AN ANALYSIS OF THE IOWA SILENT READING ADVANCED TESTS, FORM Cm.

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by

Alfred James Butler

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A Thesis submitted in Partial Fulfilment of

the requirements for the degree of

MASTER OF ARTS

in the Department of

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THE UNIVERSITY OF BRITISH COLUMBIA

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ABSTRACT

The purpose of this study was to conduct a critical statistical analysis of the Iowa Silent Reading Advanced Tests, Form Cm. This battery of nine subtests has been designed for the diagnosis of the reading ability of students from Grade 9 to junior college.

During the months of November, December and January of the academic year 1947-48, the test was administered to a total of 433 students in ten sections of English 205 at the University of British Columbia. The data from sixteen students who were unable to complete the test were rejected.

(1) The mean difficulty, expressed as the $\frac{\text{mean score}}{\text{possible score}} \times 100$, of the subtests ranged from 47 to 79%. That of four tests, 4, Word Meaning, 5, Sentence Meaning, 6, Paragraph Comprehension, and 7B, Selection of Key Words, ranged from 47 to 79 percent. The distribution of raw scores on subtests 5, 6, and 7B, was determined to be markedly negatively skewed.

(2) Subtest standard score equivalents for the subtest raw scores have been published by the test authors. With the present group, these scores for subtests 4, 5, 6, and 7A (Use of Index) were not directly comparable with those of the remaining subtests.

(3) Difficulty of items in all subtests were ranged from approximately 10 percent to 99 percent passing. In three subtests, 4, 5, and 6, over 40 percent of theitems were passed by 90 percent of the group. With the exception of Part A of subtest 1C (Comprehension), items were arranged in order of difficulty for the group.

(4) As an expression of item validity, phi coefficients were determined for each item, with the subtest scores as criteria. In spite of the lack of difficulty of many items for the group, most items, with the exception of the first half of subtest 5, correlated significantly with the subtest scores.

(5) Reliabilities of the subtest and median scores, estimated by the Kuder-Richardson formula No.20, ranged from .725 to .916 for the subtest scores; while that of the test median was estimated as .955. Only subtests 2 (Directed Reading), 4, 5 and 7B might be considered sufficiently reliable for individual diagnosis.

(6) Factor analysis by Thurstone's Centroid Method revealed three common factors, accounting for 34.3, 6.7 and 4.1 percent of the variance of the subtests respectively. In subtests 1C, 5 and 6 the variance due to the first factor exceeded 40 percent. Variance due to specific factors in subtests 1R, 2, 3, 7A and 7B exceeded that due to common factors.

(7) To study the validity and predictive value of the Iowa tests, coefficients of correlation were determined between both subtest and median scores and final grades in five second year subjects, English, Economics, Geography, Mathematics and Accounting. These coefficients ranged from -.03 to + .45. With average final grades in second year pharmacy (N=47) coefficients of correlation of test scores ranged from .28 to .61. The subtests tended to correlate more highly with grades in those courses which required more reading.

(8) Coefficients of correlation between both subtest and median scores and the Otis S.A.Test of Mental Ability, Higher Form A, administered

in the fall of 1946, for a sample of 105, ranged from -.07 to + .71. There is some support for the hypothesis that the relationship between the scores on the two tests may be due to the nature of the common factor of the Iowa tests as revealed by factor analysis.

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Chapter I

INTRODUCTION TO THE PROBLEM

Within the past two decades there has been a rapid expansion of the application of reading tests. Speaking for the United States, Wrightstone (47,p.357) claims: "In practically every high school and junior college in the country an appraisal of reading is being made."

In spite of the rapid growth in the number of reading tests placed on the market, there has been a dearth of published critical analyses of these tests. Evidence of this lack of criticism, deprecated by such authorities in the field as Traxler (41) and Strang (31) can be availed from a survey of the psychological and educational literature.

This situation is exemplified by the case of the Iowa Silent Reading Advanced Tests. Although surveys by Strang (32) and Ewing (6) indicate that this is one of the most widely used tests at the junior college level, only two extensive critical analyses have been found to be published, those of Traxler (45) and Townshend (40).

The purpose of the present study is to carry out a critical statistical analysis of the Iowa Silent Reading Advanced Tests, Form Cm. This test battery, constructed for use at the secondary school and junior college level, consists of nine subtests and is intended, according to the test manual (7,p.3), to give measures of the following unit skills:

rate, comprehension, directed reading, poetry comprehension, word meaning, sentence meaning, paragraph comprehension, and location of information.

The problem is outlined as follows:

Internal analysis:

(1) What is the difficulty of the subtests?

(2) Are the subtest standard scores directly comparable?

(3) What is the difficulty of the items?

(4) What is the validity of the items?

(5) What is the reliability of whole test and subtest standard scores?

External analysis:

(1) What is the relation of total and subtest scores to success in specific subject fields?

(2) What is the relation of whole and subtest scores to academic aptitude as measured by the Otis. S.A.Test of Mental Ability?

Firstly, in what is defined as the internal analysis consideration is given to two characteristics upon which all mental tests are typically evaluated, reliability and discriminative ability. As the test is primarily a diagnostic, rather than a screening test, it is essential that the reliabilities of the subtests scores be sufficiently high for individual diagnosis. The range of item difficulty should be appropriate to the level of abilities being measured.

The factor make-up of the tests, particularly important in a diagnostic battery, is also studied. The test authors(7,p.4) claim that the Iowa tests measure nine different aspects of reading ability, basing their statement on the fact that they obtained fairly low subtest inter-correlations with fairly high reliability coefficients.

In the second section, defined as the external analysis, the relationship of the subtest and whole test scores to academic grades and to a measure of academic aptitude is studied. Such a study provides for not only an indirect validation of the tests but also an estimate of the predictive value of the battery.

Chapter II

HISTORICAL BACKGROUND OF THE PROBLEM

APPLICATION OF READING TESTS

While it is probable that man has long realized the importance of reading in his society, it has remained until the last few decades to approach the problem of reading scientifically, to outline a psychology of reading, to determine how individual differences arise, to identify factors involved, to measure these factors, to diagnose, and to correct difficulties.

In a review of reading investigations in the United States up to 1948 Traxler(44) discusses the origins of the experimental approach to reading. He reports that the earliest work, just before the turn of the century, by Javal, Huey and others, involved procedures for making objective records of eye-movements during the reading process. Before 1920 this method was perfected and applied by various persons investigating the psychology of reading.

With the development of reading tests which came into use about 1910, investigators gained another tool in the objective evaluation of reading ability. These tests, according to Traxler(44), were not diagnostic, and merely gave a gross score for reading achievement. It was not until 1930 that diagnostic tests which attempted to measure different aspects of reading ability came into use.

Since 1930 a great number of diagnostic and screening reading tests have been published. While early tests were designed primarily for use in the lower school grades, the present greater interest in reading programs

at high school and college has accelerated the publication of tests suitable at those levels.

In a recent monograph on the use of reading tests, Traxler(42) describes eight available tests which he considers suitable for use in colleges. In a later study Triggs(46,p.131) discusses twelve tests designed for college use. Of these, surveys by Strang(32) and Ewing(6) indicate that the Iowa Silent Reading Test has the most widespread use, followed by the Nelson-Denny Reading Test, the Minnesota Reading Examination for College Students, the Cooperative English Test (Form C_2 Comprehension).

Of these, only the Iowa Test is designed as a diagnostic instrument, the others are primarily survey tests. The difference between these two types of reading tests is explained by Conant(2,p.23) as follows:

> "In general, the survey test is an effort to measure 'general" reading comprehension, and sometimes speed of comprehension. It yields a single score which must be interpreted as a measure of the student's general level of reading ability. The chief purpose of this kind of test is to rank students in a group in the order of their 'general' reading ability.
>
> "Diagnostic reading tests, on the other hand, place more emphasis upon the reliable measurement of what have been defined as specific reading techniques. A diagnostic test and a survey test may cover the same general area, but the former will be more diagnostic to the extent that it allows the separate measurement of performance in each of the techniques included in the survey test. It may show up the strong and weak points in an individual's reading performance. This, a survey test, relying on one general score, obviously cannot do."

DEVELOPMENT OF READING TEST CONSTRUCTION

In a review of the development of reading test construction, Hall and Robinson(13) state:

> "During the past twenty years the approach to constructing reading tests has tended to follow a three-step evolution. The first approach was a subjective or armchair analysis of the jobs in reading for which logically consistent tests were constructed. For example, the division and the validity of the Iowa Silent Reading Test were based on the subjective analysis made by Horn and McBroom in 1924.
>
> "As a second step an intercorrelation technique was used to test success in making independent measures of aspects of reading . . . . Factor analysis represents the latest step to determine what independent reading skills actually exist in individuals and what tests seem to describe them best."

