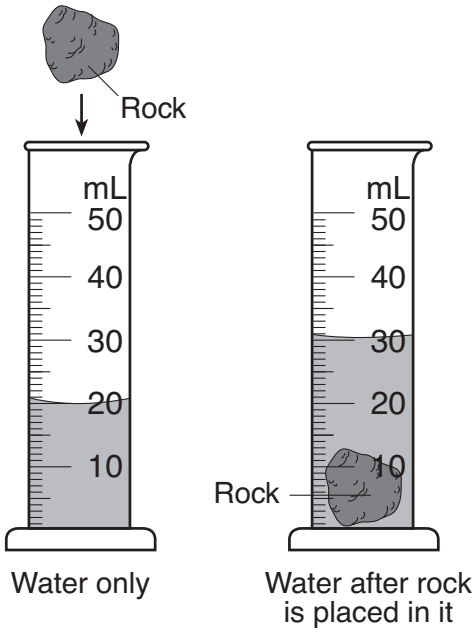
29 The diagram below represents a cross section of sedimentary rock layers in Earth's crust. Line *XY* represents a fault.



Which statement best describes the geologic history of this section of Earth's crust?

(1) The area has remained stable since the sedimentary rocks were formed.
(2) Sediments were deposited differently on each side of the fault.
(3) Crustal movement occurred after the sedimentary rocks were formed.
(4) Lava has flowed along the fault.

30 The diagram below represents a rock that was placed in a graduated cylinder containing 20 mL of water, causing the water level to rise.



Which physical property of the rock is being measured using the graduated cylinder?

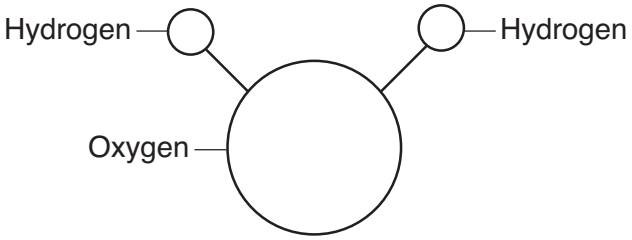
(1) volume
(2) solubility
(3) mass
(4) hardness

Note that question 31 has only three choices.

31 As water is heated, the motion of the water molecules will generally

(1) decrease
(2) increase
(3) remain the same

Base your answers to questions 32 and 33 on the model of a water molecule below and on your knowledge of science.



(Not drawn to scale)

32 What does this model represent?

(1) a single atom
(2) a cell
(3) a mixture
(4) a compound

33 Hydrogen and oxygen are classified as

(1) minerals
(2) elements
(3) organisms
(4) energy

34 Which form of energy is almost always produced during energy transformations?

(1) heat
(2) electricity
(3) light
(4) sound

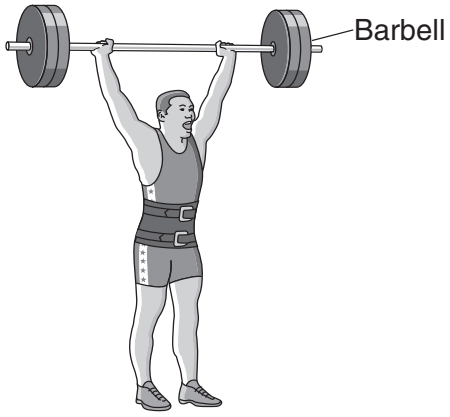
35 Which energy source is *nonrenewable*?

(1) solar
(2) wind
(3) biomass
(4) fossil fuel

36 A student added some sugar to a glass of water, but it did not dissolve quickly. What could the student do to increase the rate at which the sugar dissolves in the water?

(1) freeze the water
(2) heat the water
(3) add salt to the water
(4) filter the water

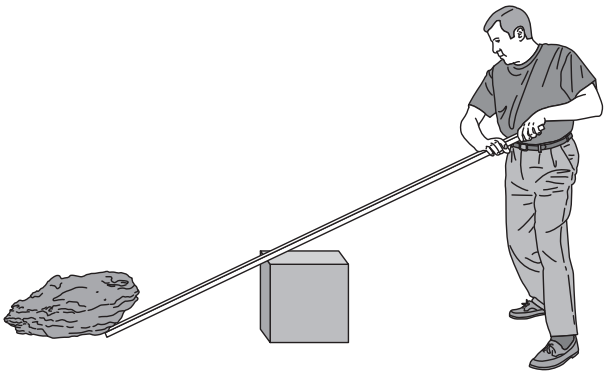
37 The diagram below represents a weightlifter holding a barbell above his head.



The force of gravity pulling down on the barbell is 756 newtons (N). How many newtons of force are exerted by the weightlifter to hold the barbell up?

(1) 0 N
(2) 378 N
(3) 756 N
(4) 1512 N

38 The diagram below represents a person using a lever.



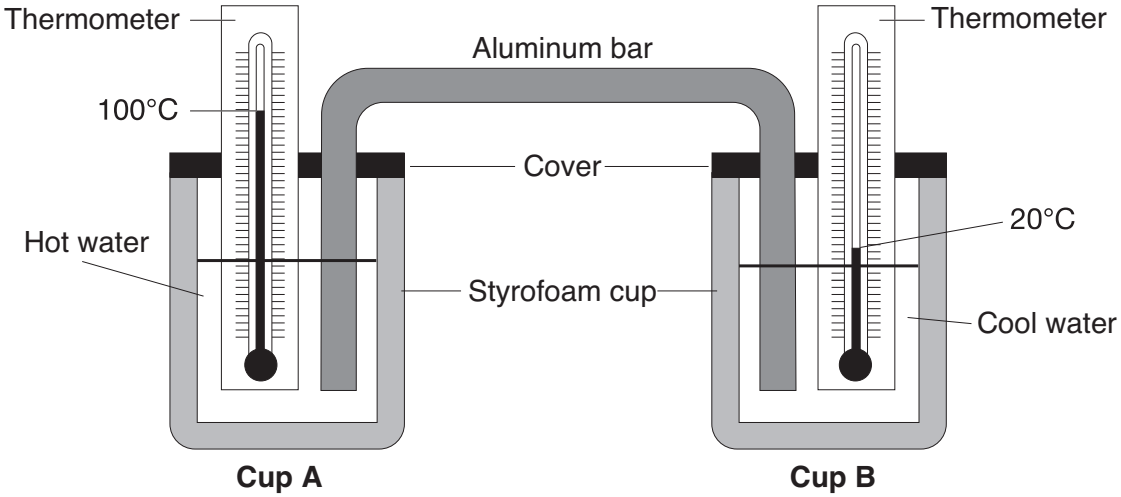
The person applies force to the lever to change the rock's

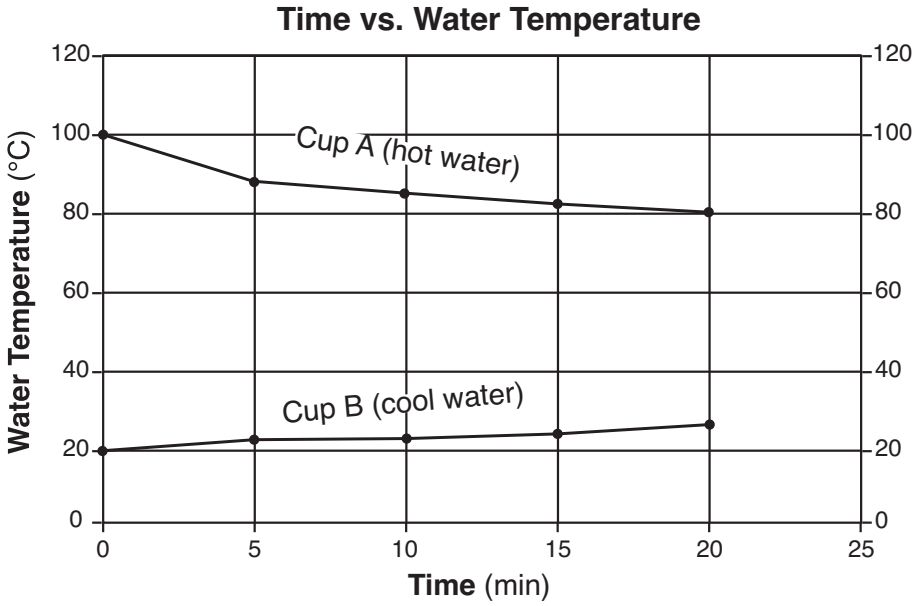
(1) flexibility
(2) weight
(3) size
(4) position

