

Longitudinal Study of American Youth

SCIENCE

Form (B)

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.

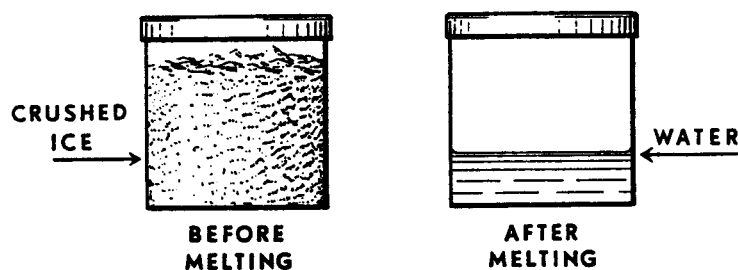
Social Science Research Institute

Northern Illinois University DeKalb, Illinois 60115

1. Which of the following is NOT an example of a chemical change?
- (A) A log burning
(B) A nail rusting
(C) An ice cube melting
(D) An apple rotting

N420201

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.



2. 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

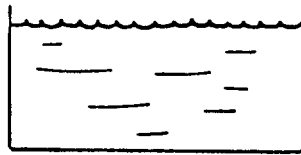
3. A chemist will frequently write a formula for some kind of matter. For example, H_2SO_4 is the formula for sulfuric acid. The numbers used in the formula stand for
- (A) the number of isotopes in a mole of substance.
(B) the number of grams of each atom in a given molecule.
(C) the number of atoms 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

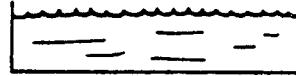
4. Can you see a single atom with a magnifying glass?
- (A) Yes
(B) No

N404802

- Questions 5-6. Two flames of the same size were used to heat the two pans of water shown below. Both pans were heated until they reached 90 degrees Celsius.



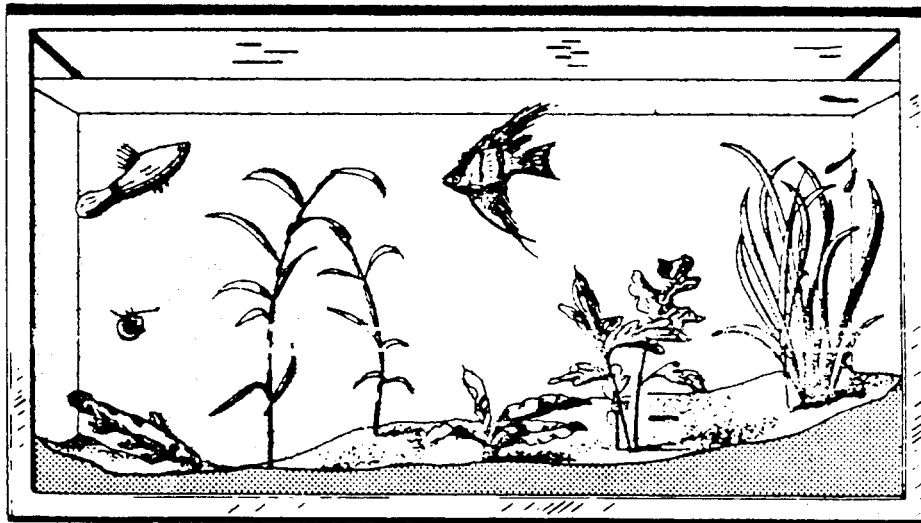
Pan 1



Pan 2

5. In which pan did the temperature reach 90 degrees first?
- (A) Pan 1 (B) Pan 2 (C) Both at the same time N404901
6. Which pan cooled down the fastest when the flame was turned off?
- (A) Pan 1 (B) Pan 2 (C) Both at the same time N404903

Some water plants, fish, snails, and other water animals were placed in a sealed aquarium as shown in the picture below.



