Longitudinal Study of American Youth

SCIENCE

Form (Y)

INTRODUCTION

This booklet contains questions about science for you to answer. You will be able to answer some of the questions quickly and others will require more thought. Please do not feel discouraged if you are not absolutely sure of an answer. Some questions will ask about things you have covered in class, but others will not. Please do your best to answer each question. If you are not sure of the answer, read the question again, and make your best guess.

MARKING YOUR ANSWERS

Each question is followed by a set of possible answers labeled A, B, C, etc. Read each question carefully, then choose the *one* answer you think is the best, and darken in the letter on your *Answer Sheet* next to the number for that question. Be sure to mark only *one* letter for each question. Do not skip any questions.

Do not make any stray marks on your *Answer Sheet*. Do all of your calculations on the Question Booklet, and use the *Answer Sheet* only to record your answers.

If you have any questions while taking this test, raise your hand, and the person giving the test will come to your seat to help you.

Public Opinion Laboratory

Northern Illinois University DeKalb, Illinois 60115

1. As a spaceship approaches the Earth, it begins to get hot and glow. Which of the following best explains why this happens?

   (A) The increasing force of gravity causes the spaceship to become hot.

   (B) Friction heats the spaceship as it passes through the Earth's atmosphere.

   (C) Sunlight reflected from the spaceship's surface heats it.

   (D) Electricity in the air heats up the spaceship. N413101

► **Questions 2-3.** Scientific discoveries in one area can often be applied to other areas. Is each of the following an example of this process?

2. Solid state research for small computers was applied in developing better television sets. **(A)** Yes **(B)** No N407401

3. Laser research was applied in developing a superior method of eye surgery. **(A)** Yes **(B)** No N407404

4. Acid rain is the result of the combination of pollution in the air and precipitation. Environmental action groups are advocating the control of acid rain by what means?

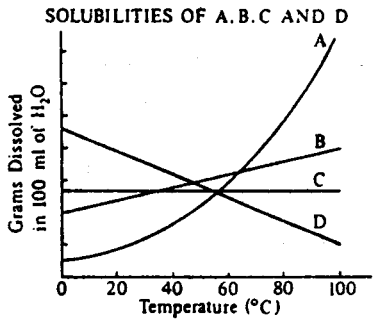
   (A) Prohibiting industrialization wherever crops are grown

   (B) Requiring workers to wear protective clothing

   (C) Requiring industries to install antipollution filters and other devices

   (D) Requiring that new industries locate in areas of low precipitation N424701

5.



According to the graph above, which of the chemicals is most soluble in water at 90°C?

(A) A (B) B (C) C (D) D N427501

6. Due to the expansion of our universe, the wavelengths of the light from the most distant stars are shifted to longer wavelengths. A combination of which two of the following instruments could be used to measure this property of the distant stars?

   I. Telescope
   II. Microscope
   III. Spectrometer
   IV. Thermometer

   (A) I and II **(C)** II and III

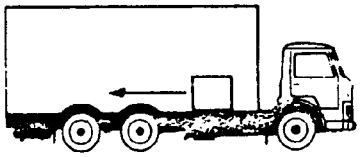
   (B) I and III **(D)** III and IV N418001

7. The Pacific Ocean is surrounded by a large belt of mountain ranges and volcanoes. Which natural events are most closely associated with these landforms?

(A) Hurricanes
(B) Tornadoes
(C) Sandstorms
(D) Earthquakes

N420401

8.



The truck shown above accelerates quickly to the right. If the floor of the trailer is slippery enough so there is little friction, a package inside the truck slides to the back. What does this illustrate?

(A) Objects at rest remain at rest unless acted on by a force.
(B) Mass can be converted to energy.
(C) All objects have weight.
(D) The total energy of an object always remains the same.

N425001

9. Adele decided to try Super Plant Food solution on her potted begonia plants. She placed 5 begonias on a table near a window and watered each plant daily with the same amount of Super Plant Food solution. After two weeks, Adele was amazed to see that all of the begonia plants were bending over in the same direction. Adele believed that the Super Plant Food caused the bending. How could she test this?