39 Which measurement can be used to determine if a specific place is located north or south of the equator?

(1) elevation in kilometers
(2) altitude in kilometers
(3) longitude in degrees
(4) latitude in degrees

Base your answers to questions 40 and 41 on the diagram and graph below and on your knowledge of science. The diagram represents a laboratory setup used to study heat transfer. Two covered, insulated cups, *A* and *B*, are connected with an aluminum bar. Each cup contains the same amount of water, but the water has different starting temperatures. The water in cup *A* had a starting temperature of 100°C. The water in cup *B* had a starting temperature of 20°C. The graph shows the changes in the water temperatures over a 20-minute period.





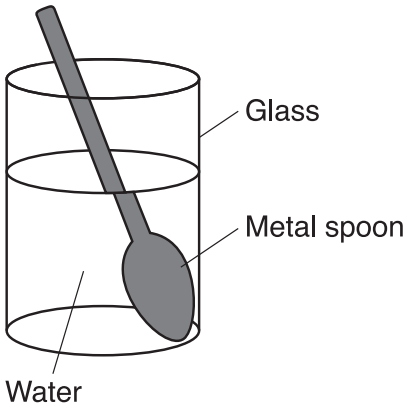
40 If the temperature of the water in cup *A* continues to *decrease* as shown on the graph, what will the approximate temperature of the water in cup *A* be at the end of 25 minutes?

(1) 25°C
(2) 30°C
(3) 78°C
(4) 80°C

41 If the aluminum bar were shorter, the cool water in cup *B* would increase in temperature at a faster rate because

(1) less heat would be produced by the water
(2) less heat would be lost to the surrounding air
(3) more heat would be produced by the water
(4) more heat would be lost to the surrounding air

42 The diagram below represents a metal spoon in a glass of water.



The spoon's broken appearance is caused by light that is

(1) reflected
(2) refracted
(3) absorbed
(4) vibrated

43 An experiment is described below.

A large field at the base of a mountain becomes flooded when heavy rains in the mountains cause a stream to overflow. Each time the flooding occurs, more soil washes away.

The owners of the land want to perform an experiment to see if different types of plants could help reduce the soil erosion. They choose five areas of ground that are the same size, the same distance from the stream, have the same slope and the same kind of soil, and receive the same amount of sunlight. The type of plant planted in each area is different for each of the five areas. Measurements of soil erosion will be made each time flooding occurs. The results will be compared after six months.

Which hypothesis is being tested in this experiment?

(1) Soil erosion is affected by the strength of the wind.
(2) Flooded areas have greater soil erosion than areas that are not flooded.
(3) Some types of plants reduce soil erosion more than others.
(4) Some types of soil are more easily eroded.

44 The data table below shows the yield of vegetables in a school's garden for 3 years. The yield is the number of pounds of vegetables harvested. The same number of plants was planted each year for all five vegetables.

Data Table

Vegetable	Yield per Year (pound)		
	2004	2005	2006
acorn squash	139	143	52
beet	93	122	81
butternut squash	147	103	30
onion	143	134	83
spinach	102	137	0

What is the most likely reason for the *decrease* in the vegetable yield in 2006?

(1) an increase in the size of the garden area
(2) an increase in the amount of sunlight
(3) a decrease in the rabbit population near the garden
(4) a decrease in the average yearly rainfall

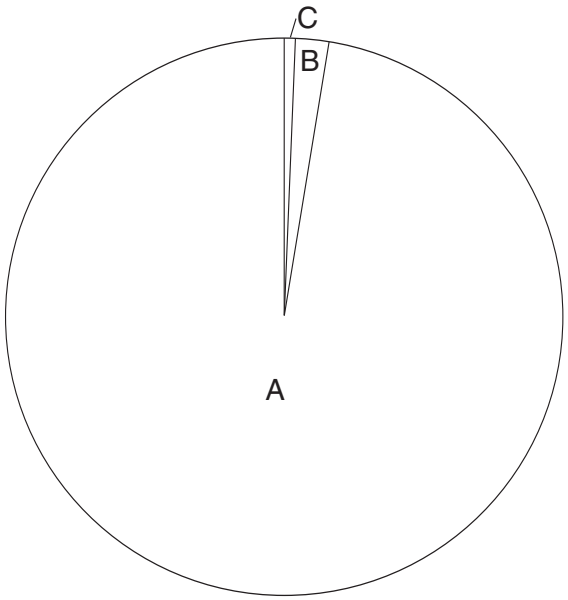
45 The data table below lists Earth's major water resources and some examples of where they are found.

Earth's Water Resources

Water Resource (example)	**Percentage of Earth's Total Water**
ice (glaciers and icebergs)	2.0
freshwater (groundwater, rivers, lakes)	0.6
salt water (oceans, bays, seas)	97.4

The letters *A*, *B*, and *C* in the graph below show the percentage of Earth's total water from each resource.

Percentage of Earth's Total Water



Which list correctly identifies *A*, *B*, and *C* in the graph?

(1) *A*: freshwater
B: salt water
C: ice

(2) *A*: freshwater
B: ice
C: salt water

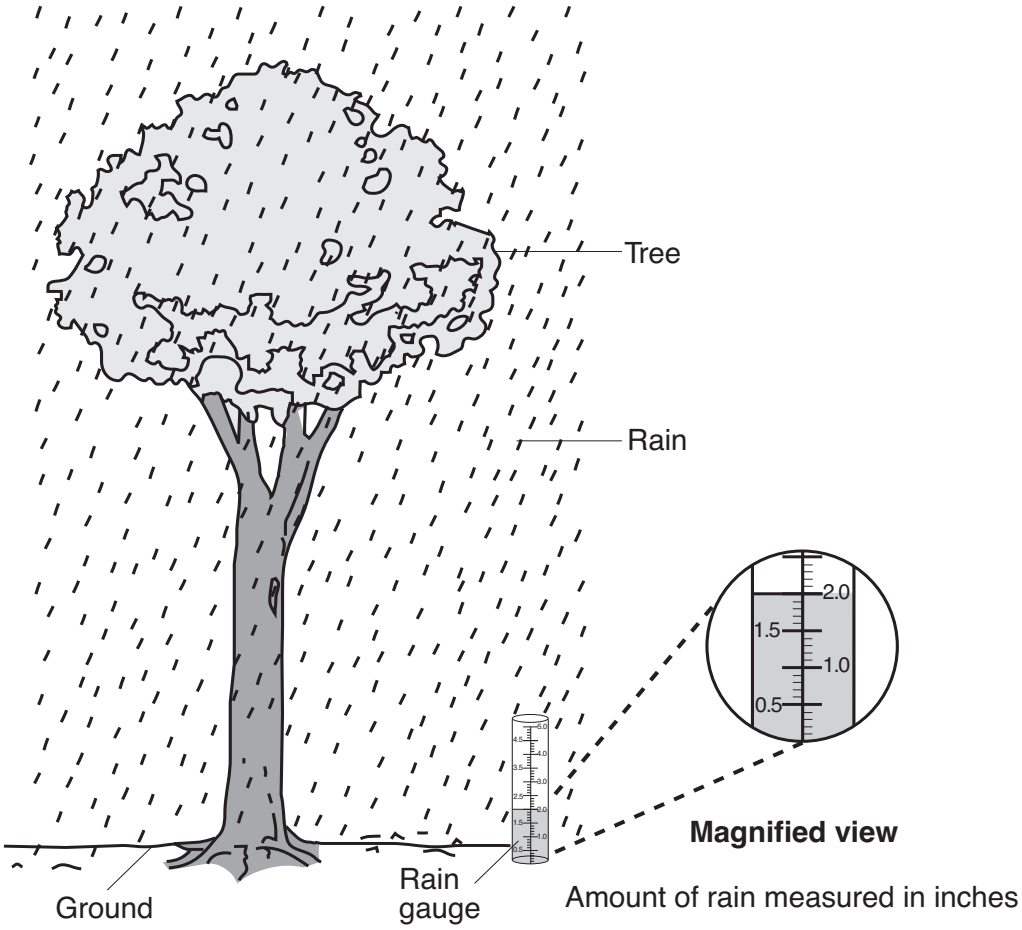
(3) *A*: salt water
B: freshwater
C: ice

(4) *A*: salt water
B: ice
C: freshwater

Part II

Directions (46–85): Record your answers in the space provided below each question.

