

THE UNIVERSITY OF THE STATE OF NEW YORK

# **GRADE 8**

## **INTERMEDIATE-LEVEL TEST**

### **SCIENCE**

# **WRITTEN TEST**

JUNE 2005

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 35 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 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><b>Sample Question</b></p> <p>Earth gets most of its light from</p> <p>(1) the stars</p> <p>(2) the Sun</p> <p>(3) the Moon</p> <p>(4) other planets</p>
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The correct answer is **the Sun**, which is choice number **2**. On your answer sheet, look at the box showing the row of answer circles for the sample question. Since choice number **2** is the correct answer for the sample question, the circle with the number **2** has been filled in.

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

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

You may use a calculator if needed.

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

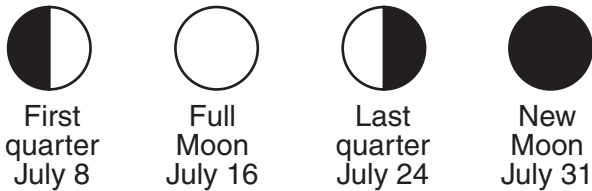
When you have finished Part I, go right on to Part II. Answer all of the questions in Part II.

## Part I

1 Which statement best explains why the Sun and the Moon appear to be about the same size in the sky?

- (1) The Sun and the Moon have the same diameter.
- (2) The Moon is larger in diameter and farther from Earth than the Sun.
- (3) The Moon is smaller in diameter and is closer to Earth than the Sun.
- (4) The Sun and the Moon are the same distance from Earth.

2 The diagram below shows four Moon phases observed during July.



On which date would the next New Moon occur?

- (1) August 5
- (2) August 10
- (3) August 19
- (4) August 29

3 Dust and ash entering the atmosphere as a result of volcanic eruptions can affect Earth's

- (1) tidal activity
- (2) orbital shape
- (3) weather and climate
- (4) rotation and revolution

4 The surface of Earth is covered by a relatively thin layer of water called the

- (1) crust
- (2) mantle
- (3) hydrosphere
- (4) atmosphere

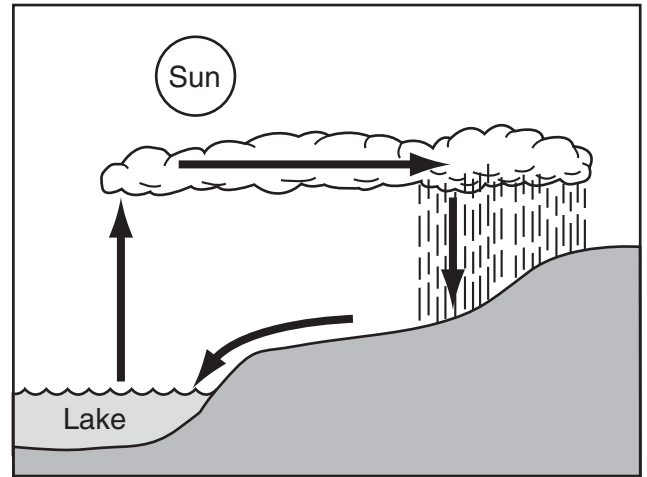
5 Movement of Earth's crust along plate boundaries produces

- (1) fronts
- (2) tides
- (3) hurricanes
- (4) earthquakes

6 In which type of rock are fossils generally found?

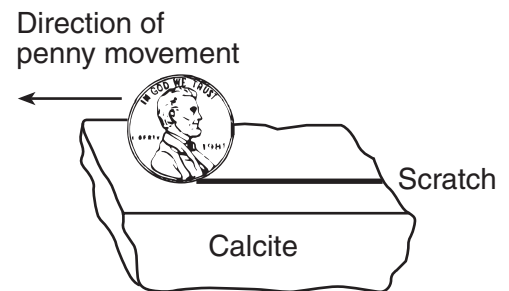
- (1) igneous
- (2) metamorphic
- (3) sedimentary
- (4) volcanic

7 Which title best describes the processes shown in the diagram below?



- (1) The Rock Cycle
- (2) The Water Cycle
- (3) Plate Tectonics
- (4) Chemical Changes

8 The diagram below shows a penny scratching the surface of the mineral calcite.



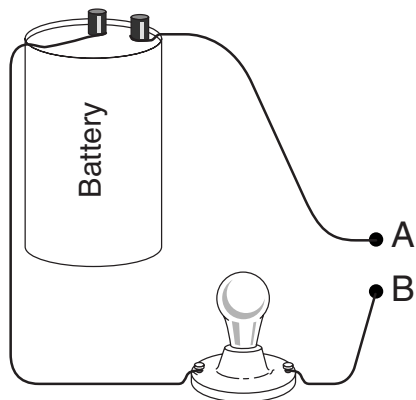
Which physical property of the calcite is being tested?

- (1) streak
- (2) hardness
- (3) melting point
- (4) reaction to acid

9 Which equipment will best separate a mixture of iron filings and black pepper?

- (1) magnet                      (3) triple-beam balance  
 (2) filter paper                (4) voltmeter

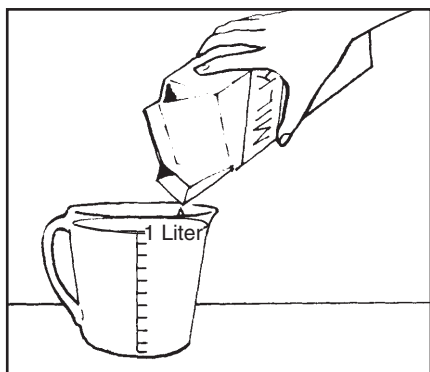
10 The diagram below shows an *incomplete* circuit.



Which item would allow the bulb to light up if it were used to connect point A to point B?

- (1) a glass rod                (3) a plastic comb  
 (2) a metal coin              (4) a paper cup

11 The diagram below shows milk being poured into a measuring cup.



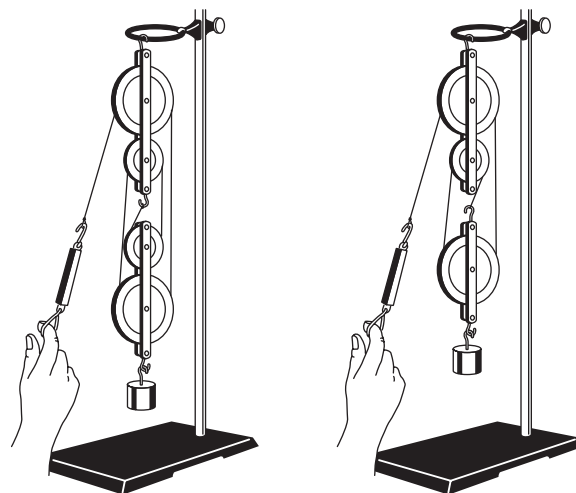
Which property of the milk can be directly measured using the cup?

- (1) mass                        (3) solubility  
 (2) density                      (4) volume

12 Hydrochloric acid is added to a beaker containing a piece of zinc. As a result, zinc chloride is formed and hydrogen gas is released. This is an example of

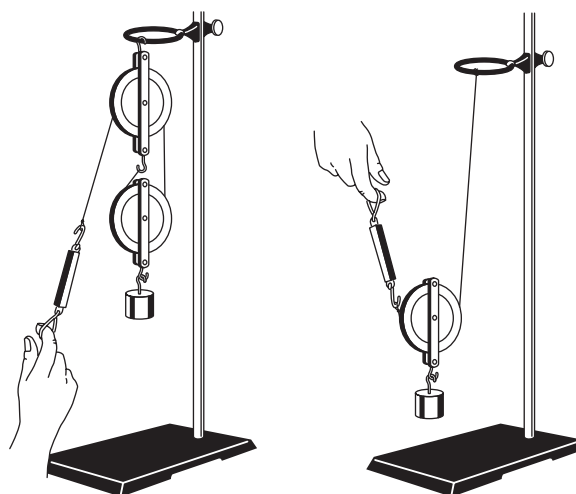
- (1) a chemical reaction      (3) photosynthesis  
 (2) a physical change        (4) evaporation

13 Which setup below would require the *least* force to lift a 100-gram mass a distance of 10 centimeters?



(1)

(3)



(2)

(4)

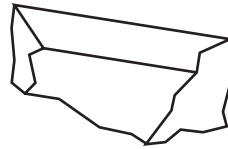
14 Which model is used by scientists to determine the properties of elements?

