

# REGENTS COMPETENCY TEST

## SCIENCE

Thursday, January 24, 2002 — 8:30 a.m.

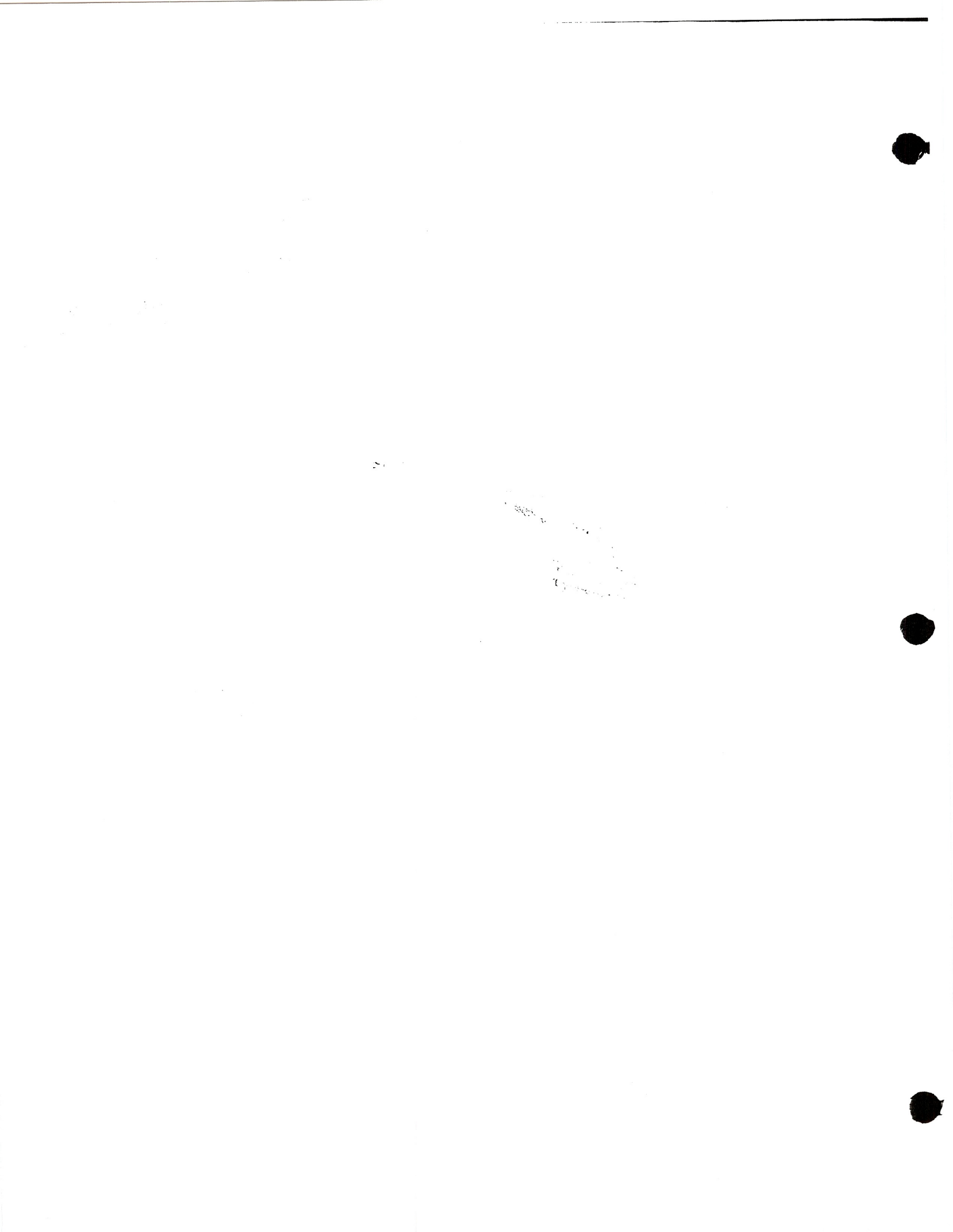
There are 70 questions on this test of basic science concepts and skills. Your answers for questions 1 through 69 must be recorded on the separate answer sheet for multiple-choice questions. Use only a No. 2 pencil on that answer sheet. Your answer for question 70 is to be recorded in the spaces provided on the last page of this test booklet.

When you have completed the test, you must sign the declaration which states that you did not see any of the questions or answers before taking this test and that you have neither given nor received help in answering any of the questions during the test. Your answer papers cannot be accepted if you fail to sign this declaration.

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

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## DIRECTIONS TO STUDENTS

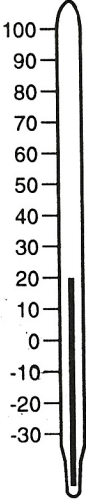
Questions 1 through 69 on this test are multiple-choice questions. Read each question carefully. Decide which of the choices given is the *best* answer, based on science principles. On the separate answer sheet, mark your answer in the row of circles for each question by filling in the circle that has the same number as the answer you have chosen.

Read the sample question below.

**Sample Question**

What temperature reading is shown on the thermometer?

(1)  $-30^{\circ}\text{C}$   
(2)  $20^{\circ}\text{C}$   
(3)  $70^{\circ}\text{C}$   
(4)  $100^{\circ}\text{C}$



CELSIUS ( $^{\circ}\text{C}$ )

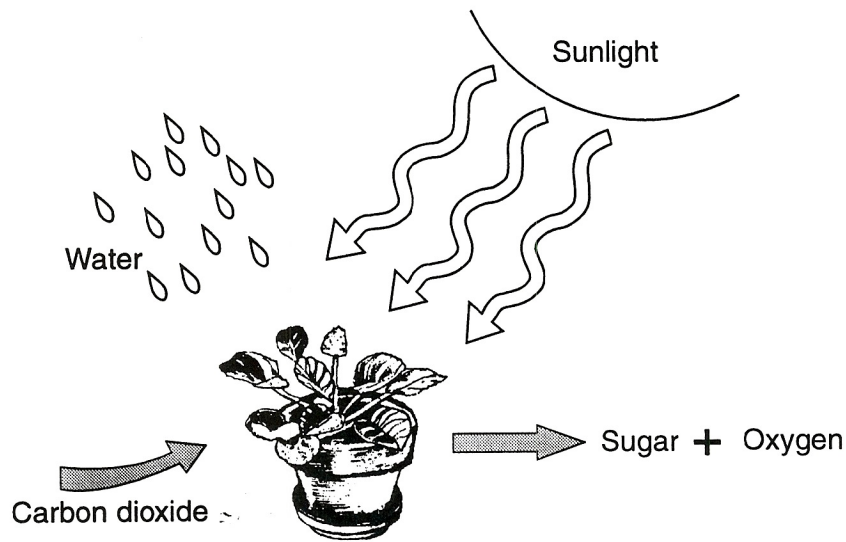
The correct answer is  $20^{\circ}\text{C}$ , which is choice number **2**. On your separate answer sheet for the multiple-choice questions, look at the box showing the row of answer circles for the sample question. Since choice number **2** is the correct answer for the sample question, the circle with the number **2** has been filled in.

Answer questions 1 through 69 on this test 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 may use scrap paper and the blank spaces of this test booklet to work out the answers to the questions, but be sure to mark all your answers for questions 1 through 69 on the separate answer sheet.