46 The diagram below represents a tree, rain, and a rain gauge as viewed by a student looking out of a classroom window. A magnified view of the rain gauge is shown.



In the spaces below, use the letter **O** or **I** to identify each statement made by the student as either an observation (**O**) or an inference (**I**). [1]

____ 1. In two more hours, a total of 3.0 inches of rain will have fallen.

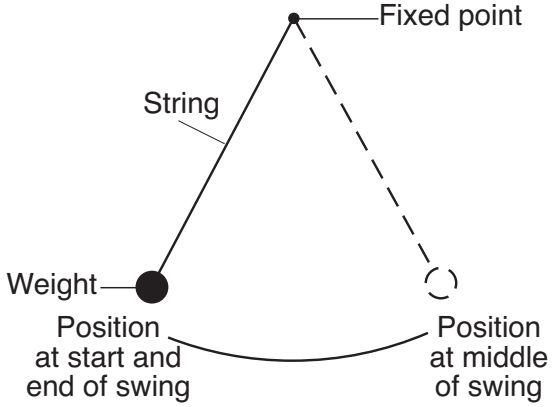
____ 2. The rain is falling on the tree and the ground.

____ 3. The rain gauge shows 2.0 inches.

____ 4. The air temperature is above freezing.

Base your answers to questions 47 through 49 on the information below and on your knowledge of science. The diagram represents a pendulum, which is a weight attached by a string to a fixed point and allowed to swing freely back and forth. A group of students did an experiment in which they timed, in seconds (s), how long it took for the pendulum to complete one swing (back and forth) for five different string lengths. The results are shown in the data table.

Pendulum



Data Table

String Length (cm)	**Time to Complete One Swing** (s)
20	0.9
40	1.3
60	1.6
80	1.8
100	2.0

47 Identify the dependent (responding) variable measured in this experiment. [1]

_____

48 Describe the general relationship between the length of the string and the time to complete one swing of the pendulum. [1]

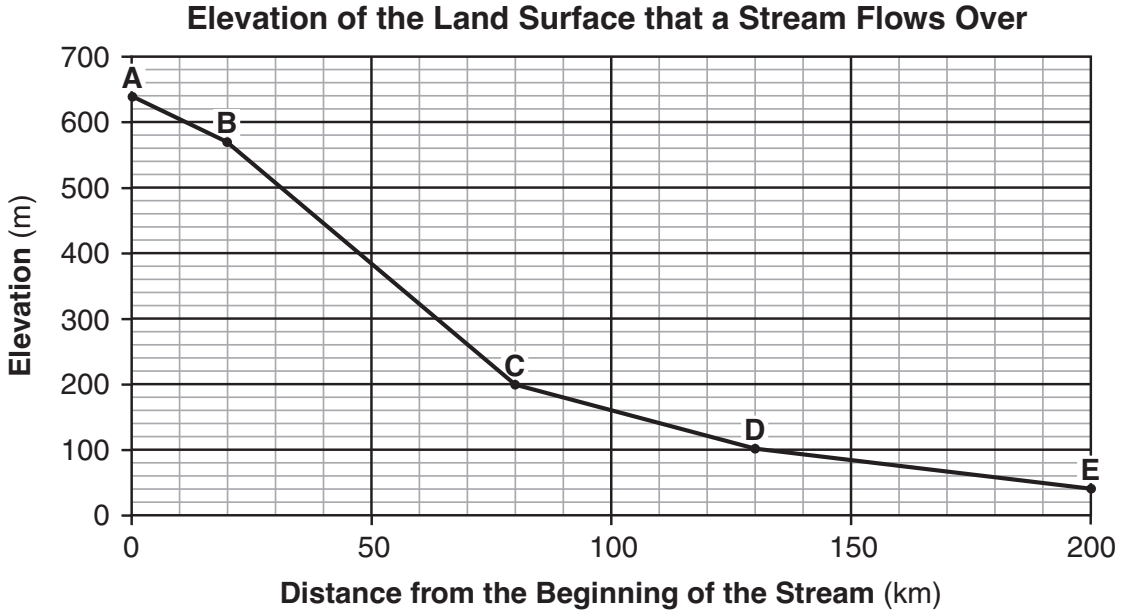
_____

_____

49 Predict the amount of time necessary for a pendulum with a string length of 70 cm to complete one swing. [1]

_____ **s**

Base your answers to questions 50 and 51 on the graph below and on your knowledge of science. The graph represents the changes in elevation in meters (m) of a stream. Letters *A* through *E* represent locations in the stream at different distances in kilometers (km) from point *A* where the stream begins.



50 Identify the letter where the stream would have the greatest potential energy. [1]

Letter: _____

51 Complete the data table below, using data from the graph. Fill in the distance from the beginning of the stream to each lettered location along the stream. [1]

Data Table

Location in the Stream	Distance from the Beginning of the Stream at Point A (km)
B	
C	
D	
E	

Base your answers to questions 52 and 53 on the data table below and on your knowledge of science. A scientist measured the number of Calories used by a 60-kilogram person while participating in three different activities for one hour. The data table shows the results.

Calories Used by a 60-kg Person While Participating in Three Different Activities for One Hour

Activity	Number of Calories Used
bicycling	190
playing basketball	412
watching television	66

52 Calculate the number of Calories used by a 60-kg person while watching television for *two* hours. [1]

_____ **Calories**

53 Describe *one* health benefit that comes from regular participation in activities that provide physical exercise. [1]

_____

_____

54 An experiment is described below.

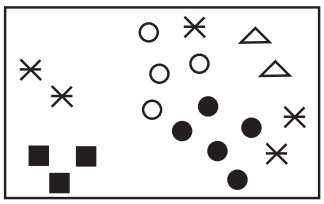
> A student was interested in comparing sunblock lotions, which contain chemicals that protect the skin from sunburn. The student purchased three different brands of lotion at three different prices and performed an experiment to see which one best protected the skin. The lotions cost \$3, \$5, and \$7 for an 8-ounce bottle. The sun protection factor (SPF) was 30 for all three lotions. The student applied equal amounts of each lotion next to each other on one of her arms. The three areas covered by the lotions were the same size. The student observed the three areas for color change after two hours of Sun exposure.

Identify *two* conditions that were held constant in this experiment. [1]

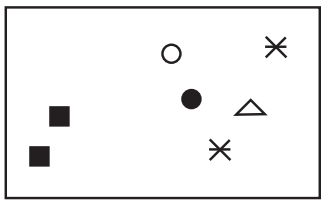
(1) _____

(2) _____

Base your answers to questions 55 and 56 on the diagrams below and on your knowledge of science. The diagrams represent the same forest community in 1990 and 2010.



