GENERAL SCIENCE

Science Aptitude Test

This quiz, taken from a two and one-half hour examination recently given to 16,000 high school seniors, can give you an indication of your science ability.

By ALLEN LONG

➤ DO YOU have the makings of a scientist? Are you trying to decide what course to pursue in college? Are you eyeing the security and salaries offered by technical professions?

Or are you one of those who decided a high school education was enough, only to suspect—when it was too late—that you made a mistake?

Here is a test that will give you some idea of your scientific ability. This is a short version of the Science Talent Search's two and a half hour examination recently given to about 16,000 high school seniors scattered from coast to coast.

You have half an hour to answer these 20 questions. You probably will not answer all of them correctly. You may not even get them all answered in the allotted time.

However, neither did any student who took this initial step toward winning part of the $11,000 in scholarships. No student made the perfect score of 137—which would have meant that all parts of the 109 questions were answered correctly.

No student ever has made a perfect score, nor is anyone likely to. This test, drawn up by psychologists, is tried out on a group of college freshmen. Questions that seem too easy are discarded.

The idea is to create a test so tough that it is fairly simple to spot the top 40 science-minded high school seniors in the continental United States.

The test gives one indication of the youth's interest and ability in science, but the contestant must supplement his test score with a science project of some kind. He writes a report on his project and sends the report in to be judged. Furthermore, his teachers are required to evaluate the student's personality as well as his scientific ability.

Each of these parts represents a rugged hurdle. The test alone eliminates thousands. Of the 16,344 who took the exam, only 2,409 were able to complete all the entrance requirements by the deadline, Dec. 27, 1953.

A crew of graders working day and night checked off the right answers on each examination. Psychologists evaluated the personal data concerning each entrant. Scientists judged the project reports. Then the 40 winners were selected.

Each year since 1942, about 15,000 high school seniors have attempted this test. Approximately 2,000 have been able to complete it and fulfill other qualifications each year. Of these, 40 come to Washington every spring to take part in the annual Science Talent Institute and to compete for thousands of dollars in Westinghouse Science scholarships.

Another 260 receive honorable mention each year. Most of the 300 winners are offered scholarships by colleges and universities throughout the nation. The Science Talent Search is supported by the Westinghouse Educational Foundation and is conducted by Science Clubs of America, administered by SCIENCE SERVICE.

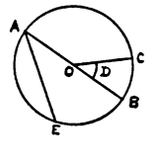
The task of seeking out potential science talent grows more urgent each year. Although the nation has doubled its number of scientists in the past 13 years, the demand for them stays well ahead of the supply. The need to stay ahead of the Soviets in technology makes imperative the training of still more scientists, technicians and engineers.

The Science Talent

PART A

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

1. Which of the following is *not* correct?



( ) 1. central angle: BAE
( ) 2. chord: AE
( ) 3. diameter: AOB
( ) 4. radius: OB

2. Why do cold-water pipes in a basement often "sweat" on a hot summer day?
( ) 1. More water is drawn through the pipes on warm days.
( ) 2. The air around the pipes expands and loses water vapor.
( ) 3. Water evaporates from the surrounding air.
( ) 4. Water vapor in the surrounding air condenses on the pipes.

4. Which of the following is *not* a use of the mineral quartz?
( ) 1. as parts in ultra-violet lamps
( ) 2. cutting diamonds
( ) 3. manufacturing glass
( ) 4. regulating radio-wave frequency

5. Which of these is *not* a classification of rocks?
( ) 1. fragmentary
( ) 2. igneous
( ) 3. metamorphic
( ) 4. sedimentary

6. When a lighted match is thrust into a bottle containing pure oxygen, the match
( ) 1. burns more slowly
( ) 2. burns more rapidly
( ) 3. explodes
( ) 4. ignites the oxygen

7. The *tympanic membrane* is located in the
( ) 1. ear
( ) 2. eye
( ) 3. larynx
( ) 4. nose

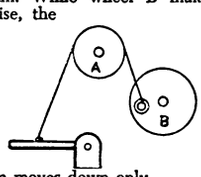
30. Rare earths occur in all the following *except*
( ) 1. cecite
( ) 2. cinnabar
( ) 3. gadolinite
( ) 4. monazite

