

THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL SCIENCE TEST

WRITTEN TEST

SPRING 2009

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 38 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.

<p style="text-align: center;">Sample Question</p> <p>Earth gets most of its light from</p> <ul style="list-style-type: none">(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.

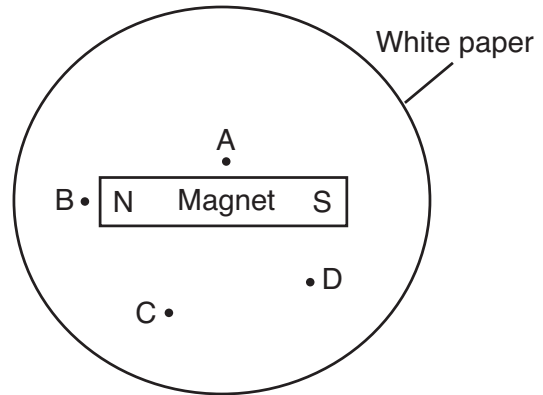
When you are told to start working, turn the page and begin with question 1. Work carefully and answer all of the questions in Part I.

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

Part I

- 1 The Sun appears larger than other stars because of its
- (1) yellow color
 - (2) high temperature
 - (3) distance from Earth
 - (4) chemical composition
- 2 The longitude of a location determines which time zone it is in. Different time zones are the result of
- (1) Earth's rotation
 - (2) Earth's revolution
 - (3) the Moon's rotation
 - (4) the Moon's revolution
- 3 In New York State, an observer will usually see the Sun rise in the
- (1) north
 - (2) south
 - (3) east
 - (4) west
- 4 Which weather event usually includes heavy precipitation, strong winds, and surface air temperatures below 0°C ?
- (1) blizzard
 - (2) hurricane
 - (3) thunderstorm
 - (4) tornado
- 5 Which process must occur for clouds to form?
- (1) erosion
 - (2) conduction
 - (3) condensation
 - (4) precipitation
- 6 All matter is made up of particles called
- (1) cells
 - (2) molecules
 - (3) atoms
 - (4) compounds
- 7 Which sequence of energy transformations occurs after a battery-operated flashlight is turned on?
- (1) electrical \rightarrow light \rightarrow chemical
 - (2) electrical \rightarrow chemical \rightarrow light
 - (3) chemical \rightarrow light \rightarrow electrical
 - (4) chemical \rightarrow electrical \rightarrow light

- 8 The diagram below shows a bar magnet resting on top of a piece of white paper. The north and south poles of the magnet are labeled N and S. Points A, B, C, and D represent four locations around the magnet.

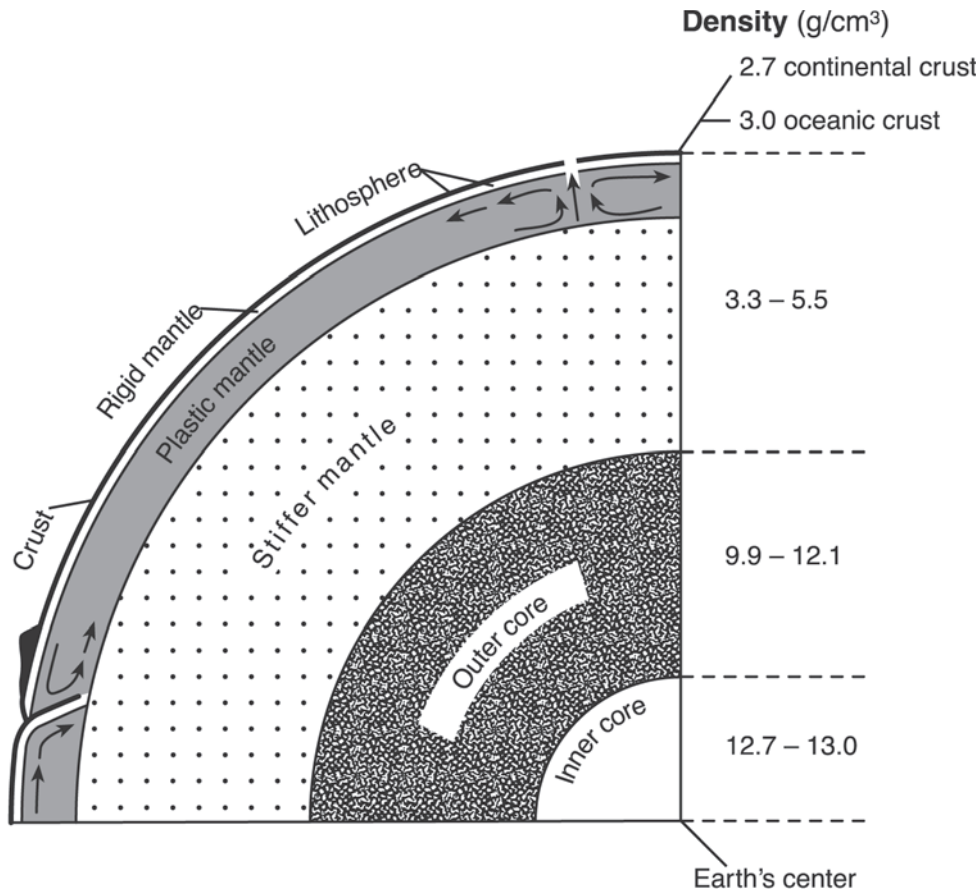


- If iron filings were sprinkled evenly across the entire paper circle, at which location would the greatest concentration of iron filings be found after 30 seconds?
- (1) A
 - (2) B
 - (3) C
 - (4) D
- 9 Which energy source is considered *nonrenewable*?
- (1) oil
 - (2) moving water
 - (3) sunlight
 - (4) biomass
- 10 A boy pulls a sweater off over his head. His hair is attracted to the sweater due to
- (1) a magnetic force
 - (2) a heat transfer
 - (3) a chemical change
 - (4) an electrical charge
- 11 The gravitational force between two objects depends on the distance between the objects and each object's
- (1) mass
 - (2) volume
 - (3) pressure
 - (4) temperature

12 Limestone is a sedimentary rock and marble is a metamorphic rock. Even though limestone and marble have the same chemical makeup, they are classified as different rocks because they

- (1) were formed from different fossils
- (2) took different amounts of time to form
- (3) formed at different times
- (4) formed by different methods

Base your answers to questions 13 and 14 on the cross section below and on your knowledge of science. The cross section compares the densities of different Earth layers.



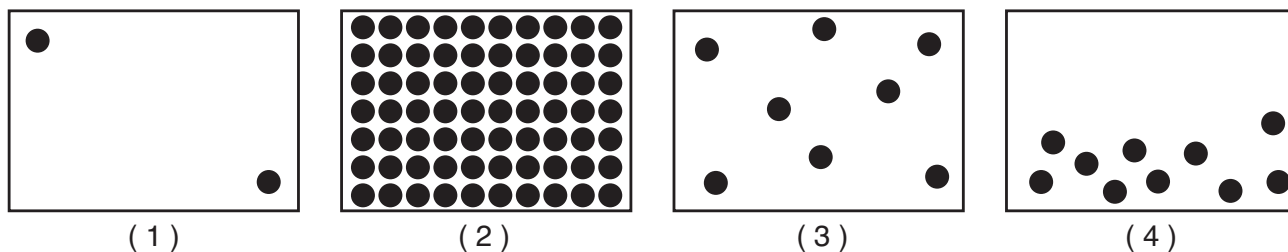
13 Which Earth layer is most dense?