Answer question 70 in the space provided on the last page of this test booklet. Do not make any marks for question 70 on the separate answer sheet. Specific directions for answering this question are given in the test booklet.

When you are told to start working, turn the page and begin with question 1. Work carefully and answer all the questions. Your score will be the number of questions you answer correctly.

1 The diagram below shows a plant using materials and energy from its environment to make sugar and oxygen.



The plant obtains its energy from the

- (1) water
- (2) sunlight
- (3) carbon dioxide
- (4) sugar

2 The amount of carbon dioxide an organism gives off is often used to measure the organism's

- (1) nervous-system response
- (2) bone density
- (3) rate of respiration
- (4) rate of digestion

4 One characteristic common to all living things is that they

- (1) make food
- (2) live on land
- (3) respond to changes in their environment
- (4) continually move from place to place

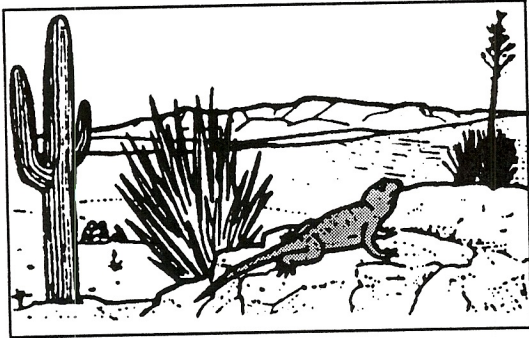
3 Each fall, robins fly south. This observation provides evidence that some living things

- (1) migrate
- (2) hibernate
- (3) undergo metamorphosis
- (4) remain inactive

5 Which group of organisms is listed in order of increasing complexity?

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

6 The organisms shown in the diagram below are adapted for life in which location?



- (1) forest                      (3) lake  
 (2) desert                      (4) grassland

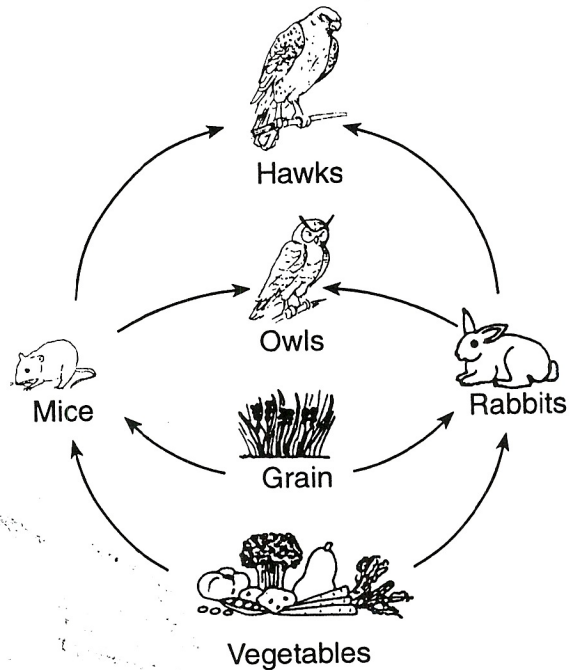
7 The chart below shows some of the requirements of certain organisms for survival.

Organism	Requirements
Green plants	Light Water Carbon dioxide Oxygen
Mushrooms	Dead matter Oxygen Water
Cows	Oxygen Grass Water
Anaerobic bacteria	Dead matter Water

Each of these living organisms requires

- (1) oxygen                      (3) water  
 (2) carbon dioxide          (4) light

Base your answers to questions 8 and 9 on the diagram below which shows several food chains in a community.



(not drawn to scale)

**Note that question 8 has only three choices.**

8 Which type of living thing is missing from the diagram?

- (1) consumer  
 (2) producer  
 (3) decomposer

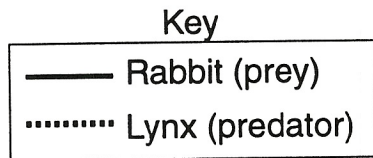
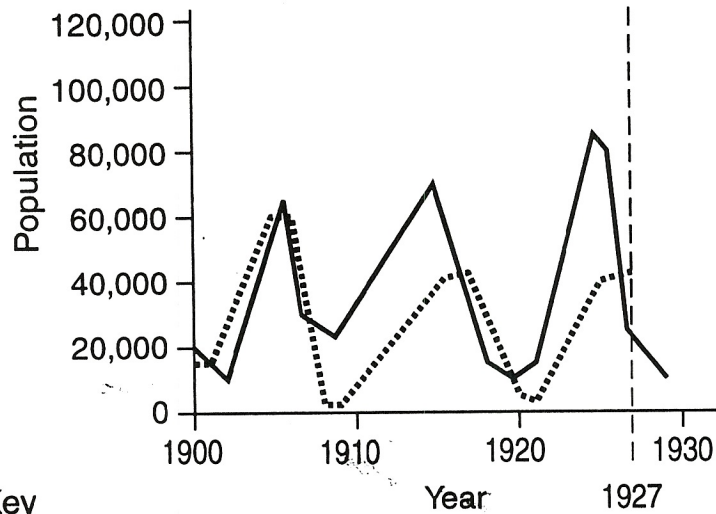
9 If the hawks were removed from the community, one likely effect would be

- (1) a decrease in the number of owls  
 (2) a decrease in the number of rabbits  
 (3) an increase in the amount of grain  
 (4) an increase in the number of mice

Note that question 10 has only three choices.

10 The graph below shows the population of lynx and rabbits in an area of Canada in the early 1900s.

Changes in Rabbit Population



What most likely happened to the lynx population between 1927 and 1930?

- (1) It decreased.
- (2) It increased.
- (3) It remained the same.

11 The table lists three groups of animals and some of their adaptations.

Animal Group	Adaptations
Fish	fins, gills, swim bladder
Mammals	claws, fur, good sense of smell
Birds	feathers, wings, hollow bones

These adaptations are used to help the organism

- (1) produce food from carbon dioxide and water
- (2) disturb the natural balance in the environment
- (3) adjust to its environment
- (4) maintain contact with its mate

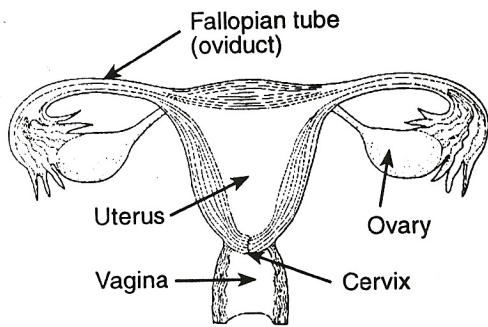
12 In which human organ does oxygen pass from the air into the blood?