7. No food, water or air was added to the aquarium for three months. The water level remained the same and the plants, fish, snails, and other water animals continued to live and thrive. What did this prove?
- (A) Fish do not require oxygen. (C) Snails do not require oxygen.
(B) Water plants do not require oxygen. (D) It did not prove any of these things. N404601

8. 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 (C) Sandstorms
(B) Tornadoes (D) Earthquakes N420401

9. 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

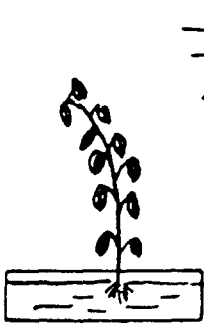
N418001

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

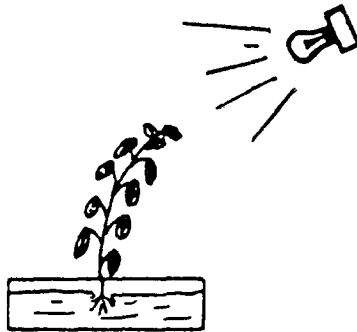
- (A) The increasing force of gravity causes the spaceship to become hot.
- (B) Friction heats the spaceship as it passes through the Earth's atmosphere.
- (C) Sunlight reflected from the spaceship's surface heats it.
- (D) Electricity in the air heats up the spaceship.

N413101

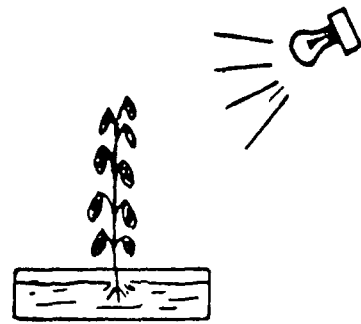
11. A teacher left a plant in a dark classroom during the school's ten day spring break. She placed a light near the plant, and she watered the plant well. When students returned to school after spring break, what do you think the plant looked like?



(A)



(B)



(C)

N401201

12. 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

13. 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

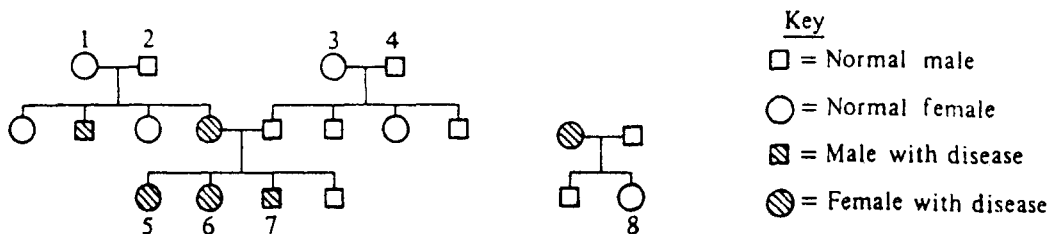
14. Suppose you believe that all blue objects will sink in water. How should you go about testing this idea?

- (A) Look for white objects that float.
- (B) Look for white objects that sink.
- (C) Look for blue objects that sink.
- (D) Look for blue objects that float.

N413701

► Questions 15-16.

The pedigree chart below shows the occurrence of a hypothetical inherited disease.



15. If Individual 7 marries Individual 8, what is the chance that any of their children will have the disease?

- (A) 0
 (B) 25%
 (C) 50%
 (D) 100%

N430003

16. If one uses the letter A to represent the dominant trait and the letter a to represent the recessive trait, what is the genotype of Individual 2 for this trait?

- (A) AA
 (B) Aa
 (C) aa

N430002

► Questions 17-18.

As an experiment, Mary grew some plants in the refrigerator and some plants on the window sill. She watered the ones on the window sill every day. For two days she forgot to water the ones in the refrigerator. The plants on the window sill grew 4 centimeters. The plants in the refrigerator grew 2 centimeters.