- (1) plastic mantle
- (2) stiffer mantle
- (3) outer core
- (4) inner core

14 Convection currents, which may be the driving force for the movement of lithospheric plates, are mostly found in Earth's

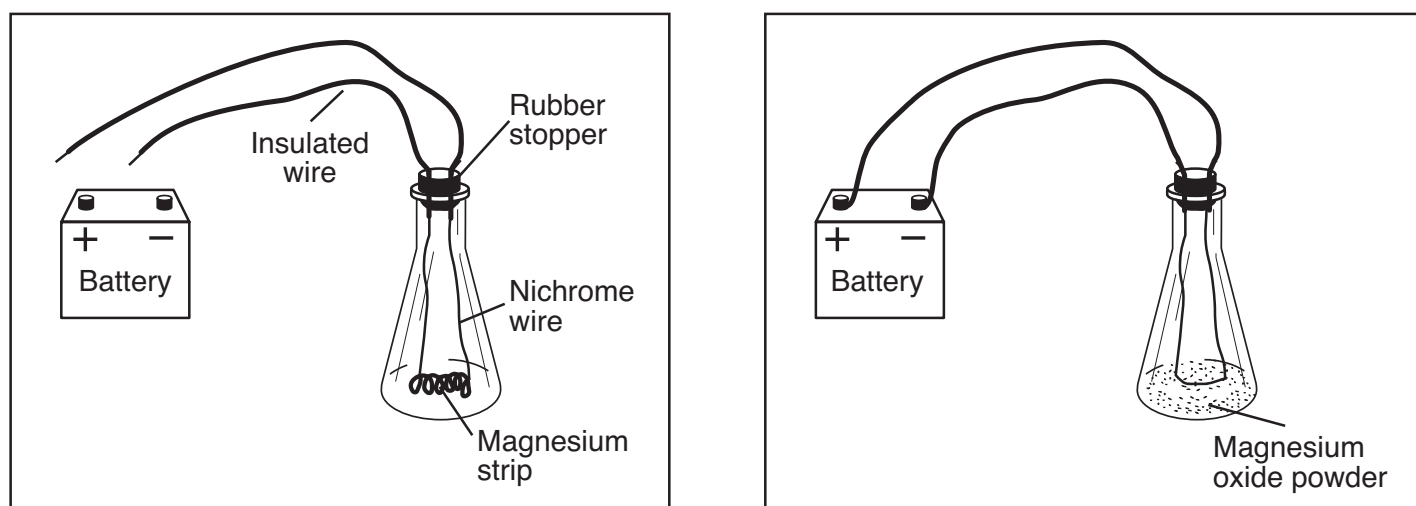
- (1) crust
- (2) plastic mantle
- (3) outer core
- (4) inner core

15 Which diagram best represents molecules of matter in the solid phase?



Base your answers to questions 16 and 17 on the information and diagram below and on your knowledge of science.

During an experiment, a strip of magnesium (Mg) metal wrapped around a nichrome (nonreactive) wire is placed in a flask. The nichrome wire outside the flask is insulated. The contents of the flask are sealed off from the environment with a rubber stopper. When the nichrome wire is connected to a battery, an electric current passes through the wire, causing a white powder called magnesium oxide (MgO) to form.



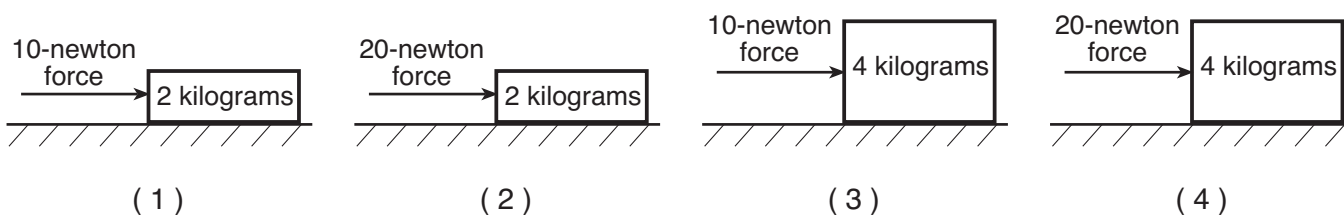
16 The flask and its contents had a mass of 120 grams before the experiment and a mass of 120 grams after the experiment. Which conclusion can best be made from these measurements?

- (1) A phase change took place.
- (2) Energy was destroyed.
- (3) Matter was conserved.
- (4) New elements were formed.

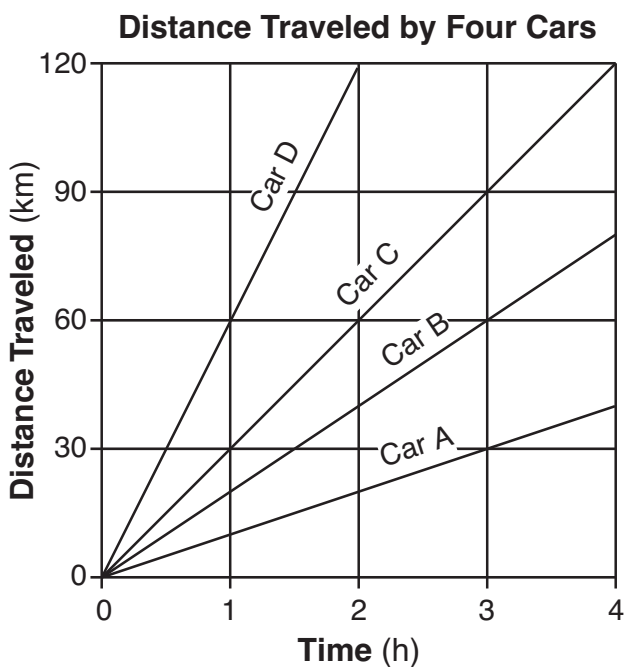
17 The chemical change that occurred in the flask is most similar to

- (1) burning a piece of coal
- (2) freezing water in a container
- (3) breaking a piece of wood into many pieces
- (4) bending a wire to form a hook

18 The diagrams below show smooth blocks of wood being pushed across the same surface. The mass of the block and amount of force applied are labeled in each diagram. In which diagram would the block of wood have the greatest acceleration?



19 The graph below shows the distance traveled by four cars, A, B, C, and D, over a period of time.



The average speed of a moving object can be determined by using the equation below.

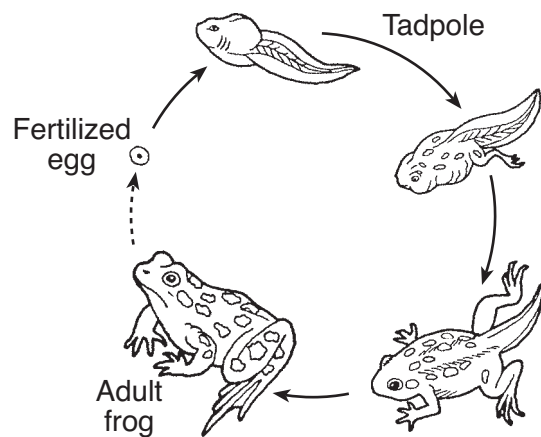
$$\text{average speed} = \frac{\text{distance traveled}}{\text{time}}$$

Which car traveled at an average speed of 20 kilometers per hour?

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

- 20 One important difference between living things and nonliving things is that only living things have
- (1) compounds (3) molecules
(2) elements (4) cells
- 21 All plants and animals have mechanisms that
- (1) transport nutrients
(2) perform photosynthesis
(3) regulate nerves
(4) produce flowers
- 22 What is the major function of the human excretory system?
- (1) eliminate waste materials
(2) respond to stimuli
(3) break down food mechanically
(4) absorb nutrients from food
- 23 The interaction of the skeletal and muscular systems to produce locomotion is coordinated by which human body system?
- (1) circulatory (3) nervous
(2) excretory (4) respiratory
- 24 Which human body system produces the hormones that regulate growth?
- (1) skeletal (3) circulatory
(2) digestive (4) endocrine
- 25 Infections may be caused by
- (1) mutations (3) toxic substances
(2) microorganisms (4) climate changes
- 26 Different species of carnivorous animals that share the same habitat in an ecosystem may
- (1) become decomposers
(2) compete for food
(3) produce their own food
(4) mate with each other

- 27 What is the outermost structure in a plant cell?
- (1) cell membrane (3) cell wall
(2) cytoplasm (4) chloroplast
- 28 In humans, a trait can be determined by one pair or many pairs of
- (1) genes (3) cells
(2) microbes (4) organs
- 29 In which organisms could evolution occur most rapidly?
- (1) humans (3) birds
(2) fish (4) bacteria
- 30 Which process is represented by the diagram below?