- (1) a Punnett square        (3) a pedigree chart  
 (2) the Periodic Table      (4) the rock cycle

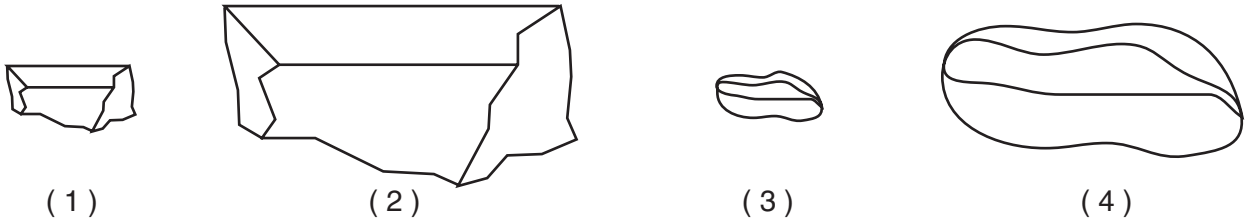
15 Which energy resource is renewable?

- (1) fuel oil                      (3) wind  
 (2) natural gas                (4) coal

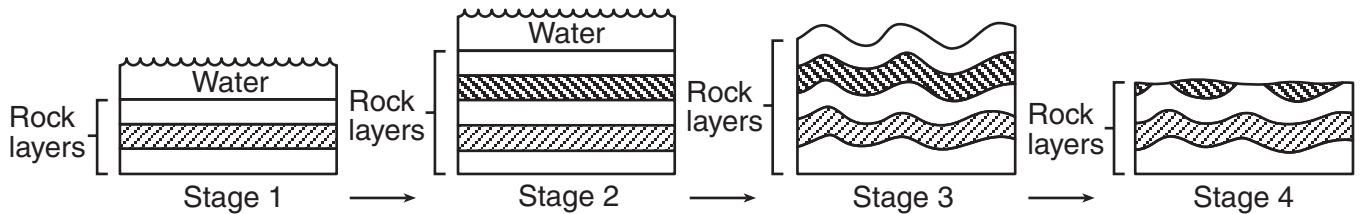
16 The drawing below shows the original size and shape of a rock sample before it is thrown into a rapidly moving stream.



Which drawing best shows the actual size and shape the rock will have after being carried several hundred miles downstream and deposited?



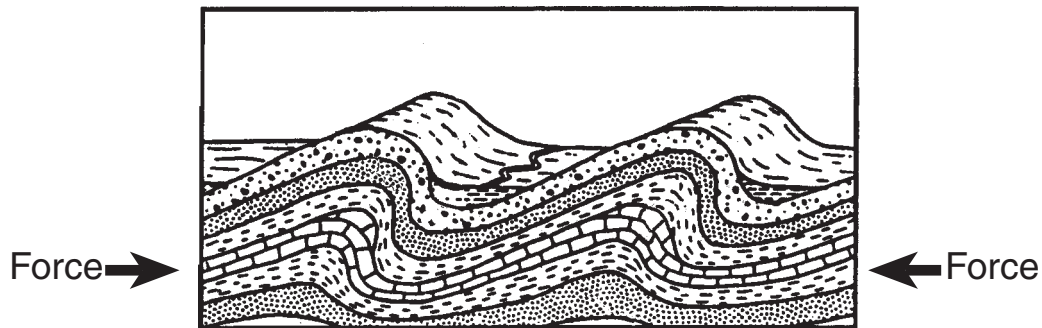
17 The diagram below shows stages in the development of a certain landscape.



When did erosion become the most dominant process in the development of the landscape shown in stage 4?

- (1) at stage 1
- (2) at stage 2
- (3) between stages 2 and 3
- (4) between stages 3 and 4

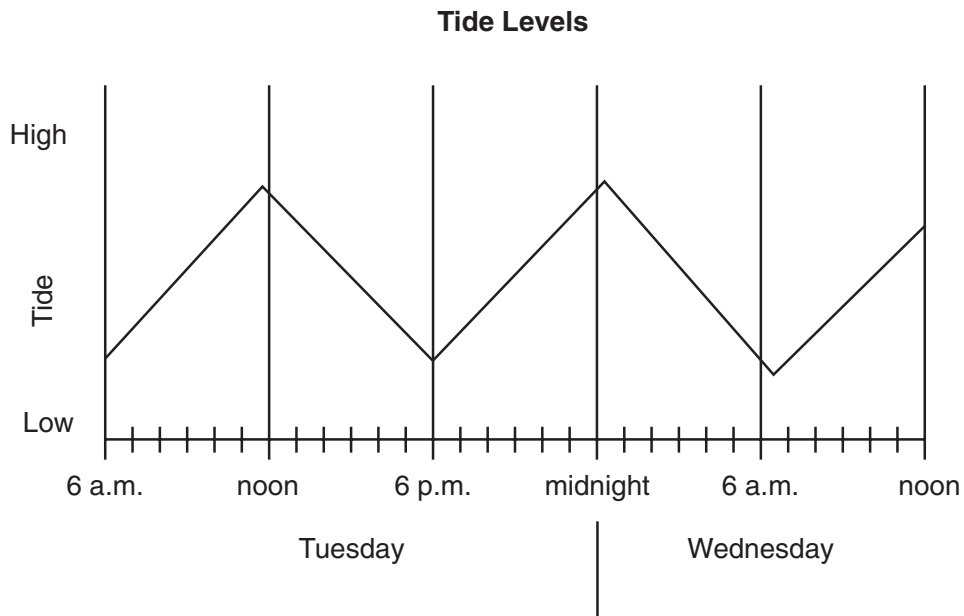
18 The diagram below shows a cross section of rock layers in Earth's crust.



