

THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL TEST

SCIENCE

WRITTEN TEST

MAY 2006

Name _____

School _____

The questions on this test measure your knowledge and understanding of science. The test has two parts. Both parts are contained in this test booklet.

Part I consists of 45 multiple-choice questions. Record your answers to these questions on the separate answer sheet. Use only a No. 2 pencil on your answer sheet.

Part II consists of 28 open-ended questions. Write your answers to these questions in the spaces provided in this test booklet.

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

You will have two hours to answer the questions on this test.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Part I

DIRECTIONS

There are 45 questions on Part I of the test. Each question is followed by three or four choices, numbered 1 through 4. Read each question carefully. Decide which choice is the best answer. On the separate answer sheet, mark your answer in the row of circles for each question by filling in the circle that has the same number as the answer you have chosen.

Read the sample question below:

Sample Question

Earth gets most of its light from

- (1) the stars
- (2) the Sun
- (3) the Moon
- (4) other planets

The correct answer is **the Sun**, which is choice number **2**. On your answer sheet, look at the box showing the row of answer circles for the sample question. Since choice number **2** is the correct answer for the sample question, the circle with the number **2** has been filled in.

Answer all of the questions in Part I in the same way. Mark only one answer for each question. If you want to change an answer, be sure to erase your first mark completely. Then mark the answer you want.

You will not need scrap paper. You may use the pages of this test booklet to work out your answers to the questions.

You may use a calculator if needed.

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

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

Part I

- 1 Young frogs do not resemble adult frogs. Which term is given to this pattern of development in frogs?
- (1) asexual reproduction
 - (2) cloning
 - (3) metamorphosis
 - (4) biological adaptation
- 2 The streaks in the time-lapse photograph below show the apparent motion of the stars around the North Star during one hour.

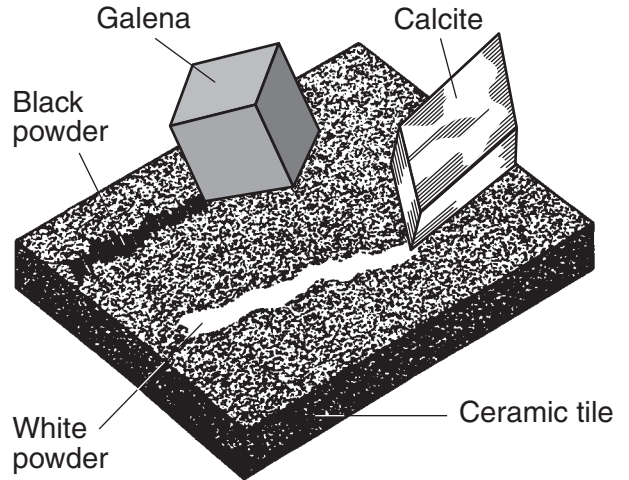


Source: Photograph by Verkes Observatory

This apparent motion of the stars can best be explained by Earth's

- (1) rotation on its axis
 - (2) tilted axis
 - (3) revolution around the North Star
 - (4) changing distance from the North Star
- 3 In addition to oxygen, which gases make up the largest percentage of Earth's atmosphere?
- (1) hydrogen, helium, and water vapor
 - (2) hydrogen, methane, and ozone
 - (3) carbon dioxide, water vapor, and nitrogen
 - (4) carbon dioxide, methane, and helium

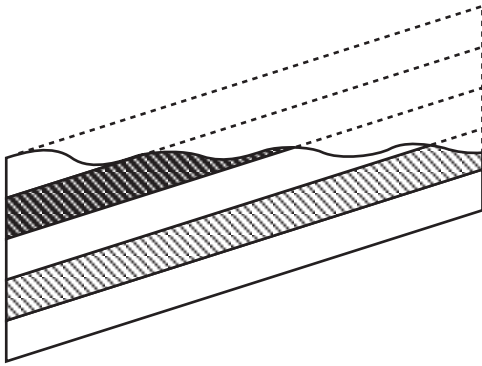
- 4 The diagram below shows a method for determining a physical property of a mineral. The results are shown for two minerals, galena and calcite.



Which property of the galena and calcite is indicated by the color of the powder each leaves on the ceramic tile?

- (1) streak
 - (2) hardness
 - (3) reaction to an acid
 - (4) reaction to a solvent
- 5 The wheels and gears of a machine are greased in order to *decrease*
- (1) potential energy
 - (2) efficiency
 - (3) output
 - (4) friction
- 6 Weather forecasts are more accurate today than in the past due to
- (1) global warming
 - (2) air-quality control
 - (3) plate tectonics
 - (4) use of images from space

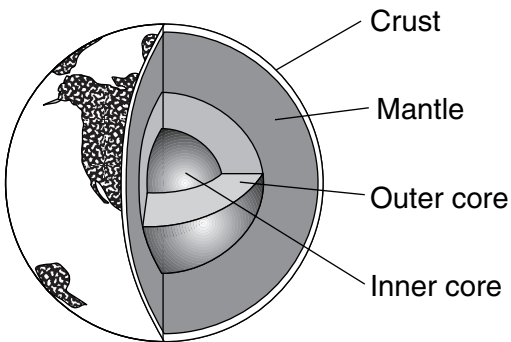
7 The diagram below shows tilted rock layers. The dashed lines represent missing parts of the rock layers.



Which process is most likely responsible for the removal of the missing parts of the rock layers?

- (1) erosion
- (2) deposition
- (3) earthquakes
- (4) faulting

Base your answers to questions 8 and 9 on the diagram below, which shows a model of Earth's interior.



(Not drawn to scale)

8 What information did scientists study in order to develop this model?

- (1) recordings of earthquake waves
- (2) locations of recent volcanic activity
- (3) core samples from seafloor drillings
- (4) fossils found in rocks

9 Many scientists believe that crustal plate movement occurs because of convection cells contained in Earth's

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

10 Rocks are classified as igneous, metamorphic, or sedimentary according to

- (1) their color
- (2) their shape
- (3) how they formed
- (4) the minerals they contain

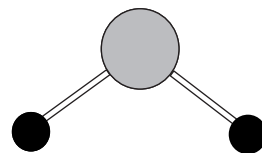
11 Sand and iron particles that are similar in size and color are mixed together in a beaker. What would be the best method of separating the particles?

- (1) Use tweezers to separate them.
- (2) Use a magnet to separate them.
- (3) Add water to the mixture.
- (4) Pour the mixture into a filter.

12 Which action forms a different chemical substance?

- (1) crushing a rock
- (2) burning a piece of wood
- (3) mixing salt and pepper
- (4) melting an ice cube

