

THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL TEST SCIENCE

WRITTEN TEST

JUNE 2001

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 35 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 37 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.

Part I

DIRECTIONS

There are 35 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.

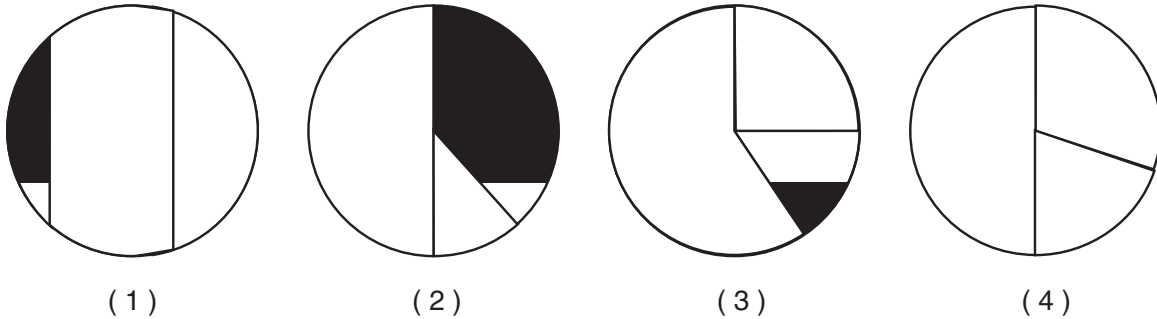
Part I

1 The information below shows what happens to incoming solar radiation.

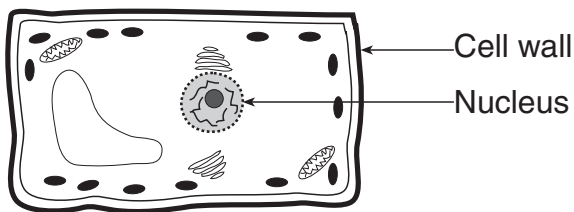
Incoming Solar Radiation

- 30% reflected by atmosphere
- 20% absorbed by atmosphere
- 50% absorbed by Earth's surface

Which pie graph best represents this information?



2 The diagram below shows a cell.



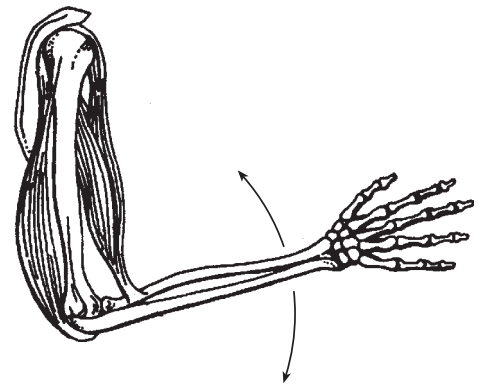
This cell would be found in which type of organism?

- (1) animals
- (2) fungi
- (3) viruses
- (4) plants

3 Tissue is composed of a group of

- (1) similar cells working together
- (2) different organs working together
- (3) organ systems working together
- (4) nuclei in a cell working together

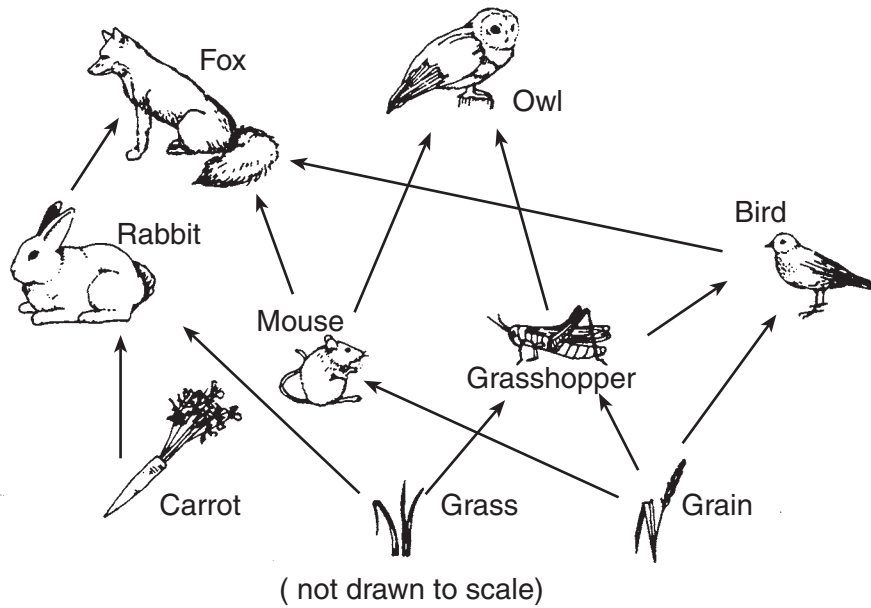
4 The diagram below shows a part of a human body system.



