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**Average and variability of measured intelligence related to teachers' ratings of temperament traits.**

Farrant, Barbara Elizabeth

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*Boston University*
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Thesis

Average and Variability of Measured Intelligence Related to Teachers' Ratings of Temperament Traits

Submitted by

Barbara Elizabeth Farrant
(A. B., Boston University, 1947)

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First Reader:

Walter N. Durost
Associate Professor of Education

Second Reader:

James F. Baker
Assistant Professor of Education
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CHAPTER I

THE PROBLEM

Purpose -- Children vary in performance from day to day. Temperament is responsible, at least partially, for this variability. Objective research in this area has seldom been carried out. Dr. June E. Downey did develop several promising Will-Temperament Tests, but after her death the studies were not continued.

Just as children vary in performance they vary in measured IQ. Such variations are often too great to explain through measurement errors alone. It is the purpose of this study to try to relate teacher made temperament rankings with variations in standardized day to day measured intelligence.

Justification -- If it can be established that certain temperament factors "inhibit" or "increase" measured intelligence, teachers will be less inclined to depend upon a single IQ score. A child's future would not be built upon a single day's performance. Several intelligence tests would be administered over a short period of time. Bingham¹ in 1938 urged the members of the American Association of Applied Psychology to dispel the popular error regarding the constancy and hence the sanctity of a recorded IQ. Those cases which showed unusual variability could then be isolated.

and studied. It may be possible to determine from a ranking scale what the signs of these temperament factors are. Eventually an objective instrument may be constructed to measure temperament.

Population Tested -- The study was carried out in five elementary schools in Ellsworth, Maine and in one elementary school in Bucksport, Maine. Two hundred and seventy-eight pupils in grades four through seven were tested. Complete seriatum data were obtained for 271 cases. Nine teachers administered the tests and ranked their pupils.

Instruments Used -- The Otis Quick Scoring Mental Ability Test, Beta Test Form CM, was administered to gain an original IQ score. Split forms of the Otis Beta Test Forms A & B were used to study the day to day variability in each child's intelligence. A Practice Test of forty items was given before each of the Split Beta Tests.

Design of the Experiment -- The entire population took the Otis Beta Test Form CM on the first day. On the second through fifth days the Practice Test was given first. Then the split forms of the Otis Beta Test Forms A & B were administered to random fourths of the group. During the five day testing period each teacher was asked to rank her students on five temperament traits.
CHAPTER II

REVIEW OF RESEARCH

Will-Temperament

The influence of character traits, temperament, or personality upon performance, has been recognized. The most extensive work in this field was done by Dr. June E. Downey. She defined will-temperament as "an innate relatively permanent disposition within the person". Temperament involved the fundamental traits of human personality. Dr. Downey felt that it revealed itself in various patterned forms of activity which were determined by

1. "the amount of nervous energy at the disposal of the individual.
2. the tendency of such nervous energy to discharge immediately into the motor areas that innervate the muscles and glands, or, on the contrary, to find a way out by a round-about pathway of discharge".

Dr. Downey divided her will-temperament tests into three categories to check the output of energy.

2 Op. cit. p. 59
3 Op. cit. p. 59
1. Speed and fluidity of reaction
   a. Speed of movement
   b. Freedom from load (ratio of actual speed to capacity speed)
   c. Flexibility
   d. Speed of decision
2. Forcefulness and decisiveness of reaction
   a. Motor Impulsion
   b. Reaction to contradiction
   c. Resistance to opposition
   d. Finality of judgment.
3. Carefulness and persistence of reaction
   a. Motor inhibition
   b. Interest in detail
   c. Coordination of impulses
   d. Volitional perseveration (persistence at a task when there is no objectively established end.)

The tests used to measure speed traits were of the motor type involving handwriting. The results of the tests were presented in the form of a graph called the will-profile. Both group and individual tests were developed.

Dr. Downey\(^1\) concluded that "a very high score undoubtedly reveals a forceful personality, and a very low score a weak or colorless or psychopathic personality". In analyzing the profiles, she found that one representative of a deliberate, consistent personality was identified with ease. Profiles from unstable inconsistent variable types of personality were difficult to identify. She expected to find fluctuations on the part of the latter in his record on repeated tests.

Dr. Downey\(^2\) realized that her tests lacked statistical background, but felt that the experimental background compensated for that in part. She also felt that it was a mistake to label the tests with the names of specific

\(^1\) Downey - Op. cit. p. 73
\(^2\) Ibid.
personality traits. It would have been better to name each test in terms of the reaction involved. It could then be determined whether the test could be used in selecting individuals of differing gifts. She used her labels "partly to arouse interest in the material and create a challenge to result in clearer definitions of terms and more precise understanding of what is involved in temperamental tests".

Will-temperament and Intelligence

In her experimentation Dr. Downey found that the will-temperament was relatively independent of intelligence. She always looked for lack of correlation between the two, but did say that the temperamental pattern carried with it implications concerning the quality of intelligence, although not indicating the level of intelligence.

One of her own studies involved giving a long series of group intelligence tests to a class of adults in summer school. The majority of the group maintained their relative position in the group but two individuals' records went up and down the list. It was found that those individuals were emotional and highly unstable. The results caused Dr. Downey to ask: "Why not use repeated group testing to identify such types, just as we use the fluctuating IQ in the identification of the psychopathic child?"

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1 Downey Op. cit. p. 175
2 Ibid
3 Downey Op. cit. p. 278
4 Downey Op. cit. p. 66
5 Downey Op. cit. p 66
This was done by Keys who found that prediction of future performance of individual pupils was improved when the current findings were averaged with scores made on parallel forms of the test given at any time within the past two years. Deviations were found to increase with age and schooling, thus recent tests were more valid.

Independent of the Downey material, other research workers have investigated traits and their relation to intelligence. Spearman in discussing intelligence spoke of the "g" factor and the "s" factors which were functions of cognition (perceiving and thinking). He felt that they were controlled by conation or the effort of will in striving and feeling. He and Garnett isolate the "c" factor which is characterized by profundness, quickness, and common sense with a freedom from inertia. This is very similar to the Downey speed traits.

With the help of Webb, Spearman found a "w" factor which he described as purposive consistency, and self control resulting from volition or will. Spearman said that this should lead to character study which could be objective.

Recently Wechsler warned psychologists not to treat intelligence as if it consisted exclusively of intellectual elements or factors. He said

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that cognitive abilities were capacities and traits dependent upon temperament and personality which are not restricted to logical and abstract perceptions.

Even though psychologists know that temperament influences intelligence he said they use an IQ not only to determine comparative mental endowment, capacity to learn, presence of special abilities and disabilities, evaluation of a degree of mental deficiency, but also as a basis for school placement, for vocational guidance, for psychiatric diagnosis and for the prediction of adjustment potentials in a variety of situations from infancy to old age including such areas as child adoption, juvenile delinquency, fitness for military service, college success, and old age counseling.

Wechsler felt that we must know what non intellectual factors are relevant to intelligence and to what degree they are relevant.

Ryans said that "Learning an activity which is in conflict with one's existing traits is likely to suffer from the standpoint of efficiency."

Thus since Dr. Downey's original work, the importance of temperament has been emphasized.

Will-Temperament and Achievement

Will-temperament has been more closely studied in its relation to school achievement.

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1 Wechsler, Op. cit. p. 78
2 Wechsler, Op. cit. 79
Dr. Downey said of the achievement to be expected of certain temperamental types:

"The slow deliberate temperamental type conforms rather consistently to Meumann's so-called slow type of learner. He is an individual with a highly concentrated attention of a narrow range, who learns slowly and forgets slowly, and utilizes much visual imagery. The rapid fire type recalls Meumann's type of quick learner who possesses the rapidly adjusting broad-span type of attention that is usually distractible, who learns quickly and forgets quickly and is more largely verbal than visual in his ideational processes. Intermediate temperamental types seem to be, also, intermediate between the learning types".

Several studies were carried out using the Downey material and relating it to achievement. Dr. Uhrbrock supplemented the will-temperament tests and used a rating scale, paralleling as closely as possible the will-temperament test. One hundred and fifty-one boys, median age 14-2, were given the group will-temperament tests and the McCall Multimental Scale. The Will-Temperament Tests were given for purposes of self correlation. Fifty of the boys were given the Downey Individual Will-Temperament Test. Two ratings in a specially prepared five-step scale were secured for each subject. School grades were used as a "success" measure. One hundred thirteen of the boys were tested individually to obtain data to establish criteria for an intensive study of the traits termed "speed of movement", "speed of decision" and "motor inhibition".

The conclusions were as follows:

1 Downey, Op. cit. p. 252
1. No single speed test may be taken as an adequate representation of the function. Therefore to measure general speed of movement a great number of specific speed habits must be measured.

2. The results would not justify the selection of any one test as a measure of the trait of "motor inhibition".

3. Correlations with the ratings are negative in six out of eight cases indicating that something not suggested by the trait names "motor inhibition" and "speed of decision" may be measured.

4. Subtest scores do not show significant correlation with school grades.

Despite these negative results Dr. Uhrbrock felt that increasing the length of any of the promising subtests would increase the reliability and provide a battery of tests to measure those habit systems involved in personality. He felt that a reliable objectively scored form should be available for the measurement of non-intellectual traits.

Thompson studied the validity of the Will-Temperament test in predicting success in practice teaching. He found that speed of movement and flexibility did have some relationship. The partial correlations (.52-.44) between practice teaching and the Downey traits were not reduced when the factors of intelligence and scholarship were partialled out. Intelligence and scholarship did reduce each other. Therefore Thompson inferred that "the Downey tests referred to do measure something not included in intelligence or scholarship measures."

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Traxler used the Downey tests to study the fundamental differences which cannot be measured by tests of intelligence. The experiment involved 157 pupils ages 7-12 in four schools. IQ's ranged from 61-127 with an average IQ of 97. He found twelve different types of will-profile. Correlation of the Downey test with intelligence was $0.228 \pm 0.05$, with achievement $0.36 \pm 0.05$. The correlation of IQ with marks was $0.545 \pm 0.04$. He felt that no accurate prediction of school success could be made from the results.

The Will-Temperament tests were used by Reaves with high school pupils for diagnosis and guidance. They showed a strength of purpose which the IQ tests could not bring out and showed the way a student was likely to use his ability. He did warn that the results of the Downey test alone would not enable the counselor to diagnose all the causes of pupil maladjustment because the causes were too numerous and varied. Still it was a help. May went back to validating the tests by ratings. His results were ambiguous and low but as reliable as ratings go. He found that definitions were difficult to agree upon. The chief value of the tests seemed to him to be as research methods. He felt as Uhrbrock that we must have a reliable method of measuring human energies.

A more extensive study of Downey results correlated with ratings was

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carried on by Buchanan. He found correlations with the Downey tests both before and after the teachers had been well grounded in the meanings of the traits to be rated. He found that training in most cases did not appreciably increase the correlation. R's for non-compliance, finality of judgment, motor inhibition and interest in details were low showing a possible lack of previous understanding. Several of the other traits had correlations of .59 to .75. He concluded that all the traits were not understood equally well. He also found low correlations between the Downey test-retesting and felt that the test was not suited for young children.

Meier gave the individual Downey Test and obtained three independent estimates from those who knew the subjects well, using a graphic rating scale. Even with explicit descriptions of the traits he obtained low correlations; the average being .118 with the range from .05 - .24. He felt that the estimates might have been unreliable, or the test might not be valuable for certain traits.

Other Trait Studies.

There have been few Temperament trait studies with material differing from Dr. Downey's. Trow used Dr. Downey's finality of judgment trait test and also his own tests of line discrimination, weight discrimination, ethical judgments, and spelling in order to find out if those who made quick decisions once do so always. He felt that the Downey measures were unreliable. His conclusion was that speed of decision was not a trait, but

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that it acts different ways in different situations. He said, "We can discover many different types of situations where the trait in question may operate and prepare tests calling for responses of those different types. Some traits may show a higher consistency than others. Each trait could be given an "index of consistency". Or perhaps "certain people are more constant".

Collins measured perseveration using certain sensori-motor tests in order to find an objective measure of character integration. She grouped her forty-six cases (23 girls - 23 boys - ages 8-6 to 14-6) into 3 levels of ability (below average, average and above average) based on IQ's which ranged from 50-140 on the Stanford revision of the Binet. Scores on Cattell's perseveration tests of writing abc's, drawing triangles, writing w's and naming colors, were combined. Highest scores were made by the below average students while the above average received the lowest scores. Collins said, "the results of this experiment do indicate clearly that there is a negative correlation between intelligence quotients and perseveration when a reliable test is used".

Clark made an extensive character test study at the Lenox Preparatory School. He wanted to supplement his intelligence test results and felt that perseverance was the most valuable trait making for success. From his preliminary experimentation he developed two tests. One was building as many

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words as possible from a given number of letters and the other was a similar task with numbers. The students had unlimited time. The perseverance score was the number of words or numbers correctly built with a correction for age. (a rough approximation based on average score for age)

In the first study 77 boys were tested and rated on perseverance by five to eight masters. The pooled ratings had a corrected correlation of .94. The correlation between ratings and word building was .21. With number building it was .45. The combined r was .43. Similar results were obtained at another school. This was an indication of some validity and further studies were made, with more attention to motivation.

In the next study new students were tested when they were just entering school and wished to make a good impression. After three months the masters were asked to rate these boys. The correlation with the combined tests and classroom perseverance was .77. The r with general perseverance was .70. Such high correlations with personality suggested to Clark a rather definite repudiation of the doctrine of specificity of personality traits and in many respects confirmed the results of the general testing program.

Such research indicates that temperament is related to variations in performance, but no standardized objective tests have yet been developed to measure temperament.

It is the intention in this study to experiment with variations in seriatum intelligence test data as did Downey and Keys, the time interval

1 Clark, Ibid
2 Downey, Op. cit., p. 61
3 Keys, op. cit. p. 76
is shorter but Thorndike in his research found that Stanford-Binet test-retest correlations fall off as the interval between tests increase. Consequently there may be less variability after equating for practice effects, in the IQ scores computed for this study. The seriatum method has been emphasized by Prescott who said that "apparently the search should be made for significant continuums of variation rather than for specific types, and apparently it is better to make the differentiations on a functional basis rather than to undertake such complete controls as will distinguish innate factors clearly."

The Downey tests were studied using correlations with ratings. Low correlations were found in many cases because the raters did not understand the temperament terms. Clark, on the other hand, found high correlations with his ratings.

In the present research rankings rather than ratings have been developed based upon the Downey and Spearman experiments. However these rankings will not be used as verification for any tests, but merely as signs of various temperament reactions. Thus this investigation follows Goodenough's theory of signs in which she says that "The nature of the trait

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to be appraised must remain undetermined until its character has been experimentally established". The rankings will be further normalized for each class along a nine point scale.
CHAPTER III

PROCEDURE OF THE STUDY

Instruments Used

Otis Quick Scoring Mental Ability Test, Beta Test -- This test of eighty items (Appendix 1) is typical of the omnibus type intelligence test commonly used in the public schools. Beta Test, Form CM, was constructed for grades four through nine. Thus the grade range was suitable for the sample studied. The validity of the test was determined by item analysis for differentiating values based on a criterion of rapid progress through school. The reliability of the test for grades four to nine gives a combined test-retest coefficient of .96.

Split Otis Tests -- With the publisher's permission, Otis Quick Scoring Mental Ability Tests, Beta Tests, Forms A & B, were split to obtain four comparable tests of forty items apiece. The split-half reliability coefficients corrected by the Spearman Brown formula for grades four through seven are .81, .92, .90, and .87. These were obtained by dividing the test into two parts, one containing the odd items and one containing the even items. The writer found on studying the two halves of each test form that

2 Ibid
3 Ibid
the items were not evenly matched by type when this odd-even division was followed. As a result of this reasoning it was decided to divide the tests by types of items, keeping in mind the fact that the items had been arranged according to difficulty. From this procedure four forms were obtained: A, A, B, B. (Appendix 2)

Practice Test. -- A Practice Test of forty items (Appendix 3) was constructed, similar in vocabulary to the Otis Beta Test. The thinking processes involved were simple enough to make answering a matter of perception in most cases. A sample item is given below.

Which one of the five answers below tells best what a cat is?
   a. a bird  b. an animal  c. a girl  d. a fish  e. a man

The Practice Test was printed on the backs of the split forms of the Otis Beta Tests A, A, B, B. In order to relieve the monotony of the Practice Test and more specifically to avoid having the children mark the answers without reading the questions the items in the Practice Test were rearranged within groups of ten for each day's testing. It was not felt that the items could be completely rearranged because the slower children might never finish the test in the time allotted. The practice value would then disappear because each time the test was taken the slower children would be answering new items.

Design of the Experiment

Specific directions for test administration were given to the teachers in a carefully prepared manual. (Appendix 4)

First Day's Testing. -- On the first day the children took the Otis Beta Test Form CM. The printed manual directions (Appendix 5) were followed using the thirty minute time limit. (A power score was also obtained to use in further experimentation).
Second Day's Testing. -- On the second day the children were each given a Practice Test booklet. The Practice Test was taken with a fifteen minute time limit. At three minute intervals the children were told to circle the number of the question they had just completed. In this way a check was kept upon individual speed of reaction.

When the time was up the children were told to turn their test booklets over. On the back of the Practice Test booklet the Otis Split Forms were printed. From the class lists the group had been divided into random fourths. In this way comparability of forms could be seen. Thus one-fourth of the group took test A, one-fourth test A, one-fourth test B, and one-fourth test B.

Third Through Fifth Day's Testing.-- The same procedure was followed as that outlined in detail for the second day's testing. By the fifth day each child had taken each of the split forms.

The Ranking Scale

While the testing procedure was going on the teachers were asked to rank their pupils on five traits described by five phrases. (Appendix 6). Those traits were:

I Energy Level

1. Always seems to have a superabundance of energy.
2. Definitely above average in energy level most of the time.
3. Not noticeably different from the rest of the class with respect to energy level.
4. Somewhat listless and lacking in energy most of the time.
5. Strikingly different from the group in energy potential - seems to be tired much of the time.

II Changes in Energy Level (Variations in energy whether the level is high or low).

1. Notably even and lacking in variation in the level of energy output.
2. Some variation is noted, but tends to be more stable than most.
3. Variation in energy level average - fluctuations minor in range or frequency.
4. Tends to fluctuate noticeably more than the typical child.
5. Unusually wide differences in energy level from day to day.

III Persistence

1. Seems self-compelled to complete any task attempted - even without supervision.
2. Completes work without much prompting unless distraction is very great - definitely above average in persistence.
3. Usually finishes work unless distracted - typical of most of the class.
4. Seldom completely finishes work - lacks final push.
5. Shows little or no persistence in completing task - requires constant prompting.

IV Rate of Work

1. Always works rapidly - among the first to finish.
2. Finishes and usually has time to go over work - above average speed.
3. Finishes work in allotted time.
4. Often needs a little extra time to finish.
5. Works very slowly - seldom, if ever, finishes within the school period.

V Accuracy

1. Very careful and precise - neatness and accuracy are definitely characteristic.
2. Above average in accuracy - but it is done without conscious effort.
3. Average amount of care exercised - work does not stand out in one way or another.
4. Not notably accurate or precise in work.
5. Inaccurate papers, poorly formed letters, no attention to detail - every job should be done over, but the results are often not much better.

Each teacher was given a name card for each pupil in his or her room. On the back of each card (Appendix 7) were five Roman numerals representing the five temperament traits. The teachers were asked to observe the following steps in ranking their pupils: (Appendix 8)

1. Read and study the five descriptive phrases for the trait.
2. Sort your student's name slips into five piles corresponding to
the five descriptive phrases.

3. Within each pile arrange the slips in order from the highest individual's name (the child most like the phrase) down to the lowest individual's name (the child least like the phrase). You may move your slips from one pile to another if you wish.

4. Put all the slips together with the pile most like descriptive phrase 1 on top.

5. Run through the slips and make sure that each child's name is in the right order.

6. Number the slips 1, 2, 3, 4, etc., 1 for the name of the pupil most like phrase 1 and the number representing the number of pupils in your class for the name of the pupil least like phrase 5.

7. Write the number on the back of each slip beside the Roman Numeral representing the trait that you are rating.

8. Repeat this procedure for the four other traits.

The slips were then sealed in envelopes and returned.

