● RADIO

Saturday, February 13, 1:30 p.m., EWT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Some of the winners of the second Science Talent Search will discuss "Science's Next Great Step Ahead."

Monday, February 8, 9:15 a.m., EWT; 2:30 p.m., CWT; 9:30 a.m., MWT; and 1:30 p.m., PWT

Science at Work, School of the Air of the Americas over the Columbia Broadcasting System, presented in cooperation with the National Education Association, Science Service and Science Clubs of America.

"Man Against Insects" will be the subject of the program.

ENGINEERING

Engineers Can Carry Substitutions Much Further

➤ MORE SUBSTITUTE materials can be developed by American engineering as needed for the war effort, John G. Wood, assistant chief engineer, Chevrolet Division of General Motors Corporation, declared at the War Engineering Production meeting of the Society of Automotive Engineers in Detroit.

The extent of substitution to which we must go cannot be foretold. But even if Army vehicles had to be made of cast iron, the speaker maintained that vehicles would be produced to do the job required of them.

On one type of Army truck at present, 107 rubber parts have been replaced by less critical materials such as plastics, cotton, iron and paper, or have been eliminated altogether. Substitutes ranging through lead and cadmium plate to cactus fiber replace 129 copper alloy items. On this same truck, 60 parts of nickel and chromium alloy have been substituted for by steels with less critical elements.

Shorter life of parts must be accepted as the result of some substitutions, Mr. Wood warned. But it has been the policy throughout the automotive industry not to sacrifice durability where safety of our men is involved.

Thorough testing has often produced a substitute just as satisfactory as the original. Present production often cannot wait for extensive field tests. Then special apparatus is set up in the laboratory, Mr. Wood explained. Normal loads are applied and released at a much higher rate of speed than would normally occur in service. Thus in a short time engineers discover weaknesses that would show up only after months of use.

Science News Letter, February 6, 1943

PSYCHOLOGY

Science Talent Test

Over 14,000 copies of science aptitude examination were distributed to teachers for testing their most talented students. Best selected for Talent Search.

By WATSON DAVIS
Director, Science Service.

➤ WHAT IS YOUR ABILITY in science? To answer this question for boys and girls just finishing high school, over 14,000 copies of a science aptitude examination were distributed previous to December 28 so that teachers could give them to their most talented students.

The tests of the second annual Science Talent Search offered to your high school and others throughout the nation have just been completed, so now anyone can try the examination on his own brain.

The test, reproduced in part on this page, is only one step in the selection of boys and girls who are scientifically gifted. In addition each contestant filled out a personal data blank and wrote an essay on what he believes will be the next great step in science. Teachers filled out a recommendation form and principals reported scholarship. All these requisites are used in choosing winners.

Forty contestants will receive free trips to the Science Talent Institute to be held in Washington, D. C., in February. Of these, two will be selected to receive $2,400 Westinghouse grand scholarships to the college of their choice, eight will get $400 Westinghouse science scholarships, and additional Westinghouse scholarships totaling $3,000 will be awarded at the discretion of the board of judges. Honorable mentions also will be awarded to call the attention of colleges and universities to those contestants of outstanding ability.

Leadership Speeded

This will uncover scientific ability among those ready to enter college. Thus, exceptional youths, in the shortest possible time, will take up leadership in scientific research so important to the war effort and be ready to take a hand in the scientific world of the peace to come.

Science Service, sponsoring Science Clubs of America, is conducting the Science Talent Search as a part of the science club movement.

The aptitude examination does not test what a person already knows about science. It is designed to tell how well you can reason and understand. Thus, even those who have no special training in science will want to try it.

The test was devised for the Science Talent Search by Dr. Harold A. Edgerton, director of the Occupational Opportunities Service of Ohio State University and Dr. Steuart Henderson Britt, executive director of the National Research Council's Office of Psychological Personnel. The most advanced testing methods developed over the past two decades, were utilized in constructing the test.

Of the thousands of boys and girls who took the examination last year, not one made a perfect score. When you try this selection of questions from the examination you should, therefore, not expect to find that you have checked all the right answers.

To save your time only typical questions out of the original three-hour examination are reproduced on this page. You should be able to do the 18 questions, aside from the first five warming-up questions, in about a half hour.