1990



2010

Key
Each ✳ = 10 red squirrels
Each ○ = 10 sugar maple trees
Each ● = 10 red maple trees
Each △ = 10 silver maple trees
Each ■ = 10 birch trees

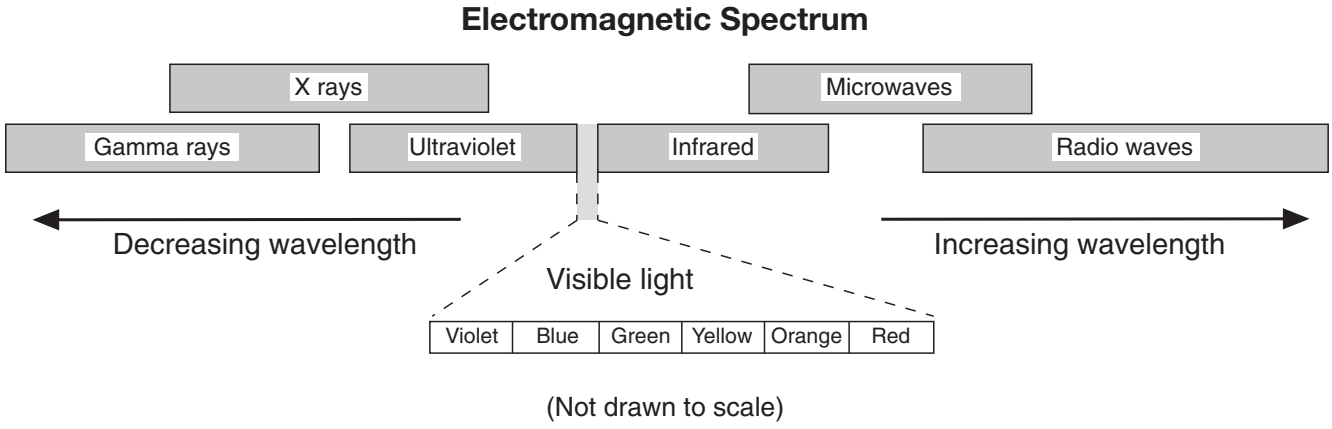
55 How many sugar maple trees were in the community in 1990? [1]

_____

56 How many populations are represented in the 2010 diagram? [1]

_____

Base your answers to questions 57 and 58 on the model below and on your knowledge of science. The model shows the relative wavelengths of different types of electromagnetic energy in the electromagnetic spectrum.



57 Identify *one* type of electromagnetic energy that has a shorter wavelength than green light. [1]

_____

58 Which type of electromagnetic energy reflected by the Moon is most easily seen by a person on Earth? [1]

_____

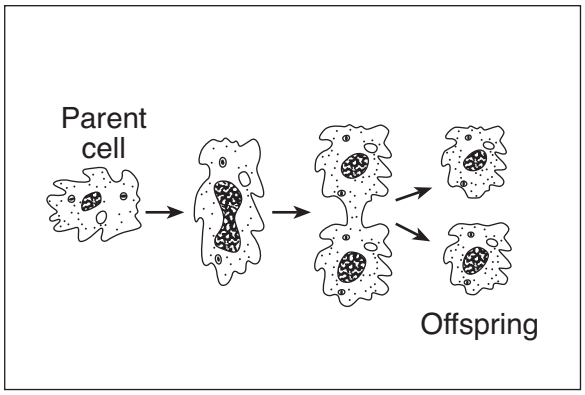
59 The human body has specialized cells, such as white blood cells, to help protect it from many diseases. Describe what these specialized cells do to protect the body from the disease. [1]

_____

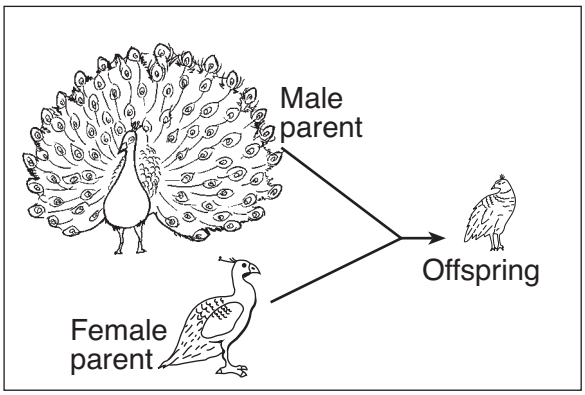
_____

60 The diagrams below represent reproduction in two different types of organisms, amebas and birds.

Ameba



Birds



Explain why the bird offspring will differ from its parents more than the ameba offspring will differ from its parent. [1]

_____

_____

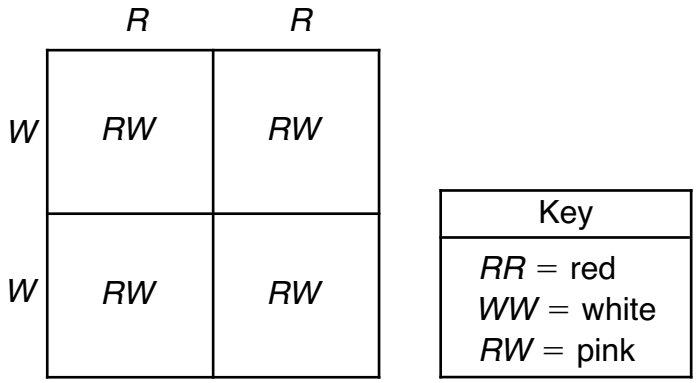
_____

_____

Base your answers to questions 61 and 62 on the information below and on your knowledge of science.

Genes control the inheritance of traits. Some genes are dominant and some are recessive. Some are neither dominant nor recessive, such as the genes that control flower color in a certain species of plant. In this species, a plant with red flowers inherits two genes for red (*RR*), a plant with white flowers inherits two genes for white (*WW*), and a plant with pink flowers inherits one gene for red and one gene for white (*RW*).

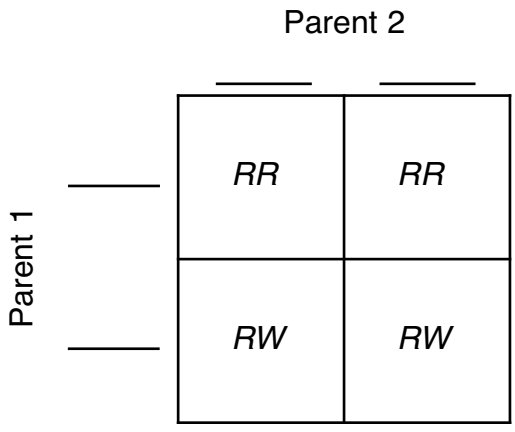
61 The Punnet square below shows the results of a cross between a plant with red flowers and a plant with white flowers.



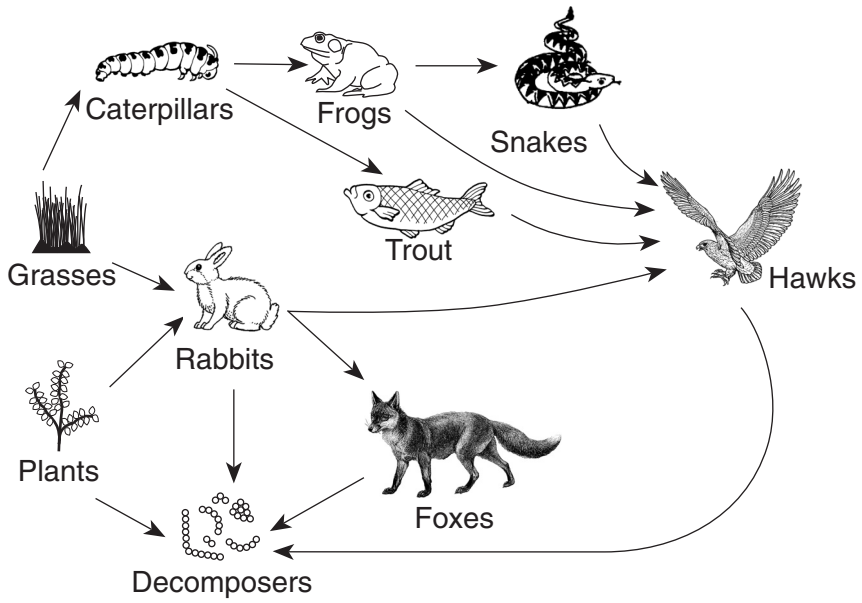
Based on the results, record the percentages of each color offspring from this cross in the table below. [1]

Percentage of red plants	%
Percentage of white plants	%
Percentage of pink plants	%

62 Complete the Punnet square below by showing the genetic makeup of the parent plants of the cross shown. Be sure to show both genes for each parent. [1]



Base your answers to questions 63 through 65 on the partial food web below and on your knowledge of science.