The forces shown in the diagram caused the rock layers to

- (1) fault
- (2) fold
- (3) form
- (4) expand

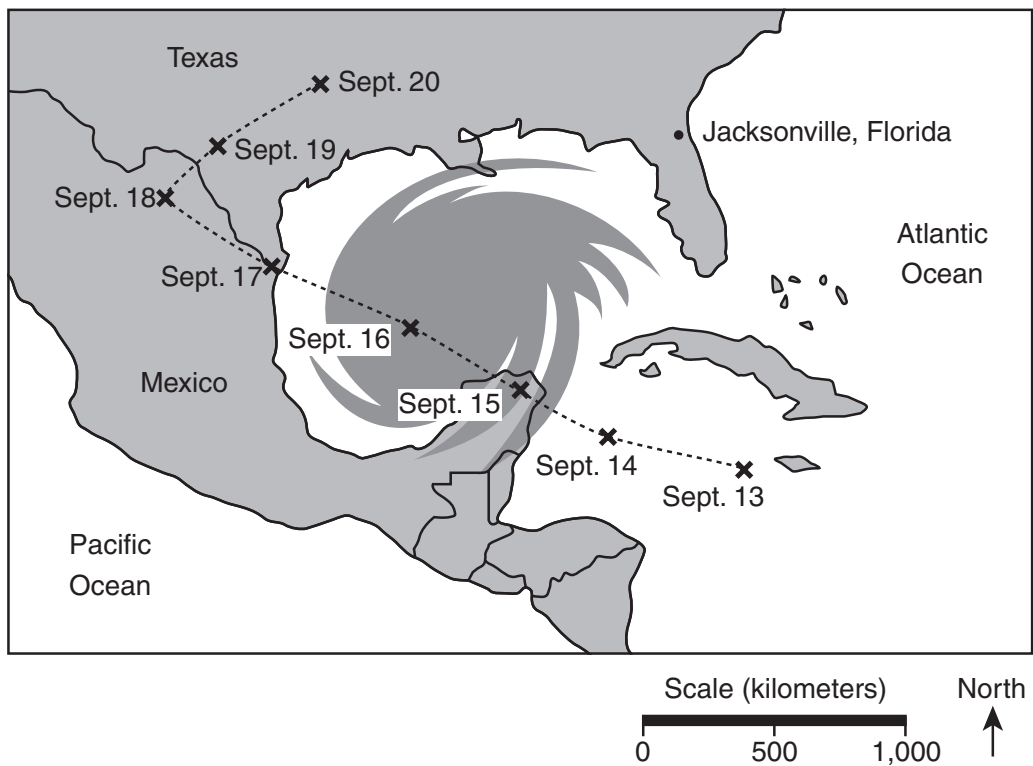
19 The graph below shows tide levels for two days at an ocean location.



Approximately how many hours are between the high tide on Tuesday and the first high tide on Wednesday?

- (1) 6 hours
- (2) 9 hours
- (3) 12 hours
- (4) 18 hours

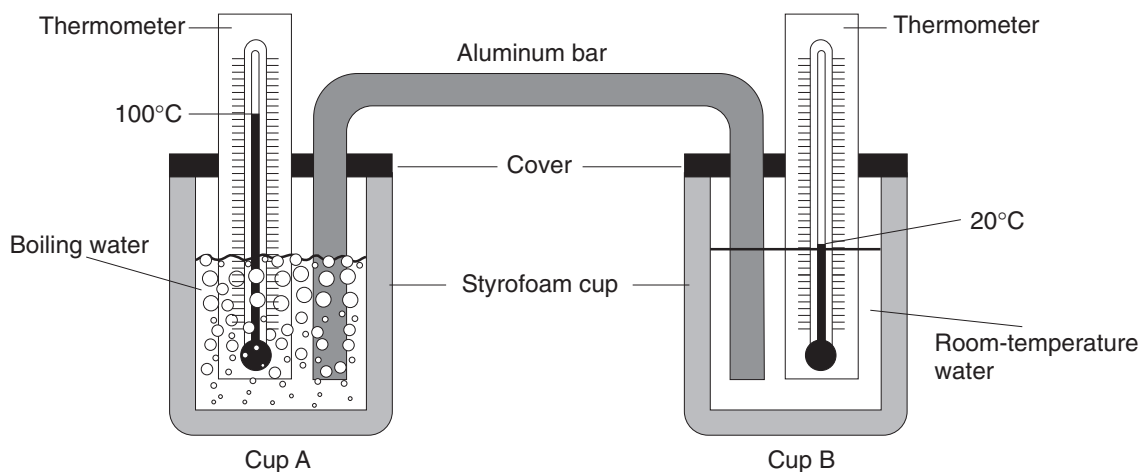
20 The map below shows the relative size and track of a certain weather event.



Which weather event is shown on the map?

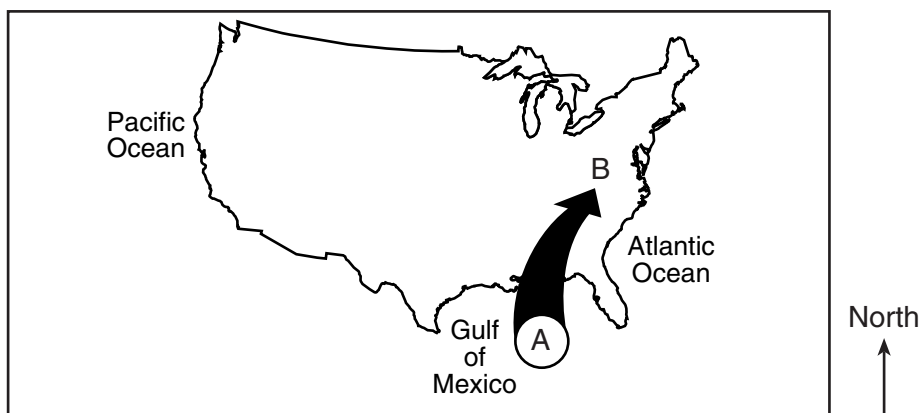
- (1) tornado
- (2) blizzard
- (3) hurricane
- (4) thunderstorm

Base your answers to questions 21 and 22 on the diagram below, which shows two insulated Styrofoam cups of water connected by an aluminum bar. The thermometers show the temperature of the water in cup A and cup B at the beginning of a heat-flow experiment.



- 21 Over the next 15 minutes, which changes would most likely occur?
- (1) The temperature in cup A will decrease and the temperature in cup B will increase.
  - (2) The temperature in cup A will decrease and the temperature in cup B will decrease.
  - (3) The temperature in cup A will increase and the temperature in cup B will increase.
  - (4) The temperature in cup A will increase and the temperature in cup B will decrease.
- 22 Which process is most responsible for the temperature changes that will take place?
- (1) radiation of heat from the water in the cups to the thermometers
  - (2) conduction of heat through the aluminum bar
  - (3) radiation of heat from the water in the cups into the air
  - (4) conduction of heat through the air to the water in the cups

23 The map below shows an air mass that formed over the Gulf of Mexico at location A.

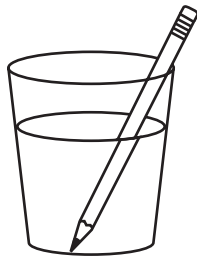


Once air mass A reaches location B, the weather conditions at location B will most likely become

- (1) warmer and drier
- (2) warmer and more humid
- (3) colder and more humid
- (4) colder and drier

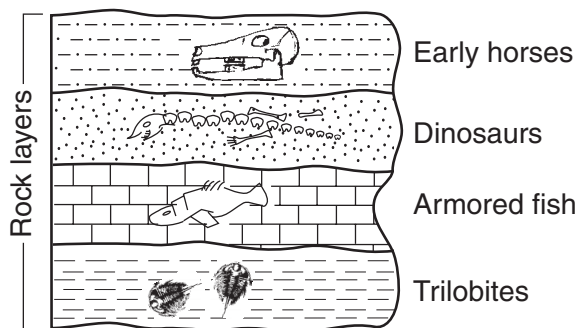


- 24 The diagram below shows a pencil in a glass of water.



When viewed from the side, the pencil appears to be broken. What process causes this to happen?

- (1) absorption                      (3) reflection  
 (2) evaporation                    (4) refraction
- 25 The cross section below shows fossils and the rock layers in which they are found. Crustal movement has *not* displaced the rock layers.

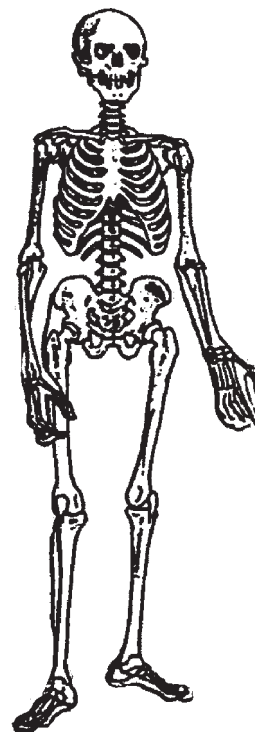


(Not drawn to scale)

Which fossil is considered the oldest in the cross section shown?