(A) Place 2 similar begonia plants in the window. Water one with Super Plant Food solution as before and water one without Super Plant Food.
(B) Leave the original 5 plants where they are, continue to water with the same amount of Super Plant Food solution, and observe for two more weeks.
(C) Leave the original 5 plants where they are and double the amount of Super Plant Food solution used in watering them for two more weeks.
(D) Place 5 similar begonia plants in a dark closet and water them with plain water each day for two weeks.

N421302

10. Why are environmental-protection groups often opposed to the burning of coal to produce electricity?

(A) Power plants using coal require a great deal of space.

(B) Coal is in limited supply.

(C) The burning of coal releases pollutants into the air.

(D) Coal is more expensive to burn than wood.

N435201

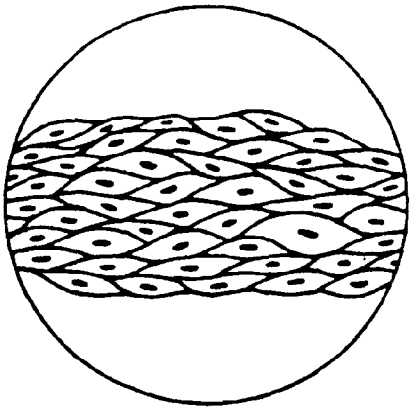
11. One hundred pea seeds were put in Petri dishes and covered with wet paper towels. The dishes were put inside black plastic sacks and carefully divided between two temperature-controlled incubators set to different temperatures.

The experiment was apparently designed to study the effect of which of the following variables on the germination of pea seeds?

(A) Seed type
(B) Water
(C) Light
(D) Temperature

N431901

12. A group of cells looks like this under a microscope.



These cells all work together to do the same thing. A group of cells like this is called

(A) a tissue.
(B) an organism.
(C) an organ.
(D) a system.

N405001

13. Which part of the blood carries most of the oxygen to the body?

(A) Plasma
(B) Platelets
(C) Red cells
(D) Serum
(E) White cells

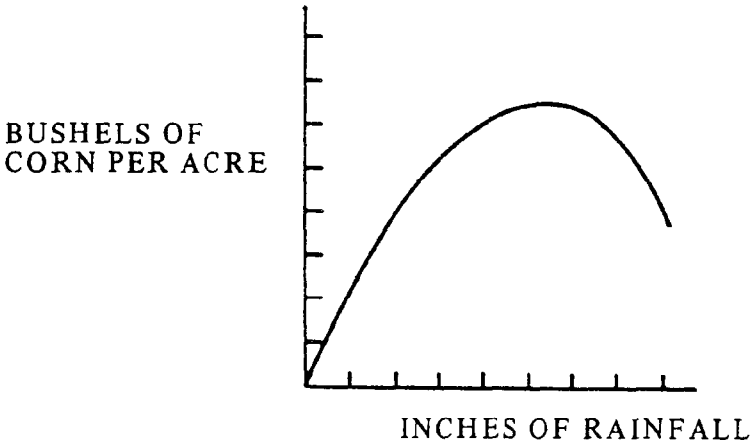
N405201

14. Lasers are used for many purposes. However, a laser would probably NOT be used for which of the following?

(A) Home heating
(B) Eye surgery
(C) Welding
(D) Entertainment

N432101

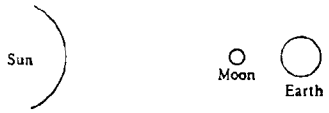
15. Which one of the following is the best conclusion you can make from this graph?



(A) The more rain there is, the better the corn will grow.
(B) Corn needs rain to grow, but too much rain is harmful.
(C) Different kinds of corn need different amounts of rain to grow best.
(D) Corn can grow well even if there is no rain.

N408801

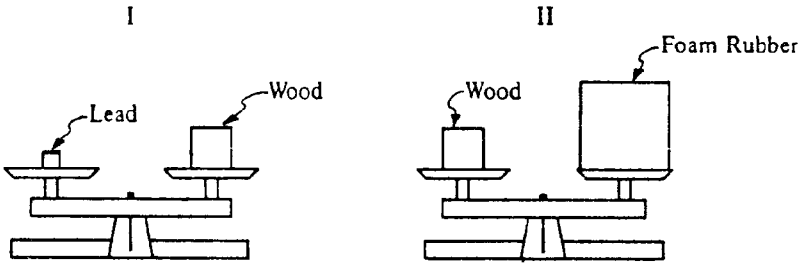
16. When the Moon, the Earth, and the Sun are in the same line, as shown below, which of the following could occur?