The possible movement represented by the arrows in the diagram is coordinated by the

- (1) circulatory system
- (2) excretory system
- (3) nervous system
- (4) reproductive system

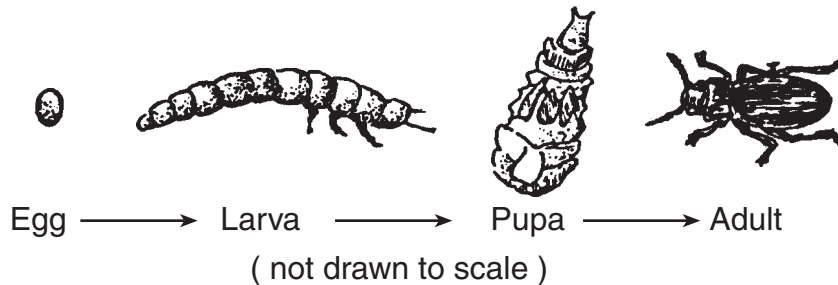
5 The diagram below shows a food web.



Which three organisms in the food web are competing for the same food resource?

- (1) carrot, rabbit, and fox
- (2) grain, bird, and owl
- (3) fox, owl, and rabbit
- (4) bird, mouse, and grasshopper

6 The diagram below shows the development of a certain type of insect.



This diagram shows the process of

- (1) metamorphosis
- (2) fertilization
- (3) selective breeding
- (4) environmental change

7 The endocrine system produces chemicals that affect organ functions. These chemicals are called

- (1) nutrients
- (2) hormones
- (3) microbes
- (4) wastes

8 What is the function of DNA in a cell?

- (1) regulating the movement of nutrients
- (2) storing and releasing chemicals
- (3) carrying genetic material
- (4) providing energy for activities

Base your answers to questions 9 and 10 on the table below, which compares human population and carbon dioxide (CO₂) levels in the atmosphere over time.

Human Population and Carbon Dioxide Levels

Year	Human Population (billions)	Carbon Dioxide (CO ₂) Levels in the Atmosphere (parts per million)
1960	2.50	317
1970	2.75	325
1980	3.00	337
1990	5.00	342

9 How have the size of the human population and the amount of carbon dioxide (CO₂) in the atmosphere changed from 1960 to 1990?

- (1) The human population has increased while the amount of CO₂ has decreased.
- (2) The human population has decreased while the amount of CO₂ has increased.
- (3) Both the human population and the amount of CO₂ have increased.
- (4) Both the human population and the amount of CO₂ have decreased.

10 Which human activity might explain the change in carbon dioxide levels shown in the graph?

- (1) storing nuclear waste
- (2) collecting solar energy
- (3) using wind energy
- (4) burning fossil fuels

11 The effects of natural selection are generally seen most quickly in which organisms?

- (1) bacteria
- (2) corn plants
- (3) humans
- (4) cats

12 A plant forms new tissue at the tips of its roots and stems. This new tissue growth is a direct result of

- (1) circulation
- (2) coordination
- (3) cellular respiration
- (4) cell division

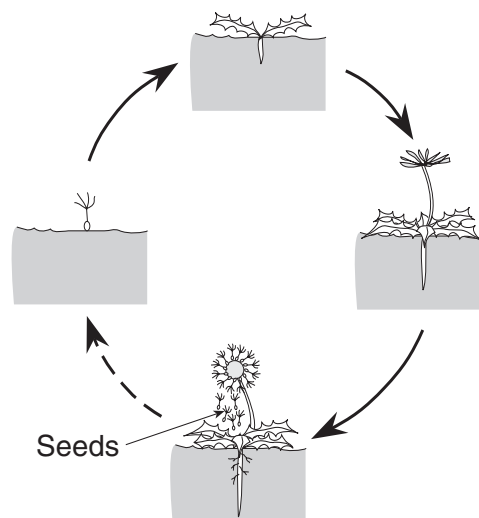
13 What do all organisms need to survive?

- (1) energy
- (2) blood
- (3) carbon dioxide
- (4) soil

14 Which substance provides humans with their main source of energy?

- (1) food
- (2) carbon dioxide
- (3) water
- (4) chlorophyll

15 The diagram below shows a model of plant reproduction.



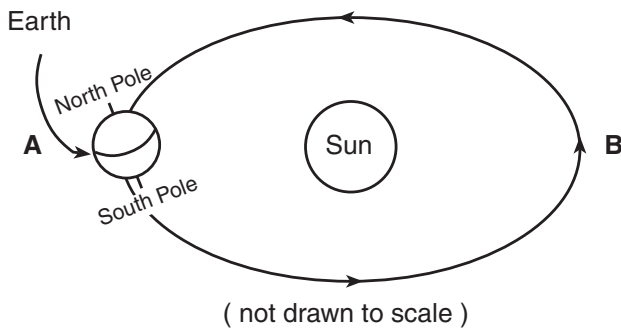
The seeds shown on the plant are produced as a result of

- (1) ecological succession
- (2) hibernation
- (3) fertilization
- (4) genetic engineering

- 16** When a human exercises, sweat often forms on the skin. Sweating is an example of the human body's ability to
- (1) recycle nutrients
 - (2) respond to the environment
 - (3) obtain water for nourishment
 - (4) make more energy

- 17** Which body in our solar system is classified as a star?
- (1) Earth
 - (2) Mars
 - (3) Venus
 - (4) Sun

- 18** The diagram below shows Earth, as viewed from space, as it moves around the Sun.



