GENERAL SCIENCE

Are You Science-Minded?

To get an idea, take this short version of a 2½-hour examination given recently to more than 20,000 high school seniors. It is the first step in the annual Science Talent Search.

By HOWARD SIMONS

➤ HOW SCIENCE-MINDED are you?

A youngster's ABC's these days are likely to consist of Atoms, Beetles and Cells rather than Apples, Blocks and Candy. This is just as true for his parents.

Perhaps at no other time in history has man been more aware of the scientific world and its achievements than he is today. This is a direct result of scientific progress, which has revolutionized mass communication and mass transportation.

Evidence for the fact that the average man is better versed in scientific lore today than were his ancestors can be found quickly in the daily press. It can be found in the front page stories about cancer research, jet airplanes and earth satellites, and it can be found in the back page ads pleading for engineers. Evidence can also be found by listening to the daily conversation of the average person, who has had to master a whole new vocabulary: placebo, chlorophyll, automation, transistor, electronic computer, rocket propulsion, gamma radiation and dehydration.

But, how science-minded are you?

Clue to Science Aptitude

You can get an inkling by taking this test. What is more, you can also get a clue as to whether or not you have an aptitude for science. The test is a shortened version of a much longer one recently taken by more than 20,000 high school seniors throughout the nation. The long, 2½-hour test, is especially designed for the Science Talent Search conducted annually by Science Clubs of America, administered by Science Service, in a nationwide search for young men and women who show the best potential of becoming future research scientists.

For these aspiring young scientists, the examination is only the first hurdle on the road to $11,000 in Westinghouse Science Scholarships and a trip to the nation's capital for the top 40 winners.

The tests, both the long examination and this junior-sized version, are tough. They are meant to be tough. Science itself is difficult and to become a scientist is not an easy or overnight task. It requires long, hard work and years of education and experience.

The results of this "difficult" examination, together with a report by the young scientist on a scientific project and evaluation of the student by the teacher or faculty, make it possible for the judges to spot the

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 is *most nearly correct*.

16. One kilowatt is equivalent to 2,654,200 foot pounds per hour. One horsepower is equivalent to 33,000 foot pounds per minute. How many kilowatts are equal to one horsepower?

( ) 1. $\frac{33{,}000}{2{,}654{,}200}$

( ) 2. $\frac{33{,}000 \times 60}{2{,}654{,}200}$

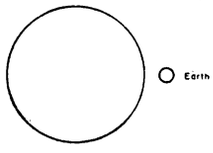
( ) 3. $\frac{33{,}000 \times 2{,}654{,}200}{60}$

( ) 4. $\frac{2{,}654{,}200}{60 \times 33{,}000}$

17. Which one of the following terms or concepts does *not* apply to *lichens*?
( ) 1. fungus
( ) 2. perennial
( ) 3. seeds
( ) 4. symbiosis

18. Leprosy (Hansen's disease) is caused by a
( ) 1. bacillus
( ) 2. chemical irritant
( ) 3. protozoan
( ) 4. virus

19. The diagram shows the relative size of the earth and another celestial body. On the basis of relative size, which of the following is the *most* likely identity of the larger body?
( ) 1. Jupiter
( ) 2. Mars
( ) 3. Polaris
( ) 4. Sun



PART A

40. Androgens have been made from
( ) 1. ascorbic acid
( ) 2. cholesterol
( ) 3. insulin
( ) 4. trypsin

41. *Hyperon* refers to
( ) 1. a unit of measurement
( ) 2. guided missiles
( ) 3. hormones
( ) 4. subatomic particles

42. If a sphere of 10 inches radius represented the earth (sea level), about how far would a projection representing a mountain range with a height of 15,000 ft. project from the surface of the sphere if the scale were the same?
( ) 1. .0025 inches
( ) 2. .0075 inches
( ) 3. .0250 inches
( ) 4. .1000 inches

43. The first successful separation of rare earth elements as free ions, reported in 1955, made use of what method?
( ) 1. chromatography
( ) 2. ion exchange resins
( ) 3. magnetic centrifuging
( ) 4. successive precipitation

44. A special type of temperature-sensing element which can transmit a strong signal from a very tiny temperature change is a
( ) 1. thermion
( ) 2. thermistor
( ) 3. thermocouple
( ) 4. thermophile

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 is *most nearly correct*.