In ranking the pupils the teachers were forced to differentiate between the children. Thus the halo effect was minimized to some extent since only one child could be first and only one child last.

It was then necessary to translate these numerical rankings into a scale for comparability from class to class. Using the Durost normalized scale technique the class rankings were equated to a nine point scale based upon a normalized curve for the number of cases in the class. Dr. Walker says "A variable which is the resultant of several independent, equally potent causes, each as likely to be present as absent in any given instance, has a binomial distribution, . . . the normal curve is a continuous distribution which is the limiting form of the discrete binomial distribution \[ N \approx 0.5 \] as \( N \) is made to increase without limit."

---

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

The tests were scored and rescored. The following raw scores were obtained for each child:

- Otis Beta Test, Form CM -- 30 minute score -- untimed score.
- Split Otis Beta Test, Form A₁ -- 15 minute score -- untimed score.
- Split Otis Beta Test, Form A₂ -- 15 minute score -- untimed score.
- Split Otis Beta Test, Form B₁ -- 15 minute score -- untimed score.
- Split Otis Beta Test, Form B₂ -- 15 minute score -- untimed score.
- Four Practice Tests -- 3, 6, 9, 12 & 15 minute scores for each test.

This report will not make a complete analysis of the data, but will concentrate on the specific problem outlined in Chapter I.

Measured Intelligence

Normality of the population -- In order to establish the intellectual character of the group tested, the deviation IQs for the Otis Beta Test, Form CM, were plotted on a Normal Percentile Chart. This may be seen in Figure 1. The mean IQ of 96.6 is slightly below the national average (97) for these grades. The New England average IQ is 98. The standard deviation for the IQs of the group is 13.5. Thus this group does not differ significantly from a normal population.

Equivalence of forms -- The equivalence of the split forms of the Otis Beta Test was determined by plotting the four distributions on a Normal Percentile Chart as shown in Figure 2. It will be recalled that all four forms were given randomly each testing day. The numerical equivalence of the raw scores for certain selected percentiles will be found in Table 1.
### NORMAL PERCENTILE CHART

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<thead>
<tr>
<th>Grade or group No. of cases</th>
<th>Measure (Examination)</th>
<th>Form</th>
<th>Date</th>
<th>Examiner</th>
<th>School</th>
<th>City</th>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable II</td>
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<td></td>
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<td>Sub-totals</td>
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</tbody>
</table>

**PERCENTILE SCALE**

*Figure 1. Distribution of IQs Derived from Otis Quick Scoring Test of Mental Ability, Beta Test, Form CM*

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NORMAL PERCENTILE CHART

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<th>Grade or group</th>
<th>No. of cases</th>
<th>Measure (Examination)</th>
<th>Form</th>
<th>Date</th>
<th>Examiner</th>
<th>Graphs by</th>
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<td></td>
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<td>By Ferrant</td>
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PERCENTILE SCALE

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</table>

Median: 3.5

Standard Deviation Scale

Figure 2. Distribution of Raw Scores for Split Forms of the Otis Quick Scoring Test of Mental Ability, Beta Test
Table 1

Selected Percentiles, Means, and Standard Deviations for Form CM and Split Forms* of the Otis Quick Scoring Test of Mental Ability, Beta Test

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<th>Statistic Percentile Ranks</th>
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<th>A^2</th>
<th>B^1</th>
<th>B^2</th>
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<td>9</td>
<td>7</td>
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<td>7</td>
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</table>

Mean
Mean
31.57
20.75
20.80
21.50
21.32
Standard Deviation
11.90
7.07
6.96
6.78
7.23

*based on 274 cases in Grades 4-7 in Ellsworth and Bucksport, Maine.
Pearson Product Moment Correlations were found to be .84 for $A_1$ with $A_2$ and .85 for $B_1$ with $B_2$. The split forms were thus considered to be comparable because of the high correlations and because of the numerical equivalence of the percentiles. Because the test forms were equivalent, scores in the subsequent analysis of the day by day testing were combined regardless of form.

Practice effect -- Practice effect had to be cancelled out before the scores could be compared from day to day. In Figure 3 will be seen the Normal Percentile graphs for the four successive split tests. The graphs have been stepped up one interval for each day's testing in order to make them easier to read and compare. Table 2 shows selected percentiles for the initial Form CM testing and for the successive split tests. There was a definite practice effect noted between Form CM and the first split test. This is on the assumption that doubling the first split test score (regardless of form) gives a result comparable to the Form CM score. There was also some slight practice effect between the first split test and the second split test. There did not appear to be much practice effect from the second to the third or from the third to the fourth split tests.

Using the equi-percentile method lines of relation were set up between Form CM and the first split test and Form CM and the second, third, and fourth split tests. Figure 4 shows the line of relation between Form CM and the first split test. Reading the graph shows that a score of 20 on the first split form is equivalent to a score of 30 on the Form CM Test (See dotted line on Figure 4). Table 2 shows selected Percentiles for Form CM and the Split Tests. A full table of equivalent scores will be found in the Appendix (9).
Note: Frequencies have been stepped up one score interval for each variable.

<table>
<thead>
<tr>
<th>Grade or group</th>
<th>No. of cases</th>
<th>Measure (Examination)</th>
<th>Form</th>
<th>Date</th>
<th>Examiner</th>
<th>Graphs by</th>
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</thead>
<tbody>
<tr>
<td>1 - III</td>
<td>I - 7</td>
<td>I = 1st Split Test - III = 3rd Split Test</td>
<td>May, 1951</td>
<td>Classroom Teachers</td>
<td>B. Farrant</td>
<td>Elementary Schools</td>
</tr>
<tr>
<td>2 - III</td>
<td>IV - 7</td>
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Standard Deviation Scale

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Table 2
Selected Percentiles, Means, and Standard Deviations for Form CM and Successive Day's Testing* with Split Forms of The Otis Quick Scoring Test of Mental Ability Beta Test.

<table>
<thead>
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*based on 274 cases in Grades 4-7 in Ellsworth and Bucksport, Maine.
The dotted line shows the equivalence of raw score 20 on the Split Test and raw score 30 on the CM Test.

Figure 4. Equipercentile Line of Relation Between Otis Beta Test, Form CM, and the First Split Test
Equivalent scores were found for each raw score and then deviation IQs were computed for each child following the procedure outlined in the Otis Quick Scoring Test Manual. Table 3 shows the intercorrelations between the IQs obtained for each day's testing. These are really test-retest reliability coefficients. These IQs, derived from comparable forms, are free of practice effect. Thus they reflect the amount of variability in measured intelligence from day to day due to all causes.

**Variability**

**Variances** -- It was next necessary to compute individual variabilities for each child's five IQs. The CM IQ, because of its length, was considered more reliable than the split tests. Consequently it was weighted as two IQs, giving a total of six IQs for every pupil for averaging purposes. Both mean and median IQs were computed for each child. Using 38 cases taken in sequence the correlation was found to be .97 between the mean and median IQs. It was recognized that the mean was more affected by extreme cases. However, since the two measures of central tendency were so closely akin it was decided to use the mean IQ as the average intelligence measure for each child. This was done because the mean is a part of the product moment system of statistical analysis and variance from a mean is more acceptable statistically than variance from a median.

Each child's variance was computed by finding the sum of the squares of his deviation from his own mean IQ and dividing by six. This measure of variability is not in terms of test scores. Conversion to score units could be accomplished by finding the square root of each child's variance.

---

Table 3

Intercorrelations of IQs* of Form CM and Split-Forms of The Otis Quick Scoring Test of Mental Ability, Beta Test, with Means and Standard Deviations for each Form.

<table>
<thead>
<tr>
<th>Forms</th>
<th>CM</th>
<th>First Split Form</th>
<th>Second Split Form</th>
<th>Third Split Form</th>
<th>Fourth Split Form</th>
<th>Mean</th>
<th>Standard Deviation</th>
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<td>.85</td>
<td>.83</td>
<td></td>
<td>96.58</td>
<td>13.52</td>
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<td>.88</td>
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<td>.87</td>
<td>.85</td>
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<td>96.80</td>
<td>13.96</td>
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</table>

*based on 271 cases in grades 4-7 in Ellsworth and Bucksport, Maine.
(the standard deviation). However, the restriction in the range of the variability measure would be so great in this case, that it would seriously affect the relation of these measures with the other measures under consideration. Hence this was not done.

Range of Variances -- The variances ranged from .2 to 74.5 which would be equivalent to variations of less than one IQ point to over eight IQ points. The probable error of score given in the Otis Manual is 2.7 for 465 pupils in grades 4 to 9. This means that due to chance factors a pupil's score will be in error only between 0 and 2.7 points in 50% of the cases. It was considered that this applied equally to all pupils. In this study it seems that individuals differ enormously in their degree of variation. Since practice effect was cancelled out in the raw scores it did not affect the IQ scores. Thus the variability is even greater, in most cases, than a probable error or even a standard error of measurement would lead one to expect. Furthermore, the mean IQs and the standard deviations (as shown in Table 3) were nearly the same from day to day. Consequently, the large amount of variation found was within the child himself.

Character of the variance distribution -- Study of the variances showed that the distribution gave the appearance of a normal distribution folded in half. This was to be expected since the variance measure did away with negative signs and treated all deviations from the mean as being positive. Thus the average variability for the whole group was almost on the bottom of the distribution. After doubling the number of cases (271 then became 542) and calling the first interval minus two to plus two (zero being the mean of the assumed normal distribution) fifty percent or 271 cases (half

---

of the assumed normal distribution) were added to the frequency in the first interval to force the curve to start at the fiftieth percentile. This is shown on a Normal Percentile Chart in Figure 5. A smooth curve was then drawn through the points. This curve did not give correct percentile ranks for the individual children in the group studied, since all the children were at the fiftieth percentile or above. By treating the half curve as a whole normal curve, and using a variance of 25 which was found to be one standard deviation above the mean, a table of percentile ranks were set up based upon the normal probability curve. These percentile ranks, equivalent to each child's variability are shown in the Appendix (10). If a child had a variability of 14 (in this particular population) he would have a percentile rank of 42.4.

To further represent the unsuitability of the variance technique to treatment by the correlation method, Table 4 shows a bivariate distribution of the mean IQs and the variance. A correlation of .13 indicates little relation between average intelligence and amount of variation. The correlation ratios were .229 (ranking against mean IQ) and .279 (mean IQ against ranking). These probably are truer measures of the relationship, but the character of the distribution of the variances makes a true correlation impossible.

Ranking.

The temperament rankings were normalized following the Durost technique discussed in Chapter III. A total rating for each child based on a nine point scale for five temperament traits was obtained. Figure 6 shows the normality of the distribution when it is plotted on a Normal Percentile Chart.
**NORMAL PERCENTILE CHART**

<table>
<thead>
<tr>
<th>Variable I</th>
<th>Variable II</th>
</tr>
</thead>
<tbody>
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<td>Grade or group</td>
<td>No. of cases</td>
</tr>
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<td>-------------</td>
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<tr>
<td>1-7</td>
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<table>
<thead>
<tr>
<th>Score Intervals</th>
<th>Frequencies</th>
<th>Subtotals</th>
<th>Percentages</th>
<th>Score Intervals</th>
<th>Frequencies</th>
<th>Subtotals</th>
<th>Percentages</th>
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**PERCENTILE SCALE**

- **Standard Deviation Scale**
  - $-3\sigma$ to $+3\sigma$

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Table II. Bivariate Distribution of Mean IQs (Grades 1-7, Ellsworth and Rockport, Maine) Based Upon Five Successive Testings and the Variance of These IQs

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</table>

\[ N = 271 \]

\[ x = \text{Mean IQ} \quad y = \text{Variability} \quad r_{xy} = 0.13 \]

\[ M_x = 96.61 \quad M_y = 19.06 \quad r_{xx} = 0.229 \]

\[ \sigma_x = 12.92 \quad \sigma_y = 15.45 \quad \eta_{xy} = 0.279 \]
### Table: Normal Percentile Chart

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<tr>
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<th>No. of cases</th>
<th>Measure (Examination)</th>
<th>Form</th>
<th>Date</th>
<th>Examiner</th>
<th>Graphs by</th>
<th>School</th>
<th>City</th>
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#### Standard Deviation Scale

-3σ  -2σ  -1σ  0σ  +1σ  +2σ  +3σ

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**Figure 6.** Distribution of Teachers' Normalized Total Rankings on Five Temperament Traits.

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Ranking and IQs -- Table 5 shows the relationship between the mean IQ and total temperament rating. It may be seen that what the teachers were ranking as temperament is markedly related to intelligence. The correlation is .56. It was not feasible to ask the teachers to repeat the rankings after a short time interval in order to determine their reliability. If one assumes that the teachers' rankings are .80 reliable and knows that the estimated reliability of the mean IQs is .97 (using the Spearman Brown Prophecy Formula) the correlation corrected for attenuation is .70. Thus intelligence does enter into the ranking as the teachers interpreted the meaning of the traits.

Ranking and Variability -- The students who had a variability of more than one standard deviation above the mean (variances from 26 to 74.5) were then studied in relation to the total group. They are indicated in Table 5 by the red frequency figures. It will be noted that they differed slightly in both mean IQ and mean total rating score. Here the correlation of .72 proves even more conclusively the high relationship between rating and mean IQ. However, it can be seen that those who have a high variability score really do have a wide range of IQs from 65 to 134. Even though the correlation of variability with mean IQ is not applicable, the indication of low relationship is substantiated.

A bivariate distribution was plotted for the normalized total ratings against the IQ variability (Table 6). The correlation of .10 is not suitable because the relationship as mentioned before is not linear. Correlation ratios were found for the two variables against each other. They were .207 (variability versus rating) and .316 (rating versus variability). There is no assurance that even the correlation ratio gives a true measure.
### Table 5: Bivariate Distribution of Mean IQs (Grades 4-7, Ellsworth and Rockport, Maine) Based Upon Five Successive Testings and Teachers' Total Ranked Rankings on Five Temporaneous Traits

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<th>70-79</th>
<th>80-89</th>
<th>90-99</th>
<th>100-109</th>
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Legend: Purple = Total Population  Red = Portion of the Population One Standard Deviation or more above the Mean Variance

\[
x = \text{Mean IQ} \\
\mu_x = 96.61 \\
\sigma_x = 12.92
\]

\[
y = \text{Total Ranking} \\
\mu_y = 25.30 \\
\sigma_y = 7.54
\]

\[
r_{xy} = 0.59
\]

\[
x = \text{Mean IQ} \\
\mu_x = 99.65 \\
\sigma_x = 17.80
\]

\[
y = \text{Total Ranking} \\
\mu_y = 27.31 \\
\sigma_y = 7.95
\]

\[
r_{xy} = 0.72
\]
Table 6. Bivariate Distribution of Teachers' Standardized Total Rankings on Five Temperament Traits and to Variability Based on Five Successive Testings (Grades 4-7, Ellsworth and Buckport, Maine)

<table>
<thead>
<tr>
<th>x</th>
<th>5</th>
<th>10</th>
<th>15</th>
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<th>25</th>
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<td>5</td>
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<td>4</td>
<td>4</td>
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</tr>
</tbody>
</table>

N = 271

\[ x = \text{Total Ranking Score} \quad y = \text{Variability} \]

<table>
<thead>
<tr>
<th>M_x = 24.30</th>
<th>M_y = 19.06</th>
<th>( \eta_{xy} = 0.10 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sigma^2_x = 7.54 )</td>
<td>( \sigma^2_y = 15.45 )</td>
<td>( \eta_{xy} = 0.20 )</td>
</tr>
<tr>
<td>( \eta_{yx} = 0.31 )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
of this distribution. The statistical reliability of the variability measure can not be determined from these data, but it should be higher than that of the teachers' rankings. The lack of appropriateness of the correlation technique made it difficult to study the relation between variability and ranking.

Separate traits — It was possible, however, to study the intercorrelations between the five temperament traits. A sub-sample of 136 cases, based on teachers' rankings, was selected. The teachers' rankings ranged from one to nine on the normalized rating scale, for each trait. Persistence showed the highest average intercorrelation (.69). Persistence and Accuracy showed the highest correlation (.86). Changes in Energy Level showed the lowest average intercorrelation (.52). Changes in Energy Level and Accuracy showed the lowest correlation (.47). Changes in Energy Level with Energy Level itself showed the next lowest correlation (.59). The correlations are high in the cases of Persistence and Accuracy and marked for the other traits. There is an indication that Trait II, Changes in Energy Level, is least related to the other traits and consequently probably less related to intelligence in the teachers' minds. Table 7 shows the intercorrelations between the traits.
Table 7

Intercorrelations of Temperament Traits,* Averages of the Intercorrelations, Means and Standard Deviations

<table>
<thead>
<tr>
<th>Traits</th>
<th>Average Intercorrelations</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistence (III)</td>
<td>.69</td>
<td>.82</td>
<td>.86</td>
<td>.59</td>
<td>.50</td>
<td>5.15</td>
</tr>
<tr>
<td>Rate of Work (IV)</td>
<td>.68</td>
<td>.75</td>
<td>.61</td>
<td>.52</td>
<td>.50</td>
<td>5.10</td>
</tr>
<tr>
<td>Accuracy (V)</td>
<td>.66</td>
<td>.55</td>
<td>.47</td>
<td>.59</td>
<td>.50</td>
<td>5.04</td>
</tr>
<tr>
<td>Energy Level (I)</td>
<td>.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.02</td>
</tr>
<tr>
<td>Changes in Energy Level (II)</td>
<td>.52</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.99</td>
</tr>
</tbody>
</table>

*based on 136 cases, Grade 4-7, Ellsworth and Bucksport, Maine.
CHAPTER V

SUMMARY AND CONCLUSIONS

In summarizing the findings of this study it will be seen that it has proved to be an exploratory investigation on which to build further research.

Conclusions

The following conclusions may be noted:

1. Variations in measured IQ (when the raw scores have been equated for practice effect - giving the same average IQs and the same standard deviation from day to day) are numerous; ranging from less than one IQ point to over eight IQ points.

2. Children differ greatly in their degree of variation and thus the probable error or the standard error of measurement does not apply equally to all individuals.

3. Variability is shown by a normal distribution that seems to have been folded back upon itself.

4. Correlations between variability and mean IQ and variability and ratings are not applicable because the relation between the two variables is not linear.

5. Correlation ratios between variability and mean IQ and variability and ratings were higher than the correlations
themselves, but there is no assurance that the correlation ratio gives a true measure of this unusual distribution.

6. Teachers' temperament rankings correlate substantially with intelligence.

7. The intercorrelations between the five temperament traits are fairly high.

8. Persistence (Trait III) shows the highest average intercorrelation with the other traits.

9. Changes in Energy Level (Trait II) shows the lowest average intercorrelation with the other traits.

Limitations

The limitations of this study are centered principally around questions of reliability.

1. There is no statistical measure of the reliability of the variances.

2. The reliability of the teachers' rankings was not statistically determined.

Suggestions for Further Research

Further research could be carried out either using the data presented here or using similar techniques on comparable data. A few suggested topics are:

1. The relation of IQ variances to achievement as determined by a standardized test.

2. The relation of temperament rankings to achievement as determined by a standardized test.

3. The relation of IQ variances to teachers' marks.

4. The relation of temperament rankings to teachers' marks.
5. The relation of Changes in Energy Level to variances.
6. The correlation between teachers' total temperament rankings on one day and teachers' total temperament rankings on a subsequent day.
7. The relation of speed on the practice test to IQ variances.
8. Changes in variance from the timed IQ to the untimed IQ.
9. Case studies of the 70 children with high IQ variances.
OTIS QUICK-SCORING MENTAL ABILITY TESTS

By ARTHUR S. OTIS, PH.D.
Formerly Development Specialist with Advisory Board, General Staff, United States War Department

BETA TEST: FORM CM

For Grades 4-9

IQ.............. Score..............

---

Read this page. Do what it tells you to do.

Do not open this booklet, or turn it over, until you are told to do so.

Fill these blanks, giving your name, age, birthday, etc. Write plainly.

Name.......................................................... Age last birthday.............. years
First name, initial, and last name

Birthday.................................................. Teacher............................... Date......................... 19...........
Month Day

Grade............................... School............................... City and state

This is a test to see how well you can think. It contains questions of different kinds. Here are three sample questions. Five answers are given under each question. Read each question and decide which of the five answers below it is the right answer.