Excel in Scholarship

Those who make high scores on the science aptitude test, in general, also excel in scholarship. This is shown by last year's 300 highest-ranking contestants, 99% of whom were in the upper 5% of their high school classes. Many are now making outstanding records in colleges throughout the country.

The life and achievements of each of the 3,200 students who completed the 1942 competition will be closely followed for the next ten years by Dr. Edgerton and Dr. Britt, who are vocational psychologists. Results of the study will be of interest to every educator in the country.

Only experience of the passing years will show to what extent those selected in the Science Talent Search will produce real contributions to science and engineering that will make the world a better place in which to live.

(*Turn to next page*)

DIRECTIONS: This is a test to see how well you can read and understand the materials of science. You will be allowed three hours for this test. Most students will be able to finish in less than two and one-half hours. The entire test must be completed during one test session. Read each paragraph and then answer each of the questions asked, by putting an X in the answer box corresponding to the number of the answer which is *most nearly correct.* For each question there is *one best answer.* Do not spend too much time on any one question. You may return to it later. In case you wish to change an answer, erase completely, and then mark the correct answer. Any question with more than one answer X'ed will be counted wrong. In order to make sure that you understand the directions, answer the questions below which refer to this paragraph. The correct answers are indicated for the first two questions. Then mark the correct answers for questions 3, 4, and 5.

ANSWERS

1. The time allowed for this test is *1:* one hour *2:* two hours *3:* two and one-half hours *4:* three hours — ☐ ☐ ☐ ☒ (1 2 3 4) 1
2. How many students can expect to complete the test within two and one-half hours? *1:* most *2:* half *3:* a few *4:* none — ☒ ☐ ☐ ☐ (1 2 3 4) 2
3. The right way to indicate your answer to a question is to *1:* mark out the answer *2:* make an X in the appropriate answer box *3:* write the answer in the margin *4:* mark out all wrong answers — ☐ ☐ ☐ ☐ (1 2 3 4) 3
4. Among the answers for each question there is always: *1:* one best answer *2:* one right and three wrong answers *3:* two answers which are correct *4:* no completely correct answers — ☐ ☐ ☐ ☐ (1 2 3 4) 4
5. This test is designed to measure *1:* your ability to guess *2:* your knowledge of science subject matter *3:* your ability to understand scientific subject matter *4:* your reading speed — ☐ ☐ ☐ ☐ (1 2 3 4) 5

Do NOT turn over the page until you are told to do so.

I am beginning the Science Aptitude Examination at_____o'clock.

PARAGRAPH NUMBER 2: About 3,000 stars are visible with the naked eye at any time under the most favorable conditions. To a first approximation the stars appear to be fixed relative to one another on a celestial sphere which makes one revolution around the pole star in 23 hours, 56 minutes, and 3 seconds. On the sphere appear also the sun, moon, and planets. These continually change their positions with respect to the stars. The moon moves eastward on the celestial sphere about 12° per day, the sun moves eastward about 1° per day, and the planets move mostly eastward but sometimes westward at varying rates. Except for the sun and moon most objects in the sky fall within a range in brightness of approximately 500 to 1. The average of the 20 brightest stars is only 100 times as bright as the faintest star that can be seen by the naked eye. Some stars are blue white, others white, some yellow, some orange and some red. The planets other than Mars are yellow, and their light resembles that of the sun.

QUESTIONS ON PARAGRAPH 2: ANSWERS

5. A clock which keeps star time would have to *1:* run more slowly than our ordinary clocks *2:* run at the same rate as our ordinary clocks *3:* run faster than our ordinary clocks *4:* have a different type of construction than our ordinary clocks — ☐ ☐ ☐ ☐ (1 2 3 4) 5
6. For the sun to return to the same position in the celestial sphere (relative to an observer on the earth), it will take *1:* more than one clock year *2:* less than one clock year *3:* slightly more than one clock day *4:* one clock day — ☐ ☐ ☐ ☐ (1 2 3 4) 6
7. The celestial sphere is *1:* the locus of the earth's rotation *2:* the periphery of the solar system *3:* a synthetic concept *4:* the locus described by the major constellations — ☐ ☐ ☐ ☐ (1 2 3 4) 7
8. To an observer on the earth, the celestial body which retains its absolute position is *1:* the sun *2:* the moon *3:* Mars *4:* the pole star — ☐ ☐ ☐ ☐ (1 2 3 4) 8
9. To an observer on the earth, the celestial body showing the greatest relative change of position is *1:* the sun *2:* the moon *3:* Mars *4:* Polaris — ☐ ☐ ☐ ☐ (1 2 3 4) 9
10. The brightness of the sun is to the brightness of the faintest visible star as *1:* 500 to 1 *2:* 100 to 20 *3:* 1 to 20 *4:* indeterminate — ☐ ☐ ☐ ☐ (1 2 3 4) 10

