

THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL SCIENCE TEST

WRITTEN TEST

JUNE 7, 2010

Student Name _____

School Name _____

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 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 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 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 The label below shows the nutritional information for one serving of macaroni and cheese.

Nutrition Facts	
Serving Size: 1 cup (228g)	
Servings Per Container: 2	
Amount Per Serving	
Calories 250	Calories from Fat 110
% Daily Value *	
Total Fat 12g	18%
Saturated Fat 3g	15%
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Sugars 5g	
Protein 5g	
Dietary Fiber 0g	0%
* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:	
	Calories: 2,000 2,500
Total Fat	Less Than 65g 80g
Sat Fat	Less Than 20g 25g
Cholesterol	Less Than 300g 300g
Sodium	Less Than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g

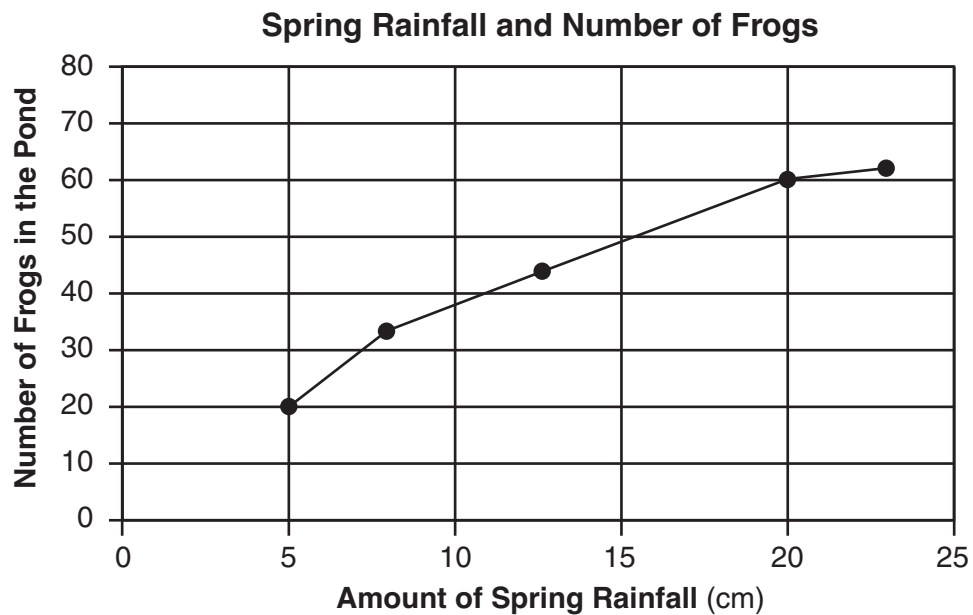
In one serving of this macaroni and cheese, how many Calories come from fat?

- (1) 12
(2) 65
(3) 110
(4) 250

2 A student examined a rock sample and described it as having particles of various colors that were 1 millimeter to 12 millimeters in size. The student was making

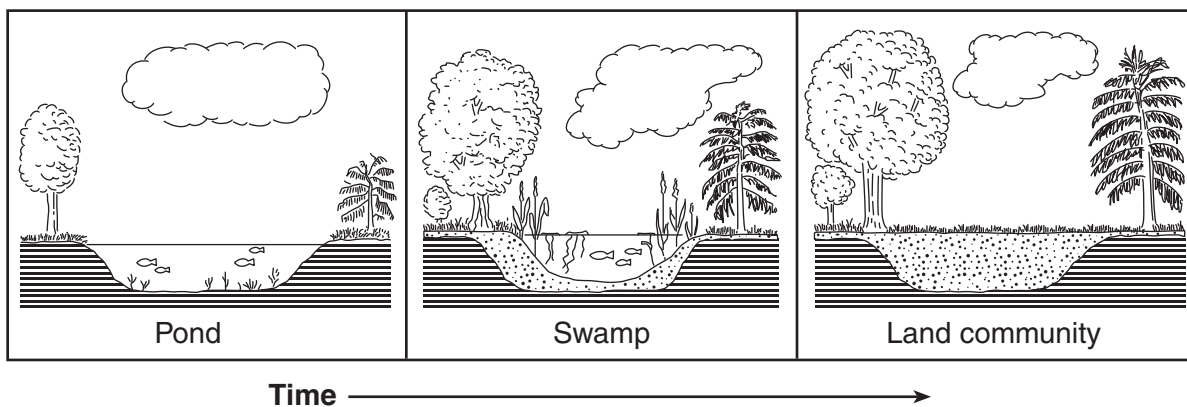
- (1) an inference
(2) a hypothesis
(3) a prediction
(4) an observation

- 3 The graph below represents the relationship between the amount of spring rainfall recorded at a pond and the number of frogs in that pond. The data were collected over five spring seasons.



What is the difference between the number of frogs in the pond when the rainfall was 5 cm and when the rainfall was 20 cm?

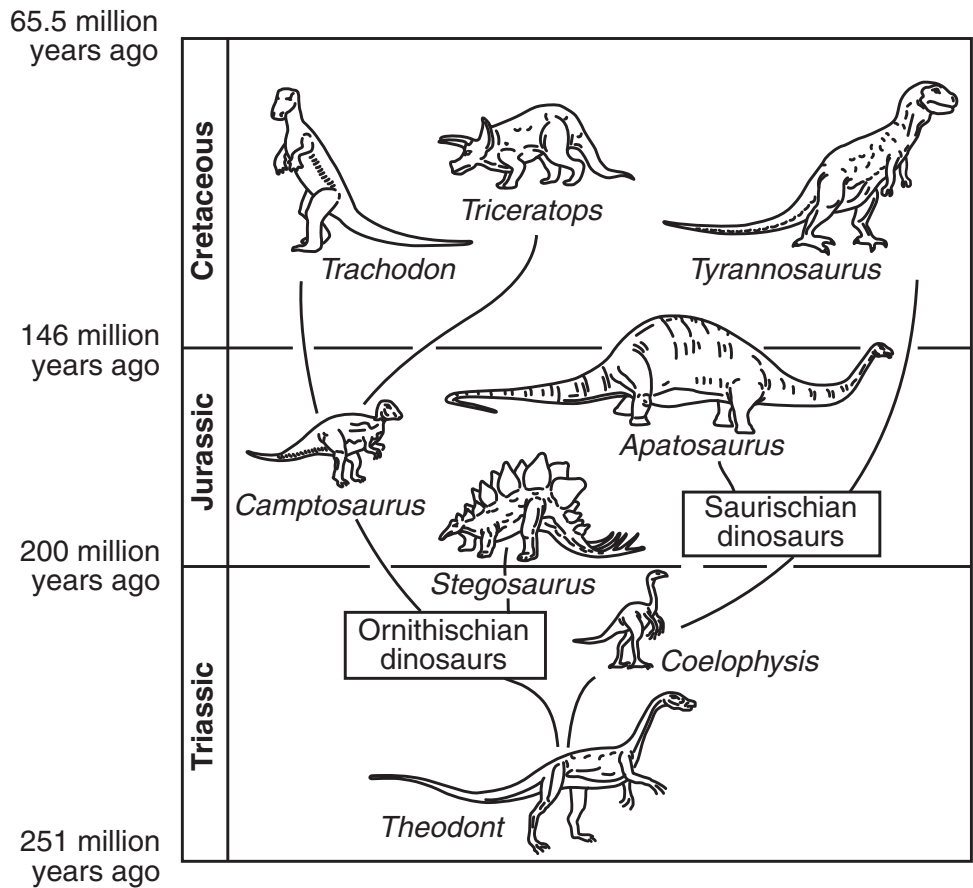
- (1) 20
 (2) 40
 (3) 50
 (4) 60
- 4 The diagram below shows a sequence of environmental changes in an area over a long period of time.



Which statement best describes the changes shown in the diagram?

- (1) Over time, one natural area is replaced by another.
 (2) Over time, the number of fish increases.
 (3) The environment goes through seasonal changes.
 (4) Precipitation follows cloud formation.

5 The chart below shows the inferred evolution of some dinosaurs during three time periods in Earth's history.



Which dinosaur most likely evolved from *Coelophysis*?

- (1) *Theodont*
- (2) *Tyrannosaurus*
- (3) *Triceratops*
- (4) *Camptosaurus*

6 A student fails to eat a balanced diet over a period of time. This lack of a balanced diet can lead to

- (1) selective breeding
- (2) dynamic equilibrium
- (3) extinction
- (4) disease

7 Which human organ system eliminates liquid and gaseous wastes from the body?

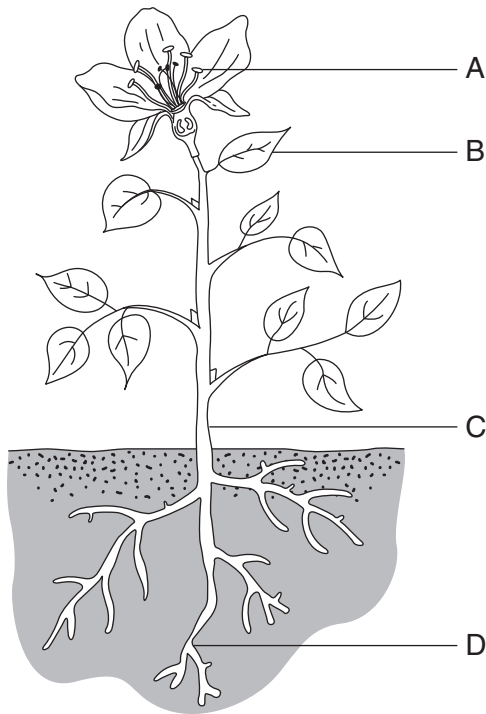
- (1) circulatory
- (2) endocrine
- (3) excretory
- (4) reproductive

8 Which human organ system produces hormones to regulate growth, development, and reproduction?

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

- 9 What model is used to show the pattern of traits that are passed from one generation to the next in a family?
- (1) pedigree chart
 - (2) dichotomous key
 - (3) energy pyramid
 - (4) line graph

Base your answers to questions 10 and 11 on the diagram of a green plant below and on your knowledge of science. Four parts of the plant are labeled A, B, C, and D.



