

Longitudinal Study of American Youth

SCIENCE Form (X)

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. To which of the following animals is the wolf most closely related?

- (A) Buffalo (C) Dog (E) Sheep
(B) Deer (D) Rabbit

N404501

2. Which of the following animals does NOT lay eggs?

- (A) Ostrich (C) Mouse
(B) Frog (D) Turtle

N412101

3. Why can astronauts wearing space suits jump much higher on the Moon than on the Earth?

- (A) The pull of gravity on the Moon is much less than it is on the Earth.
(B) There is no air on the Moon.
(C) Their spacesuits help them to jump farther.
(D) The Moon has less magnetism than the Earth has.

N413001

► **Questions 4-5.** In two different places in a museum of natural history, you may find the following combinations.

Place 1: Aspen trees, beaver, blue jays and deer

Place 2: Rattlesnakes, alligators and turtles

4. The things in Place 1 are probably grouped together because

- (A) they are found in the same area in nature.
(B) people enjoy looking at them.
(C) they were collected at about the same time.
(D) they were all alive once.

N404701

5. The things in Place 2 are probably grouped together because

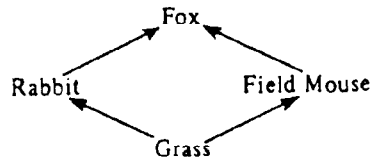
- (A) they are found in the same area in nature.
(B) people enjoy looking at them.
(C) they have similar characteristics.
(D) they eat the same kinds of food.

N404702

6. Ten plants were placed in sandy soil and ten others were placed in clay soil. Both groups of plants were kept at room temperature, given the same amount of water, and placed in a sunny room. This experiment tests the effect of
- (A) sunlight on plant growth. (C) different soils on plant growth.
 (B) temperature on plant growth. (D) water on plant growth.

N413401

7.



With respect to the field mouse in the food web above, what is the fox considered?

- (A) A predator (C) A producer
 (B) A prey (D) A decomposer
8. If a stone is a diamond, it can scratch glass. Stone A cannot scratch glass. Which of the following statements about stone A is true?
- (A) It is a diamond.
 (B) It is not a diamond.
 (C) There isn't enough information to tell whether or not it is a diamond.

N418401

N413201

9. 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

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

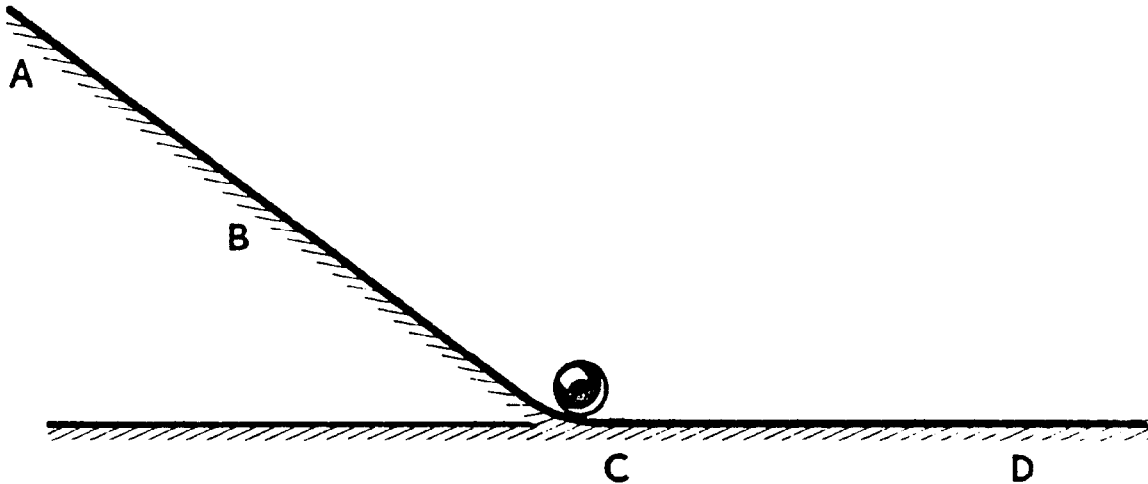
11. Animal bones, seashells, and a certain mineral, all found in shallow ocean water, combine to form the rock limestone. Limestone is found in the state of Ohio. What would this information lead scientists to conclude about Ohio?
- (A) Ohio is a good area for geologists.
(B) An unusual number of animals died in Ohio in the past.
(C) Part of Ohio was probably once covered by an ocean.
(D) Many fish live in Ohio.
- N416401
12. Polaris, the North Star, will appear most directly overhead to an observer at which of the following places in the Northern Hemisphere?
- (A) Near the equator
(B) In Miami
(C) In Seattle
(D) Near the North Pole
- N420601
13. 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
(B) I and III
(C) II and III
(D) III and IV
- N418001
14. Our solar system contains all of the following EXCEPT
- (A) Earth.
(B) Mars.
(C) the Sun.
(D) the Moon.
(E) the North Star.
- N406601
15. 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

16. A theory in geology says that huge sections of the earth's crust move around very slowly. Does this theory help us explain how continents move?

