



Directions: Four possible answers are given for each question. Put an X in the answer box corresponding to the number of that answer which you think is most nearly correct.

1. A statement of equality between two ratios is known as a
- 1. fraction
 - 2. quotient
 - 3. percentage
 - 4. proportion

2. This is a diagram of a spring similar to a hair spring in a watch. It is classified as a
- 1. compression spring
 - 2. disk spring
 - 3. leaf spring
 - 4. torsion spring



3. Which of the following elements is chemically least like the other three?
- 1. argon
 - 2. chlorine
 - 3. krypton
 - 4. neon

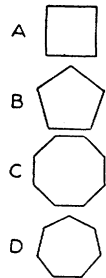
4. The gravitational attraction between two homogeneous spheres varies inversely as the square of the distance between
- 1. their centers
 - 2. their farthest surfaces
 - 3. their nearest surfaces
 - 4. them and the ground

5. Which word belongs least with the other three?
- 1. calyx
 - 2. corona
 - 3. stamens
 - 4. stigma

6. In a general sense, a process of transferring energy from a body across space is called
- 1. elasticity
 - 2. magnetism
 - 3. polarization
 - 4. radiation

7. The gaseous envelope surrounding a celestial body is called
- 1. air
 - 2. atmosphere
 - 3. humidity
 - 4. vapor

8. A is a square, B is a pentagon, and C is an octagon. D is a



- 1. decagon
- 2. heptagon
- 3. hexagon
- 4. nonagon

9. Which of the following is true?

- 1. $(3 \times 6) \binom{1}{3} = \binom{3}{3} \binom{6}{3}$
- 2. $\frac{(10-4)}{2} = 5 - 4$
- 3. $\frac{9 \times 4}{3 \times 2} \times \frac{4}{3} = \binom{9}{3} \binom{4}{2} \binom{12}{9}$
- 4. $\frac{(3)(3 \times 3)}{\frac{1}{3}} = 1 \times 3 \times 3$

PART A

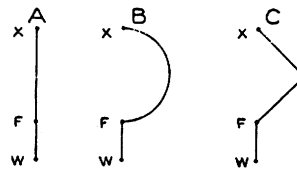
10. A village was considering a standpipe to produce pressure for its water supply. Four standpipes were considered with characteristics as shown below. Which would produce the greatest pressure at street level?

- 1. average height of water surface above the street 50 feet, diameter of standpipe 20 feet
- 2. average height 60 feet, diameter of standpipe 17 feet
- 3. average height 70 feet, diameter of standpipe 15 feet
- 4. average height 80 feet, diameter of standpipe 13 1/2 feet

11. Which of the following terms has least in common with the other three?

- 1. fluorescence
- 2. incandescence
- 3. luminescence
- 4. phosphorescence

12. Disregarding friction, which of the arrangements of levers would give the greatest mechanical advantage? In each the force is applied at point X, and the fulcrum is indicated by F.

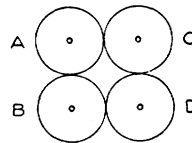


- 1. A
- 2. B
- 3. C
- 4. the same advantage for each

13. Which of the following pairs of things are most similar?

- 1. aero-embolism; bends
- 2. anoxia; anemia
- 3. DDT; 2,4D
- 4. hyperopia; presbyopia

14. All of the gears in the accompanying gear system have the same number of teeth. Each gear is in mesh with two other gears. Gear A turns counterclockwise.



- Which of the following statements is correct?
- 1. Gears A and C turn in the same direction
 - 2. Gears A and D turn in the same direction
 - 3. Such a gear system cannot operate
 - 4. Such a gear system would be useless

PART B

QUESTIONS FOR SECT

65. If the entire exterior of the largest cube which is made of half-inch cubes is painted, how many of the smaller cubes will have no paint on them?

- 1. 1-inch cube
- 2. 1 1/2-inch cube
- 3. 2-inch cube
- 4. 2 1/2-inch cube

66. The coordinates of the center of a cube shown in the diagram are

- 1. 1,1,1
- 2. 2,2,2
- 3. 3,3,3
- 4. 5,5,5

67. What are the coordinates of the center of a cube which has two holes in it? The holes were drilled from the center of the cube in the same direction.