SECTION H

According to Charles Darwin, "A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Every being, which during its natural lifetime produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year, otherwise, on the principle of geometrical increase, its members would quickly become so inordinately great that no country could support the product.

"Hence, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life. It is the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage. Although some species may be now increasing, more or less rapidly in numbers, all cannot do so, for the world would not hold them."

QUESTIONS ON SECTION H

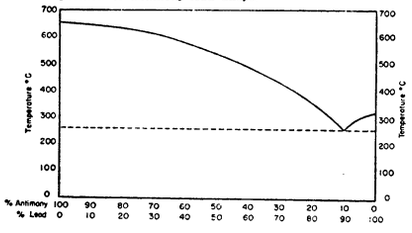
72. It can best be inferred from the paragraphs that
( ) 1. the natural laws of reproduction serve to keep all organic beings in check
( ) 2. the principle of geometric increase serves to keep all organic beings in check
( ) 3. there is always a struggle for survival, keeping organic beings in check
( ) 4. when environment is limited, a struggle for survival must occur

73. The doctrine of Malthus evidently refers to
( ) 1. manifold force
( ) 2. the fact that natural limits cannot be overcome, even by living organisms
( ) 3. the fact that organic beings, if allowed, will overgrow the capacity of their surroundings
( ) 4. the fact that the animal and vegetable kingdoms are in constant strife

74. According to the paragraphs, the constant battle which each organic being wages against the other is due, first of all, to
( ) 1. food problems
( ) 2. high reproductive rate
( ) 3. natural enmity
( ) 4. the animal-vegetable cycle

SECTION O

The graph shows the relationship between melting temperature and composition of antimony-lead alloys.



QUESTIONS ON SECTION O

94. The graph clearly shows that
( ) 1. antimony decomposes lead
( ) 2. lead and antimony are insoluble
( ) 3. lead has a lower melting point than antimony
( ) 4. lead is softer than antimony

95. As the percentage of antimony increases from 0 to 100, the melting temperature of the alloy
( ) 1. decreases
( ) 2. first decreases and then increases
( ) 3. increases
( ) 4. remains constant

96. A mixture of lead and antimony with the lowest melting point consists of
( ) 1. 10% lead and 90% antimony
( ) 2. 50% antimony and 50% lead
( ) 3. 90% lead and 10% antimony
( ) 4. none of the mixtures listed in the other three answers

TEST YOURSELF—Try your luck with these questions which make up part of the Science Talent Search examination.

PART C

105. Underscore the correct chemical name for each of the following substances.

( ) 1. hypo
(sodium hypochlorite) (sodium thiosulfate)

( ) 2. marsh gas
(methane) (methanol) (trichlormethane)

( ) 3. rare earths
(actinide series) (lanthanide series)

( ) 4. saltpeter
(potassium nitrate) (sodium nitrate)

( ) 5. T.N.T.
(trinitrophenol) (trinitrotoluene)

107. Column I lists enzymes and hormones. Column II lists the glands that secrete them. Place the number of the gland from Column II in the parentheses in front of the appropriate name in Column I.

COLUMN I	COLUMN II
( ) 1. ACTH	1. adrenal cortex
( ) 2. erepsin	2. adrenal medulla
( ) 3. insulin	3. gastric glands
( ) 4. parathormone	4. intestinal glands
( ) 5. pepsin	5. liver
( ) 6. ptyalin	6. pancreas
( ) 7. rennin	7. parathyroid glands
( ) 8. thyroxine	8. pituitary gland
	9. salivary glands
	10. thyroid gland

40 top and 260 honorable mention students in the United States each year. Not every one of the 20,145 students who took the examination this year completed all the requirements of the Search. Nearly a quarter of a million students have entered this competition since the Search's inception in 1942, but less than 19% have qualified. This year, 3,122 high school seniors completed all of the difficult requirements.

Crying Need for Scientists

Each year in the United States, there are more and more drums being beaten about the "crying need" for scientists. But almost unheard in this present-day din is the crying answer of the nation's young people. All across the nation, according to the Science Talent Search mentors, more and more high school students are showing an interest in science and in overwhelming numbers.