It was claimed above that the earliest edition of the Iowa Silent Reading Test was based on the first method of subjective analysis. Although the new edition has been considerably revised, this method seems to have been retained. According to the test authors(7,p.3):

> "In general, validity may best be expressed in terms of the extent to which the test sets up situations calling into play the skills or abilities which experienced observers consider fundamental to success in the given field. Such judgments are represented by the opinions of experienced teachers, the recommendations of committees and other qualified authorities, etc.
>
> "In validating this silent reading test the major dependence has been placed upon . . . (this) method."

In the Manual(7,p.3) the test authors list what they consider "the most significant skills, knowledge, attitudes, and abilities involved in typical silent reading situations." In essence, this list, presented in Chapter I, is similar to that abstracted from Gray(22,p113) below. The

authors(7,p.3) further support their method by claiming that: "A comparison of this list of abilities and attitudes upon which successful silent reading undoubtedly depends, with the list of unit skills specifically measured by the parts of the test will reveal the extent to which they represent really valid measuring instruments."

Those factors which have been considered essential by investigators using the first, or subjective, approach have been summarized by Gray (22,p113). Reviewing analyses made by Strang, Horn and many others, he concluded that the following abilities are essential to success in silent reading:

Ability to locate materials

Ability to select data bearing on a problem

Fact-getting techniques

Ability to understand what is read

Ability to evaluate and appraise

Ability to organize

Ability to remember and to apply what is read

Special abilities in reading literature, science, mathematics, and the social sciences

The role of factor analysis in the development of reading test construction will be discussed in conjunction with factorial studies of the Iowa Silent Reading Tests.

METHODS OF TEST ANALYSIS

Essentially, criticism of a mental test may be directed against two characteristics of the test, its reliability and its validity.

Firstly, the investigator is interested in the reliability of the test scores. That is, do successive measurements of the same individual yield the same values? Secondly, he is interested in the validity of the test scores. In general, two aspects of validity may be differentiated; first, functional and second, practical validity. Functional validity may be defined as the degree to which the test measures what it purports to measure. Practical validity may be regarded as the efficiency of the test in prediction of performance in some aspect of human endeavour.

Test Difficulty

A factor which affects both the reliability and the validity of test scores is the range of difficulty of the test for the group tested. The relationship between the reliability and the length of a test is well recognized(9,p282), the longer the test, the greater the reliability. Thus administration of a test too easy or too difficult for the group is equivalent to reducing the length of the test and consequently, to lowering of the reliability. Also tests whose distributions tend to be negatively or positively skewed do not discriminate between individuals of the higher and lower levels respectively of the ability measured by the test.

Guilford(8), in a study of the relationship between the difficulty of a test and its factor composition, found that the level of difficulty may determine the ability measured. Thus validity of a test may be influenced insofar as items of different ranges of difficulty may be measuring different factors.

Item Analysis

A second factor influencing the reliability and validity of test score is the nature of the test items. Item analysis, long considered an essential step in the analysis and construction of mental tests, compasses two general but interrelated problems, that of item difficulty and that of item validity.

Several theoretical and empirical studies of the difficulty of test items have been reported. As Osburn(24), in a review of methods of item analysis, points out, opinion is divided concerning the optimum difficulty of test items. Thurstone(39) using spelling tests with sixth grade students, found that maximum test validity was obtained with items passed by 30 to 70 percent of the group, with highest item validity being obtained with items passed by 45 to 55 percent. She concluded that the diagnostic value of a test was maximum when the items were passed by 50 percent of the group.

In a theoretical study, Symonds(35) claims: "The best test for measuring a typical school or class is a test in which all of the items have a difficulty such that they can be answered with 50 percent accuracy by the average individual." However, he makes the further qualification significant insofar as the empirical studies were based upon more or less homogeneous groups: "When a standardized test is constructed for use over several grades the above rule does not hold. In this case . . . items should be chosen over a wide range of difficulty."

In his discussion of item difficulty, Guilford(9,p293) accepts 50 percent as optimum difficulty, but states that if a chance factor is present the percentage passing should be increased to correct for it. For example the optimum item difficulty of a true-false item would be 75 percent.

Studies of item validity are made to determine the diagnostic value of the item. The relationship of the item score to the total test score, or to an outside criterion, is indicative of how well the item distinguishes between individuals who have more or less of the trait measured.

Several indices of item validity have been developed. One method employs the critical ratio in which the difference between the means of passing and failing subgroups on the item is tested for significance. For dichotomously scored items, where normal distribution of ability to pass the item can be assumed, biserial r may be used. If a large number of cases are involved, tetrachoric r may be employed. An evaluation of these methods has been made by Swineford(34), Zubin(48), Osburn(24) and others. Less laborious procedures have been developed by Guilford(11), using the phi coefficient and chi square.

Reliability of Test Scores

Several methods of determining test reliability have had common usage. The application test-retest, equivalent forms, and internal consistency methods have been adequately reviewed by Jackson and Ferguson (16) and many others.

Factor Analysis

Factor analysis was developed as a means of determining the number of factors responsible for the intercorrelations in a battery of mental tests. Its purpose, more generally stated, was to ascertain the number of factors measured by a test battery.

In an article in which he compares some of the methods of factor analysis widely employed, Holzinger(14) discusses the assumptions underlying them and suggests criteria for the selection of methods. He distin-

guishes between four general factor patterns obtained by the various methods; the uni-factor pattern with distinct group factors, the bi-factor, with one general plus group factors, the multi-factor, with overlapping group factors, and the principal-factor, with one general plus bipolar factors.

He implies that, in factorial studies, it is too often overlooked that the factor pattern determined for a test battery is partly due to the method of correlational analysis. There is, he claims, no universally "right method of factor analysis, the investigator must choose his method in the light of the assumptions that are required.

Validity of Test Scores

Two general approaches to the problem of determining test validity have been discussed by Conant (2,p.34). The first, she refers to as establishing validity by definition. In the case of reading tests, she states, this involves the specific definition of the reading techniques to be investigated and the formulation of the test, including passages and questions. A test is valid by these standards insofar as it is constructed according to the author's blue print. No objective means of evaluating "validity by definition", or what has been referred to as functional validity, has been developed.

The second and more generally accepted method is that of correlating test results with outside criteria. According to Conant (2,p.34) the three types of criteria most widely used to validate reading tests are scores on other reading tests, scores on verbal intelligence tests, and academic grades.

One method seldom employed in the validation of reading tests is that in which cases falling at the extreme ends of the distribution of test scores are studied clinically. This method might prove particularly valuable with diagnostic tests such as the Iowa Silent Reading Tests.

REVIEW OF ANALYSES OF THE IOWA SILENT READING ADVANCED TESTS

Although the Iowa test was designed for use in colleges and as indicated previously has been widely employed at that level, no extensive analysis of the test other than that of the test authors, based on test results of college groups has been reported. Studies dealing with the comparability of subtest standard scores, reliability and validity of the subtest scores, based on secondary school test data have been published. Three investigations, in which a factor analysis of reading abilities was conducted, employed the Iowa Test.

In the test analyses reported below various forms of the Iowa Silent Reading Advanced Tests have been used. Eight forms have been published, Forms A and B of the original edition, Forms Am, Am(revised), Bm, Bm(revised), Cm, and Dm. As the conclusions based on one form may not be valid for another, the forms studied, if specified in the original investigation, will be stated.

Difficulty of subtests; comparability of subtest standard scores

A comparison of the range of difficulty of the four forms (Am and Bm,unrevised, Cm and Dm) was made by the Educational Records Bureau(50) basing their study on 2,724 Grade 12 students from seventy-four independent schools. They found that the four forms could be used interchangeably. However, the median scores for all the subtests except Test 2, Directed Reading, and Test 5, Sentence Meaning, exceeded that reported by the test authors for Grade 13 (college freshmen).

In the same study, the median standard scores on the subtests varied from 168 to 194, indicating that for independent schools at least, the subtest standard scores were not directly comparable. Traxler(45)

had similar results with the New Edition Form Am(unrevised) given to 2,042 Grade 10 independent school students. Also, basing her study on Grade 11 independent school pupils, Townshend (40) found that the subtest median scores on the New Edition, Form Cm, were not comparable, varying from 172 to 194.

Reliability of test scores

Reliability coefficients for the subtest and test median scores have been reported by the test authors, by Traxler (45), and by Townshend (40). The results of these investigations are summarized in Table I. The reliability data reported by the test authors are fairly well confirmed by the latter two investigators.

In order that the reliabilities reported for the Iowa test may be compared with those reported for other popular college reading tests, available reliability data for three other widely used tests are presented in Table II.

The reliabilities reported for the Iowa test median scores and some of the subtests are of the same order of those obtained for the survey tests. However, in the absence of further information concerning the range of ability, age and other attributes of the samples tested, criticism on this point should be withheld.