- (1) armored fish                    (3) early horses  
 (2) dinosaurs                        (4) trilobites
- 26 Several tomato plants are grown indoors next to a sunny window. The plants receive water and fertilizer and remain on the windowsill. What will most likely happen?
- (1) Most of the leaves on the window side will wilt and die.  
 (2) The roots of the plants will grow upward from the soil.  
 (3) Water droplets will collect on the leaves facing away from the window.  
 (4) The stem will bend toward the window.

- 27 The diagram below shows a human body system.



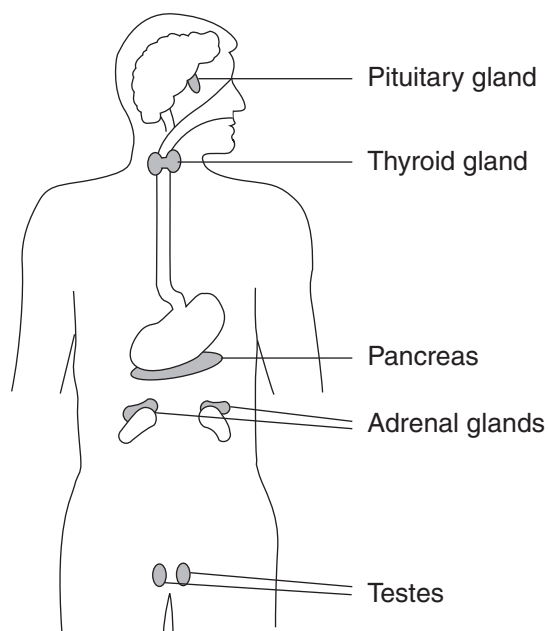
What are two of the functions performed by this body system?

- (1) protects and supports the body  
 (2) produces and transports oxygen within the body  
 (3) produces and excretes waste products  
 (4) controls and coordinates body activities
- 28 The main function of the human digestive system is to
- (1) break down foods for absorption into the blood  
 (2) exchange oxygen and carbon dioxide in the lungs  
 (3) release energy from sugars within the cells  
 (4) carry nutrients to all parts of the body
- 29 Which sequence lists the levels of organization in the human body from simplest to most complex?
- (1) organ system → tissue → cell → organ  
 (2) tissue → cell → organ → organ system  
 (3) organ → organ system → tissue → cell  
 (4) cell → tissue → organ → organ system

30 Which three systems of the human body function together to move and control body parts?

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

31 The labeled organs in the diagram below are part of which human body system?



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

32 Evidence that living things have evolved over hundreds of millions of years can be found in

- (1) particles in the air
- (2) rocks containing fossils
- (3) tree rings from recently logged trees
- (4) chemicals in human hair

33 Extinction of a species is most likely to occur as a result of

- (1) evolution
- (2) migration
- (3) selective breeding
- (4) environmental changes

Base your answers to questions 34 and 35 on the diagram below which shows a model of human inheritance.

	A	A
a	Aa	Aa
a	Aa	Aa

KEY	
A	= Straight hairline (dominant)
a	= Peaked hairline (recessive)

34 The parent whose genes are *aa*

- (1) must be dominant
- (2) has a straight hairline
- (3) has a peaked hairline
- (4) may have *AA* offspring

35 The diagram shown is called a

- (1) Punnett square
- (2) pedigree chart
- (3) dichotomous key
- (4) flowchart

36 Some kinds of fish live most of their lives in salt water but lay their eggs in freshwater. Their ability to survive in different environments is an example of

- (1) adaptation
- (2) developmental stages
- (3) a habit
- (4) selective breeding

37 Which example would result in new cells that are most different from the parent cells?

- (1) yeast cells splitting into new cells
- (2) bacteria cells dividing into new cells
- (3) skin cells dividing to produce more skin cells
- (4) sperm and egg cells uniting to produce fertilized egg cells

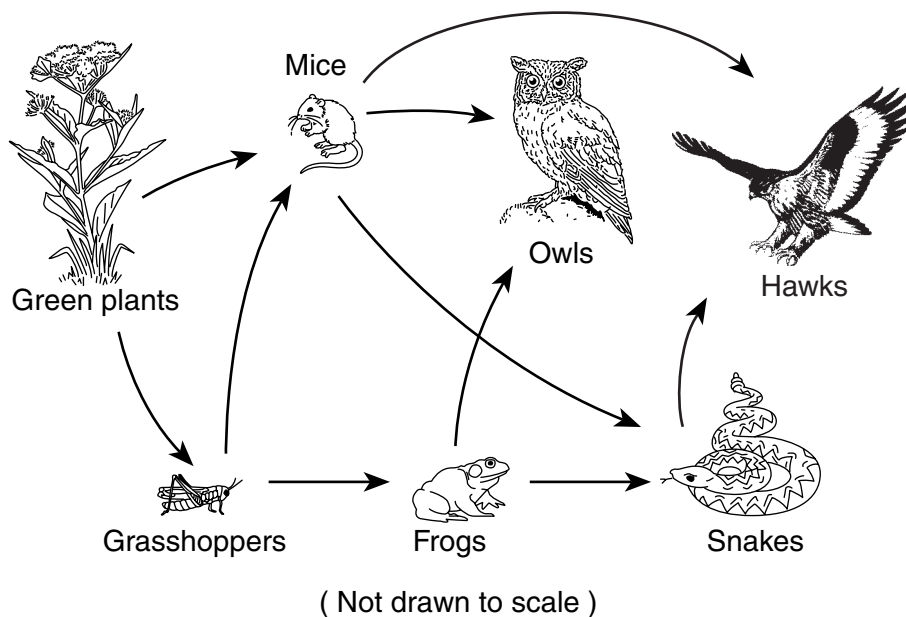
38 The table below shows the symptoms of some diseases that are caused by bacteria.

Disease	Symptoms
botulism	vomiting, abdominal pain, coughing, muscular weakness, visual disturbance
pneumonia	inflammation of lungs, fever, shortness of breath, fluid in lungs
typhoid fever	red rashes, high fever, intestinal bleeding
tetanus	uncontrolled contractions of voluntary muscles

Which two diseases listed in the table affect the digestive system?

- (1) botulism and typhoid fever
- (2) botulism and pneumonia
- (3) tetanus and pneumonia
- (4) tetanus and typhoid fever

Base your answers to questions 39 and 40 on the diagram below, which shows a partial food web.



39 How many organisms in this food web feed on the mice?

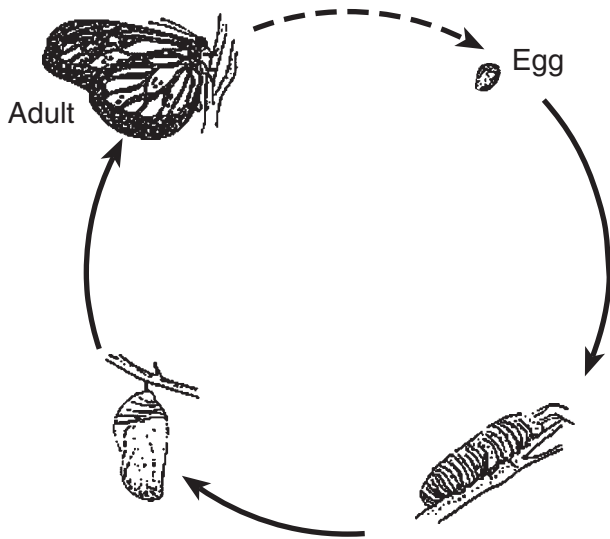
- (1) 5
- (2) 2
- (3) 3
- (4) 4

40 Which group of organisms is missing from this food web?

- (1) carnivores
- (2) herbivores
- (3) omnivores
- (4) decomposers

- 41 Growth and repair in multicellular organisms are the result of
- (1) excretion
  - (2) locomotion
  - (3) cell division
  - (4) decomposition

42 The diagram below shows changes that a butterfly undergoes as it develops from an egg into an adult.



Which process is illustrated in the diagram?