- 1. 1,3,4
- 2. 2,4,3
- 3. 3,3,3
- 4. 5,4,1

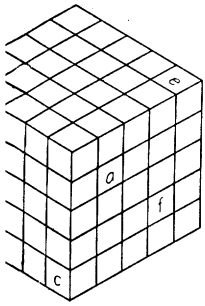
Below are a number of true and some false statements. Mark each false statement O.

- 101. A square jaw is a type of jaw.
- 102. Certain lines of latitude are parallel.
- 103. Children who are intelligent are not above average.
- 104. Criminals are intelligent.
- 105. Human beings are intelligent.
- 106. In general, men are more intelligent than women.
- 107. Many eminent children are geniuses.
- 108. The brain is the organ of intelligence.
- 109. The marriage of a man and a woman is a legal contract.
- 110. The number of stars in the universe is infinite.
- 111. We forget more things as we get older.
- 112. Many of the elements in the periodic table are named after scientists.
- 113. Transmutation is the process of changing one element into another.
- 114. Radon is a rare gas.
- 115. Injections of insulin are used to treat diabetes.
- 116. A cloud detector is a device used to detect clouds.
- 117. Treating paraffin is a process used in the petroleum industry.
- 118. The supersonic speed is the speed of sound.
- 119. In a recent experiment, a cloud of uncombined hydrogen was produced.

SECTION E: A 2 1/2 inch cube, as shown in the diagram, is made of half-inch cubes. Any one cube may be located in terms of a coordinate system. For example, cube a is in the fifth layer from the left, the fourth layer from the bottom, and the second from the front. It is, therefore, located in the position 5,4,2.

SCIENCE APTITUDE TEST—This sample contains typical questions taken from the original three-hour examination given to high school seniors in the Seventh Annual Science Talent Search conducted by Science Clubs of America, administered by Science Service. The test was devised by Dr. Harold A. Edgerton, and Dr. Stuart Henderson Britt, psychologists of New York City. If you wish to take this test arrange to spend about 40 minutes of uninterrupted time. Then turn to page 92 for the answers.





QUESTION E:

Surface is painted blue, what is the number of smaller cubes that can be built from the unpainted

edges of the cube
 e
 be
 e
 be

How many smaller cubes nearest the center of the cube are unpainted?

Which of the following cubes would be painted if a hole $\frac{1}{2}$ of an inch in diameter be drilled through cube 2,4,5 and a hole $\frac{1}{4}$ through 1,4,3?

SECTION I Suppose a number system were instituted which had eight digits $\square, \wedge, \xi, \ddagger, \bar{\square}, \bar{\wedge}, \bar{\xi}$, and $\bar{\ddagger}$ corresponding respectively to the digits 0, 1, 2, 3, 4, 5, 6, and 7. The digit \square is used in the same fashion as the 0 in the decimal system, e.g., $\wedge\square = 8$.

QUESTIONS ON SECTION I:

- 85. Which is equal to 8×8 ?
 () 1. $\wedge\square\square$
 () 2. $\bar{\square}\ddagger$
 () 3. $\wedge\square\wedge$
 () 4. $\xi\xi$
- 86. What is the sum of $\ddagger + \bar{\square} + \xi$?
 () 1. $\xi\wedge$
 () 2. $\wedge\xi$
 () 3. $\xi\ddagger$
 () 4. $\wedge\bar{\square}$
- 87. Which of the following indicates three-quarters of an inch?
 () 1. $\frac{\xi}{\wedge\square}$ inches
 () 2. $\frac{\bar{\square}}{\wedge\square}$ inches
 () 3. $\frac{\xi}{\wedge\square}$ inches
 () 4. $\frac{\xi\xi}{\wedge\square}$ inches
- 88. What is the value of $\wedge\xi\bar{\square} - \ddagger\xi + \frac{\wedge\square}{\xi}$?
 () 1. $\ddagger\bar{\square}$
 () 2. $\xi\xi$
 () 3. $\bar{\square}\xi$
 () 4. $\xi\square$

PART C

Which of the following statements, some of which are true and some of which are false, is a true statement with an X. Mark

- () The lightning bolt is a sign of will power.
- () The future is written in a person's hand foretell his future.
- () The tallest people are distinctly above average in intelligence and school grades more often than average in height and weight.
- () The tallest people very rarely above average in intelligence.
- () The tallest people seldom have to learn to fear snakes and the fear is not inborn.
- () The tallest women have smaller brains than the tallest men.
- () The tallest men have been feeble-minded as a rule.

Which of the following is divided into definite sections, each of which controls some special ability or trait: intelligence, cheerfulness, etc.