- (1) asexual reproduction
(2) ecological succession
(3) photosynthesis
(4) metamorphosis
- 31 In order to survive, all organisms must have
- (1) chlorophyll (3) energy
(2) carbon dioxide (4) blood

32 The diagram below shows four living organisms.



Bird



Cricket



Frog



Worm

(Not drawn to scale)

Which statement about the organisms shown is accurate?

- (1) They are all single celled and have similar organs.
- (2) They are all single celled and have identical organs.
- (3) They are all multicellular and have similar organs.
- (4) They are all multicellular and have identical organs.

33 The chart below identifies the function of several organs found in a human body system.

Organ	Function
nose	moistens and filters air
lungs	gas exchange
diaphragm	muscle that controls air intake

Which human body system performs these functions?

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

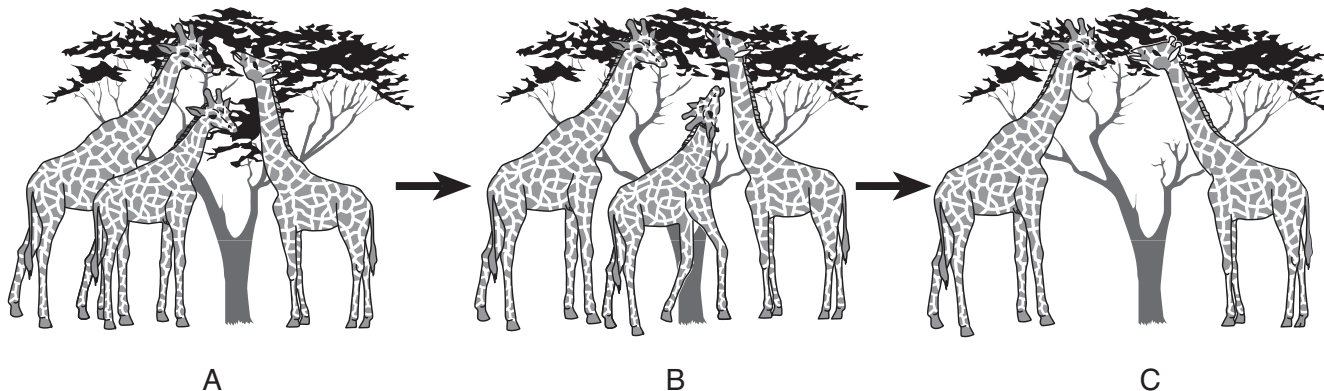
34 In humans, the amount of sugar in blood is controlled by the release of a hormone called insulin. This process is an example of

- (1) depletion
- (2) digestion
- (3) regulation
- (4) excretion

35 Scurvy is a disease that sailors often got on long voyages. It was discovered that scurvy could be prevented by eating oranges and lemons. This suggests that scurvy is a disease caused by

- (1) exposure to sea air
- (2) a nutritional deficiency
- (3) a microorganism
- (4) lack of exercise

36 The diagram below shows a population of adult giraffes over time. Letters A, B, and C represent three time periods.

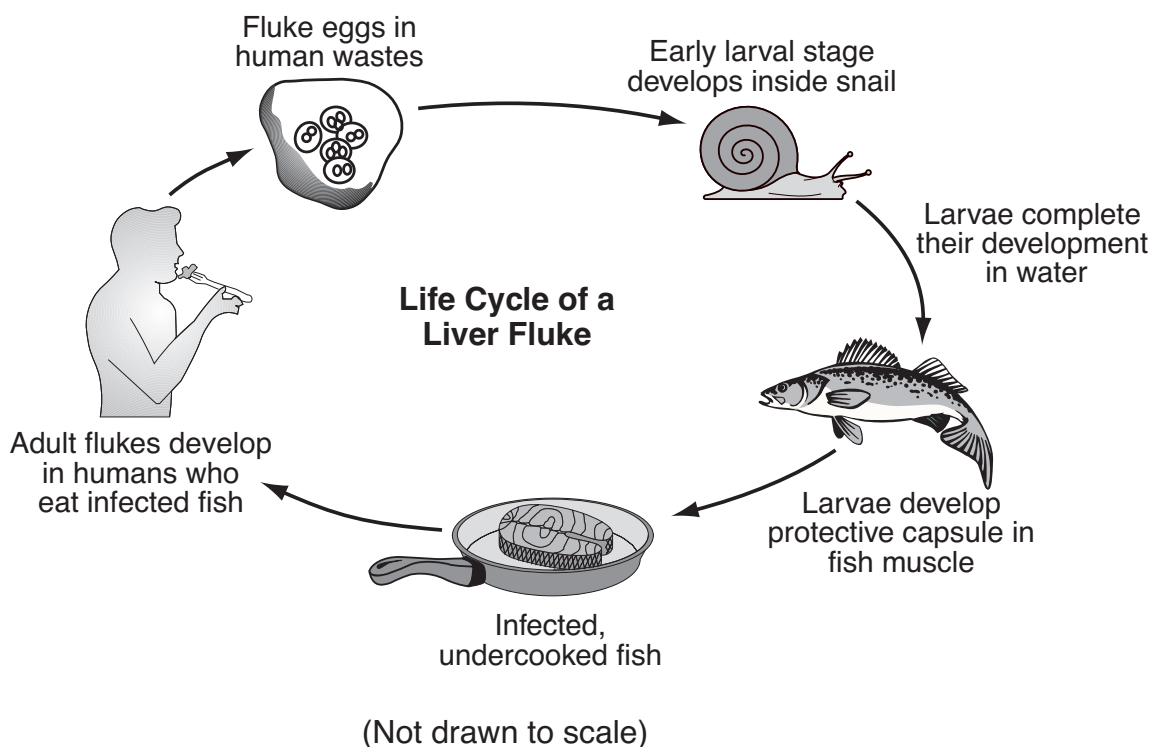


Bernstein et al (1998), Concepts and Challenges in Life Science Teachers Edition (3rd), Globe Fearon, Inc., p. 389 (adapted)

Which process does this diagram best represent?

- (1) ecological succession
- (2) genetic engineering
- (3) natural selection
- (4) asexual reproduction

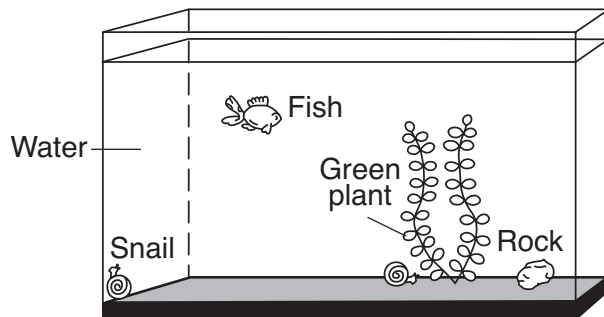
37 The diagram below shows the life cycle of a liver fluke.