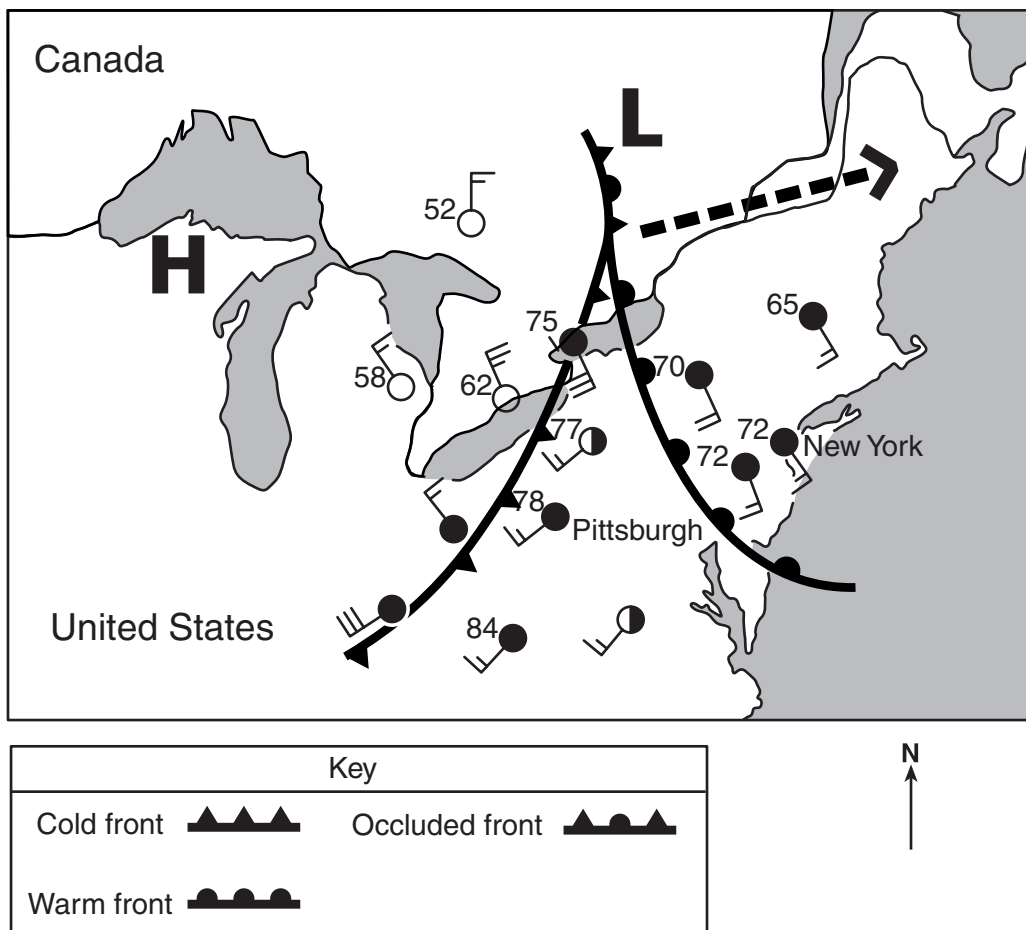
13 The diagram below shows the geometric structure of a molecule of water (H_2O).



What do the symbols  and  represent in the model?

- (1) genetic material
- (2) chemical bonds
- (3) cells
- (4) atoms

Base your answers to questions 14 and 15 on the weather map below, which shows a typical low-pressure system located over part of North America in May. The numbers on the map indicate the air temperature in degrees Fahrenheit.



14 The fronts shown on the weather map are best described as

- (1) boundaries between different air masses
- (2) boundaries between different wind belts
- (3) areas experiencing clear skies with light winds
- (4) areas experiencing extremely warm air temperatures

15 The symbol (----->) shown on the map best represents

- (1) the probable direction of storm movement for the next 12 hours
- (2) ocean currents moving the storm system toward the east
- (3) convection currents associated with the storm system
- (4) the beginning location of the storm system

16 The data table below shows the mass of an 800-gram block of ice as it melts to a 600-gram block of ice.

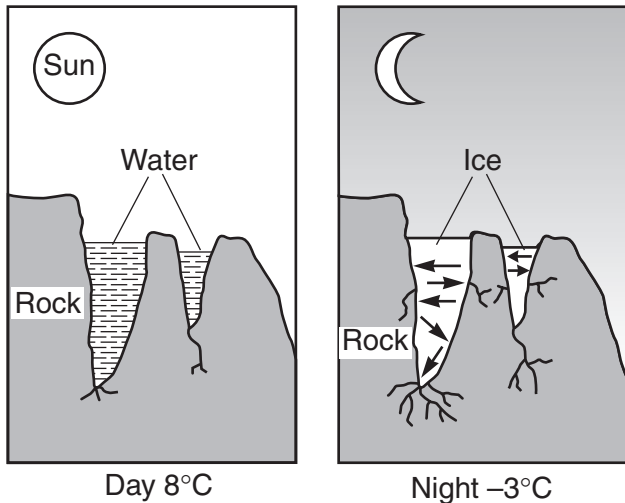
Data Table

| Time (minutes) | Mass of Block of Ice (grams) |
|----------------|------------------------------|
| 0 | 800 |
| 15 | 750 |
| 30 | 700 |
| 45 | 650 |
| 60 | 600 |

If the current rate of melting continues, how many more minutes will be required for the 600-gram block of ice to reach a mass of 400 grams?

- (1) 15
- (2) 30
- (3) 45
- (4) 60

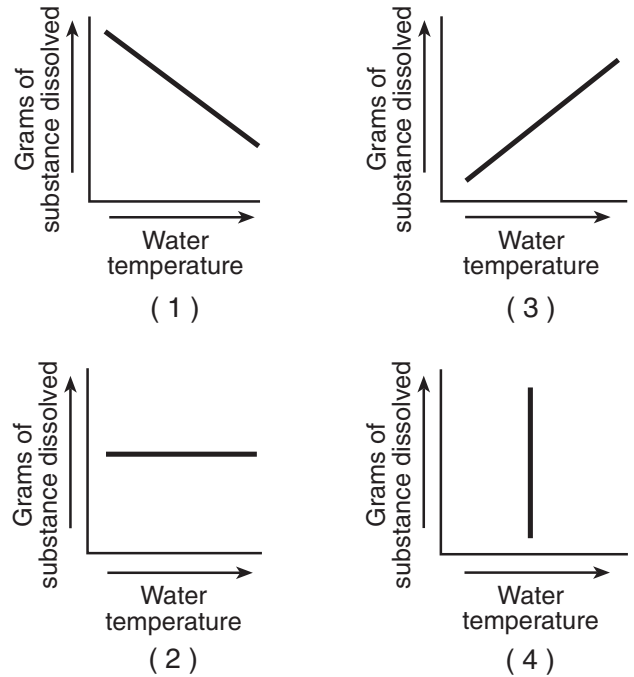
17 The diagrams below show a natural process that weathers rock.



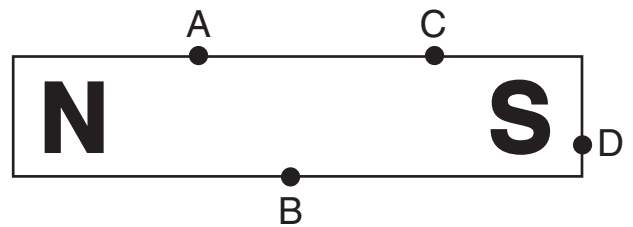
Which statement best explains why this process results in weathering?

- (1) Frozen water acts as a solute.
- (2) Water expands when it freezes.
- (3) The mass of water increases when it freezes.
- (4) Frozen water dissolves most types of rocks.

18 Which graph shows that more grams of a substance can be dissolved in water as the water temperature increases?



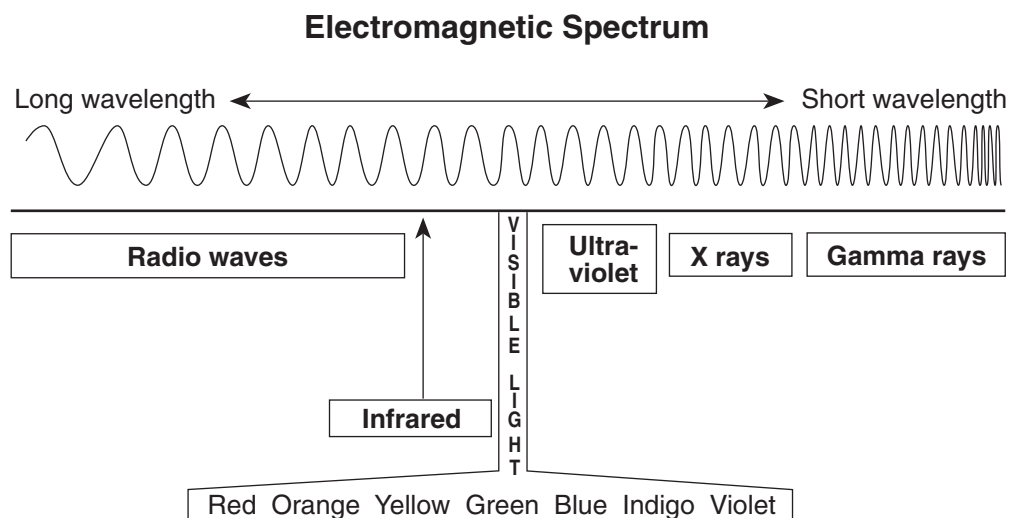
19 Letters A, B, C, and D represent locations on a bar magnet.