31. The structures in the human eye upon which the perception of color apparently is most dependent are the
( ) 1. cone cells in the region of the fovea centralis
( ) 2. peripheral cone cells
( ) 3. peripheral rod cells
( ) 4. rod cells in the region of the fovea centralis

32. On the basis of the blood-donor program in the United States, it has been found that
( ) 1. indices of anemia currently used are unsatisfactory
( ) 2. men and women are about equally anemic
( ) 3. more men than women are anemic
( ) 4. more women than men are anemic

33. The rate at which the earth rotates has been found to vary in three distinct ways. Which of the following is *not* one of these three?
( ) 1. In the spring the earth rotates slower than in the autumn.
( ) 2. The earth is gradually slowing down, so that the length of the day increases about 0.01 seconds in a century.
( ) 3. The earth is sometimes ahead and sometimes behind its average orientation; and in the past 200 years the accumulated variation has been as great as 30 seconds.
( ) 4. There is a cyclic variation which coincides with leap year.

34. The axles of wheels A and B are in fixed positions as shown in the diagram. While wheel B makes a complete turn counterclockwise, the



( ) 1. arm moves down only
( ) 2. arm moves first down, then up
( ) 3. arm moves first up, then down
( ) 4. direction of the movement cannot be determined from the information given

Search represents not only a scientific method of finding those high school seniors with the greatest aptitude for scientific careers, but it does more. In high school after high school, the very existence of the test and the interest manifested in it serve as spurs, impelling many students toward a study of the sciences.

If, after trying out the sample questions, you decide the test is too tough for you, or if you start it and then do not finish it, you will react as many thousands of high school seniors did. The test is made especially difficult, partly to eliminate all but the persevering. Perseverance is a quality especially necessary in scientific research.

The test is designed to measure science aptitude, not legal aptitude, nor other kinds of aptitude. Failure, therefore, means only that your aptitude probably does not lie in science.

Few persons are gifted with the special abilities that make good scientists. This nation now has around 200,000 scientists. About 46,000 of these have earned Ph.D. degrees. In addition, there are approximately 500,000 engineers, 300,000 physicians, veterinarians and others in the health field.

Relatively few of this group can be called research scientists, devoting their time to seeking out the answers to the fundamental questions proposed by nature.

Ready to test yourself? There are three parts to the test. You should be able to answer the sample questions in not more than half an hour. On the whole, these questions are from the easier sections of the test, although 31 and 81 of Parts A and B, respectively, are among the toughest in the full test. Questions 1 and 2 in Part A are among the easiest.

SCIENCE QUIZ — These questions are taken from the full-length Science Talent Search examination. On the whole, these questions are from the easier sections of the test, although numbers 31 and 81 are among the toughest in the entire exam.

DIRECTIONS: Read each Section carefully. The questions following each Section are based on the information given. In other words, the answers to the questions are dependent in some way on the materials of the Section to which they belong. Four possible answers are given for each question. Put an "X" in the parentheses in front of the number corresponding to that answer which you think is **most nearly correct.**

PART B

SECTION A

All tumors are divided into two groups, the benign and the malignant. A benign tumor is comparatively harmless; it grows slowly, pushes aside surrounding tissues, and does not spread to other parts of the body. A benign tumor is dangerous to life only when growing in some vital organ, such as the brain.

A malignant tumor is a cancer. Unlike a benign tumor, a cancer can grow rapidly, destroy surrounding tissues, and often spread to distant parts of the body. A malignant tumor is dangerous to life wherever it may grow. Sometimes it is very difficult to say whether a tumor is benign or malignant. Only thorough examination and special tests will determine the true nature of some tumors. The failure to distinguish between benign and malignant tumors in the early stages of growth may result in tragedy.