This diagram shows that the liver fluke

- (1) depends on other organisms for survival
- (2) dies when it enters the fish
- (3) completes its life cycle in the snail
- (4) survives at very high temperatures

38 The diagram below shows an ecosystem in a fish tank.



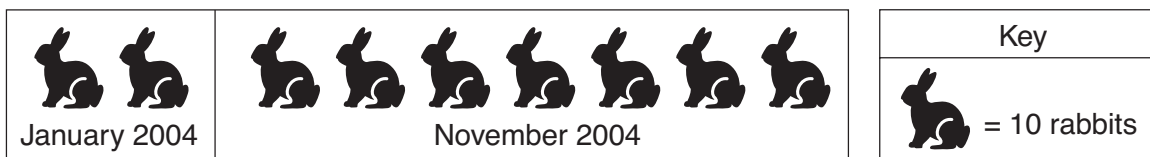
One consumer in this tank is the

- (1) water
- (2) fish
- (3) green plant
- (4) rock

39 Which sequence correctly shows the levels of increasing organization in the human body?

- (1) tissues → cells → organ systems → organs
- (2) cells → tissues → organs → organ systems
- (3) organs → organ systems → cells → tissues
- (4) organ systems → organs → tissues → cells

40 The diagram below shows a rabbit population at two different times.



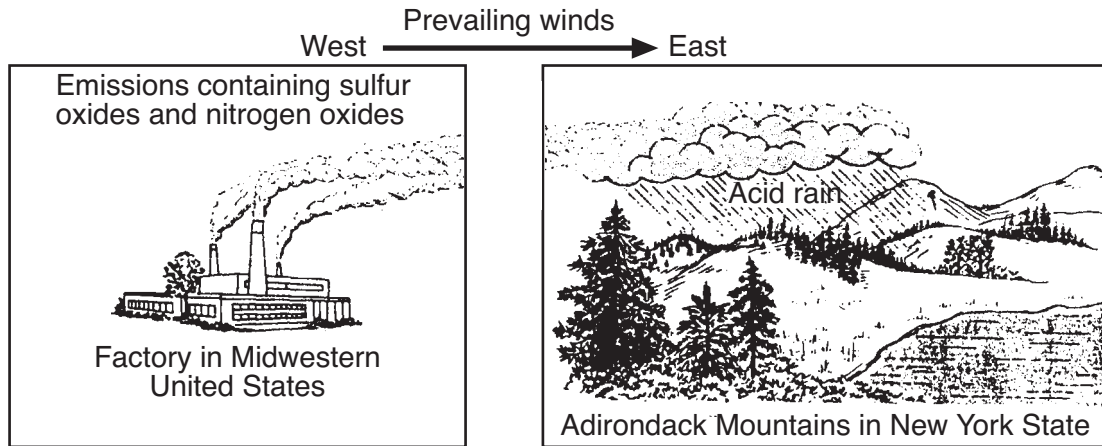
Which environmental factor may have contributed to the increase in the rabbit population?

- (1) decrease in resources
- (2) decrease in predators
- (3) increase in disease
- (4) increase in pollution

41 What is a *disadvantage* of using moving water to produce electricity?

- (1) Power is produced inexpensively.
- (2) Air pollution is produced.
- (3) Oil spills may occur.
- (4) The local ecosystem may be disrupted.

42 The diagram below shows a factory in the Midwest burning coal, the direction of prevailing winds, and an area in New York State.

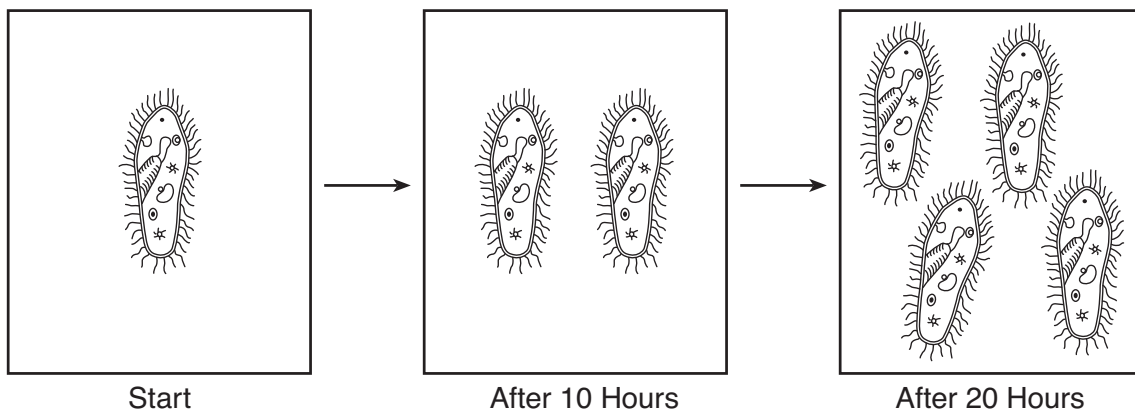


(Not drawn to scale)

Which statement is best supported by the information shown in the diagram?

- (1) Most rain is caused by factories.
- (2) Human activities can cause pollution.
- (3) Acid rain is necessary for forest growth.
- (4) The Adirondack Mountains determine the direction of prevailing winds.

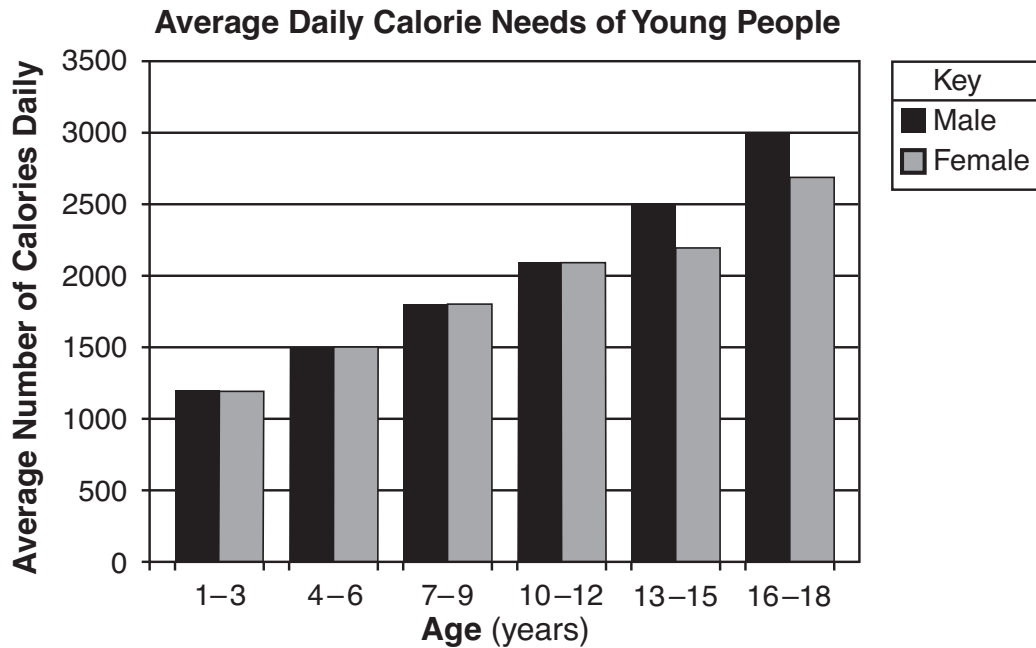
43 The series of diagrams below shows a single-celled organism and its offspring that resulted from cell division over a period of 20 hours.



If the organisms continue to reproduce asexually at this same rate, how many organisms will there be after 30 hours?

- (1) 6
- (2) 7
- (3) 8
- (4) 16

Base your answers to questions 44 and 45 on the graph below, which shows the average number of Calories needed each day by young people.



44 How many more average daily Calories are needed by a 17-year-old male than by a 17-year-old female?

- (1) 300
- (2) 500
- (3) 2700
- (4) 3000

45 Which statement is supported by the graph?

- (1) At age 9, a female needs the same daily Calories as a male.
 - (2) At age 14, a female needs more daily Calories than a male.
 - (3) An 11-year-old child needs twice as many daily Calories as a 6-year-old child.
 - (4) An 8-year-old female needs fewer daily Calories than a 5-year-old male.
-

Part II

Directions (46–83): 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.

Gems and Minerals

There are about 4,000 types of minerals on Earth. Of these, only about 15 are used to make gems. Gems are minerals that may have been cut and polished to make them sparkle.