(Not drawn to scale)

63 Identify the *two* animals in this food web that obtain nutrients directly from producers. [1]

_____ and _____

64 Explain why the population of trout might increase if the population of frogs *decreased*. [1]

_____

_____

65 Identify *one* function of the decomposers in this food web. [1]

_____

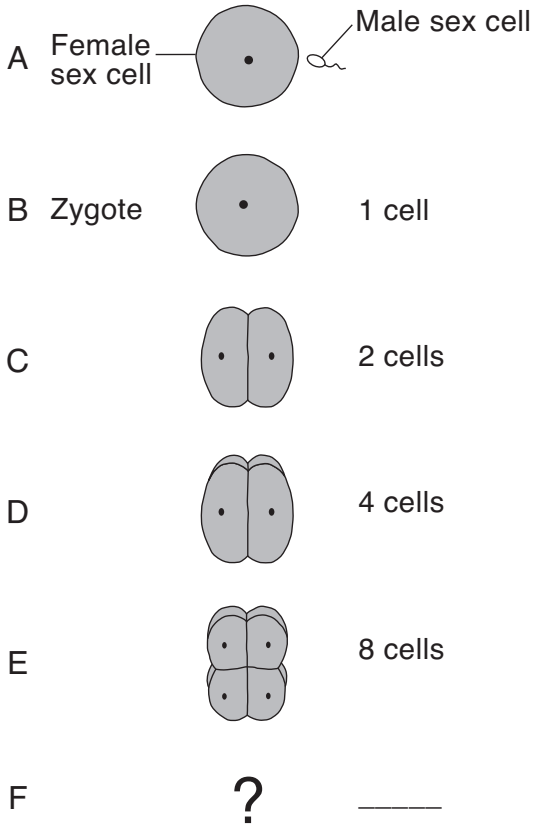
_____

_____

Base your answers to questions 66 through 68 on the information and the diagram below and on your knowledge of science. The diagram represents reproduction and cell division in a sea urchin (animal) in stages labeled *A* through *F*.

When a sea urchin reproduces, the female sex cell and the male sex cell unite to form a cell called a zygote. The zygote divides several times in a matter of hours.

Reproduction of a Sea Urchin



66 Between which two consecutive stages did fertilization occur? [1]

_____ and _____

67 Do sea urchins reproduce sexually or asexually? Circle the correct answer, and give *one* piece of evidence to support your answer. [1]

Circle one: sexually asexually

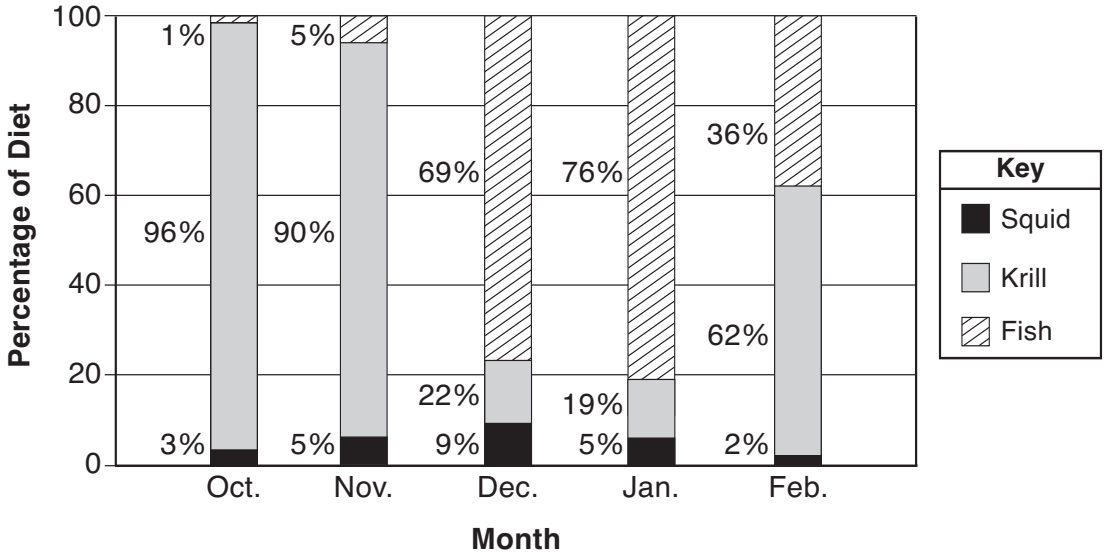
Evidence: _____

_____

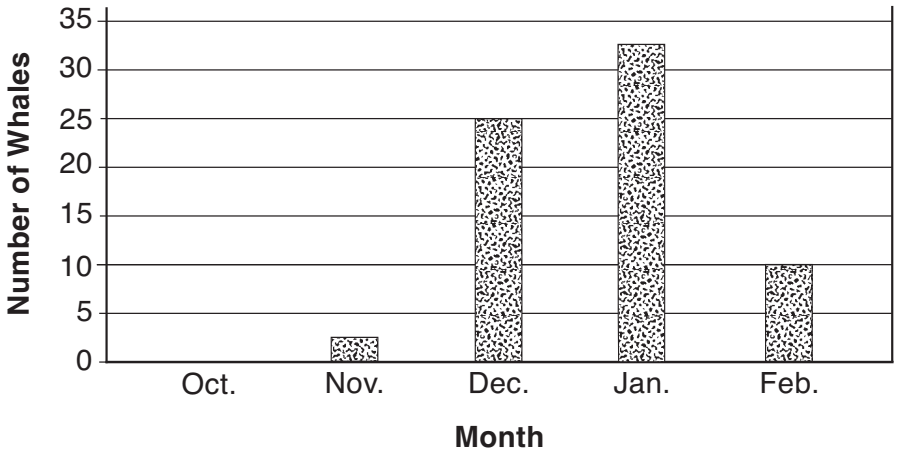
68 How many cells will the developing sea urchin have at stage *F*? [1] _____ **cells**

Base your answers to questions 69 through 71 on the bar graphs below and on your knowledge of science. Graph *A* shows the diet of a particular species of Antarctic penguin over a five-month period. Its diet includes squid, krill, and fish, which are all animals found in the ocean. Graph *B* shows the number of whales that were spotted in the penguins' habitat during the same five-month period.

Graph A
Diet of Penguins from October to February



Graph B
Number of Whales Present from October to February



69 Describe *one* change in the diet of penguins when the number of whales present increased. [1]

_____

_____

70 Based on the information on the graphs, give *one* possible explanation as to why the penguins' diet changed when the number of whales increased. [1]

_____

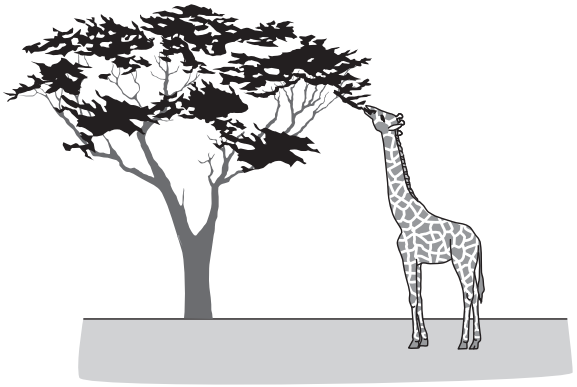
_____

71 Explain why the penguins of this species are considered carnivores. [1]

_____

_____

Base your answers to questions 72 and 73 on the diagram below and on your knowledge of science. The diagram represents a giraffe and a tree.