(A) An eclipse of the Sun could occur.
(B) An eclipse of the Moon could occur.
(C) The Moon could be pulled out of its orbit toward the Sun.
(D) The spin of the Earth could be speeded up.

N414401

17.



In Picture I, a piece of lead and a piece of wood are balanced on a scale, and in Picture II the same piece of wood is balanced with a piece of foam rubber. Which of the materials is most dense and which is least dense?

	Most Dense	**Least Dense**
(A)	Wood	Lead
(B)	Lead	Foam rubber
(C)	Foam rubber	Lead
(D)	Wood	Foam rubber

N434901

18. Half-life is a measure of

(A) distance.
(B) mass.
(C) time.
(D) temperature.
(E) color.

N407001

19. Scientists today agree on many ideas about how the natural world works. Which of the following is a scientific attitude toward these ideas?

(A) Some of the ideas will probably have to change when scientists have more information.
(B) Most ideas will not be changed for a very long time to come.
(C) All of the ideas will have to change to keep up with fast-moving world events.
(D) None of the ideas will be changed because they are scientific ideas.

N435001

20. The volume of water put into a tank is equal to the rate of flow multiplied by the time it flows. An equation that shows this relationship is

(A) volume = rate × time.
(B) rate = volume × time.
(C) time = rate × volume.
(D) time = rate/volume.
(E) volume = time/rate.

N409301

21. What happens to the sulfur dioxide released by a factory's smokestacks?

(A) The sulfur dioxide stays in the air forever.

(B) The sulfur dioxide immediately falls to earth as dust.

(C) The sulfur dioxide eventually falls to earth as acid rain.

(D) The sulfur dioxide escapes from the atmosphere into space. N405501

22. The fact that much of the world's oil supply is found under desert areas should lead one to conclude which of the following about what that land once was?

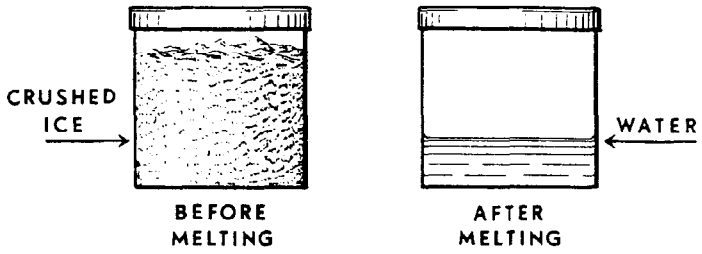
(A) It was radioactive.

(B) It was rich in vegetation.

(C) It was very mountainous.

(D) It was mined for minerals. N417701

23. The can below was filled with crushed ice, sealed, and weighed. The ice was melted by slowly warming the can and its contents. No water vapor escaped and no air entered the can.



The can was then weighed again. Which one of the following results would you expect to find?

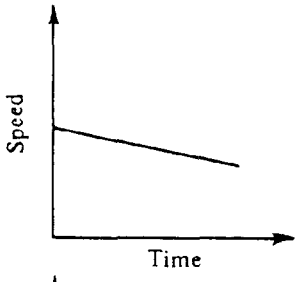
(A) The weight was the same.

(B) The weight was more.

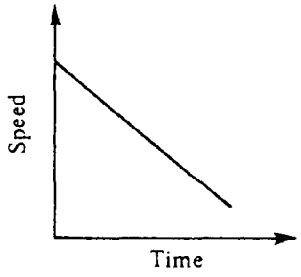
(C) The weight was less. N405101

24. The following graphs represent the speeds of four identical cars over time. If the scales on each graph are the same and each car continues its motion as suggested by the graph, which car will reach a speed of zero in the shortest time?