TALENT SEARCH TEST—You can test yourself and see how you compare with the talented high school seniors who are coming to Washington for the Science Talent Institute. Answer the questions. Then look on page 89 for the answers and the meaning of your score.

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PARAGRAPH NUMBER 9: The vertebrate integument consists of the skin and its derivatives. The exterior surface of the body is completely covered by the skin except in the areas of the nose, mouth, anus, and genital openings where it passes into a related tissue, the mucous membrane, which lines passage-ways. The skin may be divided morphologically into two layers — the epidermis, derived from the primitive ectoderm, and the corium which arises from the somatic mesoderm. The epidermis is composed of many layers of cells in two principal strata, the stratum corneum, and the stratum germinativum. The flattened cells next to the surface are hardened by deposits of paraleidin, a substance related to keratin, and are said to be keratinized. Below them are several layers of thicker cells whose active proliferation gives rise to the cells of the stratum corneum. These layers lie above the stratum germinativum, or malpighian or pigment layer. Granules of keratohyalin appear in the outer cells of this stratum as forerunners of the paraleidin, forming the thin stratum granulosum. A thin clear zone just outside of the granular layer, known as the stratum lucidum, is regarded as the basal layer of the stratum corneum. In its cells the granules of keratohyalin become a diffuse intermediate substance, eleidin. The exchange of food and waste between the malpighian layer and the blood is effected by osmosis and diffusion since no capillaries rise above the corium. The corium is a dense connective tissue layer extending from the fatty subcutaneous tissue. It is obscurely divided into an inner stratum reticulare and an outer stratum papillare which arises in papillae beneath the epidermis. The papillae are either nutritive or sensory. Epidermal derivatives including hair follicles, sweat glands, and sebaceous glands extend into the corium; and it contains nerve endings, tactile corpuscles and blood vessels.

QUESTIONS ON PARAGRAPH 9: ANSWERS

47. If the skin is pricked with a pin so that blood is drawn, we know that the pin has penetrated at least to the *1:* stratum corneum *2:* pigmented layer *3:* stratum germinativum *4:* stratum reticulare ☐1 ☐2 ☐3 ☐4 47

48. If we number the several layers of the integument beginning with the surface, the skin pigment is in layer number *1:* II *2:* III *3:* IV *4:* V ☐1 ☐2 ☐3 ☐4 48

49. The layer which originally gives rise to the keratinized material is the *1:* stratum reticulare *2:* stratum keratinosum *3:* stratum corneum *4:* stratum granulosum ☐1 ☐2 ☐3 ☐4 49

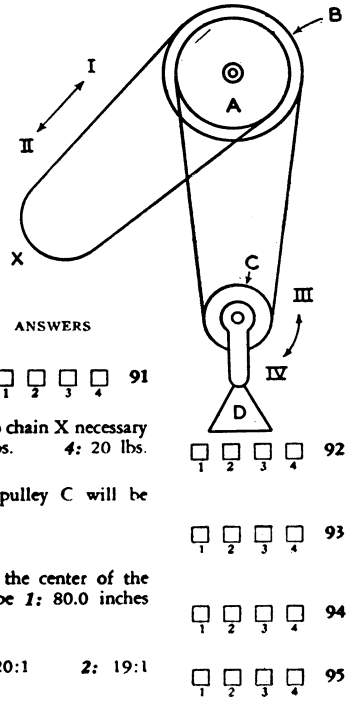
50. Non-mesodermal structures present in the corium are *1:* blood vessels *2:* sebaceous glands *3:* nutritive papillae *4:* eleidin ☐1 ☐2 ☐3 ☐4 50