The Science Youth Program, administered by Science Service, shows that at present there are more than 400,000 boys and girls holding membership in more than 16,000 Science Clubs of America; that during the coming year more than 45,000 pre-college scientists will have worked on a science project for a science fair leading to the National Science Fair. These students represent a significant slice of the nation's young student body and a spearhead of the country's future scientists.

But having interested young scientists is only part of the answer. The other, and equally important part of the picture, is finding this talent and channeling it along the proper paths that best suit the student's ability and his desires. And in the United States it is done both democratically and at the grass roots level.

Not so in Russia. Inadvertently, we have been thrown into a scientific manpower race with the Russians. They appear to be winning the race in sheer weight of numbers. Last year, for example, they graduated twice as many engineers as did the United States. But their methods are different. They pick students for science careers and coddle them along. This is a much easier task in a nation where control is centralized and choice limited.

To win the race, if that is what we really want to do, we must still do it in the manner we have been using by permitting our young people to choose their own careers.

In this respect, the Science Talent Search has more than proved effective. Students request the test through their teachers. The test itself represents a scientific method for seeking out those high school seniors interested who show the greatest aptitude for careers in scientific research. High school records throughout the country show that the test also serves as a trigger mechanism for getting students interested in science.

Ready to test yourself?

There are three parts to the short version, which is composed of the actual questions taken from this year's test. You should be able to complete it in 30 minutes. Time yourself so that you do not use more than one-half hour and try as best you can to answer all the questions.

Try the test first, score yourself by the answers shown on page 109, and then compare your results with those of 100 boy and girl contestants, selected at random, who answered the same 17 questions. Because questions 105 and 107 have multiple answers, a perfect score would be 28 for the 17 questions. If you find you have answered all the questions of this test correctly, you fared better than any of the 100 students. As a matter of fact, no student has ever answered correctly all the questions on the 2½-hour examination.

High Score Is 18

A high score on the sample test would be 18 or better. Of the 100 random selections, 12 students did this well or better. A low score would be nine or less. Fourteen students did this poorly. An average score in relation to the students' results would be between 10 and 17 correct answers.

Based on the results of the 100 samples, the easiest questions were 94, 95, 96, 105-2, 105-4, and 107-8. Each of these was answered by more than 70 of the 100 students. Questions 43, 44, 107-1, 107-2, and 107-7 were the hardest, with 26 or fewer students getting them right.

The most difficult question was 43, which was answered correctly by only 11 students, and the easiest, 96, answered correctly by 84 of the 100.

Do not be dismayed if you find you have a low score when you compare your results with those of the high school seniors. You are not dumb. The results do not necessarily reflect brightness. This is not an intelligence test, explain the psychologists who devised it. It is an aptitude test, designed to find those students with the greatest aptitude for becoming research scientists.

The 40 high school seniors who come out on top in this year's Search will be in Washington from March 7 through March 11 for the Sixteenth Annual Science Talent Institute, where they will meet leading scientists and visit laboratories surrounding the capital city.

On their last day they will attend a final banquet at which time they will learn how the $11,000 in scholarships is distributed. The scholarships can be used at any accredited college or university. The 40 winners are chosen by Dr. Harold A. Edgerton, New York psychologist; Dr. Steuart Henderson Britt, Chicago psychologist; and Dr. Rex A. Buxton, Washington psychiatrist.

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

Science News Letter, February 16, 1957

METEOROLOGY

Electronic Computer Predicts Hurricanes

➤ AN ELECTRONIC computer has been used to predict the motions of hurricanes 24 hours in advance, a University of Chicago meteorologist reported.

Akira Kasahara told the American Meteorological Society meeting in New York that a new set of mathematical equations for predicting hurricane locations a day in the future averaged only 65 miles in error, compared to the present 100-mile error.

The double equation used by Mr. Kasahara is primarily for forecasting the movement of the storm's center. He plots the focus of the swirl, rather than using the center of low barometric pressure, as in older methods. The two can be ten miles apart. His equation takes into account both the intensity of the vortex and the influence of the larger air masses that steer the hurricane.

Science News Letter, February 16, 1957