

GENERAL SCIENCE

Are You Science-Talented?

This portion of the aptitude exam tests your scientific potential. The exam was one step toward becoming a winner in the 18th Annual Science Talent Search.

By SHIRLEY MOORE

► AMERICA is engaged in a gigantic search for top level young scientists.

Thousands of people, from eminent scientists and Government officials to the most isolated rural school teacher, are cooperating in programs to recognize and encourage scientific ability in the younger generation and to insure its full development.

One of the most successful of these is the Science Talent Search for the Westinghouse Science Scholarships and Awards.

In 1941, the Science Talent Search was no more than an inspired idea. Now, with the astonishing records of its previous winners as a confident foundation, the Search has selected its 18th crop of highly promising teen-agers.

Thousands of boys and girls, seniors in high schools all over the country, recently took the Science Aptitude Examination as the first hurdle toward such recognition. Many hundreds of them scored high enough to be eligible for further judging and possible selection for the Honors Group.

Would you have scored that high if you had taken this intensive and difficult test? To give you a clue to your possible ability, some sample questions are presented here for you to try. The full-length examination is intended to pass only the best of the competing students. No one has ever made a perfect score in the two and a half hour test that is especially designed for the Science Talent Search conducted by Science Clubs of America, an activity of Science Service, and supported by the Westinghouse Educational Foundation of the Westinghouse Electric Corporation.

The school record of each student who passed the test was evaluated by the judges, along with his or her faculty recommendations, and a 1,000-word report on a research project.

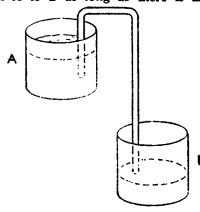
On the basis of these evaluations, an Honors Group of 427 (10% of the completed entries) was selected. From the Honors Group, the 40 top winners were then chosen.

The 40 winners will be given trips to Washington for the five-day Science Talent Institute Feb. 26 through Mar. 2. They will meet eminent scientists, visit scientific laboratories and be interviewed by the judges. The Institute will close with an awards banquet and the announcement of the winners of \$34,250 in Westinghouse Science Scholarships and Awards. (See SNL, Jan. 31, p. 70.)

Allow yourself 20 minutes to complete this shortened version of the aptitude test; then check your answers with those given in the answer box on page 110.

For a complete aptitude examination, send 15¢ in coins to Science Clubs of America, 1719 N St., N.W., Washington 6, D. C., and ask for the test.

DIRECTIONS: Four possible answers are given for each question. Choose that answer which is *most nearly correct*. Record your answer by putting an X in the answer box corresponding to your chosen answer.

3. The diagram represents a working siphon system. Which statement regarding the system is *correct*?
1. The height of the water surface in A cannot be more than 22 feet above that of B.
 2. Water will flow from A to B as long as there is any water remaining in A.
 3. Water will flow from A to B only as long as the water level in A remains above the opening in the tube.
 4. Water will flow from A to B only as long as the water level in B remains below the tube leading into it.
- 
4. How dense is the atmosphere at the surface of the moon?
1. about the same as that of the earth at 100 kilometers above sea level
 2. equal to the gravitational constant of the moon
 3. less than a trillionth as dense as that of the earth at sea level
 4. zero density
5. Water is raised in the stem of a plant as a result of
1. all of the other three reasons given here
 2. capillary action in the xylem tubes
 3. osmotic pressure in the roots
 4. the pressure differential between the roots and the leaves because of transpiration

PART A

27. Which of the following is *least* likely to be used in indigo dyeing?
1. indigotine
 2. leuco white compound
 3. purple scale
 4. zinc vat
28. Missiles the size of golf balls have been fired at speeds over 7,000 miles per hour from a hypervelocity gun (note that 88 feet per second equals 80 m.p.h.). This speed, expressed in feet per second, is
1. $\frac{7,000 \times 60 \times 88}{5,280}$
 2. $\frac{7,000 \times 88 \times 5,280}{60 \times 60 \times 60}$
 3. $\frac{7,000 \times 5,280}{60 \times 60}$
 4. $\frac{7,000 \times 5,280 \times 60}{60 \times 60 \times 88}$
29. The *most* important or primary factor in the change of color of leaves in the autumn is
1. age of the leaves
 2. frost or freezing
 3. lowering of temperature
 4. shortened length of daylight
30. "Negative practice" in learning a skill does *not* refer to
1. breaking undesirable habits
 2. learning what not to do
 3. practicing unrelated incorrect skills
 4. unlearning interfering habits

DIRECTIONS: Four possible answers are given for each question. Choose that answer which is *most nearly correct*. Record your answer by putting an X in the answer box corresponding to your chosen answer.

SECTION A

The intensity of illumination of a surface may be defined as the amount of light that falls on it per unit area. If a light source of one candle-power is placed one foot from a screen, the intensity of illumination on the screen is one foot-candle. When the screen is one foot from a light of fifty candle-power the intensity of illumination is fifty foot-candles. In the case of a light placed directly in front of a screen and then moved back to twice the original distance from the screen, the intensity of illumination will be only one-quarter of the previous amount.