17. What could be correctly concluded on the basis of this experiment?

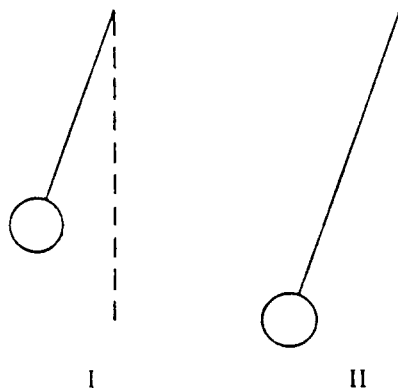
- (A) The plants on the window sill grew taller because they got more light.
 (B) The plants on the window sill grew taller because they got more water.
 (C) There is no way to be sure why the plants on the window sill grew taller.

N411501

18. Why couldn't Mary say the plants on the window sill grew taller just because they were in a warmer place?

- (A) Because the plants on the window sill got more water than those in the refrigerator
 (B) Because she used the same kinds of plants in each place
 (C) Because she used the same sized pots

N411502

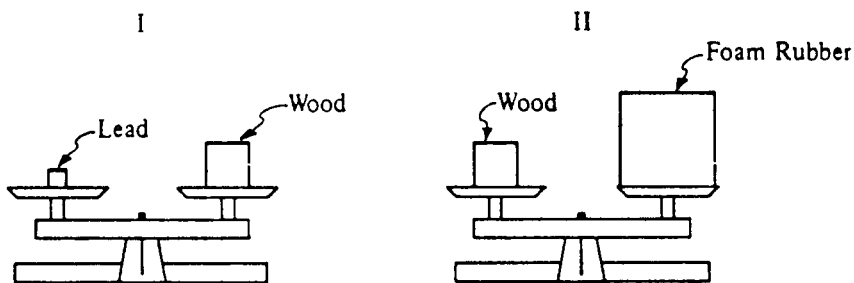


The bobs of two pendulums shown above have the same masses and volumes. The string of pendulum I is 100 centimeters long and the string of pendulum II is 150 centimeters long.

A student holds each bob at its starting angle of 20° , and then releases both bobs simultaneously.

19. How does the period (time for one complete swing) of pendulum I compare with the period of pendulum II?
- (A) The period of pendulum I is greater.
 (B) The periods of pendulums I and II are the same.
 (C) The period of pendulum II is greater.

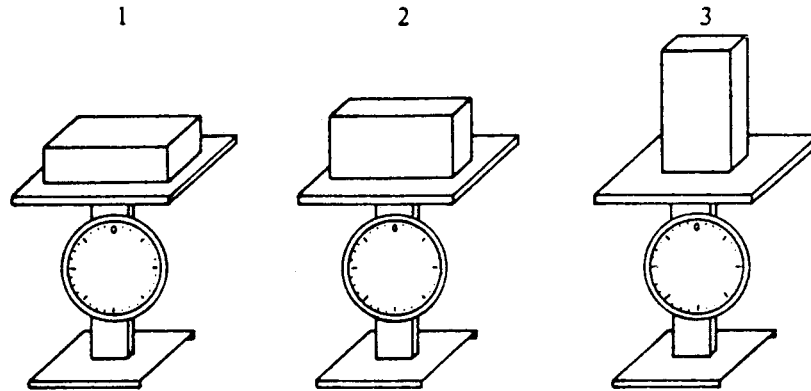
N424901



20. 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



21. A brick can be set on a scale in three different positions, as shown above. In which position will the brick weigh the most?

- (A) 1
- (B) 2
- (C) 3
- (D) The brick will weigh the same in all three positions.

N434401

22. Which of the following best explains why logs can be floated down a river?

- (A) Wood has a lower mean density than water and so will remain only partly submerged in the water.
- (B) The buoyant force of the water on the logs is less than the weight of the logs.
- (C) River water has a greater density than pure water because river water contains many dissolved minerals.
- (D) Logs are not porous and so they cannot absorb any water.