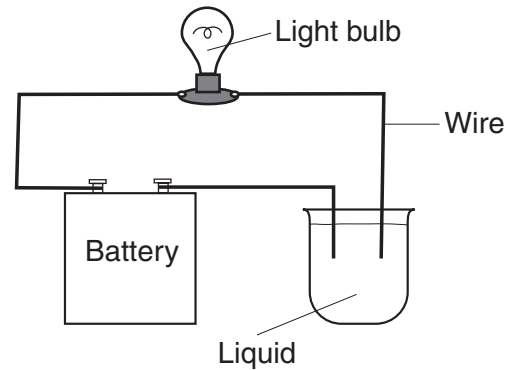
Approximately how long does it take Earth to move from position A to position B?

- (1) 1 year
 - (2) 6 months
 - (3) 1 day
 - (4) 12 hours
- 19** The Sun appears to move across the sky during the day. The best explanation for this apparent motion is that Earth is
- (1) rotating on its axis
 - (2) revolving around the Sun
 - (3) much smaller than the Sun
 - (4) tilted on its axis
- 20** Weathering and erosion of Earth's crust are primarily caused by
- (1) gravity
 - (2) volcanic activity
 - (3) evaporation
 - (4) sedimentation

- 21** Which statement is true of all rocks?
- (1) Rocks contain organic material.
 - (2) Rocks contain fossils.
 - (3) Rocks are composed of minerals.
 - (4) Rocks are formed in layers.

- 22** Igneous rocks are formed by
- (1) weathering
 - (2) cementation
 - (3) volcanic activity
 - (4) sedimentation

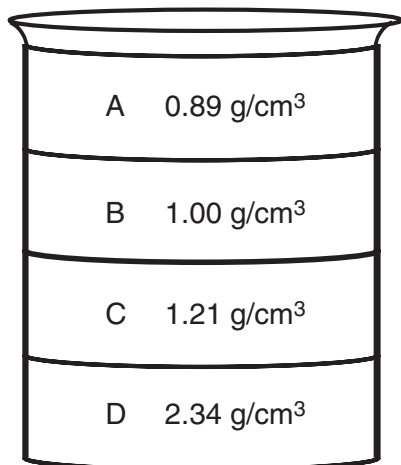
- 23** The diagram below shows an experiment to test a certain property of liquids.



Which property of the liquid is being tested?

- (1) density
 - (2) magnetic attraction
 - (3) conductivity
 - (4) freezing point
- 24** A wet shirt is put on a clothesline to dry on a sunny day. The shirt dries because water molecules
- (1) gain heat energy and condense
 - (2) gain heat energy and evaporate
 - (3) lose heat energy and condense
 - (4) lose heat energy and evaporate
- 25** Which energy source is renewable?
- (1) oil
 - (2) solar
 - (3) coal
 - (4) natural gas

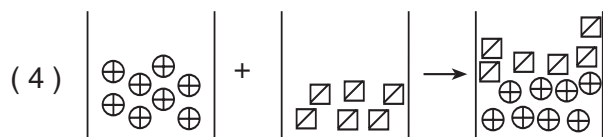
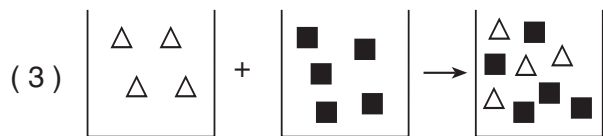
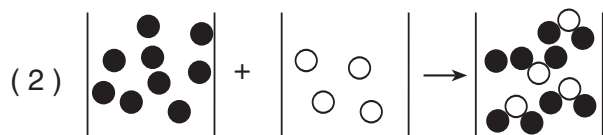
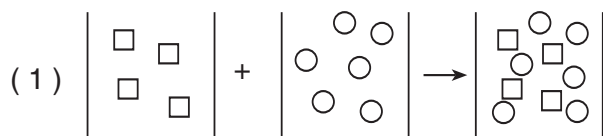
- 26 The diagram below shows a tall beaker with four different liquids and their densities.



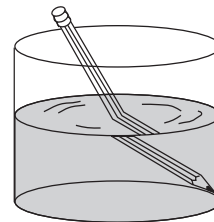
If a ball that has a density of 1.73 g/cm^3 is placed in the beaker, where will the ball come to rest?

- (1) on top of liquid *A*
- (2) between liquids *B* and *C*
- (3) between liquids *C* and *D*
- (4) on the bottom of the beaker

- 27 The four diagrams below model the results of mixing atoms of different substances. Each atom is represented by a different symbol. Which diagram correctly models a chemical change?

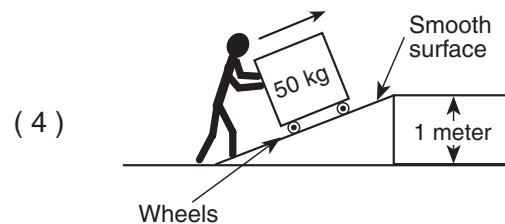
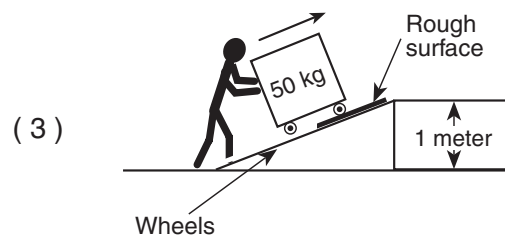
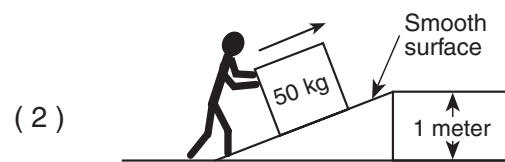
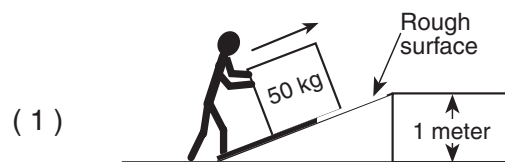


- 28 Which statement best describes the property of light waves illustrated in the diagram below?