Which location has the greatest magnetic force?

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

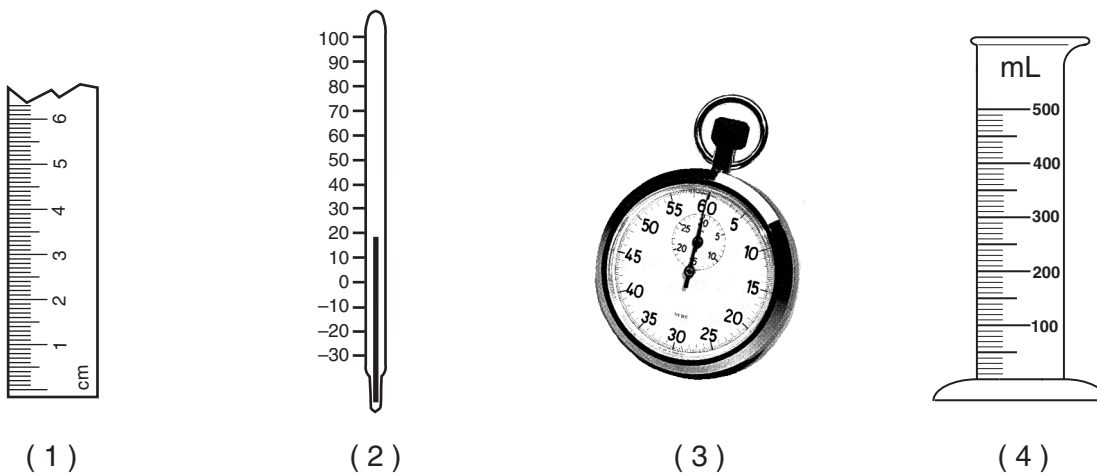
20 The diagram below represents several forms of electromagnetic energy.



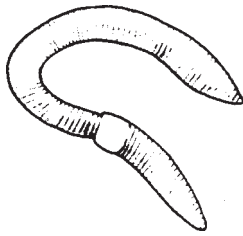
Which feature best distinguishes one form of electromagnetic energy from another?

- (1) color
- (2) wavelength
- (3) surface temperature
- (4) distance traveled

21 Which instrument could be used to determine the volume of an irregularly shaped solid?



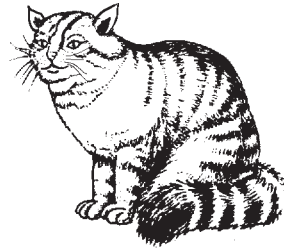
22 The drawings below show four animals.



Worm



Spider



Cat



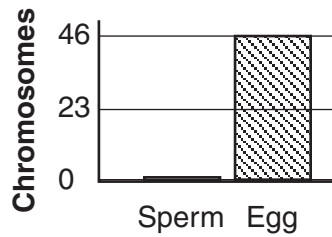
Crab

(Not drawn to scale)

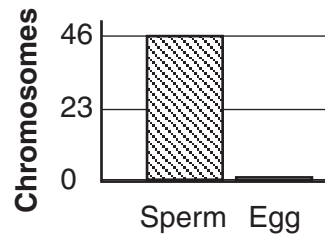
What do all four animals have in common?

- (1) They reproduce asexually.
- (2) They are composed of cells.
- (3) They have similar means of locomotion.
- (4) They have the same internal structures.

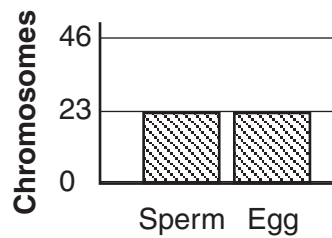
23 In humans, a fertilized egg contains 46 chromosomes. Which bar graph best represents the number of chromosomes contained in the sperm and egg before they united to make the fertilized egg?



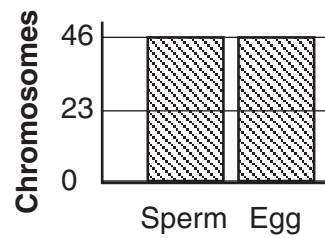
(1)



(3)

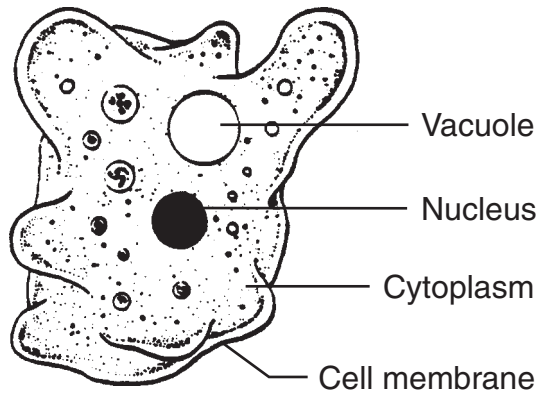


(2)



(4)

24 The diagram below shows a microscopic view of a one-celled organism. Four cell structures are labeled.



Which statement about the labeled structures is correct?

- (1) They normally can be seen without magnification.
- (2) They can survive outside the cell.
- (3) They help carry on life activities within the cell.
- (4) They cause disease within the cell.

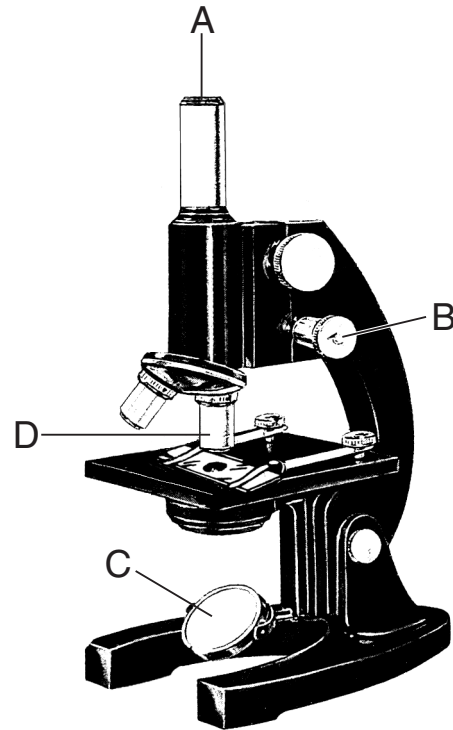
25 In the past, Native American Indians buried dead fish along with corn seeds. This technique was used because the decomposing dead fish would

- (1) provide nutrients for the growing corn plant
- (2) eliminate the need for weeding around the corn plant
- (3) release oxygen for use by the corn plant
- (4) supply all the water needed by the corn plant

26 Although change in multicellular species usually takes thousands of years, some species of bacteria undergo major changes in just a few years. One reason for this difference is that these bacteria

- (1) are microscopic
- (2) do not contain DNA
- (3) reproduce very quickly
- (4) cause infectious diseases

27 The diagram below shows a simple microscope. Four parts of the microscope are labeled A, B, C, and D.



Which part of the microscope is used to bring the image of the object on the slide into focus?