- 10 Which part of the plant is directly involved in sexual reproduction?
- (1) A
 - (2) B
 - (3) C
 - (4) D
- 11 In which part of the plant does most photosynthesis occur?
- (1) A
 - (2) B
 - (3) C
 - (4) D

- 12 Cancer is most often the result of
- (1) abnormal cell division
 - (2) natural selection
 - (3) bacterial infection
 - (4) biological adaptation

- 13 What are genes composed of?
- (1) offspring
 - (2) DNA
 - (3) cells
 - (4) traits

- 14 An organism is born with a genetic abnormality not present in any of its ancestors. This abnormality is most likely the result of
- (1) circulation
 - (2) competition
 - (3) mutation
 - (4) respiration

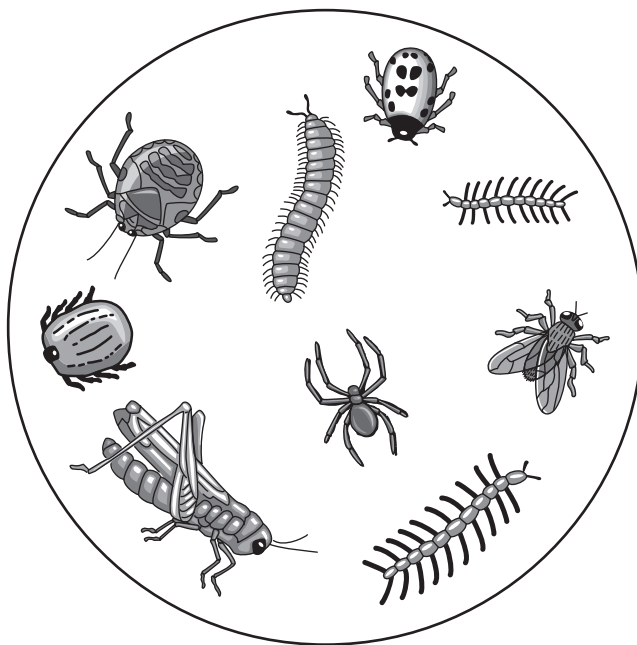
- 15 When the environment changes more quickly than a species can adapt, the species may become
- (1) extinct
 - (2) dominant
 - (3) diverse
 - (4) overpopulated

- 16 When do organs and organ systems begin to develop in humans?
- (1) before fertilization
 - (2) before birth
 - (3) during childhood
 - (4) during adulthood

- 17 Some one-celled organisms can reproduce by the process of
- (1) hormone secretion
 - (2) metamorphosis
 - (3) fertilization
 - (4) cell division

- 18 Which structure is found in a plant cell but not in an animal cell?
- (1) cell wall
 - (2) cell membrane
 - (3) cytoplasm
 - (4) nucleus

Base your answers to questions 19 through 21 on the diagram and table below and on your knowledge of science. The diagram shows a lab dish containing organisms collected at the edge of a forest.



(Not drawn to scale)

The table identifies several organisms based on their characteristics.

Identification Table

Organism	Characteristics
spiders and ticks	<ul style="list-style-type: none"> – 8 legs – no antennae
insects	<ul style="list-style-type: none"> – 6 legs – 1 pair of antennae
centipedes	<ul style="list-style-type: none"> – more than 8 legs – 1 pair of antennae on head – 1 pair of legs on each body part
millipedes	<ul style="list-style-type: none"> – more than 8 legs – 1 pair of antennae on head – 2 pair of legs on each body part

19 How many of the organisms in the lab dish are insects?

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

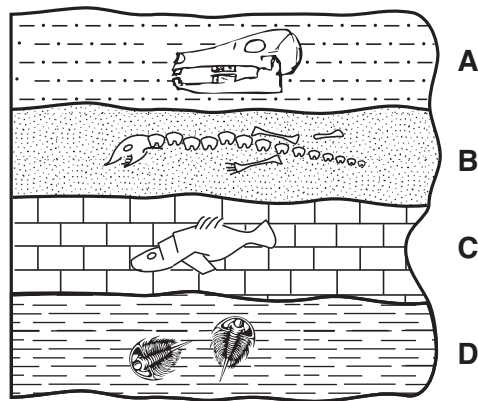
20 Over time, these organisms evolved from a common ancestor. Which process best explains why they now have different characteristics?

- (1) extinction
- (2) metabolism
- (3) asexual reproduction
- (4) biological adaptation

21 In all of these organisms, which microscopic structures carry out the major life functions?

- (1) chloroplasts
 - (2) cells
 - (3) wings
 - (4) antennae
-

22 The diagram below shows a cross section of a portion of Earth's crust that has *not* been overturned. Letters A, B, C, and D represent sedimentary rock layers that contain fossils.

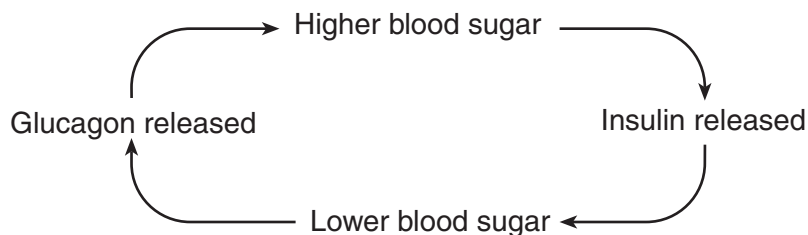


(Not drawn to scale)

Which rock layer contains the oldest fossils?

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

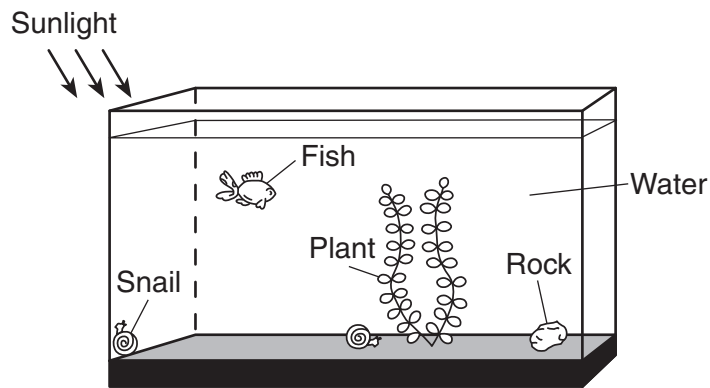
23 Insulin and glucagon are hormones that affect blood sugar levels. The diagram below shows the feedback system used by the human body to increase and decrease blood sugar levels.



This feedback system is one way that the human body

- (1) circulates gases
- (2) maintains equilibrium
- (3) destroys viruses
- (4) transports nutrients

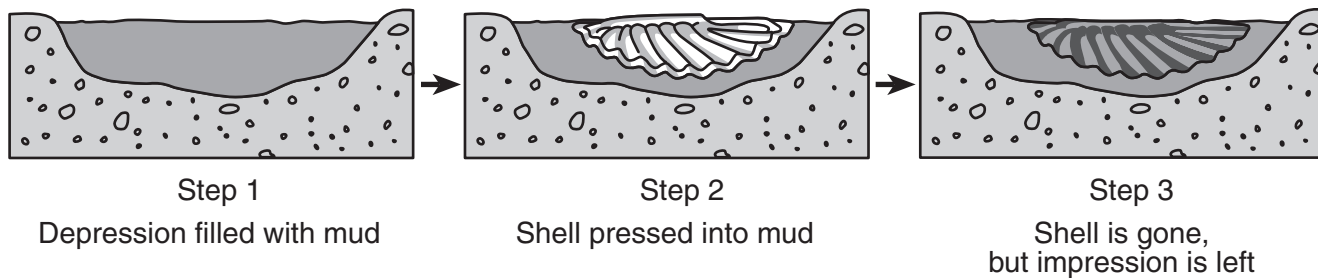
24 The diagram below shows several organisms in a fish tank.



Which item in the tank produces oxygen?

- (1) plant
- (2) water
- (3) snail
- (4) rock

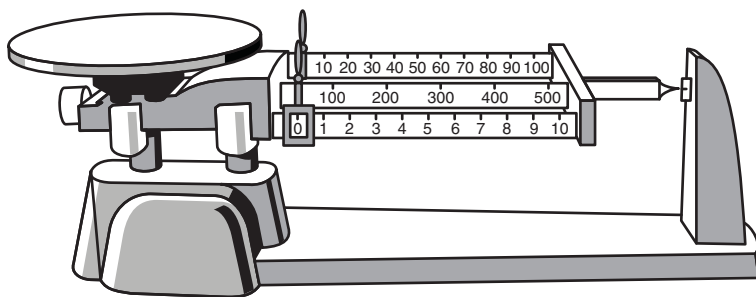
25 The sequence below occurs over a long period of geologic time.



The sequence shows the steps involved in the formation of

- (1) an element
- (2) an igneous rock
- (3) a fault
- (4) a fossil

26 The diagram below shows a triple-beam balance.



What is the maximum mass, in grams, that could be measured by this balance?