Factor Analysis

According to the test authors, the Iowa Silent Reading Advanced Test is designed to give separate measures of nine unit skills. As stated previously, their views, based on a subjective analysis of reading

TABLE I.

Reliability coefficients estimated for Iowa Silent Reading Advanced Tests.

REFERENCE	FORM USED	SUBJECTS	RELIABILITY COEFFICIENTS TESTS: 1R	1C	2	3	4	5	6	7A	7B	Med.	METHOD
Greene (7,p.5)	Am Bm Cm Dm	Grade 13 (college freshmen) N=2074[xxx]	.74	.84	.77	.83	.88	.89	.80	.79	.70	.95	K.R.[x] No.21.
Greene (7,p.5)	Am Bm Cm Dm	Grade 10 Indep. Schools N=181	.69	.72	.82	.68	.87	.75	.76	.84	.86	.92	S.H.[xx]
Traxler (45)	Am	Grade 10 Indep. Schools N=161	.75	.87	.89	.92	.91	.94	.82	.88	.93	.97	S.H.
Townshend (40)	Cm	Grade 11 Indep. Schools N=209	.71	.74	.93	.77	.90	.87	.80	.87	.92	.95	S.H.

x : Estimated by Kuder-Richardson Formula No.21.
xx : Estimated by Split Half method, corrected by Spearman-Brown Formula.
xxx : Number varies with each subtest.

TABLE II.

Reliability coefficients reported for three college level reading tests.

REFERENCE	SUBJECTS	TEST	r_{tt}	METHOD OF ESTIMATION of r_{tt}
Nelson (25)	College freshmen N = 171	Nelson-Denny [1]	.91	Split Half
Riebe (29(	College freshmen N = 143	Nelson-Denny	.91	Split Half
Triggs (46,p.155)	H.S.Seniors N = 283	Minnesota [2] Vocabulary	.93	Split Half
	College juniors N = 216	Vocabulary	.91	Test-retest
	H.S.seniors N = 283	Paragraph reading	.69	Split Half
	College juniors N = 216	Paragraph reading	.78	Test-retest
Flanagan in Triggs (46,p.168)	Description of subjects not provided.	Coop.Reading Comprehension[3] Vocabulary	.92	Test-retest (consec.days)
		Level of Compr.	.82	"
		Speed of Compr.	.78	"
		Whole test	.94	"

1. The Nelson-Denny Reading Test for Colleges and Senior High Schools.
2. Minnesota Reading Examination for College Students.
3. Cooperative English Test C-2: Reading Comprehension.

abilities, were similar to those of many authorities in the reading field.

Several investigators(2, 4, 21, 26, 37), employing factor analysis, have attempted to determine the actual number of basic factors underlying some of the reading tests now in use.

The first applications of the technique of factorial analysis to research in reading may be credited to Davis(4). Reviewing the literature to determine what were considered to be the most important skills in reading, he isolated nine factors deemed essential. Nine tests designed to measure these skills were administered to 421 students, and a factorial analysis was made by Kelly's principal axes method. Two components identified as "word knowledge" and "reasoning in reading" accounted for 89 percent of the variance.

In a reanalysis by Spearman's unidimensional method, of Davis' tests, Thurstone(39) found a common factor with three tests showing an additional specific variance not attributable to the common factors.

An approach similar to Davis' was employed by Conant(2). Six tests of reading were devised to measure skills which Conant, from a survey of the literature, found most frequently quoted as important in reading. Administering the tests with four other tests of reading and intelligence, to 256 senior high school students, and employing Hotelling's method of factor analysis, she was able to isolate three factors with significant loadings on the reading tests. However, over 70 percent of the variance was due to a general factor which she tentatively identified as "something which has to do with general comprehension." A second factor accounting for only 5.6 percent of the variance was identified as "linguistic". No interpretation was offered for the third factor which accounted for 5.0

percent of the variance.

In a factor analysis of the Iowa Silent Reading Tests (form and edition unspecified), the Iowa English Training Examination (Part 4, Vocabulary) and the Iowa Mathematics Aptitude Test (Part 4, Reading Mathematics) administered to college students, Pankaskie(26) showed three factors which she identified as speed of comprehension, vocabulary, and ability to find answers. Subtests of the Iowa Silent Reading battery did not turn out to be pure measures of these factors.

Langsam(21), in a factor analysis of reading ability, utilized the seven subtests of the New Edition, unrevised, Form Am, of the Iowa Silent Reading Tests, as well as fourteen other measures of reading ability and of intelligence. Administering the battery to 100 college freshmen, and employing Thurstone's Centroid Method of factor analysis, she identified five factors; a verbal factor V, a perceptual factor P, a word factor W, a number factor N, and a factor tentatively identified as that of seeing relationships. The Iowa subtests all had significant and heavy loadings with the verbal factor, and four had significant loadings with the perceptual factor. No significant loadings were indicated for the word factor or number factor. The absence of a significant projection of the Word Meaning Test on the word factor, she explained on the basis that the vocabulary of the test was so easy for the group, it was measuring only speed, or the perceptual factor. Only the test of sentence meaning had a fairly significant loading on the fifth factor, that of seeing relationships.

Validity of test scores

As stated previously, three types of outside criteria have been used to validate reading tests, scores on other reading tests, scores on tests of intelligence or academic aptitude, and thirdly, academic grades in specific subjects.

A study of the relationship between the Iowa test median scores and those obtained on the Cooperative English Test C2, Reading Comprehension, based on the results of Grade 9 pupils, has been reported by the Educational Records Bureau (49). The latter test gives a total score on three parts, Vocabulary, Speed, and Level of Comprehension. In three investigations with the tests given a year apart, they obtained coefficients of correlation from .68 ± .04 to .76 ± .03. They concluded that the tests must be measuring similar, if not identical, aspects of reading ability in spite of the difference in content and organization.

With 321 Grade 10 pupils, Triggs (46,p.146) reports correlations for the subtests of Iowa test New Edition with Chapman Cook test, ranging from .28 to .55. Although the Chapman Cook Speed of Reading Test is designed to measure rate, the highest coefficient, of .55, was found between that test and Test 5, Sentence Meaning.

In a study of the relationships among the scores of four college reading tests, including Iowa Silent Reading Tests, all given to 70 graduate students, Strang (31) found that those tests were measuring somewhat different reading abilities. The correlation between the Iowa paragraph meaning test and the Nelson-Denny paragraph reading test was only .49; the Iowa rate with the Whipple speed of reading, .34 (26 cases); and the Iowa word meaning with Nelson-Denny vocabulary, .65.

In a few investigations (33,45,46,p.145) the relationship between scores on the Iowa test and measures of academic aptitude was studied. Traxler (45) with Grade 11 students as subjects, correlated scores on the Iowa test (New Edition, form unspecified) with the two types of scores on the American Council Examination. With the linguistic score he obtained a correlation of .74 ± .02 and with the quantitative scores, .59 ±.03, and with the total .75 ± .02. He considered this as evidence that the Iowa test was measuring essentially a verbal factor.

Similar results were obtained by Triggs (46,p.145) who with Grade 10 students, and using the Iowa New Edition(form unspecified), correlated the subtest scores with a battery of tests of academic aptitude. The highest correlations were found on the whole with those tests which were verbal in nature. Also, she discovered that the scores in sentence meaning, word meaning and use of index are the part scores that most often correlated highly with tests of academic aptitude.

Strang (33), administering the Iowa test, New Edition, and the California Test of Mental Maturity to Grade 9 pupils, found a correlation between Iowa test median scores and the language score of the California test of .685 ±.041, as against one with the non-language section of .356 ± .068.

Several studies (15,20,29,30,36) indicate that reading ability as measured by conventional tests has a positive relationship to academic success, with correlation between reading scores and academic grades in specific subjects ranging up to .50. Remedial reading programs which have resulted in increased academic grades have been reported by Kilby (19), Dearborn (5), Simpson (30), and others.

The relationship of the Iowa Silent Reading Test to academic success has been investigated by Kilby(20) who found the test to have a higher correlation with freshman grades in English and social studies than with grades in physical sciences, mathematics and foreign languages. The test was found to have an independent relation to final grades when other variables are partialled out.

Humber(15) included in a battery of 16 reading tests given to senior college students, Test 3, Paragraph Comprehension(1931 edition); Test 7A, Use of Index; Test 7B, Use of Key Words(New Edition); from the Iowa Silent Reading Tests. Of the eleven courses, only grades in three were significantly correlated with the first, and two with Tests 7A and 7B. The relationship of the whole test with these academic grades, however, was not reported.

Chapter III.