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

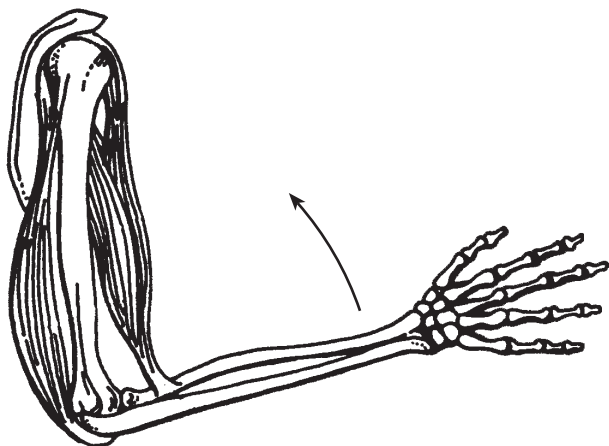
28 Competition is most likely to occur between which two organisms?

- (1) deer and butterflies
- (2) owls and bacteria
- (3) goldfish and rabbits
- (4) grass and strawberry plants

29 Many cells have a nucleus that contains chromosomes. These chromosomes carry genes that are composed of

- (1) hormones
- (2) DNA molecules
- (3) minerals and water
- (4) undigested food molecules

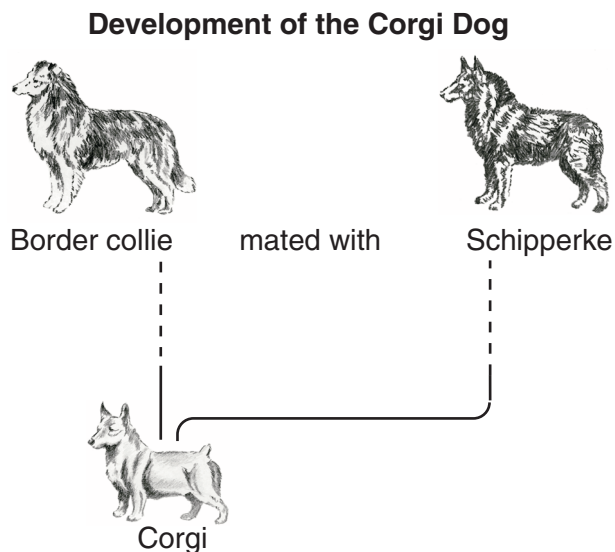
30 The diagram below shows a human arm bending at the elbow.



Which two body systems most directly cause the arm to bend?

- (1) skeletal and muscular
- (2) reproductive and endocrine
- (3) respiratory and excretory
- (4) nervous and digestive

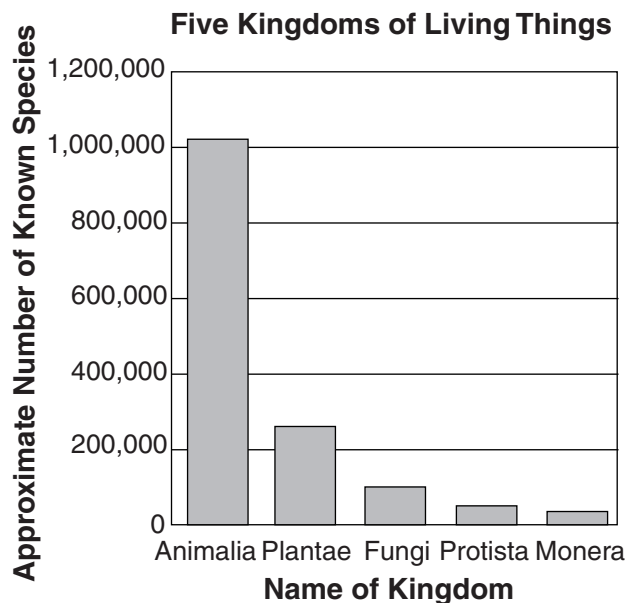
31 The illustration below traces the development of the corgi dog over several generations as a result of human activity.



This is an example of the human activity called

- (1) mutation
- (2) genetic engineering
- (3) selective breeding
- (4) natural selection

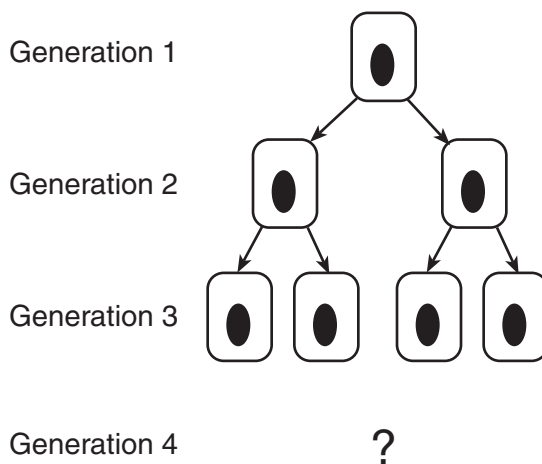
32 The graph below shows the number of known species in the five kingdoms of living things.



Based on the graph, which kingdom contains approximately twice as many known species as the Protista Kingdom?

- (1) Animalia
- (2) Plantae
- (3) Fungi
- (4) Monera

33 The diagram below shows three generations of cell division.



How many cells should exist in the fourth generation?

- (1) 10
- (2) 8
- (3) 6
- (4) 4

Base your answers to questions 34 through 36 on the diagram below and on your knowledge of science. The diagram shows a model of human inheritance.

| | | |
|---|----|----|
| | A | A |
| a | Aa | Aa |
| a | Aa | Aa |

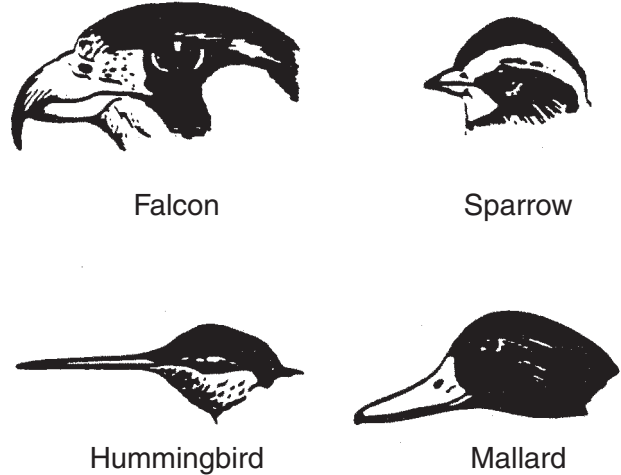
Key
 A = straight hairline (dominant)
 a = peaked hairline (recessive)

- 34 What is this model used to determine?
- (1) the possibility of having twins
 - (2) the probability of a trait being passed on
 - (3) the rate of mutation
 - (4) the production of sex cells
- 35 What is the genetic makeup of the parents?
- (1) AA and aa
 - (2) Aa and Aa
 - (3) AA and AA
 - (4) aa and aa
- 36 Why will Aa individuals have a straight hairline rather than a peaked hairline?
- (1) The peaked hairline occurs only in females.
 - (2) The peaked hairline is a mutation.
 - (3) The straight hairline is recessive.
 - (4) The straight hairline is dominant.

Note that question 37 has only three choices.