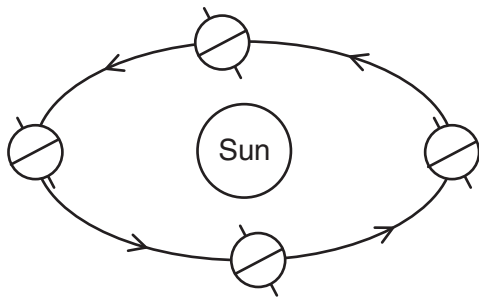
- (1) 110
- (2) 500
- (3) 610
- (4) 1510

- 27 The Moon's surface is visible to an observer on Earth because the Moon
- (1) reflects sunlight
 - (2) absorbs light from Earth
 - (3) produces its own light
 - (4) transmits sunlight

- 28 A full Moon is observed in Buffalo, New York, on June 1. Approximately when will the next full Moon be observed in Buffalo?

- (1) June 7
- (2) June 15
- (3) July 1
- (4) July 7

- 29 The diagram below shows Earth at four locations in its orbit around the Sun.



(Not drawn to scale)

Which motion do the arrows in the diagram represent?

- (1) Earth's rotation
- (2) the Sun's rotation
- (3) Earth's revolution
- (4) the Sun's revolution

- 30 On which date does North America usually experience the longest period of daylight?

- (1) March 21
- (2) June 21
- (3) September 21
- (4) December 21

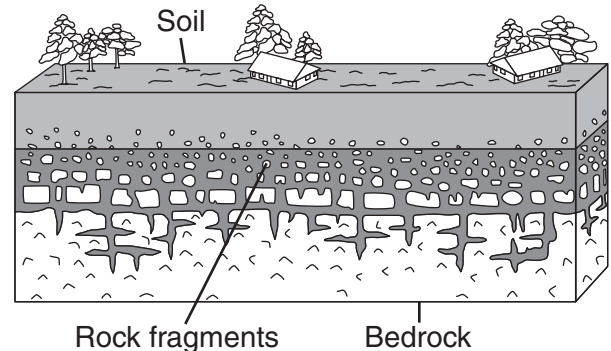
- 31 Earth's hydrosphere is best described as the

- (1) relatively thin layer of rock found above Earth's mantle
- (2) relatively thin layer of water covering most of Earth's crust
- (3) hot liquid rock located in Earth's outer core
- (4) very dense rock located in Earth's inner core

- 32 Which physical property is used to identify a mineral based on its resistance to being scratched?

- (1) hardness
- (2) density
- (3) color
- (4) streak

- 33 The diagram below shows a portion of Earth's crust.



(Not drawn to scale)

The formation of the rock fragments was most likely a result of

- (1) cooling
- (2) folding
- (3) melting
- (4) weathering

- 34 Most scientists agree that an increase in the amount of greenhouse gases entering Earth's atmosphere causes

- (1) a decrease in sea level
- (2) a decrease in average surface temperatures
- (3) an increase in melting of polar ice caps
- (4) an increase in crustal plate movement

- 35 A student is trying to dissolve 20 grams of sugar in a beaker containing 250 milliliters of water at room temperature. What can the student do to make the sugar dissolve faster in the water?

- (1) decrease the temperature of the water
- (2) use larger pieces of sugar
- (3) stir rapidly
- (4) use less water

Base your answers to questions 36 and 37 on the portion of the Periodic Table of the Elements shown below and on your knowledge of science.

Portion of the Periodic Table of the Elements

KEY		approximate atomic mass		symbol		name		atomic number		Groups	
1	H	1	Hydrogen	18	He	4	Helium	2			
		13	14	15	16	17					
		11	12	13	14	15	16	17	18		
		11	12	13	14	15	16	17	18		
64	65	70	73	75	79	80	84				
29	30	31	32	33	34	35	36				
108	112	115	119	122	128	127	131				
47	48	49	50	51	52	53	54				

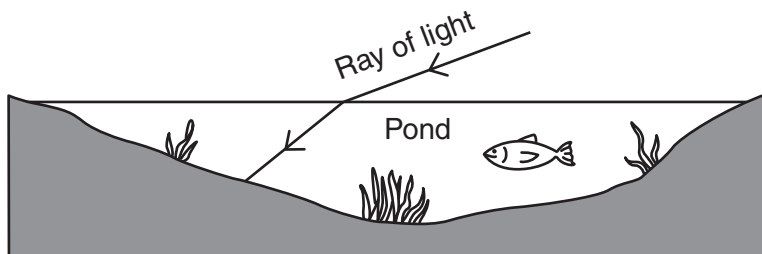
36 The elements fluorine, chlorine, bromine, and iodine are all found in the same group (17) on the table. These elements are grouped together because they

- (1) are metals
- (2) react in similar ways
- (3) have the same atomic mass
- (4) are noble gases

37 Water (H₂O) is *not* found on the Periodic Table of the Elements because water is

- (1) an atom
- (2) a liquid
- (3) a mixture
- (4) a compound

38 The diagram below shows what occurs when a ray of light strikes and enters a pond.



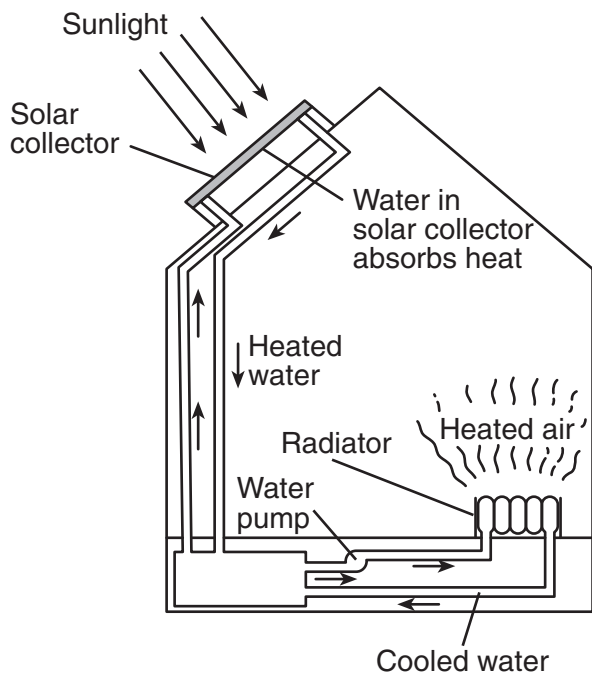
Which property of light is illustrated when the ray enters the pond?

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

39 Compared to the particles in a hardened lava sample, the particles in a liquid lava sample

- (1) have a lower temperature
- (2) have less kinetic energy
- (3) are moving faster
- (4) are closer together

40 The diagram below shows a home with a solar heating system.



What is the original source of energy for this heating system?

- (1) heated water
- (2) heated air
- (3) sunlight
- (4) water pump

41 Which energy source is considered *nonrenewable*?

- (1) moving water
- (2) fossil fuel
- (3) wind
- (4) biomass

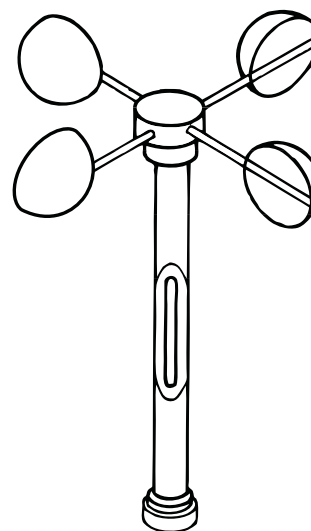
42 The force of an object, with a certain mass accelerating at a certain rate, can be determined by using the equation below.

$$\text{force} = \text{mass} \times \text{acceleration}$$

Which object would have the greatest force?

- (1) a 5-kg object accelerating at 10 m/s^2
- (2) a 5-kg object accelerating at 20 m/s^2
- (3) a 20-kg object accelerating at 4 m/s^2
- (4) a 20-kg object accelerating at 3 m/s^2

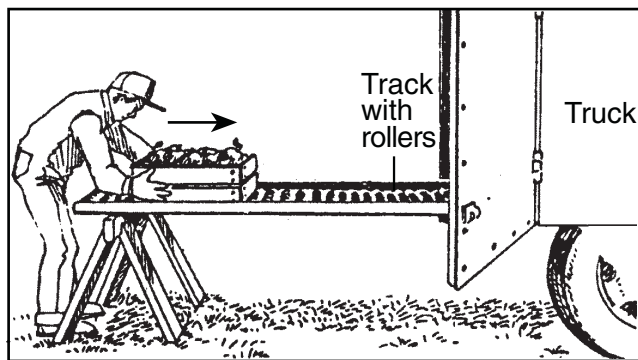
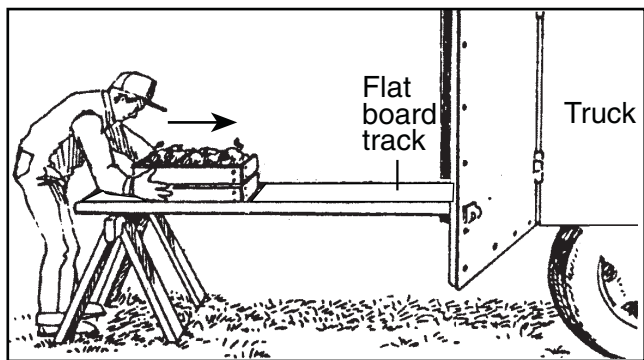
43 The diagram below shows a weather instrument.



Which weather condition is measured by this instrument?

