THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL TEST

SCIENCE

WRITTEN TEST

JUNE 2002

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 25 open-ended questions. Write your answers to Part II in the space provided in this test booklet.

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

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.

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
ALBANY, NEW YORK 12234

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 correct 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.

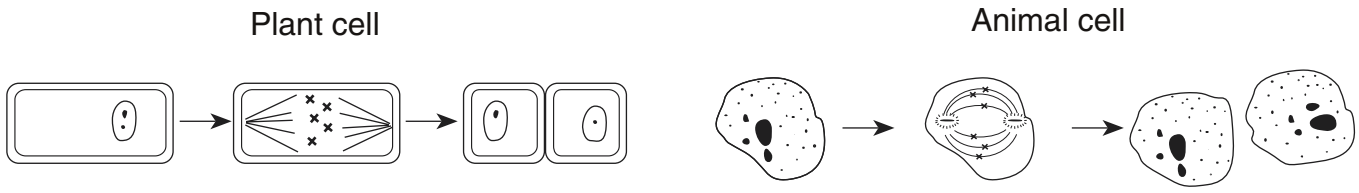
When you are told to start working, turn the page and begin with question 1. Work carefully and answer all of the questions in Part I.

When you have finished Part I, go right on to Part II.

Part I

Directions (1–45): Decide which of the choices given is the *best* answer, based on science principles. In Section A of 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.

1 A plant cell and an animal cell are shown below.



Which conclusion can be made from these diagrams?

(1) Plant and animal cells interact to make new organisms.
(2) Plant and animal cells are similar in the way they grow and divide.
(3) Animal cells require oxygen to release the energy stored in food while plant cells do not.
(4) Nerve cells are present in plant and animal cells.

---

2 Organisms are classified as insects based on their

(1) method of reproduction
(2) internal and external structures
(3) natural habitat
(4) form of communication

3 Nutrients from digested food enter the blood stream through the process of

(1) absorption
(2) elimination
(3) respiration
(4) secretion

4 The kidneys, which remove dissolved wastes from the blood, are organs of the

(1) endocrine system
(2) excretory system
(3) skeletal system
(4) nervous system

5 Which two systems of a rabbit's body must be working together for the rabbit to run away from a fox?

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

6 In which process is oxygen used to release the energy stored in food?

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

7 Chromosome is to nucleus as DNA is to

(1) cytoplasm
(2) gene
(3) cell membrane
(4) chloroplast

8 In sexual reproduction, what fraction of genes does each parent contribute to the offspring?

(1) $\frac{1}{4}$
(2) $\frac{1}{3}$
(3) $\frac{1}{2}$
(4) $\frac{3}{4}$

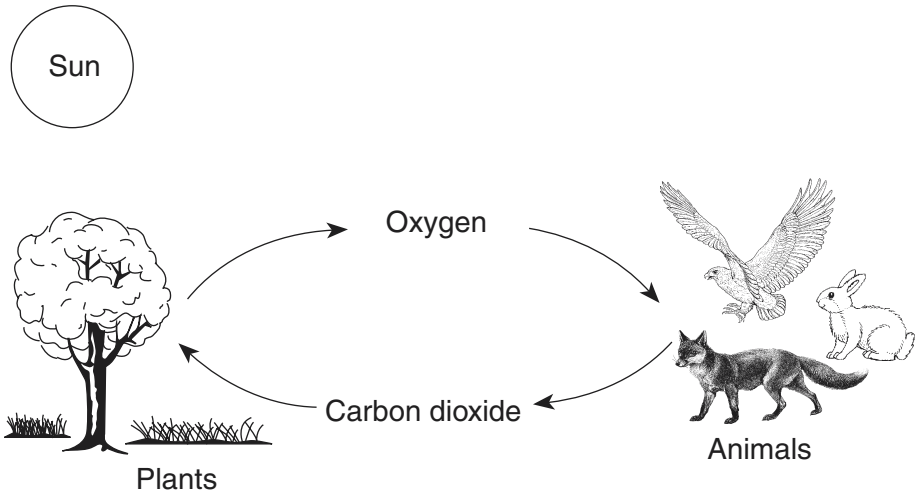
9 The fur of a snowshoe rabbit changes to white during the winter. This change is an example of

(1) adaptation
(2) competition
(3) metamorphosis
(4) metabolism

10 The male sex cell is the

(1) egg
(2) ovary
(3) sperm
(4) testes

11 The diagram below gives information about carbon dioxide and oxygen in the atmosphere.



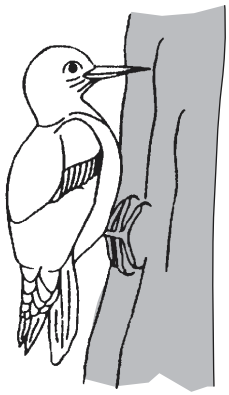
(not drawn to scale)

What is the name of the process represented in this diagram that produces the oxygen?

(1) photosynthesis
(2) metamorphosis
(3) respiration
(4) fertilization

---

12 The drawing below shows a woodpecker using its long, sharp beak to obtain insects.



What factor might contribute to the extinction of this species of woodpecker?

(1) a new source of food
(2) an overabundance of trees
(3) the use of pesticides in the forest
(4) an increase in the population of insects

13 Which condition is the result of abnormal cell division?

(1) cancer
(2) pregnancy
(3) infection
(4) extinction

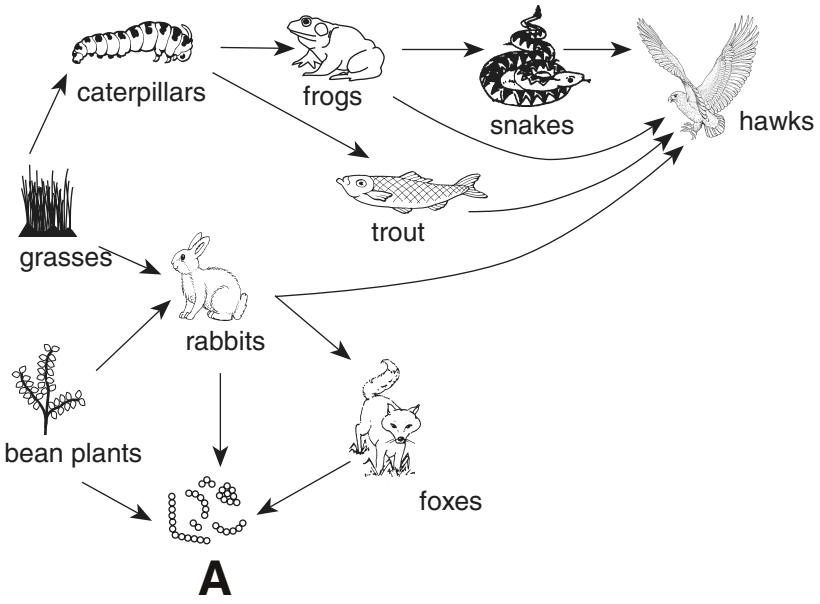
14 Which process gives rise to a variety of traits within a species?

(1) sexual reproduction
(2) dynamic equilibrium
(3) cellular respiration
(4) internal regulation

15 In multicellular organisms, cell division is required for growth and

(1) circulation
(2) locomotion
(3) repair
(4) respiration

Base your answers to questions 16 through 19 on the diagram below, which shows many organisms in a food web.