N422301

23. Half-life is a measure of

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

N407001

24. 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., $\text{CuS} + \text{O}_2 \rightarrow \text{Cu} + \text{SO}_2$). 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

25. 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
26. 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
27. At sea level, H₂O is a solid at temperatures below 0°C, a liquid between 0°C-100°C, and a gas at temperatures above 100°C. When water vapor is cooled to liquid water, energy is released. Based on these data, which of the following is the best conclusion that can be drawn?
- (A) Matter has three physical states.
 - (B) Solids can only exist at temperatures below 0°C.
 - (C) Water at 10°C has the same amount of energy as water at 90°C.
 - (D) A given mass of water has more energy as a gas than as a solid.
- N437501
28. A teaspoon of salt is dissolved in a quart of water. Which *one* of the following is true?
- (A) The salt can be separated out by filtering the solution through a fine cloth.
 - (B) The salt grains can be seen in the solution with a microscope.
 - (C) The salt will eventually settle out.
 - (D) The salt can be separated out by boiling off the water.
- N405301

29. Two astronauts walking on the moon are trying to communicate with each other. Which one of the following ways of communicating will not work for them?

- (A) Ringing a bell
 (B) Flashing a light
 (C) Using a radio
 (D) Waving

N406901

30. 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

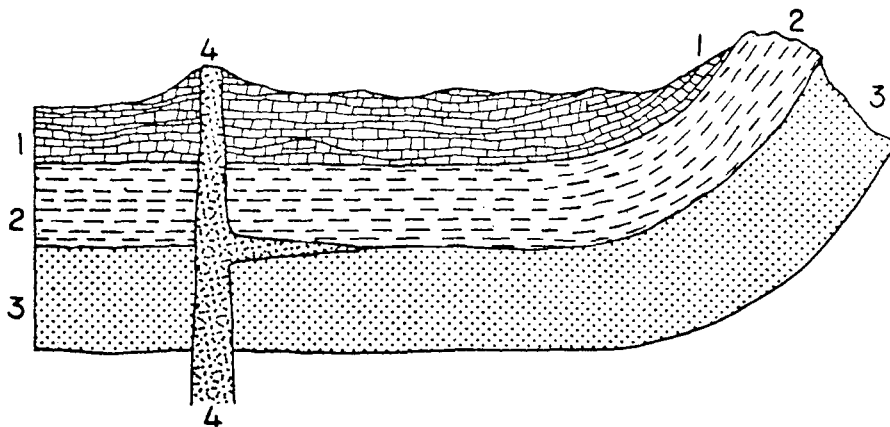
► Questions 31-32.

This diagram represents a cross-section of one part of the earth's crust. Layers 1, 2, 3 and 4 are each different kinds of rock.

31. Which layer is oldest?

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

N407301



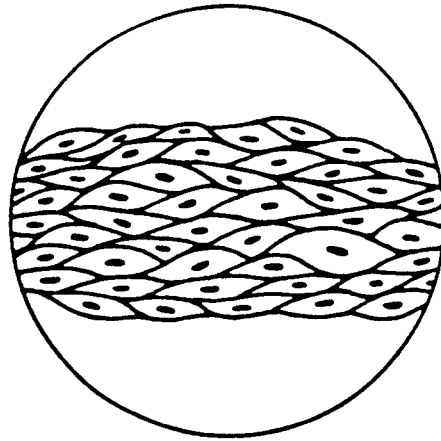
32. How can the curve of Layer 2 be explained?

- (A) Layer 2 is sedimentary rock which was formed by sediment collecting on an underwater hillside.
 (B) Layer 2 was probably flat once, but it has been bent by huge earth forces.
 (C) There must be something wrong with the diagram because all rock layers are flat and level.