- (1) air humidity
- (2) air pressure
- (3) wind direction
- (4) wind speed

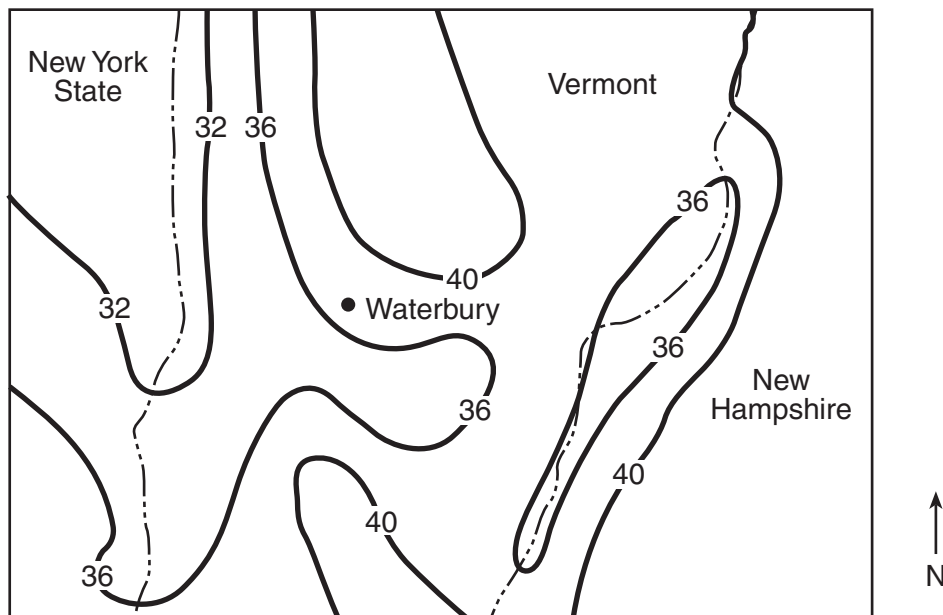
44 The diagrams below show two ways of loading a box into a truck.



The person using the track with the rollers uses less energy to load the box because the rollers reduce the

- | | |
|----------------------------------|-----------------------|
| (1) mass of the box | (3) force of gravity |
| (2) distance traveled by the box | (4) force of friction |

45 The map below shows the total rainfall, in inches, for parts of New York State, Vermont, and New Hampshire over one year. The numbered dark lines connect locations with the same amount of total rainfall. State boundaries are indicated by - - - - .



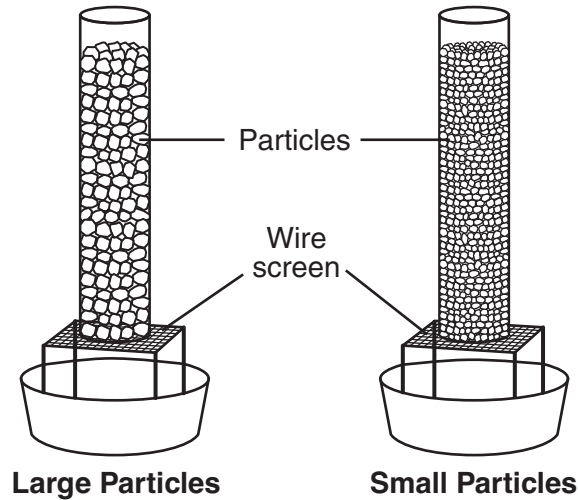
What was the probable amount of rainfall, in inches, for Waterbury, Vermont, for that year?

- | | |
|--------|--------|
| (1) 35 | (3) 37 |
| (2) 36 | (4) 43 |

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 diagram and information below and on your knowledge of science. The diagram shows an experiment conducted to see how quickly water moves through different-size particles of the same substance.



Two identical columns contained equal volumes of different-size particles. The same amount of water was added to the top of each column. A student timed how long it took for the water in each column to reach the wire screen. The data table below shows the results.

Data Table

Particle Size	Time (seconds)
large	1.2
small	5.0

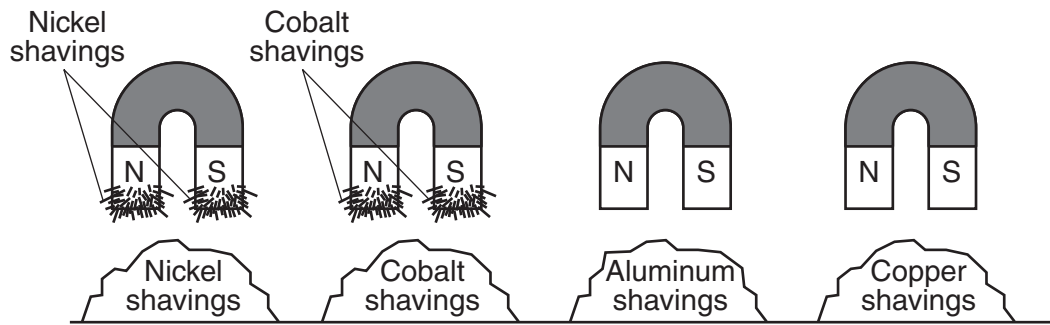
46 List *two* variables that were held constant in this experiment. [2]

(1) _____

(2) _____

47 State *one* conclusion based on this experiment. [1]

48 The diagram below shows four identical magnets that have been dipped into piles of shavings of four different metals.



Write a conclusion about a magnet's ability to attract metals based on what is shown in this diagram. [1]

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

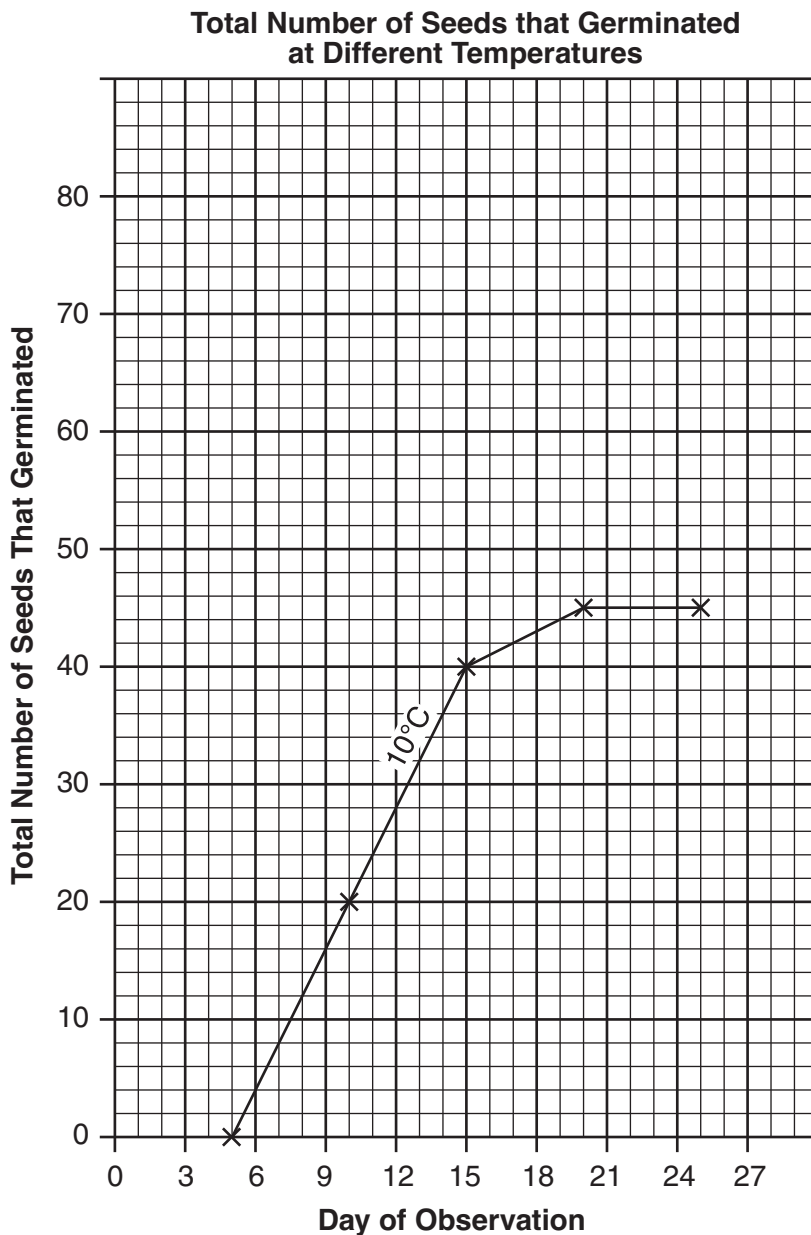
A student conducted an experiment to find out if air temperature affected the total number of seeds that germinate. Two groups of 100 identical seeds were used. One group was kept at an air temperature of 10°C and the other at an air temperature of 20°C. All other conditions were held constant. Observations made during the experiment are shown in the data table below.

Data Table

Day of Observation	Total Number of Seeds that Germinated at 10°C	Total Number of Seeds that Germinated at 20°C
5	0	5
10	20	35
15	40	70
20	45	80
25	45	80

49 On the graph below, plot with an **X** the total number of seeds that germinated at 20°C for each day of observation. Connect the **X**s with a line. [2]

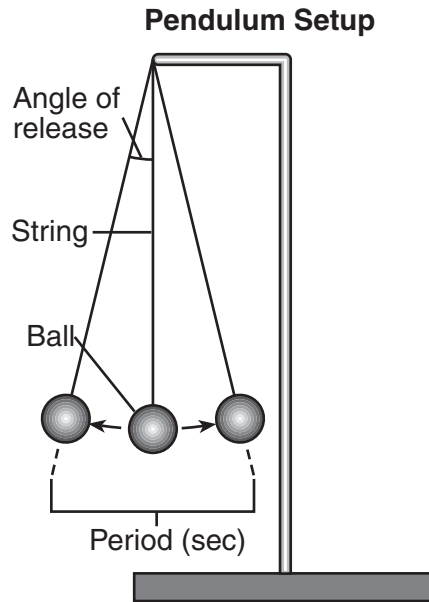
Note: The graph shows the total number of seeds that germinated at 10°C.