72 Which gas produced by the tree does the giraffe need to survive? [1]

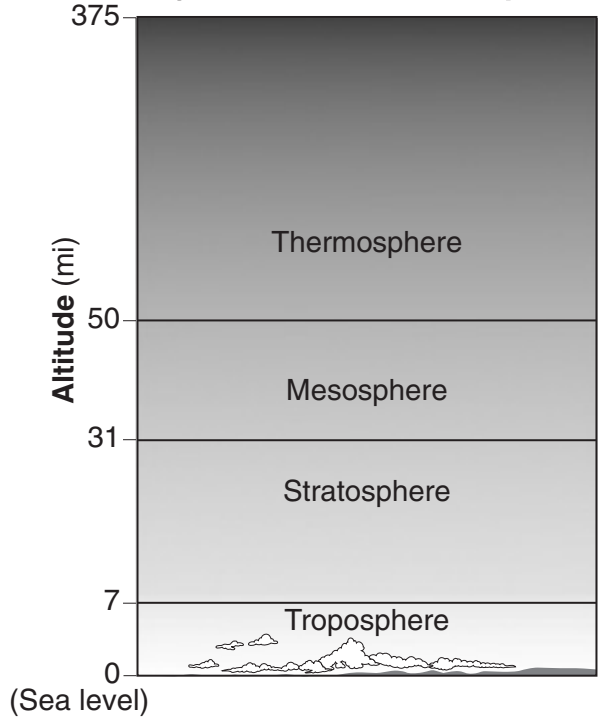
_____

73 Identify *one* material the giraffe provides that helps the tree survive. [1]

_____

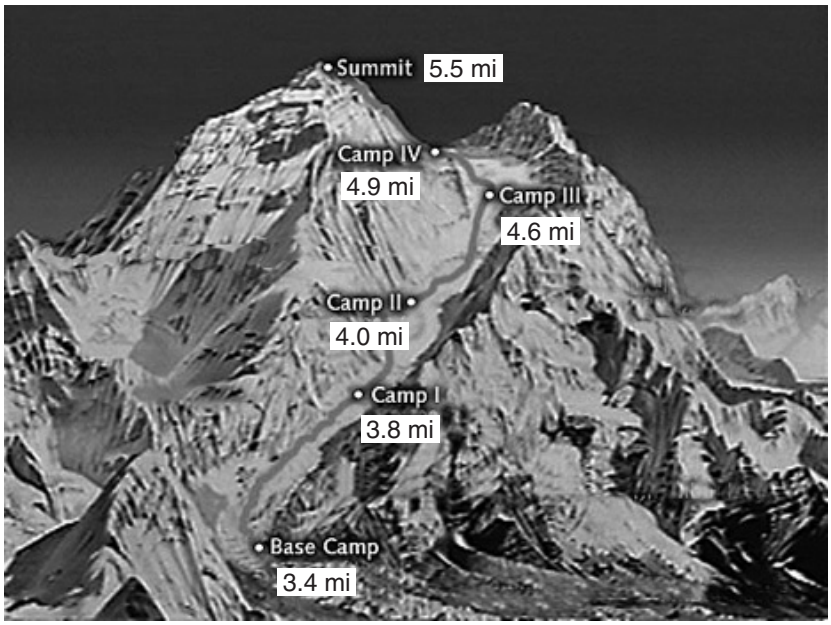
Base your answers to questions 74 and 75 on the diagrams below and on your knowledge of science. The first diagram represents the altitude, in miles (mi), of different layers of Earth's atmosphere. The second diagram represents elevations, in miles above sea level, for various locations on Mount Everest. The locations represent camps where people can rest while climbing to the summit (top) of the mountain.

Layers of Earth's Atmosphere



(Not drawn to scale)

Elevations of Locations on Mount Everest



74 Identify the layer of the atmosphere where the summit (top) of Mount Everest is found. [1]

_____

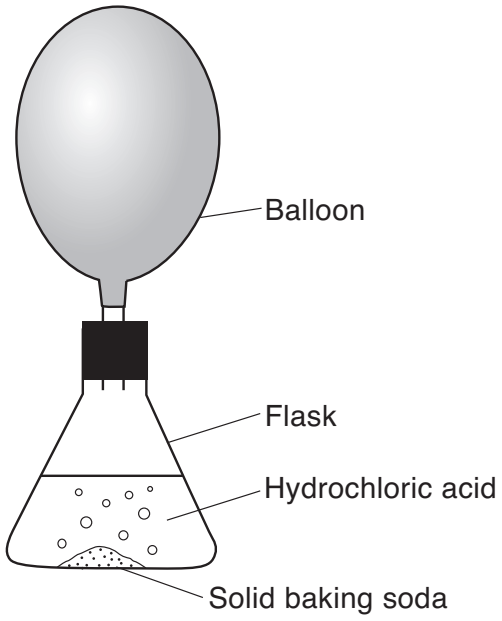
75 State the general relationship between the elevation of the camps and air pressure. [1]

_____

_____

_____

76 The diagram below represents a closed system using a flask with a balloon attached. In the flask, a chemical reaction between solid baking soda and hydrochloric acid is occurring. The balloon has inflated as products have formed from the reaction.



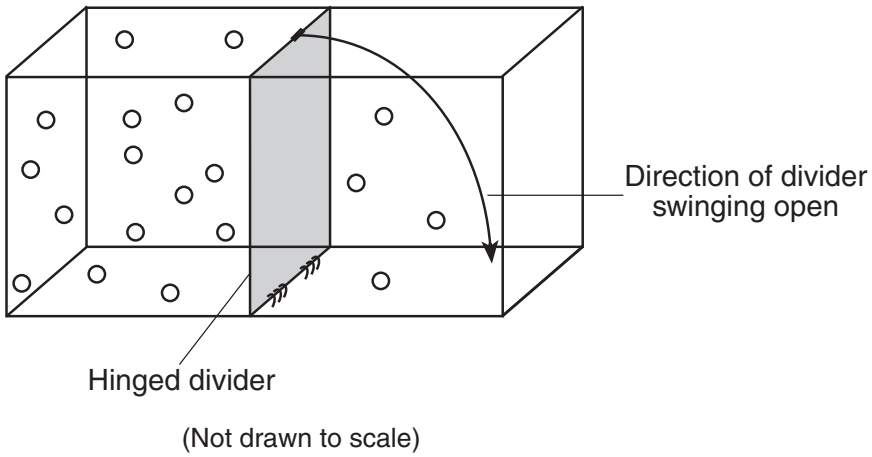
(Not drawn to scale)

Which evidence in the diagram indicates that a gas was produced as a result of the reaction? [1]

_____

_____

77 The diagram below represents a closed container with a hinged divider separating the container into two sections. One side of the container holds more oxygen gas molecules than the other side. The symbol (O) represents one oxygen gas molecule.