N407302

33. Concern has been expressed about the greenhouse effect of carbon dioxide, CO₂, on the Earth's atmosphere. The CO₂ 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 CO₂ 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
34. 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
35. Which of the following is true of the process of respiration?
- (A) It is universal in animals and plants.
 - (B) It is universal in animals but limited to a few plants.
 - (C) It is universal in plants but limited to a few animals.
 - (D) It is limited to vertebrate animals and green plants.
- N420101
36. Which of the following is an example of genetic engineering?
- (A) Putting the genes for photosynthesis into a yeast cell
 - (B) Storing frozen embryos
 - (C) Taking birth control pills
 - (D) Supplying a missing gene product like insulin to a person with diabetes.
- N430301

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

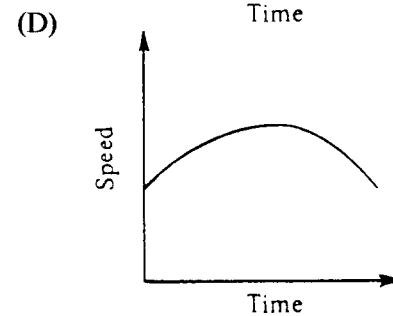
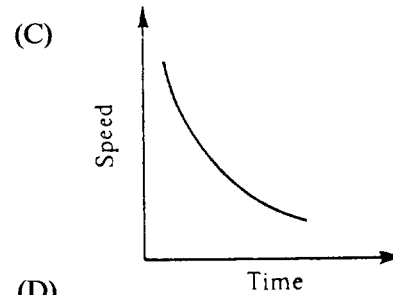
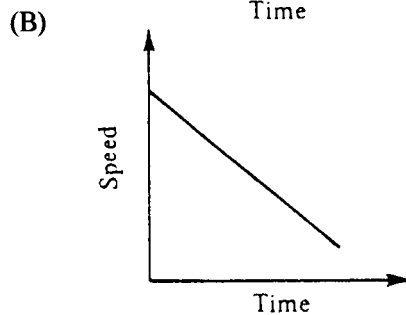
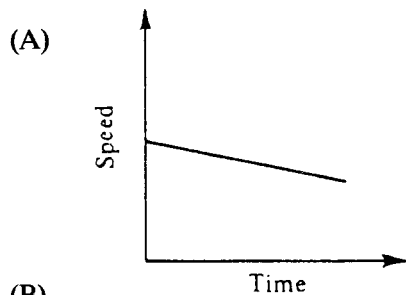


These cells all work together to do the same thing. A group of cells like this is called

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

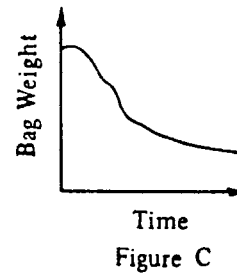
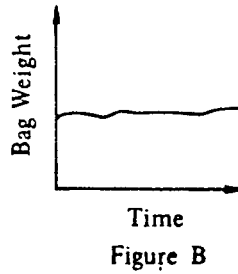
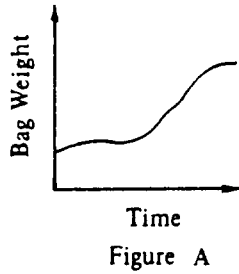
N405001

38. 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?



N428901

► Questions 39-40.



The graphs above indicate the gain or loss of weight of a dialysis bag over a period of time. A dialysis bag is made of a semipermeable material. Water moves through the material, but sugar does not.

39. If you were to place a dialysis bag containing a 30-percent sucrose solution in a container with a 60-percent sucrose solution, the graph of the time-weight relationship of the dialysis bag after 24 hours would be most like which of the above?

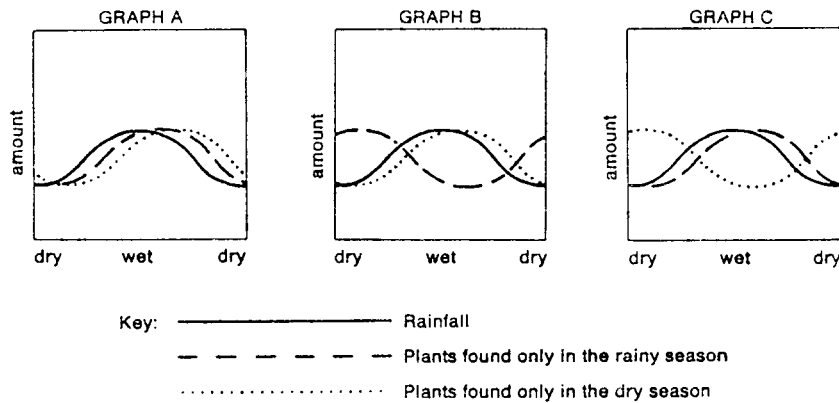
- (A) Figure A
- (B) Figure B
- (C) Figure C