(not drawn to scale)

16 One type of organism in this web that represents a producer is

(1) rabbits
(2) grasses
(3) trout
(4) snakes

17 Which organisms obtain energy for growth and development directly from the Sun?

(1) caterpillars
(2) hawks
(3) frogs
(4) bean plants

18 According to this food web, which organisms are herbivores?

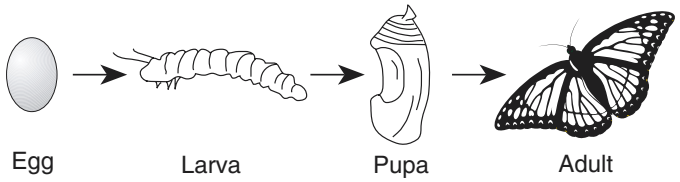
(1) caterpillars
(2) foxes
(3) hawks
(4) snakes

19 Which organism correctly completes the food web at *A*?

(1) horses
(2) mice
(3) bacteria
(4) trees

---

20 Which process is illustrated in the diagram below?



(not drawn to scale)

(1) natural selection
(2) mutation
(3) metamorphosis
(4) photosynthesis

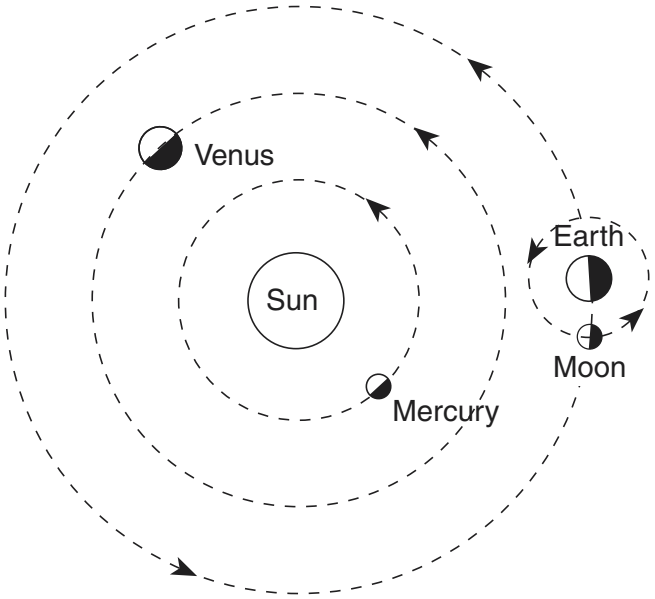
21 Fats are important nutrients because they

(1) provide genetic information
(2) contain stored energy
(3) are used in photosynthesis
(4) maintain bone density

22 Which factor contributes to global warming?

(1) increased use of solar-powered cars
(2) increased burning of fossil fuels
(3) better long-term weather forecasts
(4) changing distance between Earth and the Sun

23 The diagram below shows a portion of the solar system as seen from space.

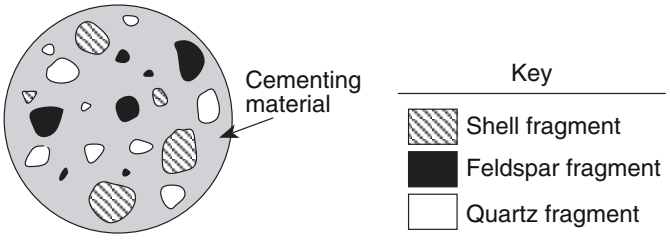


(not drawn to scale)

For which object is the lighted surface shown *incorrectly*?

(1) Moon
(2) Mercury
(3) Venus
(4) Earth

24 The diagram below shows a rock sample and an identification key.



Rock Sample

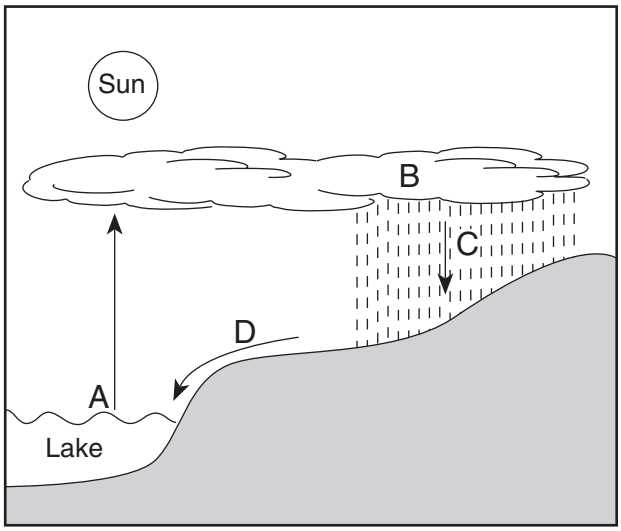
This rock sample would best be classified as

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

25 Oceans, glaciers, lakes, and rivers are part of Earth's

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

26 The diagram below shows the water cycle.



Which letter represents the process of evaporation?

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

27 Convection currents in Earth's mantle are believed to be responsible for

(1) ocean currents
(2) crustal plate movements
(3) climatic changes
(4) uneven surface heating

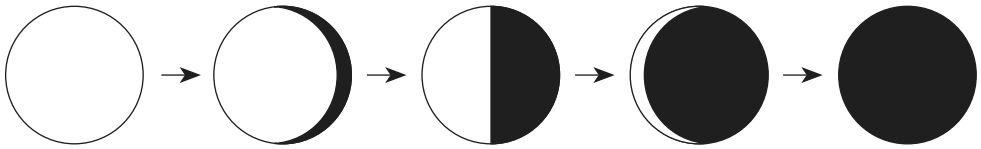
28 Water vapor changes to liquid water during which process?

(1) dissolving
(2) melting
(3) evaporation
(4) condensation

29 Skiers often wear sunglasses while they are skiing because snow

(1) radiates light
(2) absorbs light
(3) conducts light
(4) reflects light

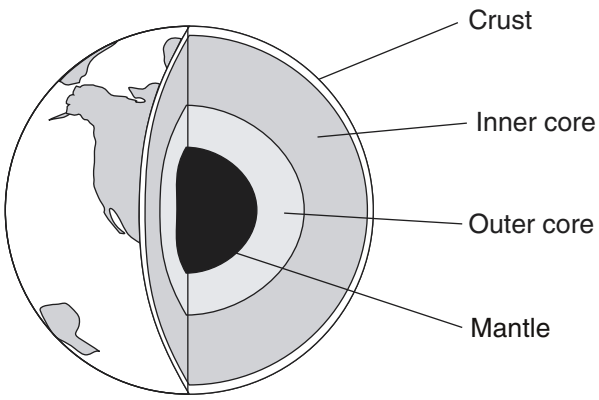
30 A student drew the pictures below to show how the Moon looked from Earth over a two-week period.



The differences shown in the student's drawings are mostly due to the changing

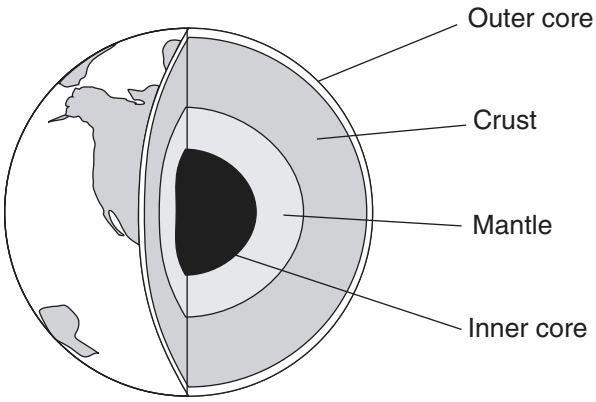
(1) distance between Earth and the Moon
(2) speed of the Moon in its orbit
(3) position of the Moon in its orbit
(4) position of the observer on Earth