- (1) heart
- (2) kidneys
- (3) lungs
- (4) brain

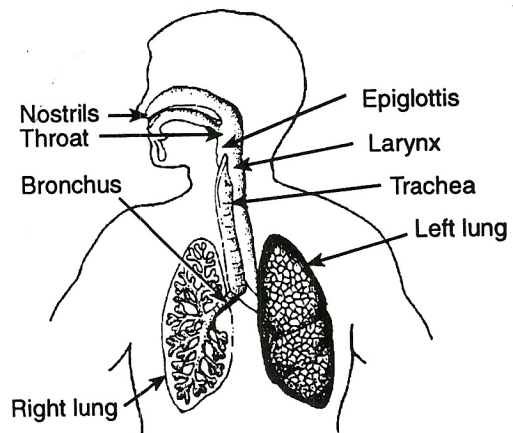
13 Many infectious diseases are caused by

- (1) allergies
- (2) microorganisms
- (3) chemicals in the environment
- (4) deficiencies in a person's diet

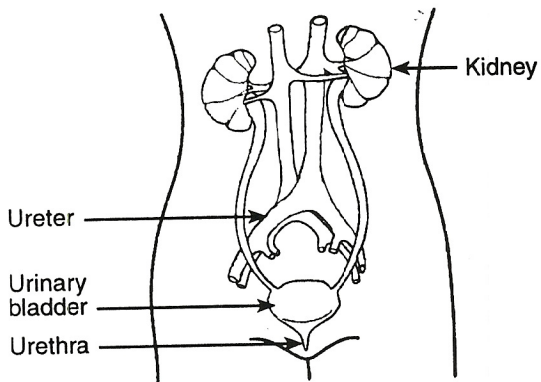
14 Which human body system helps control the water and mineral balance of the body?



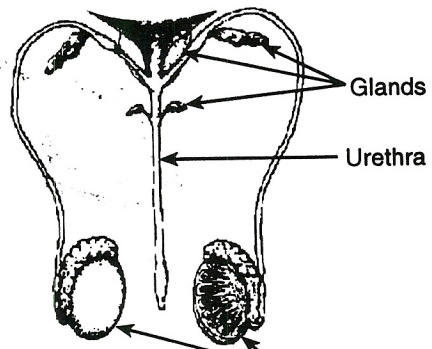
(1)



(3)

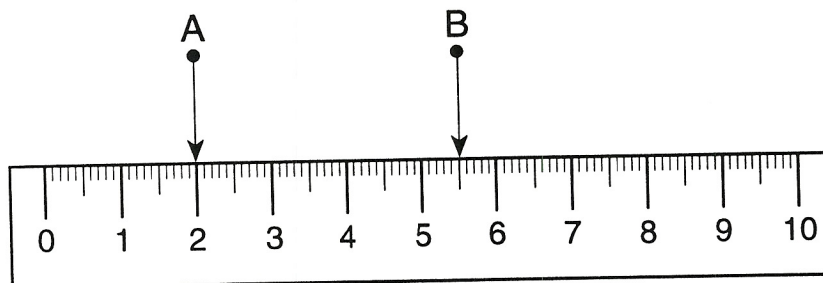


(2)



(4)

15 The diagram below shows a metric ruler.



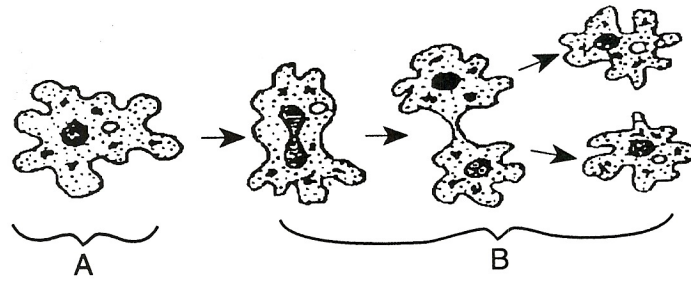
10-centimeter  
metric ruler

The distance between point A and point B is

- (1) 5.5 cm
- (2) 2.0 cm

- (3) 3.5 cm
- (4) 4.5 cm

Base your answers to questions 16 and 17 on the diagram below that shows one activity of an organism.



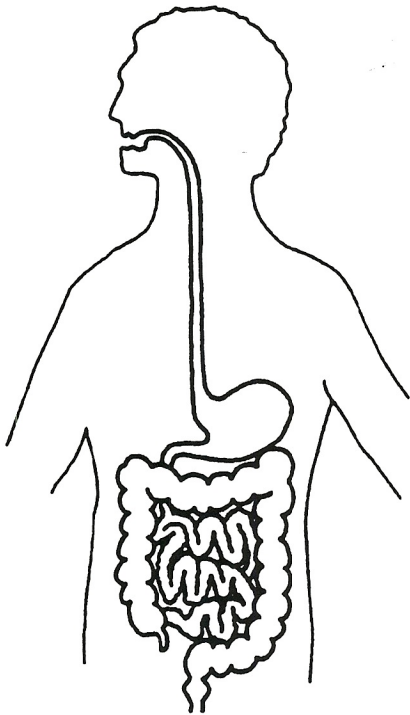
16 What is shown at A in the diagram?

- (1) a cell
- (2) a tissue
- (3) an organ
- (4) an organ system

17 Which life activity is shown at B in the diagram?

- (1) circulation
- (2) excretion
- (3) reproduction
- (4) respiration

18 What is the function of the human body system shown in the diagram below?



- (1) breaking down and absorbing food
- (2) transporting food, water, and oxygen to the cells
- (3) exchanging respiratory gases
- (4) coordinating the activities of the body

**Note that question 19 has only three choices.**

19 A student wanted to find out how exercise affects breathing rate. Each day, for 1 week, she recorded the number of breaths she took per minute at rest. Then she ran in place for 1 minute and again recorded the number of breaths she took per minute. This information is shown in the data table below.

Day	Number of Breaths per Minute	
	At rest	After exercise
1	15	23
2	16	25
3	13	21
4	15	22
5	14	26
6	12	20
7	16	26

The data table shows that exercise seems to cause the number of breaths taken per minute to

- (1) decrease
- (2) increase
- (3) remain the same

20 The table below shows temperatures at which food spoilage is prevented.

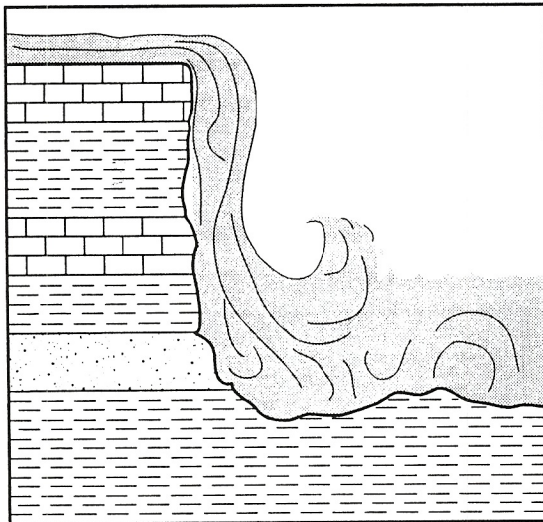
**Prevention of Food Spoilage**

Food Item(s)	Temperature (°C)	Process	Result
Canned foods	100	Sterilization	No spoilage for several years
Milk	71	Pasteurization	No spoilage for 1–2 weeks
Eggs, milk, cheese, vegetables, and meats	10 to 15	Refrigeration	No spoilage for several days
Meats and vegetables	–10 to –18	Freezing	No spoilage for several weeks to several months

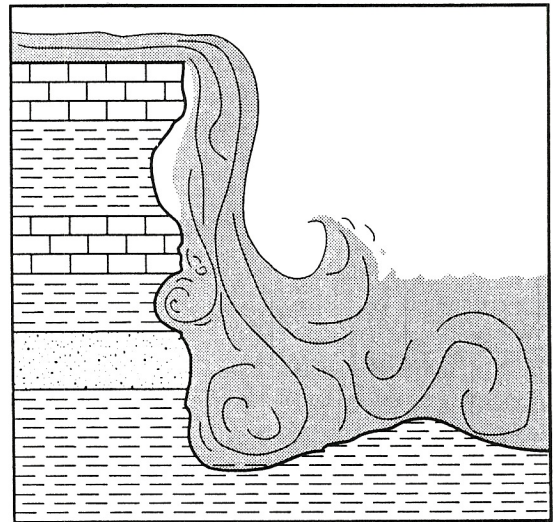
Which process preserves food for the longest time?