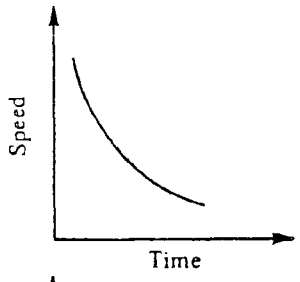
(A)



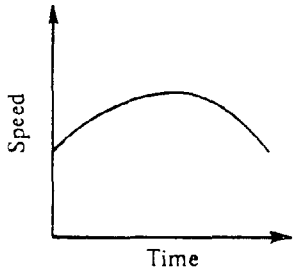
(B)



(C)



(D)



N428901

25. Which of the following best explains why marine algae are most often restricted to the top 100 meters in the ocean?

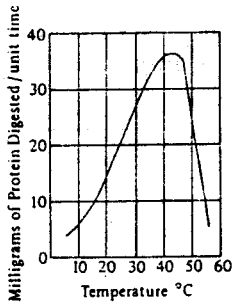
(A) They have no roots to anchor them to the ocean floor.

(B) They are photosynthetic and can live only where there is light.

(C) The pressure is too great for them to survive below 100 meters.

(D) The temperature of the top 100 meters of the ocean is ideal for them. N432901

26.



The graph above shows how temperature affects the rate of digestion of a protein by an enzyme. Based on the information above, which of the following is true?

(A) Digestion of this protein is equally effective at 35°C and 55°C.
(B) Any enzyme will digest this protein at 40°C.
(C) This enzyme is most effective for digesting this protein between 35°C and 45°C.
(D) An increase in temperature always increases the rate at which this protein is digested. N427101

27. A chemist will frequently write a formula for some kind of matter. For example, H_2SO_4 is the formula for sulfuric acid. The numbers used in the formula stand for

(A) the number of isotopes in a mole of substance.

(B) the number of grams of each atom in a given molecule.

(C) the number of atoms of each element in a given molecule.

(D) the number of molecules of each component in a mole of H_2SO_4.

(E) the number of parts by weight of each material in a pound of substance. N411101

28. A medical researcher wanted to find out what caused a certain disease. She gathered the following information from different places in the world.

	Major Type of Food	Type of Area	Mosquitoes	Disease
Country 1	Fish only	City	Yes	Yes
Country 2	Meat and vegetables	Farmland	No	No
Country 3	Fish and rice	City	No	Yes
Country 4	Fish only	Farmland	Yes	Yes

Which one of the following would be best for the researcher to study more closely in order to find the cause of the disease?

(A) Major type of food
(B) Type of area
(C) Mosquitoes
(D) Swamps N411201

29. Which of the following statements correctly describes one of the connections between science and technology today?

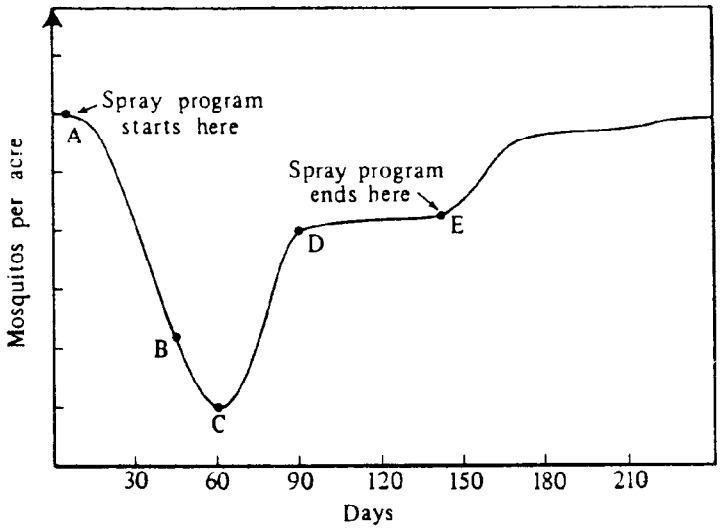
(A) Technological progress requires little input from science.

(B) Technology involves the practical applications of scientific knowledge.

(C) Workers in science use the laws and principles discovered by workers in technology.

(D) Technology is the part of science that deals with mechanical problems. N425201

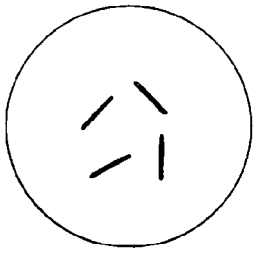
30. A swamp near a camp was sprayed with pesticide at weekly intervals over several months in an attempt to eliminate the mosquito population. Daily counts of population size yielded the information shown in the graph below.