DESCRIPTION AND ADMINISTRATION OF THE TEST

DESCRIPTION OF THE TEST

The Iowa Silent Reading Advanced Tests are designed as a diagnostic battery to "provide the teacher with a rather exact estimate of the levels of development of a number of important elements of silent reading abilities in the class, as well as with specific information in certain important skill areas concerning the limitations of the individuals comprising the class."(7,p.2)

The battery consists of seven subtests giving a total of nine subtest scores.

Test 1: Rate and Comprehension

This subtest (two scores) requires the reading of two somewhat diverse types of prose, one passage dealing with science content, the second with social studies. The student is instructed to read at a rate best for clear comprehension. The Rate score is expressed in terms of the total number of sentences read in one minute in each of the articles. The Comprehension score is determined on two exercises of multiple choice items based on the two passages. Scores are designated "1R" and "1C".

Test 2: Directed Reading

This test, consisting of twenty multiple choice items, is designed to measure the student's ability to "comprehend general and specific Situations expressed in the content without unduly stressing memory." (7,p.2). From the passage of science material placed opposite the

questions, the testee is instructed to locate the sentence which answers each question.

Test 3: Poetry Comprehension

By a series of multiple choice questions based upon a poem, the test measures the understanding of the poem as shown by ability to find passages which answer questions.

Test 4: Word Meaning

Consisting of four sections with a total of 70 multiple choice questions, this test is designed to measure understanding of significant words in four academic fields; social science, science, mathematics and English.

Test 5: Sentence Meaning

According to the authors, the sentences comprising this test are stated in such a way that in each case the meaning of the sentence as a whole must be comprehended. Each of the fifty one-sentence items is scored as true or false.

Test 6: Paragraph Comprehension

This test consists of thirty-six three-choice questions based on twelve paragraphs. The first item for each paragraph is designed to measure the ability to select the central topic of the paragraph, the second and third to measure the ability to identify details essential to the meaning of the paragraph. The total number of items answered correctly may be taken as the test score, although separate scores for the two abilities may be determined.

Test 7: Location of Information

Separate scores are provided for two aspects of the ability to locate information. Part A, with fifteen multiple choice items, gives a measure of the student's ability to find the source of answers from an index. Part B, consisting of twenty items, measures the ability to select words under which information about a given question might be found. Scores are designated "7A" and "7B".

DESCRIPTION OF THE SUBJECTS

The subjects for the present study were 433 second year university students registered in English 205 at the University of British Columbia for the session 1947-48.

While it was intended to test the total group registered for the course, participation in the program was not made compulsory, and eighty members of the class did not present themselves at the testing sessions.

The age of the subjects as reported ranged from eighteen to thirty-seven, with a median age of 22.8. Approximately 250 of the testees were exservicemen.

The distribution according to sex was 35 females and 398 males.

According to faculty of registration, the subjects were distributed as follows: Commerce, 223; Agriculture, 91; Pharmacy, 57; Arts and Science, 41; Physical Education,18; Nursing, 2; Applied Science, 1.

ADMINISTRATION OF THE TEST

The Iowa Silent Reading Tests were administered to ten sections of the class in English 205, in separate testing sessions during regular lecture periods. Five of the class instructors and the investigator acted as administrators.

Six of the testing sessions took place in late November and early December 1947, and the remainder in January 1948.

Administrators were instructed to use the Manual of Directions which provides a detailed description of the testing procedure and controls necessary in the testing situation. No additional instructions were provided. As the test is intended for use by instructors who have no specialized training in test administration, interpretation of the manual directions is a variable which might affect reliability of the test scores in the field situation.

In some cases the total time for reading the directions and for resting exceeded that allotted for a regular lecture period. For this reason sixteen subjects were unable to complete the test. In the preparation of the data, the results obtained from these cases were omitted. No cases were rejected for other reasons and the final data included results from 417 subjects.

Chapter IV.

INTERNAL ANALYSIS: ITEM ANALYSIS AND RELIABILITY

The tests were scored according to the Test Manual instructions, using the keys provided.

DIFFICULTY OF THE SUBTESTS AND COMPARABILITY OF SUBTEST STANDARD SCORES

From the distribution of raw scores on the subtests, the means, medians and standard deviations were determined as given in Table III. The mean difficulty (i.e. $\frac{\text{mean score}}{\text{possible score}} \times 100$) was also calculated. This statistic, designed to indicate the relative difficulty of test, must be used guardedly, as in the present case, with time limit tests. The distribution of raw scores is presented graphically in Figure 1.

It will be noted that the mean difficulty of the subtests ranged from 47 percent to 79 percent, but that of four exceeded 72 percent. In Figure 1, the distribution of scores on these four tests, 4, 5, 6, and 7B, is shown to be negatively skewed.

Standard score equivalents for the raw scores are given by the test authors as a means of directly comparing individual and group attainments in the ability measured by each subtest. Raw scores were converted to standard scores according to the scales published with the test. In Table IV a comparison is made of the medians and standard deviations of the subtest standard scores of the present sample with those reported for the freshman standardization group (7,p.14-15).

TABLE III

Analysis of the distribution of raw scores on the Iowa Silent Reading Advanced Tests- 417 second year university students.

TEST	POSSIBLE SCORE	MEDIAN	MEAN	S.D.	MEAN DIFFICULTY
1R	55	29.4	30.1	7.36	54.7
1C	35	24.4	24.2	4.18	69.1
2	20	9.6	9.4	4.80	47.0
3	20	8.4	10.3	3.86	51.5
4	70	50.9	50.5	8.45	72.3
5	50	40.5	39.4	6.76	78.8
6	36	29.2	28.6	4.22	79.4
7A	15	8.4	8.3	3.30	55.3
7B	20	16.9	15.7	3.86	78.5

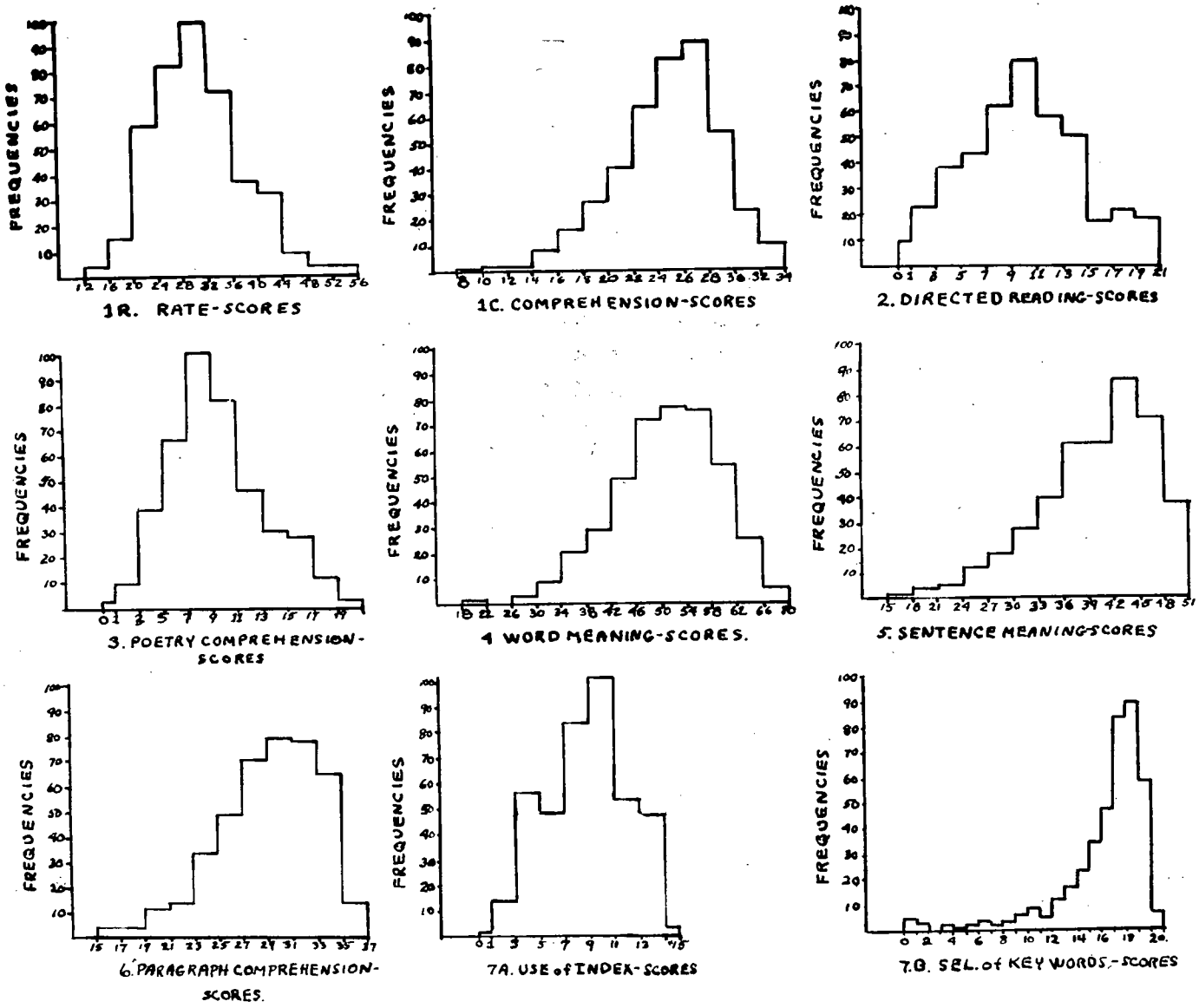

Fig. 1: Histograms of the subtest raw scores, Iowa Silent Reading Tests, form Cm.