50 Using the graph that shows the total number of seeds that germinated at 10°C, determine how many seeds would have germinated at 10°C by day 12. [1]

Total number of seeds: _____

Base your answers to questions 51 and 52 on the diagram and information below and on your knowledge of science. The diagram shows a ball hung on a string to create a pendulum. The pendulum's period and angle of release are shown. The period is the length of time, in seconds, for one complete swing of the pendulum.



Three different investigations to determine the period of a swinging pendulum are described below.

- In investigation 1, the pendulum was released at different angles. The length of string and mass of the ball were the same for each angle.
- In investigation 2, different lengths of string were used. The angle of release and mass of the ball were the same for each length.
- In investigation 3, balls of different masses were used. The angle of release and length of string were the same for each mass.

The data tables below show the results of the three investigations.

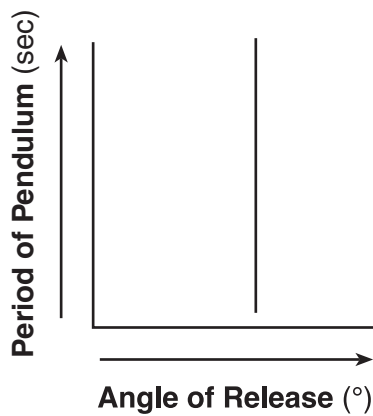
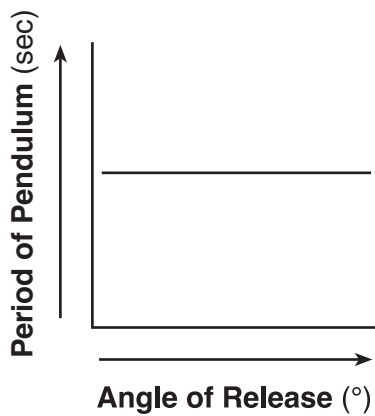
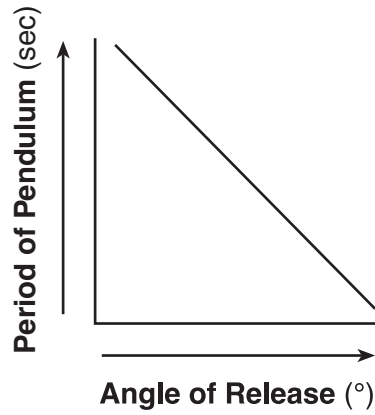
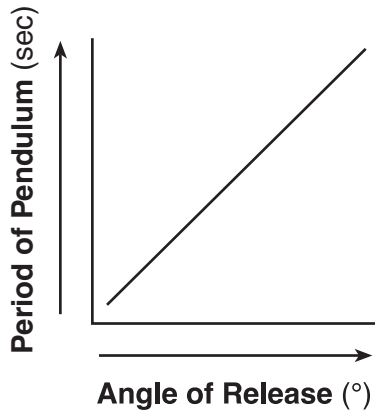
Data Tables

Investigation 1	
Angle of Release (°)	Period (sec)
20	1.3
17	1.3
15	1.3
13	1.3
10	1.3
5	1.3

Investigation 2	
Length of String (cm)	Period (sec)
135	2.4
104	2.1
98	2.0
69	1.7
34	1.3
29	1.2

Investigation 3	
Mass of Ball (kg)	Period (sec)
8.0	1.2
7.0	1.2
5.0	1.2
2.0	1.2
1.0	1.2
0.2	1.2

51 Circle the graph below that best represents the relationship shown by the data in investigation 1. [1]

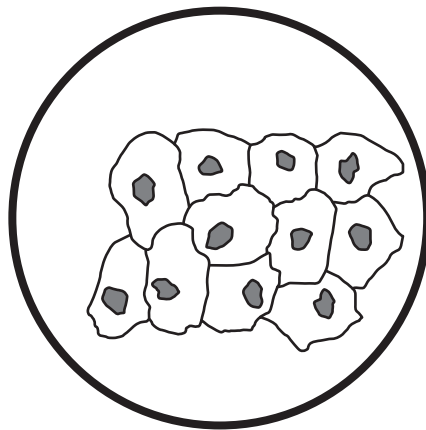


52 Determine the most likely length of the string used in investigation 3 based on the data provided in investigation 2. [1]

_____ cm

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

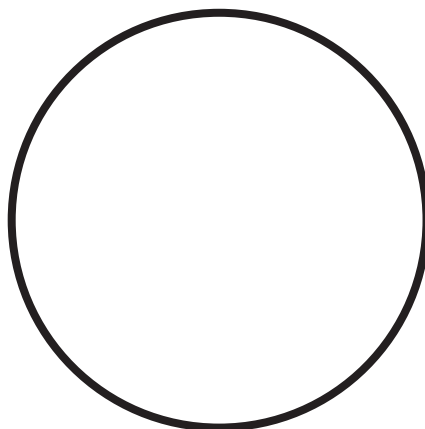
A student was studying a prepared slide of human cheek cells under a compound light microscope. The diagram represents what the student observed on the slide at a magnification of 100 \times .



100 \times

53 Identify the shaded structure shown in each cell in the diagram. [1]

54 Draw what the student would see if the cells were viewed under 400 \times magnification with the same microscope. Your drawing should be contained within the circle below. [1]



400 \times

55 The table below shows the dates and the times of high and low ocean tides in a certain location. The data show a cyclic pattern.

High and Low Tides

Date and Time of Tide	Tide (high or low)
May 5, 7:15 p.m.	high
May 6, 1:28 a.m.	low
May 6, 7:41 a.m.	high
May 6, 1:54 p.m.	low
May 6, 8:07 p.m.	high
May 7, 2:20 a.m.	low
May 7, 8:33 a.m.	high

Based on the data, predict the date and time of the next low tide. [2]

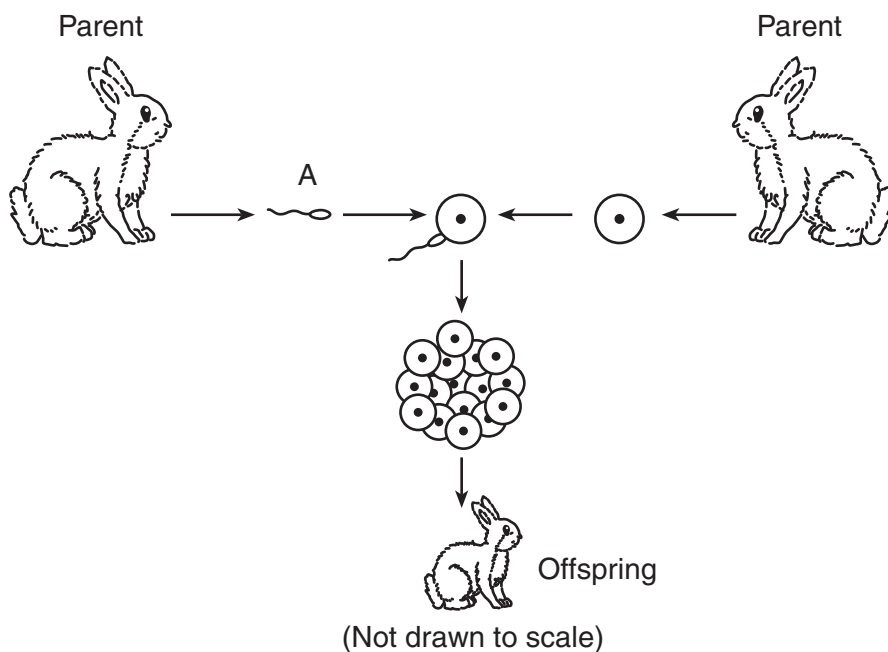
Date: _____ Time: _____

56 Complete the table below by identifying the human organ system that performs each function listed. The first row has been completed. [2]

Data Table

Function	Human Organ System
controls and coordinates the body's responses	nervous
carries nutrients to the cells	
turns large food molecules into smaller food molecules	
supplies oxygen to the blood	

Base your answers to questions 57 and 58 on the diagram below and on your knowledge of science. The diagram represents the sexual reproduction of rabbits.



57 Identify the sex cell labeled A and the sex of the rabbit that produced cell A. [1]

Cell A: _____

Sex of rabbit: _____

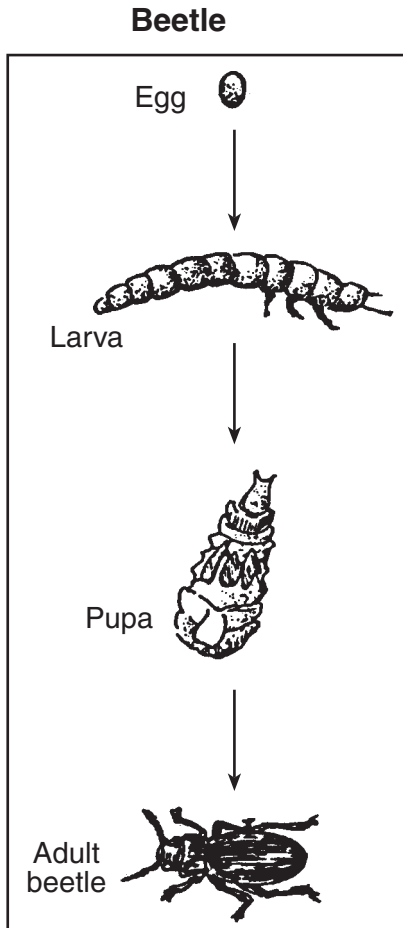
58 Explain why the offspring is *not* genetically identical to either parent. [1]

59 The Punnett square below shows a cross between a pea plant with green pods (GG) and a pea plant with yellow pods (gg). All of the offspring have green pods (Gg).