- (1) mutation
- (2) photosynthesis
- (3) germination
- (4) metamorphosis

43 Which observation of a plant supports the inference that photosynthesis can take place?

- (1) a strong, sweet smell
- (2) a dry, rough texture
- (3) a green color
- (4) a smooth stem

44 Populations living in one place form a

- (1) community
- (2) system
- (3) habitat
- (4) species

45 Which situation is the best example of ecological succession?

- (1) An organism survives a difficult winter.
- (2) The populations in an area remain the same.
- (3) One species replaces another species in an ecosystem.
- (4) Each of several species uses the same amount of resources.

## Part II

*Directions (46–80):* Record your answers in the spaces provided in this test booklet.

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

A farmer grows and sells flowering plants. The best-selling plants are the ones with the most blossoms. The farmer reads an advertisement for a plant food saying that it will make plants grow faster and taller. The farmer predicts that taller plants will have more blossoms and performs the following experiment to test this hypothesis.

Two groups of 10 plants each are grown in identical pots filled with equal amounts of identical soil. The amount of sunlight, the room temperature, and the amount of water are held constant for both groups. Group *A* is given plant food at regular intervals according to the instructions on the package. Group *B* is not given plant food.

The farmer observes the plants after 15 weeks of growth. The results are recorded below.

**Data Table**

<b>Group</b>	<b>Received Plant Food</b>	<b>Average Height (cm)</b>	<b>Average Number of Blossoms</b>
A	yes	35	18.1
B	no	28	18.2

46 State the farmer's original hypothesis. [1]

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47 Based on the results of this experiment, is the farmer's original hypothesis correct?

Circle one: Yes No Explain your answer. [1]

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48 Explain why the amount of sunlight, the room temperature, and the amount of water were held constant for both groups. [1]

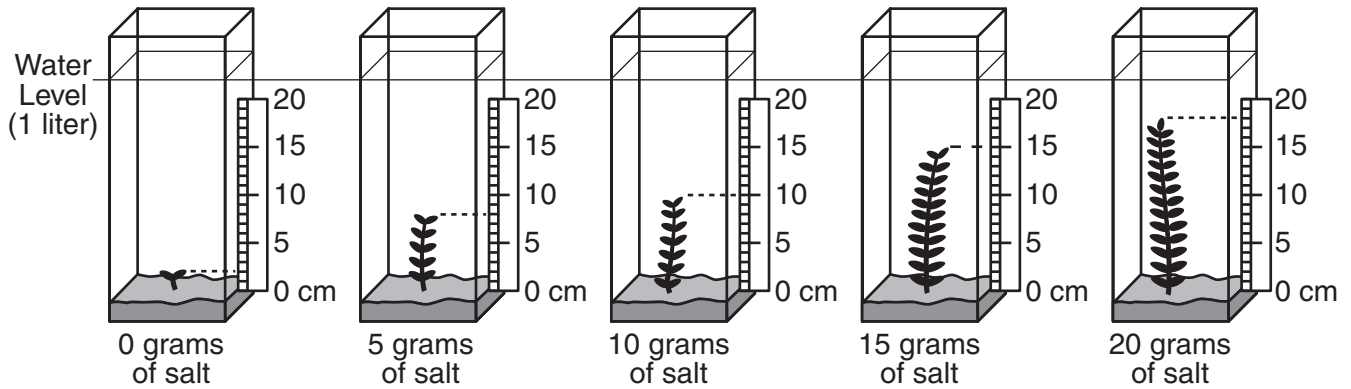
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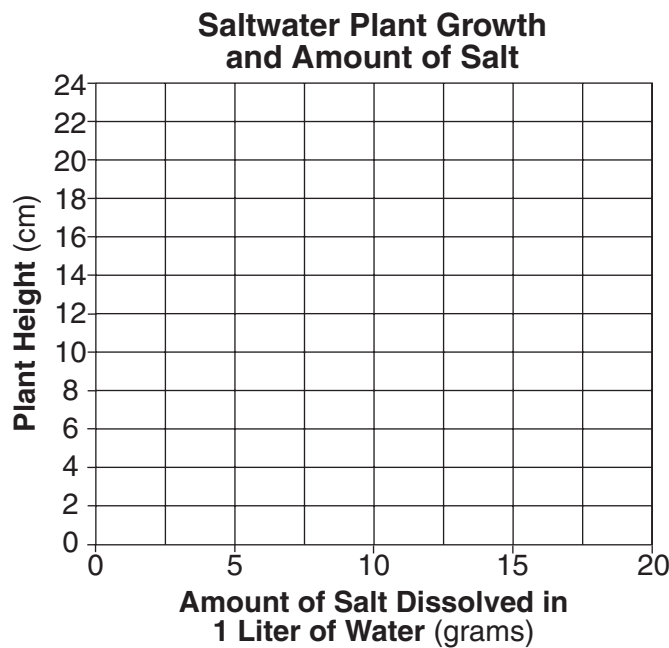
Base your answers to questions 49 through 52 on the information and diagrams below.

Saltwater plants of the same species were grown in soil in separate containers with 1 liter of water. All of the plants were the same height at the beginning of the experiment. Different amounts of salt were dissolved in each container as shown in the diagrams. All other conditions were held constant. Measurements for the final height of each plant are provided.



49 Use the information from the student's experiment to construct a line graph on the grid below.

- a Use an **X** to plot the final height of each plant at the end of the experiment. [2]
- b Connect the **X**s with a solid line. [1]



50 Based on your graph or the information provided, determine the expected height of this same type of plant if it were grown in 1 liter of water with 2.5 grams of salt added. [1]

\_\_\_\_\_ **cm**

51 State *one* conclusion, based on the information provided, about the growth of this type of saltwater plant in water containing 0 to 20 grams of salt per liter. [1]

