GENERAL SCIENCE

Test Your Science Aptitude

This is a short version of the three-hour examination given to more than 20,000 high school seniors throughout the nation as first step in the Science Talent Search.

By HOWARD SIMONS

➤ THE NATION needs scientists. This is spelled out every day in black and white in the want ad columns of the nation's newspapers.

The United States has found itself in a race for scientific manpower with the Soviet Union. Each year, the country's leading educators and scientists warn that the "crisis in science education" and the scientific manpower shortage grow urgently worse.

Continuation of these problems could very well imperil the nation's defense and its technological lead in the modern world.

Still, the nation has large and relatively untapped deep-wells of young scientific talent. One of the most effective means for locating and tapping these reservoirs of scientific potential has been the Science Talent Search, conducted by Science Clubs of America, administered by SCIENCE SERVICE.

Take Talent Test

Perhaps you are an untapped spring of scientific talent. You can get a good idea of your own potential for becoming a research scientist by taking this test.

It is a short version of the three-hour Search examination given recently to more than 20,000 high school seniors throughout the country. These students represent a record-breaking number of young persons who have shown an interest in a career in scientific research.

The test itself is the first in a series of hurdles to be overcome in the annual competition for $11,000 in Westinghouse Science Scholarships and a trip to the nation's capital for each of the 40 top winners.

If you find the test a "tough nut," do not be surprised. It is meant to be. It is deliberately made difficult, so that the results of the examination, together with the individual's report on a science project he has carried out or is completing and an evaluation of his scientific ability and personality by his teachers, make it possible for the judges to spot the 40 top and 260 honorable mention science-minded high school students in the United States each year.

In the past 15 years, 204,771 high school seniors have taken the Science Talent Search aptitude test. Of this number only 40,926 have been able to complete all the requirements of the Search.

This year, of the 20,828 examinations sent to 2,959 high school teachers, only 3,375

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*.

16. The Arctic Circle is

( ) 1. one-sixth of the distance from the North Pole to the South Pole
( ) 2. the line north of which there is insufficient vegetation to support herbivores
( ) 3. the line north of which trees are unable to grow
( ) 4. the southernmost line which has at least one day in which the sun fails to come over the horizon

17. The term "Aleph Null" would be used *most* frequently in a treatise dealing with

( ) 1. history of science
( ) 2. quantum mechanics
( ) 3. spatial curvature
( ) 4. transfinite numbers

18. A *rheostat* is a

( ) 1. form of transformer
( ) 2. tapped inductance
( ) 3. tuning condenser
( ) 4. variable resistance

19. Which of the following is bent through the greatest angle on passing through a triangular glass prism?

( ) 1. blue
( ) 2. green
( ) 3. red
( ) 4. violet

20. The jet stream is an invisible, 200 miles per hour current often found streaking 10,000 to 40,000 feet above the earth's surface. What typically is its direction of motion?

( ) 1. east to west
( ) 2. north to south
( ) 3. south to north
( ) 4. west to east

22. A form of tumor developed from a nerve is called a

( ) 1. neurocoele
( ) 2. neurofil
( ) 3. neuroma
( ) 4. neuromere

23. Which of the following is *least* associated with the other three?

( ) 1. microclimate
( ) 2. microsere
( ) 3. microsome
( ) 4. microstand

24. A *spinthariscope* is an instrument which is used to

( ) 1. amplify the sound of the heart beat
( ) 2. fire electrons at high speed toward targets
( ) 3. measure blood pressure
( ) 4. show the presence of alpha particles

25. What is the missing word in the following sentence? "Adiabatic means 'occuring without loss or gain of_____.'"

( ) 1. gas
( ) 2. heat
( ) 3. light
( ) 4. sound

PART B

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**.

SECTION D

A very large number of methods have been proposed for testing the bactericidal and bacteriostatic (antiseptic) properties of disinfectants, and the method of testing has a tremendous influence upon the results. For this reason one laboratory may report a substance as possessing a high disinfectant value and another that it is practically inert.

The standardization of disinfectants and antiseptics should be based upon their disinfecting power in comparison with phenol. The ratio is expressed as the phenol coefficient, which is a figure expressing the ratio of the germicidal efficiency of a disinfectant compared with phenol tested under identical conditions. It is not based on a comparison of different time intervals, but on a comparison of different concentrations acting for specified periods of time at designated temperatures.