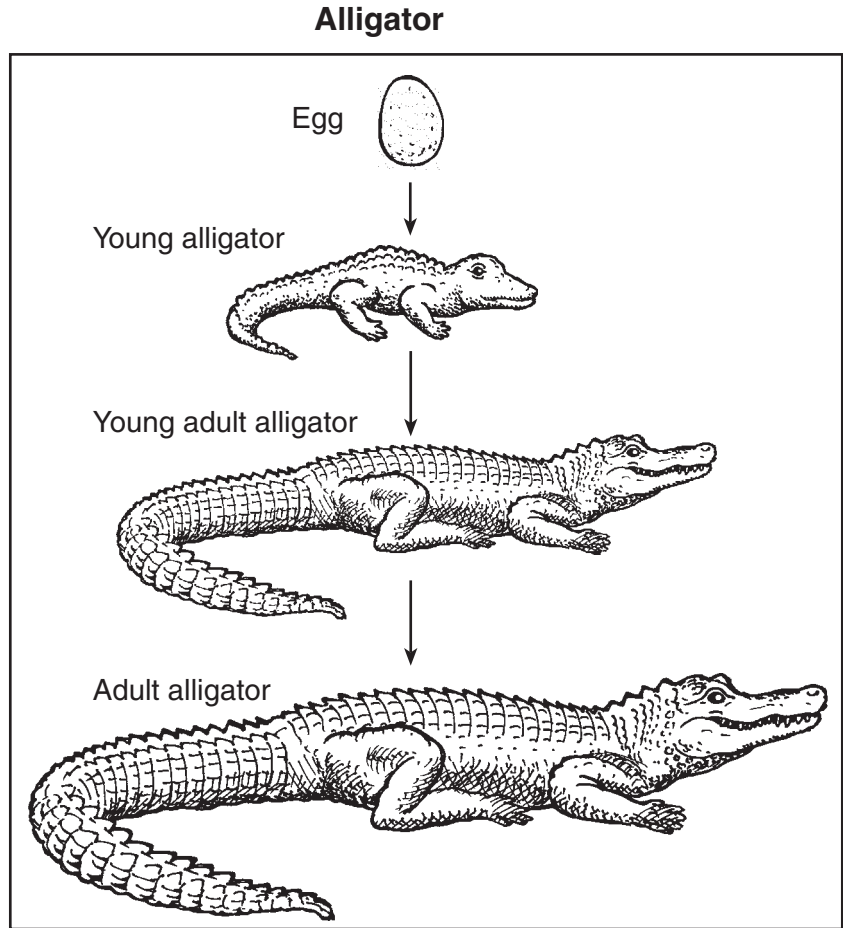
	G	G
g	Gg	Gg
g	Gg	Gg

Explain why the offspring with Gg genes for pod color look the same as a pea plant with GG genes for pod color. [1]

60 The diagrams below show the development process of a beetle and an alligator.



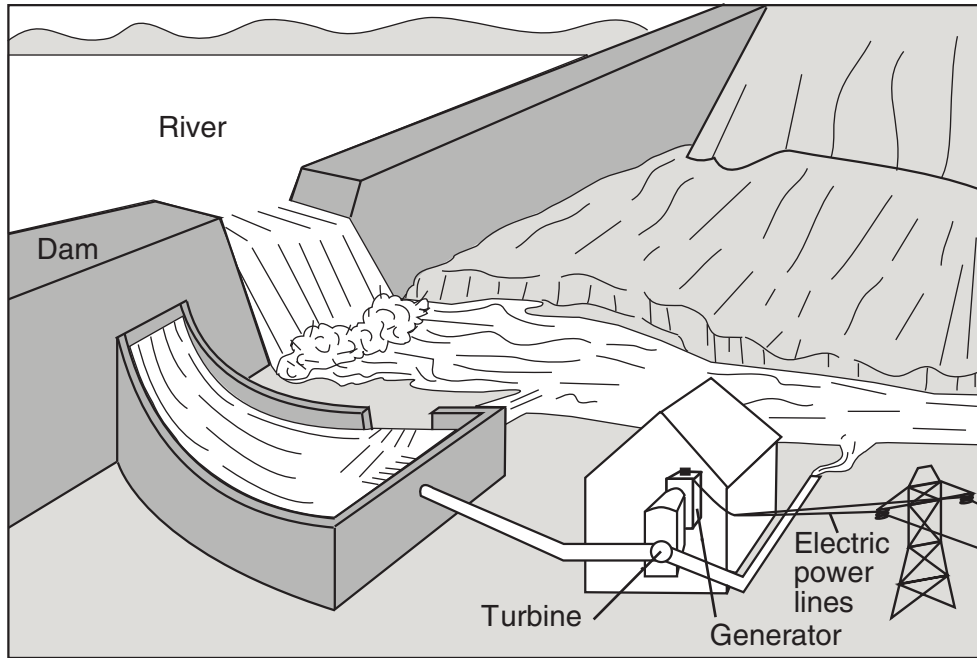
(Not drawn to scale)



(Not drawn to scale)

Identify *one* way in which the development process of the beetle differs from that of the alligator. [1]

Base your answers to questions 61 and 62 on the diagram below and on your knowledge of science. The diagram shows a dam and an electric power plant built next to a river. The power plant uses the water from the dam to generate electricity.

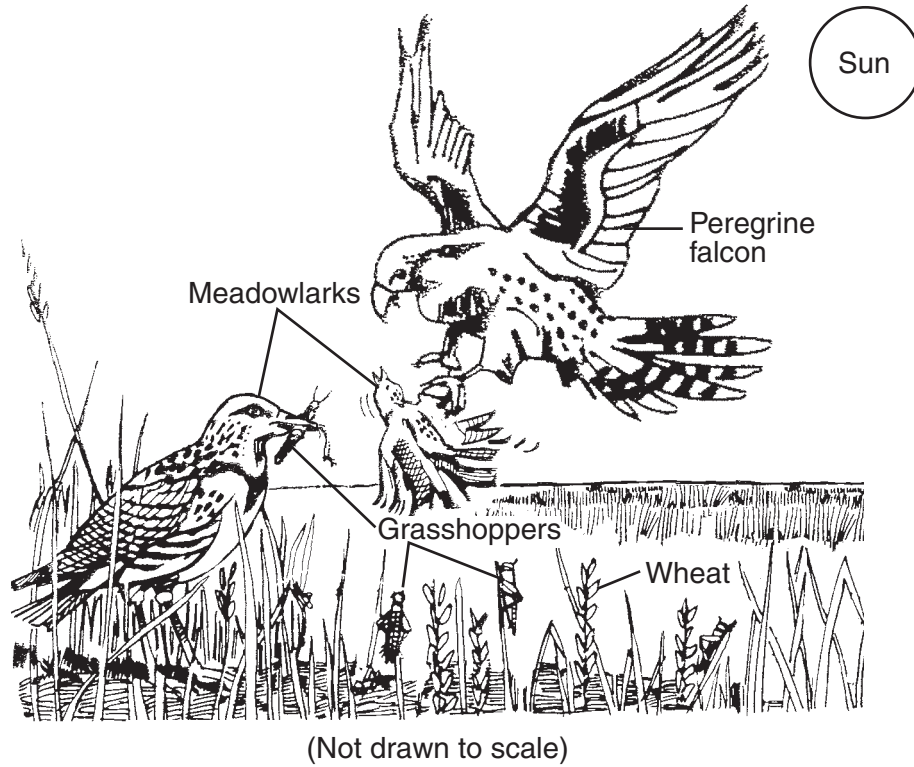


(Not drawn to scale)

61 Describe *one* positive impact of this type of power plant on the environment. [1]

62 Describe *one negative* impact of this type of power plant on the environment. [1]

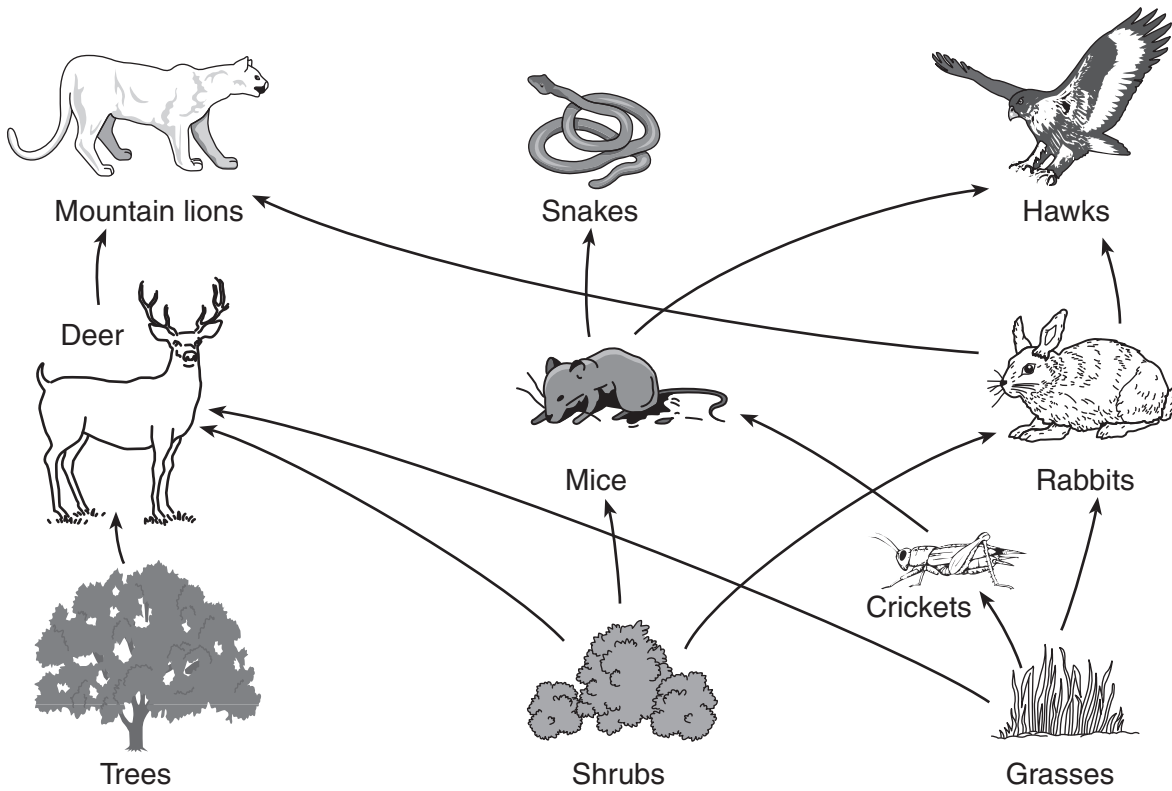
Base your answers to questions 63 and 64 on the diagram of a portion of an ecosystem below and on your knowledge of science.