Sample a: Which one of the five things below is soft?

\[\begin{array}{cccc}
1 & \text{glass} & 2 & \text{stone} \\
3 & \text{cotton} & 4 & \text{iron} \\
5 & \text{ice} & & \\
\end{array}\]

The right answer, of course, is \text{cotton}; so the word \text{cotton} is underlined. And the word \text{cotton} is No. 3; so a heavy mark has been put in the space under the 3 at the right. This is the way you are to answer the questions.

Try the next sample question yourself. Do not write the answer; just draw a line under it and then put a heavy mark in the space under the right number.

Sample b: A robin is a kind of —

\[\begin{array}{cccc}
6 & \text{plant} & 7 & \text{bird} \\
8 & \text{worm} & 9 & \text{fish} \\
10 & \text{flower} & & \\
\end{array}\]

The answer is \text{bird}; so you should have drawn a line under the word \text{bird}, and \text{bird} is No. 7; so you should have put a heavy mark in the space under the 7. Try this one:

Sample c: Which one of the five numbers below is larger than 55?

\[\begin{array}{cccc}
11 & 12 & 13 & 14 & 15 \\
16 & 17 & 18 & 19 & 20 \\
21 & 22 & 23 & 24 & 25 \\
26 & 27 & 28 & 29 & 30 \\
31 & 32 & 33 & 34 & 35 \\
36 & 37 & 38 & 39 & 40 \\
41 & 42 & 43 & 44 & 45 \\
46 & 47 & 48 & 49 & 50 \\
51 & 52 & 53 & 54 & 55 \\
56 & 57 & 58 & 59 & 60 \\
61 & 62 & 63 & 64 & 65 \\
66 & 67 & 68 & 69 & 70 \\
71 & 72 & 73 & 74 & 75 \\
76 & 77 & 78 & 79 & 80 \\
81 & 82 & 83 & 84 & 85 \\
86 & 87 & 88 & 89 & 90 \\
91 & 92 & 93 & 94 & 95 \\
96 & 97 & 98 & 99 & 100 \\
\end{array}\]

The answer, of course, is 57; so you should have drawn a line under 57, and that is No. 14; so you should have put a heavy mark in the space under the 14.

The test contains 80 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.

Patent No. 1,586,628

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PRINTED IN U.S.A. BETA: CM-7

\(\text{This test is copyrighted. The reproduction of any part of it by mimeograph, hectograph, or in any other way, whether the reproductions are sold or are furnished free for use, is a violation of the copyright law.}\)
64. If the following words were arranged in order, which word would be in the middle?  
- plaster  
- frame  
- wallpaper  
- lath  
- foundation.

65. Which statement tells best just what a window is?  
- something to see through  
- a frame with a glass in it  
- a glass opening in the wall of a house  
- a piece of glass surrounded by wood.

66. A feeling that each of two persons has for the other is said to be —  
- friendship  
- mutual  
- incompatible  
- contemporary  
- deference.

67. Which one of the following words would come last in the dictionary?  
- heart  
- judge  
- north  
- nerve  
- grass.

68. What letter precedes the letter that comes next before Q in the alphabet?  
- P  
- Q  
- R  
- S

69. One number is wrong in this series. 1 2 4 8 12 32 64 What should that number be?  
- 6  
- 12  
- 3  
- 16  
- 48.

70. If I have a large box with 3 small boxes in it and 3 very small boxes in each small box, how many boxes are there in all?  
- 6  
- 7  
- 3  
- 12  
- 13.

71. There is a saying, “Don’t ride a free horse to death.” This means —  
- Don’t be cruel.  
- Don’t abuse a privilege.  
- Don’t accept gifts.  
- Don’t be reckless.

72. Three of the four designs at the right are alike. Which one is not like the other three?  
- 25  
- 27  
- 29  
- 31  
- 33.

73. If a photograph that is 3 in. wide and 4 in. long is enlarged to be 15 in. wide, how many inches long will it be?  
- 16  
- 17  
- 20  
- 45  
- 60.

74. One number is wrong in the following series. 3 4 6 7 9 10 12 14 What should that number be?  
- 8  
- 2  
- 11  
- 13  
- 5.

75. When the time by a clock was 13 min. past 6, the hands were interchanged. The clock then said about —  
- 6 min. past 12  
- 12 min. past 6  
- 29 min. of 3  
- 12 min. of 6  
- 8 min. past 2.

76. A car owner uses a mixture in his radiator containing 1 qt. of alcohol to every 2 qt. of water. How many quarts of alcohol are needed for 18 quarts of the mixture?  
- 9  
- 7  
- 4  
- 36  
- 6.

77. What letter in the following series appears a third time nearest the beginning?  
- A  
- E  
- D  
- B  
- A  
- C  
- C  
- E  
- D  
- F  
- B  
- D  
- C  
- A  
- E  
- E  
- B  
- C.

78. In a foreign language bora cama deta means very good food, bora lopa means poor food, cama fila means very large. What word means good?  
- bora  
- cama  
- deta  
- lopa  
- fila.

79. Which one of the five words below does not belong with the others?  
- many  
- little  
- several  
- few  
- numerous.

80. A boy is now three times as old as his sister. In 2 years he will be only twice as old. How many years old will his sister be then?  
- 1  
- 2  
- 3  
- 4  
- 5.
Examination begins here.

1. Which one of the five things below does not belong with the others?
   ① rose ② violet ③ pansy ④ grape ⑤ morning-glory

2. Which one of the five answers below tells best what a hammer is?
   ① a thing ② a tool ③ furniture ④ a weapon ⑤ a machine

3. Which one of the five words below means the opposite of west?
   ① north ② south ③ east ④ equator ⑤ sunset

4. A banana is to the peeling and an ear of corn is to the husk as an egg is to what?
   ① an omelet ② the shell ③ a cob ④ a hen ⑤ food

5. A child who accidentally hurts another child should —
   ① say he didn’t do it ② run away ③ do nothing ④ say, “I’m sorry”

6. Which one of the five things below is the largest?
   ① a bud ② a branch ③ a tree ④ a twig ⑤ a limb

7. Which one of the five words below means the opposite of thin?
   ① strong ② fat ③ healthy ④ tall ⑤ large

8. Three of the four designs at the right are alike. Which one is not like the other three?

9. Which one of the five things below is most like these three: a cup, a plate, and a saucer?
   ① a fork ② a table ③ a napkin ④ a bowl ⑤ a spoon

10. A hand is to an arm as a foot is to what?
    ① a toe ② a leg ③ a finger ④ a wrist ⑤ a knee

11. Which word means the opposite of sorrow?
    ① sickness ② health ③ good ④ joy ⑤ pride

12. When a new kind of machine is thought of, it is usually called —
    ① a discovery ② an adoption ③ a creation ④ a novelty ⑤ an invention

13. Which is the most important reason we use money?
    ① It is made of silver. ② It makes goods cheaper. ③ It is fun to jingle.
    ④ It makes exchanging goods easier. ⑤ We have used it for a long time.

14. A book is to an author as a statue is to what?
    ① marble ② a sculptor ③ a model ④ a magazine ⑤ a man

15. At 4 cents each, how many pencils can be bought for 36 cents?
    ① 40 ② 32 ③ 36 ④ 9 ⑤ 144

16. Three of the four designs at the right are alike. Which one is not like the other three?

17. Which one of the five things below is most like these three: a plum, an apricot, and an apple?
    ① a tree ② a seed ③ a peach ④ a flower ⑤ a leaf

18. A seed is to a plant as ( ) is to a bird.
    ① a tree ② an egg ③ a feather ④ a nest ⑤ flying

19. If the words below were rearranged to make a good sentence, with what letter would the last word of the sentence begin?
    usually are on hung walls pictures
    ① p ② a ③ w ④ h ⑤ u

20. Which word means the opposite of ugly?
    ① witch ② pretty ③ colored ④ deformed ⑤ mean

21. A boy who often tells stories he knows are not true is said to —
    ① brag ② cheat ③ jokes ④ lie ⑤ exaggerate

22. One number is wrong in the following series. ① 7 ② 7 ③ 7 ④ 7 ⑤ 7 What should that number be?
    ① 6 ② 7 ③ 8 ④ 4 ⑤ 5

23. Which one of the five things below is most like these three: an eagle, a giraffe, and a lizard?
    ① a wing ② a neck ③ a stone ④ a mouse ⑤ a tree

24. Coal is to a locomotive as what is to an automobile?
    ① a motorcycle ② smoke ③ wheels ④ gasoline ⑤ horn
25. Which one of the words below would come first in the dictionary?
   - trail  - salt  - scaring  - grave  - quarry
   - trail

26. An electric light is to a candle as a motorcycle is to —
   - a bicycle  - an automobile  - wheels  - speed  - police
   - a bicycle

27. Which tells best just what a pitcher is?
   - a vessel from which to pour liquid  - something to hold milk
   - It has a handle  - It goes on the table  - It is easily broken
   - It has a handle

28. Which of these series contains a wrong number?
   - 3-6-9-12-15  - 1-4-7-10-13  - 2-5-8-11-15
   - 2-4-6-8-10  - 1-3-5-7-9
   - 2-4-6-8-10

29. Which of the five things below is most like these three: a boat, a horse, and a train?
   - a sail  - a river  - a motorcycle  - a road  - a track
   - a sail

30. Three of the four designs at the right are alike. Which one is not like the other three?

   - ![Design A](image1)
   - ![Design B](image2)
   - ![Design C](image3)
   - ![Design D](image4)
   - ![Design D](image4)

31. If the words below were rearranged to make a good sentence, the third word of the sentence would begin with what letter?
   - honey bee  - clover  - gather  - red  - from
   - r

32. A road is to an automobile as (?) is to an airplane.
   - flying  - a propeller  - speed  - the air  - a wing
   - flying

33. If Paul is taller than Harry and Harry is taller than James, then Paul is (?) James.
   - shorter than  - taller than  - just as tall as  - (cannot say which)
   - just as tall as

34. Count each 5 below that has a 3 next after it.
   Tell how many 5's you count.
   - 3 6 7 5 1 5 6 3 5 2 0 9 5 3 5 1 0 2 5 8 7 1 5 3 5 0 1 3 5 5 3 2 5
   - 16 2 7 3 4 5

35. A man who acquires the property of others by deceit is called a —
   - traitor  - swindler  - burglar  - prisoner  - lawyer
   - traitor

36. The son of my father's sister is my (?) —
   - nephew  - uncle  - cousin  - stepbrother  - grandson
   - nephew

37. Order is to confusion as (?) is to war.
   - guns  - peace  - powder  - thunder  - army
   - guns

38. A quantity which grows smaller is said to —
   - fade  - decrease  - dry up  - die  - sink
   - decrease

39. If the following words were arranged in order, with what letter would the middle word begin?
   - Minute  Month  Day  Second  Hour  Year  Week
   - M H D S W

40. If Carl is younger than Edward and Carl is older than John, then John is (?) Edward.
   - younger than  - older than  - just as old as  - (cannot say which)
   - younger than

41. Which tells best just what a lamb is?
   - an animal with wool  - a creature with four legs and a tail
   - a young sheep  - a lively small animal
   - a young animal that eats grass
   - a young sheep

42. Which one of the five things below is most like these three: a towel, a shirt, and a handkerchief?
   - a laundry  - a store  - a bath  - a sail  - a shoe
   - a towel

43. What is the most important reason that we use telephones?
   - to call the fire department  - to save time in communication
   - to chat with our neighbors  - to hear the bell ring
   - to chat with our neighbors

44. Which one of the words below would come last in the dictionary?
   - emerge  - eject  - edible  - estate  - enter
   - enter
45. Grass is to cattle as bread is to what?
   ① butter  ② flour  ③ milk  ④ man  ⑤ horses

46. There is a saying, “Every rose has its thorn.” This means that—
   ① All rosebushes have thorns.  ② There is no joy without some sorrow.
   ③ Some rose petals are sharp.  ④ All flowers come from bushes.

47. If the following words were arranged in order, which word would be in the middle?
   ① October  ② June  ③ December  ④ August  ⑤ April

48. If Paul is taller than Herbert and Herbert is just as tall as Robert, then Robert is (?) Paul.
   ① taller than  ② shorter than  ③ just as tall as  ④ (cannot say which)

49. A king is to a kingdom as what is to a republic?
   ① a democrat  ② a monarchy  ③ a president  ④ laws  ⑤ a voter

50. Three of the four designs at the right are alike.
   Which one is not like the other three?

51. A person who is sure he can accomplish a task is said to be—
   ① successful  ② confident  ③ proud  ④ fearless  ⑤ brave

52. Which statement tells best just what a watch is?
   ① It ticks.  ② something to tell time  ③ a small round object with a chain
   ④ a vest-pocket-sized time-keeping instrument  ⑤ something with a face and hands

53. Loud is to sound as bright is to what?
   ① noise  ② shiny  ③ dull  ④ quiet  ⑤ light

54. If the following words were rearranged to make a good sentence, the second word of the sentence would begin with what letter?
   always father A younger his than boy is
   ① f  ② a  ③ t  ④ b  ⑤ y

55. Which word means the opposite of pride?
   ① sorrow  ② proud  ③ miserable  ④ conceit  ⑤ humility

56. If a man has walked west from his home 9 blocks and then walked east 4 blocks, how many blocks is he from his home?
   ① 13  ② 9  ③ 12  ④ 4  ⑤ 5

57. An object or institution that will not perish or cease is said to be—
   ① stationary  ② stable  ③ permanent  ④ solid  ⑤ sound

58. Ice is to water as water is to what?
   ① land  ② steam  ③ cold  ④ river  ⑤ thirst

59. There is a saying, “A drowning man will grasp at straws.” This means that—
   ① A man will sink more easily than a straw.  ② Everyone should learn to swim.
   ③ Desperate people cling to absurd hopes.  ④ Those who cannot swim should stay on land.

60. Which one of the five words below is most like these three: fat, blue, soft?
   ① sky  ② size  ③ very  ④ color  ⑤ small

61. An uncle is to an aunt as a son is to a (?)
   ① brother  ② father  ③ sister  ④ daughter  ⑤ girl

62. There is a saying, “As you make your bed, so must you lie on it.” This means that—
   ① You should learn to make your own bed.  ② You must bear the consequences of your own acts.
   ③ You must lie down as soon as your bed is made up.
   ④ Sleep is necessary to have good health.

63. Three of the four designs at the right are alike.
   Which one is not like the other three?
   (Go right on to the next page)
OTIS QUICK-SCORING MENTAL ABILITY TESTS

By Arthur S. Otis, Ph.D.
Formerly Development Specialist with Advisory Board
General Staff, United States War Department

Beta Test: For Grades 4-9

Read this page. Do what it tells you to do. Do not open this booklet, or turn it over, until you are told to do so.

Name ____________________________________________________________ Test No. __________ Date __________

Starting time ___________________________ Finishing time ___________________________

Score ___________________________ IQ ___________________________

This is a test to see how well you can think. It is very much like the Otis test you took the other day. This test contains 40 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed 15 minutes after your teacher tells you to begin. Put the time that you start in the space at the top of the test. When the 15 minutes are over put a circle around the number of the question that you have just finished. Your teacher will tell you when to do this. Then go on and finish the test. On the line that says finishing time write in the time your school clock says when you have completed all 40 questions. Try to get as many right as possible. Do not go so fast that you make mistakes. Do not spend too much time on any one question. Answer the questions in the same way you answered the practice test questions. No questions about the test will be answered by your teacher after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.
39. What letter in the following series appears only 2 times?
A B B C C C D D D D

40. If the following letters were arranged in order, which one would come first?
f. Z g. M h. A i. H j. J ............. f g h i j
1. Which one of the five things below does not belong with the others?
   a. potato  b. turnip  c. carrot
   d. stone  e. onion  
   
   a b c d e

2. Which one of the five answers below tells best what a sword is?
   f. to cut  g. a weapon  h. an officer
   i. a tool  j. to fight
   
   f g h i j

3. Which one of the five things below is the largest?
   a. knee  b. toe  c. leg
   d. ankle  e. foot
   
   a b c d e

4. Which one of the five words means the opposite of strong?
   f. man  g. weak  h. small
   i. short  j. thin
   
   f g h i j

5. Which one of the five things below is most like these three: a chair, a bed, and a stove?
   a. a chimney  b. a stick  c. a window
   d. a table  e. a floor
   
   a b c d e

6. A sculptor is to a statue as an author
   is to a —
   f. book  g. man  h. name
   i. bookcase  j. pen
   
   f g h i j

7. At 3 cents each, how many pencils can be bought for 27 cents?
   a. 27  b. 31  c. 3  d. 9  e. 30
   
   a b c d e

8. Three of the four designs below are alike. Which one is not like the other three?
   f.  g.  h.  i.  
   
   f g h i
30. There is a saying, "O.K." This means --
   e. All right. f. No good. g. That's bad.
   h. I can't. i. Why not? .................... ( ) ( ) ( ) ( )

31. The opposite of night is day. Which word means the opposite of dark?
   a. light b. dark c. night d. day  
   e. sun ............................... ( ) ( ) ( ) ( )

32. A very pretty girl is often said to be --
   f. ugly g. fat h. tall i. beautiful
   j. thin ............................... ( ) ( ) ( ) ( )

33. Three of the four designs below are alike. Which one is not like the other three?
   a. □ b. □ c. □ d. □  
   e. □ f. □ g. □ h. □ i. □  
   j. □ ....................... ( ) ( ) ( ) ( )

34. What is the letter that comes after M in the alphabet?
   f. X g. A h. N i. K ................. ( ) ( ) ( ) ( )

35. One number is wrong in the following group. What should that number be?
   6 6 6 6 7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
   a. 7 b. 3 c. 4 d. 6 e. 9 ............... ( ) ( ) ( ) ( )

36. If I have a large box with one small box in it, how many boxes are there in all?
   f. 1 g. 2 h. 3 i. 4 j. 0 ............... ( ) ( ) ( ) ( )

37. If the following words were rearranged to make a sentence, which word would be last?
   see I big a cat
   a. cat b. I c. big d. a e. see ........... ( ) ( ) ( ) ( )

38. A boy had a board with 12 nails in it. He pulled 2 of them out. How many nails were left in the board?
   f. 6 g. 8 h. 4 i. 10 j. 11 ............... ( ) ( ) ( ) ( )
9. Which is the most important reason that words in the dictionary are arranged alphabetically?
   a. It is the simplest arrangement.
   b. It puts the shortest words first.
   c. It enables us to find any word quickly.
   d. It is a custom.
   e. The printing is easier.

10. If the following words were arranged in order, which word would be in the middle?
    a. lunch
    b. dress
    c. undress
    d. supper
    e. breakfast

11. A boy who often tells big stories about what he can do is said to —
    a. lie
    b. fake
    c. cheat
    d. joke
    e. brag.