- 37 Some microorganisms cause human disease. Other microorganisms are used in making cheese, yogurt, and bread. Based on this information, the relationship between humans and microorganisms can be
- (1) beneficial, only
 - (2) harmful, only
 - (3) beneficial or harmful

38 The diagram below shows the head structure of four different birds.



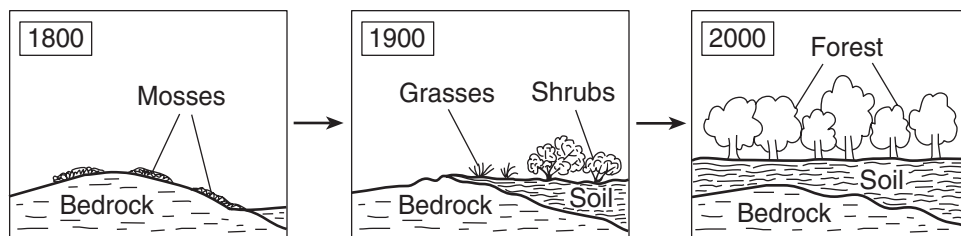
(Not drawn to scale)

The birds' beaks show how the birds

- (1) compete for the same food in their community
- (2) require different amounts of food for survival
- (3) store food for the winter months
- (4) are adapted to get food from different sources

- 39 What is the result of cellular respiration?
- (1) Energy for cell processes is released.
 - (2) Oxygen is released for photosynthesis.
 - (3) Cells undergo decomposition.
 - (4) Nutrients are excreted to prevent the buildup of body fat.
- 40 How do decomposers obtain their food?
- (1) hunting and killing prey for food
 - (2) changing carbon dioxide and water into food
 - (3) absorbing food from dead organisms
 - (4) producing food from oxygen and sunlight
- 41 Living things are classified as producers or consumers according to
- (1) their speed of movement
 - (2) the size of their communities
 - (3) how they obtain food
 - (4) how they reproduce

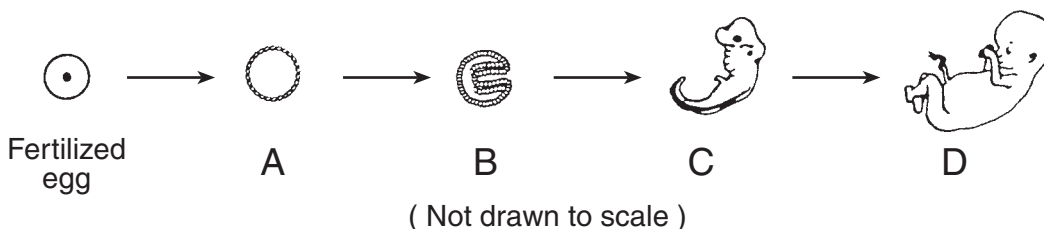
42 The diagrams below show changes in a natural community over a period of 200 years.



Which process is illustrated in the diagrams?

- (1) ozone depletion
- (2) global warming
- (3) recycling resources
- (4) ecological succession

Base your answers to questions 43 and 44 on the diagram below and on your knowledge of science. The diagram shows four stages in the development of a human after fertilization.



43 Between stages A and D, which process must occur?

- (1) mutation
- (2) sexual reproduction
- (3) cell division
- (4) extinction

44 Which sequence of development is correct?

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

45 A student wanted to study the amount of mold growing on pizza at different temperatures. In the experiment, the student set up four identical pans of pizza. Each pan contained the same amount of pizza. The temperatures and light conditions are shown in the data table below.

Data Table

| Variables | Pan 1 | Pan 2 | Pan 3 | Pan 4 |
|------------------|------------------|----------------------|------------------|----------------------|
| Temperature | -10°C | 0°C | 15°C | 30°C |
| Light conditions | kept in darkness | kept in bright light | kept in darkness | kept in bright light |

One error made in setting up the experiment was that the four pans of pizza

- (1) were at different temperatures
- (2) were different sizes
- (3) had different ingredients
- (4) received different amounts of light

Part II

Directions (46—73): Record your answers in the spaces provided below each question.

Base your answers to questions 46 and 47 on the table below and on your knowledge of science. The table shows the location of Hurricane Betsy at 1:00 a.m. on several dates in 1965.

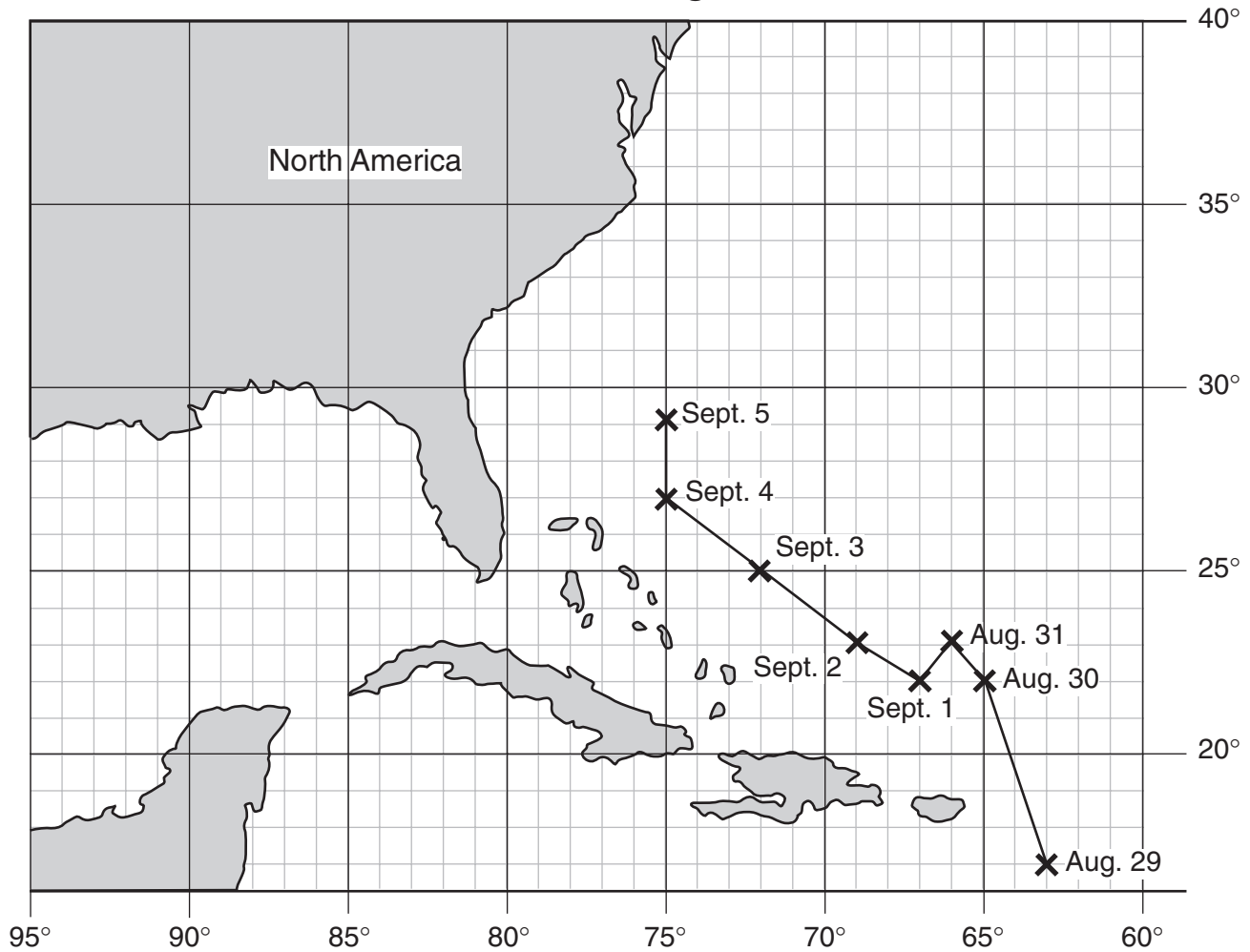
Location of Hurricane Betsy August 29 — September 10, 1965

| Date | Location at 1:00 a.m. | |
|-------------|-----------------------|-----------|
| | Latitude | Longitude |
| August 29 | 17° N | 63° W |
| 30 | 22° N | 65° W |
| 31 | 23° N | 66° W |
| September 1 | 22° N | 67° W |
| 2 | 23° N | 69° W |
| 3 | 25° N | 72° W |
| 4 | 27° N | 75° W |
| 5 | 29° N | 75° W |
| 6 | 28° N | 76° W |
| 7 | 26° N | 77° W |
| 8 | 25° N | 80° W |
| 9 | 26° N | 85° W |
| 10 | 30° N | 91° W |