Let "I" represent the candle-power of a source of light, "d" the distance in feet to the surface illuminated, and "E" the intensity of illumination in foot-candles. Then

$$E = \frac{I}{d^2}$$

QUESTIONS ON SECTION A

31. If a light source 6 ft. above a table top produces an illumination of 5 foot-candles on the table surface, the candle-power of the light source is
1. 0.14 candle-power
 2. 7.2 candle-power
 3. 150 candle-power
 4. 180 candle-power
32. Two lamps, 80 candle-power and 180 candle-power respectively, are located 10 ft. apart. At what point on a line passing through both lamps will the illumination produced by each lamp be the same?
1. A point 3 ft. from the 80 c.p. source and 7 ft. from the 180 c.p. source.
 2. A point 4½ ft. from the 80 c.p. source and 5½ ft. from the 180 c.p. source.
 3. A point 15 ft. from the 80 c.p. source and 25 ft. from the 180 c.p. source.
 4. A point 20 ft. from the 80 c.p. source and 30 ft. from the 180 c.p. source.

PART B

SECTION R

Whisker-eating mice, whose performance followed a precise working pattern, occurred in several heterozygous genotypes and in two inbred strains, but not in five other pure lines — all on the same diet. Inheritance of the character is not monofactorial, as claimed in the literature. Multiple factors may be involved. Dependence of manifestation on age was established. Exploratory experiments were directed at an interpretation of the trait in terms of the grooming drive, competitive adjustments, and social hierarchy.

QUESTIONS ON SECTION R

85. "Heterozygous genotypes" probably refers to
1. field mice
 2. inbred strains of mice
 3. mice having mixed genetic constitutions
 4. pure-bred mouse strains
86. The paragraph indicates that
1. the appearance of the whisker-eating trait in mice depends on age
 2. whisker-eating is a monofactorial inherited trait
 3. whisker-eating is due to a dietary deficiency
 4. whisker-eating is due to competitive and social adjustments
87. As an experimental tool, whisker-eating in mice would probably be *most* useful in
1. investigating relative social dominance in mouse colonies
 2. ascertaining the dietary requirements of mice
 3. identifying inbred mice
 4. studying multiple inheritance

PART C

103. Match the specific names from Column II with the corresponding terms in Column I (see Answer Sheet) by placing the number of the item from Column II in the appropriate parentheses in Column I.

COLUMN II	Column I
1. Aldebaran	() 1. cluster
2. Mars	() 2. constellation
3. Phobos	() 3. satellite
4. Pleiades	() 4. star
5. Taurus	

106. Match the names of the animals in Column I (see Answer Sheet) with the order to which they belong listed in Column II.

COLUMN II	Column I
1. Carnivora	() 1. man
2. Edentata	() 2. opossum
3. Insectivora	() 3. pig
4. Marsupialia	() 4. sloth
5. Primates	() 5. weasel
6. Rodentia	
7. Ungulata	

TEST YOURSELF—This is a short version of the two and a half hour examination for the 18th Annual Science Talent Search.

On the full-length examination, the score that qualified a contestant for further judging was 138 for boys, 119 for girls. Top score for all boys was 208. Top score for all girls was 198, and girls made up 22% of the entrants. These scores were weighted.

If you find you have answered all the questions in the sample correctly, you fared better than any of 150 contestants selected at random.

Awarding two (2) points for each correct answer in Parts A and B, and one (1) point for each in Part C, a high score on the short version would be 20 or more out of the possible total score of 33. Of the 150 random selections, 38 students did this well or better. A low score would be 11 or less. Thirty-six students did this poorly.

Based on the results of this random sample, the easiest questions were 3, 30, 85, and 106-1. Each of these was answered correctly by 51% or more of the 150 students. Questions 4, 27, and 106-4 were the hardest. Each of these was answered correctly by 25% or less of the students.

The most difficult question was 27, which was answered correctly by only 16% of the students, and the easiest, 3, answered correctly by 85% of the 150.

You should not be surprised if your score should seem somewhat disappointing in comparison with those of the unusually able high school seniors. The test has been made sufficiently difficult, say the psychologists who devised the test, to measure aptitude for becoming a successful research scientist.

Many Fail Test

If your self-estimation should need brightening at this point, you can polish it quite a little by reflecting that many highly competent scientists have commented that they probably could not make a passing score on the examination in competition with these teen-agers who are so intently exploring the frontiers of every new theory and development.


In addition to the ability to score a passing grade on the examination, the 427 members of the STS Honors Group have been judged to have a combination of abilities and tendencies indicating potential success in science.

Evidence presented by the student and his faculty sponsors concerning his activities, drives, hobbies, personality traits and scholastic ability was evaluated carefully to discover any of a number of combinations of achievement and promise. For example, 89% of the 94 girls in this year's Honors Group are in the top five percent of their high school classes and 56% of these rank first, second or third. Of the 333 boys, 79% rank in the top five percent of their classes and 46% of these are among the top three students.

Some of the traits and abilities prominent among these outstanding young people are intense intellectual curiosity, ingenuity, self-discipline, wide scope of interest, and an intuitive grasp of why and how facts may relate to each other.

Science News Letter, February 14, 1959

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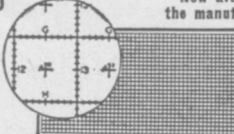
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