- (A) Yes (B) No

N406404

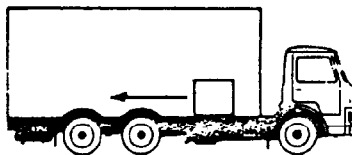
17.



A ball rolls down a wooden ramp from A to C and onto a level wooden surface. Which one of the following statements about the speed of the ball at C is sure to be true?

- (A) The speed at C is faster than it will be at D.
(B) The speed at C is the same as it was at B.
(C) The speed at C is the same as it will be at D.
(D) The speed at C is slower than at B.

N406701



18. 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.

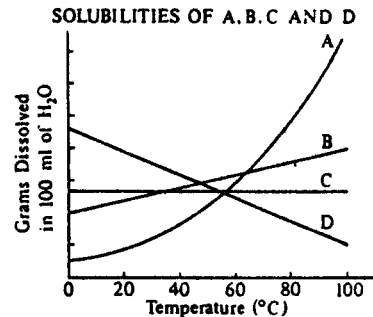
N425001

19. 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

20.



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

21. 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.

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

22. Which of the following animals is probably well adapted to a hot, dry environment?

- (A) A rabbit with small ears and fur that is brown in summer and white in winter
- (B) A rodent that sleeps underground during the day
- (C) A white fox with long fur, small ears, and a bulky body
- (D) A long-legged bird that has dark feathers and eats snails and small fish

N424301

23. 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

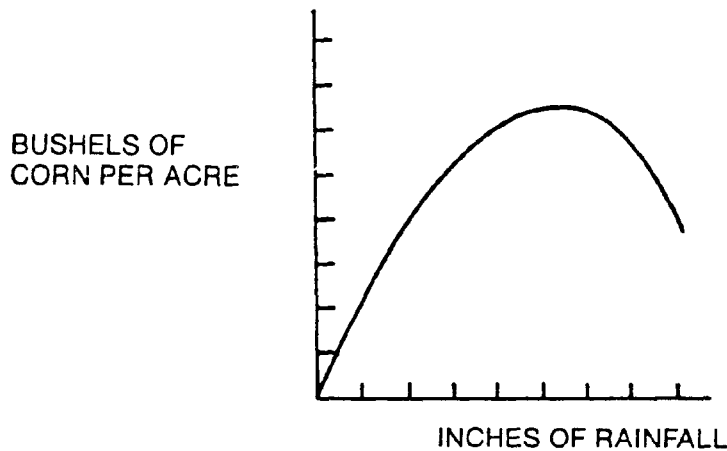
24. The new product Super Plant Food has been advertised. Claims have been made that Super Plant Food will cause plants to grow to giant sizes. Directions on the label of this new product say: "Simply add 1 teaspoon of Super Plant Food powder to each gallon of water used to water your seeds or growing plants. Plants watered with Super Plant Food solution will grow faster and become twice as large as normal plants."

Suppose you wish to test scientifically the claims of the makers of Super Plant Food. Which of the following experiments would best test whether Super Plant Food helps the growth of bean plants?

- (A) Place 1 bean seed in each of two identical pots of soil. Water each pot with the same amount of Super Plant Food solution each day.
- (B) Plant 10 bean seeds in a pot of soil. Water with the same amount of Super Plant Food solution each day.
- (C) Plant 10 bean seeds in each of two identical pots of soil. Water one pot with a cup of Super Plant Food solution each day, and water the other pot with a cup of water each day.
- (D) Place 100 bean seeds on a sponge. Keep the sponge moistened with Super Plant Food solution.

N421301

25. 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

26. 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

27.



When one looks at a pencil half-submerged in a glass of water, the pencil may appear bent as shown above. Which of the following helps to explain this effect?