31 In which diagram are the layers of Earth correctly labeled?



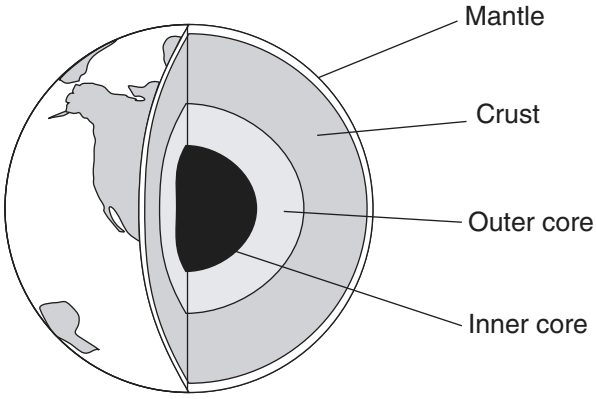
(not drawn to scale)

(1)



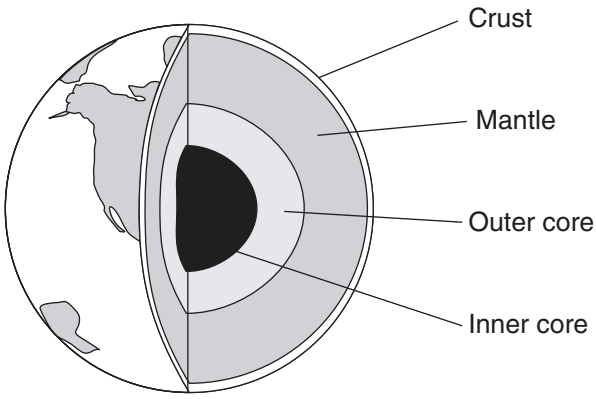
(not drawn to scale)

(3)



(not drawn to scale)

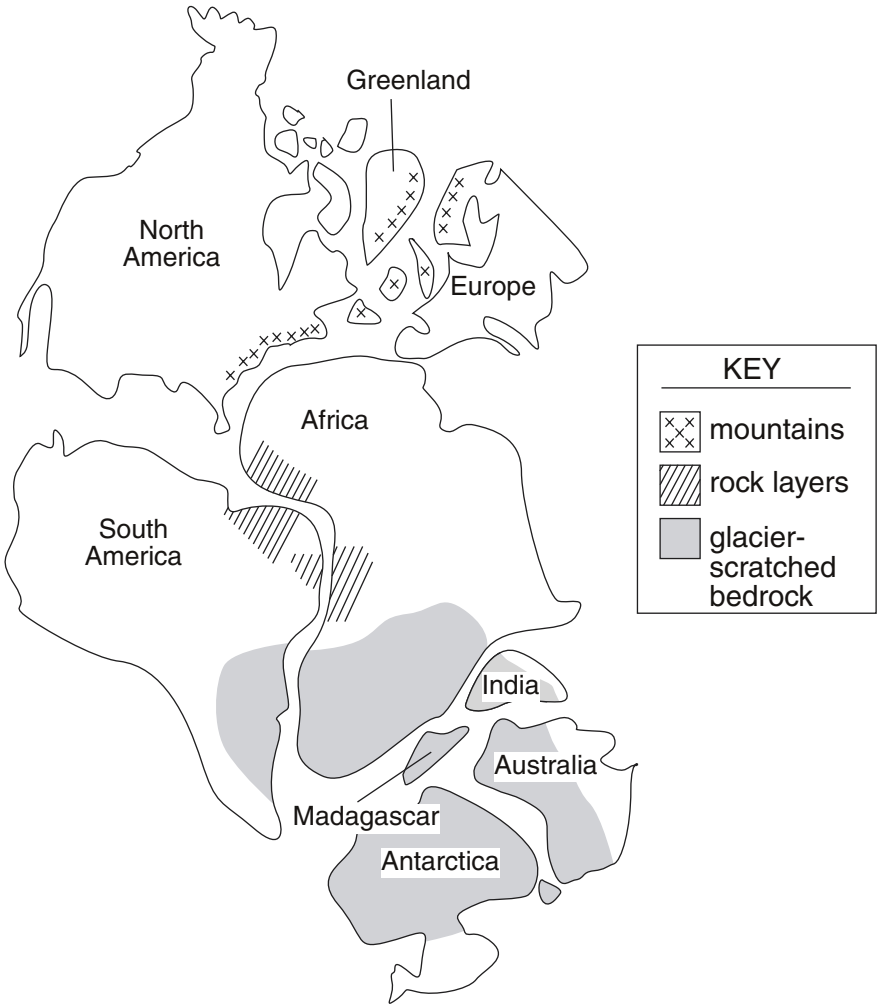
(2)



(not drawn to scale)

(4)

32 The map below indicates the possible location of some of Earth's continents in the past.



Which evidence best supports the idea that the landmasses on Earth were once in these positions?

(1) North America and India have matching mountain chains.
(2) Madagascar and India have similar shapes.
(3) Matching rock layers can be found in Africa and South America.
(4) Bedrock in Australia and Greenland have glacier scratches.

33 The chart below compares three types of rocks. The first column gives the rock classification. Which heading best describes the information provided in the second column?

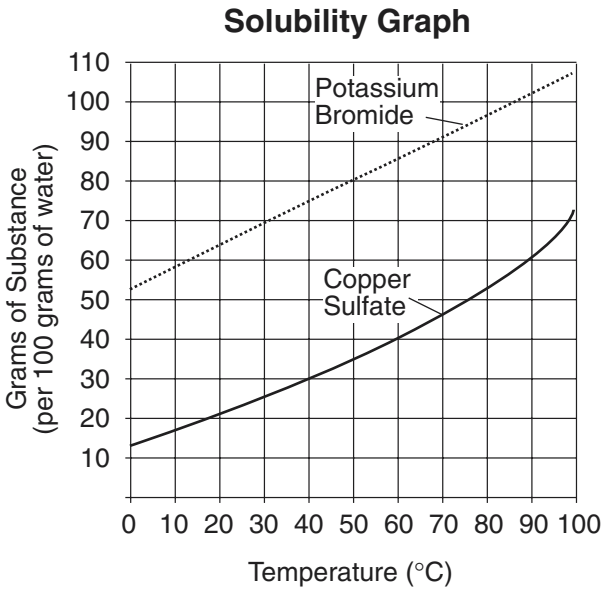
Rock Classification	???
Igneous	melting and solidification of magma
Sedimentary	mechanical, chemical, or organic processes
Metamorphic	heat and/or pressure

(1) Minerals in Rocks
(2) Method of Rock Formation
(3) The Value of Rocks
(4) The Time Rocks Take to Form

34 Earth's weather is primarily caused by the

(1) drifting of Earth's crustal plates
(2) gravitational attraction of the Moon
(3) uneven heating of Earth's surface
(4) changing distance between Earth and the Sun

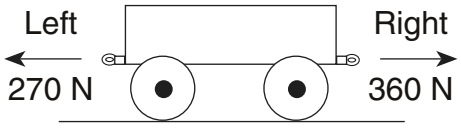
35 The graph below shows the solubility of two different chemical compounds.



Compared to copper sulfate, approximately how many more grams of potassium bromide would dissolve at 90°C?

(1) 20
(2) 40
(3) 60
(4) 80

36 The diagram below shows a stationary cart on a frictionless surface. Two *unequal* opposing forces are about to be applied to the cart.



If the *unequal* opposing forces are applied to the cart at the same time, what will occur?

(1) The cart will move to the left.
(2) The cart will move to the right.
(3) The cart will alternate between moving left and right.
(4) The cart will remain stationary.