N428101

40. Which graph represents a state of equilibrium in a dialysis bag?

- (A) Figure A
- (B) Figure B
- (C) Figure C

N428102

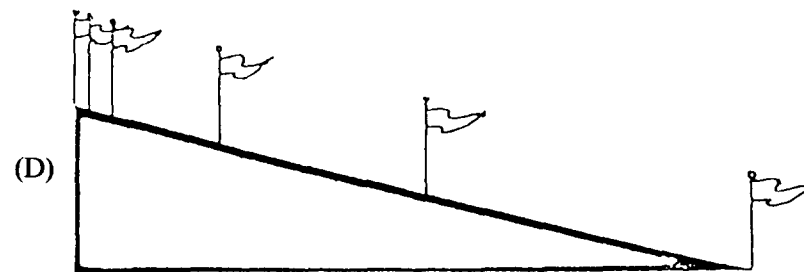
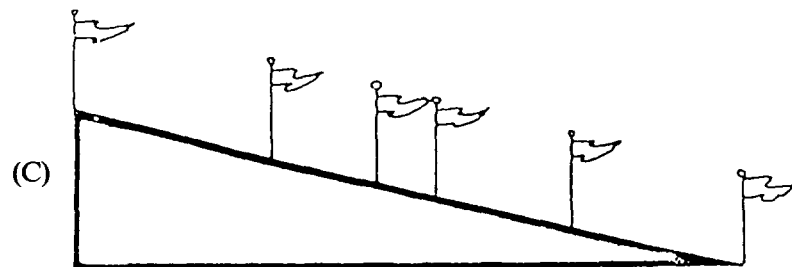
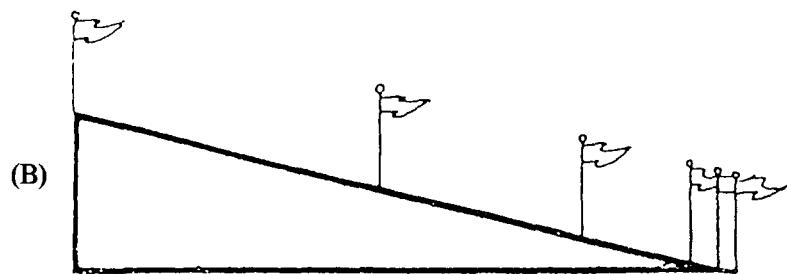
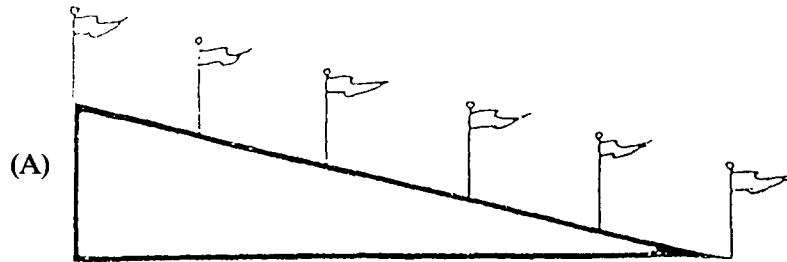


41. There are some places in the world where rainfall is seasonal. Several months of rain are followed by a long dry period. In these places, some plants are found only in the rainy season, while others are found only in the dry season. Which one of the graphs above best shows the relationship between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

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

N409601

42. A wagon starts at the top of the hill and rolls down to the bottom. There is a flag at the top of the hill. You are to place flags on the hill so that the time spent by the wagon is the same from one flag to the next. Choose the drawing that shows BEST where you would place the flags.