What portion of the graph represents the greatest increase in the number of resistant mosquitoes?

(A) AB **(B)** BC **(C)** CD **(D)** DE N437202

31. A student collected a sample of pond water and looked at it through a microscope. The figure below shows four microorganisms that she saw in one microscopic field of view.



If the diameter of the field of view is 500 microns, approximately how long is one of these organisms?

(A) 1,000 microns **(C)** 100 microns

(B) 400 microns **(D)** 20 microns N436901

32. Which of the following is NOT an example of a chemical change?

(A) A log burning **(C)** An ice cube melting

(B) A nail rusting **(D)** An apple rotting N420201

33. Which of the following best explains why insects or birds that are introduced to a new country often become pests in the new area?

(A) Their food supply in the new country is unlimited.

(B) The new country produces beneficial mutations.

(C) The predators of their former habitat are lacking in the new country.

(D) Competition among them increases.

N428001

34. At the present time, where does most of the energy used in this country come from?

(A) Nuclear reactors

(B) Hot springs

(C) Falling water

(D) Solar batteries

(E) Burning of fuels

N406501

35. A paper manufacturing company in your area produces large amounts of sulfuric acid as a waste by-product. In spite of efforts to carefully dispose of the waste, some of the acid continually escapes recovery and pollutes a nearby river, affecting wildlife and recreation. The company employs many area residents. Which of the following solutions to help stop the pollution would be preferred by the community?

(A) Moving the company to a more isolated area and giving the workers the option to move

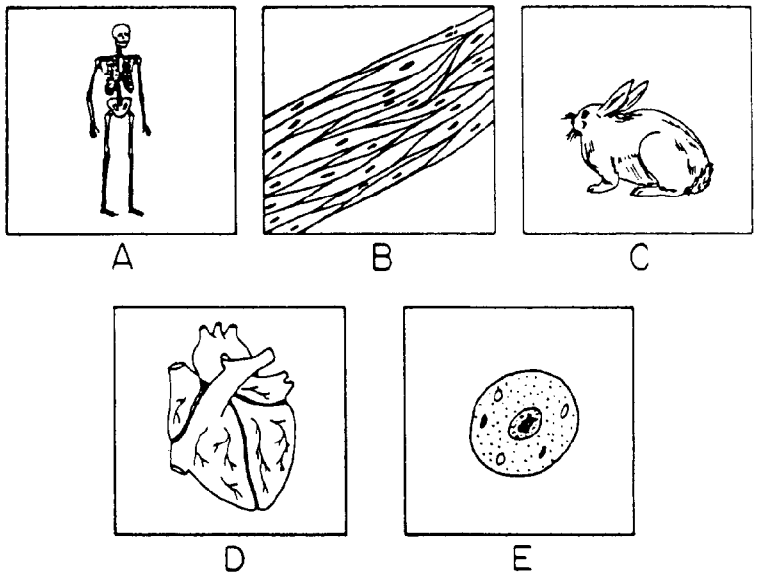
(B) Adding a substance to the escaping acid to neutralize it

(C) Adding an acid with a higher pH to the escaping acid

(D) Storing the escaping acid in large holding tanks and then taking it to an industrial waste landfill

N429601

36. Look at the pictures below, then answer the question.



Which one of the following best shows the order of these pictures from *simplest* to *most complex?*