- () The number of cousins is practically certain for all children of inferior intelligence.
- () The number of a man's senses is limited to five.
- () The number of people who are rapidly asleep when awake is more than when asleep.

Which of the following is an artificial radioactive isotope of an element that is useful for tracer experiments in physics, biochemistry, and medicine?

Which of the following is a method of separating gold from mercury by cyclotrons that has provided a new standard of measurements in grinding lenses and optical equipment.

Which of the following is a radioactive gas, generated by the atomic bomb at Bikini, was detected in the atmosphere over part of the midwestern United States three days later.

Which of the following is a liquid oxygen has been found to be the power of aircraft engines for

Which of the following is a detector that shows invisible danger from the rough use of infra-red rays has to make night flying safer.

Which of the following is a fungus that is resistant to mustard gas has physiological varieties of a fungus.

Which of the following is a species of grasshoppers, measured with an ultrasonic meter and found to be able to withstand 40,000 vibrations per second, by children.

Which of the following is an experiment, dry-ice fragments against supercooled droplets in a laboratory formed ice crystals that fell like

137. 1 meter equals 39.37 inches. Therefore, 1 square inch equals how many square meters?

138. Logically, what word is represented by the symbol Δ in the series: kiloliter, hectoliter, decaliter, liter, deciliter, Δ , milliliter.

139. What is the missing word in the following sentence? "A figure is _____ with respect to a straight line l if the points of the figure can be grouped in pairs in such a way that the straight-line segment joining any pair has l as a perpendicular bisector."

140. If the proposition "All X are Y" is universal and positive, and if the proposition "Some X are Y" is particular and positive, what two conclusions can be drawn about the proposition, "No X are Y"?

141. What is the error, and in which step or steps is it made?
- (1) Let $x = a$
 - (2) Then $x^2 = ax$
 - (3) $x^2 - a^2 = ax - a^2$
 - (4) $(x + a)(x - a) = a(x - a)$
 - (5) $x + a = a$
 - (6) Since $x = a$, we have
 - (7) $a + a = a$
 - (8) $2a = a$
 - (9) $2 = 1$

GENERAL SCIENCE

Test Your Science Ability With Sample Problems

► HERE'S a test that you can try on yourself or your friends. You may discover that you have the reasoning ability that a scientist needs in order to tackle and solve his investigational problems.

Thousands of high school seniors have just taken the science aptitude test, of which these questions are a part. They were competing in the Seventh Annual Science Talent Search for the Westinghouse Scholarships, and a tough super-quiz was part of their entry.

The questions, now made public for the first time, require the use of scientific ability or aptitude. Not everyone has the qualities that make a successful scientist, just as not everyone can sing, paint or learn languages easily. If you find the test difficult, no matter! In any case, you should get some idea of what it takes to be a scientist. You may even discover that you have abilities that you did not realize you have.

Do you want to try the test? Then arrange to spend about 40 minutes of uninterrupted time. All of the questions should be finished in one sitting. When you are through, turn to the answers on page 92.

Now a few hints about taking the test:

Don't expect to make a perfect score. No one of the thousands of boys and girls who have taken Science Talent Search examinations has ever made a perfect score. They are not expected to do so. Neither are you.

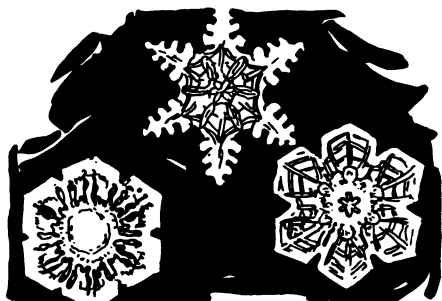
You may start in on the test and then not finish. Or you may take one look at it and say: "That is too tough for me." That is your privilege. No one is making you take the test.

The high school seniors were not required to take the test. They could walk out on it—and many of them did, thus withdrawing from the competition.

The test is made quite difficult intentionally in order to eliminate the persons who do not have perseverance to finish a job. This ability to finish what is started is a prime requisite for solving scientific problems, whether they be in atomic energy, disease control, industrial technology or in everyday life. Sometimes those who quit have reasoning ability, but it isn't useful to them unless they try to use it.