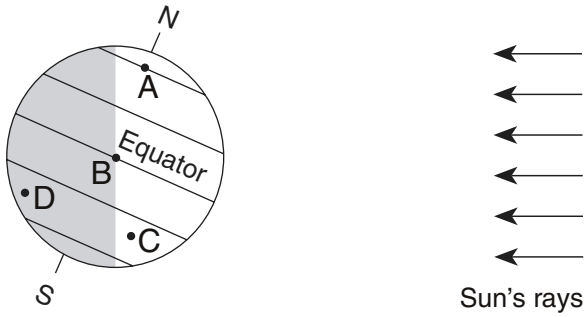
37 Some common substances and their chemical formulas are listed in the chart below.

Substance	Formula
Carbonic acid	H_2CO_3
Oxygen	O_2
Hydrochloric acid	HCl
Carbon dioxide	CO_2
Water	H_2O
Helium	He

Which of these substances are elements?

(1) hydrochloric acid and carbonic acid
(2) carbon dioxide and water
(3) oxygen and helium
(4) water and oxygen

38 The diagram below shows Earth as seen from space. Letters *A* through *D* are locations on Earth's surface.



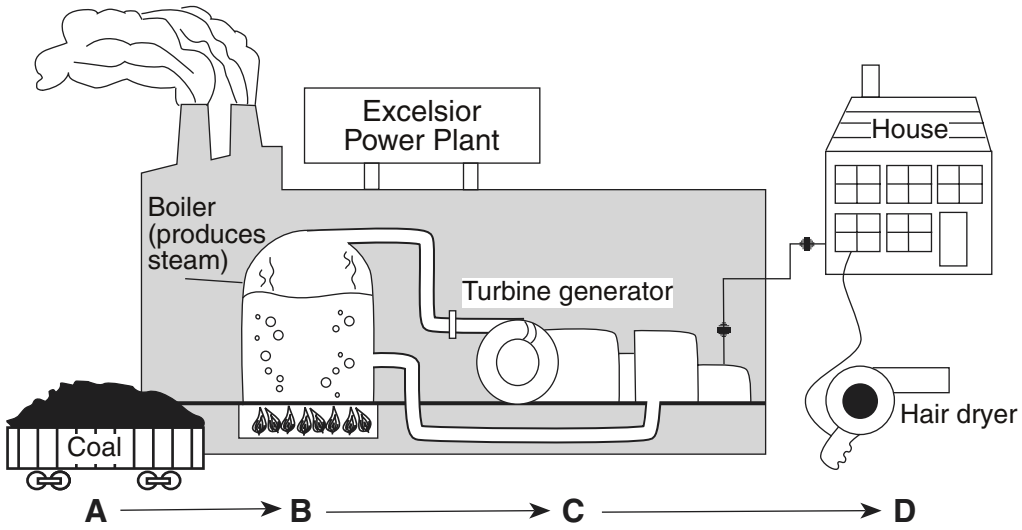
When Earth is in this position, which location would experience the greatest number of daylight hours?

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

39 A substance has a freezing point of –38°C and a boiling point of 356°C. At what temperature would this substance be in its liquid state?

(1) –100°C
(2) –50°C
(3) 80°C
(4) 375°C

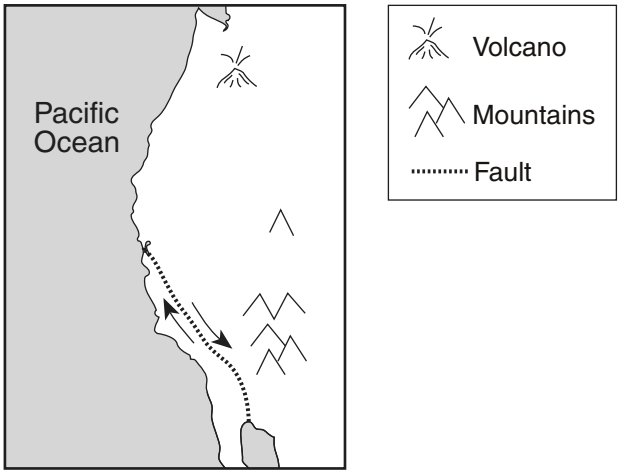
40 The diagram below shows the steps necessary to produce the energy needed to run a hair dryer.



As it moves from location *A* to location *D* in the diagram, the energy stored in the coal

(1) is converted to solar energy
(2) reduces the friction in the hair dryer
(3) is recycled
(4) is transformed

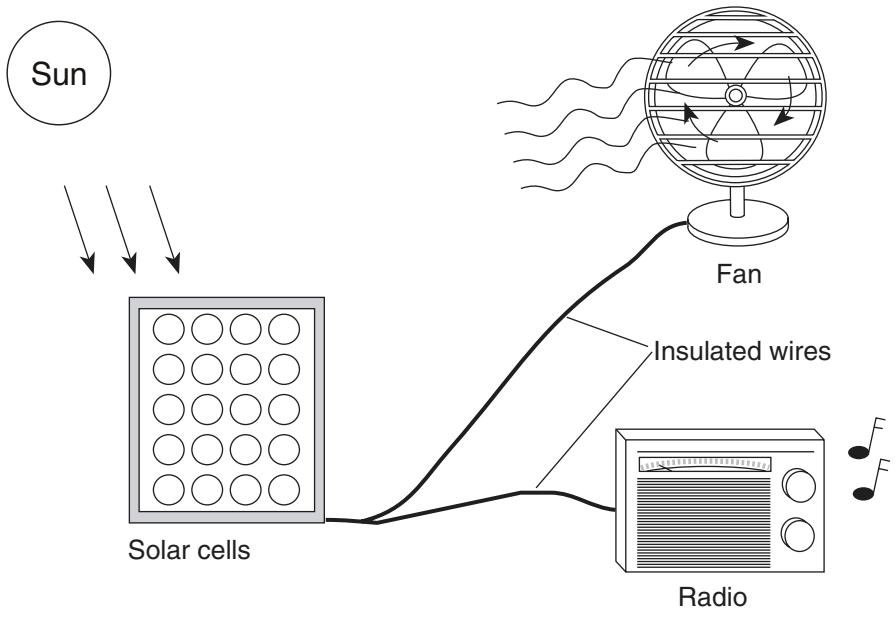
41 The map below shows some geologic features located near the west coast of the United States.



The arrows on either side of the fault represent

(1) volcanic eruptions
(2) rock formations
(3) the relative movement of air masses
(4) the relative movement of tectonic plates

42 The illustration below shows an example of energy changing forms.

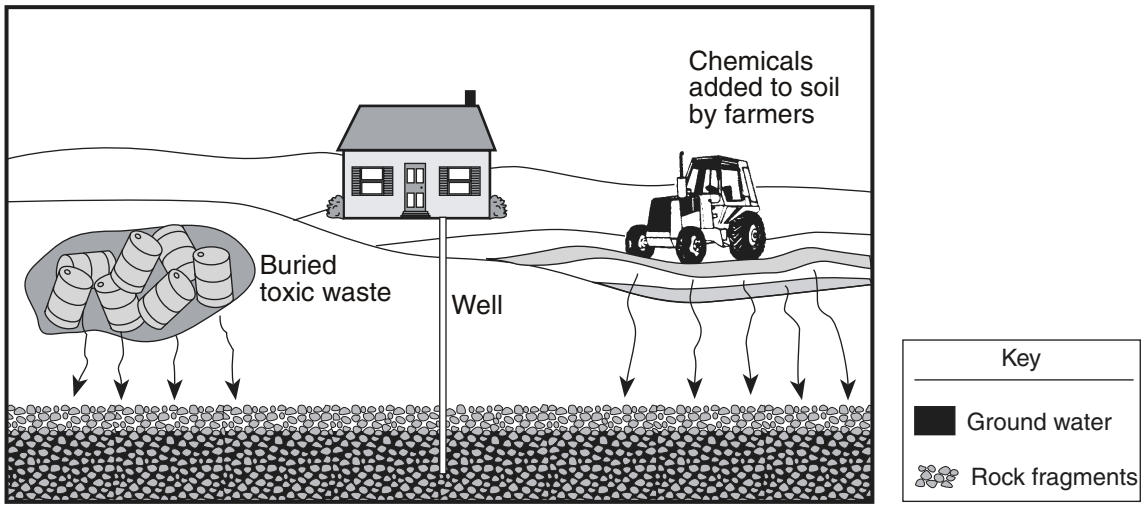


(not drawn to scale)

Which changes in energy form are illustrated in the diagram?