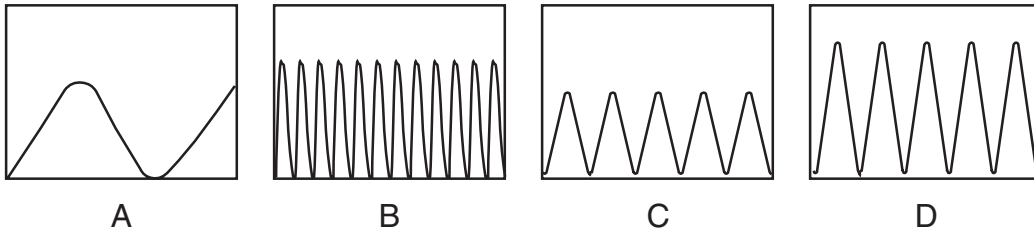


- (1) Some materials absorb light waves.
- (2) Some materials reflect light waves.
- (3) Light waves are refracted by some materials.
- (4) Light waves are emitted by some materials.

- 29 The diagrams below show a person moving a 50-kilogram object up a ramp. In which diagram is there the *least* amount of friction on the object?



30 The drawings below represent four different forms of electromagnetic energy.



Which diagram represents electromagnetic energy with the shortest wavelength?

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

31 Four machines that convert electrical energy to mechanical energy were tested for fuel efficiency. The results of the test are shown in the chart below.

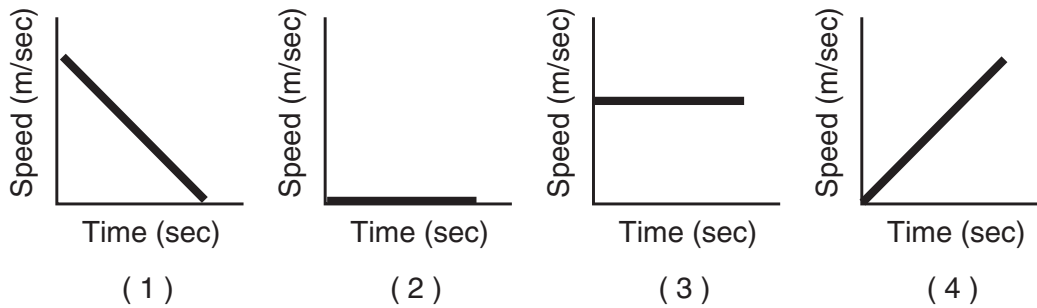
Test of Fuel Efficiency

Machine	Units of Electrical Energy Consumed	Equivalent Units of Mechanical Energy Produced
A	120	100
B	130	100
C	135	100
D	160	100

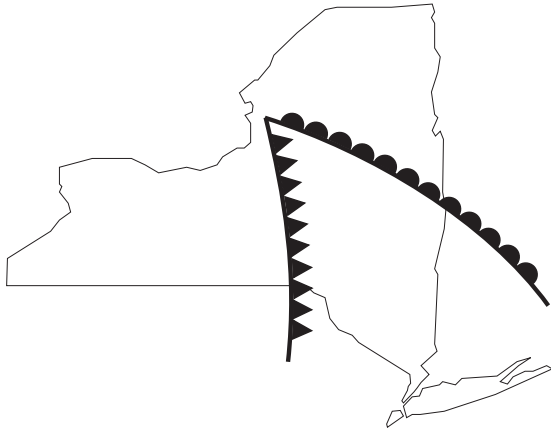
Which machine produced the most heat energy?



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

32 Which graph below shows an object slowing down?



33 The diagram below shows two symbols commonly found on a weather map.



The symbols  and  on this map represent

- (1) winds
- (2) fronts
- (3) latitude and longitude
- (4) climatic conditions

Note that question 34 has only three choices.