12. Which of the five things below is most like these three: a horse, a pigeon, and a cricket?
    a. stall
    b. saddle
    c. feather
    d. goat
    e. wing

13. Which word means the opposite of pretty?
    a. good
    b. ugly
    c. bad
    d. crooked
    e. nice

14. One number is wrong in the following series. What should that number be? 7 1 7 2 7
    a. 3
    b. 4
    c. 5
    d. 0
    e. 8

15. Which statement tells best just what a hallway is?
    a. a small room
    b. a place to hang your hat and coat
    c. it is long and narrow
    d. where to say good-by
    e. a passage leading from one room to another

16. Steam is to water as water is to —
    a. hot
    b. ice
    c. an engine
    d. a solid
    e. gas
1. A ( ) is to sit on.
a. desk b. house c. chair d. block e. table

2. Which of the five things below is most like these two: knife and fork?
f. spoon g. meat h. dish i. table j. dinner

3. If the following words were rearranged to make a good sentence with what letter would the second word of the sentence begin like we dogs?
a. m b. l c. e d. d e. s

4. Which of the following objects is something to shoot with?
f. bell g. cat h. coat i. gun j. sled

5. Find another letter just like this one-S.

6. Which one of the five things below is most like these three: an apple, a pear, and a banana?
f. a bicycle g. a dog h. a vegetable i. a peach j. a toy

7. An object that is very big is said to be --
a. small b. short c. large d. little e. thin

8. If the following words were rearranged to make a sentence, the third word would begin with what letter? sun shines the
f. o g. s h. c i. t j. u

9. Three of the four designs are alike. Which one is not like the other three?
a. b. c. d.
17. Which one of these words would come last in the dictionary?  
   a. health
   b. juggle
   c. normal
   d. never
   e. grateful
   
   a b c d e

18. If George is taller than Frank and Frank is taller than James, then George is ( )
   James.
   f. taller than g. shorter than h. just as tall as i. (cannot say which)
   
   f g h i

19. A man who betrays his country is called a—  
   a. thief
   b. traitor
   c. enemy
   d. coward
   e. slacker
   
   a b c d e

20. The daughter of my mother's brother is my—  
   f. sister
   g. niece
   h. cousin
   i. aunt
   j. granddaughter
   
   f g h i j

21. A bicycle is to a motor cycle as a wagon is to what?  
   a. an engine
   b. automobile
   c. a horse
   d. slowest
   e. an airplane
   
   a b c d e

22. Which of the five things below is most like these three: a tent, a flag, and a sail?  
   f. a shoe
   g. a ship
   h. a staff
   i. a towel
   j. a rope
   
   f g h i j

23. If the following words were rearranged to make a good sentence, with which letter would the third word of the sentence begin?  
   houses stone built of men wood and
   a. h
   b. s
   c. b
   d. m
   e. w
   
   a b c d e

24. A lamp is to a light as (?) is to a breeze.  
   f. a fan
   g. bright
   h. a sailboat
   i. a window
   j. blow
   
   f g h i j

25. If Henry is taller than Tom and Henry is shorter than George, then George is ( ) Tom.  
   a. taller than b. shorter than c. just as tall as d. (cannot say which)
   
   a b c d
11. A person who is very small is often said to be —
   a. big  b. tiny  c. huge  d. large  e. tall.  
   ( ) ( ) ( ) ( ) ( )

12. Which of the five words below is most like these three: blue, red, and green?
   f. day  g. dark  h. yellow  i. light  j. night
   ( ) ( ) ( ) ( ) ( )

13. The opposite of sick is —
   a. day  b. ill  c. well  d. bad  e. poor
   ( ) ( ) ( ) ( ) ( )

14. One number is wrong in the following list:
   1 2 3 5 5 6 7. What should that number be?
   f. 8  g. 4  h. 5  i. 6  j. 2
   ( ) ( ) ( ) ( ) ( )

15. Which sentence tells best just what a ball is?
   a. a circle  b. a square object  c. a round object
      that bounces  d. a large thing  e. a small colored object.
      ( ) ( ) ( ) ( ) ( )

16. A hat is worn on the head as a (?) is worn on the foot.
   f. cap  g. dress  h. coat  i. shoe  j. glove
   ( ) ( ) ( ) ( ) ( )

17. Which one of these words would come last in the dictionary?
   a. apple  b. alike  c. acorn  d. zebra  e.
      ( ) ( ) ( ) ( ) ( )

18. A flower and a tree are alike because they both —
   f. run  g. sing  h. play  i. talk  j. grow.
   ( ) ( ) ( ) ( ) ( )

19. A man who robs a bank is called a —
   a. banker  b. robber  c. baker  d. coward  e. hero
   ( ) ( ) ( ) ( ) ( )

20. A mother sheep's lamb is her —
   f. baby  g. uncle  h. father  i. cousin  j. aunt
   ( ) ( ) ( ) ( ) ( )
26. Brick is to a wall as (?) is to a table.
   a. a chair  f. red  g. eat  h. a kitchen  e f g h i
   i. wood

27. An object or institution that is designed to last only a short time is said to be —
   a. temporary  b. changeable  c. unsound  a b c d e
   d. worthless  e. unstable

28. If the words below were rearranged to make a good sentence, the third word of the sentence would begin with what letter?
   men high the a wall built stone
   f. m g. b h. h i. w j. s

29. Three of the four designs below are alike.
   Which one is not like the other three?
   a. b. c. d. e

30. There is a saying, "Any port in a storm."
   This means —
   e. Ships should not venture out to sea in storms.
   f. Stormy weather causes large waves in harbors.
   g. In emergencies any aid is acceptable.
   h. Ships usually sink in storms

31. A boy is to a man as (?) is to a sheep.
   a. wool  b. a lamb  c. a goat  a b c d e
   d. a shepherd  e. a dog

32. An agreement reached in which both sides yield somewhat in their demands is called —
   f. a promise  g. a compromise  h. an understanding
   i. a deadlock  j. an armistice

33. Three of the four designs below are alike.
   Which one is not like the other three?
   a. b. c. d.
1. A circle is —
   a. round  b. square  c. pointed  
d. long  e. short .................................
   ( ) ( ) ( ) ( )

2. Which one of the five answers below tells
   best what a cat is?
   f. a bird  g. an animal  h. a girl
   i. a fish  j. a man .................................
   ( ) ( ) ( ) ( )

3. Which one of the five things below is
   biggest?
   a. a house  b. a top  c. a boy  d. a table
   e. a bed ................................. ( ) ( ) ( ) ( )

4. Sweet is the opposite of —
   f. hard  g. soft  h. funny  i. sour  j. hot.. ( ) ( ) ( ) ( )

5. Which of the five words below is most like
   these three: January, March, and August?
   a. Monday  b. morning  c. day  d. December
   e. night ................................. ( ) ( ) ( ) ( )

6. A man who makes bread is called —
   f. a baker  g. a carpenter  h. a plumber
   i. a locksmith  j. a chief ...........................
   ( ) ( ) ( ) ( )

7. If a girl has two pencils and gives one
   away how many will she have left?
   a. 0  b. 2  c. 3  d. 1  e. 4 .................................
   ( ) ( ) ( ) ( )

8. Three of the four figures below are alike
   which one is not like the other three?
   f. △ g. △ h. □ i. △ ................................. ( ) ( ) ( )

9. Which is the most important reason that
   we have stoves?
   a. to cook food  b. to furnish the kitchen
   c. to save money  d. to keep food cold
   e. to sleep on ................................. ( ) ( ) ( ) ( )

If the following numbers were rearranged in
order, which number would be in the middle?
   f. four  g. two  h. five  i. one  j. three  ( ) ( ) ( ) ( )
34. What is the letter that follows the letter that comes next after i in the alphabet?
   e. L  f. M  g. N  h. O  i. P
   ( ) ( ) ( ) ( )

35. One number is wrong in the following series:
   1  2  4  8  24  32  64. What should that number be?
   a. 6  b. 12  c. 3  d. 16  e. 48
   ( ) ( ) ( ) ( )

36. If I have a large box with two small boxes in it and five very small boxes in each small box, how many boxes are there in all?
   f. eight  g. seven  h. ten  i. twelve
   j. thirteen
   ( ) ( ) ( ) ( )

37. There is a saying, "An ounce of practice is worth a pound of preaching." This means—
   a. Don't preach  b. Deeds count more than words  c. Preaching takes practice  d. Don't practice
   ( ) ( ) ( ) ( )

38. A car owner uses a mixture in his radiator containing 1 quart of alcohol to every 2 quarts of water. How many quarts of alcohol are needed for 15 quarts of the mixture?
   e. 7  f. 1  g. 1/4  h. 30  i. 5
   ( ) ( ) ( ) ( )

39. What letter in the following series appears a third time nearest the beginning?
   A  E  C  B  A  D  D  E  C  F  B  C  D  A  E
   E  B  D
   ( ) ( ) ( ) ( )

40. In a foreign language pira numa bega means very deep snow; pira seco means white snow; numa copa means very well. What word means deep?
   f. pira  g. numa  h. bega  i. copa  j. seco
   ( ) ( ) ( ) ( )
PRACTICE TEST

Read this page. Do what it tells you to do. Do not open this book.

Name __________________________ Score ______ Date ______

This test is a practice test. It contains questions of different kinds.

Here is a sample question already answered correctly. Notice how the
question is answered.

SAMPLE: Which of the five things below is blue?
   a. grass  b. sky  c. snow  d. money  e. apple ... ( ) ( ) ( ) ( )

   The right answer, of course, is sky; so the word sky is underlined.
   And the word sky is by so the letter e parenthesis has been filled in.
   This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer. Just
draw a line under it and fill in the right parenthesis.

SAMPLE: A fish ... 
   f. runs  g. walks  h. swims  i. hops  j. jumps ... ( ) ( ) ( )

   The answer is swims; so you should have drawn a line under swims and
   filled in the h parenthesis. Try this one:

SAMPLE: How much is 3 and 7?
   a. 8  b. 4  c. 6  d. 9  e. 10 ... ( ) ( ) ( ) ( ) ( )

   The answer, of course, is 10; so you should have drawn a line under 10
   and filled in the e parenthesis.

This test contains 40 questions. You will be given 45 minutes in
which to complete the test. Your teacher will tell you when to begin and
when to put your pencils down. Since this is a practice test the ques-
tions will seem quite simple. In most cases you will be able to figure out the
answers very quickly. When your teacher tells you to stop, put a circle
around the number of the question you have just finished.
OTIS QUICK-SCORING MENTAL ABILITY TESTS

By Arthur S. Otis, Ph.D.
Formerly Development Specialist with Advisory Board
General Staff, United States War Department

Beta-Split
Forms A B

Beta Test: For Grades 4-9

Read this page. Do what it tells you to do. Do not open this booklet, or turn it over, until you are told to do so.

Name ________________________________ Test No. ____ Date ______________

Starting time _____________________ Finishing time _____________________

Score __________________________ IQ __________

This is a test to see how well you can think. It is very much like the Otis test you took the other day. This test contains 40 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed 15 minutes after your teacher tells you to begin. Put the time that you start in the space at the top of the test. When the 15 minutes are over put a circle around the number of the question that you have just finished. Your teacher will tell you when to do this. Then go on and finish the test. On the line that says finishing time write in the time your school clock says when you have completed all 40 questions. Try to get as many right as possible. Do not go so fast that you make mistakes. Do not spend too much time on any one question. Answer the questions in the same way you answered the practice test questions. No questions about the test will be answered by your teacher after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.
other toilets

Third of the four designs below are

in alfresco box in the bow many boxes are there

appears only 2 these

Toilet better in the condition better

Practice Form A2
1. Which one of the five words below means the opposite of north?
a. east  b. star  c. south  
d. pole  e. equator

2. The peeling is to a banana and the husk is to an ear of corn the same as a shell is to what?
f. an apple  g. an egg  h. juice
i. a peach  j. a hen

3. A child who knows he is guilty of doing wrong should feel —
a. bad  b. sick  c. better  d. afraid
 e. ashamed

4. Three of the four designs below are alike. Which one is not like the other three?
f.  
g.  
h.  
i.  

5. A knee is to a leg as an elbow is to what?
a. an arm  b. a shoulder  c. a bone
 d. a wrist  e. a hand

6. Which word means the opposite of joy?
f. sickness  g. bad  h. happiness
i. sorrow  j. cry

7. If I find a kind of plant that was never seen before, I have made —
a. an invention  b. an adoption  c. a creation
 d. a novelty  e. a discovery

8. Which one of the five things below is most like these three: a saw, a hammer, and a file?
f. a bottle  g. a pen  h. a screw driver
i. a fork  j. a carpenter

9. The saying, "Don't count your chickens before they are hatched," means —
a. Don't hurry  b. Don't be too sure of the future  c. Haste makes waste  d. Don't gamble  e. Don't raise chickens
29. Which one of the five things below is most like these three: an apple, a pear, and a banana?
   a. a bicycle  b. a dog  c. a vegetable  d. a peach  e. a toy
   ( ) ( ) ( ) ( ) ( )

30. If the following words were rearranged to make a good sentence with what letter would the second word of the sentence begin? Like we dogs
   f. w g. l h. e i. d j. e
   ( ) ( ) ( ) ( )

31. A boy had a board with 12 nails in it. He pulled 2 of them out. How many nails were left in the board?
   a. 0  b. 6  c. 4  d. 10  e. 11
   ( ) ( ) ( ) ( )

32. One number is wrong in the following group. What should that number be?
   f. 7  g. 3  h. 4  i. 6  j. 9
   ( ) ( ) ( )

33. A very pretty girl is often said to be —
   a. ugly  b. fat  c. tall  d. beautiful  e. thin
   ( ) ( ) ( ) ( )

34. If the following letters were arranged in order, which one would come first?
   f. Z  g. E  h. A  i. H  j. I
   ( ) ( ) ( ) ( )

35. If the following words were rearranged to make a sentence, which word would be last? See I big a cat
   a. cat  b. I  c. big  d. a  e. see
   ( ) ( ) ( )

36. What is the letter that comes after J in the alphabet?
   f. X  g. A  h. C  i. H  j. K
   ( ) ( ) ( ) ( )

37. The opposite of night is day. Which word means the opposite of dark?
   a. light  b. dark  c. night  d. day  e. sun
   ( ) ( ) ( ) ( )
10. Three of the four designs below are alike. Which one is not like the other three?
   f. □  g. □  h. □  i. □  j. □  k. □  l. □  m. □  n. □  o. □  p. □  q. □  r. □  s. □  t. □  u. □  v. □  w. □  x. □  y. □  z. □  

11. Which tells best just what a colt is?
   a. an animal with hoofs  b. an awkward little beast  c. an animal that runs fast
d. a young horse  e. a little animal that eats hay  

   f. □  g. □  h. □  i. □  j. □  k. □  l. □  m. □  n. □  o. □  p. □  q. □  r. □  s. □  t. □  u. □  v. □  w. □  x. □  y. □  z. □  

12. Railroad tracks are to a locomotive as what is to an automobile?
   f. tires  g. steam  h. speed  i. the road  j. gasoline  

   f. □  g. □  h. □  i. □  j. □  k. □  l. □  m. □  n. □  o. □  p. □  q. □  r. □  s. □  t. □  u. □  v. □  w. □  x. □  y. □  z. □  

13. Which one of the words below would come first in the dictionary?
   a. tramp  b. saint  c. razor  d. quart  e. grass  

   a. □  b. □  c. □  d. □  e. □  f. □  g. □  h. □  i. □  j. □  k. □  l. □  m. □  n. □  o. □  p. □  q. □  r. □  s. □  t. □  u. □  v. □  w. □  x. □  y. □  z. □  

14. An event which is sure to happen is said to be —
   f. probable  g. possible  h. doubtful  
i. certain  j. delayed  

   f. □  g. □  h. □  i. □  j. □  k. □  l. □  m. □  n. □  o. □  p. □  q. □  r. □  s. □  t. □  u. □  v. □  w. □  x. □  y. □  z. □  

15. Which of these series contains a wrong number?
   a. 3-6-9-12-15  b. 2-5-8-11-14  c. 1-4-7-10-13  d. 1-4-6-8-10  e. 1-3-5-7-9  

   a. □  b. □  c. □  d. □  e. □  f. □  g. □  h. □  i. □  j. □  k. □  l. □  m. □  n. □  o. □  p. □  q. □  r. □  s. □  t. □  u. □  v. □  w. □  x. □  y. □  z. □  

16. Which one of the five things below is most like these three: a ship, a bicycle, and a truck?
   f. a sail  g. a wheel  h. a train  
i. the ocean  j. a tire  

   f. □  g. □  h. □  i. □  j. □  k. □  l. □  m. □  n. □  o. □  p. □  q. □  r. □  s. □  t. □  u. □  v. □  w. □  x. □  y. □  z. □  

17. Count each 7 below that has a 5 next after it.
   7 5 3 0 9 7 3 5 8 7 7 4 2 1 7 5 7 3 2 4 7 0 9
   3 7 5 5 7 2 5 7 7 5 4 7 1
   How many such 7's did you count?
   a. 11  b. 2  c. 3  d. 4  e. 12  

   a. □  b. □  c. □  d. □  e. □  f. □  g. □  h. □  i. □  j. □  k. □  l. □  m. □  n. □  o. □  p. □  q. □  r. □  s. □  t. □  u. □  v. □  w. □  x. □  y. □  z. □
20. The opposite of sick is _____________.
21. If the following words were rearranged to make a sentence, the third word would be in the correct position:
   a. spoon  b. meat  c. dish  d. table
22. Which of the five things below is most like these two: knife and fork?
   a. glass  b. book  c. dish  d. table
23. There is a saying, "O.K." This means —_________.
   a. All right  b. No good  c. I can't  d. Why not?
24. In object that is very big is said to be —_________.
   a. small  b. short  c. large  d. little
25. Which of the following objects is something to shoot with?
   a. desk  b. house  c. chair  d. block
26. f. ( ) is to sit on.
   a. desk  b. house  c. chair  d. block
18. Peace is to war as (?) is to confusion.
f. explosion g. order h. armistice... f g h i j
i. riot j. police .................

19. If Paul is older than Herbert and Paul
is younger than Robert, then Robert is
(?) Herbert.
a. older than b. younger than c. just
as old as d. (cannot say which) ........

20. If the following words were arranged in
order, with what letter would the middle
word begin?
Week Year Hour Second Day Month
Minute
e. W f. S g. H h. D i, k ...........

21. A quantity which grows larger is said to —
a. prosper b. increase c. fatten
d. rise e. burst .................

22. What is the most important reason that we
use clocks?
f. To wake us up in the morning.
g. To help us catch trains.
h. To regulate our daily lives.
i. They are ornamental.
j. So that children will get to school
on time. .........................

23. Which of these expressions is the most
definite?
a. soon b. early c. later
d. morning e. ten A.M. ............

24. A vase is to flowers as (?) is to milk.
f. a cow g. a pitcher h. white
i. drink j. cream ...................

25. If the following words were arranged in
order, which word would be in the middle?
a. good b. excellent c. wretched
d. fair e. poor ......................
10. Three of the four figures below are alike. Which one is not like the other three?
   f. △  g. △  h. □  i. △

   ( ) ( ) ( ) ( )

11. A flower and a tree are alike because they both —
   a. run  b. sing  c. play  d. talk  e. grow

   ( ) ( ) ( ) ( )

12. Which sentence tells best just what a ball is?
   f. a circle  g. a square object
   h. a round object that bounces  i. a large thing
   j. a small colored object

   ( ) ( ) ( ) ( )

13. Which of the five words below is most like these three: blue, red, and green?
   a. day  b. dark  c. yellow  d. light  e. night

   ( ) ( ) ( ) ( )

14. A mother sheep's lamb is her —
   f. baby  g. uncle  h. father
   i. cousin  j. aunt

   ( ) ( ) ( ) ( )

15. Which one of these words would come last in the dictionary?
   a. apple  b. alike  c. acorn  d. zebra  e. and

   ( ) ( ) ( ) ( )

16. One number is wrong in the following list. 1 2 3 5 5 6 7 What should that number be?
   f. 8  g. 4  h. 5  i. 6  j. 2

   ( ) ( ) ( ) ( )

17. A person who is very small is often said to be —
   a. big  b. tiny  c. huge  d. large  e. tall

   ( ) ( ) ( ) ( )

18. A man who robs a bank is called a —
   f. banker  g. robber  h. baker  i. coward  j. hero

   ( ) ( ) ( ) ( ) ( )
26. A king is to a kingdom as a president is to what?
   f. queen  g. vice-president  h. senate  f g h i j
   i. republic  j. democrat  .....................
   ( ) ( ) ( ) ( ) ( )

27. John is the fifth child from each end of a row. How many pupils are there in a row?
   a. ten  b. eleven  c. seven  d. nine  a b c d e
   e. five  ..................
   ( ) ( ) ( ) ( ) ( )

28. Which tells best what an automobile is?
   f. a thing with tires  g. something to travel in  h. an engine mounted on wheels
   i. a horseless carriage  j. a vehicle
   f g h i j
   propelled by an engine  ..................
   ( ) ( ) ( ) ( )

29. A wire is to electricity as (?) is to gas.
   a. a flame  b. a spark  c. hot
   d. a pipe  e. a stove  ...................
   ( ) ( ) ( ) ( )

30. Which word means the opposite of humility?
   f. joy  g. pride  h. dry  i. funny
   j. recklessness  ..................
   ( ) ( ) ( ) ( )

31. A word that means suitable, fit, or proper is —
   a. grotesque  b. odd  c. inadequate
   d. superfluous  e. appropriate
   a b c d e
   ................
   ( ) ( ) ( ) ( ) ( )

32. Which one of the five things below is most like these three: cannon ball, wire, and penny?
   f. dollar bill  g. bone  h. string
   i. pencil  j. key
   f g h i j
   ................
   ( ) ( ) ( ) ( )

33. Three of the four designs below are alike. Which one is not like the other three?
   a. 
   b. 
   c. 
   d. 
   a b c d
   ................
   ( ) ( ) ( ) ( )
1. Which one of the five things below is biggest?
   a. a house   b. a top   c. a boy   d. a table   e. a bed
   a   b   c   d   e

2. Which of the five words below is most like these three: January, March and August?
   f. Monday   g. morning   h. day   i. December   j. night
   f   g   h   i   j

3. Which one of the five answers below tells best what a cat is?
   a. a bird   b. an animal   c. a girl   d. a fish   e. a man
   a   b   c   d   e

4. If the following numbers were rearranged in order, which number would be in the middle?
   f. four   g. two   h. five   i. one   j. three
   f   g   h   i   j

5. If a girl has two pencils and gives one away, how many will she have left?
   a. 0   b. 2   c. 3   d. 1   e. 4
   a   b   c   d   e

6. Sweet is the opposite of —
   f. hard   g. soft   h. funny   i. sour   j. hot
   f   g   h   i   j

7. A circle is —
   a. round   b. square   c. pointed   d. long   e. short
   a   b   c   d   e

8. Which is the most important reason that we have stoves?
   f. to cook food   g. to furnish the kitchen
   f   g
   h. to save money   i. to keep food cold
   h   i
   j. to sleep on
   j

9. A man who makes bread is called a —
   a. baker   b. carpenter   c. plumber   d. locksmith   e. chief
   a   b   c   d   e
24. There is a saying, "Don't look a gift horse in the mouth." This means —
e. It is not safe to look into the mouth of a horse. f. You cannot judge the age of a gift horse by his teeth.
g. Don't accept a horse as a gift.
h. Although you question the value of a gift, accept it graciously .........