The diamond is the hardest natural substance we know. Diamonds form deep under ground at very high temperatures and pressure conditions caused by the overlying thick layers of rock that squeeze the carbon atoms into a tight, strong crystal.

Diamonds might grow under these conditions for 1 billion to 3 billion years and therefore are considered the oldest gemstone. Only about 20 percent of diamonds are made into jewels. Because they are so hard, most diamonds are used to make tools such as dental drills and metal cutters.

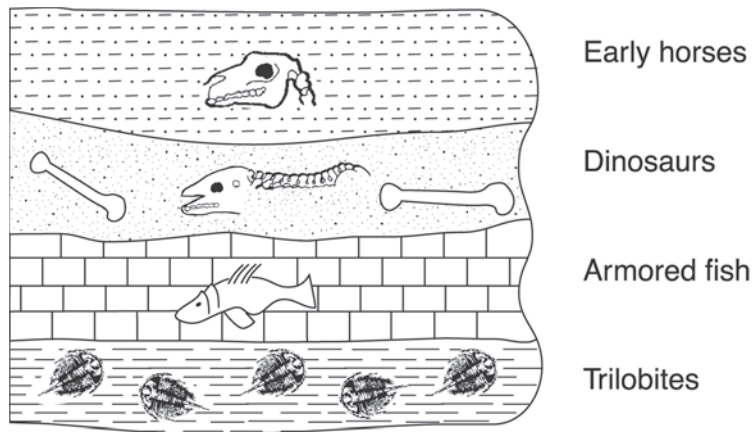
Adapted from Debnam, Betty (1999). "The Mini Page,"
Distributed by Universal Press Syndicate

46 Explain why hardness is a valuable property of some minerals. [1]

47 Identify *one* physical property, other than hardness, that may add to the beauty of a gemstone. [1]

48 When diamonds are shipped to jewelry stores, they are individually wrapped in paper. Explain why the paper is needed to protect each diamond from damage. [1]

Base your answers to questions 49 and 50 on the cross section below and on your knowledge of science. The cross section shows sedimentary rock layers containing fossils. The rock layers have *not* been overturned since they formed.



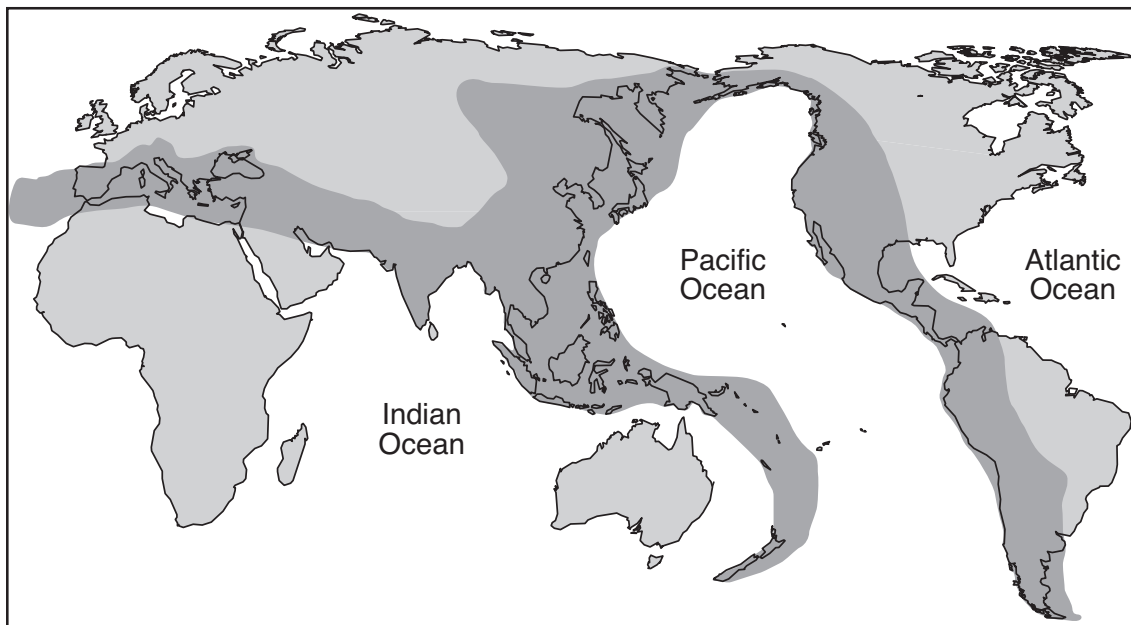
(Not drawn to scale)

49 Explain why the trilobites are considered to be the oldest fossil in this diagram. [1]

50 Explain how this diagram shows that all Earth's rock layers were *not* formed at the same time. [1]

Base your answers to questions 51 and 52 on the map below and on your knowledge of science. The darker shading on the map shows the most active earthquake areas.

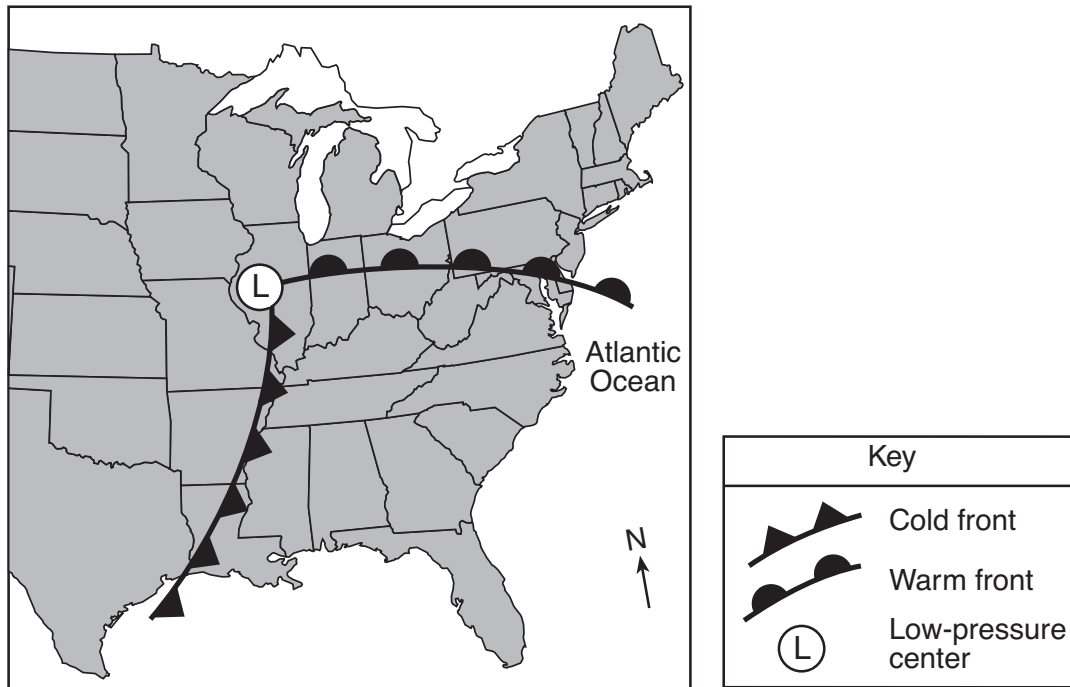
Active Earthquake Areas



51 The most active earthquake areas are associated with the boundaries of lithospheric plates. Explain what happens to the lithospheric plates at these boundaries that causes an earthquake. [1]

52 Identify *one* geologic event, other than an earthquake, that may also occur in the darker shaded areas on the map. [1]

Base your answers to questions 53 and 54 on the weather map below and on your knowledge of science. The map shows a low-pressure system centered over the central portion of the United States in mid-July.



53 What weather condition is most likely occurring at the fronts shown on this weather map? [1]

54 In which compass direction will this low-pressure center most likely move? [1]

Base your answers to questions 55 and 56 on the data table below and on your knowledge of science. The data table shows the concentration of carbon dioxide in Earth's atmosphere for a period of 250 years.