34 As altitude increases, air pressure

- (1) decreases
- (2) increases
- (3) remains the same

35 The table below shows the chemical symbols for some common elements.

Element	Symbol
Hydrogen	H
Helium	He
Oxygen	O
Silicon	Si
Carbon	C
Iron	Fe

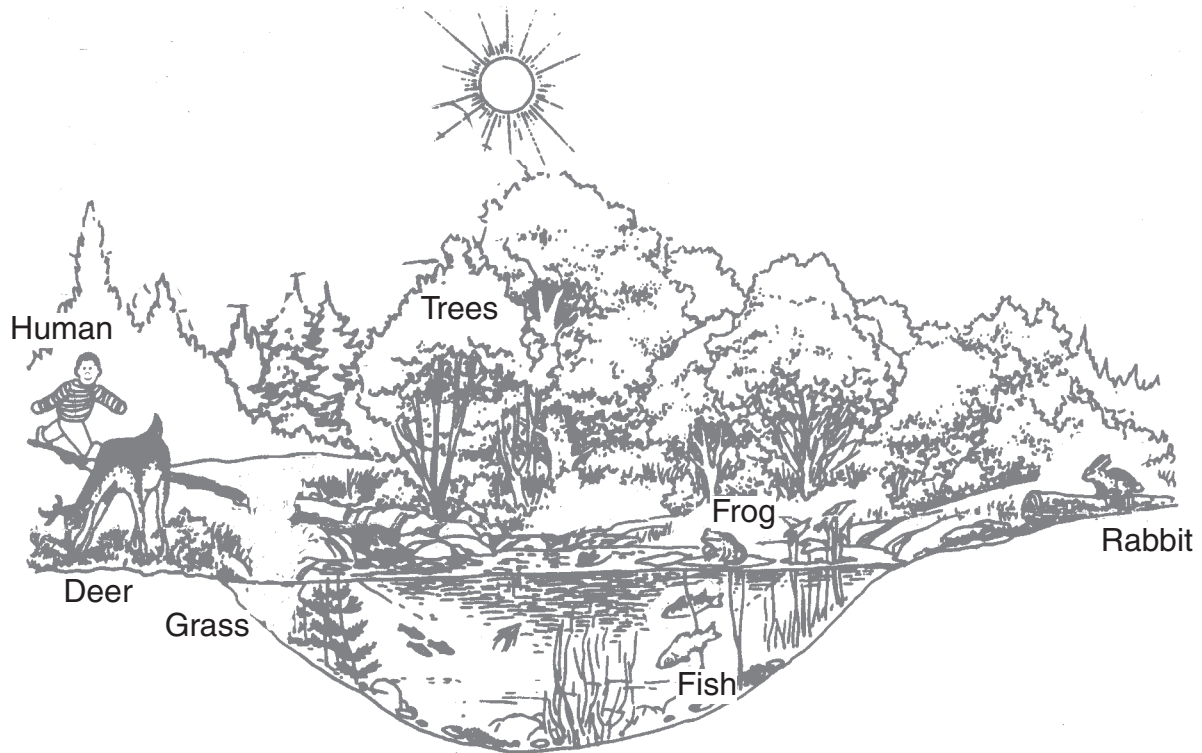
Based on the information in the table, which of the four substances below is a compound?

- (1) CO
- (2) He
- (3) Si
- (4) Fe

Part II

Directions (36–72): Record your answers in the spaces provided in this test booklet.

Base your answers to questions 36 through 38 on the woodland and pond ecosystems illustrated below. The members of these ecosystems interact with one another as well as with the nonliving environment.



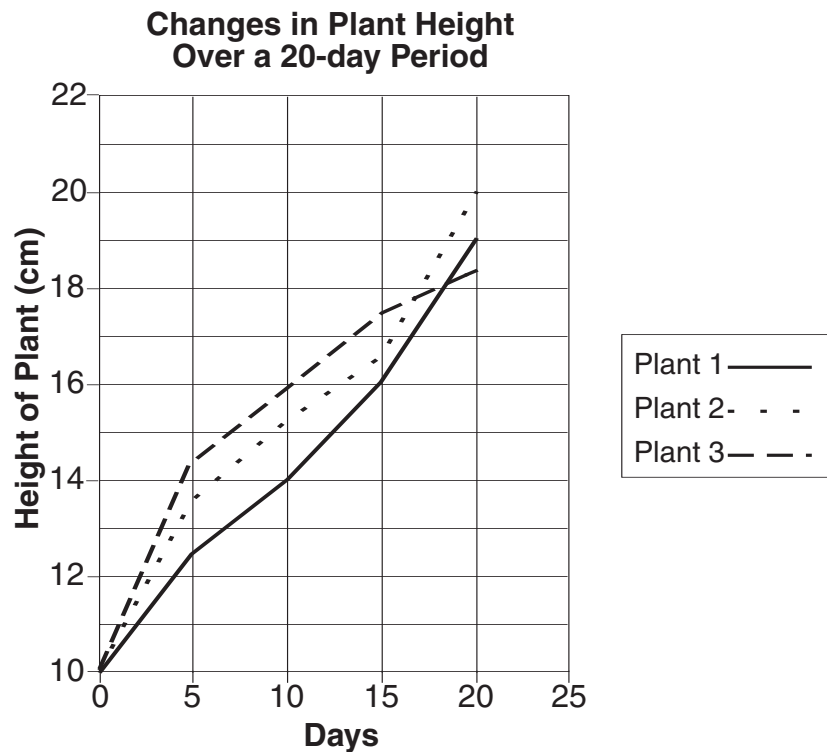
36 What is the main source of energy for these ecosystems? [1] _____

37 Identify a consumer in these ecosystems. [1] _____

38 Identify **one** organism in these ecosystems that produces chlorophyll. [1] _____

Base your answers to questions 39 through 43 on the information and graph below.

A gardener performs an experiment growing three types of plants in equal amounts of soil. Three different types of plants are used. Each plant is 10 centimeters tall at the beginning of the experiment. The three plants are given 4 milliliters of water every day for 20 days. The results of the experiment are shown on the graph.