- (1) freezing
- (2) pasteurization
- (3) refrigeration
- (4) sterilization

21 The diagrams below show the rock layers behind a waterfall in the past and at present.



Past

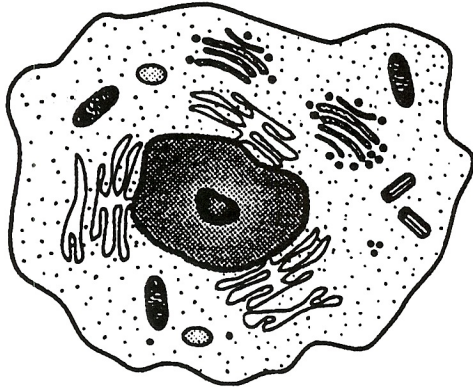


Present

Some of the rock layers have changed as a result of

- (1) folding
- (2) faulting
- (3) weathering
- (4) deposition

22 The diagram below shows a cell and many of its internal structures.



Which statement about these structures is correct?

- (1) They are made up of tissues.
- (2) They can survive outside the cell.
- (3) They can be seen with the naked eye.
- (4) They perform the life functions of the cell.

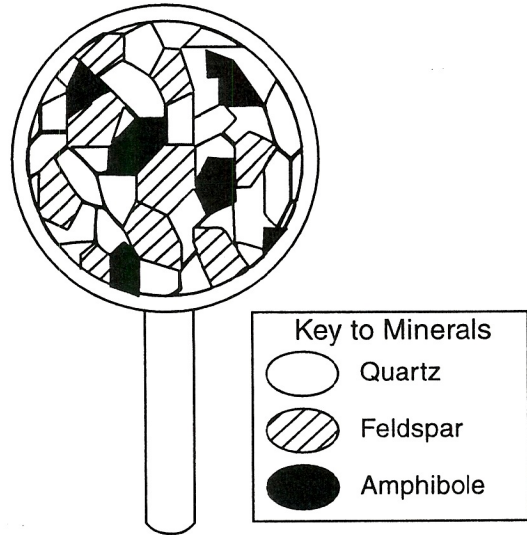
23 The energy from digested food is released in the

- (1) stomach, only
- (2) small intestine, only
- (3) arteries, only
- (4) cells throughout the body

24 Which landforms are found on the ocean floor?

- (1) plains, only
- (2) plains and plateaus, only
- (3) plains, plateaus, and valleys, only
- (4) plains, plateaus, valleys, and mountains

25 The diagram below shows a material containing minerals as seen through a magnifying glass.



What type of material is being observed?

- (1) steel
- (2) rock
- (3) wood
- (4) plastic

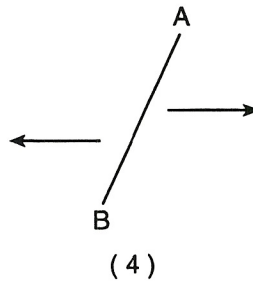
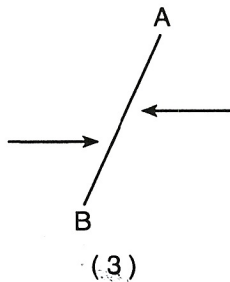
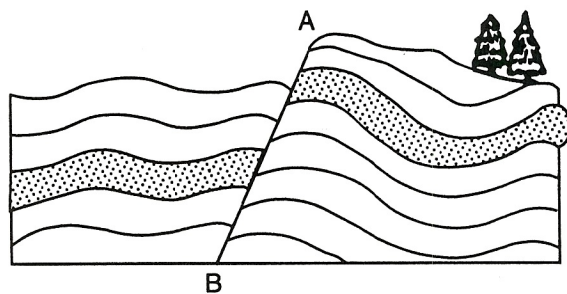
26 The table below shows some properties of several rocks.

Rock	Properties
Granite	Hard, crystalline, long lasting
Pumice	Very light, contains many air spaces
Sandstone	Porous, can be penetrated by water
Slate	Hard, splits into thin sheets

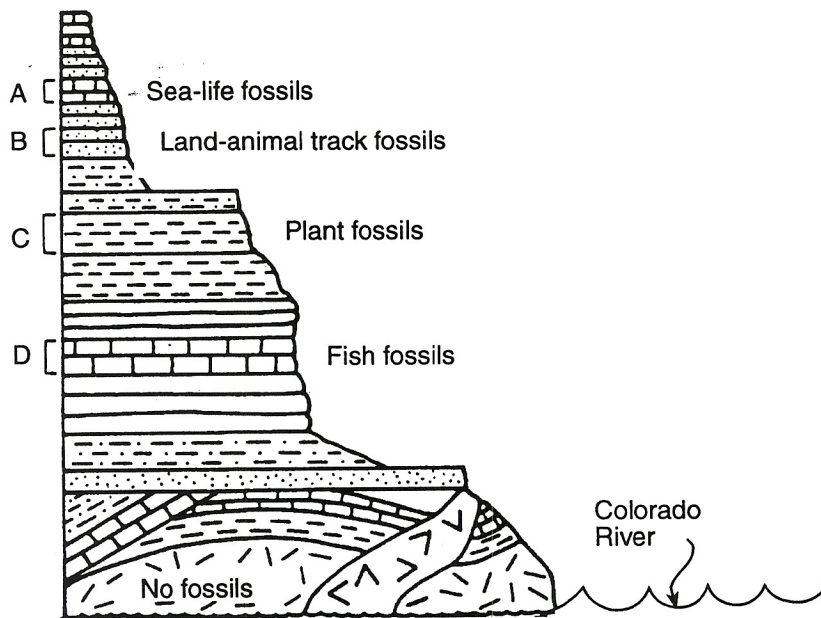
Which rock would be best to use for a statue?

- (1) granite
- (2) pumice
- (3) sandstone
- (4) slate

27 Which set of arrows shows the directions in which the rock layers most likely moved when fault line AB was formed?



Base your answers to questions 28 and 29 on the diagram of the Grand Canyon shown below. The diagram shows the rock layers and the type of fossils found in each layer.