Atmospheric Concentration of Carbon Dioxide

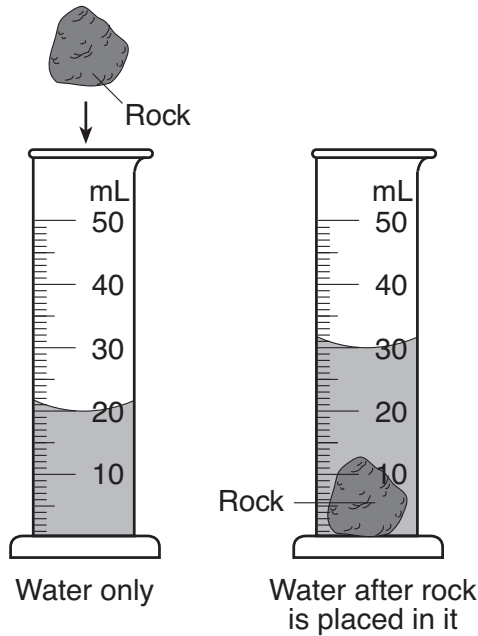
Year	Carbon Dioxide Concentration (parts per million)
1750	282
1800	283
1850	290
1900	297
1950	312
2000	378

Source: Oak Ridge National Laboratory,
Carbon Dioxide Information Analysis Center

55 Explain why many scientists are concerned about the increased concentration of carbon dioxide and other greenhouse gases in Earth's atmosphere. [1]

56 State *one* specific action that humans can take to reduce the rate of increase in the concentration of carbon dioxide in Earth's atmosphere. [1]

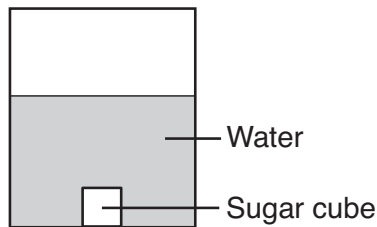
57 The diagram below shows a rock being placed in a graduated cylinder containing water.



What is the volume of the rock? **Note:** 1 mL = 1 cm³. [1]

_____ cm³

58 The diagram below shows a sugar cube that has been placed in a container of water. The sugar cube will dissolve in the water.

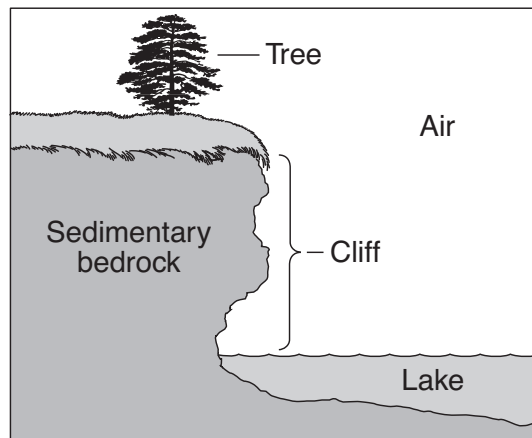


Describe *two* ways to make this sugar cube dissolve more quickly in the water. [2]

(1) _____

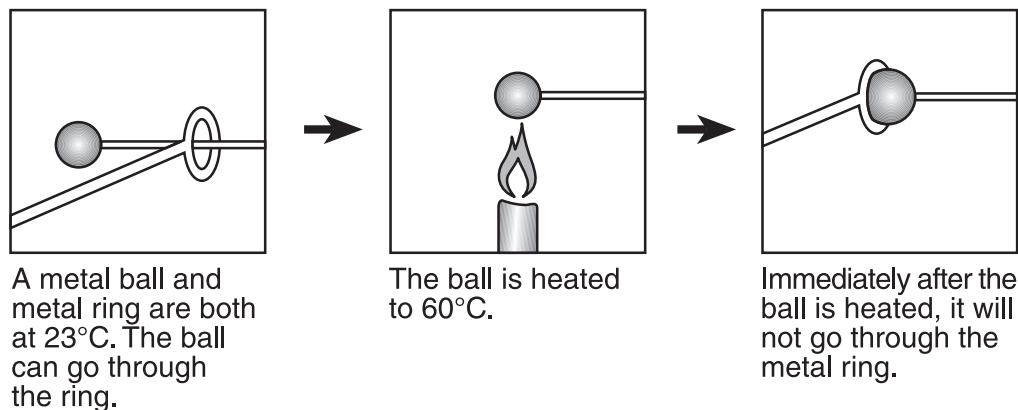
(2) _____

59 The cross section below shows sedimentary bedrock along the shore of a lake.



Identify the labeled part of the cross section that belongs to Earth's hydrosphere. [1]

Base your answers to questions 60 and 61 on the diagram below and on your knowledge of science. The diagram shows a sequence of events. The ball and ring are made of the same metal.

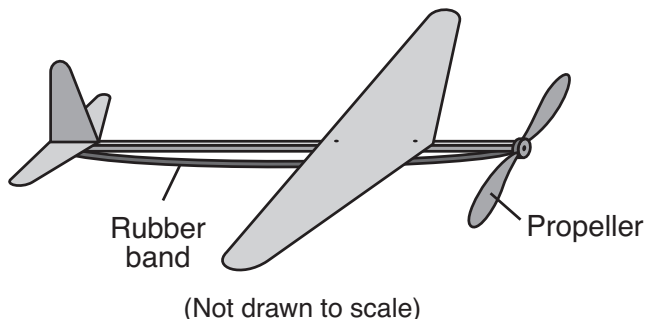


60 Describe what can be done so that the metal ball will again go through the ring. [1]

61 State the relationship between the temperature of the metal ball and the speed of the molecules moving in the ball. [1]

Base your answers to questions 62 and 63 on the information and diagram below and on your knowledge of science.

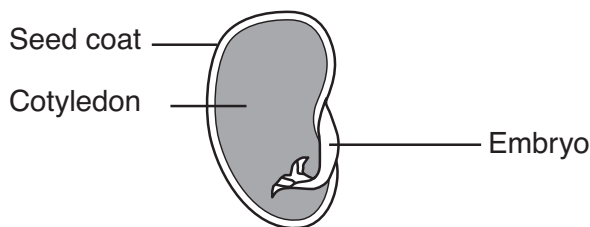
The diagram below shows a toy airplane. The propeller is turned twenty times, which twists the rubber band connected to it. When the propeller is released, the rubber band unwinds and the propeller turns at a high speed, enabling the airplane to fly.



62 What type of energy results when the rubber band unwinds and the propeller turns, enabling the plane to fly? [1]

63 Identify *one* change that could be made that would make the toy airplane fly at a different speed. [1]

64 The diagram below shows a cross section of a bean seed. Three parts of the seed are labeled.



The function of the cotyledon is to provide food for the embryo. Explain why the cotyledon is *not* needed once the bean plant matures. [1]