39 Which plant was the tallest at the end of the 20-day period? [1] _____

40 Other than at the beginning of the experiment, on what day were plant 2 and plant 3 the same height? [1]

41 Which plant grew at the slowest rate from day 0 to day 5? [1] _____

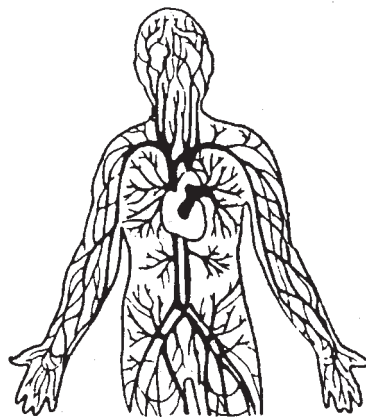
42 During which time interval did plant 1 become taller than plant 3? Circle the correct answer. [1]

- days 0–5
- days 5–10
- days 10–15
- days 15–20

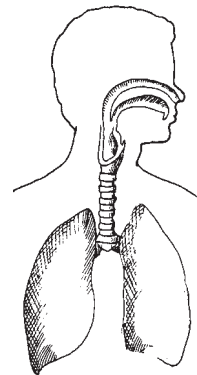
43 The gardener repeated the experiment using identical conditions. Plant 1 grew the fastest. Suggest **one** change to the experimental design that would help the gardener decide which plant really grows fastest. [1]

44 The two human body systems shown below interact to perform several functions for the whole organism. Describe how gas exchange occurs when the circulatory and respiratory systems work together. [2]

Human Circulatory System



Human Respiratory System



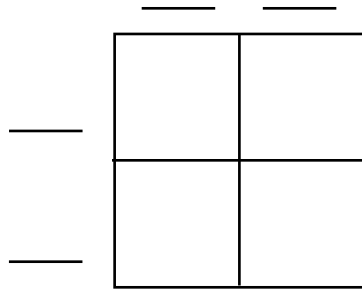
The Punnett square below shows an RR pea plant crossed with an Rr pea plant.

	R	r
R	RR	Rr
R	RR	Rr

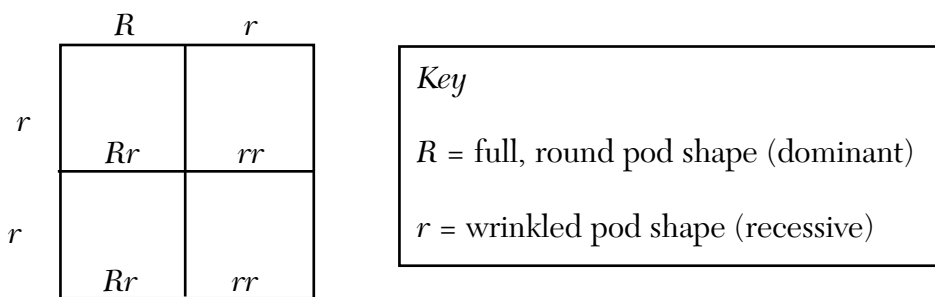
Key
 R = full, round pod shape (dominant)
 r = wrinkled pod shape (recessive)

45 What percentage of the offspring will have a full, round pod shape? [1] _____ %

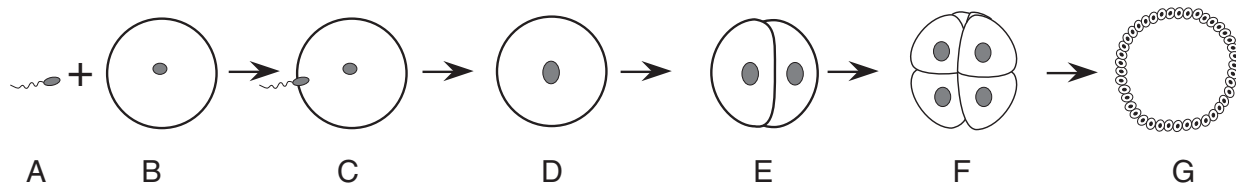
46 Complete the Punnett square provided below to show the crossing of two *Rr* parents. [2]



47 If 100 offspring were produced from the crossing shown in the Punnett square below, approximately how many would have a wrinkled pod shape? [1] _____



Base your answers to questions 48 through 51 on the diagram below which shows the process of sexual reproduction.



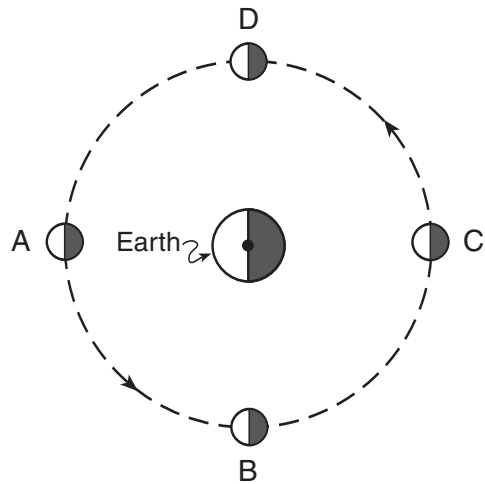
48 Identify the sex cell shown at A. [1] _____

49 Identify the sex cell shown at B. [1] _____

50 Identify the reproductive process that is occurring at C. [1] _____

51 Identify the process that is occurring between E and F. [1] _____

Base your answers to questions 52 through 54 on the diagram below. The diagram shows the position of Earth and four positions of the Moon during one orbit of Earth.