25. If the following words were arranged to make a good sentence, with what letter sentence begin? usually are of maid tables wood
a. w, b, d, c, a, d, t, e, m

26. If a photograph that is 2 inches wide and 3 inches long is enlarged to be 10 inches wide, how many inches long will it be?
f. 11 g. 12 h. 15 i. 20 j. 30

27. One number is wrong in this series:
1 2 4 5 7 8 10 11 12 14
What should that number be?
a. 9 b. 6 c. 3 d. 13 e. 16

28. When the time by a clock was 8 minutes past 10, the hands were interchanged. The clock then said:

a. 10 min. past 8 b. 6 min. past 10
c. 8 min. of 2 d. 8 min. of 10
e. 8 min. past 2

29. Which of the five words below does not belong with the others?
a. brave b. clever c. honest
d. generous e. loyal

30. A boy is now three times as old as his sister. In 4 years he will be only twice as old. How many years old is his sister?
f. 1 g. 2 h. 3 i. 4 j. 5
Read this page. Do what it tells you to do. Do not open this booklet.

This test is a practice test. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered.

SAMPLE: Which of the five things below is blue?  
s. grass  b. sky  c. snow  d. money  e. apple .... ( )  ( )  ( )  ( )  ( )

The right answer, of course, is sky; so the word sky is underlined. And the word sky is b; so the letter b parenthesis has been filled in. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer. Just draw a line under it and fill in the right parenthesis.

SAMPLE: A fish — 
  f. runs  g. walks  h. swims  i. hops  j. jumps .... ( )  ( )  ( )  ( )  ( )

The answer is swims; so you should have drawn a line under swims and filled in the h parenthesis. Try this one:

SAMPLE: How much is 3 and 7? 
  a. 8  b. 4  c. 6  d. 9  e. 10 ................. ( )  ( )  ( )  ( )

The answer, of course, is 10; so you should have drawn a line under 10 and filled in the e parenthesis.

This test contains 40 questions. You will be given 15 minutes in which to complete the test. Your teacher will tell you when to begin and when to put your pencils down. Since this is a practice test the questions will seem quite simple. When your teacher tells you to stop, put a circle around the number of the question you have just finished.
This is a test to see how well you can think. It is very much like the Otis test you took the other day. This test contains 40 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed 15 minutes after your teacher tells you to begin. Put the time that you start in the space at the top of the test. When the 15 minutes are over put a circle around the number of the question that you have just finished. Your teacher will tell you when to do this. Then go on and finish the test. On the line that says finishing time write in the time your school clock says when you have completed all 40 questions. Try to get as many right as possible. Do not go so fast that you make mistakes. Do not spend too much time on any one question. Answer the questions in the same way you answered the practice test questions. No questions about the test will be answered by your teacher after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.
38. If the following words were rearranged to make a sentence, which word would be last? see I big a cat
f. cat g. I h. big i. a j. see ...... f g h i j

39. The opposite of night is day. Which word means the opposite of dark?
a. light b. dark c. night d. day e. sun ......................... a b c d e

40. If I have a large box with one small box in it, how many boxes are there in all?
f. 1 g. 2 h. 4 i. 3 j. 0 ........... f g h i j
1. Which one of the five things below does not belong with the others?
   a. peach  b. banana  c. orange  d. baseball  e. plum
   \[ \text{a b c d e} \]

2. Which one of the five answers below tells best what a saw is?
   f. something  g. a tool  h. furniture  i. wood  j. a machine
   \[ \text{f g h i j} \]

3. Which one of the five things below is the smallest?
   a. a twig  b. a limb  c. a bud  d. a tree  e. a branch
   \[ \text{a b c d e} \]

4. Which word means the opposite of succeed?
   f. win  g. decline  h. try  i. accede  j. fail
   \[ \text{f g h i j} \]

5. Three of the four designs below are alike. Which one is not like the other three?
   a.  \[ \text{\text{ }} \]  b.  \[ \text{\text{ }} \]  c.  \[ \text{\text{ }} \]  d.  \[ \text{\text{ }} \]
   \[ \text{a b c d} \]

6. A finger is to a hand as a toe is to a what?
   e. foot  f. toenail  g. heel  h. shoe  i. knee
   \[ \text{e f g h i} \]

7. If we believe someone has committed a crime, but we are not sure, we have a —
   a. fear  h. suspicion  c. wonder  d. confidence  e. misunderstanding
   \[ \text{a b c d e} \]

8. At 4 cents each, how many pencils can be bought for 32 cents?
   f. 36  g. 8  h. 128  i. 4  j. 28
   \[ \text{f g h i j} \]

9. Which one of the five things below is most like these three: a pick, a shovel, and a rake?
   a. a ladder  b. a club  c. a garden  d. a hoe  e. a plow
   \[ \text{a b c d e} \]
29. A (?) is to sit on.
   a. desk b. house c. chair
   d. block e. table
   a b c d e

30. Which one of the five things below
    is most like these three: an apple,
    a pear, and a banana?
   f. a bicycle g. a dog h. a vegetable
   i. a peach j. a toy
   f g h i j

31. One number is wrong in the following
    group. What should that number be?
   6 6 6 6 6 6 6 6
   a. 7 b. 3 c. 4 d. 6 e. 9
   a b c d e

32. If the following letters were arranged
    in order, which one would come first?
   f g h i j

33. What is the letter that comes after H
    in the alphabet?
   a b c d e

34. What letter in the following series
    appears only 2 times?
   A B B C C C D D D D
   f. A g. C h. D i. E j. B
   f g h i j

35. Three of the four designs below are
    alike. Which one is not like the other
    three?
   a. □ b. □ c. □ d. □
   a b c d

36. A boy had a board with 12 nails in it.
    He pulled 2 of them out. How many nails
    were left in the board?
   e. 6 f. 8 g. 4 h. 10 i. 11
   e f g h i

37. A very pretty girl is often said to be—
   a. ugly b. fat c. tall d. beautiful
   e. thin
   a b c d e

   ( ) ( ) ( ) ( ) ( )

   ( ) ( ) ( ) ( ) ( )

   ( ) ( ) ( ) ( ) ( )
10. Wool is to a sheep as feathers are to what?
   f. a pillow  g. a rabbit  h. a bird  
   i. a goat  j. a bed  
   ( ) ( ) ( ) ( )  

11. If the words below were rearranged to make the best sentence, with what letter would the last word of the sentence begin? Usually cans made tin of are
   a. m  b. a c. c  d. u  e. o  
   ( ) ( ) ( ) ( )  

12. Three of the four designs below are alike, which one is not like the other three?
   f.  
   g.  
   h.  
   i.  
   ( ) ( ) ( )  

13. Which of these five words would come first in the dictionary?
   a. many  b. obey  c. house  
   d. porch  e. elephant  
   ( ) ( ) ( ) ( )  

14. Which tells best what a cup is?
   f. It has a handle  g. something to hold coffee  h. a thin, breakable object  
   i. It is used on a table  j. a small drinking vessel  
   ( ) ( ) ( ) ( )  

15. Which of these series contains a wrong number?
   a. 3-4-5-6-12-15  b. 1-4-7-10-13  
   c. 2-5-6-11-14  d. 1-3-5-7-9  
   e. 2-4-6-8-11  
   ( ) ( ) ( ) ( ) ( )  

16. Which one of the five things below is most like these three: a doll, a top, and a scooter?
   f. a box  g. a broom  h. a pillow  
   i. a yard  j. a kite  
   ( ) ( ) ( ) ( )  

17. A church is to a preacher as a school is to what?
   a. study  b. pupils  c. teacher  
   d. religion  e. a choir  
   ( ) ( ) ( ) ( ) ( )
19. A person who is very small is often said to be —
   a. big  b. tiny  c. huge  d. large  e. tall
   ( )  ( )  ( )  ( )  ( )

20. A hat is worn on the head as a (?) is worn on the foot.
   f. cap  g. dress  h. coat  i. shoe  j. glove
   ( )  ( )  ( )  ( )  ( )

21. Find another letter just like this one
   S
   ( )  ( )  ( )  ( )  ( )

22. There is an saying "O.K". This means——
   f. All right  g. No good  h. That's bad  i. I can't  j. Why not
   ( )  ( )  ( )  ( )  ( )

23. Which of the following objects is something to shoot with?
   a. bell  b. cat  c. coat  d. gun  e. sled
   ( )  ( )  ( )  ( )  ( )

24. Three of the four designs are alike.
   Which one is not like the other three?
   f.  g.  h.  i.  j.
   ( )  ( )  ( )  ( )

25. If the following words were rearranged to make a good sentence with what letter would the second word of the sentence begin? Like we dogs
   a. w  b. l  c. e  d. d  e. s
   ( )  ( )  ( )  ( )  ( )

26. If the following words were rearranged to make a sentence, the third word would begin with what letter. Sun shines the
   f. o  g. e  h. a  i. t  j. u
   ( )  ( )  ( )  ( )  ( )

27. Which of the five things below is most like these two: knife and fork?
   a. spoon  b. meat  c. dish  d. table  e. dinner
   ( )  ( )  ( )  ( )  ( )

28. An object that is very big is said to be —
   f. small  g. short  h. large  i. little  j. thin
   ( )  ( )  ( )  ( )  ( )
18. Count each 5 below that has a 7 next after it.
   7 5 3 5 7 2 3 7 5 6 7 7 2 5 7 3 4 7
   7 5 2 0 7 5 7 8 3 7 2 5 1 7 9 6 5 7
   Tell how many 5's you counted.
   f. 13   g. 6   h. 3   i. 4   j. 5

19. Worse is to bad as better is to what?
   a. very bad        b. medium        c. good
   d. much better      e. worse

20. A coin made by an individual and meant to look like one made by the government is called a —
   f. duplicate         g. counterfeit
   h. imitation         i. forgery         j. libel

21. If George is taller than Frank and George is shorter than James, then James is (?) Frank.
   a. taller than        b. shorter than
   c. just as tall as    d. (cannot say which)

22. What is the most important reason that bright lights are placed in front of theaters? b. to help light up the street
   f. so that people can see where they are            g. to attract attention and look inviting
   h. so that people can see the advertisements better
   i. electricity is furnished to theaters cheaply

23. If the following words were arranged in order, which word would be in the middle?
   a. sentence        b. letter        c. paragraph
   d. word            e. chapter

24. Son is to daughter as uncle is to —
   f. aunt            g. mother         h. relation
   i. woman           j. sister

25. Which tells best just what a guess is?
   a. a mistaken idea   b. a statement we
   c. a statement that is almost correct d. something we cannot find out
10. A man who makes bread is called a —
   f. baker  g. carpenter  h. plumber
   i. locksmith  j. chief

11. Which sentence tells best just what a ball is?
   a. a circle  b. a square object
   c. a round object that bounces
   d. a large thing  e. a small colored object

12. A mother sheep's lamb is her —
   f. baby  g. uncle  h. father
   i. cousin  j. aunt

13. One number is wrong in the following list. 1 2 3 5 5 6 7. What should that number be?
   a. 3  b. 4  c. 5  d. 6  e. 2

14. A man who robs a bank is called a —
   f. banker  g. robber  h. baker
   i. coward  j. hero

15. The opposite of sick is —
   a. day  b. ill  c. well  d. bad
   e. poor

16. A flower and a tree are alike because they both —
   f. run  g. sing  h. play  i. talk
   j. grow

17. Which of the five words below is most like these three: blue, red, and green?
   a. day  b. dark  c. yellow  d. light
   e. night

18. Which one of these words would come last in the dictionary?
   f. apple  g. alike  h. acorn
   i. zebra  j. and
26. If the words below were rearranged to make a good sentence, the third word of the sentence would begin with what letter? boys birch the a canoe made bark
   a. f. t g. b h. c i. m .......... ( ) ( ) ( ) ( )

27. Which word means the opposite of truth?
   a. chest b. rob c. liar
   i. ignorance e. falsehood .......... ( ) ( ) ( ) ( )

28. If the suffering of another makes us suffer also, we feel —
   f. worse g. harmony h. sympathy
   i. love j. repelled ................. ( ) ( ) ( ) ( )

29. A governor is to a state as a general is to what?
   a. a king b. war c. an army
   d. a captain e. a commander .......... ( ) ( ) ( ) ( )

30. There is a saying, "He that scatters thorns, let him go barefoot." What does this mean?
   f. let him who causes others discomforts bear them himself
   also. g. Going barefoot toughens the feet. h. People should pick up what they scatter.
   i. Don't scatter things around. j. Thorns hurt feet ................. ( ) ( ) ( ) ( )

31. Which one of the five words below is most like these three: small, black, and hard?
   a. thick b. coal c. very d. soot
   e. color ................. ( ) ( ) ( ) ( )

32. Three of the four designs below are alike. Which one is not like the other three?
   f. g. h. i. .......... ( ) ( ) ( )

33. If the following words were arranged in order, which word would be in the middle?
   a. state b. park c. nation d. city
   e. yard ................. ( ) ( ) ( ) ( )
1. which of the five words below is most like these three: January, March and August?
   a. Monday b. morning c. day d. December e. night

   a b c d e

2. If the following numbers were rearranged in order, which number would be in the middle?
   f. four g. two h. five i. one j. three

   f g h i j

3. Sweet is the opposite of —
   a. hard b. soft c. funny d. sour e. hot

   a b c d e

4. Which is the most important reason that we have stoves?
   f. to cook food g. to furnish the kitchen h. to save money i. to keep food cold j. to sleep on

   f g h i j

5. Which one of the five things below is biggest?
   a. a house b. a top c. a boy d. a table e. a bed

   a b c d e

6. Three of the four figures below are alike. Which one is not like the other three?
   f. △ g. △ h. □ i. △

   f g h i

7. Which one of the five answers below tells best what a cat is?
   a. a bird b. an animal c. a girl d. a fish e. a man

   a b c d e

8. If a girl has two pencils and gives one away, how many will she have left?
   f. 0 g. 2 h. 3 i. 1 j. 4

   f g h i j

A circle is —
   a. round b. square c. pointed d. long e. short

   a b c d e
34. A statement which expresses just the opposite of that which another statement expresses is said to be a —
f. lie  g. contradiction  h. falsehood  i. correction  j. explanation
() () () () ()

35. If I have a large box with 5 small boxes in it and 2 very small boxes in each of the small boxes, how many boxes are there in all?
a. 7  b. 8  c. 10  d. 16  e. 15
() () () () ()

36. There is a saying, "Kill not the goose that lays the golden eggs." This means that —
f. Geese that lay golden eggs are too tough to eat.  g. Don't destroy the things that do you good.  h. Don't kill birds.
 i. Not many geese can lay golden eggs.  j. Golden eggs are valuable
() () () () ()

37. One number is wrong in the following series. 1 2 5 6 9 10 13 14 16 18. What should that number be?
a. 4  b. 7  c. 3  d. 15  e. 17
() () () () ()

38. When the time by a clock was 9 minutes past 8, the hands were interchanged. The clock then said about —
f. 6 min. past 9  g. 9 min. past 8
 h. 19 min. past 1  i. 9 min. of 8
 j. 19 min. of 2
() () () () ()

39. A car owner uses a mixture in his radiator containing 1 quart of alcohol to every 2 quarts of water. How many quarts of alcohol are needed for 12 quarts of the mixture?
a. 6  b. 24  c. 11 d. 4  e. ½
() () () () ()

40. In a foreign language tana dona meka means very cold water; tana neta means hot water; dona bela means very good. What word means cold?  f. tana  g. dona
 h. meka  i. neta  j. bela
() () () () ()
Read this page. Do what it tells you to do. Do not open this booklet.

This test is a practice test. It contains questions of different kinds.

Here is a sample question already answered correctly. Notice how the question is answered.

**SAMPLE:** Which of the five things below is blue?

- a. grass
- b. sky
- c. snow
- d. money
- e. apple

... () () () () ()

The right answer, of course, is sky; so the word sky is underlined. And the word sky is b; so the letter b parenthesis has been filled in.

This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer. Just draw a line under it and fill in the right parenthesis.

**SAMPLE:** A fish

- f. runs
- g. walks
- h. swims
- i. hops
- j. jumps

... () () () () ()

The answer is swims; so you should have drawn a line under swims and filled in the h parenthesis. Try this one:

**SAMPLE:** How much is 3 and 7?

- a. 8
- b. 4
- c. 6
- d. 9
- e. 10

... () () () () ()

The answer, of course, is 10; so you should have drawn a line under 10 and filled in the e parenthesis.

This test contains 40 questions. You will be given 15 minutes in which to complete the test. Your teacher will tell you when to begin and when to put your pencils down. Since this is a practice test the questions will seem quite simple. In most cases you will be able to figure out the answers very quickly. When your teacher tells you to stop, put a circle around the number of the question you have just finished.
Read this page. Do what it tells you to do. Do not open this booklet or turn it over, until you are told to do so.

Name ____________________________ Test No. __________ Date __________

Starting time ______________________ Finishing time ______________________

Score ____________________________ IQ ____________________________

This is a test to see how well you can think. It is very much like the Otis test you took the other day. This test contains 40 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed 15 minutes after your teacher tells you to begin. Put the time that you start in the space at the top of the test. When the 15 minutes are over put a circle around the number of the question that you have just finished. Your teacher will tell you when to do this. Then go on and finish the test. On the line that says finishing time write in the time your school clock says when you have completed all 40 questions. Try to get as many right as possible. Do not go so fast that you make mistakes. Do not spend too much time on any one question. Answer the questions in the same way you answered the practice test questions. No questions about the test will be answered by your teacher after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.