— adapted from The Weather Underground, Inc., “Weather Underground: 1965 Hurricane Archive,”
[http://wunderground.com/hurricane/at_1965.asp\(9/27/02\)](http://wunderground.com/hurricane/at_1965.asp(9/27/02))

- 46 The locations for August 29 through September 5 have been plotted on the hurricane tracking chart on page 15. Plot the five remaining locations of Hurricane Betsy shown on the data table by following the directions below.
- a* Place an **X** for each remaining location of Hurricane Betsy from September 6 through September 10. [1]
 - b* Label each **X** with the appropriate date. [1]
 - c* Connect the **Xs** using straight lines to show the continuing path of Hurricane Betsy. [1]

Hurricane Tracking Chart



Source: Adapted from The Weather Underground, Inc., "Weather Underground: 1965 Hurricane Archive," <http://wunderground.com/Hurricane/at196503.asp> (9/27/02)

47 The United States Weather Bureau issued hurricane warnings before Hurricane Betsy moved over land areas. State *two* actions that the United States Weather Bureau most likely advised coastal residents to take to prepare for Hurricane Betsy. [2]

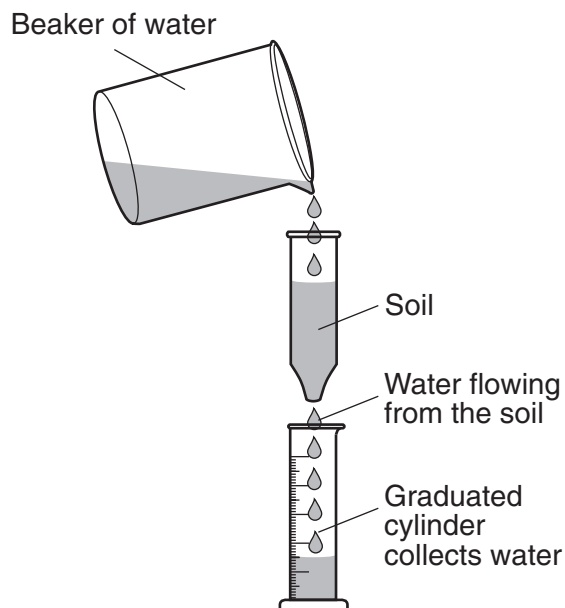
(1) _____

(2) _____

48 A student made this entry in her laboratory notebook:

5/5/2005

We are doing an experiment to determine if the size of soil particles affects the amount of water that flows through soil. We poured 100 milliliters (mL) of water through four different types of soil. The equipment is shown below.



We got the following results: With gray soil, the average particle size was 2.0 millimeters (mm) and 80 mL of water flowed through. We then used tan soil. Its average particle size was 0.5 mm and 40 mL of water flowed through. With brown soil, 60 mL of water flowed through. Brown soil has an average particle size of 1.5 mm. In our last trial we used black soil. It has an average particle size of 1.0 mm and 50 mL of water flowed through.

- a Using the data table below, organize the results to show the average particle size and the amount of water that flowed through for each type of soil. Be sure to include column headings, data, and units in the table. [3]

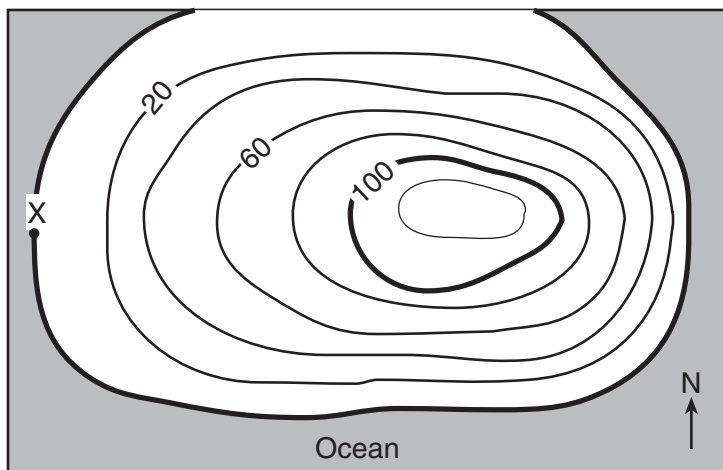
Data Table

| Soil Color | | |
|------------|--|--|
| gray | | |
| brown | | |
| black | | |
| tan | | |

b What is the dependent (responding) variable in this experiment? [1]

c What conclusion can be drawn from the data that the students collected? [1]

Base your answers to questions 49 through 51 on the contour map below and on your knowledge of science. The map shows a portion of an island. The elevations shown on the island are in meters (m).



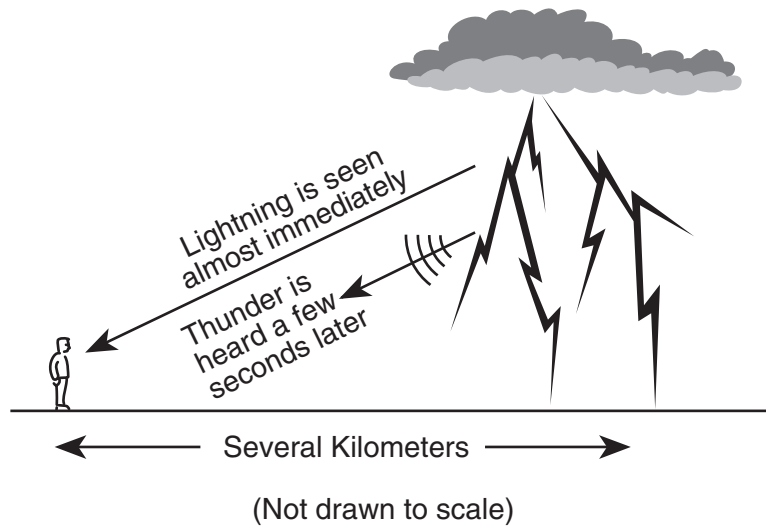
49 What is the elevation of point X? [1]

_____ **m**

50 Explain how the contour lines shown on the map can be used to determine which area of the island has the steepest slope. [1]

51 On the map above, shade in the entire area of the island that would be under water if the ocean level rose 40 meters. [1]

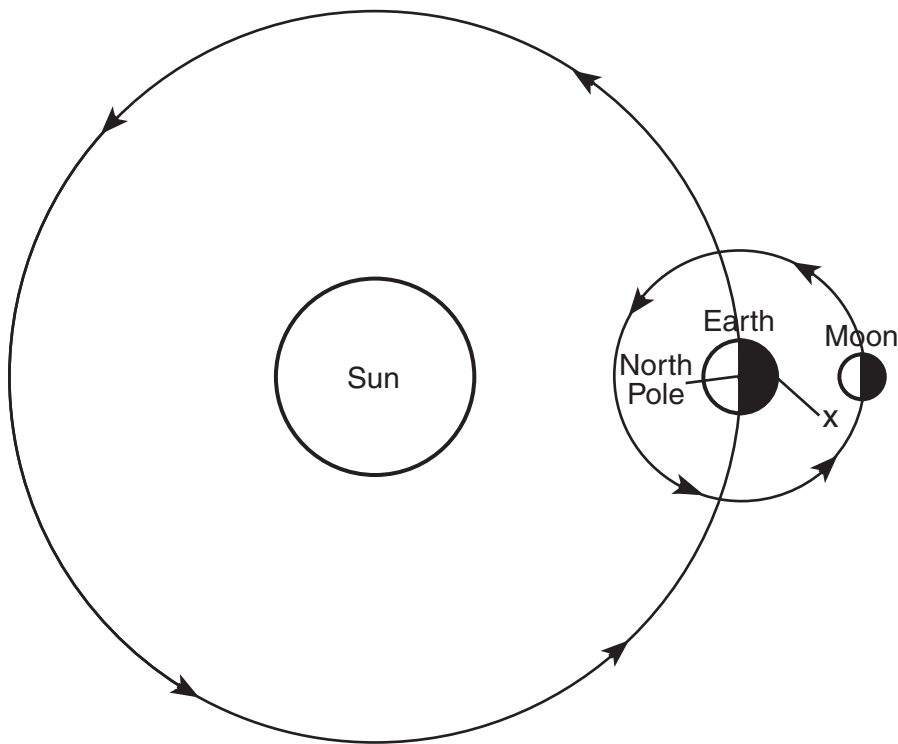
Base your answers to questions 52 and 53 on the information below and on your knowledge of science. The diagram shows a person observing a thunderstorm located several kilometers away. The person hears the thunder several seconds after seeing the lightning.