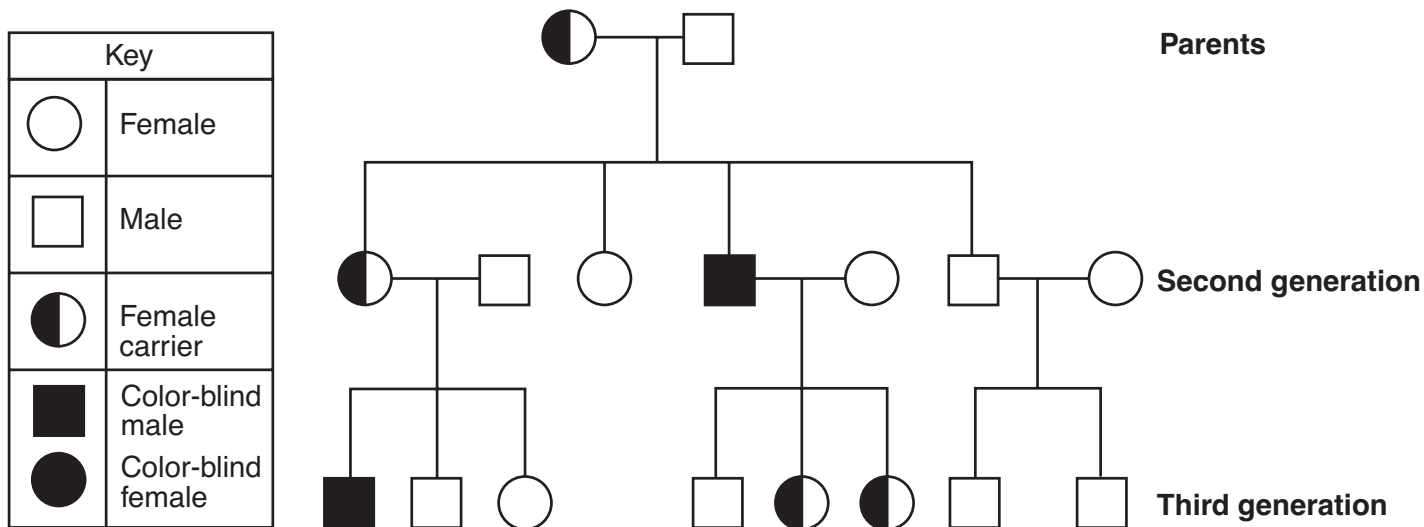
Base your answers to questions 65 and 66 on the information and chart below and on your knowledge of science.

Inheritance of Color Blindness

Gender in humans is determined by a pair of sex chromosomes. A female has two X chromosomes and a male has one X and one Y chromosome. A recessive gene that causes color blindness is located on the X chromosome. When a male inherits this gene, he will be color-blind because the Y chromosome does not contain a gene for color blindness.

In order for a female to be color-blind, she must inherit the recessive gene on both X chromosomes. If she has the gene on only one chromosome, she is *not* color-blind. She is called a carrier because she can pass this gene along to her offspring. The pedigree chart shows the children and grandchildren of a female carrier and a male who is *not* color-blind.

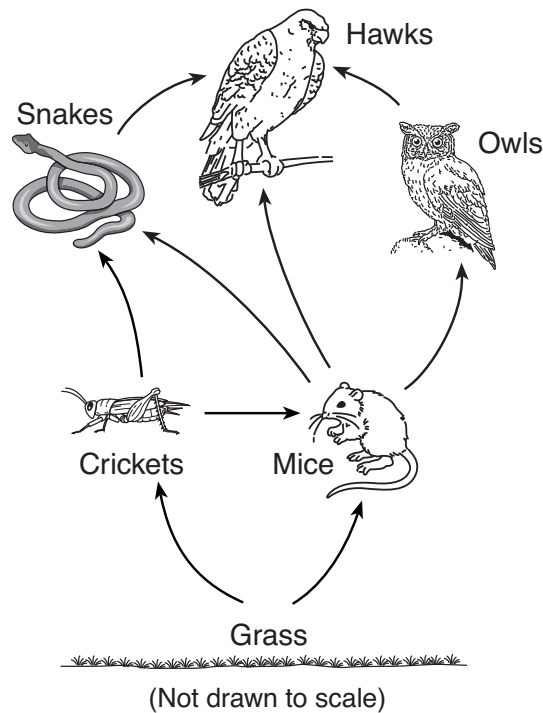
Pedigree Chart for Color Blindness



65 How many children did the original parents have? [1]

66 What is the total number of children and grandchildren who are color-blind in this family? [1]

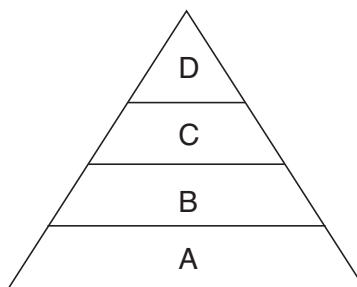
Base your answers to questions 67 through 69 on the food web below and on your knowledge of science.



67 Identify the producer in this food web. [1]

68 Explain why mice are classified as omnivores in this food web. [1]

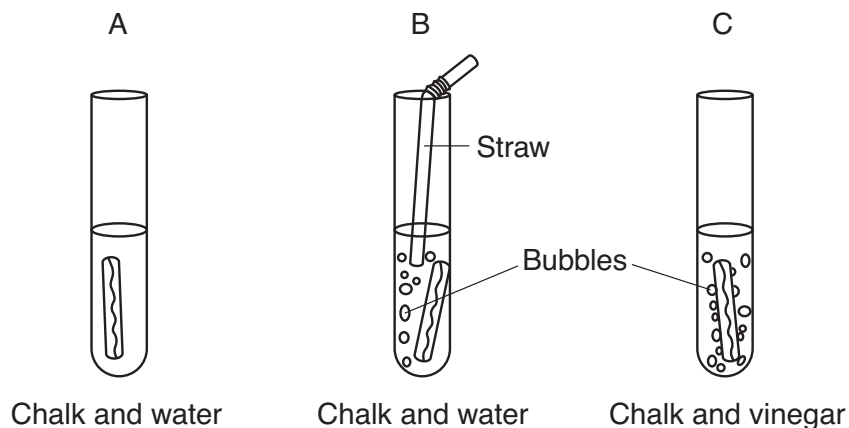
69 Letters A, B, C, and D represent different energy levels in the energy pyramid below.



Identify *one* organism labeled in the food web that could be placed on the energy pyramid at level B. [1]

Base your answers to questions 70 through 72 on the information below and on your knowledge of science.

An experiment was conducted to observe the effects of acid on chalk, a form of calcium carbonate. Three pieces of chalk were carved with the same pattern and placed in test tubes *A*, *B*, and *C*. Equal volumes of water were added to test tubes *A* and *B*. The student blew through a straw into test tube *B* for five minutes, producing bubbles. An equal volume of vinegar (acetic acid) was added to test tube *C* and bubbles were produced.



50 Terrific Science Experiments, Frank Schaffer Publications, p. 71 (adapted)

The next day, the student observed and recorded the results shown in the data table below.

Observations of Chalk in Test Tubes A, B, and C

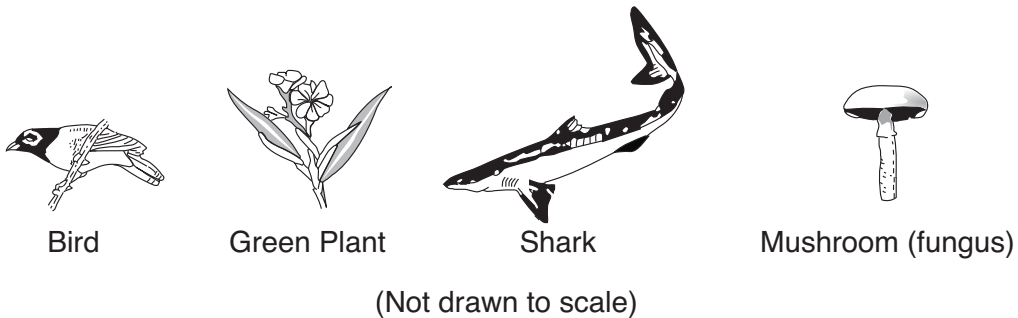
Test Tube	Observations
A	no change observed in the chalk
B	chalk slightly smaller and carvings in chalk reduced
C	chalk much smaller and carvings in chalk no longer visible

70 What was the purpose of test tube A in this experiment? [1]

71 Carbon dioxide in the air dissolves in rain as it falls to Earth. This results in the formation of carbonic acid, a weak acid. Explain why the student blowing into test tube *B* is similar to the process of forming slightly acidic rain. [1]

72 Many statues and monuments are made of limestone, another form of calcium carbonate. Some pollutants in the atmosphere can combine with rain to form acid rain. Acid rain can be as acidic as vinegar. Based on the results of this experiment, describe the effect that acid rain can have on these statues and monuments. [1]

73 The diagram below shows four organisms.



Which *two* organisms above belong to the same kingdom? [1]

(1) _____

(2) _____

74 Pea plants can produce round or wrinkled peas. The genes for round and wrinkled peas are:

R = round (dominant)

r = wrinkled (recessive)

Complete the Punnett Square below, which shows a cross between a hybrid round-pea plant (Rr) and a wrinkled-pea plant (rr). [1]

	R	r
r		
r		

Base your answers to questions 75 and 76 on the information about trees below and on your knowledge of science.