(not drawn to scale)

52 On the diagram, draw an X to show where the Sun would need to be located to create the Moon phases shown. [1]

53 Which letter in the diagram shows the position of the Moon when an observer on Earth sees a full Moon? [1] _____

54 What motion is represented by the arrows in the diagram? [1] _____

Base your answers to questions 55 through 57 on the information below.

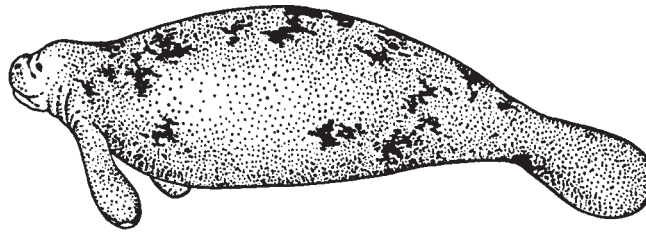
Models are often used to explain natural phenomena. Develop a model to show the relationship between heat energy and the motion and position of particles in a sample of matter. Use a group of 20 students in an empty room to represent the particles in a sample of matter.

55 How should the students be placed in the room to represent the arrangement of particles in a solid? [1]

56 What instruction should be given to the 20 student “particles” to show the addition of heat to the “solid sample of matter”? [Note: The solid is simply being heated; it should not melt.] [1]

57 What instruction should be given to the 20 student “particles” to represent a liquid? [1]

Base your answers to questions 58 through 60 on the information and illustration below.



Manatees are mammals that live in the warm, clear water environment of Florida's shallow rivers. They are large, peaceful, gentle, curious creatures and slow-moving swimmers. They spend many hours each day feeding on water plants. Manatees must surface to breathe every 15 minutes.

The manatee's environment is changing because of hotels and homes being built along Florida's rivers, and the change is affecting them in a negative way. Noise and activity from people and boats scare them. Manatees can be seriously injured by powerboat propellers because the manatees cannot tell the direction from which the boats are coming. The water plants the manatees use for food are being destroyed. As a result of these and other changes in their surroundings, manatees are on the endangered species list and may one day be gone from Florida's rivers.

58 List **two** environmental conditions that might lead to the disappearance of manatees from Florida's rivers. [2]

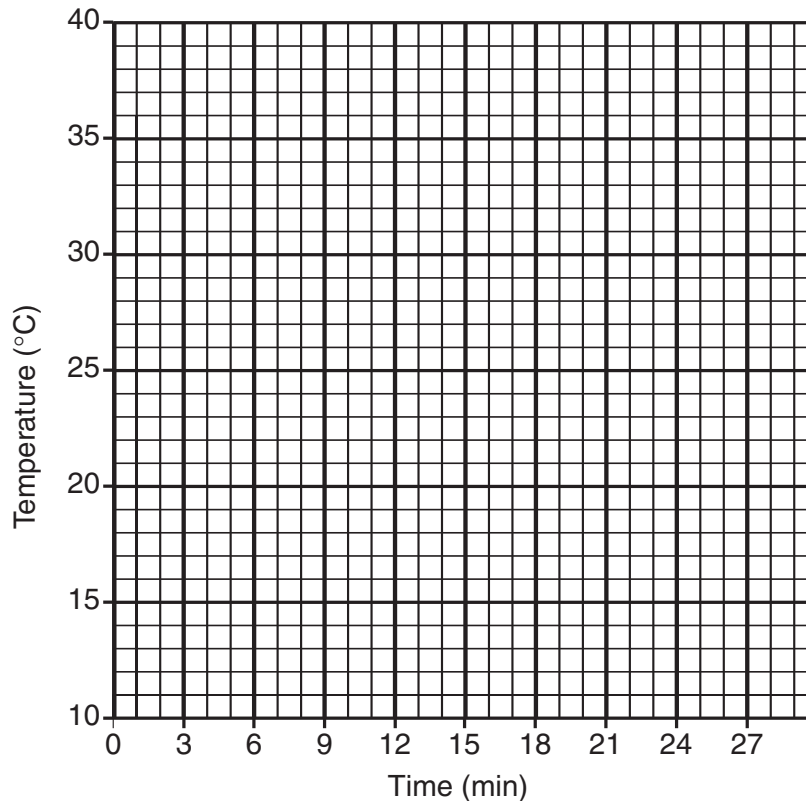
59 Why is the manatee classified as an herbivore? [1]

60 Identify **one** external feature of the manatee that allows it to live in water. [1]

Base your answers to questions 61 through 65 on the experiment described below.

Heat was applied at a constant rate to a solid substance under controlled conditions. The temperature of the substance was recorded every 3 minutes. These data are recorded in the table below.

