

# Are You as Good as . . .

## The 40 winners of Westinghouse Science Competition who took the test?

What is a barn? Well, it's a place where cows live, or a home that you bought for \$5,000 and redecorated for \$50,000. But what is it to a nuclear physicist? And have you ever heard of a takahe (a bird)? Or Reaumur (a temperature scale)? Or Betelgeuse (a star)?

Late last year, thousands of high school students took a torturous test of their scientific acumen in which they were asked about these wide-ranging subjects, as well as others such as Pauli's exclusion principle ("no two particles of the same kind in the same atom can be in the same quantum state"), Nematelminthes (the phylum that includes round worms) and aflatoxin (a substance produced by moldy peanuts and which can cause liver cancer in animals).

The occasion for this intellectual third degree was the twenty-sixth annual Science Talent Search conducted by Science Service and supported by the Westinghouse Educational Foundation, which provided \$34,250 in scholarships and awards. Of 23,829 students requesting the examination, 2,626 submitted complete entries.

No one has ever gotten a perfect score; in fact, the highest score this time around was 258 points out of a possible 377. If you're still curious about the barn, here's a small cross-section of the questions in the test (that's a clue). The answers are upside-down at the end of the story.

**DIRECTIONS:** Each question has five possible answers, but there may be as many as five right answers for a question. For some questions, there will be only one right answer, while others may have two, three, four or five right answers. Your score is the number of answers marked correctly plus two times the number of questions answered entirely correctly. © Science Service 1966

8. New findings from measurements made of earth-circling satellites give information about the earth's shape. Which of the following is (are) NOT true?
1. It bulges at the equator.
  2. It has four high points, giving it roughly a pyramid shape.
  3. It is narrower at the equator, wider at latitudes 60°N and 60°S and flatter at the poles than a sphere.
  4. It is slightly pear-shaped with the narrow end in the Arctic.
  5. The earth's equator is egg-shaped, not circular.
9. In what century was Gregor Mendel's great work on inherited characteristics first published?
1. 19th century
  2. 18th century
  3. 17th century
  4. 16th century
  5. 15th century

10. Element 96, created by the bombardment of uranium 238 and plutonium 239 with high energy ions or alpha particles in a cyclotron, was named

1. americium
2. berkelium
3. californium
4. curium
5. transuranium

32. A barn is a term used in nuclear physics as a measure of

1. acceleration
2. cross section
3. isotopic spin
4. mean value energy levels
5. velocity

36. Twilight

1. does not occur on a planet having no atmosphere
2. has shorter duration at the equator than at 40° north
3. is longer in July than January at 66½° north
4. occurs just before sunrise
5. occurs just before sunset

### SECTION K

In the diagram,

$$\begin{array}{r}
 a + b + c = u \\
 d + e + f = v \\
 a + d = r \\
 b + e = s \\
 c + f = t \\
 r + s + t = u + v = N
 \end{array}
 \begin{array}{c}
 \begin{array}{|c|c|c|}
 \hline
 a & b & c \\
 \hline
 d & e & f \\
 \hline
 \end{array} \\
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 \end{array}
 \begin{array}{l}
 u \\
 v \\
 \\
 N \\
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 \\
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 \end{array}$$

Each of the values,  $a, b, c, d, e, f, r, s, t, u, v$ , and  $N$  is integral and positive.

### QUESTIONS ON SECTION K

81. Which of the following sets of values taken one at a time make(s) it possible to determine the value of  $f$ ?
1.  $c, t$
  2.  $d, e, N$
  3.  $d, e, v$
  4.  $r, s, N$
  5.  $r, s, v$
82. Which set(s) of values taken one at a time will enable one to determine each of the remaining values in the diagram, when  $r, s$  and  $t$  are known?
1.  $a, d, N$
  2.  $a, e, f$
  3.  $d, b, c$
  4.  $d, e, v$
  5.  $u, v$
83. If the values of  $N, v, r$  and  $s$  are known, which additional set(s) of values will enable one to determine the value of  $c$ ?
1.  $a$  only
  2.  $b$  only
  3.  $d$  only
  4.  $e$  only
  5.  $f$  only
84. If  $N, u, r$  and  $t$  are known, what is the smallest number of additional values one must know to determine each of the remaining values ( $a, b, c, d, e, f, s$  and  $v$ ) in the diagram?
1. 0
  2. 1
  3. 2
  4. 3
  5. 4

There is no predetermined "passing" grade. As one of the measuring devices of the Search, the examination is designed to test ability to think and reason in terms of scientific concepts and vocabulary. Scores on this test represent only a part in the judging procedures that select the students who seem most likely to become outstanding research scientists.

Detailed scholastic records of each "qualified" contestant were evaluated. Information offered by the student and his faculty sponsor about his accomplishments, activities, traits and attitudes was weighed carefully to find any of a number of good combinations of achievement and promise.

Each entrant was required to submit a written report of an individual research project, usually about 1,000 words of text, plus relevant diagrams, graphs, theorems, pictures, etc. The papers of all the students were read critically by a board of professional scientists, which included specialists in the many fields explored by the student-scientists. This board studied and evaluated reports on computer methods, viruses, planet observations, lasers, complex mathematics, microorganisms and more than a thousand other subjects.