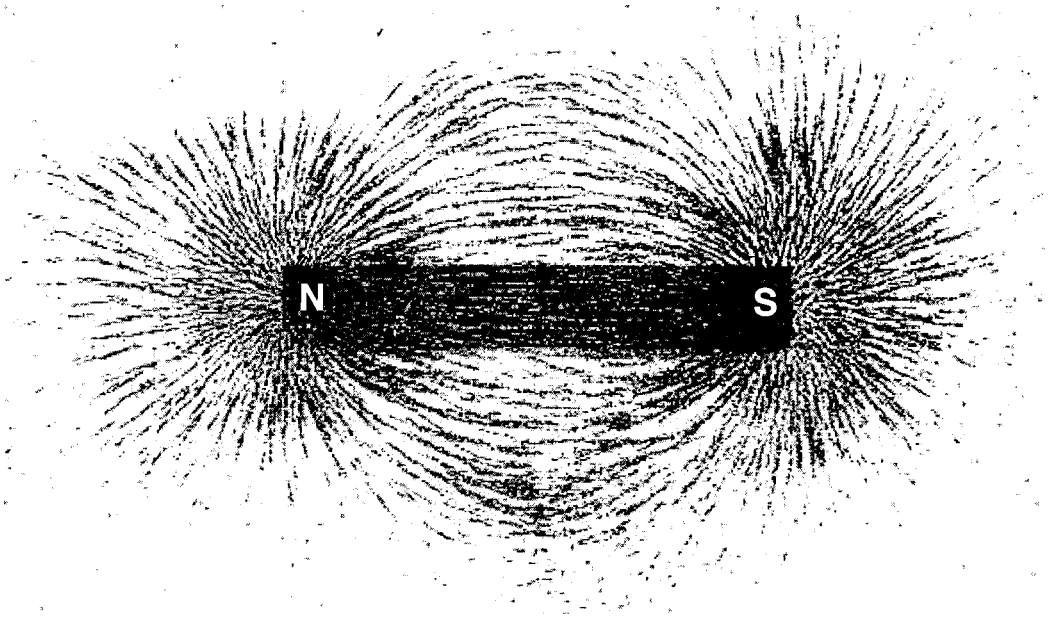
(Not drawn to scale)

Describe how the location of the oxygen molecules will change after the divider swings open. [1]

_____

_____

78 The diagram below represents a bar magnet. When iron filings were placed near the magnet, they moved to form the pattern shown.



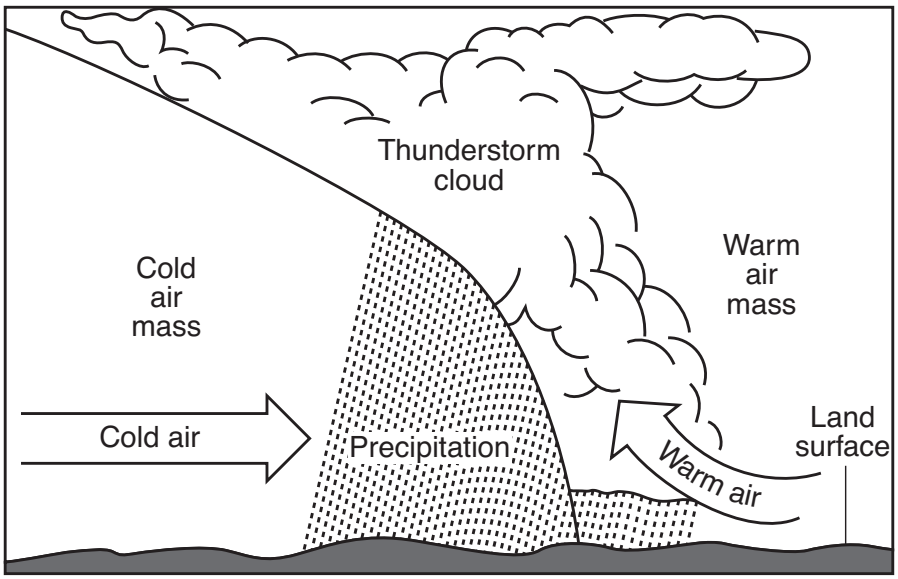
Explain why more iron filings are located at the ends of the magnet than at the center of the magnet. [1]

_____

_____

Base your answers to questions 79 through 82 on the diagram of a cold front below and on your knowledge of science. The diagram is a cross section that represents the air-mass movement and weather conditions associated with a cold front.

79 On the cross section below, place an **X** at *one* location on the cold frontal boundary. [1]



80 Identify the process in the water cycle that changed water vapor into liquid water droplets that formed the thunderstorm cloud. [1]

_____

81 Describe *one* piece of evidence shown in the diagram that suggests this cold front is associated with a low-pressure system. [1]

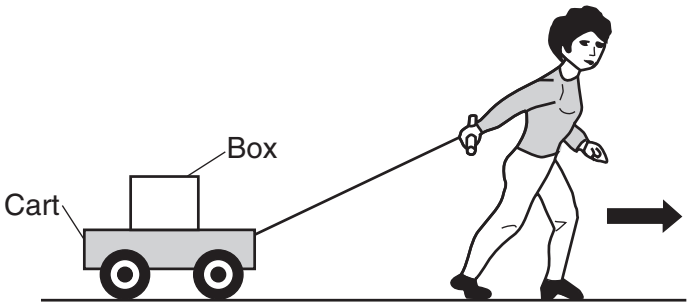
_____

82 A person who is walking outdoors hears thunder and sees lightning from the approaching storm. Describe *one* action the person should take to stay safe. [1]

_____

_____

Base your answers to questions 83 and 84 on the diagram below and on your knowledge of science. The diagram represents a person pulling a cart with a box on it. The arrow represents the direction in which the person is moving.



83 Identify *one* force acting on the cart. [1]

_____

84 Explain why the box may continue to move forward if the cart suddenly stops moving. [1]

_____

_____

85 The data table below shows the sunrise and sunset times for the first day of each season at a location in New York State. The times for the first day of fall are shown. Complete the table by identifying the season that matches the remaining sunrise and sunset times. [1]

Data Table

Season	Sunrise	Sunset
fall	6:43 a.m.	6:54 p.m.
	5:42 a.m.	8:30 p.m.
	7:16 a.m.	4:31 p.m.
	6:59 a.m.	7:07 p.m.

THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL SCIENCE TEST

JUNE 2016 WRITTEN TEST

FOR TEACHERS ONLY

SCORING KEY AND RATING GUIDE

Note: All schools (public, nonpublic, and charter) administering the Grade 8 Intermediate-Level Science Test are required to make arrangements to obtain answer sheets and associated scanning services from a Regional Information Center (RIC) or a large-city scanning center. These centers will scan and score the answer sheets according to the following criteria:

1. One credit will be awarded for each correct response.
2. Credit will not be allowed if two or more answers have been marked for the same question.
3. The raw score for Part I will be determined by counting the number of correct responses.

For information only, correct responses are listed in the chart below.

Question Number	Correct Response	Question Number	Correct Response	Question Number	Correct Response
1	3	16	2	31	2
2	1	17	3	32	4
3	2	18	3	33	2
4	1	19	1	34	1
5	1	20	4	35	4
6	3	21	3	36	2
7	4	22	1	37	3
8	2	23	3	38	4
9	1	24	1	39	4
10	4	25	2	40	3
11	4	26	3	41	2
12	1	27	3	42	2
13	2	28	4	43	3
14	4	29	3	44	4
15	3	30	1	45	4

46 [1] Allow 1 credit if *all four* statements are correctly identified, as shown below.

I 1. In two more hours, a total of 3.0 inches of rain will have fallen.
O 2. The rain is falling on the tree and the ground.
O 3. The rain gauge shows 2.0 inches.
I 4. The air temperature is above freezing.

47 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— time to complete one swing
— time
— period of the pendulum swing

48 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The longer the string, the longer/greater the time to complete one swing.
— The shorter the string, the shorter/less time for one swing.
— direct relationship

49 [1] Allow 1 credit for any value greater than 1.6 s but less than 1.8 s.

50 [1] Allow 1 credit for letter *A*.

51 [1] Allow 1 credit if *all four* distances are correctly filled in, as shown below.

Location in the Stream	**Distance from the Beginning of the Stream at Point A** (km)
B	20
C	80
D	130
E	200

52 [1] Allow 1 credit for 132 Calories.

53 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— prevent weight gain
— build muscles
— stronger heart
— helps lose weight
— relieve stress
— live longer
— stronger immune system
— lower cholesterol
— prevent diabetes
— increase physical fitness
— increase strength
— better coordination
— use more Calories

Unacceptable responses include:

be healthier (This is repeating "health benefit" which is in the question.)
get exercise (This is given in the question.)
It's fun. (Does not directly explain the health benefit.)
It gives you more energy. (This is a common misconception. Energy is being *used*.)