QUESTIONS ON SECTION D

61. According to the paragraphs, phenol was selected as the basis for standardization of disinfectants because

( ) 1. it functions in an unvarying manner
( ) 2. it is one of the strongest disinfectants
( ) 3. it was the first disinfectant studied experimentally
( ) 4. of reasons not given

62. Variation in the estimates of the bacteriostatic action of a disinfectant is *least* likely to be

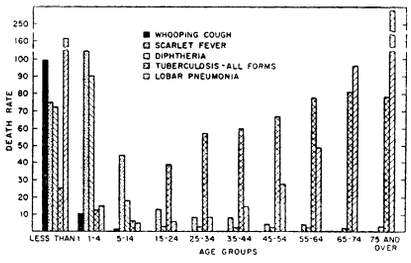
( ) 1. a matter of interpretation of experimental data
( ) 2. dangerous to users of the disinfectant
( ) 3. the result of poorly controlled methods
( ) 4. the result of using different methods

63. The phenol coefficient requires that the test for the disinfectant be

( ) 1. a 60-minute exposure
( ) 2. effective for all classes of bacteria
( ) 3. effective for viruses as well as bacteria
( ) 4. under conditions identical to those used for the phenol test

SECTION K

The graph shows the relationship of several specific death rates to age. For comparative purposes the death rate for scarlet fever has been multiplied by a factor of 40, and the diphtheria death rate by a factor of 10.



QUESTIONS ON SECTION K

87. About what is the infant (under one year) death rate for scarlet fever?

( ) 1. 2
( ) 2. 7
( ) 3. 36
( ) 4. 72

88. Which disease shows a high death rate for infants and for the older groups, but not for ages in between?

( ) 1. lobar pneumonia
( ) 2. scarlet fever
( ) 3. tuberculosis
( ) 4. whooping cough

89. Which disease appears earliest to lose its mortality with age?

( ) 1. diphtheria
( ) 2. scarlet fever
( ) 3. tuberculosis
( ) 4. whooping cough

90. What age group shows the lowest death rate for the five diseases considered together?

( ) 1. 5-14
( ) 2. 15-24
( ) 3. 25-34
( ) 4. 35-44

91. On the basis of data shown in the graph, which statement is *most* tenable?

( ) 1. Females, on the average, live longer than males.
( ) 2. The antitoxin treatment for diphtheria has almost wiped out the disease.
( ) 3. The older ages are particularly susceptible to pneumonia.
( ) 4. Tuberculosis is the major killer at all ages.

SCIENCE QUIZ—These questions are part of the three-hour Science Talent Search examination. Try them and compare your results with those of a random group of the more than 20,000 high school seniors in the United States who took the full length test.

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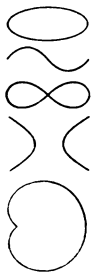
PART C

108. For each item in Column I, select that word in Column II to which it applies, or with which it is most significantly associated. In each case put the number of your choice from Column II in the parentheses.

	COLUMN I	COLUMN II
( ) 1.	A cephalopodous invertebrate related to the Cherrystone Clam (*Mercenaria mercenaria*).	1. Euspongia
( ) 2.	Aggregate masses of this fossil protozoan form the limestone of the Cheop's pyramids.	2. Nummulites
( ) 3.	One of the largest Atlantic porifera, this genus attains a width of four feet on occasion.	3. Octopus

109. In Column I are diagrams of some curves. In Column II are names of curves. Place the number of the curve in Column II in the parentheses before the corresponding curve in Column I.

COLUMN I	COLUMN II
( ) 1.	1. Cardioid
( ) 2.	2. Catenary
( ) 3.	3. Cosine curve
( ) 4.	4. Ellipse
( ) 5.	5. Exponential curve
	6. Hyperbola
	7. Lemniscate of Bernoulli
	8. Limaçon of Pascal
	9. Parabola



students cleared all the hurdles. This, however, was a 31% increase over the number last year, and a record-breaker for the Search.

In addition to the $11,000 awarded each year in Westinghouse Science Scholarships since the Search's inception in 1942, additional financial aid and scholarships estimated in the millions of dollars have come to the winners and honorable mentions from colleges and universities as a direct result of their Search standing.