28 Which rock layer most likely contains the oldest fossils?

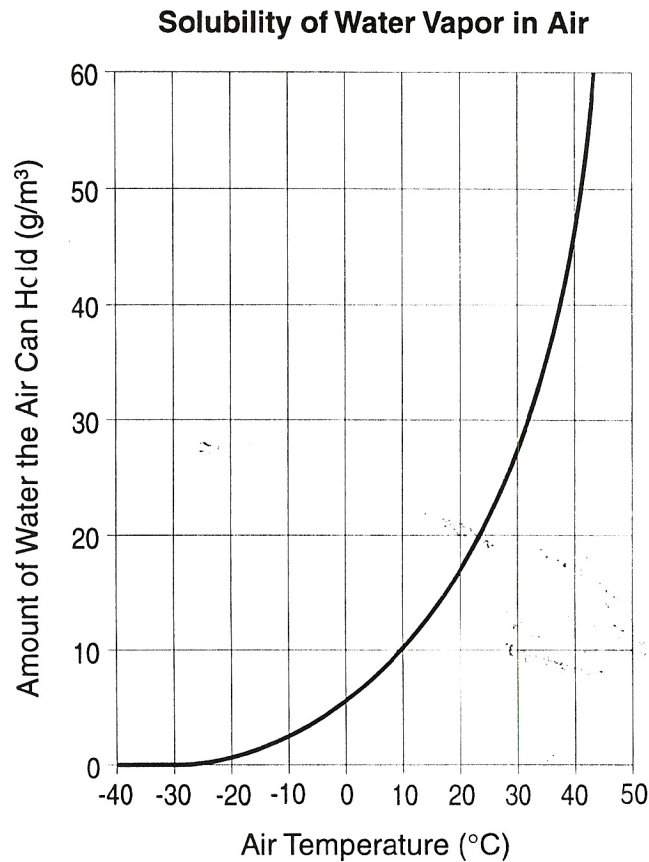
- (1) A
- (2) B
- (3) C
- (4) D

29 These rock layers most likely were exposed to view by uplifting and

- (1) erosion
- (2) hurricanes
- (3) plate movement
- (4) volcanic eruption

Note that question 30 has only three choices.

- 30 The graph below shows the maximum amount of water vapor that air can hold at different temperatures.



According to the graph, as the air temperature increases, the amount of water vapor the air can hold

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

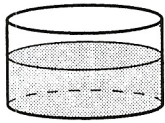
31 Sometimes frost is found early in the morning in valleys but not on nearby hilltops. One reason this occurs is that

- (1) windy conditions in valleys cause frost
- (2) cold air sinks into the valleys at night
- (3) hills are usually colder than valleys
- (4) lakes form in valleys more often than on hilltops

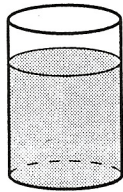
32 By which process is dew formed on grass in the morning?

- (1) condensaton
- (2) evaporation
- (3) freezing
- (4) melting

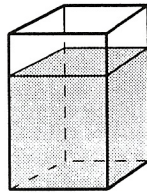
33 The containers shown below contain an equal amount of water and are placed side by side in direct sunlight. In which container will the water evaporate the fastest?



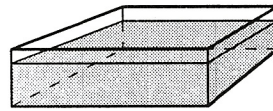
(1)



(2)



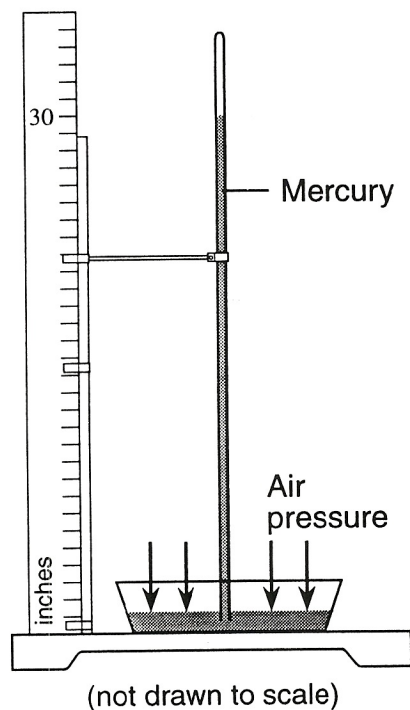
(3)



(4)

Note that question 34 has only three choices.

34 The diagram below shows a mercury barometer which measures air pressure.



When the air pressure increases, the height of the mercury in the tube

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

35 A cold front is a boundary between

- (1) glaciers
- (2) rock layers
- (3) climate zones
- (4) air masses

36 The energy that drives the water cycle comes primarily from

- (1) the wind
- (2) fossil fuels
- (3) the Sun
- (4) simple machines



39 During which season in New York State is the Northern Hemisphere tilted away from the Sun?

- (1) winter                      (3) summer  
 (2) spring                      (4) fall

40 Earth makes one revolution around the Sun in about one

- (1) day                          (3) month  
 (2) week                      (4) year

41 The major bodies in the solar system are the Sun and the

- (1) planets                      (3) meteors  
 (2) stars                        (4) comets

42 Compared to the size of Earth, the Sun is

- (1) many times smaller  
 (2) about the same size  
 (3) twice as large  
 (4) many times larger

43 The metal top of a glass jar can *not* be removed. After hot water is poured over the top, the top comes off. This event occurs because the hot water causes the top to

- (1) undergo a chemical change  
 (2) produce more friction  
 (3) contract  
 (4) expand

44 The table below shows the length of a day in Earth hours on four planets.

Planet	Length of Day (Earth hours)
Venus	5,832
Earth	24
Mars	24.6
Jupiter	9.8

Which planet is spinning most slowly on its axis?

- (1) Venus                      (3) Mars  
 (2) Earth                      (4) Jupiter

45 The table below gives information about several stars, including our Sun. The color of a star often indicates its surface temperature.

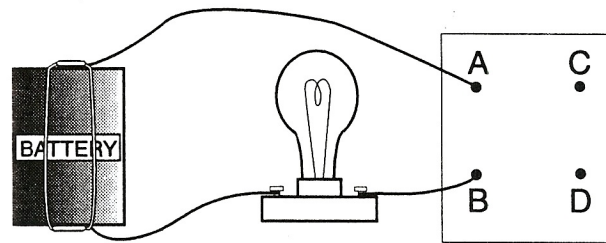
**Color and Surface Temperatures of Stars**

Star	Color	Surface Temperature (°C)
<i>Rigel</i>	blue	11,600
<i>Sirius</i>	white	9,800
<i>Sun</i>	yellow	6,300
<i>Arcturus</i>	orange	3,700
<i>Betelgeuse</i>	red	3,000

*Capella*, another star, has a surface temperature of 5,300°C. Based on the table, what color is *Capella* most likely to be?

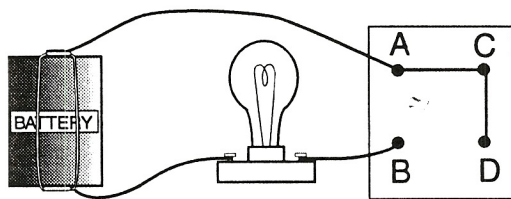
- (1) blue                      (3) yellow  
 (2) white                      (4) red

46 The diagram below shows a battery, a bulb, wires, and a board with connection points A, B, C, and D.

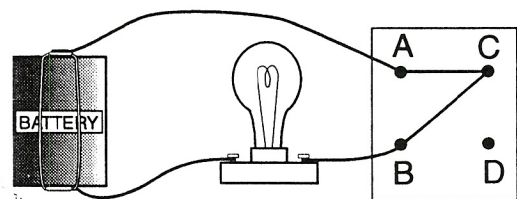


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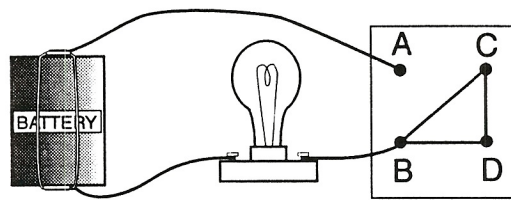
Which combination of wire connections would light the bulb?