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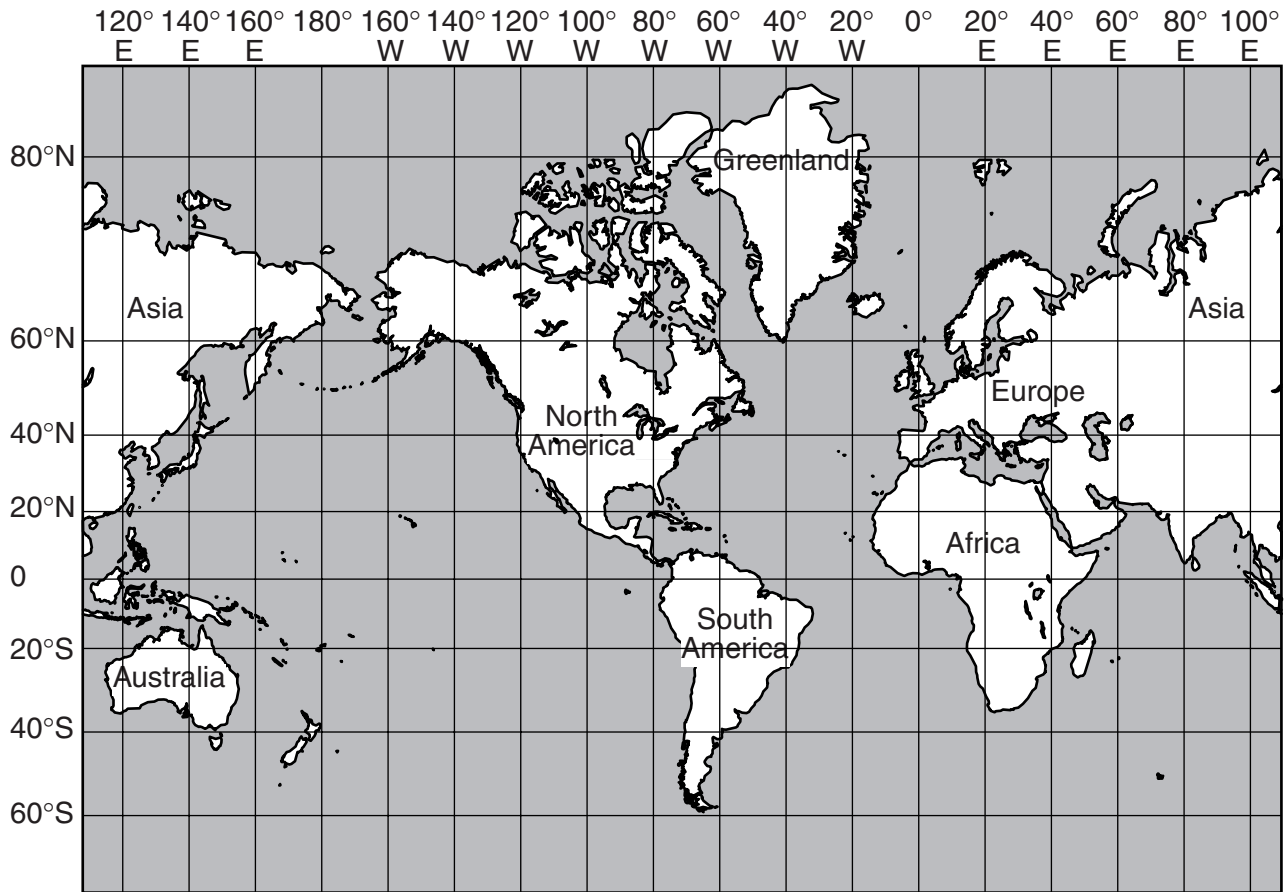
52 In this experiment, the student used plants of the same height and species in equal amounts of water. Identify *one* other condition that the student needed to keep constant. [1]

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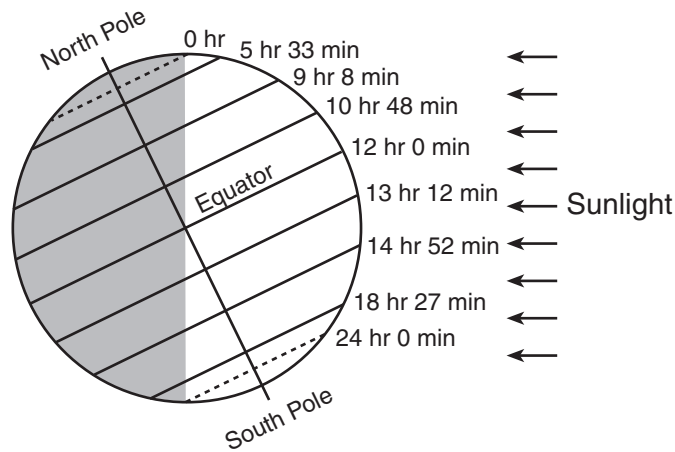
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53 On the world map below, place an **X** so that its center represents the location at  $40^{\circ}$  N and  $80^{\circ}$  E. [1]





Base your answers to questions 54 through 56 on the diagram below, which shows Earth at one point in its orbit around the Sun. The length of daylight experienced at different latitudes on a given date is shown on the diagram.



54 Describe how the length of daylight changes from the Equator to the North Pole on the date shown. [1]

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55 What season is beginning in the Northern Hemisphere? [1]

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56 Explain why the South Pole receives 24 hours of daylight on the date shown. [1]

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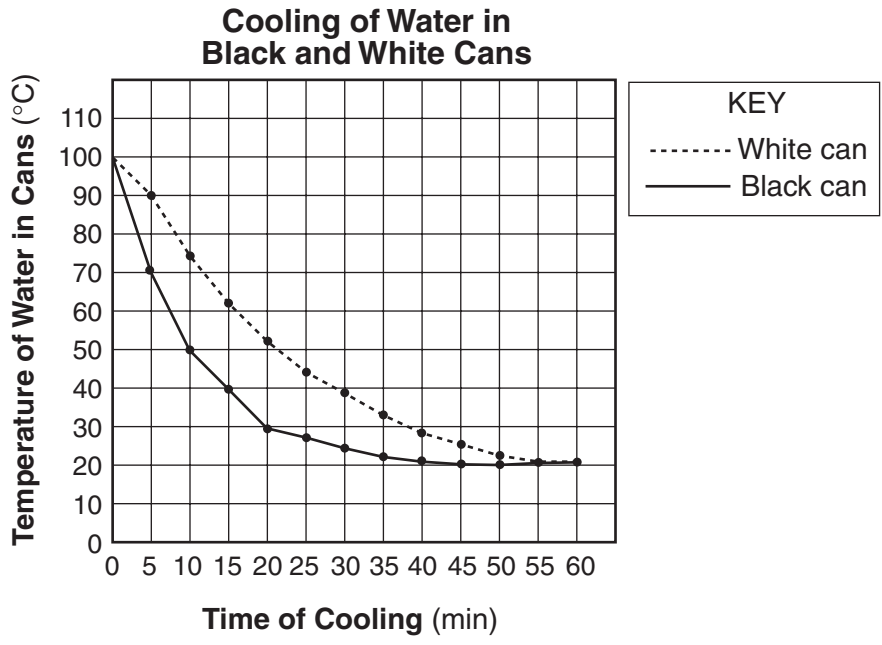


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Base your answers to questions 57 and 58 on the graph below, which shows the results of an experiment comparing the cooling rates of two cans of identical size and shape that are painted different colors and filled with water at 100°C. The cans were allowed to cool for 60 minutes. The temperature of the water in each can was recorded every 5 minutes.



57 Calculate the rate of cooling of the water in the black can for the first 10 minutes. Use the equation below. [1]

$$\text{rate of cooling} = \frac{\text{difference in temperature of water in can (}^\circ\text{C)}}{\text{time of cooling (min)}}$$

\_\_\_\_\_ °C/min

58 Describe the effect the color of the cans had on the cooling rate of the water during the first 10 minutes of the experiment. [1]

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Base your answers to questions 59 through 61 on the passage below and on your knowledge of science.

### Acid Rain

Sulfur dioxide and nitrogen dioxide are pollutants released into the atmosphere from the burning of fossil fuels. These pollutants combine with moisture in the air to form acid rain. A main source of these pollutants can be traced to power plants located in the mid-western United States. Due to weather patterns, the effects of acid rain have been most severe in the northeastern United States, including New York State.

The acid rain destroys the natural balance in lakes and streams and kills many species of fish. Acidic conditions affect not only lakes and forests, but also buildings and statues composed of limestone and marble. Other materials, such as metals, ceramics, glass, paints, and leather, are affected by acid rain.