TABLE IV.

Comparison of subtest median standard scores of U.B.C. second year students with Iowa freshmen standardization group.

TEST	U.B.C. N = 417		IOWA N = 2,074	
	Subtest median standard score	S.D.	Subtest median standard score	S.D.
1R	176.7	18.4	168.4	20.2
1C	180.3	17.7	185.3	21.0
2	178.8	20.4	180.3	21.1
3	176.8	18.9	177.9	21.7
4	198.8	13.1	190.4	19.4
5	192.2	15.8	190.4	19.0
6	186.8	16.7	180.0	20.8
7A	169.2	18.3	182.1	22.0
7B	183.0	14.4	178.6	18.8
Median	183.3	12.4	181.1	15.4

The subtest median scores with the present group ranged from 171 to 198; with standard deviations from 13.1 to 18.9.

The median standard scores of the U.B.C. group differ significantly from those obtained with Iowa State freshmen on six of the subtests and on the whole test median scores. On subtests 1R, 4, 6, 7B, and on the whole test score, the U.B.C. median exceeds that of the Iowa group. On subtests 1C and 7A the U.B.C. medians are significantly lower. On subtests 2, 3, and 5, the difference between the two groups is not statistically significant. However, with the exception of subtest 1R, the differences obtained between the U.B.C. and Iowa testees are much less than those reported between the Iowa freshmen and the Grade 12 standardization group.

Thus on the basis of difficulty of the subtests alone, the extension of the use of the test to the second year of college may be justified. The chief purpose of the test is to select those with low reading scores, and those tests which do have a negatively skewed distribution are still able to discriminate between those at the lower end of the distribution.

Although the standard scores on subtests 1R, 1C, 2, 3, and 7B are fairly comparable, standard scores on the remaining subtests can not be compared directly with the others. Standard scores based on local norms would overcome this difficulty.

ITEM DIFFICULTY

The difficulty of each item may be expressed in terms of percentage of the group passing each item. The distribution of the item difficulties of the nine subtests is presented in Table V. In this table a comparison of the median item difficulty is made with that of the assumed optimum difficulty of 50 percent with a correction for chance success (9,p.287).

TABLE V.

Distribution of item difficulties.

TESTS	NUMBER OF ITEMS PASSED BY PROPORTION OF GROUP										MEDIAN ITEM DIFF.	No. of poss. resp.	ASSUMED OPTIMUM DIFF.[X]
	90–100 %	80 – 89.9 %	70 – 79.9 %	60 – 69.9 %	50 – 59.9 %	40 – 49.9 %	30 – 39.9 %	20 – 29.9 %	10 – 19.9 %	00 – 9.9 %			
1C	6	11	6	1	0	4	1	3	3	0	79.6	3	66.7
2	0	2	4	3	1	2	1	2	3	2	50.0	5	60.0
3	0	1	3	2	3	1	2	4	3	1	40.0	5	60.0
4	28	10	6	5	4	4	1	7	1	2	83.3	5	60.0
5A[XX]	22	3	0	0	0	0	0	0	0	0			
5B[XX]	7	5	2	4	1	4	1	0	1	0			
5	29	8	2	4	1	4	1	0	1	0	91.4	2	75.0
6	16	6	5	2	3	2	1	0	1	0	86.7	3	66.7
7A	1	1	5	1	1	0	2	2	2	0	65.0	5	60.0
7B	7	6	3	1	0	2	1	0	0	0	85.0	4	62.5

X : Guilford(9,p.289)

XX : Distribution of item difficulties for the first 25 items(A) and the second 25 items(B) of Test 5 is presented separately.

On subtests 1C, 4, 5, 6 and 7B, over 50 percent of the items were passed by over 80 percent of the group, and in the case of subtests 4, 5 and 6, over 40 percent of the items were passed by more than 90 percent. In Table V the difficulty of the items in the first and second half of Test 5 are presented separately. It will be noted that all but three items in the first half are passed by over 90 percent of the group. In all the subtests the difficulty of the items is widely distributed from the assumed optimum difficulty.

In considering these results, it should be remembered that the Iowa Silent Reading Advanced Tests are designed for Grades 9 to 12 as well as junior college. In the present situation the group was drawn from the latter higher academic level. The fact that the items ranged from 0 to 99 percent is in agreement with Symond's (35) contention that items of a test designed for a heterogeneous group should be graded in difficulty.

Although a large proportion of items appear to be too easy for this group, criticism of the item difficulty should be made in conjunction with the evaluation of item validity.

When the items are graded in difficulty, it has been a practice of "longstanding recognition" to arrange items in rank in a test, easiest items first(9,p.287).

The relationship of item difficulty to position of items in the subtests may be expressed by the rank order coefficient of correlation (rho). These values of rho for the subtests are given in Table VI. It will be observed that rho, with the exception of that for section A of subtest 1C, exceeds .62.

ITEM VALIDITY

Closely related to the problem of item difficulty is that of item validity. Methods of item validation have previously been discussed. In this case the index of discrimination used has been the phi coefficient using the subtest scores as the criteria. One of the advantages of the phi coefficient is that it does not require, according to Guilford(11), the assumption of a continuous distribution in either the item or criterion variable. When bi-serial r is used as an index of item validity the assumption of normal distribution of ability to pass the item is required. The phi coefficient has an advantage over the simple index of item validity ($p_u - p_l$) in that it takes into account the dispersion of individuals on the item variable, while the latter does not.

The criterion subgroups selected were the upper and lower 27 percent of the distributions on each subtest. The theoretical basis for this selection has been established by Kelly(18). Guilford(9,p.297) states that from his experience, but without mathematical proof, when upper and lower 27 percent are used, ϕ is equivalent to the Pearson r. Carter(1) has presented evidence that indices of item validity based on upper and

TABLE VI.

Values of rho between rank order of difficulty of items and rank order of items within the subtests

TEST	No. of ITEMS	rho	$P.E._{rho}$
1C Part A	10	.288	.21
Part B	25	.888	.07
2	20	.892	.08
3	20	.628	.13
4 Part A	20	.912	.07
Part B	15	.623	.15
Part C	15	.778	.12
Part D	20	.887	.08
5	50	.890	.05
6	36	.702	.11
7A	15	.700	.13
7B	20	.819	.10

lower 27 percent of the distribution are as reliable as those based on the upper and lower 50 percent.

According to Guilford(11) the lowest value of the phi coefficient significant at the five percent level of confidence is equal to $\sqrt{\frac{3.841}{N}}$ and at the one percent level, $\sqrt{\frac{6.635}{N}}$.

In Table VII the distribution of phi coefficients, with the number of significant (.05 level of confidence) and very significant (.01 level of confidence) values in each subtest, is presented.

In all subtests the number of non-discriminating items is very small. The mean phi coefficient for each subtest ranges from .32 to .620. The distribution of phi coefficients for the first and for the second halves of Test 5 are presented separately. In the first half of Test 5, the mean phi coefficient is .137, and only 11 items are significantly correlated, at the one percent level of confidence, with the subtest score.

RELIABILITY OF THE SUBTESTS

The reliability coefficients of the subtests were determined by the Kuder-Richardson Formula No. 20.(28).