63 Give an example of *one* carnivore shown in this diagram. [1]

64 Explain how the use of a chemical designed to kill grasshoppers could reduce the population of peregrine falcons. [1]

Base your answers to questions 65 and 66 on the food web below and on your knowledge of science.



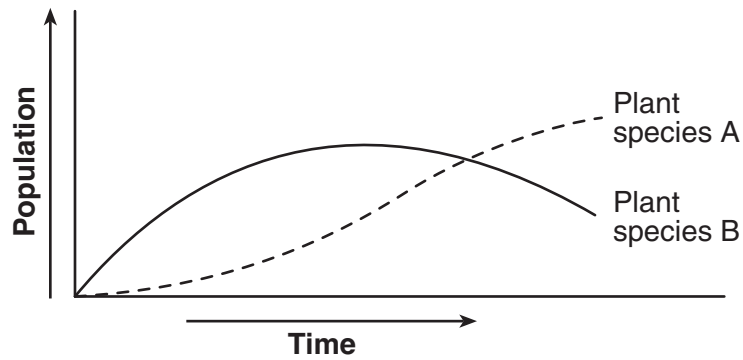
(Not drawn to scale)

65 Explain how the rabbits depend on energy from the Sun. [1]

66 Which *three* organisms in this food web are herbivores? [1]

- (1) _____
- (2) _____
- (3) _____

67 The graph below compares the populations of two plant species, *A* and *B*, over a period of time. The two plant species live in the same area and have a competitive relationship.

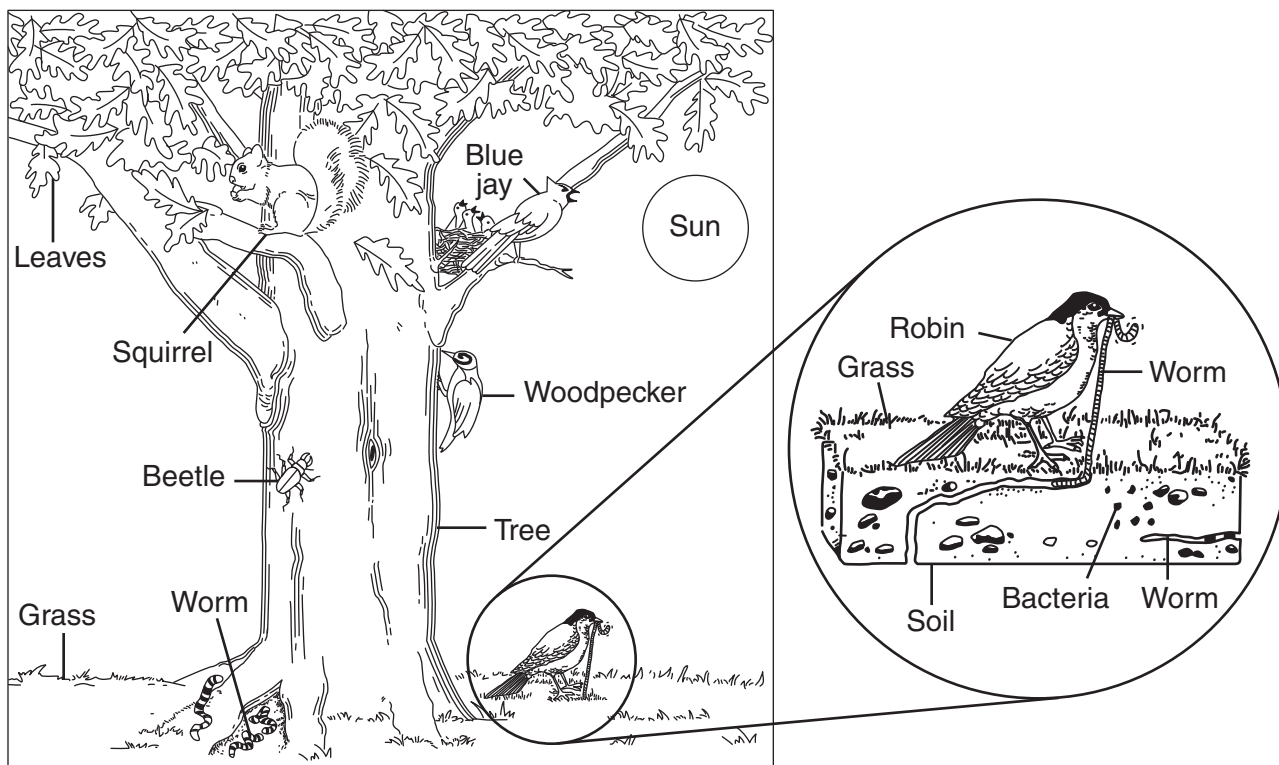


Identify *two* resources for which plant species *A* and plant species *B* might compete. [1]

Resource 1: _____

Resource 2: _____

Base your answers to questions 68 through 70 on the diagram below and on your knowledge of science. The diagram shows a portion of an ecosystem.



(Not drawn to scale)

Adapted from: *Project Learning Tree: Environmental Education Activity Guide pre K-8*, American Forest Foundation, Fifth Edition, 1997

68 Identify the original source of energy for this ecosystem. [1]

69 Explain why bacteria in the soil are necessary in this ecosystem. [1]

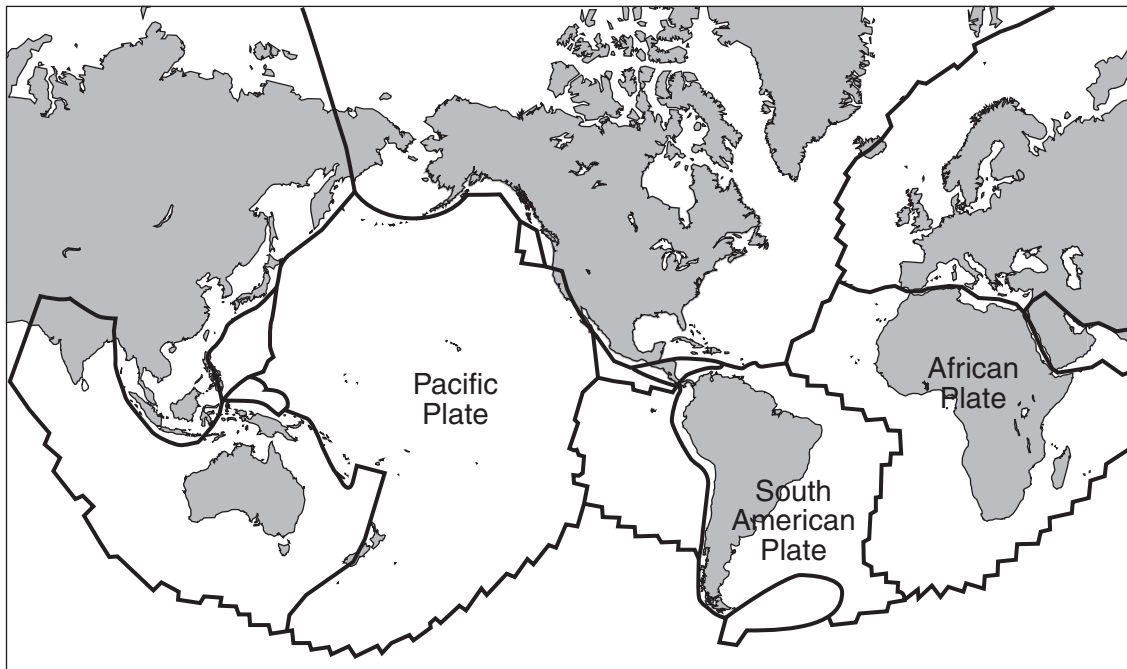
70 Identify *one* predator-prey relationship shown in this diagram. [1]

Predator: _____

Prey: _____

Base your answers to questions 71 and 72 on the map below and on your knowledge of science. The map shows the seven continents and several lithospheric plates. The dark lines between the plates represent the boundaries that separate them. Three of the plates are labeled.