Published by World Book Company, Yonkers-on-Hudson, New York and Chicago, Illinois. Copyright 1937 by World Book Company. Copyright in Great Britain. All rights reserved. Duplicated split-forms reproduced under publisher's authorization, March 1951.
37. What letter in the following series appears only 2 times?
   A B B C C C D D D D D D

38. What is the letter that comes after H in the alphabet?
   f. X g. A h. C i. N j. K .......... ( ) ( ) ( ) ( )

39. If the following letters were arranged in order, which one would come first?

40. One number is wrong in the following group. What should that number be?
   f. 7 g. 3 h. 4 i. 6 j. 9 .......... ( ) ( ) ( ) ( )
1. Which one of the five words below means the opposite of south?
   a. west  b. arctic  c. north  d. tropics  e. pole
   a b c d e

2. A boy is to a man and a lamb is to a
   f. girl  g. cat  h. dog  i. wolf
   j. pole
   f g h i j

3. If we feel sorry for the suffering of another, we have a feeling of
   a. hate  b. pity  c. contempt  d. disdain  e. eagerness
   a b c d e

4. Which one of the five things below is most like these three: a carrot, an onion, and a cabbage?
   f. a bush  g. an apple  h. a potato
   i. a salad  j. a cherry
   f g h i j

5. Which expression tells best just what a floor is?
   a. part of a house  b. an inverted wall
   c. the part of a room to walk on  d. it is made of wood  e. a place to put a chair
   a b c d e

6. Hat is to head as thimble is to what?
   f. finger  g. needle  h. thread
   i. hand  j. sewing
   f g h i j

7. Three of the four designs below are alike. Which one is not like the other three?
   a.  b.  c.  d.
   ( ) ( ) ( )

8. Why have the means for air transportation increased? e. Trains were unsafe.
   f. Roads were crowded.  g. There was a demand for more rapid transportation.
   h. Airplanes furnish work for mechanics  i. Trains were getting too crowded
   e f g h i
28. Which of the following objects is something to shoot with?
   a. bell  f. cat  g. coat  h. gun  i. sled  ................. e  f  g  h  i

29. There is a saying, "O.K." This means--
   a. All right.  b. No good.  c. That's bad.  d. I can't e. Why not? ........ a  b  c  d  e

30. Find another letter just like this one 5
   f. A  g. G  h. D  i. U  j. T  ............ f  g  h  i  j

31. If I have a large box with one small box in it, how many boxes are there in all?
   a. 1  b. 2  c. 4  d. 3  e. 0 ........... a  b  c  d  e

32. The opposite of night is day. Which word means the opposite of dark?
   f. light  g. dark  h. night  i. day  j. sun  ................. f  g  h  i  j

33. If the following words were rearranged to make a sentence, which word would be last? see I big a cat
   a. cat  b. I  c. big  d. a  e. see ....... a  b  c  d  e

34. A very pretty girl is often said to be--
   f. ugly  g. fat  h. tall  i. beautiful  j. thin  ................. f  g  h  i  j

35. A boy had a board with 12 nails in it. He pulled 2 of them out. How many nails were left in the board?
   a. 6  b. 8  c. 4  d. 10  e. 11 ........... a  b  c  d  e

36. Three of the four designs below are alike. Which one is not like the other three?
   f.  □  g. □  h. □  i. □  ........... f  g  h  i
If a person sleeping quietly is awakened by a sudden cry, he is likely to be —

a. sick  b. dreaming  c. startled  d. paralyzed  e. asleep

Which of the five things below is most like these three: a goat, a frog, and a dove?

f. a flower  g. a nest  h. a yard  i. a snake  j. a tree

One number is wrong in the following series. 1 6 2 6 3 6 4 6 5 6 7 6 What should that number be?

a. 8  b. 6  c. 7  d. 9  e. 5

Which of the five words below means the opposite of difficult?

f. hard  g. quick  h. soft  i. easy  j. common

Food is to the body as what is to an engine?

a. wheels  b. motion  c. smoke  d. fuel  e. fire

Which tells best just what a cat is?

f. it drinks milk  g. something that walks quietly  h. it has soft fur

i. a small domestic animal  j. a thing that climbs trees

If the words below were rearranged to make a good sentence, the last word of the sentence would begin with what letter?

a. u  b. s  c. l  d. m  e. a

leather shoes usually made are of

If John is older than Peter and Peter is older than Harry, then John is (?) Harry.

f. older than  g. younger than  h. just as old as  i. (cannot say which)

16. Form B
20. Which sentence tells best just what a ball is?
f. a circle  g. a square object  h. a round object that bounces i. a large thing j. a small colored object. .......... f g h i j

21. Which one of the five things below is most like these three: an apple, a pear, and a banana? a. a bicycle  b. a dog  c. a vegetable  d. a peach  e. a toy. .......... a b c d e

22. A (?) is to sit on.
   f. a desk  g. a house  h. chair  i. block  j. table .......... f g h i j

23. An object that is very big is said to be - a. small  b. short  c. large  d. little  e. thin. .......... a b c d e

24. Which of the five things below is most like these two: knife and fork? a. spoon  b. meat  c. dish  d. table  e. dinner. .......... f g h i j

25. If the following words were rearranged to make a sentence, the third word would begin with what letter? sun shines the
   a. a  b. s  c. c  d. t  e. u. .......... a b c d e

26. If the following words were rearranged to make a good sentence with what letter would the second word of the sentence begin? like we dogs
   f. w  g. l  h. i  i. d  j. s. .......... f g h i j

27. Three of the four designs are alike. Which one is not like the other three? a. b. c. d. .......... a b c d

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25. If the following words were rearranged to make a sentence, the third word would begin with what letter? sun shines the
   a. a  b. s  c. c  d. t  e. u. .......... a b c d e

26. If the following words were rearranged to make a good sentence with what letter would the second word of the sentence begin? like we dogs
   f. w  g. l  h. i  i. d  j. s. .......... f g h i j

27. Three of the four designs are alike. Which one is not like the other three? a. b. c. d. .......... a b c d
17. Bread is to man as hay is to what?
   a. wheat  b. a horse  c. grass  
   d. a barn  e. flour  ......................
   a  b  c  d  e

18. The son of my father's sister is my —
   f. brother  g. nephew  h. cousin
   i. uncle  j. grandson  ......................
   f  g  h  i  j

19. If the following words were arranged
   in order, the middle word would begin
   with what letter? Eleven One Nine Zero Ten
   a  b  c  d  e

20. Which one of the five things below is
    most like these three: a president,
    an admiral, and a general?
   f. a ship  g. an army  h. a king
   i. a republic  j. a soldier  ............
   f  g  h  i  j

21. Which statement tells best just what
    a fork is?
   a. a thing to use when eating
   b. it goes with a knife
   c. an instrument with prongs for lifting
   d. it goes on the table  e. it is made of
      silver  ......................................
      a  b  c  d  e

22. There is a saying, "A stitch in time
    saves nine." It means that —
   f. A little sewing may save nine dollars.
   g. It pays to attend to troubles before
      they get worse.  h. You should work hard
      and save as much as you can.  i. You can
      save time by sewing.  j. Sewing takes time
      ...................
      f  g  h  i  j

23. A book is to information as (?) is to
    money.
   a. paper  b. dollars  c. a bank
   d. work  e. gold  .........................
   ( ) ( ) ( ) ( )

24. Which of these words would come first in
    the dictionary?
   f. brave  g. burst  h. broke  i. build
   j. breadth  ....................
   f  g  h  i  j
11. A hat is worn on the head as a (?) is worn on the foot.
   a. cap b. dress c. coat d. shoe e. glove ........................
   a b c d e

12. A person who is very small is often said to be —
   f. big g. tiny h. huge i. large j. tall ........................
   f g h i j

13. Which one of these words would come last in the dictionary?
   a. apple b. alike c. acorn d. zebra e. and ........................
   a b c d e

14. Which of the five words below is most like these three: blue, red, and green?
   f. day g. dark h. yellow i. light j. night ........................
   f g h i j

15. A flower and a tree are alike because they both —
   a. run b. sing c. play d. talk e. grow ........................
   a b c d e

16. The opposite of sick is —
   f. day g. ill h. well i. bad j. poor ........................
   f g h i j

17. A man who robs a bank is called a —
   a. banker b. robber c. baker d. coward e. hero ........................
   a b c d e

18. One number is wrong in the following list. 1 2 3 5 5 6 7 What should that number be?
   f. 8 g. 4 h. 5 i. 6 j. 2 ........................
   f g h i j

19. A mother sheep's lamb is her —
   a. baby b. uncle c. father d. cousin e. aunt ........................
   a b c d e
25. If Frank is younger than George and George is just as old as James, then James is (?) Frank.
   a. younger than  b. older than  c. just as old as  d. (cannot say which)
   ( ) ( ) ( ) ( )

26. A man who strives and hopes to achieve success is said to be —
   a. ambitious  f. lazy  g. contented
   h. faithful  i. loyal
   ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )

27. Large is to object as loud is to what?
   a. soft  b. small  c. heavy
   d. sound  e. weight
   ( ) ( ) ( ) ( )

28. If a man has walked west from his home 8 blocks and then walked east 5 blocks, how many blocks is he from home?
   a. 13  b. 8  c. 3  d. 4  e. 5
   ( ) ( ) ( ) ( ) ( )

29. A sting is to a bee as a revolver is to a —
   a. hive  b. fly  c. weapon
   d. horn  e. man
   ( ) ( ) ( ) ( )

30. Three of the four designs below are alike. Which one is not like the other three?
   f.  
   g.  
   h.  
   i.  
   ( ) ( ) ( )

31. There is saying, "Make hay while the sun shines." This means —
   a. Hay made in cloudy weather is poor.
   b. Haste makes waste.  c. Make the best of your opportunities.
   d. Hay grows best in summer.  e. It is more healthful to work in the sun than in the shade.
   ( ) ( ) ( ) ( ) ( )

32. Which tells best just what a neck is?
   f. It is something to wear a collar on.
   g. It is that which joins the head to the body.
   h. It is something to fasten a necklace on.
   i. It is the connecting part of the body
   ( ) ( ) ( ) ( )
1. A man who makes bread is called a —
   a. baker  b. carpenter  c. plumber  d. locksmith  e. chief
   a b c d e

2. A circle is —
   f. round  g. square  h. pointed  i. long  j. short
   f g h i j

3. If a girl has two pencils and gives one away, how many will she have left?
   a. 0  b. 2  c. 3  d. 1  e. 4
   () () () () ()

4. Which one of the five answers below tells best what a cat is?
   f. a bird  g. an animal  h. a girl  i. a fish  j. a man
   f g h i j

5. Three of the four figures below are alike. Which one is not like the other three?
   a. △  b. △  c. □  d. △
   () () () ()

6. Which one of the five things below is biggest?
   e. a house  f. a top  g. a boy  h. a table  i. a bed
   e f g h i

7. Which is the most important reason that we have stoves?
   a. to cook food  b. to furnish the kitchen  c. to save money  d. to keep food cold  e. to sleep on
   a b c d e

8. Sweet is the opposite of —
   f. hard  g. soft  h. funny  i. sour  j. hot
   f g h i j

9. If the following numbers were rearranged in order, which number would be in the middle?
   a. four  b. two  c. five  d. one  e. three
   a b c d e

10. Which of the five words below is most like these three: January, March and August?
   f. Monday  g. morning  h. day  i. December  j. night
   f g h i j
33. Which one of the words below would come last in the dictionary?
   a. glory  b. label  c. green
   d. linen  e. knife ............... a b c d e

34. Three of the four designs below are alike. Which one is not like the other three?
   f.  g.  h.  i. ............... f g h i

35. What letter follows the letter that comes next after K in the alphabet?

36. One number is wrong in the following series. 1 2 4 8 16 24 64. What should that number be?
   f. 12  g. 6  h. 3  i. 48  j. 32 ...... f g h i j

37. If a photograph that is 3 inches long and 2 inches wide is enlarged to be 15 inches long, how many inches wide will it be? a. 14 b. 13 c. 10
   d. 7 1/2  e. 5 .................. a b c d e

38. What letter in the following series appears a third time nearest the beginning?
   A E B C A D D D E E F
   G B D A E E C D
   f. A  g. B  h. C  i. D  j. E ............... f g h i j

39. Which one of the five words below does not belong with the others?
   a. time  b. temperature  c. length
   d. weight  e. number ............... a b c d e

40. A boy is now three times as old as his sister. In 3 years he will be only twice as old. How many years old is he now?
   f. 15  g. 6  h. 3  i. 12  j. 9 ............... f g h i j
PRACTICE TEST

Read this page. Do what it tells you to do. Do not open this booklet.

This test is a practice test. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered.

SAMPLE: Which of the five things below is blue? 

<table>
<thead>
<tr>
<th>a. grass</th>
<th>b. sky</th>
<th>c. snow</th>
<th>d. money</th>
<th>e. apple</th>
</tr>
</thead>
</table>

The right answer, of course, is sky; so the word sky is underlined. And the word sky is b; so the letter b parenthesis has been filled in. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer. Just draw a line under it and fill in the right parenthesis.

SAMPLE: A fish —

f. runs g. walks h. swims i. hops j. jumps ...

The answer is swims; so you should have drawn a line under swims and filled in the h parenthesis. Try this one:

SAMPLE: How much is 3 and 7?

| a. 8 | b. 4 | c. 6 | d. 9 | e. 10 |

The answer, of course, is 10; so you should have drawn a line under 10 and filled in the e parenthesis.

This test contains 40 questions. You will be given 15 minutes in which to complete the test. Your teacher will tell you when to begin and when to put your pencils down. Since this is a practice test the questions will seem quite simple. In most cases you will be able to figure out the answers very quickly. When your teacher tells you to stop, put a circle around the number of the question you have just finished.
PRACTICE TEST

Read this page. Do what it tells you to do. Do not open this booklet.

This test is a practice test. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered.

SAMPLE: Which of the five things below is blue? a. grass b. sky c. snow d. money e. apple ... () () () ()

The right answer, of course, is sky; so the word sky is underlined. And the word sky is b; so the letter b parenthesis has been filled in. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer. Just draw a line under it and fill in the right parenthesis.

SAMPLE: A fish —
... f. runs g. walks h. swims i. hops j. jumps ... () () () ()

The answer is swims; so you should have drawn a line under swims and filled in the h parenthesis. Try this one:

SAMPLE: How much is 3 and 7? a. 8 b. 4 c. 6 d. 9 e. 10 ................. () () () ()

The answer, of course, is 10; so you should have drawn a line under 10 and filled in the e parenthesis.

This test contains 100 questions. You will be given 15 minutes in which to complete the test. Your teacher will tell you when to begin and when to put your pencils down. Since this is a practice test the questions will seem quite simple. In most cases you will be able to figure out the answers very quickly. When your teacher tells you to stop, put a circle around the number of the question you have just finished.
What letter in the following series appears only 2 times?


e. D

If the following letters were arranged in order, which one would come first?

f. Z g. M h. A i. H j. J ............ ( ) ( ) ( ) ( )

e. f g h i j
1. A circle is —
   a. round  b. square  c. pointed  
   d. long  e. short  
   f. ( ) ( ) ( ) ( )

2. Which one of the five answers below tells best what a cat is?
   f. a bird  g. an animal  h. a girl  
   i. a fish  j. a man  
   f. ( ) ( ) ( ) ( )

3. Which one of the five things below is biggest?
   a. a house  b. a top  c. a boy  d. a table  
   e. a bed  
   f. ( ) ( ) ( ) ( )

4. Sweet is the opposite of —
   f. hard  g. soft  h. funny  i. sour  j. hot.  
   f. ( ) ( ) ( ) ( )

5. Which of the five words below is most like these three: January, March, and August?
   a. Monday  b. morning  c. day  d. December  
   e. night  
   f. ( ) ( ) ( ) ( )

6. A man who makes bread is called —
   f. a baker  g. a carpenter  h. a plumber  
   i. a locksmith  j. a chief  
   f. ( ) ( ) ( ) ( )

7. If a girl has two pencils and gives one away how many will she have left?
   a. 0  b. 2  c. 3  d. 1  e. 4  
   a. ( ) ( ) ( ) ( )

8. Three of the four figures below are alike which one is not like the other three?
   f. △  g. △  h. □  i. △  
   f. ( ) ( ) ( )

9. Which is the most important reason that we have stoves?
   a. to cook food  b. to furnish the kitchen  
   c. to save money  d. to keep food cold  
   e. to sleep on  
   a. ( ) ( ) ( ) ( )

10. If the following numbers were rearranged in order, which number would be in the middle?
    f. four  g. two  h. five  i. one  j. three  
    f. ( ) ( ) ( ) ( )
26. Brick is to a wall as (?) is to a table.
   e. a chair  f. red  g. eat  h. a kitchen  i. wood
   e f g h i

27. An object or institution that is designed to last only a short time is said to be —
   a. temporary  b. changeable  c. unsound  d. worthless  e. unstable
   a b c d e

28. If the words below were rearranged to make a good sentence, the third word of the sentence would begin with what letter?
   man high the a wall built stone
   f. m g. b h. h i. w j. s
   f g h i j

29. Three of the four designs below are alike.
   Which one is not like the other three?
   a.  b.  c.  d.  (a) (b) (c) (d)

30. There is a saying, "Any port in a storm."
   This means —
   e. Ships should not venture out to sea in storms.
   f. Stormy weather causes large waves in harbors.
   g. In emergencies any aid is acceptable.
   h. Ships usually sink in storms
   e f g h

31. A boy is to a man as (?) is to a sheep.
   a. wool  b. a lamb  c. a goat  d. a shepherd  e. a dog
   a b c d e

32. An agreement reached in which both sides yield somewhat in their demands is called —
   f. a promise  g. a compromise  h. an understanding  i. a deadlock  j. an armistice
   f g h i j

33. Three of the four designs below are alike.
   Which one is not like the other three?
   a.  b.  c.  d.  (a) (b) (c) (d)
11. A person who is very small is often said to be — a b c d e
   a. big  b. tiny  c. huge  d. large  e. tall

12. Which of the five words below is most like these three: blue, red, and green?
   f. day  g. dark  h. yellow  i. light
   j. night

13. The opposite of sick is — a b c d e
   a. day  b. ill  c. well  d. bad  e. poor

14. One number is wrong in the following list.
   1 2 3 5 5 6 7 What should that number be?
   f. 8  g. 4  h. 5  i. 6  j. 2

15. Which sentence tells best just what a ball is?
   a. a circle  b. a square object  c. a round object that bounces  d. a large thing  e. a small colored object

16. A hat is worn on the head as a (?) is worn on the foot.
   f. cap  g. dress  h. coat  i. shoe  j. glove

17. Which one of these words would come last in the dictionary?
   a. apple  b. alike  c. acorn  d. zebra  e. and

18. A flower and a tree are alike because they both — f g h i j
   f. run  g. sing  h. play  i. talk  j. grow

19. A man who robs a bank is called a — a. banker  b. robber  c. baker  d. coward  e. hero

20. A mother sheep's lamb is her —
   f. baby  g. uncle  h. father  i. cousin  j. aunt
27. Which one of these words would come last in the dictionary?
   a. health  b. juggle  c. normal  d. never  e. grateful
   (a) (b) (c) (d) (e)

28. If George is taller than Frank and Frank is taller than James, then George is (?)
   James.
   i. taller than g. shorter than h. just as tall as i. (cannot say which)
   (f) (g) (h) (i)

29. A man who betrays his country is called a—
   a. thief  b. traitor  c. enemy  d. coward  e. slacker
   (a) (b) (c) (d) (e)

30. The daughter of my mother's brother is my—
   f. sister  g. niece  h. cousin  i. aunt  j. granddaughter
   (f) (g) (h) (i) (j)

31. A bicycle is to a motor cycle as a wagon is to what?
   a. an engine  b. automobile  c. a horse  d. slower  e. an airplane
   (a) (b) (c) (d) (e)

32. Which of the five things below is most like these three: a tent, a flag, and a sail?
   f. a shoe  g. a ship  h. a staff  i. a towel  j. a rope
   (f) (g) (h) (i) (j)

33. If the following words were rearranged to make a good sentence, with which letter would the third word of the sentence begin?
   houses stone built of men wood and
   a. h  b. s  c. b  d. m  e. w
   (a) (b) (c) (d) (e)

34. A lamp is to a light as (?) is to a breeze.
   f. a fan  g. bright  h. a sailboat  i. a window  j. blow
   (f) (g) (h) (i) (j)

35. If Henry is taller than Tom and Henry is shorter than George, then George is (?)
   Tom.
   a. taller than  b. shorter than  c. just as  d. (cannot say which)
   (a) (b) (c) (d)

21. A (?) is to sit on.
   a. desk  b. house  c. chair  d. block  e. table

22. Which of the five things below is most like those two: knife and fork?
   f. spoon  g. meat  h. dish  i. table  j. dinner

23. If the following words were rearranged to make a good sentence with what letter would the second word of the sentence begin like we dogs?
   a. w  b. l  c. e  d. d  e. s

24. Which of the following objects is something to shoot with?
   f. bell  g. cat  h. coat  i. gun  j. sled

25. Find another letter just like this one - S.

26. Which one of the five things below is most like these three: an apple, a pear, and a banana?
   f. a bicycle  g. a dog  h. a vegetable  i. a peach  j. a toy

27. An object that is very big is said to be a small b. short c. large d. little e. thin

28. If the following words were rearranged to make a sentence, the third word would begin with what letter? sun shines the
   f. o  g. s  h. c  i. t  j. u