51. The stratum granulosum *1:* lies above the stratum malpighii *2:* lies below the stratum reticulare *3:* is adjacent to the stratum corneum *4:* contains eleidin ☐1 ☐2 ☐3 ☐4 51

52. A structure found in the stratum germinativum is *1:* stratum corneum *2:* stratum papillare *3:* stratum reticulare *4:* stratum malpighii ☐1 ☐2 ☐3 ☐4 52

53. Mucous membrane is *1:* keratinized *2:* adjacent to the stratum corneum *3:* derived from the ectoderm *4:* derived from the mesoderm ☐1 ☐2 ☐3 ☐4 53

PARAGRAPH NUMBER 16: The diagram represents a pulley system. Pulleys A and B are fixed so that they can only rotate together. A has a circumference of 19 inches, and B has a circumference of 20 inches. Pulley C has a 10 inch circumference. The chain X is an endless chain.



QUESTIONS ON PARAGRAPH 16: ANSWERS

91. When chain X is pulled in direction I, the direction and rotation of movable pulley C will be *1:* up, II *2:* down, III *3:* up, IV *4:* down, IV ☐1 ☐2 ☐3 ☐4 91

92. If it requires 2 pounds pull to operate the hoist without weight D, the force applied to chain X necessary to lift a weight D of 80 pounds will be *1:* 3 lbs. *2:* 3½ lbs. *3:* 4 lbs. *4:* 20 lbs. ☐1 ☐2 ☐3 ☐4 92

93. In raising a load D through 2 inches, the number of revolutions made by pulley C will be *1:* $\frac{19}{200}$ *2:* 2 *3:* 8 *4:* 16 ☐1 ☐2 ☐3 ☐4 93

94. If the bottom of the chain loop around X and the pulleys is 100 inches from the center of the pulleys, its length when C has revolved twice and D has moved down will be *1:* 80.0 inches *2:* 99.5 inches *3:* 105.0 inches *4:* 120.0 inches ☐1 ☐2 ☐3 ☐4 94

95. The mechanical advantage of this chain hoist, disregarding friction, is *1:* 20:1 *2:* 19:1 *3:* 20:19 *4:* 40:1 ☐1 ☐2 ☐3 ☐4 95

Don't read further. Cover up this paragraph until you have taken the test. Here are the correct answers: 5, **3**; 6, **2**; 7, **3**; 8, **4**; 9, **2**; 10, **4**; 47, **4**; 48, **3**; 49, **4**; 50, **2**; 51, **1**; 52, **4**; 53, **2**; 91, **4**; 92, **3**; 93, **3**; 94, **2**; 95, **4**.

The following rating estimates how your score would compare with the brilliant group of high school seniors who completed the examination. The rating is based on your probable score for the entire examination computed from the portions which you have already taken.

If more than ten were scored right you did better than three-fourths of the scholars.

Those who got six to nine correct did well, falling in the middle 50%.

Five or less answered correctly, puts you in the lower fourth of those who completed the competition in the annual Science Talent Search.

Science News Letter, February 6, 1943

PSYCHIATRY

More Mental Health Units In Army Camps Urged

➤ MANY MEN could be saved for effective service in the armed forces and many mental breakdowns during training, costly to the man and the nation, could be prevented by the establishment of more mental health units in Army camps, Dr. George S. Stevenson, medical director of the National Committee for Mental Hygiene, declared.

Commending the efforts so far made in this direction, Dr. Stevenson spoke of Mrs. Eleanor Roosevelt's recent visit to the mental health unit at Ft. Monmouth, N. J., and her endorsement of its accomplishments. He said he heartily agreed with her "that such units should be installed in every classification center in the country."

Men who would be particularly susceptible to mental breakdown should be excluded before induction, so far as possible, Dr. Stevenson stated. In the haste of induction examinations, however, such men sometimes are passed, to the detriment and even potential danger of themselves and their units.

When danger signals show up after induction, a mental-health unit can provide means for their appraisal and treatment. Three-quarters of the men seen at such a unit are essentially normal, though giving evidence of minor maladjustments which might become serious if they remained untreated.

"Many danger signals come to the