(A) A B C D E

(B) E B D A C

(C) E A D B C

(D) C A B D E

(E) A C E D B

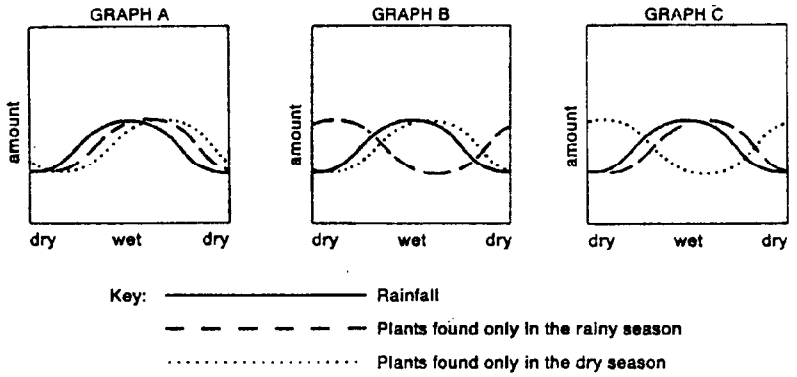
N405801

37. The ores of many metals are sulfides of the metals. In the refining process these ores are "roasted," that is, the sulfur is combined with oxygen, liberating the metal or its oxide (e.g., $CuS + O_2 \rightarrow Cu + SO_2$). This process is most likely to result in which of the following?

(A) Acid rain
(B) Aging of lakes
(C) Depletion of the ozone layer
(D) Lead poisoning

N429701

38.



There are some places in the world where rainfall is seasonal. Several months of rain are followed by a long dry period. In these places, some plants are found only in the rainy season, while others are found only in the dry season. Which one of the graphs above best shows the relationship between the rainfall and the two kinds of plants?

(A) Graph A (B) Graph B (C) Graph C

N409601

39. What is the most important advantage resulting from the orbiting space telescope?

(A) It is closer to the stars than are telescopes on the Earth's surface.
(B) It can remain stationary in space, thus focusing on a single object for a longer time.
(C) It is not affected by distortions caused when light passes through the Earth's atmosphere.
(D) It remains at a more constant temperature because of its position in space.

N417401

40. Recently, some forests were cleared in the Himalayan Mountains. What could have happened as a result of this clearing?

(A) Colder weather in the hills
(B) Less rain on the plains below
(C) Floods on the plains below
(D) Snow in the mountains
(E) Warmer weather in the hills

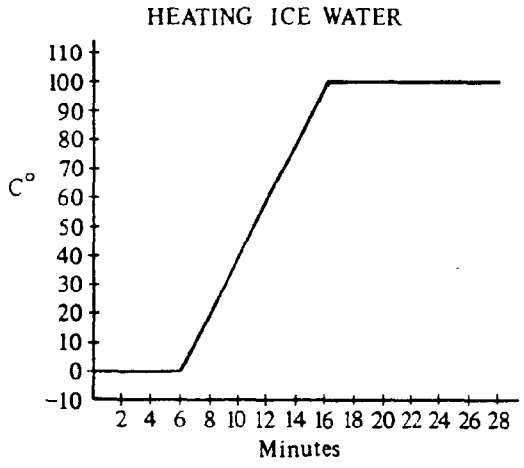
N407701

41. Concern has been expressed about the greenhouse effect of carbon dioxide, CO_2, on the Earth's atmosphere. The CO_2 allows sunlight to penetrate to the surface but blocks long-wave infrared radiation from escaping to space. If we continue to burn fuels at an increasing rate, all of the following are likely to occur EXCEPT:

(A) Atmospheric CO_2 will increase.
(B) Less heat will be trapped in the atmosphere.
(C) Sea levels will rise.
(D) The antarctic ice sheet will become smaller.

N437101

42. A beaker containing crushed ice and water is heated. The temperature of the beaker's contents is recorded every 30 seconds. A graph of the data appears below.



Approximately when does active boiling of the contents of the beaker occur?

(A) From the beginning of the process

(B) Between 2 and 6 minutes after the heating begins

(C) Between 6 and 16 minutes after the heating begins

(D) After approximately 16 minutes of heating

N418701

43. When phosphorus, P_4, is exposed to air, it reacts with oxygen, O_2, to form an oxide, P_4O_{10}. Which one of the following represents the balanced equation for the reaction?

(A) $P_4 + O_2 \rightarrow P_4O_{10}$

(B) $P_4 + 10\ O_2 \rightarrow P_4O_{10}$

(C) $4\ P_4 + 5\ O_2 \rightarrow P_4O_{10}$

(D) $P_4 + 5\ O_2 \rightarrow P_4O_{10}$

N411801

44. A student is doing a project on the effect of a magnet on the picture on a television screen. The student uses only a strong bar magnet, and later writes the following four statements. Which of the following statements does NOT describe an observation?

(A) The magnet distorts the picture when held near the front of the screen.