(1) electrical → sound → light and mechanical
(2) sound → mechanical → light and electrical
(3) mechanical → light → sound and electrical
(4) light → electrical → mechanical and sound

43 The diagram below shows some ways in which groundwater can be affected by humans.

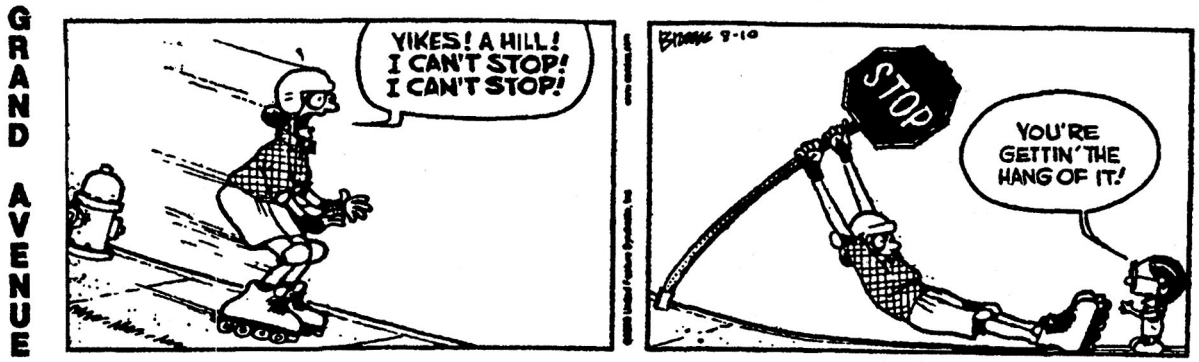


(not drawn to scale)

Which statement is best supported by the diagram?

(1) Chemicals applied by farmers lower the level of pollution in drinking water.
(2) Drinking water can become polluted from unsuspected sources.
(3) Human activities do not affect groundwater.
(4) Toxic waste is safe if buried below the level of the basements of nearby homes.

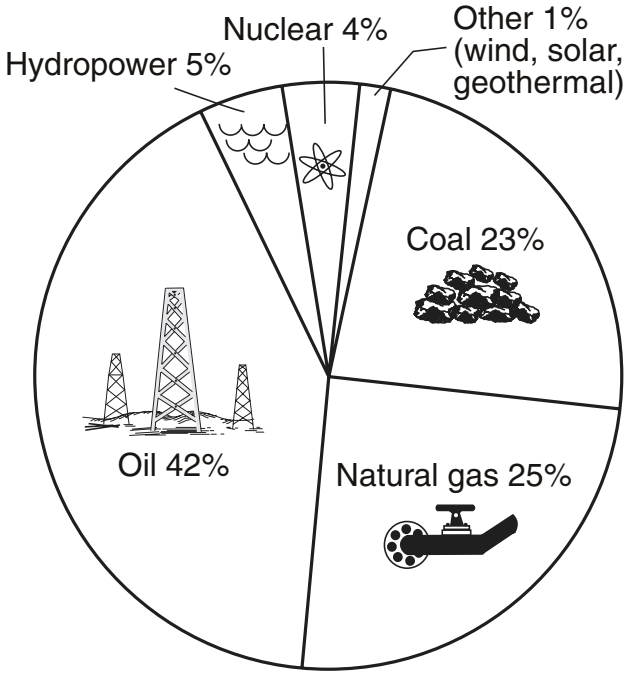
44 The cartoon below shows a humorous view of a law of motion.



Which statement best summarizes the scientific concept shown in the cartoon?

(1) A falling body accelerates at a constant speed.
(2) The motion of an object is constantly changing due to magnetic forces.
(3) The force of friction causes an object in motion to move faster.
(4) A body in motion will remain in motion unless influenced by an outside force.

45 The pie chart below compares the amounts of energy from different sources used in the United States each year.



Which two energy sources together provide more than 50% of the energy needs of the United States?

(1) nuclear and natural gas
(2) hydropower and oil
(3) oil and coal
(4) natural gas and coal

Part II

Directions (46–70): Record your answers in the spaces provided in this test booklet.

46 A student goes skateboarding a few times a week. The student notices that she can go faster while skating on some level surfaces than on others. She hypothesizes that speed has something to do with the surface she is skating on. The student wants to design an experiment to test this hypothesis.

a Identify the independent (manipulated) variable in the experiment. [1]

_____

b Identify the dependent (responding) variable in the experiment. [1]

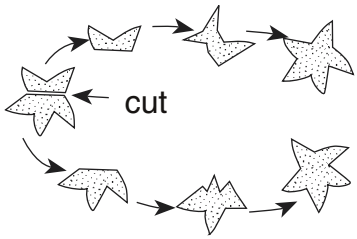
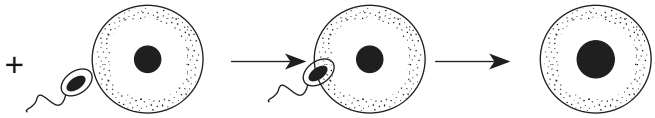
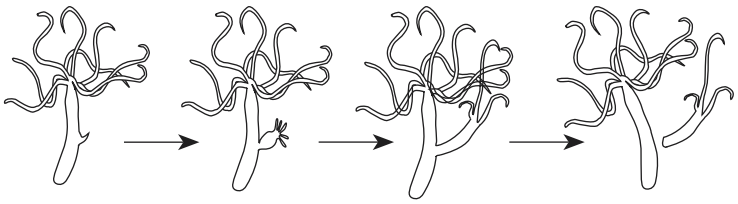
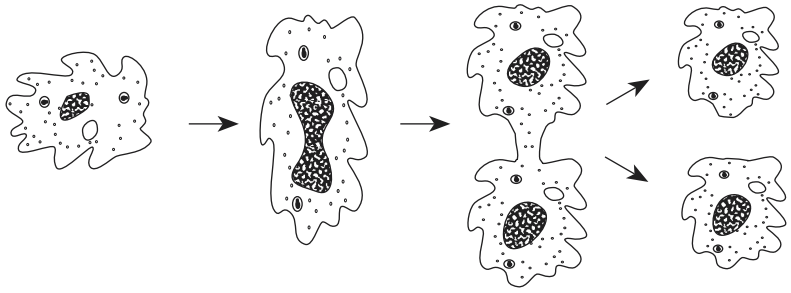
_____

c Identify *two* factors that will need to be held constant in the experiment. [2]

(1) _____

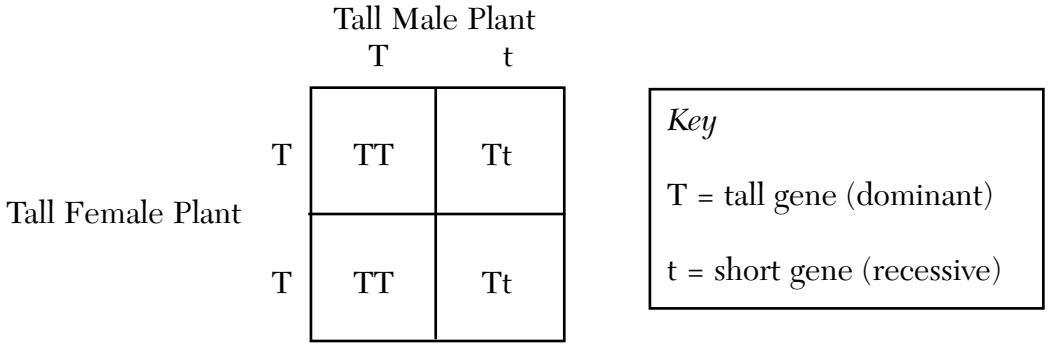
(2) _____

47 The diagrams in the first column of the chart below show various forms of reproduction. In the second column, circle the form of reproduction (asexual or sexual) shown by each of the diagrams. [2]

	Asexual Sexual
	Asexual Sexual
	Asexual Sexual
	Asexual Sexual

(not drawn to scale)

Base your answers to questions 48 through 50 on the Punnett square below, which shows a cross between two tall pea plants (Tt × TT).