Some Benefits of Trees

- Trees offer shade and help protect organisms from the Sun's harmful ultraviolet radiation.
- Trees reduce the amount of carbon dioxide in the atmosphere.
- Trees can be used to make paper products.
- Trees produce oxygen that is used by other organisms in the environment.
- Trees can help protect against strong winds.

75 Identify the process that occurs in trees which helps reduce the amount of carbon dioxide in the atmosphere. [1]

76 Identify *one* benefit, other than those stated above, that trees may provide to organisms in the environment. [1]

Base your answers to questions 77 and 78 on the student investigation described below and on your knowledge of science.

A student is given a ruler and a hand lens and asked to make observations and inferences about a rock sample collected on a field trip. The student wrote the nine statements below.

1. The rock is mostly gray with white speckles on the outside surface.
2. When acid is placed on the rock, a bubbling reaction occurs at the white speckles.
3. The white speckles are probably the mineral calcite.
4. The rock probably formed in a water environment.
5. The rock measures 4 cm wide, 8 cm long, and 2 cm thick.
6. Fossil shells embedded in the rock can be seen with a hand lens.
7. If the rock is broken with a hammer, it will probably contain more fossil shells within its interior.
8. The rock has a smooth surface.
9. The smooth surface is most likely the result of weathering and erosion over many years.

77 List the numbers of the *five* student statements that are observations. [1]

_____, _____, _____, _____, and _____

78 The student concluded that the rock was sedimentary in origin. What information from the student's investigation supports this conclusion? [1]

Base your answers to questions 79 through 81 on the data table below and on your knowledge of science. The table shows the average height in centimeters (cm) and average mass in kilograms (kg) for students age 8 to 16 years old in the United States in 1994.

**Average Height and Average Mass
of Students Age 8 to 16 in the United States in 1994**

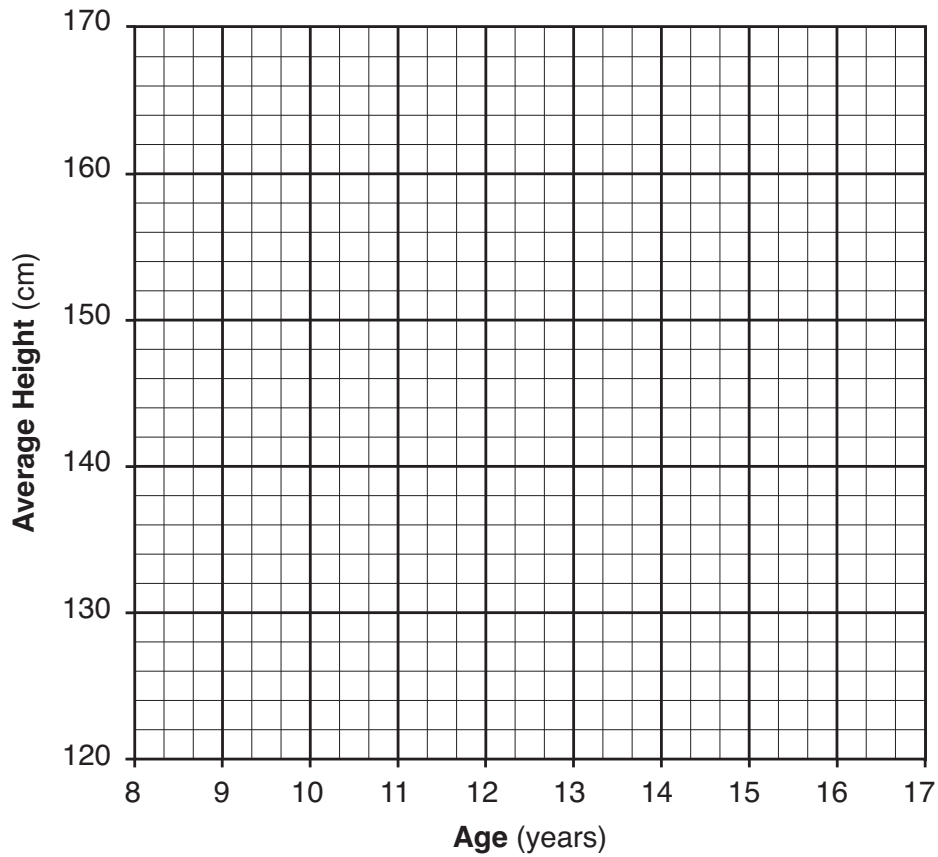
Age (years)	Average Height (cm)		Average Mass (kg)	
	Female	Male	Female	Male
8	127	128	28	27
10	140	140	34	35
12	152	154	46	45
14	161	165	55	56
16	163	175	57	66

Source: www.halls.md/chart/child-growth.pediatric.htm

79 What is the relationship between the average mass of males and their age? [1]

80 Use the data in the table to construct a line graph on the grid below. Using an **X** for each point, plot the data for the age and average height of females. Connect the **Xs** with a line. [2]

**Average Height of Female Students
Age 8 to 16 in the United States in 1994**

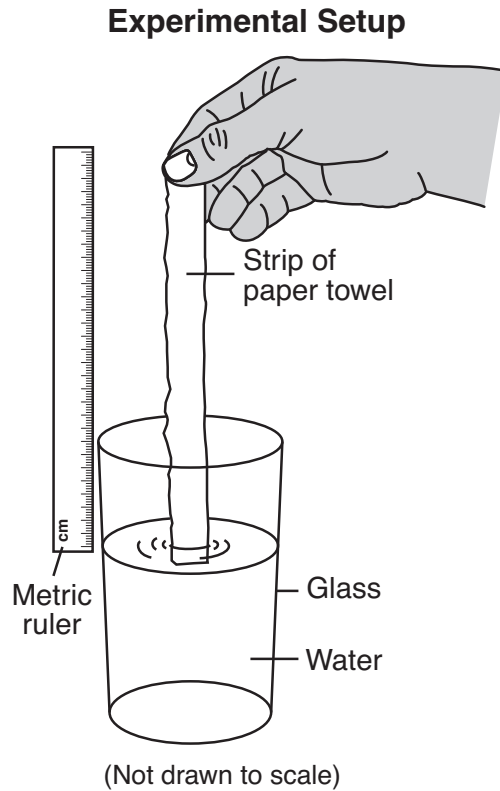


81 Based on the data, estimate the average height of an 11-year-old female. [1]

_____ **cm**

Base your answers to questions 82 and 83 on the information below and on your knowledge of science.

An experiment was done to study the amount of capillary action that occurs in a certain type of paper towel. Capillary action is the upward movement of liquid through tiny spaces. A strip of paper towel was held with one end in a glass of water. The water height in the towel was recorded every five seconds. Three trials were done using the same type of towel. The diagram shows the experimental setup and the data table shows the results of the experiment.



Data Table

Time Paper Towel is in the Water (sec)	Water Height in Towel (cm)			Average Water Height in Towel (cm)
	Trial			
	1	2	3	
5	4	3	2	3
10	5	4	4	4
15	5	6	5	5
20	6	6	6	6
25	7	6	7	7
30	8	7	8	8

82 Identify *one* factor that should remain constant in all three trials of this experiment. [1]

83 State *one* conclusion that can be drawn from the results of this experiment. [1]

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	2	
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	2	
81	1	
82	1	
83	1	
Total	40	