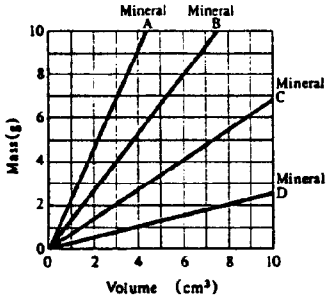
(B) Electrons are attracted by the magnet as they travel through the tube.

(C) Opposite ends of the magnet produce opposite directions of distortion on the screen.

(D) The magnet has no effect on the volume of sound.

N425901

► Questions 45-46 refer to the graph.



45. If you wish to obtain a sample of the mineral that has the greatest mass for a given volume, which of the minerals should you select?

(A) A (B) B (C) C (D) D N436801

46. Water has a density of 1 gram per cubic centimeter. Which mineral(s) would float in water?

(A) A only (B) D only (C) A and B only (D) C and D only N436802

47. A student wanted to study the effect of heat on the growth of a particular type of plant. She placed one seedling in each of ten identical pots that contained the same type of soil, and she gave each pot the same amount of water. She then divided the pots into two groups. She placed one group on a window sill where it would be heated by the Sun and placed the other group in a closet on the cool (north) side of her house.

What was wrong with the design of her experiment?

(A) The temperature difference between the two sets of seeds was not great enough to make a difference.
(B) Seedlings require light to grow.
(C) Both heat and light were different for the two groups.
(D) One group of seedlings was cooler than the other. N425801

48. The burning of fossil fuels has increased the carbon dioxide content of the atmosphere. What is the most immediate effect that this increasing amount of carbon dioxide is likely to have on our planet?

(A) A warmer climate
(B) A cooler climate
(C) Decreased relative humidity
(D) Increased relative humidity N428401

ABOUT THIS TEST

Please answer the following questions after you have completed this test. Record your answers in the box at the end of the answer sheet.

A. How much of the material covered on this test has been taught in your classes?
B. How difficult was this test for you?
C. How well do you think you did on this test?
D. How hard did you work to do well on this test?

WHEN YOU HAVE FINISHED

Please check to make sure you have marked *one* answer for each question. When you have checked your answers, place your *Answer Sheet* inside the front cover of the test booklet. All of the booklets will be collected at the same time after everyone is finished. Please sit quietly while others are completing their work.

LONGITUDINAL STUDY OF AMERICAN YOUTH

SCIENCE TEST (FORM Y)

Student's Name

Today's Date

CORRECT MARK

INCORRECT MARKS

- Use black lead No. 2 pencil.
- Make heavy marks the full length of the boxes.
- Make only one mark per question.
- Erase cleanly any unintended marks.

PAGE 1

1 A B C D
2 A B
3 A B
4 A B C D
5 A B C D
6 A B C D

PAGE 2

7 A B C D
8 A B C D
9 A B C D
10 A B C D
11 A B C D

PAGE 3

12 A B C D
13 A B C D E
14 A B C D
15 A B C D

PAGE 4

16 A B C D
17 A B C D
18 A B C D E
19 A B C D
20 A B C D E

PAGE 5

21 A B C D
22 A B C D
23 A B C
24 A B C D

PAGE 6

25 A B C D
26 A B C D
27 A B C D E
28 A B C D

PAGE 7

29 A B C D
30 A B C D
31 A B C D
32 A B C D

PAGE 8

33 A B C D
34 A B C D E
35 A B C D
36 A B C D E

PAGE 9

37 A B C D
38 A B C
39 A B C D
40 A B C D E
41 A B C D

PAGE 10

42 A B C D
43 A B C D
44 A B C D

PAGE 11

45 A B C D
46 A B C D
47 A B C D
48 A B C D

ABOUT THIS TEST

A. How much of the material on this test has been taught in your classes?

All	Almost All	Most	Some	Little
○	○	○	○	○

B. How difficult was this test?

Very Difficult	Difficult	Easy	Very Easy
○	○	○	○

C. How well do you think you did?

Very Well	Well	Poorly	Very Poorly
○	○	○	○

D. How hard did you work?

Very Hard	Pretty Hard	Not Very Hard	Not Hard At All
○	○	○	○

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