48 What percentage of the offspring will grow tall? [1] _____

49 According to the Punnett square, what is the probability of an offspring inheriting two tall genes?

(Express your answer as a fraction or percentage.) [1] _____

50 Explain why both parent plants are tall, even though their genes for height are not exactly the same. [1]

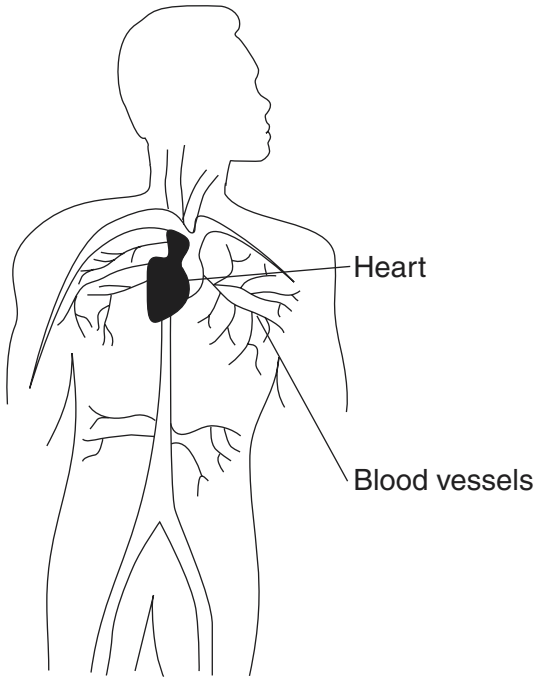
_____

_____

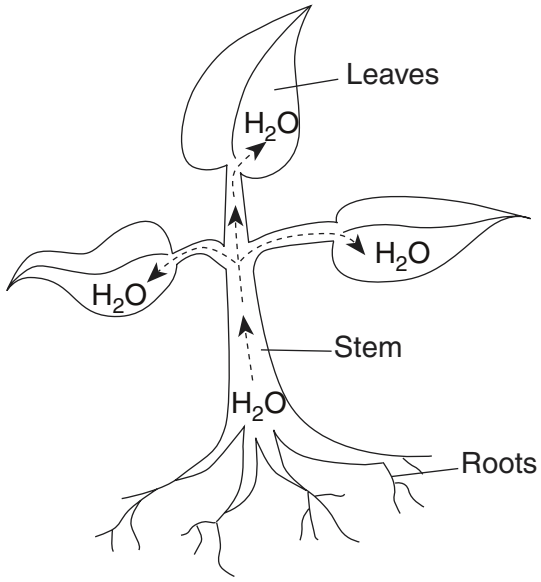
_____

_____

Base your answers to questions 51 and 52 on the diagrams below, which show a system in a human and a system in a plant.



Human



Plant

(not drawn to scale)

51 Select *one* structure labeled in the human system above and explain how it contributes to the way the human system functions. [1]

Human Structure: _____

Explanation: _____

_____

52 Select *one* structure labeled in the plant system above and explain how it contributes to the way the organism functions. [1]

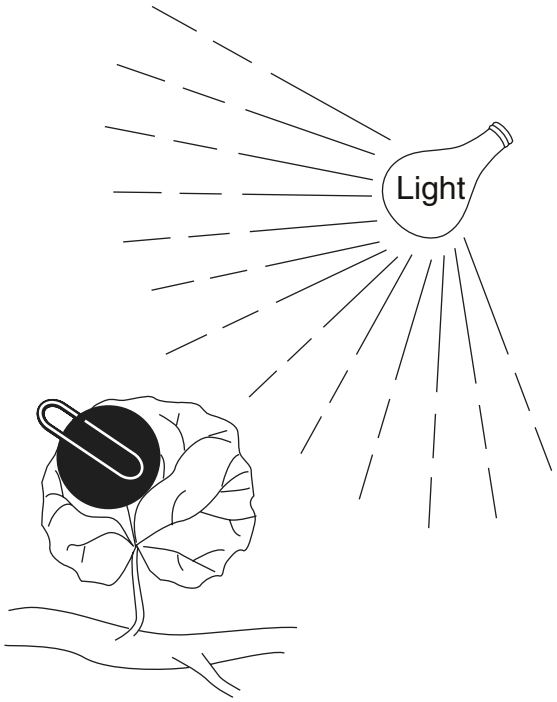
Plant Structure: _____

Explanation: _____

_____

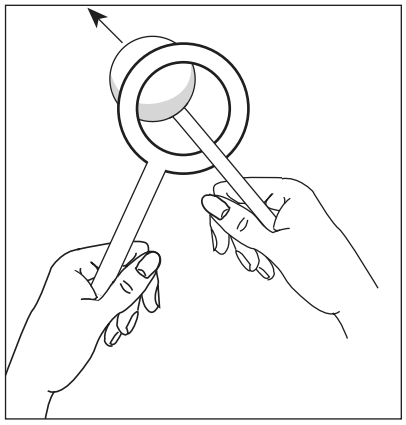
_____

53 The diagram below illustrates a geranium leaf that has been partially covered with black paper for three days.

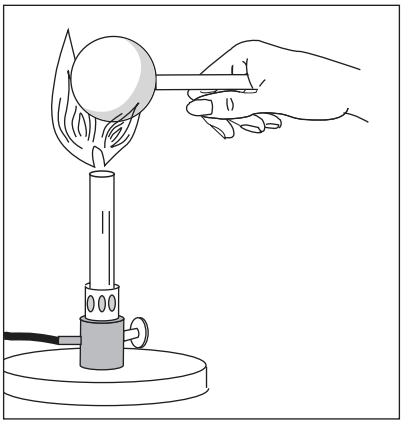


When the black paper is removed, the area that was covered by the paper has turned white. The white section of the leaf tests negative for the presence of sugar and the green section tests positive for the presence of sugar. Explain why the white and green sections of the leaf have different sugar test results. [2]

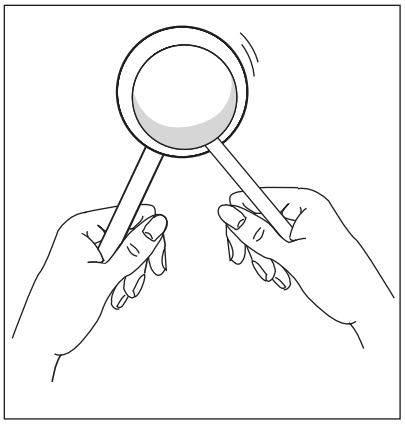
54 The illustration below shows a solid metal ball and a ring before and after heat is applied to the metal ball. Before heat is applied, the metal ball passes easily through the ring. After heat is applied, the metal ball does *not* pass through the ring.