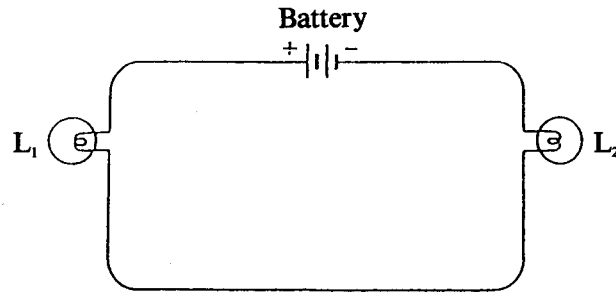


N410901

43. Which of the following will occur if a 500-gram solid ball and a 1,000-gram solid ball are dropped in a vacuum from the same height above the ground?

- (A) The 500-gram ball will fall faster.
(B) The 1,000-gram ball will fall faster.
(C) Both balls will fall at the same rate.
(D) The results are unpredictable.

N430501



44. Two identical bulbs are connected to a battery, as shown above. How will the brightness of light bulb 1 compare to the brightness of light bulb 2?

- (A) Bulb 1 will be brighter than bulb 2.
- (B) Bulb 1 will be less bright than bulb 2.
- (C) Bulb 1 and bulb 2 will have the same brightness.

N424801

45. 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

46. After 6 days of incubation, 5 of 50 pea seeds had germinated at 10°C, whereas 41 of 50 pea seeds had germinated at 30°C. Which of the following conclusions can be correctly drawn on the basis of these data?

- (A) Pea seeds need light to germinate.
- (B) The higher the temperature, the more seeds will germinate.
- (C) In order for any type of germination to occur, moisture must be present.
- (D) More pea seeds germinated in the warmer incubator.

N431902

47. Which of the following is the best way to induce an electrical current in a coil of wire?

- (A) Heating the coil uniformly
- (B) Surrounding the coil with oil
- (C) Pounding the coil with a hammer
- (D) Rotating the coil in a magnetic field
- (E) Stroking the coil with a piece of cat's fur

N407901

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 B)**

	CORRECT MARK A B C ● D	<ul style="list-style-type: none"> 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.
Student's Name	INCORRECT MARKS X ◊ ◊ ◊ ◊ ◊	
Today's Date		

<p>PAGE 1</p> <p>1 A B C D 2 A B C 3 A B C D E 4 A B</p>	<p>PAGE 6</p> <p>19 A B C 20 A B C D</p>	<p>PAGE 12</p> <p>39 A B C 40 A B C 41 A B C</p>
<p>PAGE 2</p> <p>5 A B C 6 A B C 7 A B C D 8 A B C D</p>	<p>PAGE 7</p> <p>21 A B C D 22 A B C D 23 A B C D E 24 A B C D</p>	<p>PAGE 13</p> <p>42 A B C D 43 A B C D</p>
<p>PAGE 3</p> <p>9 A B C D 10 A B C D 11 A B C</p>	<p>PAGE 8</p> <p>25 A B C D 26 A B C D 27 A B C D 28 A B C D</p>	<p>PAGE 14</p> <p>44 A B C 45 A B C D 46 A B C D 47 A B C D E</p>
<p>PAGE 4</p> <p>12 A B C D 13 A B C D 14 A B C D</p>	<p>PAGE 9</p> <p>29 A B C D 30 A B C D 31 A B C D 32 A B C</p>	
<p>PAGE 5</p> <p>15 A B C D 16 A B C 17 A B C 18 A B C</p>	<p>PAGE 10</p> <p>33 A B C D 34 A B C D 35 A B C D 36 A B C D</p>	
	<p>PAGE 11</p> <p>37 A B C D 38 A B C D</p>	

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

FOR LSAY USE ONLY

DATE						LSAYID					
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>