29. Three of the four designs are alike. Which one is not like the other three?
   a. b. c. d. ....
9. Which is the most important reason that words in the dictionary are arranged alphabetically?
   a. It is the simplest arrangement.
   b. It puts the shortest words first.
   c. It enables us to find any word quickly.
   d. It is a custom.
   e. The printing is easier. ............................... ( ) ( ) ( ) ( )

10. If the following words were arranged in order, which word would be in the middle?
    f. luncheon  g. dress  h. undress
    i. supper  j. breakfast ............................... ( ) ( ) ( ) ( )

11. A boy who often tells big stories about what he can do is said to —
    a. lie  b. fake  c. cheat  d. joke  e. brag. ( ) ( ) ( ) ( )

12. Which of the five things below is most like these three: a horse, a pigeon, and a cricket?
    f. a stall  g. a saddle  h. a feather
    i. a goat  j. a wing ............................... ( ) ( ) ( ) ( )

13. Which word means the opposite of pretty?
    a. good  b. ugly  c. bad  d. crooked  e. nice ( ) ( ) ( ) ( )

14. One number is wrong in the following series. What should that number be?
    7 1 7 2 7 3 7 4 7 5 7 o 7 8
    f. 7  g. 6  h. 8  i. 4  j. 5 ............................... ( ) ( ) ( ) ( )

15. Which statement tells best just what a hallway is?
    a. a small room  b. a place to hang your hat and coat
    c. it is long and narrow  d. where to say good-by
    e. a passage lead— from one room to another ............................... ( ) ( ) ( ) ( )

16. Steam is to water as water is to —
    f. hot  g. ice  h. an engine
    i. a solid  j. gas ............................... ( ) ( ) ( ) ( )
30. There is a saying, "O.K." This means --
é. All right. f. No good. g. That's bad. h. I can’t. i. Why not? ................
31. The opposite of night is day. Which word means the opposite of dark?
a. light b. dark c. night d. day e. sun .................................
32. A very pretty girl is often said to be --
f. ugly. g. fat h. tall i. beautiful j. thin .................................
33. Three of the four designs below are alike. Which one is not like the other three?
a. b. c. d. .................................
34. What is the letter that comes after H in the alphabet?
e. X f. A g. C h. N i. K .................................
35. One number is wrong in the following group. What should that number be?
6 6 6 6 7 6 6 6 6 6 a. 7 b. 3 c. 4 d. 6 e. 9 .................................
36. If I have a large box with one small box in it, how many boxes are there in all?
f. 1 g. 2 h. 4 i. 3 j. 0 .................................
37. If the following words were rearranged to make a sentence, which word would be last?
see I big a cat a. cat b. I c. big d. a e. see .................................
38. A boy had a board with 12 nails in it. He pulled 2 of them out. How many nails were left in the board?
f. 6 g. 8 h. 10 i. 10 j. 11 .................................
1. Which one of the five things below does not belong with the others?
   a. potato  b. turnip  c. carrot  d. stone  e. onion
   
2. Which one of the five answers below tells best what a sword is?
   f. to cut  g. a weapon  h. an officer  i. a tool  j. to fight

3. Which one of the five things below is the largest?
   a. knee  b. toe  c. leg  d. ankle  e. foot

4. Which one of the five words means the opposite of strong?
   f. man  g. weak  h. small  i. short  j. thin

5. Which one of the five things below is most like these three: a chair, a bed, and a stove?
   a. a chimney  b. a stick  c. a window  d. a table  e. a floor

6. A sculptor is to a statue as an author is to a —
   f. book  g. man  h. name  i. bookcase  j. pen

7. At 3 cents each, how many pencils can be bought for 27 cents?
   a. 27  b. 81  c. 3  d. 9  e. 30

8. Three of the four designs below are alike. Which one is not like the other three?
   f.  
   g.  
   h.  
   i.  

   ( ) ( ) ( ) ( ) ( )
34. What is the letter that follows the letter that comes next after L in the alphabet? e. L f. M g. N h. O i. P ............ e f g h i

35. One number is wrong in the following series: 1 2 4 8 16 32 64. What should that number be? a. 5 b. 12 c. 3 d. 16 e. 48 ............ a b c d e

36. If I have a large box with two small boxes in it and five very small boxes in each small box, how many boxes are there in all? f. eight g. seven h. ten i. twelve j. thirteen ......................... f g h i j

37. There is a saying, "An ounce of practice is worth a pound of preaching." This means a. Don't preach b. Deeds count more than words c. Preaching takes practice d. Don't practice .................. a b c d

38. A car owner uses a mixture in his radiator containing 1 quart of alcohol to every 2 quarts of water. How many quarts of alcohol are needed for 15 quarts of the mixture? e. $\frac{7}{2}$ f. $\frac{3}{2}$ g. 1 h. 30 i. 5 ............ e f g h i


40. In a foreign language pira numa bega means very deep snow; pira seco means white snow; numa copa means very well. What word means deep? f. pira g. numa h. bega i. copa j. seco .................. f g h i j
Read this page. Do what it tells you to do. Do not open this booklet or turn it over, until you are told to do so.

This is a test to see how well you can think. It is very much like the Otis test you took the other day. This test contains 50 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed 15 minutes after your teacher tells you to begin the time that you start in the space at the top of the test. Then 15 minutes are over put a circle around the number of the question that you have just finished. Your teacher will tell you when to do this. Then go on and finish the test. On the line that says finishing time write in the time your school clock says when you have completed all 50 questions. Do not spend too much time on any one question. Answer the questions in the same way you answered the practice test questions. No questions about the test will be answered by your teacher after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.

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MANUAL FOR TEACHERS

Purpose of the Experiment:

You all share the experience of noting changes in children's performances from day to day. This experiment is a scientific attempt to study these changes. A series of tests has been made up to be given to your students in a predetermined order.

Tests to be Administered:

1. Full length Otis Quick Scoring Mental Ability Test, Form CM
2. 15 Minute Practice Test - 4 Forms
3. Otis Quick Scoring Mental Ability Test Split Forms - A₁, A₂, B₁, B₂

Total Testing Time:

First Day: Approximately one hour
Second Through Fifth Days: Thirty minutes to forty-five minutes - depending on the speed and ability of your group.

ACTUAL TEST ADMINISTRATION

First Day:

Give each child a printed Otis Quick Scoring Mental Ability Test, Form CM. Use the directions in the printed manual with the following exceptions: (Please be sure that the age and birthday date are correct.)

1. Have each child mark the starting time for the test in the upper left hand corner of the front page of his test booklet.

2. When the time limit (30 minutes) given in the manual is up, have the children draw a circle around the number in front of the question just finished.

3. Allow those children who have not completed the test to continue until they have answered all 80 questions.

4. Have each child record his finishing time under the starting time in the upper left hand corner of the test booklet. (If there is no school clock use your own watch and write the time on the blackboard changing each minute after the first child to finish raises his hand.)

5. In order to cover these exceptions read the following directions aloud:

At the end of 30 minutes I will tell you to draw a circle around the number in front of the question you have just finished. Then go on and finish the test. When you have answered all 80 questions write the time that you finish in the upper left hand corner of the front page of your test under the starting time.

If there is no clock say:

Raise your hand as you finish and write down the time that I have written on the front blackboard. I will change the time every minute after I see the first hand go up.
Are there any questions?

Pick up your pencil and write the starting time in the upper left hand corner of the front page of your test booklet.

The time is ———

You may begin.

Second Day:

Use the test booklets in the envelope marked "Second Day's Testing". Pass the tests out giving each child his own named booklet with the Practice Test side face up on the desk. Do not allow the children to open the booklet.

Read the following directions aloud:

Yesterday you took a test to see how well you could think. You are going to take a series of tests this week to show us whether you can think just as clearly every day. The tests will seem very much alike, although most of the questions are really different, so you will have to make sure that you work just as hard on each test.

Before you take today's test you will have a chance to practice. All of the Practice Test questions are on the right hand pages of your booklet. The Practice Test is an easy test which looks like the harder test you took yesterday.

Let's read the directions together.

Read out loud as the children read silently.

Today's date is ———

When you finish close your booklet and put it on the right hand corner of your desk. Wait quietly until every one is finished or has been told to stop.

Are there any questions?

Be sure that each child understands how to handle the answer spaces.

Pick up your pencils - begin!

Timing the Practice Test:

1. At the end of 2 minutes say:

Stop! Draw a circle around the number in front of the question you have just finished and go on working.
2. After 3 more minutes (a total of 6 minutes) say:

Stop! Draw a circle around the number in front of the question you have just finished and go on working.

3. At the end of 2 more minutes (a total of 2 minutes) say:

Stop! Draw a circle around the number in front of the question you have just finished and go on working.

4. Allow 3 more minutes (a total of 12 minutes) and say:

Stop! Draw a circle around the number in front of the question you have just finished and go on working.

5. At the end of 3 more minutes (a total of 15 minutes in all) say:

Stop! Put your pencils down. Turn your booklet over to the side that says Otis Quick Scoring Mental Ability Tests. As you can see we have a different test on the back of the Practice Test.

Let's read the directions together.

Read out loud as the children read silently.

Today's date is ____________________

If you do not have a school clock say:

When you have finished the whole test raise your hand and then write down the time I have written on the front blackboard. I will change the time every minute after I see the first hand go up.

Are there any questions?

When you finish close your booklet and put it on the upper right hand corner of your desk. Wait quietly until every one has finished.

Pick up your pencils.

The time is ____________________

You may begin.

Timing the Otis Test:

1. Allow the children to work for 15 minutes and then say:

If you have not finished draw a circle around the number in front of the question you have just finished and go on to finish the test.

2. Write the time on the blackboard changing it each minute after the first child to finish raises his hand.
Third to Fifth Days:

Follow the same procedure as that outlined in detail for the Second Day using the envelopes marked for the proper day.

Absences:

Absences should be made up if possible in order to have a complete set of tests for each child. Give the tests in the correct order being sure that the dates have been carefully filled in.

Example:

If a child misses the second testing day and returns to school on the third day he would take his test number two while the rest of the class were taking test number three. Thus he would always be one test behind the group. The final test would of necessity be given during the following week.

Please indicate such make up tests on the bottom of this sheet and return this sheet with the completed tests. It would be helpful if you listed any troubles you might have had in giving the tests.

Use of the Ranking Scale:

Follow the directions given with the scale. To be most fair with your class rank your group on only one trait each day that you test.

Thank you for your co-operation.

MAKE UP TESTS GIVEN:

<table>
<thead>
<tr>
<th>Name</th>
<th>Test Number</th>
<th>Date</th>
</tr>
</thead>
</table>

GENERAL OBSERVATIONS, TROUBLES, OR CRITICISMS:
OTIS QUICK-SCORING MENTAL ABILITY TESTS

By Arthur S. Otis, Ph.D.
Formerly Development Specialist with Advisory Board, General Staff, United States War Department

MANUAL OF DIRECTIONS FOR BETA TEST
FORMS CM AND DM

THE QUICK-SCORING SERIES

The Otis Quick-Scoring Mental Ability Tests comprise three tests, called Alpha, Beta, and Gamma. The three tests are designed for grades as follows:

- Alpha Test . . . Grades 1-4
- Beta Test . . . Grades 4-9
- Gamma Test . . . High Schools and Colleges

The Alpha Test consists entirely of pictures and is completely new. The Beta and Gamma Tests are revisions and extensions of the Intermediate and Higher Examinations, respectively, of the Otis Self-Administering Tests of Mental Ability.

PURPOSE OF THE TESTS

The purpose of the three tests in the series is to measure mental ability — thinking power or the degree of maturity of the mind.

It should be understood from the outset that it is not possible to measure mental ability directly. It is possible only to measure the effect mental ability has had in enabling the pupil to acquire certain knowledge and mental skill. Of course the answering of some types of questions depends less upon schooling and more upon mental ability than the answering of others, and in making up the test the aim has been for the most part to choose that kind of question which depends as little as possible on schooling and as much as possible on thinking.

However, in the interest of variety it has been found necessary and even advantageous to include in verbal tests of mental ability such as the Beta and Gamma Tests certain questions which might seem at first glance to be mere measures of achievement. This type includes questions on vocabulary, arithmetic reasoning, etc. It must be remembered, however, that any test which involves the use of language can measure mental ability only to the extent to which we may assume that pupils of the same age have had approximately the same opportunity to learn. Consequently, if a pupil has grown up with a limited educational opportunity, especially with reference to language, his mental ability is not fairly measured by any test involving language. But in a given community in which all children have approximately the same educational opportunity, it is reasonable to assume that a pupil who progresses rapidly in school and learns much has greater mental ability for his age than one who progresses less rapidly and learns less. To this extent, therefore, certain achievement questions such as vocabulary and arithmetic-reasoning questions, even though depending on language, do measure mental ability.

ALTERNATIVE FORMS

There are four forms of the Beta Test. Forms A and B are published in a smaller size for hand scoring only. Forms CM and DM are for machine scoring or hand scoring.

SPECIAL FEATURES

The tests are self-administering in the same sense as the Otis Self-Administering Tests of Mental Ability, in that it is necessary merely to pass out the booklets, allow the pupils time to study the first page with a minimum of directions, and then let them go ahead and take the test. A single examiner may administer the tests to all the classes of a moderate-sized school in a day, by devoting a few minutes to start one class taking the test, leaving the class in care of the teacher, and going on to the next class, etc. This is a good way to assure reasonable uniformity of procedure in the giving of the tests.

In addition to the ease of administration which these tests afford by virtue of their single time limit, a new method of stencil scoring is provided by which the tests may be scored even more rapidly than the Self-Administering Tests.

Provision is made for the pupil to put his answers to all the questions on one sheet, called the Answer Sheet, which is page 2 of the test booklet. To use the Answer Sheet, the pupil tears it off from the rest of the booklet and slips
it under the booklet in such a way that the spaces for the answers appear just to the right of the test page.

A row of 5 spaces, like this 1 2 3 4 5 on the Answer Sheet corresponds to each question. The spaces are numbered consecutively and arranged so as to align perfectly with the questions on the test paper in order to make sure the pupil will not put his answer mark in the wrong row of spaces.

To indicate his answer to a question, the pupil makes a vertical mark in the space that has the same number as the answer he has chosen, like this: 1 2 3 4 5

The Answer Sheet is then scored by a stencil key containing holes so spaced that if the pupil has put his mark in the right space it will show through the hole in the Key; otherwise not. To score the paper, it is necessary merely to count the marks that can be seen through the holes in the Key. One application of the Key is sufficient, of course, to score the whole test.

Experience shows that this is the quickest possible method of scoring a test “by hand,” so to speak. Its principal advantage is that the scorer does not have to look at each answer to see whether a cross is in or not in a given square or circle — he disregards all wrong answers completely and merely counts right ones.

It is by reason of this new scoring feature that the tests are called “Quick-Scoring Tests.”

MACHINE SCORING

The test may be scored also by the International Business Machines Corporation scoring machine. For this purpose a special separate Answer Sheet must be used. It is used in the same way as the attached Answer Sheet but is printed and sold separately. Special mechanical pencils must be used by the pupils when marking the machine-scored Answer Sheet.

DIRECTIONS FOR ADMINISTERING

To administer Beta, Form CM or Form DM, address the pupils as follows: (Give all directions slowly and distinctly, with a pause after each sentence.)

“We are now going to give you some tests that measure your ability to think. I will pass out the test papers and as soon as you receive one, read the first page and do what it tells you to do; that is, fill the blanks, giving your name, age, etc., and answer the sample questions.

“Do not open or turn over the booklet. Part of the test is to see if you can follow directions.”

Have the test papers passed, one to each pupil, right side up; that is, with the title page up. If machine-scored Answer Sheets are to be used, pass out these and the mechanical pencils, and caution the pupils to use only the mechanical pencils and to make heavy marks.

Allow a reasonable time for all to finish reading the first page; then say: “Is there anyone who does not understand how to answer the samples?” Be sure all do.

If the attached Answer Sheet is to be used, have the pupils tear the Answer Sheet off from the rest of the booklet. In that case, see that every pupil is supplied with two pencils and an eraser. It is better not to have the pencils too sharp, principally because it is better to have the pupils make wide marks. Then say:

“You are to put your marks in the spaces on the Answer Sheet.

“Slip the Answer Sheet under the edge of page 3 so that the column of spaces marked ‘Page 3’ is alongside of page 3 like this.” (Show by holding up page 3 with the “Page 3” column of the Answer Sheet close to page 3 of the booklet.) “Notice that the arrow tips on the Answer Sheet point directly toward the arrow tips on page 3. In answering the first question, you put a mark in one of the spaces from the first row, and so on.

“When you finish page 3, pull out the Answer Sheet a little way like this (Show) so that you can see the column of answers for page 4, and do page 4. Always keep the Answer Sheet shoved under the booklet so that the column of the Answer Sheet on which you are working is close to the test paper.

“When you come to page 5, fold page 6 under like this (Show how) so that you can get the ‘Page 5’ column of the Answer Sheet close to page 5 of the booklet like this. (Show)

“Never put more than one mark in any row of spaces.

“Is there anyone who does not understand what to do?” (Answer any questions about how to take the test.) Then say:

“As explained in the paragraph below the samples, the test contains eight questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed a half hour. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered after the test begins.

“Now go ahead and answer the questions. Remember to make heavy black marks.”

Write immediately on the blackboard the exact time when the pupils begin to take the test. It is helpful to write on the blackboard also the time the pupils must stop work. Thus, if pupils are started at 1:17, write this on the blackboard and under it write 1:47. Or set your watch exactly on the hour and when it is exactly half-past the hour by your watch, the time will be up.
It should be understood by the examiner that no questions about the test are to be answered which might give the pupils the slightest help in answering the questions; that is, the examiner or teacher may not explain the meaning of any word or give any hints. It is permissible at the beginning of the examination for the examiner to move quietly about the room to make sure that the pupils are indicating their answers in the proper manner (making heavy black marks), and if during the examination a pupil becomes confused on account of the use of the separate Answer Sheet, it is permissible, of course, to explain to him how to proceed. Thereafter it is better for the teacher to remain seated at her desk so that the room is quiet and the pupils may work undisturbed.

The one in charge of timing the test should be particularly impressed with the need to watch the time carefully, for it is very easy to forget the time and let the pupils work more than the time allowed.

When the stopping time is reached, say: “Stop! Lay your pencil down.”

Have the Answer Sheets collected. Then have the pupils write their names at the top of page 3 of the booklet and have the booklets collected.

**DIRECTIONS FOR SCORING**

A Key for scoring is included in each package of tests. To score an Answer Sheet, lay the Key over the Answer Sheet in such a way that two of the heavy arrows on the Answer Sheet show through the holes of the Key and point directly toward the two arrows on the Key. The Key will then be adjusted so that all the marks that the pupils have made in the right spaces will show through the holes. The number of marks so appearing is the pupil’s score. This should be written in the space provided at the top of the title page.

The pupils have been instructed to be sure not to put more than one mark in any row of spaces. However, if in the case of any item two marks have been put in the same row of spaces, give no credit for that item.

Ordinarily in scoring this test there is no need to mark the answers right or wrong but merely to count them, for only the total score is of significance. To avoid errors in counting, after the numbers right have been counted, continue the count with the wrong and omitted items and make sure that you end with 80.

In the interest of accuracy it is well for each Answer Sheet to be scored independently by two persons. If this is done, the score obtained by the first scorer may be written at the foot of the page. Then, after the next scorer has scored the paper and compared his count with that made by the first scorer and found it to check, the sheet may be turned and the checked score written on the title page.

**DIRECTIONS FOR RECORDING SCORES**

In each package of tests there is included a Class Record which provides for the recording of scores of a class. Before entering the scores on the Class Record, arrange the Answer Sheets either in alphabetical order or in order of magnitude of score, according to preference. Then enter the name of each pupil, his age in years and months, and his score.

Note that provision is made on the Class Record for entering later the IQ of the pupil and any additional data, such as percentile rank in the class or school, classification designation, etc., and for entering the median age, median score, etc., if desired.

Provision is made at the foot of page 2 of the Class Record for distributing the scores of a class or a school. To distribute the scores of a class, make a mark in the second column of the table for each pupil’s score, putting the mark opposite the interval within which the score falls. Thus, if the first pupil has made a score of 63, put a mark opposite 60–64. Draw each fifth mark across the preceding four like this, $\mid\mid\mid\mid\mid$. This makes it easier to count the marks.

After the marks are all entered, count those in each interval and write the number in the column headed “Freq.” (Frequency).