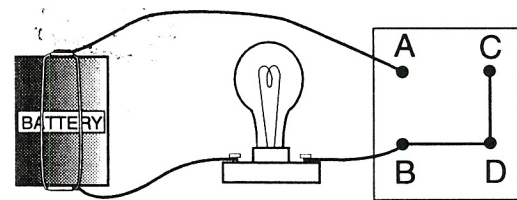
(1)



(3)



(2)



(4)

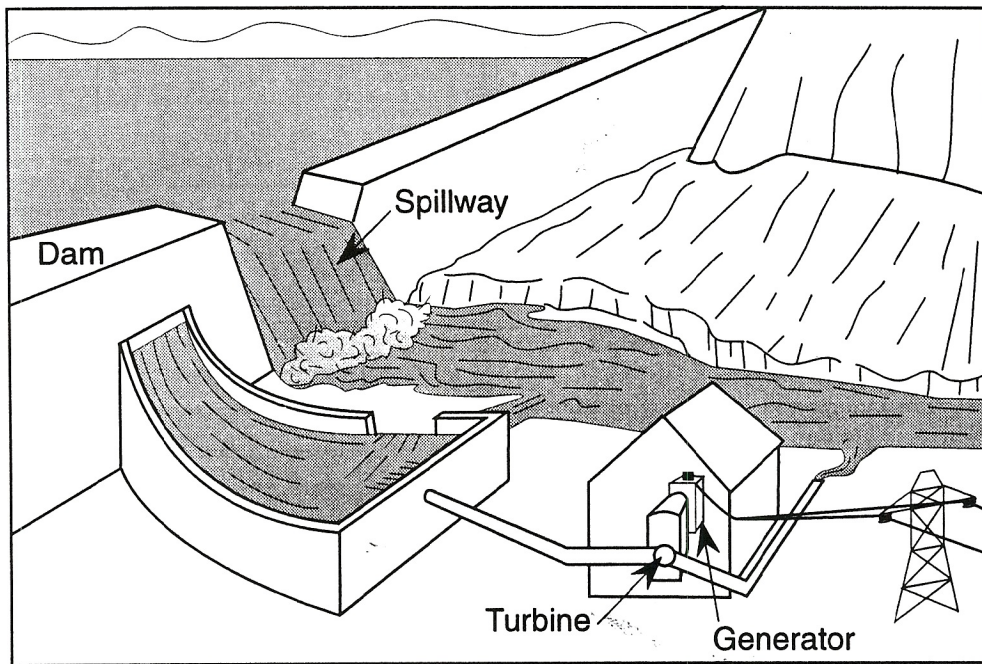
47 Oil is used in the engine of a car because oil

- (1) reduces friction in the engine
- (2) reduces the horsepower of the engine
- (3) increases the heat produced by the engine
- (4) increases the energy needed to run the engine

48 Which type of energy do machines transfer from one object to another?

- |                |             |
|----------------|-------------|
| (1) chemical   | (3) nuclear |
| (2) mechanical | (4) light   |

49 The diagram below shows a power plant that uses water to produce energy.



(not drawn to scale)

What form of energy is produced by the power plant?

- (1) electrical
- (2) solar
- (3) nuclear
- (4) chemical

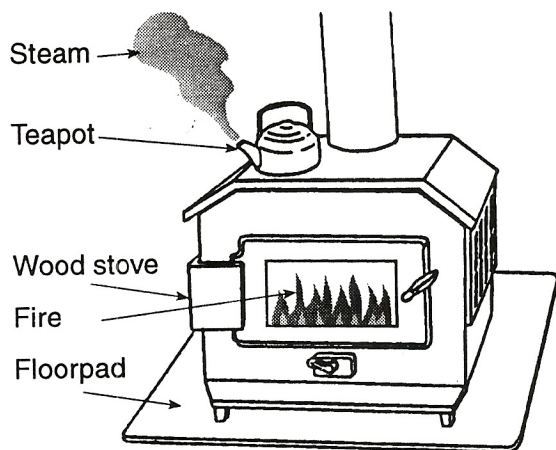
50 What happens at the boiling point of a substance?

- (1) Liquid rapidly changes to solid.
- (2) Liquid rapidly changes to gas.
- (3) Gas rapidly changes to solid.
- (4) Gas rapidly changes to liquid.

51 The size of the image created by eyeglasses can be changed by changing the

- (1) lens color
- (2) lens thickness
- (3) frame color
- (4) frame size

52 The diagram below shows a teapot filled with water sitting on a wood stove in which a fire is burning.



In this situation, heat energy is flowing from the

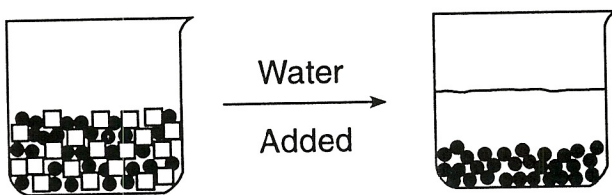
- (1) water inside the teapot to the teapot
- (2) teapot to the wood stove
- (3) floorpad to the wood stove
- (4) wood stove to the teapot

53 The diagram below shows an activity in which water is added to a mixture of sugar and sand.

Key

□ = Sugar Particle

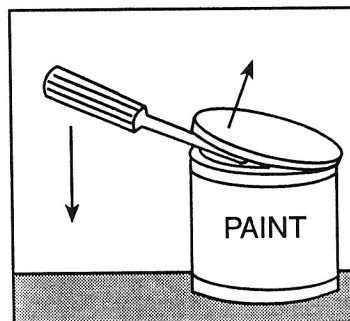
● = Sand Particle



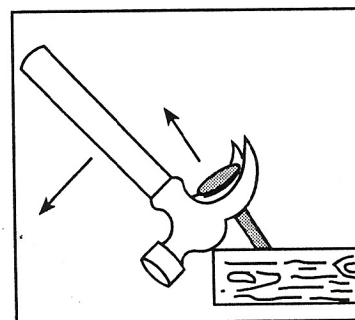
After the water is added, only the sand is visible. The sugar can no longer be seen because it has been

- (1) changed to energy
- (2) combined chemically with the sand
- (3) destroyed by the water
- (4) dissolved in the water

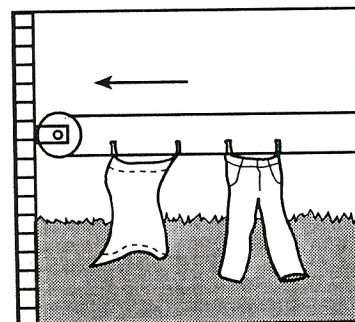
54 In which diagram do the arrows show an inclined plane in use?