52 Identify a form of energy, other than light and sound, that is often present during a thunderstorm. [1]

53 Explain how sound travels through the air to the observer. [1]

Base your answers to questions 54 through 56 on the diagram below and on your knowledge of science. The diagram shows the Sun, Earth, and the Moon as seen from a point in space far above Earth's North Pole. The shaded areas represent darkness. Point X represents a location on Earth's surface.



(Not drawn to scale)

54 From Earth, an observer can view the phases of the Moon over time.

a Circle the phase of the Moon that an observer at X would see when the Sun, Earth, and the Moon are in the positions shown in the diagram above. Assume there is no eclipse at that time. [1]

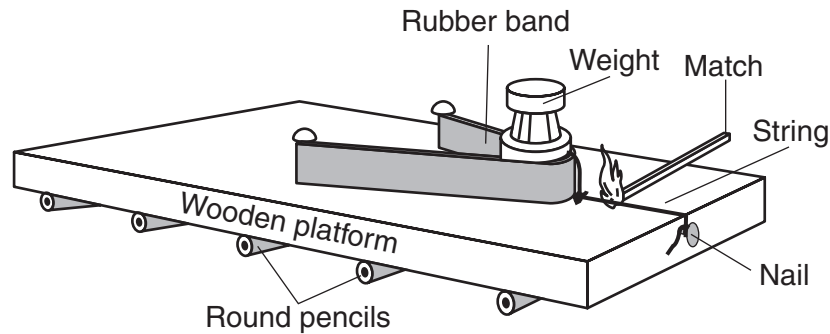


b Approximately how long would it be until the Moon is in this phase again? [1]

55 Identify *one* force that keeps Earth in orbit around the Sun. [1]

56 How long does it take for Earth to make one revolution around the Sun? [1]

Base your answers to questions 57 and 58 on the diagram below and on your knowledge of science. The diagram shows a set of materials that a science teacher used to demonstrate motion. The rubber band has been stretched with a string that has been tied to the nail. A weight is resting on the platform. The platform is resting on several round pencils on a tabletop.



Source: Adapted from, Constantine Constant, *Earth Science Workbook*, AMSCO, 1972

57 On the diagram above, draw an arrow to represent the direction the **wooden platform** will move when the lit match burns through the string and the weight is propelled from the platform. [1]

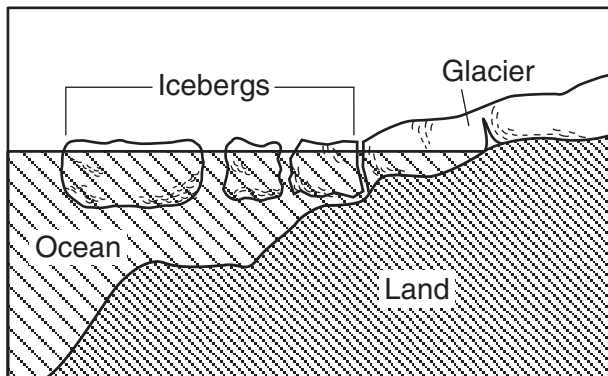
58 The table below lists four changes to the materials in the diagram. Will the changes cause the distance the wooden platform moves to decrease, increase, or remain the same? For each change in the left column, circle your answer in the right column. [3]

| Change to Materials | Effect this Change Will Have on the Distance the Wooden Platform Moves |
|--|--|
| Shorten the string to stretch the rubber band. | decrease increase remain the same |
| Use a wooden platform that has a greater mass. | decrease increase remain the same |
| Remove the pencils from under the wooden platform. | decrease increase remain the same |
| Use scissors to cut the string instead of burning it with a match. | decrease increase remain the same |

Base your answers to questions 59 and 60 on the information and cross section below and on your knowledge of science.

Icebergs

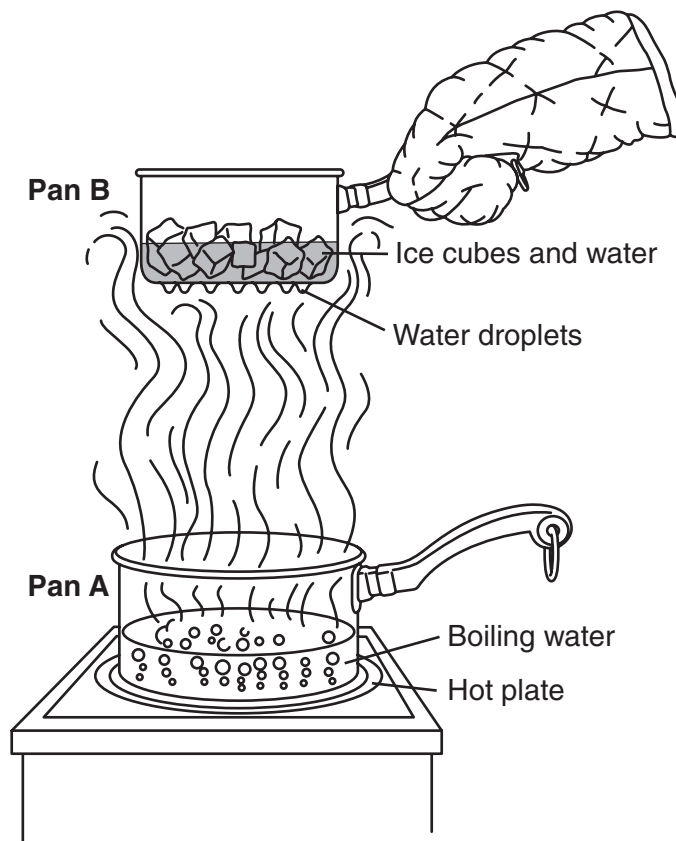
Floating pieces of glacial ice are called icebergs. Huge pieces of glacial ice near a coast may break off and fall into the ocean, as shown in the cross section below. Only about one-tenth of the total iceberg is visible above the surface of the water.



59 Explain why an iceberg floats in the ocean. [1]

60 Describe *one* change in the environment that would occur if all the glaciers on Earth melted. [1]

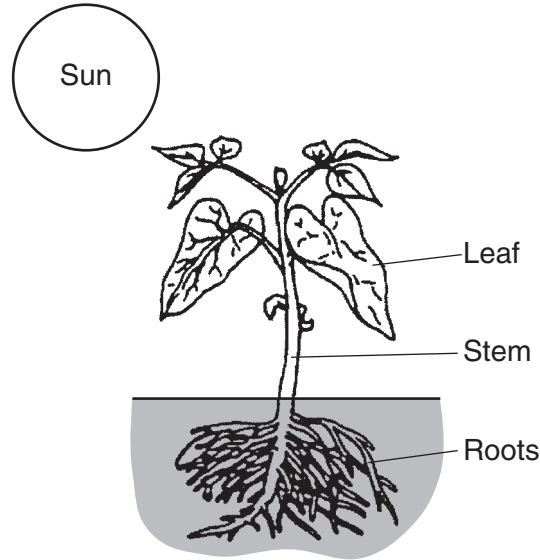
61 The diagram below shows an activity performed by a student in a classroom.