Time (min)	0	3	6	9	12	15	18	21	24	27
Temperature (°C)	12°	14°	16°	16°	16°	20°	24°	28°	32°	36°



61 Use the grid above to construct a line graph from the data in the table. Follow the steps below.

a Use Xs to plot the data for time and temperature. [1]

b Draw a solid line that connects the Xs. [1]

62 Provide an appropriate title for the graph. [1]

Title: _____

63 According to your graph, what would the temperature of the substance be at 23 minutes? [1]

_____ °C

64 What is the independent (manipulated) variable in this experiment? [1] _____

65 If heat was added at a constant rate to the solid substance, why did the temperature remain at 16°C for approximately 6 minutes? [1]

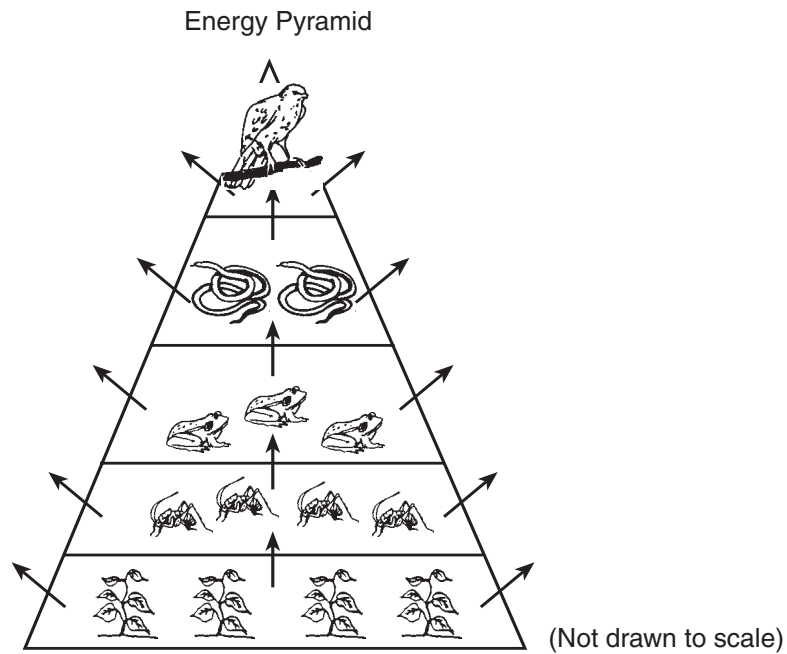
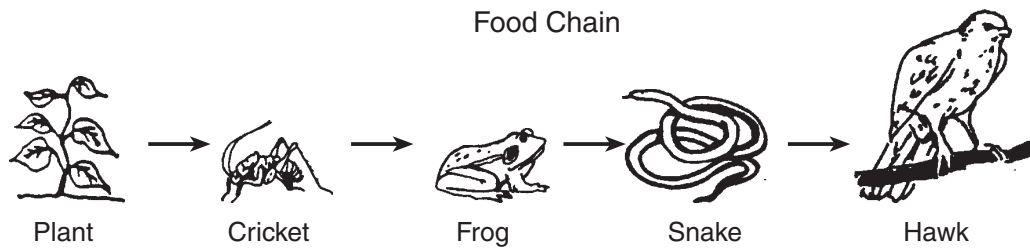
66 A student wants to design a controlled experiment to solve the following problem:
When placed in a freezer, will hot water or cold water reach 0°C faster?

The student plans to place two containers with equal masses of water (one hot and one cold) in the same freezer in the classroom.

- a* List **three** conditions the student should keep constant for the hot-water and cold-water setups when planning this experiment. [3]
- b* For **each** condition you name, give a scientific reason why the condition needs to be the same for both the hot-water and cold-water setups. [3]

<i>a</i> Condition to be held constant	<i>b</i> Reason
(1)	(1)
(2)	(2)
(3)	(3)

Base your answers to questions 67 through 71 on the diagrams of a food chain and energy pyramid below and on your knowledge of science. Food chains and energy pyramids are used to help us understand the flow of energy in an ecosystem.



Circle the correct answer for questions 67, 68, and 69.

67 If the plants die during a summer drought, the cricket population would most likely [1]

- decrease
- increase
- remain the same

68 If the number of frogs increases, the snake population would most likely [1]

- decrease
- increase
- remain the same

69 If another predator that preyed on snakes was introduced into the ecosystem, the hawk population would most likely [1]

decrease

increase

remain the same

70 State **one similarity** between what food chains and energy pyramids represent regarding energy flow. [1]

71 State **one difference** between what food chains and energy pyramids represent regarding energy flow. [1]

72 The usage of electricity in the United States has increased dramatically over the past 20 years. Most of this electricity is currently produced by burning fossil fuels.

a State **one** reason for this increased usage of electricity. [1]

b Describe a strategy to reduce the amount of fossil fuels people use in the United States. [1]

For Teacher Use Only
Part II Credits

Question	Max Credit	Credit Allowed
36	1	
37	1	
38	1	
39	1	
40	1	
41	1	
42	1	
43	1	
44	2	
45	1	
46	2	
47	1	
48	1	
49	1	
50	1	
51	1	
52	1	
53	1	
54	1	
55	1	
56	1	
57	1	
58	2	
59	1	
60	1	
61	2	
62	1	
63	1	
64	1	
65	1	
66	6	
67	1	
68	1	
69	1	
70	1	
71	1	
72	2	
Total	47	