Doing well on this sample of the full test (which takes three hours to do) is

(Turn to page 92)



Eskimos and Wheat

➤ SNOW is the friend of migratory Eskimos in the long Arctic winter, just as it is of the rooted wheat in this more favored land. When a little band of Eskimos decide to make camp, they quickly build a perfectly domed igloo out of blocks of packed snow. When there is a thick cover of snow over the wheat-fields, farmers stop worrying about the crop.

The same physical property of snow benefits both frigid-zone men and temperate-zone plants, though not in exactly the same way. The structure of snow crystals, as spiky six-pointed stars, insures that massed snow on the ground shall be highly porous and fluffy, with a great deal of trapped air. This makes snow a good thermal insulator, for exactly the same reason that such things as rock wool, felt and cork are good insulators. As a matter of fact, up to the temperature where it partly melts and then re-freezes into solid ice, snow is a better insulator, weight for weight, than most commercial products used for that purpose.

Not that it is warm under the snow. It cannot be, else the snow would melt. But it is less cold than it is in the outer air, and the wind does not reach the living creatures within its shelter. The latter point is of especial importance in the case of the wheat, for it is probable that plants suffer even more from drying out than from freezing when they are naked to the winter weather. Another important benefit of snow-insulation for the plants it covers is its prevention of too-rapid changes in temperature, either up or down, which can harm plants in a number of different ways.

The snow-sheltered Eskimos do warm up the inside of the igloo to some extent, partly with their blubber-fed stone lamps, partly with animal heat from their own robust bodies. They even keep themselves warm when lying on the snow sleeping-bench, by inserting a layer of a different kind of insulator—furs. But they must not make the interior so hot that the snow walls begin to melt, then re-freeze; for ice, unlike snow, is a rather good conductor of heat. You ruin the igloo if you make it too warm inside.

Exactly this has been happening, among Eskimos who have obtained kerosene stoves from white traders. After the excessive warmth has changed the igloo from a snow house into an ice house, it loses much of its value as a shelter, and the inhabitants are liable to contract tuberculosis and other lung ailments. Since the trade in stoves cannot be stopped, missionaries in the Arctic now try to persuade the Eskimos to use their summer skin tents as linings for their igloos, thereby preserving the insulating value of the snow blocks.

Science News Letter, February 7, 1948

From Page 89

credible, but it does not mean that you can quit what you are doing and become a scientist. To be a professional scientist requires many years of study and preparation as well as native ability. But there are many situations in your daily work and life that require the same kinds of ability that scientists need.

The science aptitude test is only one of the techniques used in selecting boys and girls who are scientifically gifted. In addition each contestant filled out a personal data blank and wrote an essay describing some scientific project he has done or wishes to do. Teachers filled out

a recommendation form and principals reported scholarship. All these are used in choosing winners.

Taking the test and competing in the search comes as a culmination of high school science study and science club activity for thousands of boys and girls of America's public, private and parochial secondary schools.

Don't read further. Cover up the following paragraph until you have taken the test.

The correct answers to Part A are: 1, 4; 2, 4; 3, 2; 4, 1; 5, 2; 6, 4; 7, 2; 8, 2; 9, 3; 10, 4; 11, 2; 12, 4; 13, 1; and 14, 2. Right answers for Part B are 65, 2; 66, 3; and 67, 2. 85, 1; 86, 2; 87, 2; 88, 3.

Your true and false answers should read: 101, 0; 102, 0; 103, X; 104, 0; 105, X; 106, X; 107, 0; 108, 0; 109, 0; 110, 0; 111, X; 112, X; 113, X; 114, X; 115, 0; 116, X; 117, X; 118, 0; 119, X.

On the last questions, you may take credit if your answer was in different words, but be sure it means the same as the correct ones. They are: 137. One over 39.37 squared; 138. Centiliter or .01 liters; 139. Symmetric or symmetrical; 140. Universal and negative; 141. Both sides were divided by zero in going from step four to step five, which results in an indeterminate form.

Your score is the number of questions you answered correctly. If you only answered 20 or less correctly, you probably are not gifted in science. But if you scored 33 or more, then you may have a real talent for science. Average aptitude is indicated by scores ranging from 21 to 32 inclusive.

Now, let's go back over the answers and see which questions you answered correctly. You should have been right on 1, 3, 7, 8, 101, 102, 105 and 112. Those are rated as the easiest ones.

Which ones did you puzzle over most? The hardest questions are 13, 85, 88, 103, 106, 108, 110, 113, 137 and 140.

Science News Letter, February 7, 1948

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