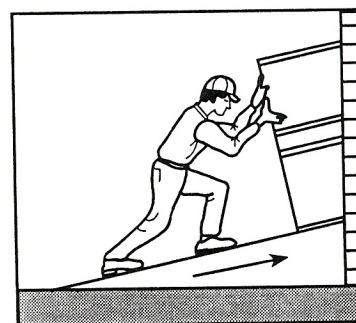
(1)



(2)

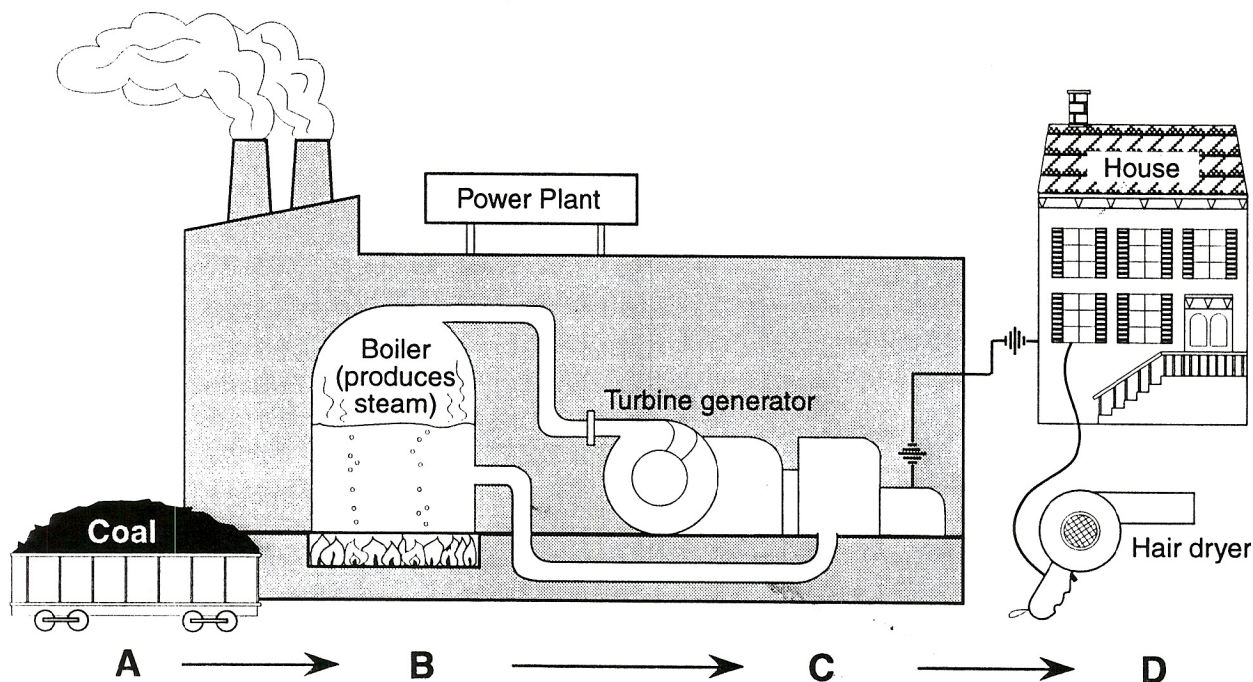


(3)



(4)

Base your answers to questions 55 and 56 on the diagram below, which shows the steps needed to produce energy for a hair dryer.



55 What form of energy is stored in the coal at point A?

- (1) chemical energy
- (2) electrical energy
- (3) mechanical energy
- (4) light energy

56 Between points A and D in this diagram, energy was

- (1) destroyed
- (2) created
- (3) changed to matter
- (4) changed in form

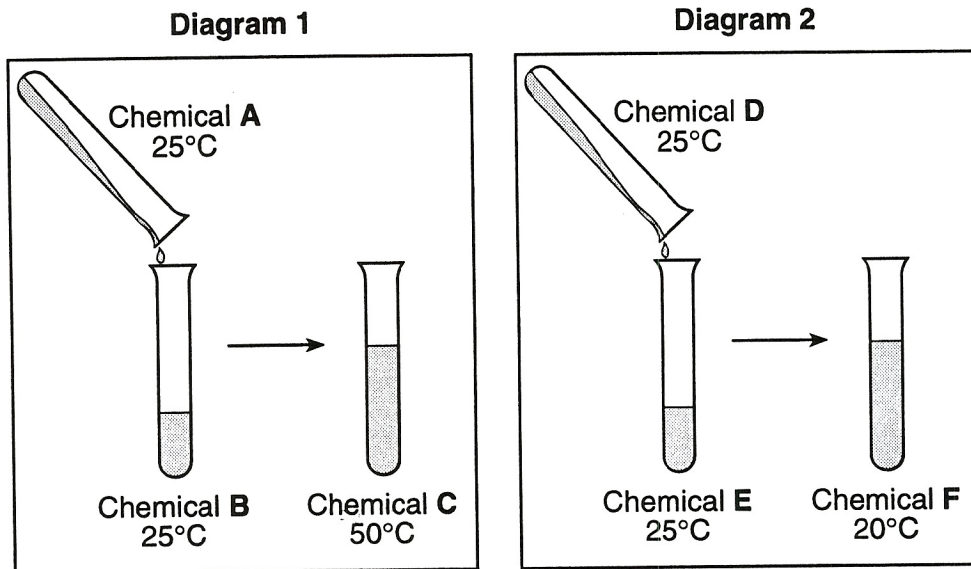
57 Before salt crystals are added to water they are crushed into smaller particles. This action causes

- (1) the salt to dissolve faster in water
- (2) a chemical change in the water
- (3) a change in the total mass of the salt
- (4) the salt to have a different taste

58 When a solid absorbs heat, what happens to its atoms?

- (1) They move more slowly.
- (2) They move more rapidly.
- (3) Their motion remains the same.
- (4) Their motion stops.

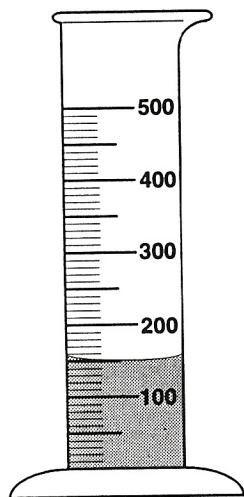
59 The diagrams below show two chemical reactions. Chemicals A, B, D, and E start at room temperature (25°C).



These diagrams show that chemical changes

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>(1) release energy, only</li> <li>(2) absorb energy, only</li> </ul> | <ul style="list-style-type: none"> <li>(3) can either release or absorb energy</li> <li>(4) can neither release nor absorb energy</li> </ul> |
|---|--|

60 What is the piece of equipment shown below most often used to measure?



- |            |            |
|------------|------------|
| (1) mass   | (3) weight |
| (2) volume | (4) length |