Before heating metal ball



Heating metal ball



After heating metal ball

a What evidence shows that a physical change took place in the metal ball? [2]

_____

_____

b Explain why heating the metal ball caused this physical change. [1]

_____

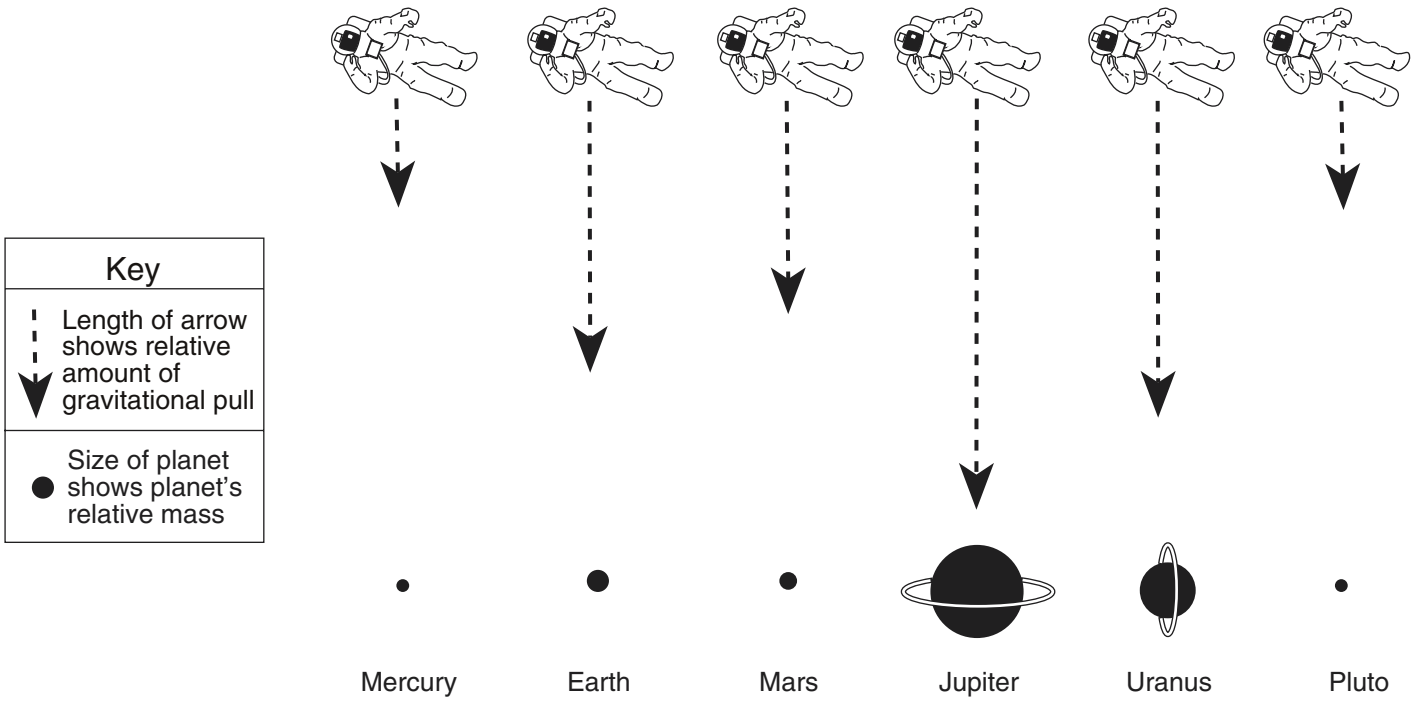
_____

c Explain why this is *not* evidence of a chemical change. [1]

_____

Base your answers to questions 55 and 56 on the diagram below. The diagram shows the relative strengths of the gravitational force for planets of different masses. The size of each planet represents the planet's relative mass. The arrow length indicates the relative amount of gravitational pull that each planet would exert on an astronaut in space.

Relative strengths of gravitational force for planets of different mass



55 What is the relationship between the mass of the planets and the relative strength of their gravitational pull? [1]

_____

_____

_____

_____

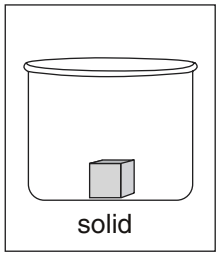
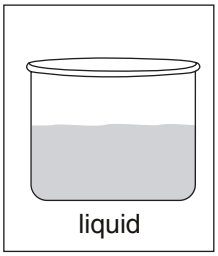
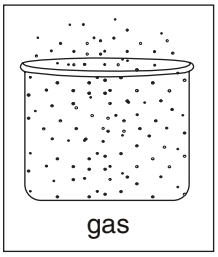
56 Which three planets shown have *less* gravitational pull than Earth? [1]

(1) _____

(2) _____

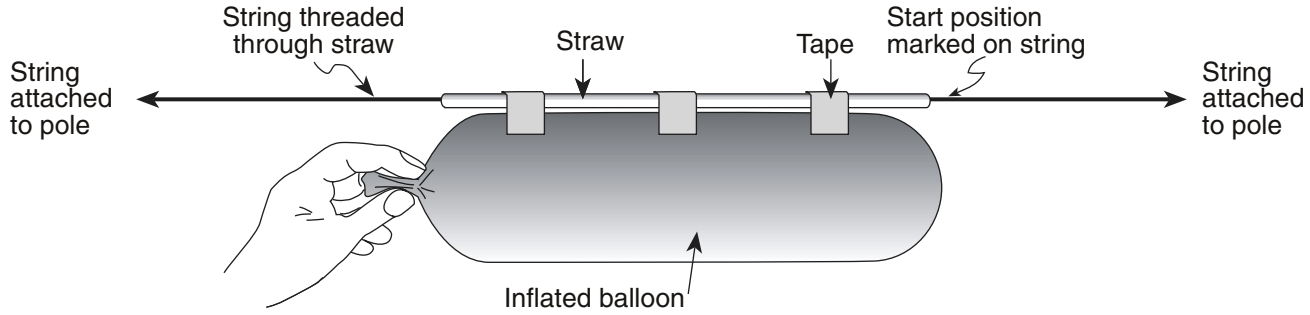
(3) _____

57 The drawings on the top row of the chart below represent water in its three phases (solid, liquid, and gas) in open containers. Complete this chart by filling in the answers that correspond to the drawing at the top of each column and the question in each row. Make sure you fill in an answer in every empty box. [3]

			
Does this phase of matter have a definite shape? Write **Yes** or **No** in each box.			
Does this phase of matter have a definite volume? Write **Yes** or **No** in each box.			
How do these phases rank in order of the relative speed of their particles? Rank them **1, 2, 3,** with 1 having the slowest particles and 3 having the fastest particles.			

Base your answers to questions 58 through 61 on the diagram and information below.

A student made a rocket balloon using an inflated balloon, a straw, a long piece of string, two poles, and some tape. It looked similar to the diagram below.