Colleges, universities and technical schools have found the Science Talent Search a valuable aid in spotting above-average science students. From the first Search they have used it as a way of giving scholarships and other financial aid.

Pacing the Search, and as another result of it, industry and philanthropic organizations have instituted or expanded their own programs of educational aid, but the need for finding scientific talent and directing its course toward the nation's institutions of higher learning persists.

As Dr. Alan T. Waterman, director of the National Science Foundation, said, "Whether we like it or not, we have been forced into a competitive race with other nations. We cannot ignore the fact that the Soviet Union is graduating almost twice as many technical specialists in certain fields as is the United States."

Potential scientific talent must be found. Specialists for a specialists' world have to be trained. But they cannot be trained unless they are found.

The Science Talent Search represents not only a scientific method of finding those high school seniors with the greatest aptitude for scientific careers, it does more. In high schools throughout the nation its very existence and the interst exhibited in the test serve as mechanisms to spur students toward a study of science.

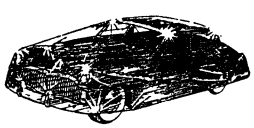
Ready to test yourself? There are three parts to the short version. You should be able to do the selected parts of the test in a half-hour. Time yourself so that you do not go over 30 minutes and answer all the questions as best you can in one session.

Try the test first, score yourself by the answers shown on p. 77, and then compare your results with those of 100 of the male high school seniors who answered the same 19 questions during the three-hour examination.

These 100 students' answers were selected at random by the graders from the 3,375 tests corrected. This was the number of Search participants that were able to complete all requirements for the competition this year.

Because questions 108 and 109 have multiple answers, a perfect score would be 25 for the 19 questions. If you find that you have answered all the questions of the short version correctly, then you have done better than any of the 100 students. None of them answered all the 19 questions correctly, or made a perfect score on the full test. No student has ever made a perfect score on the whole test, nor is anyone likely to do so.

PORTABLE GARAGE



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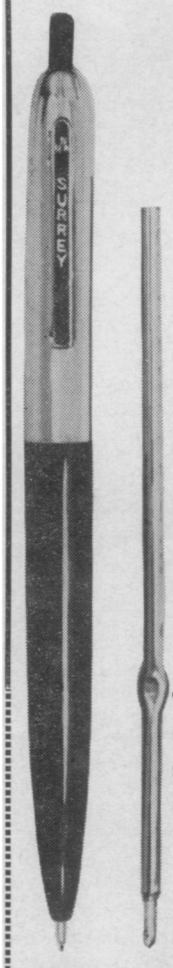

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A high score on the sample test would be 18 or better. Of the 100 sampled papers, 17 students scored this well or better. A low score would be nine or less. Only five of the 100 high school seniors fell into this bracket.

Based on the results of the 100 random samples, the easiest questions were numbers 25, 61, 63, 88, 89 and 109-1. Each of these was answered by more than 75 of the 100 students. Questions 17, 23, 62, 90, 109-3 and 109-5 were the hardest, with 30 or fewer students being able to answer them correctly.

The most difficult question turned out to be 23, which was answered correctly by only 13 of the 100 teen-agers.

When you have compared your results with those of the seniors, and if you find you have a poor mark, this does not necessarily mean that you are not bright. The examination is not an intelligence test. It is, explain the psychologists responsible for devising it each year, an aptitude test, designed to find those students with the greatest interest and aptitude for becoming research scientists.

The 40 high school seniors who came out on top are listed on p. 70.

To see the complete aptitude test, send ten cents in coin to Science Clubs of America, Science Service, 1719 N Street, N. W., Washington 6, D. C. Ask for the science aptitude test.

Science News Letter, February 4, 1956

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Serivce.

ABATEMENT OF HIGHWAY NOISE AND FUMES—Wilbur H. Simonson and D. M. Finch—*Highway Research Board,* Bulletin 110, 47 p., illus., paper, 90 cents. Of interest to all motorists and also to those with homes along a highway.

ADVANCES IN VETERINARY SCIENCE: Volume II—C. A. Brandly and E. L. Jungherr. Eds.—*Academic Press.* 449 p.. illus., $10.00. Reviewing the progress in the more active fields of veterinary science.