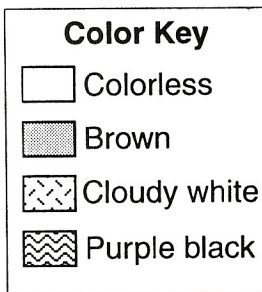
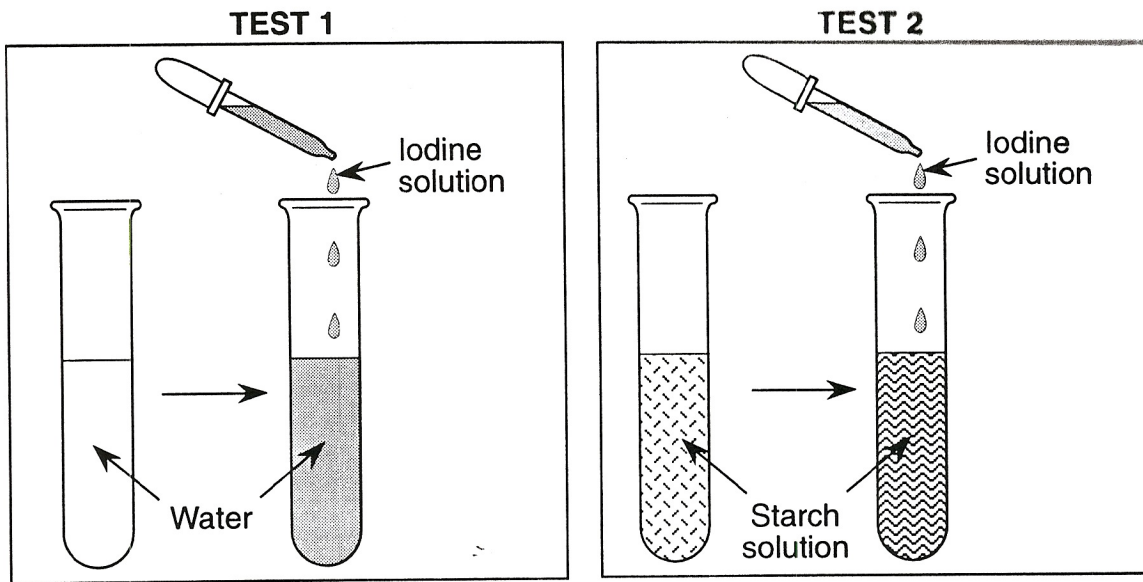
61 Which two products are obtained from oil?

- (1) coal and natural gas
- (2) coal and gasoline
- (3) natural gas and uranium
- (4) gasoline and heating fuel

62 Pollution of beaches and death of marine life most often occur as a result of problems with the transportation of

- |          |             |
|----------|-------------|
| (1) coal | (3) oil     |
| (2) iron | (4) uranium |

63 The diagrams below show two test procedures.



When an iodine solution is put on a slice of bread (a starchy food), the iodine will most likely stain the bread

- (1) green
- (2) cloudy white
- (3) brown
- (4) purple black

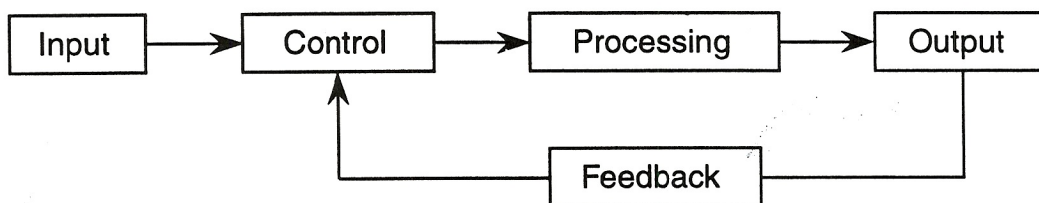
64 Which statement describes a *disadvantage* of using uranium as a source of nuclear power?

- (1) Uranium deposits are easily found.
- (2) Radioactive nuclear wastes must be stored.
- (3) Nuclear power plants use resources more efficiently than fossil-fuel power plants.
- (4) The United States has enough uranium to meet its needs.

65 A major cause of air pollution is

- (1) photosynthesis
- (2) solar heating
- (3) organic farming
- (4) combustion engines

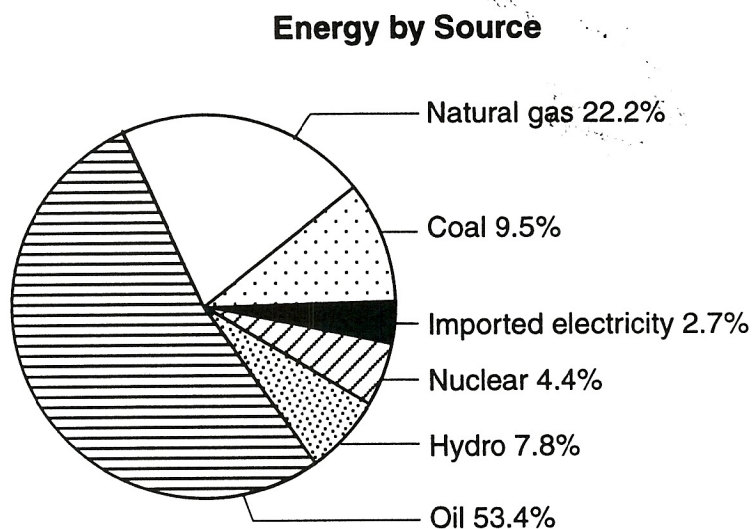
66 The diagram below shows a way to describe many complex technological devices.



This diagram represents

- (1) a system
- (2) a theory
- (3) an energy source
- (4) a simple machine

67 The graph below shows the percentage of different sources of energy used in New York State during a recent year.

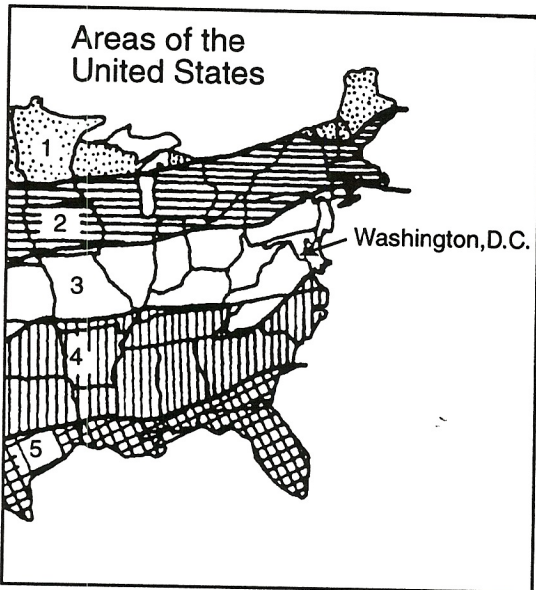


More than half of New York State's energy was obtained from

- (1) natural gas
- (2) hydro
- (3) oil
- (4) nuclear

Base your answer to question 68 on the information below.

R-values are used to help people decide how much insulation should be used in a house. R-values vary for different parts of a house and for different areas of the United States.



**TABLE OF RECOMMENDED INSULATION R-VALUES**

Part of House	Area of United States				
	1	2	3	4	5
Ceilings	38	33	30	26	26
Walls	19	19	19	19	13
Floors	22	22	19	19	11

68 What is the recommended R-value for the ceiling of a house located in Washington, D.C.?

- (1) 19
- (2) 26
- (3) 30
- (4) 33

69 Which title is best for column A in the table below?

Column A	Device
Cold temperatures reduce bacterial growth.	Refrigerator
Heated air rises.	Hot-air balloon
Lenses bend light.	Microscope

- (1) Technology
- (2) Scientific Principle
- (3) Effects of Temperature
- (4) Effects of Light

*Directions (70):* Record your answer for question 70 in the space provided on the last page of this test booklet. Turn to the last page and fold it along the dotted line. Then tear it off slowly and carefully. Write your name and the other information requested in the spaces at the top of the page.

**70** A student ran in place for 2 minutes. She measured her pulse rate before she ran, while she was running, and after she ran. The table below shows the data collected.

<b>Time</b> (minutes)	<b>Activity</b>	<b>Pulse Rate</b> (beats per minute)
0	Resting before running	70
1	Running	100
2	Running	120
3	Resting after running	100
4	Resting after running	80
5	Resting after running	70
6	Resting after running	70

Use the information in the data table to construct a line graph on the grid shown on the answer sheet. Mark the location of each point with an **X** and connect the points with a line.