59 Which *two* pollutants combine with water vapor in the air to produce acid rain? [1]

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

60 Describe how the prevailing winds play a role in the amount of acid rain that occurs in New York State. [1]

\_\_\_\_\_

61 Identify *one* action that could be taken to reduce the amount of acid rain. [1]

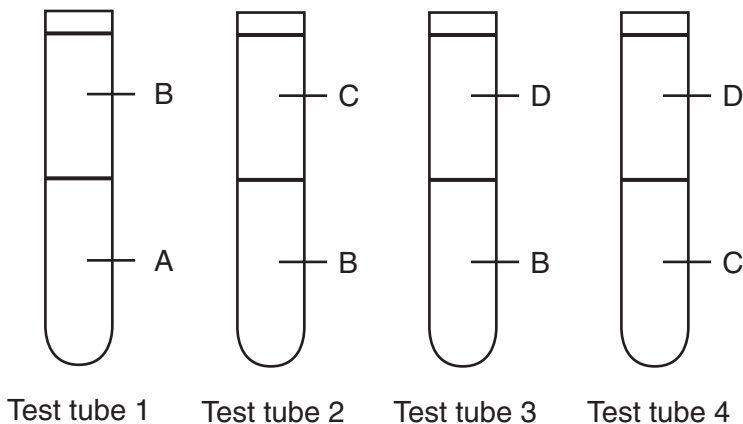
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Base your answers to questions 62 and 63 on the information and diagram below.

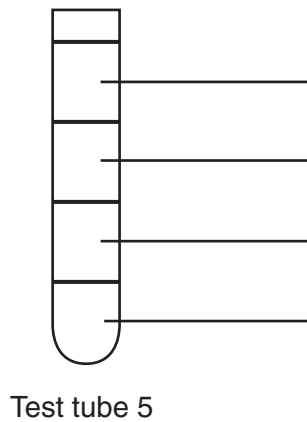
A student was given samples of four different liquids, *A*, *B*, *C*, and *D*. The student poured equal amounts of two different liquid samples into several test tubes. The results are shown in test tubes 1, 2, 3, and 4.



62 What physical property of the liquids causes them to separate into different layers when poured into the test tubes? [1]

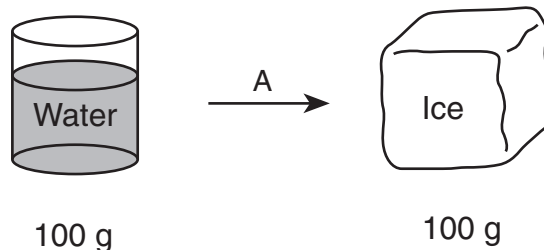
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63 When equal amounts of liquids *A*, *B*, *C*, and *D* were placed into test tube 5, the liquids separated into four layers. A diagram of test tube 5 appears below. On the blank lines next to each layer, list the final order of the liquids as they would appear in test tube 5. [1]



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Base your answers to questions 64 through 66 on the diagram below and on your knowledge of science. The diagram shows a phase change represented by letter A.



(Not drawn to scale)

64 State the term for the phase change that occurs at A. [1]

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65 Explain why the phase change at A is a physical change. [1]

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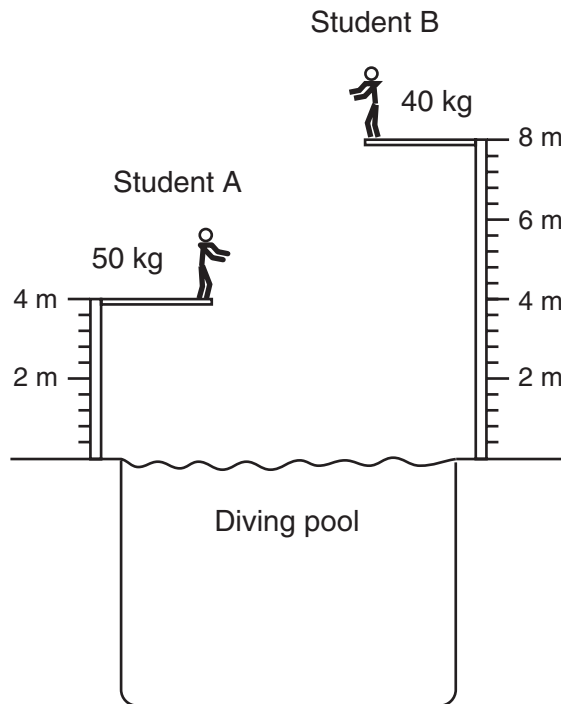
66 Explain why the 100 grams of ice would have a greater volume than 100 grams of water. [1]

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Base your answers to questions 67 and 68 on the diagram below and on your knowledge of science. The diagram shows two students ready to dive into a pool.



(Not drawn to scale)

67 Explain why student *B* has more potential energy than student *A*. [1]

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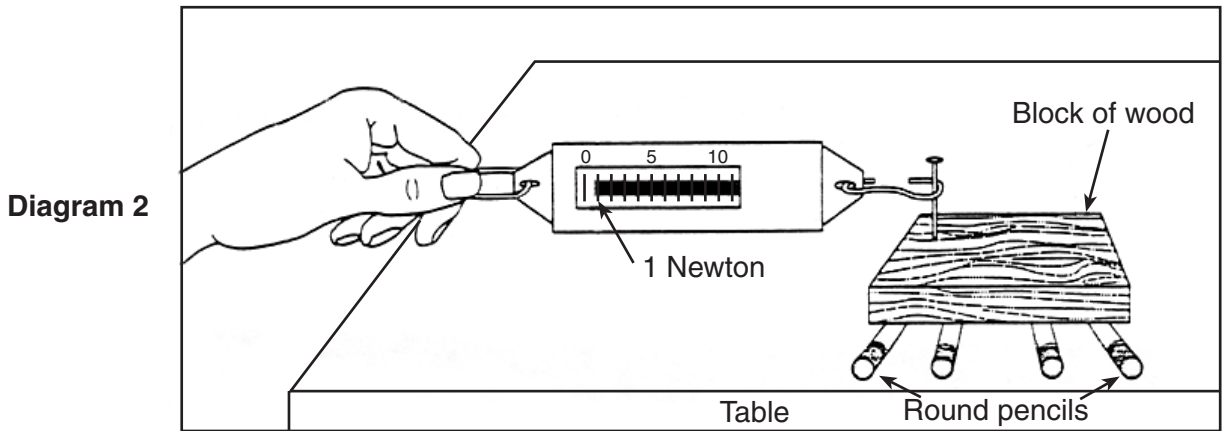
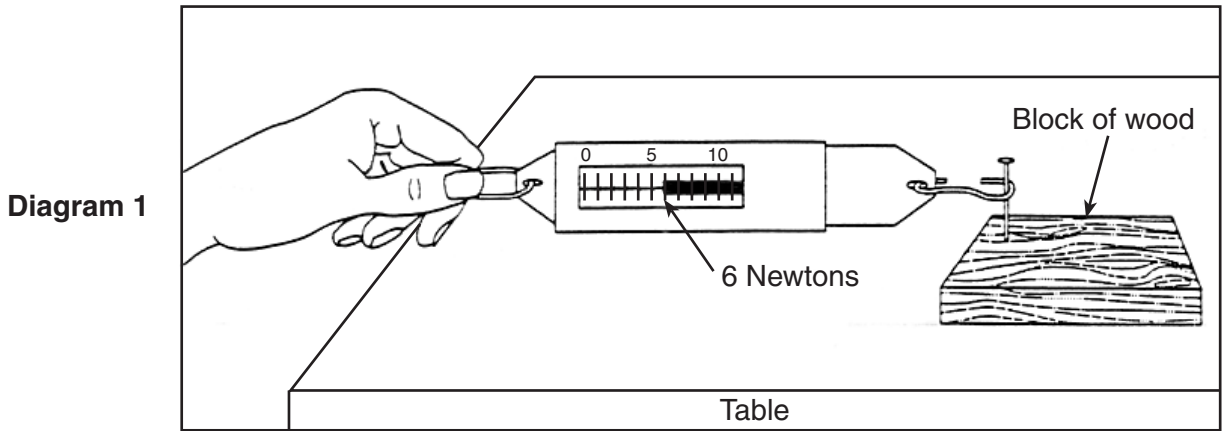
68 Student *A* dives from the board into the water. Explain why student *A*'s kinetic energy decreases as the student enters the water. [1]

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Base your answers to questions 69 through 71 on diagram 1 and diagram 2 below and on your knowledge of science. The amount of force required to keep the same block of wood moving across a tabletop is shown in the diagrams.