Correlating all of these evaluations, the board of judges selected an Honors Group of 300 students (just over 10% of those with completely qualified entries). These students are being specifically recommended to colleges and universities for admission and scholarship aid.

The 40 top winners from the Honors Group were selected to attend the Science Talent Institute, March 1 through 6, in Washington, D.C. Each will have interviews with the board of judges and five will be given Westinghouse Science Scholarships ranging from \$7,500 to \$3,000 and the rest awarded \$250 each.

The scholarships may be used at any accredited college or university and are intended to assure the professional training of these young pre-scientists. Recognition in the Science Talent Search brings many thousands of dollars in other scholarship offers to the Honors Group. In addition, 42 states and the District of Columbia conduct State Science Talent Searches in cooperation with Science Clubs of America, awarding more than a half million dollars in scholarships to students from their states who were qualified entrants in the national Search.

**... Science test**

Here is the list of top winners:

**CALIFORNIA:** Trevor Rand Lewis, Point Loma H.S., San Diego; Janice Lynn Petersen, Birmingham H.S., Van Nuys; Linda Jo Roy, Menlo-Atherton H.S., Atherton.

**COLORADO:** Gerald Arthur Edgar, Boulder H.S., Boulder.

**DISTRICT OF COLUMBIA:** Daniel Philip Weisser, Woodrow Wilson H.S., Washington.

**FLORIDA:** Nevin Morris Summers Jr., Terry Parker Sr. H.S., Jacksonville; Thomas Allan Weaver, Winter Park H.S., Winter Park.

**GEORGIA:** Jack Eugene Gartrell Jr., Henry Grady H.S., Atlanta.

**ILLINOIS:** Steven Ross Binder, Niles Twp. H.S. North, Skokie; Carol Sharon Egel, Niles Twp. H.S. West, Skokie; Daniel Reuven Farkas, Niles Twp. H.S. North, Skokie; Alan Louis Weiss, Niles Twp. H.S. West, Skokie.

**INDIANA:** Dennis Wade Dawson, Oliver P. Morton H.S., Hammond.

**MARYLAND:** Jeffrey Clark Lagarias, Springbrook H.S., Silver Spring.

**MASSACHUSETTS:** George Miltiades Eliopoulos, Technical H.S., Springfield; Steven Lawrence Strasnick, Sharon H.S., Sharon.

**MICHIGAN:** Haig Donabedian, Ann Arbor H.S., Ann Arbor.

**MINNESOTA:** Martha Helen Verbrugge, Alexander Ramsey Sr. H.S., St. Paul.

**NEBRASKA:** Mary Ann Helen Fitzwater, Notre Dame Academy, Omaha.

**NEW YORK:** Allen Henry Back, Deer Park H.S., Deer Park; Louis Baker, Abraham Lincoln H.S., Brooklyn; Emily Bass, Croton-Harmon H.S., Croton-on-Hudson; Arthur Robert Firstenberg, Midwood H.S., Brooklyn; Paul Bernard Goldberg, Jamaica H.S., Jamaica; Martin Harris Goodman, Erasmus Hall H.S., Brooklyn; Frank Anthony Wilczek, Martin Van Buren H.S., Queens Village.

**OHIO:** Robin Jay Braus, Princeton H.S., Cincinnati; Diane Louise Jeffery, Vermilion H.S., Vermilion; Sharon Elaine Nicholson, Whitehall-Yearling H.S., Whitehall; Barbara Jean Spakowski, Magnificat H.S., Rocky River.

**PENNSYLVANIA:** Mark Richard Cullen, Central H.S., Philadelphia; Steven Edward Landau, Central H.S., Philadelphia; Mary Doris Rose Ruggere, Central Catholic H.S., Kingston.

**TENNESSEE:** John Norman Hooker Jr., Bearden H.S., Knoxville.

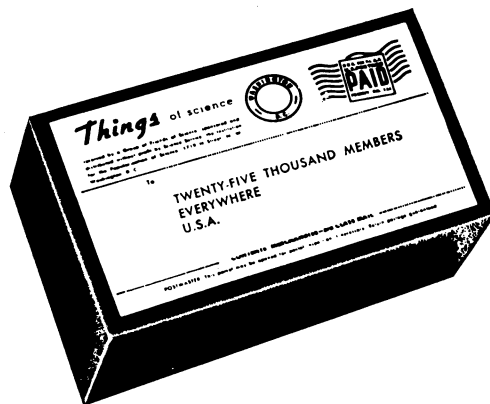
**TEXAS:** Joe Bailey Brame Jr., W. B. Ray H.S., Corpus Christi; Larry Richard Grisham, Lufkin H.S., Lufkin; Richard John Ruckman, Robert E. Lee H.S., Baytown.

**VIRGINIA:** Elwyn Yuan Loh, Blacksburg H.S., Blacksburg; Lawrence David Meisel, Yorktown H.S., Arlington; Sandra Ann Schwarz, McLean H.S., McLean.

**ANSWERS:**

Question 8-3; 9-1; 10-4; 32-2; 36-1, 2, 3, 4; 81-1, 3; 82-2, 3, 4; 83-5; 84-3

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