As Cronbach(3) in a discussion and review of existing methods of determining test reliability points out, there appears to have developed no universally accepted procedure. The reliability of a test score, he states, has generally been defined in terms of the variation of scores obtained by the individual on successive independent testing. However, he continues, neither the assumption of constancy of true scores nor the assumption of experimental independence is realized in practice with most psychological variables, and he concludes that the reliability of a test as so defined is a concept which cannot be directly observed. Also, different assumptions

TABLE VII

Distribution of phi coefficients based upon subtest raw scores as criteria

Values of Ø	TESTS: 1C	2	3	4	5A[x]	5B[x]	5	6	7A	7B
.90-1.00	0	3	0	0	0	0	0	0	2	0
.80- .89	0	3	0	1	0	8	8	4	1	1
.70- .79	0	2	4	5	0	3	3	2	3	1
.60- .69	2	2	3	9	0	2	2	1	3	1
.50- .59	5	2	2	7	0	2	2	1	2	5
.40- .49	3	5	4	8	0	3	3	3	1	5
.30- .39	7	2	3	8	2	4	6	4	1	5
.20- .29	12	1	2	15	1	2	3	9	0	2
.10- .19	4	0	2	14	15	1	16	9	1	0
.00- .09	2	0	0	3	7	3	1	0	7	0
Significant[xx]	33	20	20	67	18	25	43	33	14	15
Very significant[xxx]	30	20	20	61	11	25	35	31	14	15
Mean Ø	.325	.620	.480	.376	.137	.501	.363	.345	.598	.470

x : The distribution of phi coefficients for the first 25 items(A) and second 25 items(B) of Test 5 are presented seperately.

xx : Significant at .05 level of confidence, phi $\geq$ .126.

xxx : Significant at .01 level of confidence, phi $\geq$ .096.

lead to different types of coefficients, which are not estimates of each other. Of the four definitions outlined by Cronbach, the one accepted for this study, that of "coefficient of equivalence" is stated as follows:

> "Reliability is the degree to which the test scores indicate the status of the individual in the general and group factors of the test."

Two methods of obtaining a coefficient of equivalence are the "Split-Half" method and the Kuder-Richardson formulae. As pointed out by Richardson and Kuder (28) the Split-Half technique assumes equal standard deviations of the two halves and also implicitly assumes that the correlation coefficient between the two halves is representative of the many different coefficients that could be obtained if the test were halved in different ways. The particular split may not select a representative value from the many different estimates possible.

The derivation of Kuder-Richardson Formula No. 20 requires the following assumption(16,p.73):

$$r_{ij} = r_{i'j'} = r_{i'j}$$

$$S_i = S_{i'} \; ; \quad S_j = S_{j'}$$

Where r_{ij} = correlation between items i and j of the test

$r_{i'j'}$ = correlation between items i' and j' of the hypothetically equivalent form of the test,

S_i = standard deviation of item i of the test,

$S_{i'}$ = standard deviation of item i' of the hypothetically equivalent form of the test.

However, Jackson and Ferguson(16,p.74) have developed a formula identical to the Kuder-Richardson Formula No.20, with the following less rigorous assumption that the average item covariances are equal. This assumption may be written:

$$\overline{r_{ij}S_iS_j} = \overline{r_{i'j'}S_{i'}S_{j'}} = \overline{r_{i'j}S_{i'}S_j}$$

where $\overline{r_{ij}S_iS_j}$ = average item covariance of the test

$\overline{r_{i'j'}S_{i'}S_{j'}}$ = average item covariance of the hypothetically equivalent form of the test.

The coefficients of equivalence, or coefficients of reliability as defined above, compared with those obtained by the test authors for the nine subtests, are given in Table VIII.

As the score of Test 1, Rate of Reading, was based on number of sentences completed in each of two passages, reliability was determined by the Split-Half method using the correlation of the scores obtained in the two sections. The reliability coefficient for the test battery, that is for the median scores, was determined by the method outlined by Jackson (16,p.78).

As the coefficient of reliability varies with the range of talent, the standard deviations and probable errors of measurement for each subtest are included in Table VIII. as a basis for comparison with results obtained by the test authors(7,p.5).

The obtained coefficients, ranging from .725 to .916 for the subtest scores and .955 for the median scores do not differ markedly from those calculated by the test authors with Iowa State freshmen, using the Kuder-

TABLE VIII

Reliability data based on Kuder-Richardson Formula No. 20 for second year university (U.B.C.) group compared with data presented by test authors

TEST	U.B.C. N = 417			IOWA N = 2,074		
	r_{tt}	S.D.	PE_m	r^{x}_{tt}	S.D.	PE_m
1R	.733[xx]	18.4	7	.744	21.8	7
1C	.725	17.7	6	.839	20.8	6
2	.892	20.4	5	.769	19.9	6
3	.786	18.9	6	.826	20.6	6
4	.888	13.1	3	.877	19.3	5
5	.916	15.8	3	.891	20.4	5
6	.773	16.7	6	.800	20.8	6
7A	.816	18.3	5	.794	20.7	6
7B	.870	14.4	3	.695	16.0	6
Median	.955[xxx]	12.4	2	.949	15.8	2

x : Based on Kuder-Richardson Formula No. 21.
xx : Split-Half corrected by Spearman-Brown formula.
xxx : Estimated battery reliability, Jackson & Ferguson (16, p.78)

Richardson Formula No. 21.

The meaningfulness of the Split-Half coefficient for subtest 1R might be questioned, as the halves correlated were equivalent neither in length nor subject content. However the time limits were equal, and according to the test authors the passages were of the same "level of comprehension".

SUMMARY AND CONCLUSIONS

As the sample tested was a selected group of second year university students, generalizations concerning the application of the test at the second year university and at the junior college level are valid insofar as the present sample is representative of students of those two levels respectively.

(1) The mean difficulty of the subtests ranged from 47 percent to 79 percent, but that of four exceeded 72 percent. The distribution of scores on these four subtests, 4, 5, 6, and 7B, were negatively skewed.

Median standard scores of the U.B.C. second year group exceeded those obtained by Iowa college freshmen standardization group, on subtests 1R, 4, 5, 6, and 7B, and on the test median. Although the differences were statistically significant in most cases, these differences were much lower in terms of standard scores, than those obtained between Iowa college freshmen and Grade 12 standardization group. On the basis of difficulty of the subtests alone, the extension of the use of the test to the second year of college may be justified.

The standard scords on subtests 1R, 1C, 2, 3, and 7B are directly comparable, but standard scores on the remaining subtests can not be compared directly with the others.

(2) The difficulty of the items was determined as the percentage of the group passing each item. Although the items were ranged in difficulty from 0 to 99 percent, over 50 percent of the items in subtests 1C, 4, 5, 6, and 7B were passed by more than 80 percent of the group. In the case of the first half of subtest 5, 22 of the 25 items were passed by over 90 percent.

Rank order coefficients of correlations between order of difficulty and order of items within the subtests exceeded .62 (with the exception of part A of subtest 1C, in which rho = .29). The latter subtest, involving ten items, provides only part of the comprehension score. The tests then as a whole contained items which were arranged approximately in order of difficulty.

(3) The phi coefficient of each item was determined as an index of item validity, using the subtest score as a criterion. In subtests 2, 3 and 7B a very significant phi coefficient was determined for all items. With the exception of subtest 5, over 85 percent of the items of the remaining subtests had significant phi coefficients. The first half of subtest 5, Sentence Meaning, consisted of items which were particularly easy for this group, and the phi coefficients were low.

Despite the apparent lack of difficulty of the test battery, most items seem to discriminate between high and low ability groups in each ability measured.

(4) The reliability coefficients determined by the Kuder-Richardson Formula No.20 for subtests 1C to 7B ranged from .725 to .916. For subtest 1R, the Split-Half coefficient was .723. The coefficient of reliability

for the median scores was determined as .955. No coefficient differed markedly from those obtained by the test authors with the standardization group.

Insofar as the coefficients of equivalence as determined by the method of rational equivalence are adequate estimates of reliability, all the subtests may be considered sufficiently reliable for group measurements, but only subtests 2, 4, 5 and 7B should be used for individual diagnosis.

Chapter V.

FACTOR ANALYSIS

According to the authors, the Iowa Test measures nine different aspects of reading ability. Thurstone's(38) Centroid Method of factor analysis was used to determine the number of common factors underlying the nine subtests.

As pointed out by Holzinger(14), one of the assumptions underlying the use of Thurstone's method is that overlapping group factors may account for the intercorrelations of a test battery. One of the criticisms of the method is that it is unable to reveal a general factor even if it is present. As it is of particular importance to determine if a general reading ability is responsible for the intercorrelations of the Iowa subtests, this point is significant. Guilford(10) demonstrated that it is possible to reveal a general factor by presenting fictitious data to students for factor analysis by the centroid method. Working independently, all arrived at essentially "correct solutions, revealing the fictitious general factor.

Product-moment intercorrelations of the nine subtests were determined from the raw scores of the total group of 417 subjects. In Table IX is presented the correlation matrix upon which the factor analysis was conducted.

TABLE IX.

Intercorrelations, with T values, of the subtest raw scores[x]
N=417

TEST	1R	1C	2	3	4	5	6	7A	7B
1R		.358	.221	.255	.369	.396	.405	.156	.151
1C	7.9[xx]		.384	.383	.511	.518	.522	.369	.321
2	4.5	8.1		.373	.455	.462	.460	.345	.248
3	5.3	8.1	7.9		.299	.382	.428	.271	.205
4	7.9	11.4	10.2	6.3		.628	.584	.423	.339
5	8.5	11.8	10.2	8.1	15.0		.593	.288	.361
6	8.9	11.8	10.2	9.3	13.4	14.0		.380	.371
7A	3.2	8.5	7.7	5.7	9.3	6.1	8.1		.262
7B	3.0	7.0	5.3	4.3	7.1	7.7	7.9	5.5	

[x] : Intercorrelations are given in upper right diagonal, T values in lower left diagonal.