Complete the chart below by identifying *one* phase change that is occurring at each location. [2]

| Location | Phase Change Occurring |
|----------|------------------------|
| Pan A | |
| Pan B | |

Base your answers to questions 62 through 64 on the diagram below and on your knowledge of science. The diagram shows the Sun and a green plant.



(Not drawn to scale)

62 Identify *one* labeled part of the plant that carries on photosynthesis. [1]

63 In addition to sunlight and chlorophyll, what are the *two* materials that a plant needs to carry on photosynthesis? [2]

(1) _____

(2) _____

64 Identify *one* product that results from the process of photosynthesis. [1]

Base your answers to questions 65 through 67 on the food chain below and on your knowledge of science.

grain → grasshoppers → frogs → snakes → owls → bacteria

65 What represents the flow of energy in this food chain? [1]

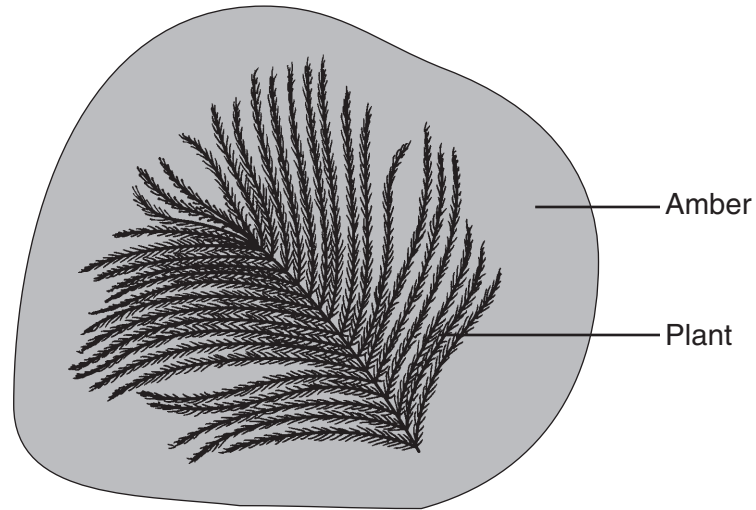
66 Which organism in this food chain is responsible for recycling nutrients? [1]

67 State *one* similarity in the way that snakes and frogs get their energy. [1]

Base your answers to questions 68 and 69 on the reading passage and diagram below and on your knowledge of science.

Preserved in Amber

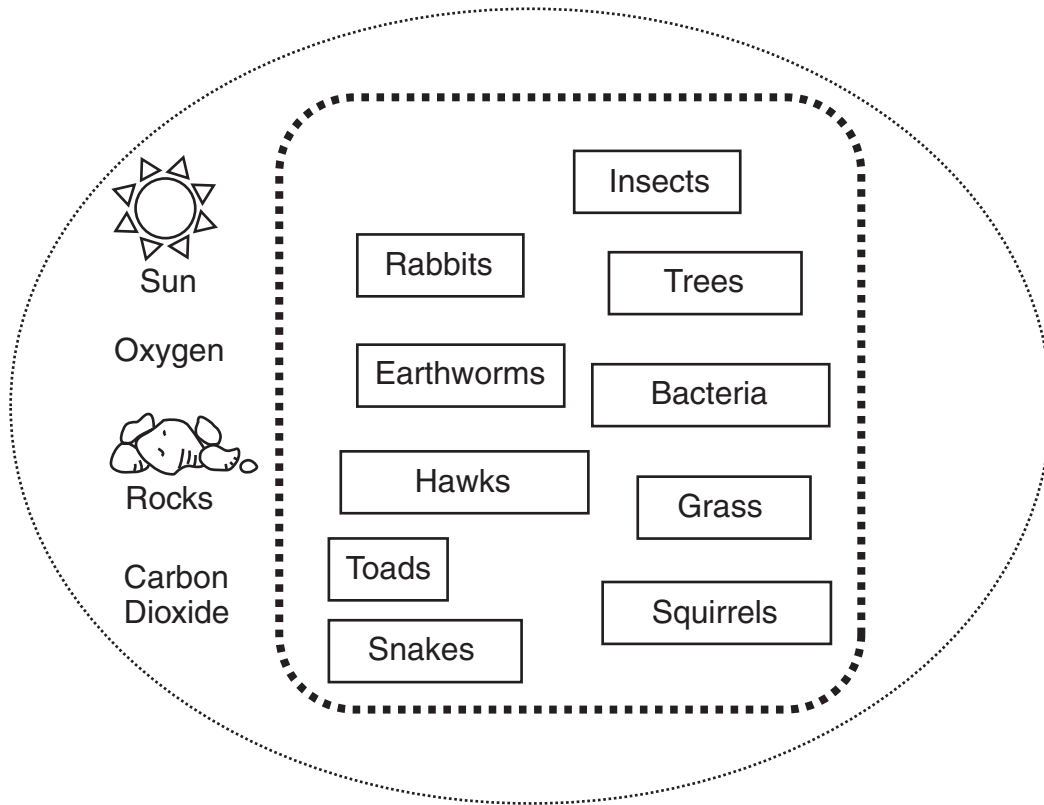
Sap is a substance secreted by some trees. Many years ago, plants and small animals were caught in the sap on the trees. Sap hardens and turns into a clear substance called amber. The plants or animals are preserved as fossils in the amber. Part of a plant preserved in amber is shown below.



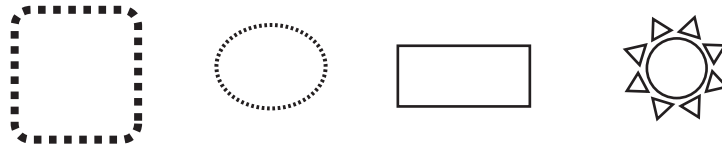
68 Explain why fossils are important to scientists. [1]

69 Explain why plant fossils found in amber, such as the one shown, are *not* usually found in volcanic rocks. [1]

Base your answers to questions 70 through 72 on the diagram below and on your knowledge of science. The diagram represents an ecosystem.



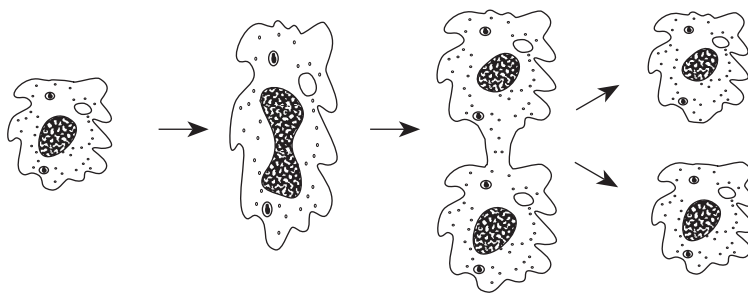
70 Circle the symbol below that shows a community in this model. [1]



71 What is the source of energy for this ecosystem? [1]

72 Describe how removing the grass would affect the other living things in this ecosystem. [1]

73 The diagram below shows a one-celled organism reproducing.



This is an example of asexual reproduction. What information in the diagram supports this statement? [1]

For Teacher Use Only
Part II Credits

| Question | Maximum Credit | Credit Allowed |
|-----------------|---------------------------|---------------------------|
| 46 | 3 | |
| 47 | 2 | |
| 48 | 5 | |
| 49 | 1 | |
| 50 | 1 | |
| 51 | 1 | |
| 52 | 1 | |
| 53 | 1 | |
| 54 | 2 | |
| 55 | 1 | |
| 56 | 1 | |
| 57 | 1 | |
| 58 | 3 | |
| 59 | 1 | |
| 60 | 1 | |
| 61 | 2 | |
| 62 | 1 | |
| 63 | 2 | |
| 64 | 1 | |
| 65 | 1 | |
| 66 | 1 | |
| 67 | 1 | |
| 68 | 1 | |
| 69 | 1 | |
| 70 | 1 | |
| 71 | 1 | |
| 72 | 1 | |
| 73 | 1 | |
| Total | 40 | |