58 On the diagram above draw and label arrows to show the motion of the air and the motion of the balloon that would occur when the student releases the inflated balloon. [2]

59 Why is marking the starting position important if the student wants to calculate the average speed of the balloon? [1]

_____

_____

_____

60 How would taping a coin (adding mass) to the balloon affect the overall motion of the balloon? [1]

_____

_____

_____

61 If the string were extremely long, what would eventually happen to the motion of the balloon? Explain why. [2]

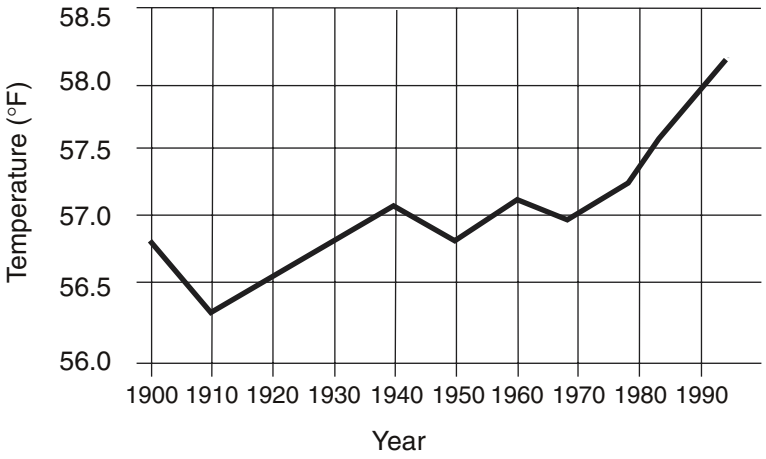
_____

_____

_____

Base your answers to questions 62 through 64 on the graph below, which shows average yearly temperatures for Earth from 1900 to 1990.

Average Yearly Temperature on Earth



62 Describe what happened to the average yearly temperature on Earth from 1970 to 1990. Give *one* possible reason why this change occurred. [2]

63 What was the *lowest* average yearly temperature in the period of time shown? [1]

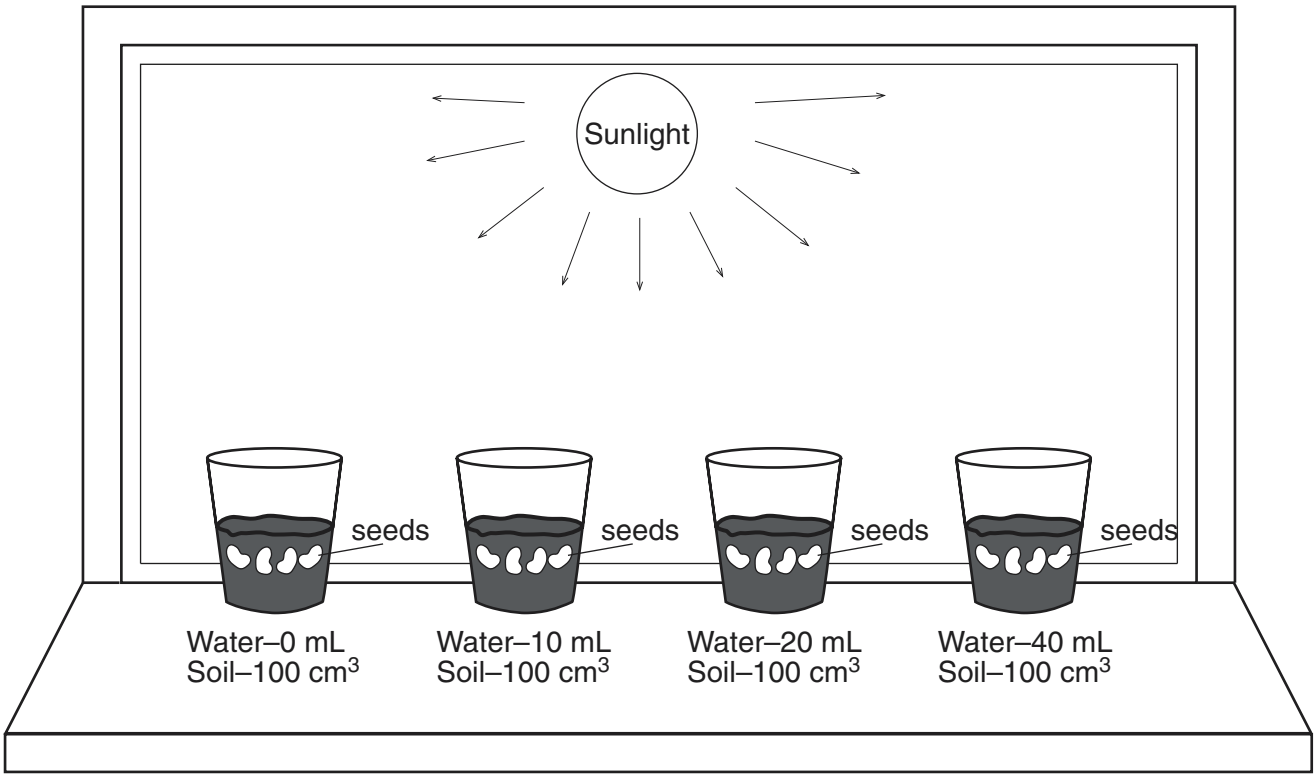
_____ °F

64 In which 10-year time interval did the average yearly temperature show both an increase and a decrease? [1]

Circle the correct answer. 1915–1925 1925–1935 1945–1955 1975–1985

Base your answers to questions 65 and 66 on the information and on the diagram below.

A student set up the experiment below to learn about plant growth. The student added a different amount of water to four identical containers, each containing four seeds in 100 cubic centimeters of soil. All of the containers were placed in the same sunny location.



65 State a hypothesis being tested in this experiment. [1]

_____

_____

66 *a* Identify *one* variable that is being held constant in this experiment. [1]

_____

b Explain why this variable needs to be held constant. [1]

_____

_____

Base your answers to questions 67 through 70 on the information and chart below.

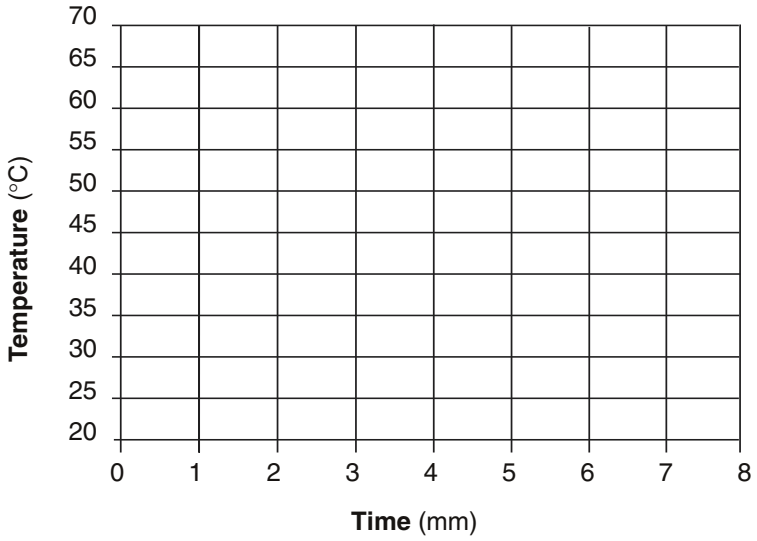
The chart below shows temperature readings recorded every minute while a substance was being heated at a constant rate. The material was a solid before heating and a hot liquid after 7 minutes of heating.

Time (min)	**Temp** (°C)
0	22
1	35
2	53
3	53
4	53
5	53
6	58
7	65

67 Construct a line graph on the grid provided by following the steps below:

a Use an **X** to plot the temperature at each time shown on the chart. [2]

b Connect the **X**s with a solid line. [1]



68 Based on the data, at what temperature did a phase change take place? [1]

Circle the correct answer: 35°C 53°C 58°C 65°C

69 Was energy absorbed or released by the material during the phase change from a solid to a liquid? [1]

Circle the correct answer: absorbed released

70 What would be an appropriate title for this graph? [1]

For Teacher Use Only
Part II Credits

Question	Max Credit	Credit Allowed
46	4	
47	2	
48	1	
49	1	
50	1	
51	1	
52	1	
53	2	
54	4	
55	1	
56	1	
57	3	
58	2	
59	1	
60	1	
61	2	
62	2	
63	1	
64	1	
65	1	
66	2	
67	3	
68	1	
69	1	
70	1	
Total	41	