[xx] : r is significant at .01 level of confidence when T = 2.58.

r is significant at .001 level of confidence when T = 3.29

FACTOR LOADINGS

Employing the centroid method as outlined by Guilford(12,p.478), two calculations of the factor loadings were made, after two approximations of the communalities. Rotation of the reference axes was made to maximize the number of zero loadings and to eliminate negative loadings. This revealed three factors.

The factor loadings of these three factors and the communality of each subtest is given in Table X, before and after rotation of the reference axes. The communality of each subtest, h^2, is the proportion of the variance due to the three factors.

Significance of a factor loading, which represents the correlation of the test with the factor, may be determined by comparing it with its sampling error. Studies by McNemar(23) and Guilford(10) indicate that sampling errors of the calculated factor matrix are similar to those of correlation coefficients. However, McNemar(23), using three sets of data, found that sampling errors for loadings beyond the first factor are at least twice those of correlation coefficients. Thus for the purpose of this problem, only loadings exceeding .20 were considered significant. That is, only those loadings were considered significant which exceeded six probable errors of a numerically equivalent coefficient of correlation. From the final factor matrix, it will be observed that all tests have a significant loading on the first factor. Tests of directed reading, word meaning, sentence meaning, and paragraph comprehension have significant loadings on the second factor, while significant projections for the third are found on tests of directed reading, poetry comprehension, and use of

TABLE X

Factor loadings and communalities of the subtests before and after rotation of reference axes.

	CENTROID MATRIX				ROTATED FACTOR MATRIX			
TEST	k_1	k_2	k_3	h^2	k_1	k_2	k_3	h^2
1R	.465	.156	.177	.272	.518	.037	-.047	.271
1C	.692	-.030	.102	.490	.650	.188	.185	.492
2	.607	-.165	-.090	.404	.469	.307	.298	.403
3	.530	-.236	.221	.385	.509	-.014	.349	.381
4	.765	.176	-.255	.681	.613	.552	.001	.680
5	.770	.246	.058	.657	.760	.275	-.067	.658
6	.782	.086	.081	.625	.747	.244	.092	.626
7A	.506	-.211	.194	.338	.488	.005	.320	.340
7B	.448	.033	.002	.202	.406	.178	.069	.201

index.

Relative importance of the three factors and the specific factors may be determined by an examination of the variance of each subtest due to the respective factors and to errors of measurement. For the purpose of this study the coefficients of reliability obtained by the method of rational equivalence, and reported in Table VIII, have been accepted.

In Table XI, the variance of each subtest due to the three factors (k_1^2, k_2^2, k_3^2), to specific factors (specificity, k_s^2) and to errors of measurement (error variance, k_e^2) is given. Uniqueness (k_u^2) of the subtests is given as the total variance due to specific factors and to errors of measurement. It will be observed that the first factor, which is common to all subtests, accounts for 34.3 percent of the variance; the second for 6.7 percent; and the third for 4.1 percent; as compared with 37.2 percent for the specific factors.

In Test 1C, Comprehension, Test 5, Sentence Meaning, and Test 6, Paragraph Comprehension, the proportion of the variance due to the first factor is much larger than that due to the specific factors. Also the error variance exceeds that due to specific factors in Tests 1C and 6. Scores of these three tests might justifiably be combined.

In subtests 1R, 2, 3, 7A, and 7B, the variance due to specific factors exceeds that due to common factors. Thus while each test is designed to measure a unit skill, only the subtests just mentioned are specific factors relatively important.

TABLE XI

Factor variances, communalities, reliabilities, specificities, uniqueness and error variances of the subtests

TEST	k_1^2	k_2^2	k_3^2	h^2	r_{tt}	k_s^2	k_u^2	k_e^2
1R	.268	.001	.002	.271	.733	.462	.729	.267
1C	.423	.035	.034	.492	.725	.233	.508	.275
2	.219	.094	.089	.402	.892	.490	.598	.108
3	.259	.000	.122	.381	.786	.405	.619	.214
4	.376	.304	.000	.680	.888	.208	.320	.112
5	.578	.076	.004	.658	.916	.258	.342	.084
6	.558	.060	.008	.626	.773	.147	.374	.227
7A	.238	.000	.102	.340	.816	.476	.660	.184
7B	.165	.032	.005	.202	.870	.668	.798	.130
Σk^2	3.084	.602	.366	4.052		3.347	4.948	1.601
$\frac{\Sigma k^2}{N}$	.343	.067	.041	.450		.372	.550	.178

INTERPRETATION OF THE FACTORS

While factor analysis is intended to determine the number of factors which are responsible for the intercorrelations of a battery of tests, it does not provide a means of naming these factors.

Interpretation of each factor in the present study was made by examination of the contribution of each factor to the variance of each test, and by consideration of the skills which the test was designed to measure.

The first factor, although common to all tests, has its highest variance in tests of sentence meaning and paragraph comprehension. This factor, the only factor commonly measured by Test 1, Rate, and Test 1, Comprehension, may be tentatively identified as "speed of comprehension".

The second factor, which has its highest loading on Test 4, Word Meaning, has significant loadings also on Test 2, Directed Reading, Test 5, Sentence Meaning, and Test 6, Paragraph Comprehension. This factor is tentatively identified as a "word" factor.

The third factor has small but significant loadings on Test 2, Directed Reading, Test 3, Poetry Comprehension, and Test 7A, Use of Index. Of the test battery, only these tests require the testee to seek answers to questions from a passage of reading. This factor is therefore tentatively identified as the "ability to find answers to questions".

SUMMARY AND CONCLUSIONS

Thurstone's Centroid Method of factor analysis was employed to determine the number of factors which were responsible for the intercorrelations of the nine subtests of the Iowa Silent Reading Advanced Tests.

Significant factor loadings for three common factors were determined. The proportion of the variance attributable to the common factors was 34 percent, compared with 37 percent for specific factors.

In Tests 1C, Comprehension, 5, Sentence Meaning, and 6, Paragraph Comprehension, the largest proportion of the variance is due to the first common factor. The scores of these tests might justifiably be combined.

The relatively high specificities for Tests 1R, Rate of Reading, 2, Directed Reading, 7A, Use of Index, and 7B, Selection of Key Words, may be cided as justification for retaining them as separate subtests.

Significant loadings were determined for the first factor on all subtests. This factor was tentatively identified as "speed of comprehension". The second factor with its highest loading in Test 4, Word Meaning, was tentatively identified as a "word" factor. The third factor common to tests requiring the testee to seek answers for questions in a passage of reading was tentatively identified as the "ability to find answers".

Chapter VI.

EXTERNAL ANALYSIS

RELATIONSHIP OF TEST SCORES TO ACADEMIC GRADES

To investigate the relationship between scores on the Iowa Silent Reading Tests and academic grades, correlations were determined between the test scores and academic grades in six subject fields: English, commerce, economics, geography, mathematics and pharmacy.

Of the 417 students who took the Iowa test, 170 were enrolled in Commerce 251 (Fundamentals of Accounting); 172 in Economics 200 (Principles of Economics); 161 in Geography 102 (Human and Economic Geography) and 163 in Mathematics 201 (Mathematical Theory of Investments). A subjective evaluation of the amount of reading required in these courses might place English first, Economics and Geography second, and Commerce and Mathematics third.

Also included in the group tested were 47 students who were taking the full prescribed course for second year pharmacy.

Product-moment correlations were determined between the subtest and whole test standard scores and final grades in each of the single courses, and with the average final grade in second year Pharmacy. The results are presented in Table XIII.

It will be observed that no subtest or median score correlates higher than .45 with a single course final grade. Many of the relationships are statistically insignificant.

With the average final grades in Pharmacy, correlations of the subtest scores range from .26 to .61; the correlation of the test median score

TABLE XIII.

Coefficients of correlation, with T values, of subtest, and median scores, and final grades in six second year university courses.