- (A) Part of the pencil is wet and part is dry.
- (B) There is a difference in temperature between the air and the water.
- (C) Light changes direction as it passes from water to air.
- (D) Water reflects more light than air does.

N431401

► **Questions 28–29.** Scientific discoveries in one area can often be applied to other areas. Is each of the following an example of this process?

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

N407401

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

N407404

30. 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

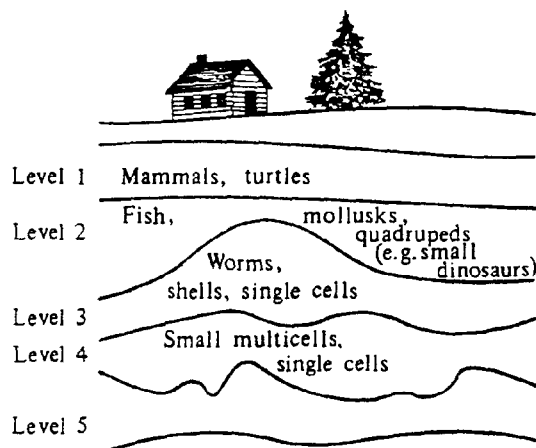
N432101

31. It has been found that certain DDT insecticides become *less* effective as they are used over a period of time primarily because

- (A) insects use DDT in their metabolism and adapt to it in their environment
- (B) surviving insects reproduce and pass on to their offspring genes for resistance
- (C) DDT acts as a fertility drug
- (D) DDT accumulates in food chains

N428301

32.



The drawing above shows a side view of rock layers containing various kinds of fossils. Which of the following can you conclude from the drawing?

- (A) Organisms at level 1 are older than those at level 2 because their fossils are smaller.
- (B) Organisms at level 2 are youngest because their fossils have shapes similar to those of modern organisms.
- (C) Organisms at level 4 are the oldest because they are in the lowest layer that contains fossils.
- (D) There are no organisms in level 5 because there has not been enough time for fossils to sink to that level.

N423301

33. Which of the following produces the antibiotic penicillin?

- (A) Protists
- (B) Molds
- (C) Protozoa
- (D) Algae

N419101

34. Beaker I contains 200 milliliters of water and beaker II contains 400 milliliters of water. Both beakers are initially at 25°C.

If the two beakers are heated at the same constant rate for 2 minutes, how will the temperature of the water in them compare?

- (A) It will be higher in beaker I than in beaker II.
- (B) It will be higher in beaker II than in beaker I.
- (C) It will be the same in both beakers.

N423901

35. Half-life is a measure of

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

N407001

36. 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
37. 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
38. 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
39. 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
40. 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

41. 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
42. 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
43. At the present time, where does most of the energy used in this country come from?
- (A) Nuclear reactors
(B) Hot springs
(C) Falling waters
(D) Solar batteries
(E) Burning of fuels
- N406501
44. 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
45. 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

46. 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. (C) Sea levels will rise.
(B) Less heat will be trapped in the atmosphere. (D) The antarctic ice sheet will become smaller.
- N437101
47. 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) $\text{P}_4 + \text{O}_2 \rightarrow \text{P}_4\text{O}_{10}$ (C) $4 \text{P}_4 + 5 \text{O}_2 \rightarrow \text{P}_4\text{O}_{10}$
(B) $\text{P}_4 + 10 \text{O}_2 \rightarrow \text{P}_4\text{O}_{10}$ (D) $\text{P}_4 + 5 \text{O}_2 \rightarrow \text{P}_4\text{O}_{10}$
- N411801
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 (C) Decreased relative humidity
(B) A cooler climate (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 X)

Student's Name _____

Today's Date _____

CORRECT MARK
 A B C D E

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 E
 2 A B C D
 3 A B C D
 4 A B C D
 5 A B C D

PAGE 2

- 6 A B C D
 7 A B C D
 8 A B C
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PAGE 3

- 11 A B C D
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 13 A B C D
 14 A B C D E
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PAGE 4

- 16 A B
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PAGE 5

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- 27 A B C D
 28 A B
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 40 A B C D

PAGE 10

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 42 A B C D
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 44 A B C D
 45 A B C D E

PAGE 11

- 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?

Almost
 All All Most Some Little

B. How difficult was this test?

Very Very
 Difficult Difficult Easy Easy

C. How well do you think you did?

Very Very
 Well Well Poorly Poorly

D. How hard did you work?

Very Pretty Not Very Not Hard
 Hard Hard Hard At All

FOR LSAY USE ONLY

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