QUESTIONS ON SECTION A

51. An early cancer is
    ( ) 1. always a benign tumor
    ( ) 2. always a malignant tumor
    ( ) 3. neither a benign nor a malignant tumor
    ( ) 4. sometimes a benign and sometimes a malignant tumor

52. An early cancer
    ( ) 1. always spreads rapidly
    ( ) 2. is easy to diagnose
    ( ) 3. is not curable
    ( ) 4. represents an emergency

53. A test for differentiating malignant and benign tumors is
    ( ) 1. being sought
    ( ) 2. described
    ( ) 3. needed only when growing on some vital organ
    ( ) 4. referred to only in general terms

SECTION H

The common gregariousness of Cliff Swallows at their nest sites is observed in their tendency to build adjoining nests in large colonies. Although the colony is ordinarily one large unit, when suitable sites (bridges, eaves or walls of buildings, or overhanging cliffs) are available, subcolonies and peripheral groups do form within a half mile of the main colony. In four colonies studied there was no antagonism observed either between the members of two sections of a colony or between the members of separate colonies, and casual intermingling was not uncommon.

Synchrony of the breeding cycle was observed to be greater within any one colony or group than could be expected from individual responses to seasonal and weather factors. In some cases this synchrony was attributable to the withdrawal of pairs or individuals which were unsuccessful in establishing territories and building or occupying surrounding areas where they would remass and establish new groups quite apart from the original colony. On the whole, however, synchrony was interpreted as a result of the effect social forces have on the individual with regard to its breeding schedule.

QUESTIONS ON SECTION H

80. The settling of peripheral groups might indicate that
    ( ) 1. central positions are unobtainable or untenable
    ( ) 2. central positions are preferable
    ( ) 3. peripheral positions are preferable
    ( ) 4. positions are chosen at random

81. Which of the following statements is the most tenable?
    ( ) 1. Cliff Swallow colonies are essentially "open," that is, not restricted to original members.
    ( ) 2. Cliff Swallows always nest in groups.
    ( ) 3. The group nesting of Cliff Swallows sets up social forces which, acting through sensory channels, influence the physiological mechanisms of flock members so as to produce parallel development of the reproductive processes.
    ( ) 4. The possible effect of social factors is greater than seasonal or weather changes on the breeding cycles of Cliff Swallows.

PART C

DIRECTIONS: Four possible answers are given for each of the questions 104, 105, and 106. Put an X in the parentheses in front of the number corresponding to that answer which you think is *most nearly correct.*

101. In Column I are diagrams of varieties of gears. In Column II are the names of these gears. Place the number of the gear from Column II in the parentheses before the diagram of that gear in Column I.

COLUMN I		COLUMN II
( ) 1.		1. Bevel gear
( ) 2.		2. Gear pump
( ) 3.		3. Spur gear
( ) 4.		4. Worm gear

104. The man who discovered that blood circulates in a vascular system was
    ( ) 1. Darwin
    ( ) 2. Harvey
    ( ) 3. Mayo
    ( ) 4. Osler

105. In which year was the cyclotron invented?
    ( ) 1. 1921
    ( ) 2. 1931
    ( ) 3. 1941
    ( ) 4. 1951

106. The first accurate determination of the earth's circumference was made by
    ( ) 1. Eratosthenes
    ( ) 2. Galileo
    ( ) 3. Newton
    ( ) 4. Ptolemy

Time yourself so you do not go over 30 minutes and answer all the questions in one session.

After you have completed the test, score yourself, using the answers that are printed on p. 78.

The 40 high school seniors who come out on top will be in Washington Feb. 25 through March 1 for the Thirteenth Annual Science Talent Institute. They will meet and talk with leading scientists, visit some of the extensive government research laboratories, hear scientific lectures, and attend a final banquet when the winners of the $11,000 in scholarships will be announced. The scholarships can be used at any accredited school selected by the winner.

The 40 winners were chosen by Dr. Harold A. Edgerton, vice-president, Richardson, Bellows, Henry & Co., New York; Dr. Steuart Henderson Britt, vice-president and director of research, Needham, Louis & Brorby, Inc., Chicago, and Dr. Rex A. Buxton, Washington psychiatrist.

If you want to see the complete aptitude test used in the 13th Search, send ten cents in coin to SCIENCE SERVICE, 1719 N St., N.W., Washington 6, D. C. Ask for the science aptitude test.