THE COMPLETE MEDICAL GUIDE—Benjamin F. Miller—*Simon and Schuster,* 913 p., illus., $4.95. A book for adults, particularly parents of a family. The emphasis is on maintaining normal health, but there is also a description of each of the major diseases.

ECONOMIC NEEDS OF OLDER PEOPLE—John J. Corson and John W. McConnell—*Twentieth Century Fund,* 533 p., $4.50. Nearly three-fourths of Americans over 65 have either no income of their own or less than $1,000 a year, this survey revealed.

EDUCATION IN FRANCE—*France Actuelle,* 26 p., illus., paper, 25 cents. Schools in France, as in the U. S., face the problems of shortages of buildings, teachers and budget but, in addition, French schools suffer from war damage and wartime occupation.

THE FIELDS OF GROUP PSYCHOTHERAPY—S. R. Slavson, Ed.—*International Universities Press,* 338 p., $6.00. Describing the development and present status of this relatively new technique.

FISH SAVING: A History of Fish Processing from Ancient to Modern Times—Charles L. Cutting—*Philosophical Library,* 372 p., illus., $12.00. An account of fish preservation methods from drying in the sun and salting to quick freezing.

FLORA OF GUATEMALA: Part II, Grasses of Guatemala—Jason R. Swallen—Bamboos—F. A. McClure—*Chicago Natural History Museum,* Fieldiana: Botany, 390 p., illus., paper, $6.00. Including 120 genera and 455 species growing in diverse habitats ranging from tropical lowlands to subalpine meadows.

MINISTRY AND MEDICINE IN HUMAN RELATIONS—Iago Galdston, Ed.—*International Universities Press,* 165 p., $3.50. Summarizing two conferences undertaken to discover ways in which minister and physician can cooperate to further health.

A NEW SPECIES OF CHONDRIA: With a Key to the Bornean Species (Coleoptera: Endomychidae)—H. F. Strohecker—*Chicago Natural History Museum,* Fieldiana, Zoology, 2 p., illus., paper, 10 cents.

OUR NATURAL RESOURCES AND THEIR CONSERVATION—Richard L. Neuberger—*Public Affairs Committee,* Public Affairs Pamphlet No. 230, 28 p., illus., paper, 25 cents. If we are heedless, we could use up most of our rich resources and leave future generations comparatively destitute, the Senator tells us.

A PARIS SURGEON'S STORY—Charles F. Bove with Dana Lee Thomas, foreword by Leland Stowe—*Little, Brown,* 306 p., $4.50. An autobiography of a surgeon who worked for many years at the American Hospital in Paris.

PRINCIPLES OF ORGANIC CHEMISTRY: An Introductory Text—James English Jr., and Harold G. Cassidy—*McGraw-Hill,* 2d ed., 469 p., illus., $6.50. Stressing the fundamental principles for students planning to go on to advanced scientific work.

QUALITY OF SURFACE WATERS OF KENTUCKY 1951-1953: Chemical Quality, Suspended Sediment and Water Temperature—William L. Lamar, Robert A. Krieger and Charles R. Collier—*Kentucky Agricultural and Industrial Development Board* and *U. S. Geological Survey,* 210 p., illus., paper, $1.00.

SOLID PROPELLANT ROCKETS: An Introductory Handbook — Alfred J. Zaehringer — *American Rocket Co.,* 162 p., illus., paper, $4.00. For the engineer and scientist.

THE SOVIET ACADEMY OF SCIENCES—Alexander Vucinich — *Stanford University Press,* Hoover Institute Studies, Series E: Institutions, No. 3, 157 p., paper, $2.00. Describing the history, organization and functions of the Academy, and evaluating the social status of the scholars and the effects of their work.

THREE NEW BULBULS FROM AFRICA (CLASS AVES)—Austin L. Rand—*Chicago Natural History Museum,* Fieldiana, Zoology, 4 p., paper, 10 cents. Describing new subspecies of this bird.

YOGA DICTIONARY—Ernest Wood—*Philosophical Library,* 178 p., $3.75. For students of the East. The list contains the terms of all the major systems of Yoga.

Science News Letter, February 4, 1956

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