54 [1] Allow 1 credit for *two* acceptable responses. Acceptable responses include, but are not limited to:

— amount of lotion
— amount of time exposed to the sun/time/two hours
— same arm
— size of area on her arm
— same SPF

55 [1] Allow 1 credit for 40.

56 [1] Allow 1 credit for 5.

57 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— gamma rays

— x-rays

— ultraviolet/ultraviolet light/ultraviolet rays

— blue light

— violet light

Unacceptable responses include: "visible light" and "white light" as these contain some colors with wavelengths longer than green light.

58 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— visible light

— sunlight

— light

— white light

59 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— They kill/fight/attack germs.

— Specialized cells produce chemicals/antibodies to destroy microbes.

— These cells help destroy harmful organisms that do not belong in the body.

— White blood cells can get rid of things that enter the body before they become a problem.

Unacceptable responses include: "keep you healthy," because this is not specific enough.

60 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The bird gets half of its genetic material from each of its two parents, the ameba only gets it from one parent.

— Sexual reproduction in birds results in more variation in offspring.

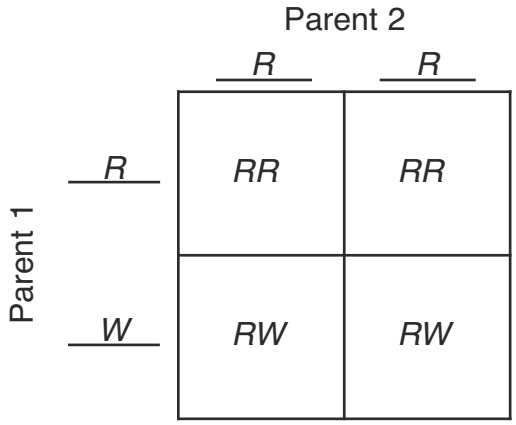
— Asexual reproduction in the ameba makes offspring that are genetically identical to the parent.

61 [1] Allow 1 credit for *three* acceptable responses, as shown below.

Percentage of red plants	0%
Percentage of white plants	0%
Percentage of pink plants	100%

Note: Allow credit for blank spaces for red/white if pink is labeled 100%.

62 [1] Allow 1 credit for a correctly completed Punnett square, as shown below.



63 [1] Allow 1 credit for rabbits *and* caterpillars.

64 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— more caterpillars for the trout to eat

— more food for the trout

— less competition for resources

65 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Decomposers recycle the nutrients in the food web so they can be reused.

— A food web needs decomposers to break down waste and dead organisms.

— Decomposers eat dead plants and animals.

— They eat dead things.

— return nutrients to the soil

66 [1] Allow 1 credit for *A* and *B* or *B* and *A*.

67 [1] Allow 1 credit for circling sexually *and* an acceptable explanation. Acceptable responses include, but are not limited to:

— There is an egg and sperm.

— There are both male and female sex cells.

— Fertilization occurred.

— A zygote was formed.

68 [1] Allow 1 credit for 16.

69 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— When more whales are present, the penguins eat more fish.

— Penguins eat fewer krill as the number of whales increases.

— The krill went from 90% of their diet to 22% of their diet.

— ate more fish

Unacceptable responses include: They had less food to eat. (They had food available, just different organisms.)

70 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The whales eat the krill, so the penguins have to eat fish.
— The whales and penguins compete for krill.
— There weren't as many krill in the area.
— Whales eat some of the same food as penguins.

71 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— They eat only other animals.
— Penguins eat fish/krill/squid.
— Penguins eat meat.
— They do not eat plants.

72 [1] Allow 1 credit for oxygen *or* O_2.

73 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— carbon dioxide/CO_2
— fertilizer from solid waste

74 [1] Allow 1 credit for troposphere.

75 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— As elevation increases, air pressure decreases.
— As air pressure decreases, elevation increases.
— The higher you go, the less air pressure there is.
— Camps higher up have lower air pressure.
— inverse/indirect relationship

76 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Gas bubbles were formed.

— bubbles in the liquid

— The balloon filled up with gas/carbon dioxide gas.

Unacceptable responses include: The balloon filled with helium. (Helium is not produced in this reaction.)

77 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The molecules of gas will spread throughout the container.

— Molecules will move to where there is less concentration.

— There will be fewer molecules on the left side than there were before.

— Some molecules will move into the right side.

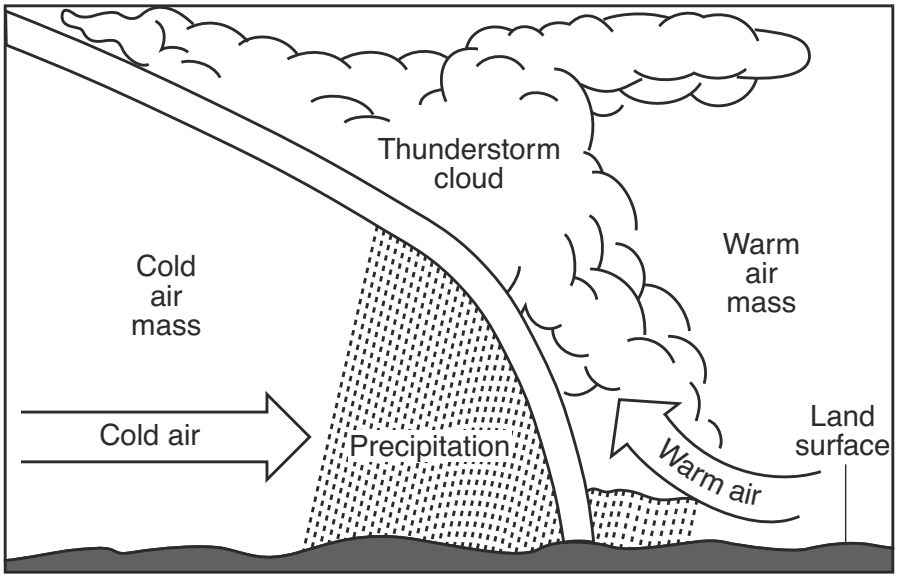
— They will fill all of the available space.

78 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The force of magnetic attraction is strongest near the poles.

— Greater magnetism is at the ends.

79 [1] Allow 1 credit if the center of the student-plotted **X** is located within or touches the outlined boundary line between the warm and cold air masses as shown below.



Note: It is recommended that an overlay of the same scale as the student answer booklet be used to ensure reliability in rating.

Allow one credit if a symbol other than an **X** is used.

80 [1] Allow 1 credit for condensation.

81 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Warm air is rising.
— Unstable weather conditions exist.
— Precipitation is occurring.
— cloudy conditions
— A thunderstorm is occurring.

82 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Go inside a building or car.
— Stay away from tall objects and trees.
— Avoid bodies of water.
— Crouch down on the ground.

83 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— gravity
— the pulling of the cart
— friction
— weight of the box
— force pushing upward on cart from surface (normal force)
— weight of air on box/air pressure
— air resistance

Unacceptable responses include:

person (This is not specific enough.)
box (This is not specific enough.)
acceleration (This is not a force.)
momentum (This is not a force.)

84 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— not enough force/friction to stop the box

— The box is not attached to the cart.

— Newton's First Law of Motion

— Objects in motion will remain in motion in the same direction until acted on by a force.

— The box has inertia.

— The box still has momentum.

Unacceptable responses include:

because of gravity

There was no force/friction to stop the box. (There is some force/friction, but not enough to prevent the box from moving.)

85 [1] Allow 1 credit if the seasons in *all three* unshaded rows are correct, as shown below.

Data Table

Season	Sunrise	Sunset
fall	6:43 a.m.	6:54 p.m.
summer	5:42 a.m.	8:30 p.m.
winter	7:16 a.m.	4:31 p.m.
spring	6:59 a.m.	7:07 p.m.