To find the median (middle) score, count from either end of the distribution to the middle mark. If the middle mark falls, say, in the interval 50–54, sort out the papers whose scores fall in this interval, and, if the median is the third mark in the interval, find the score on the third paper in that bunch of papers. That score is the median score of the class. (See Chapter II of Otis: *Statistical Method in Educational Measurement*, or a similar text, for detailed explanations of other methods for finding the median.)

**REPORTING TO THE AUTHOR**

To assist in making the norms more comprehensive, the author would appreciate the favor of receiving from each school system using 100 tests or more the following data for each grade:

<table>
<thead>
<tr>
<th>Test used (Beta)</th>
<th>Form used (CM or DM)</th>
<th>Grade</th>
<th>Date of the test</th>
<th>Median Age (when each age has been recorded in years and months)</th>
<th>Median Score</th>
</tr>
</thead>
</table>

1 The arrangement for scoring this test is covered by Patent No. 1,586,628, originally taken out by Charles E. Lauterbach.
That is, the author wishes to know the median age in years and months and the median score of all the pupils in the school system who are in the fifth grade, the same for all who are in the sixth grade, etc., whatever grades were tested. Address Dr. Arthur S. Otis, care of World Book Company, Yonkers, New York. This courtesy will be appreciated.

DISTRIBUTIONS OF SCORES

Table 1 shows the distributions of scores by ages of 12,983 sixth-grade pupils in Form A. About half are from a large city in Ohio and about half from towns and villages of New York State. The median age of these pupils was 12 years and 4 months and the median score, 46 points.

The table is interpreted as follows: The column headed 12 contains the distributions of scores of the 5017 sixth-grade pupils whose age last birthday was 12 years, and whose ages therefore ranged from 12 years to 13 years at the time of the test. It shows that, of those pupils, 1 made a score that fell in the interval 75-79, 11 made scores that fell in the interval 70-74, etc.

Table 2 shows the distributions of scores by ages of 2657 urban eighth-grade pupils in South Carolina who took the test in April, 1937. The median age of these pupils was 14 years 5 months and the median score, 46 points.

These tables are given partly in order to show what wide ranges of ages and ability are found in a single grade. Of course the average classroom does not show quite as wide a range of ages and scores, but nearly so. The need for dividing the pupils of such a grade into more homogeneous groups and the method of doing so are given below under the heading “Application of Results” (page 7).

NORMS

If a large number of 12-year pupils take a test and the scores are arranged in order, the median or middle score is considered just normal for 12-year pupils and is said to be the norm for the age of 12 years. Table 3 gives the norms for the various ages of pupils taking Beta, Form Cm or Form DM.

Table 3 is read as follows: The norm for the age of 8 years 0 months is 10 points of score; the norm for the age of 11 years 3 months is 33 points, etc.

The norms in Table 3 are based in part on the scores of 16,242 pupils in Beta, Form A; in part on a comparison of scores in Beta and scores in the Intermediate Examination of the Otis Self-Administering Tests of Mental Ability made by means of an experiment in which 3259 pupils in Grades 4 to 9 took Beta, Forms A and B, and Form A of the Intermediate Examination; in part on a comparison between Beta, Form Cm, and Gamma in which 742 pupils in Grades 7, 8, and 9 took both these tests; and in part on two experiments in which Beta, Form Cm, was compared with Beta, Form A, using groups of 780 and 1068 pupils in Grades 4 to 9.
Local norms for different localities differ markedly. The norms in Table 3, therefore, should not be thought of as necessarily representative of any particular section of the country but rather as representative of the country as a whole.

These norms apply to a first test. If a pupil takes a second form of the test later, it is necessary to make a correction for familiarity with the test before using Table 3. (See “Practice Effect” below.)

**Practice Effect**

When a pupil takes a second form of a test within a short time after the first form, he tends to make a better score on the second test. This increase in score is generally called “practice effect.”

It was found that when a second form of Beta was given two days after the first form; the practice effect was about 4 points. This means that to render the second score of a pupil comparable to the first score if the tests were taken two days apart, 4 points should be subtracted from the second score.

Practice effect decreases, of course, as the length of time between tests increases. Possibly the amount of practice effect would drop to about 3 points if the interval were a week; to 2 points if the interval were a month; to 1 point if the interval were three months or more.

Whenever it is desired to find a Mental Age or IQ (see below) from the score of a pupil in a second test, the proper correction should be made for practice effect in the second score before comparing it with the norm for the pupil’s age in Table 3 or before finding the pupil’s Mental Age.

**Mental Ages**

Some examiners wish to express scores in terms of Mental Age. The term “Mental Age” originally meant the age for which a pupil’s score was normal or median. Thus, if a pupil makes a score just normal or median for pupils 10 years old, he is said to have a Mental Age (MA) of 10 years.

This method of interpretation has a serious limitation, since mental growth slows down along with physical growth, and pupils reach a mental maturity in their teens. Thus the highest norm for any age in the Beta Test, Form CM or DM, is 57 points, as shown in Table 3. This means that some pupils make scores that are above what is normal for any age. In order to express degrees of mental ability which are above the norm for adults in terms of Mental Age, it is customary to proceed as though mental growth did not slow down but kept on at about the rate it is increasing between the ages of 12 and 14, which in the Beta Test is approximately 1 point in score for each two months of age. According to this supposition, artificial mental ages are assigned to scores above age 13. This is called “extrapolation.” This extrapolation method is used also with the Binet Scale.

According to the above method the following table of Mental Ages (Table 4) has been drawn up.

Table 4 is read as follows: A score of 1 in Beta denotes a Mental Age of 6 years 8 months; a score of 61 may be treated as denoting a Mental Age of 16 years 0 months (though actually it is 4 points above the norm for adults).

<table>
<thead>
<tr>
<th>SCORE</th>
<th>MA</th>
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<tbody>
<tr>
<td>1</td>
<td>6-8</td>
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<tr>
<td>10</td>
<td>10-8</td>
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<td>15</td>
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<td>195</td>
<td>195-8</td>
</tr>
<tr>
<td>200</td>
<td>200-8</td>
</tr>
</tbody>
</table>

**Measuring Brightness**

Pupils making the same score in the test are presumed to have the same mental ability or, as we say, the same...
Mental Age even though their actual ages (spoken of as “chronological ages”) are not the same. That is, as explained above, a pupil who makes a score equal to the norm for the age of 10 years is said to have a Mental Age of 10 years, whether the pupil is 10 years old or 9 years old or 11 years old.

A 10-year pupil who has a Mental Age of 11 years is brighter than normal, and a measure of his brightness is often found by dividing his Mental Age of 11 years by his “chronological age” of 10 years (11 + 10 = 1.10). The decimal point is then dropped and the 11.0 is called the pupil’s Intelligence Quotient (IQ). Intelligence Quotients so found cluster most thickly around 100, but in a few instances go above 150 and below 50. They are distributed according to the “law of normal-distribution.”

A study of the dispersion of IQ’s of various populations aggregating 100,000 pupils tested by various group tests of mental ability showed standard deviations of IQ’s ranging from 10 to 19 points. Of IQ for the various populations, the median value of the standard deviations of IQ being between 15 and 16 points; hence theoretically about 0.06 of 1% of pupils make IQ’s of 150 or over, ¼ of 1% of pupils make IQ’s of 142 or over, and so on as shown in Table 5.

<table>
<thead>
<tr>
<th>TABLE 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERCENTS OF PUPILS MAKING VARIOUS IQ’S</strong></td>
</tr>
<tr>
<td>This per cent of pupils</td>
</tr>
<tr>
<td>½ of 1%</td>
</tr>
<tr>
<td>1%</td>
</tr>
<tr>
<td>5%</td>
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<tr>
<td>10%</td>
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<tr>
<td>25%</td>
</tr>
<tr>
<td>33½%</td>
</tr>
<tr>
<td>50%</td>
</tr>
</tbody>
</table>

A measure of brightness comparable to the IQ can be found from scores of pupils in the Beta Test according to the method below. Although the measures are not quotients, they are called “Beta IQ’s” because they are comparable to IQ’s.

**HOW TO FIND A PUPIL’S “BETA IQ”**

To find a pupil’s “Beta IQ,” proceed as follows:
1. Find the norm for the pupil’s age from Table 3.
2. Find the amount by which the pupil’s score exceeds (or falls below) the norm for his age. Call this his “deviation of score.”
3. Add the pupil’s deviation of score to 100 (or subtract from 100 if the deviation is downward). The result is the pupil’s “Beta IQ.”

4. If a pupil’s score is above 70, it is to be augmented before proceeding with Steps 2 and 3 above. Treat a score of 71 as though it were 72. Treat a score of 72 as though it were 74, etc., according to Table 6.

<table>
<thead>
<tr>
<th>TABLE 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FOR AUGMENTING HIGH SCORES</strong></td>
</tr>
<tr>
<td>This per cent of pupils</td>
</tr>
<tr>
<td>⅛ of 1%</td>
</tr>
<tr>
<td>⅓ of 1%</td>
</tr>
<tr>
<td>1%</td>
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<tr>
<td>5%</td>
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<tr>
<td>10%</td>
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<tr>
<td>25%</td>
</tr>
<tr>
<td>33½%</td>
</tr>
<tr>
<td>50%</td>
</tr>
</tbody>
</table>

As a sample of Step 4, suppose a pupil of 16 years 0 months makes a score of 75. The norm for 16 years 0 months is 55. To find his deviation of score, treat the score of 75 as though it were 80, subtract 55 from 80 (answer 25), and add 25 to 100, yielding an “IQ” of 125.

Various determinations of the dispersions of “Beta IQ’s” yield standard deviations of “IQ” of from 10 to 17 points for various populations. The standard deviation of “IQ’s” of 32,139 pupils of Pittsburgh derived from scores in the Intermediate Examination (similar to Beta) was 16.2 points. It is believed that “Beta IQ’s” tend to be somewhat less dispersed than IQ’s obtained by the division method from group tests in general (that is, they tend to be somewhat nearer to 100); therefore allowance should be made for this fact when comparing “Beta IQ’s” with ordinary IQ’s from other tests.

However, the above method is recommended as yielding measures of brightness that are more consistent and constant for a given individual than ordinary IQ’s.

**RELIABILITY AND VALIDITY OF THE BETA TEST**

By “reliability” is meant the degree of precision with which a test measures what it measures.

One common measure of the reliability of a test is the coefficient of correlation between two forms of the test. Table 7 gives the coefficients of correlation between Forms A and B in Grades 4 to 9 of a large school system, the average number of pupils per coefficient being 86. The average of the 12 coefficients is .79. For Grades 4 to 9 combined the coefficient is .96.

<table>
<thead>
<tr>
<th>TABLE 7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RELIABILITY COEFFICIENTS (FORM A VS. FORM B)</strong></td>
</tr>
<tr>
<td>Grades Combined</td>
</tr>
<tr>
<td>A (1st) – B (2d)</td>
</tr>
<tr>
<td>B (1st) – A (2d)</td>
</tr>
</tbody>
</table>
Another measure of reliability is the coefficient of correlation between odd and even items of a single test. This is virtually a correlation between two forms of a short test each half as long as the full test, the two tests being given, we might say, simultaneously.

It is customary, then, to correct the coefficients of correlation between the half tests by the Spearman-Brown formula to obtain the corresponding coefficient for two full-length tests given under the same circumstances.

The coefficients of correlation for the odd and even items of one test (Form CM) are as shown in Table 8.

### TABLE 8

<table>
<thead>
<tr>
<th>Grades</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Coefficients</td>
<td>.81</td>
<td>.92</td>
<td>.90</td>
<td>.87</td>
<td>.86</td>
<td>.79</td>
</tr>
</tbody>
</table>

The average of the six corrected coefficients in Table 8 is .86, which is 7 points higher than .79, the average of the coefficients of Table 7. This deficiency of 7 points in the coefficients of Table 7 is due to the instability of the pupils themselves. That is, if pupils remained as constant in ability from day to day as from moment to moment, so to speak, the coefficients in Table 7 would be as high as the coefficients in Table 8.

By validity of a test is meant the degree to which it measures the ability it is designed to measure. Or we might say, it is the degree to which it serves its purpose.

Now the purpose of the Beta Test is most generally that of finding the degree of brightness of a pupil; that is, obtaining some measure (such as the IQ) that indicates the probable rate of progress the pupil will make in school. This being the case, it follows that actual rate of progress of pupils through school is the most appropriate criterion of the validity of the Beta Test.

This criterion is the one that was used in the standardization of the Otis Intermediate Examination, from which most of the items of the Beta Test were taken. The method is described in the Manual for the Otis Self-Administering Tests of Mental Ability (page 3). The determination of the validity of each item consisted of comparing the number of passes of that item by a group of pupils who were making rapid progress through school with the number of passes of the item by a group of pupils who were making slow progress through school. Only those items were used which showed a distinct gain in number of passes of the rapid-progress pupils over the number of passes of the slow-progress pupils. Each item justified its inclusion, therefore, because it contributed definitely to the capacity of the test to measure brightness as reflected in rate of progress through school.

### Probable Error of a Score

Another measure of reliability which is entirely independent of the degree of heterogeneity of the group is the probable error of a score. By “probable error of a score” is meant the median amount by which any pupil’s actual score differs from his true score. While we don’t know the true score of any pupil (by which is meant the average of a great many scores found under identical conditions), we can tell from the differences between scores pupils make in two forms what this probable error is.

In the case of 465 pupils in Grades 4 to 9 the median amount of difference between two scores of the same pupil was 3.8 points, from which it follows theoretically that the probable error of a score is 2.7 points. $(3.8 \div \sqrt{2} = 2.7)$

That is, a pupil’s score will be in error only between 0 and 2.7 points in 50% of cases, and so on as shown in Table 9.

### TABLE 9

<table>
<thead>
<tr>
<th>In this per cent of cases</th>
<th>the pupil’s score will probably be in error</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>between 0 and 2.7 points</td>
</tr>
<tr>
<td>32%</td>
<td>between 2.7 and 5.4 points</td>
</tr>
<tr>
<td>16%</td>
<td>between 5.4 and 8.1 points</td>
</tr>
<tr>
<td>2%</td>
<td>over 8.1 points</td>
</tr>
</tbody>
</table>

### Application of Results

**Purposes of mental ability tests:** The principal purpose for which mental tests are given are these:

1. For teaching purposes, to discover which pupils are bright and capable of doing better school work than they are doing and to discover which pupils are dull and may be attempting work beyond their capacity.

2. For administrative purposes, to regrade pupils so that the pupils in any one grade will be more homogeneous in mental ability and therefore able to progress at more nearly the same rate than otherwise.

3. For administrative purposes, to classify pupils into separate groups within grades in order that the brighter or the more mature pupils may be given an enriched curriculum and in order that the duller or the less mature pupils may be allowed to progress at a slower rate.

Such classifying is sometimes done on the basis of score (dividing the pupils on the basis of mental maturity) and sometimes on the basis of IQ (dividing the pupils on the basis of brightness). The first of these methods is recommended.

4. For research purposes, to obtain two or more groups of equal mental ability or brightness which may be given
different methods of instruction for the purpose of
determining which method is superior.

5. For guidance purposes, to assist pupils to choose
wisely in planning their educational, recreational, and
vocational programs.

6. For administrative purposes, to determine the
comparative mental status of pupils of different schools
or localities.

Distributing scores. For any one of the purposes men-
tioned above it is desirable to distribute the scores of a
class. This is usually done by finding the intervals 0–4,
5–9, etc., into which the scores fall. Provision is made for
so distributing the scores of a class on the Class Record,
a copy of which is enclosed in each package of tests.

Classifying pupils according to score. If desired to
divide the pupils of a grade into classes according to score,
the scores of all the pupils of the grade may be entered in
one distribution on a Class Record or the test papers may
be arranged in order of score. The scores may then
be divided into an upper third, middle third, and lower
third, or in any other convenient way, and the pupils
classified accordingly.

It will be found that pupils so grouped are much more
alike in their ability to learn than the pupils of the whole
group and can be taught together much more easily.

ACKNOWLEDGMENTS

Thanks are due to Dr. Leon N. Neulen, Superintendent
of Schools, Camden, New Jersey, and to the teachers
of Camden; to Dr. W. C. McCall, University Personnel
Bureau, University of South Carolina; to Dr. William
L. Connor, formerly head of the Bureau of Research at
Cleveland; and to Dr. Leo J. Brueckner of the University
of Minnesota, for kind cooperation in furnishing scores
for standardizing the Beta Test, Forms A and B.

Thanks are also due to Dr. A. L. Maxon, Director of
Research, Department of Public Instruction, Schenec-
tady, New York, for cooperation in standardizing the
Beta Test, Form Cm.
### Trait I  
**Energy Level**

1. Always seems to have a superabundance of energy.
2. Definitely above average in energy level most of the time.
3. Not noticeably different from the rest of the class with respect to energy level.
4. Somewhat listless and lacking in energy most of the time.
5. Strikingly different from the group in energy potential — seems to be tired much of the time.

### Trait II  
**Changes in Energy Level** (Variations in energy whether the level is high or low.)

1. Notably even and lacking in variation in the level of energy output.
2. Some variation is noted, but tends to be more stable than most.
3. Variation in energy level average - fluctuations minor in range or frequency.
4. Tends to fluctuate noticeably more than the typical child.
5. Unusually wide differences in energy level from day to day.

### Trait III  
**Persistence**

1. Seems self-compelled to complete any task attempted — even without supervision.
2. Completes work without much prompting unless distraction is very great — definitely above average in persistence.
3. Usually finishes work unless distracted — typical of most of the class.
4. Seldom completely finishes work — lacks final push.
5. Shows little or no persistence in completing task — requires constant prompting.

### Trait IV  
**Rate of Work**

1. Always works rapidly — among the first to finish.
2. Finishes and usually has time to go over work — above average speed.
3. Finishes work in allotted time.
4. Often needs a little extra time to finish.
5. Works very slowly — seldom, if ever, finishes within the school period.

### Trait V  
**Accuracy**

1. Very careful and precise — neatness and accuracy are definitely characteristic.
2. Above average in accuracy — but it is done without conscious effort.
3. Average amount of care exercised — work does not stand out in one way or another.
4. Not notably accurate or precise in work.
5. Inaccurate papers, poorly formed letters, no attention to detail — every job should be done over, but the results are often not much better.
<table>
<thead>
<tr>
<th>NAME</th>
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</tbody>
</table>
DIRECTIONS FOR RANKING PUPILS

Would you please help us to learn more about the children we are testing by ranking your students on the following traits? You have been given sheets of paper with each pupil's name typed in a different block. Cut the sheets apart so that you have a separate slip of paper for each child.

On the back of each slip you will see Roman Numerals that stand for the five qualities in the ranking scale. You have been asked to rank each child on these five traits. In ranking do not pay attention to a child's rank on any other trait. The ranking should be done separately and independently for each trait.

The steps to follow in ranking your class on each trait are as follows:

1. Read and study the five descriptive phrases for the trait.
2. Sort your student's name slips into five piles corresponding to the five descriptive phrases.
3. Within each pile arrange the slips in order from the highest individual's name (the child most like the phrase) down to the lowest individual's name (the child least like the phrase). You may move your slips from one pile to another if you wish.
4. Put all the slips together with the pile most like descriptive phrase 1 on top.
5. Run through the slips and make sure that each child's name is in the right order.
6. Number the slips 1, 2, 3, 4, etc., 1 for the name of the pupil most like phrase 1 and the number representing the number of pupils in your class for the name of the pupil least like phrase 5.
7. Write the number on the back of each slip beside the Roman Numeral representing the trait that you are rating.
8. Repeat this procedure for the four other traits.

When you have ranked each child on all five traits place all of your slips in the envelope attached to your copy of the ranking scale. Fill in the information required on the front of the envelope, seal the envelope, and return it.

THANK YOU FOR YOUR HELP!
Appendix 9

Equivalent Scores for Form CM and Successive Day's Testing with Split Forms of the Otis Quick Scoring Test of Mental Ability, Beta Test.*

<table>
<thead>
<tr>
<th>Split Form Raw Score</th>
<th>Otis, CM, Equivalent Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First Split Day's Testing</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
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* Based on 274 cases in grades 4-7 in Ellsworth and Bucksport, Maine
Appendix 10

Percentile Ranks for IQ Variances Based on 271 Cases
(Grades 4-7) Ellsworth and Bucksport, Maine.

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