Lithospheric Plates

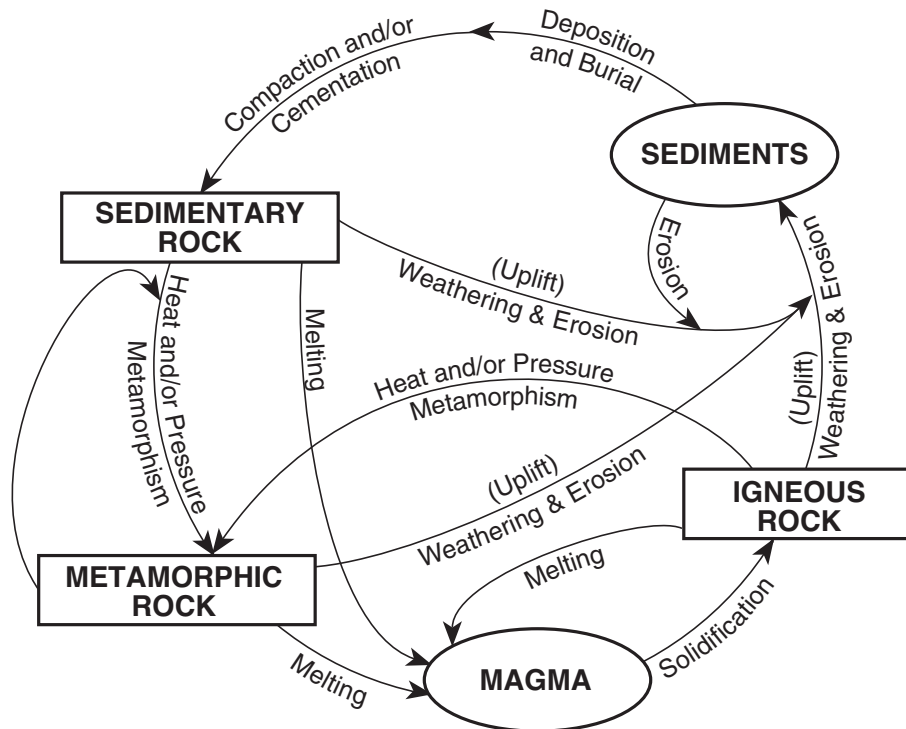


71 Describe *one* piece of evidence shown on the map suggesting that the continents of South America and Africa were once joined together. [1]

72 Identify *one* geologic event or feature that frequently occurs when lithospheric plates collide (converge) or move apart from each other (diverge). [1]

Base your answers to questions 73 and 74 on the diagram of the rock cycle below.

Rock Cycle in Earth's Crust



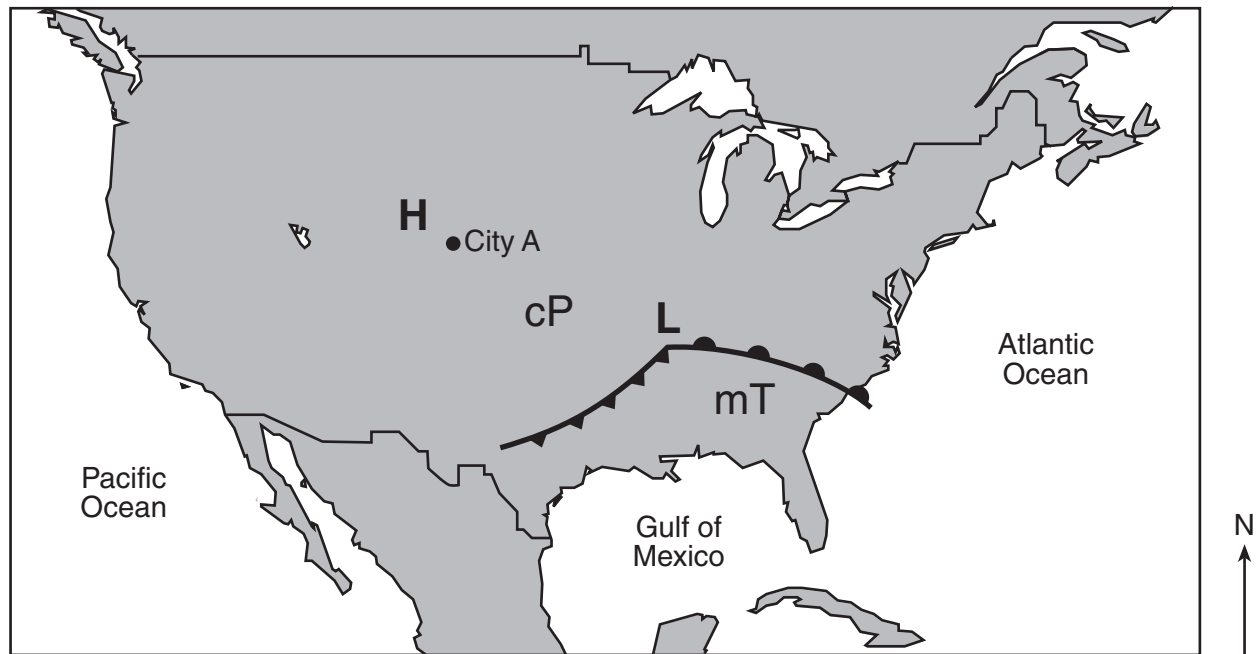
73 Identify *two* processes labeled in this rock cycle that must occur in order to change any rock into an igneous rock. [1]

_____ and _____

74 Identify *two* processes labeled in this rock cycle that change igneous rock into sediments. [1]

_____ and _____

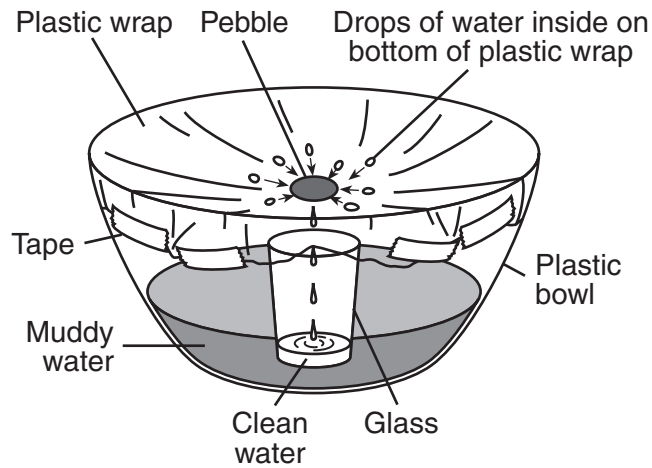
75 The weather map below shows the locations of a high-pressure center (**H**) and a low-pressure center (**L**), air masses cP and mT, and city A.



Key	
cP	Cold, dry air mass
mT	Warm, moist air mass
	Cold front
	Warm front

Explain why city A has clear sky conditions. [1]

Base your answers to questions 76 through 78 on the diagram below and on your knowledge of science. The diagram shows a model of the water cycle.

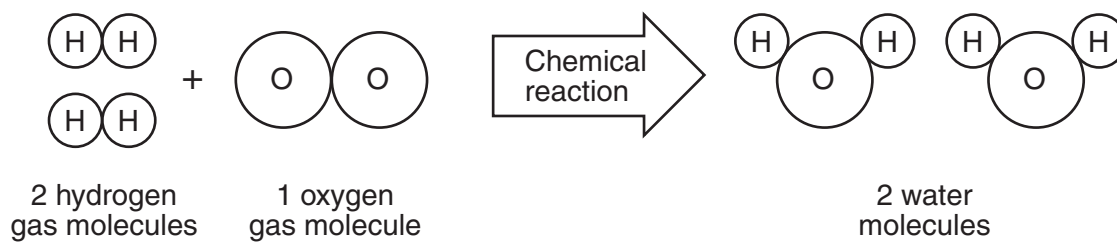



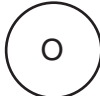
76 Explain why the level of the muddy water will *decrease* slightly if the model is left in a sunny location for several days. [1]

77 What water cycle process is represented by the drops of clean water falling into the glass? [1]

78 Explain why the amount of sediment in the muddy water will remain the same. [1]

79 The diagram below shows the formation of two water molecules.



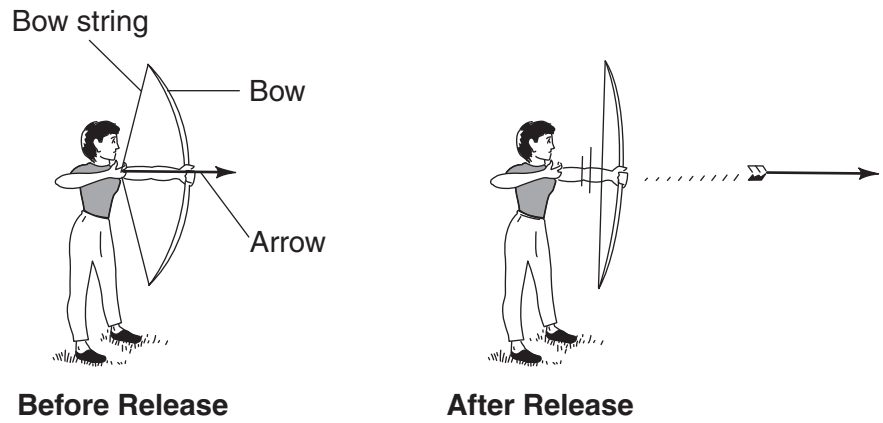
Key	
	Hydrogen atom
	Oxygen atom

(Not drawn to scale)

How many atoms combined to form the two water molecules? [1]

_____ **atoms**

Base your answers to questions 80 and 81 on the diagrams below and on your knowledge of science. The diagrams show a student using a bow and arrow. The bow string on the bow is used to propel the arrow forward.



80 State *one* change the student could make, without changing the angle at which the bow is held, so that the arrow would travel a greater distance. [1]

81 Describe how gravity affects the path of the arrow after it has been released. [1]

GRADE 8 INTERMEDIATE-LEVEL SCIENCE

For Teacher Use Only Part II Credits

Question	Maximum Credit	Credit Allowed
46	2	
47	1	
48	1	
49	2	
50	1	
51	1	
52	1	
53	1	
54	1	
55	2	
56	2	
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	1	
71	1	
72	1	
73	1	
74	1	
75	1	
76	1	
77	1	
78	1	
79	1	
80	1	
81	1	
Total	40	