69 Circle the name of the device in the diagrams used to measure force. [1]

- spring scale      voltmeter      thermometer      graduated cylinder

70 What change could be made in the setup in diagram 1 to increase the amount of force necessary to move the block of wood? [1]

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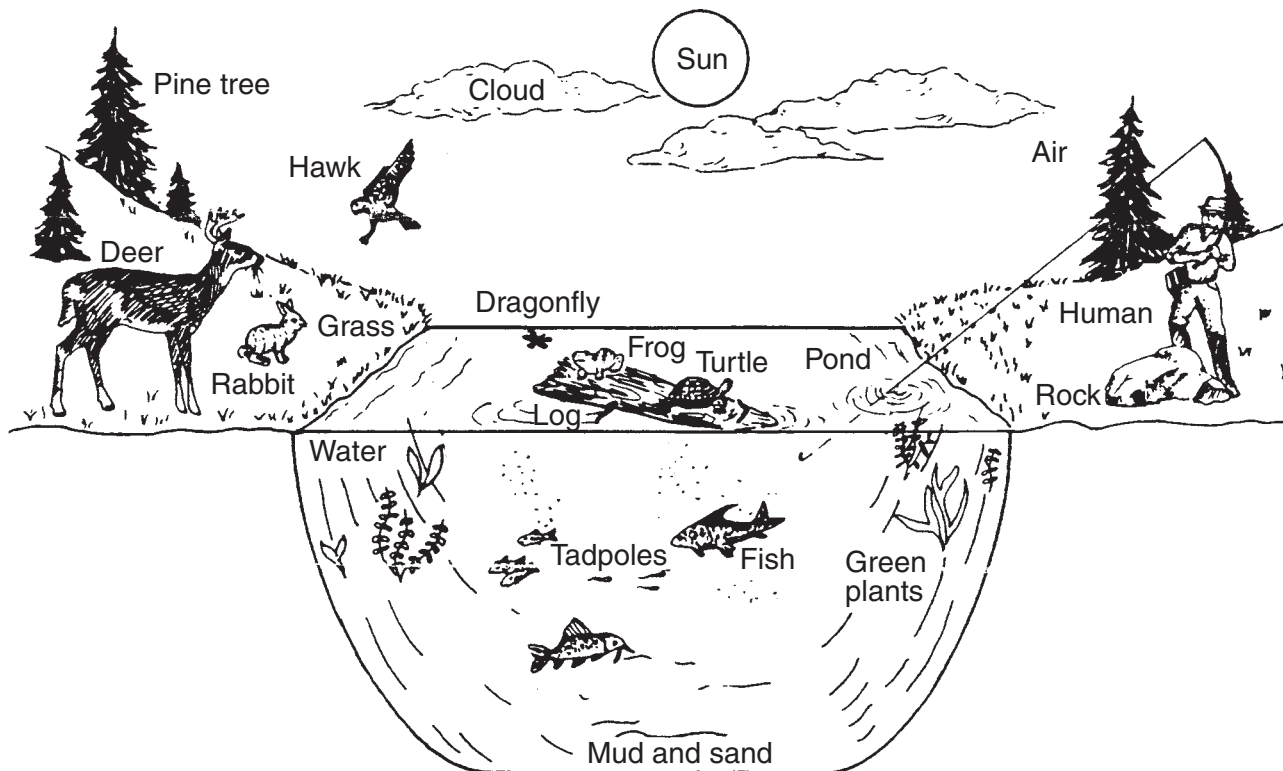
71 Explain why the round pencils in diagram 2 *decrease* the amount of force necessary to move the block of wood. [1]

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Base your answers to questions 72 through 74 on the woodland and pond ecosystems illustrated below. The members of these ecosystems interact with one another as well as with the nonliving environment.



(Not drawn to scale)

72 Identify *one* consumer shown in this ecosystem. [1]

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73 Identify *one* producer shown in this ecosystem. [1]

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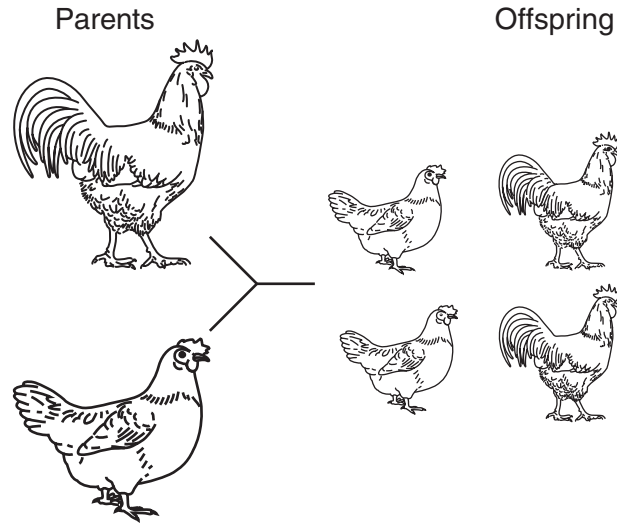
74 What is the primary source of energy for this ecosystem? [1]

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Base your answers to questions 75 through 77 on the diagram below and on your knowledge of science. The diagram shows the result of sexual reproduction.



75 Identify the *two* sex cells that are necessary for sexual reproduction. [1]

(1) \_\_\_\_\_

(2) \_\_\_\_\_

76 In each of the offspring, what percentage of the genetic material comes from the male parent? [1]

\_\_\_\_\_ %

77 State *one* advantage that a species that reproduces sexually has over a species that reproduces asexually. [1]

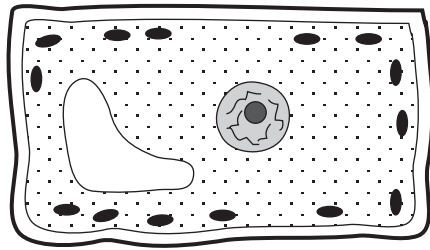
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Base your answers to questions 78 and 79 on the diagram of a cell below and on your knowledge of science. Some of the cell structures are labeled.



**Plant cell**

KEY	
	Cell membrane
	Cell wall
	Vacuole
	Cytoplasm
	Nucleus
	Chloroplast

78 Which *two* structures are found in plant cells, but *not* in animal cells? [2]

(1) \_\_\_\_\_

(2) \_\_\_\_\_

79 Select *three* of the structures labeled in the diagram key. List these structures in the table below. For each structure selected, state its function in the cell. [3]

Structure	Function of This Structure in the Cell
_____	_____ _____ _____
_____	_____ _____ _____
_____	_____ _____ _____

80 The diagram below shows two different-colored moths resting on a tree trunk.



How does this difference in pattern and color affect the moths' ability to survive in the environment? [1]

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**For Teacher Use Only**  
**Part II Credits**

<b>Question</b>	<b>Maximum Credit</b>	<b>Credit Allowed</b>
46	1	
47	1	
48	1	
49	3	
50	1	
51	1	
52	1	
53	1	
54	1	
55	1	
56	1	
57	1	
58	1	
59	1	
60	1	
61	1	
62	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	2	
79	3	
80	1	
<b>Total</b>	<b>40</b>	