TEST	COURSE: ENGLISH 205 N=105		ECONOMICS 200 N=172		GEOGRAPHY 102 N=161	
	r	T	r	T	r	T
1R	.14	1.41	x .19	2.45	xx .24	3.02
1C	xx .28	2.92	x .18	2.32	xx .30	3.91
2	xx .27	2.83	x .16	2.06	.15	1.89
3	x .21	2.12	.15	1.94	.07	.88
4	xx .37	3.74	xx .24	3.10	xx .39	5.17
5	xx .36	3.84	xx .20	2.58	x .18	2.27
6	xx .39	4.04	x .19	2.45	x .19	2.39
7A	xx .29	2.93	.15	1.94	.10	1.26
7B	.06	0.61	x .18	2.32	.07	0.88
Median	xx .45	4.55	xx .33	4.39	xx .32	4.00

TEST	COMMERCE 251 N=170		MATHEMATICS 201 N=163		SECOND YEAR PHARMACY AVERAGE FINAL GRADE N=47	
	r	T	r	T	r	T
1R	.09	1.15	.14	1.76	.28	1.92
1C	.12	1.54	.08	1.01	xx .54	3.98
2	.09	1.15	-.03	0.38	xx .42	2.98
3	.15	1.92	-.02	0.25	x .30	2.06
4	.06	0.77	.06	0.76	xx .37	2.59
5	.01	0.13	.02	0.25	.27	1.86
6	x .16	2.05	.09	1.13	x .34	2.32
7A	.15	1.92	.05	0.63	xx .61	4.71
7B	.13	1.66	x .16	2.02	.24	1.59
Median	xx .21	2.69	xx .27	3.40	xx .46	3.32

x : Significant at the .05 level of confidence.
xx : Significant at the .01 level of confidence.

is .46.

From this it follows that for the above courses the Iowa Silent Reading Tests used alone would have little predictive value. However, some of the relationships shown might justify the use of the whole test, or some subtests in a test battery for predictive purposes.

In the present study there was only one large sample for which both Otis scores and grades on a single course were known. For this sample of 105, the multiple correlation coefficient between final grades in English 205 and grades estimated by the regression equation, using Iowa median and Otis scores, was calculated. The coefficient of correlation between English grades and the Iowa scores was .44, between English grades and the Otis scores, .38, and between the Otis and the Iowa scores, .42. The multiple coefficient of correlation between the English 205 grades and the grades predicted from the regression equations was determined as .48.

Some light on the validity of the test is given by correlations shown in Table XIII. Generally higher correlations were determined for subtest and median scores with grades in English, Economics and Geography, than in Mathematics and Commerce (Accounting). Significance of the differences between these correlations, based as they were on overlapping samples, was not tested. With final grades in English 205, correlations significant at the five percent level of confidence were obtained with seven subtests; in Economics 200, with seven subtests; and in Geography 102, with five subtests. On the other hand only one significant correlation was obtained between subtest scores and grades in Commerce 251, and one between subtest scores and grades in Mathematics 201.

Thus, for the group tested, the Iowa Silent Reading Tests tend to

correlate higher with grades in courses which require more reading.

RELATIONSHIP OF TEST SCORES TO A MEASURE OF ACADEMIC APTITUDE

Of the group tested, 105 were administered the Otis S.A.Test of Mental Abilities, Higher Form A, in the fall testing session of 1946. To investigate the relationship between Iowa test scores and academic aptitude as measured by the Otis, product-moment correlations were determined between the Iowa subtest and median standard scores and the raw scores on the Otis. The results are presented in Table XIV.

The coefficients of correlations ranged from -.07 to +.70. All coefficients with the exception of those determined between rate and the Otis, and poetry comprehension and the Otis, were significant at the one percent level of confidence.

The size of coefficient of correlation between the scores of two tests is dependent firstly upon the degree to which these tests measure identical factors, and secondly upon the reliability of the tests. In the present case correction for attenuation could not be made, as no estimate of the reliability of the Otis was available. If, however, the Otis may be considered reliable for a period of over fifteen months, the low coefficients of correlation between the Otis and the Iowa subtests scores may be considered as evidence that the tests are not measuring identical factors.

However, there is some indication that the common factors as revealed by factor analysis of the Iowa tests are responsible for the relationship between the Iowa test scores and Otis scores. In Table XV is given the rank order of the communalities of the subtests and the rank order of the coefficients of correlation of the subtests scores with the

TABLE XIV.

Coefficients of correlations, with T values, of subtest, and test median scores, and scores on the Otis S.A.Test of Mental Ability, Higher Form A.

TEST	r	T
1R	-.07	0.71
1C	.39	4.14
2	.30	3.13
3	.21	2.12
4	.70	8.79
5	.44	4.75
6	.49	5.45
7A	.37	3.94
7B	.27	2.83
Median	.48	5.25

TABLE XV.

Rank order of the communalities of the subtests and rank order of the coefficients of correlation between subtest and Otis scores.

TEST	COMMUNALITIES	VALUES OF r between subtests and Otis	RANK ORDER OF COMMUNALITIES	RANK ORDER OF r's
4	.680	.703	1	1
5	.658	.441	2	3
6	.626	.489	3	2
1C	.492	.391	4	4
2	.403	.302	5	6
3	.381	.207	6	8
7A	.340	.366	7	5
1R	.271	-.070	8	9
7B	.201	.270	9	7

Otis. The value of rho between these rank orders was determined as .87. This is presented as support of the implied hypothesis rather than proof of the relationship.

SUMMARY AND CONCLUSIONS

(1) Product-moment coefficients of correlation were determined between the Iowa subtest, and test median, scores and grades in six second year university subjects, and with average final grades in the second year of Pharmacy.

No coefficient of correlation between scores on a subtest and grades in a single subject exceeded .393. The correlations between test median scores and single subject grades ranged from .206 to .445. Coefficients of correlation between subtest, and test median, scores and average final grades in Pharmacy ranged from .238 to .611.

It is concluded that for the population of which the present group is representative, the subtest or test median scores of the Iowa Silent Reading Advanced Tests, if used alone, would be of little value in the prediction of academic grades. However, some of the coefficients of correlation were high enough to justify the use of some of the subtests, or the whole test in a test battery for predictive purposes.

Generally higher correlations were obtained between both the subtest and test median scores, and grades in those courses (English, Economics and Geography) which require more reading, than between those scores and grades in Mathematics and Accounting.

(2) Product-moment correlations between the Iowa subtest, and test median, scores and scores on the Otis S.A.Test of Mental Ability, administered approximately fifteen months previous to the reading test, ranged

from -.07 to +.70. It is concluded that the subtests are measuring factors which are not identical with those measured by the Otis. There is some support for the hypothesis that the relationship between scores on the two tests may be due to the common factors of the Iowa tests revealed by factor analysis.

CHAPTER VII.

SUMMARY AND CONCLUSIONS

(1) Problem: It was the purpose of the present study to conduct a critical statistical analysis of the Iowa Silent Reading Advanced Tests, Form Cm. The problem has been outlined in Chapter II.

(2) Subjects: The test was administered to 417 second year students at the University of British Columbia, enrolled in English 205.

(3) Difficulty of the subtests: The mean difficulty of the subtests ranged from 47 to 79 percent, while that of four subtests, 4, 5, 6, and 7B exceeded 72 percent. The distribution of scores for this group on these four tests was negatively skewed.

(4) Comparability of subtest standard scores: Standard score equivalents for the subtest raw scores have been published by the test authors. With the present group these scores for subtests 4, 5, 6, and 7A were not directly comparable with those of the remaining subtests. Traxler (45) and Townshend (40) had somewhat similar results with Grade 10 independent school children. It is proposed that the standard scores should be used only with local norms.

(5) Item difficulty: Difficulty of items in all subtests were ranged from approximately 10 percent to 99 percent passing. In three subtests, 4, 5, and 6, over 40 percent of the items were passed by 90 percent of the group. Items were arranged approximately in order of difficulty in all subtests except Part A of subtest 1C.

(6) Item validity: Phi coefficients were determined for each item, with subtest scores as the criteria. In spite of the lack of difficulty of many items for this group, most items, with the exception of those of the first half of Test 5, correlated significantly with the subtest scores.

(7) Reliability of test scores: Reliabilities of the subtest and median scores, with the exception of Test 1R, were estimated by the method of rational equivalence. Reliability of the scores of Test 1R was estimated by the Split Half method, and corrected by the Spearman-Brown formula. Coefficients of reliability ranged from .725 to .916 for the subtest scores; the reliability of the test median score was estimated as .955.

It was concluded that scores on subtests 1R, 1C, 3, 6, and 7A were sufficiently reliable for group measurement only, while subtests 2, 4, 5, and 7B might be used for individual diagnosis.

(8) Factor analysis: Thurstone's Centroid Method of Factor Analysis was employed to determine the number of factors which were responsible for the intercorrelations of the test battery. Three common factors, accounting for 34.3, 6.7, and 4.1 percent of the variance of the subtests respectively, were isolated and tentatively identified. The first factor accounted for over 40 percent of the variance in subtests 1C, 5, and 6. Variance due to specific factors exceeded that due to common factors in subtests in 1R, 2, 3, 7A and 7B.

It is concluded that the number of subtests could be reduced to seven with scores from 1C, 5, and 6 combined.

(9) Relationship between test scores and academic grades: Product-moment coefficients of correlation were determined between the subtest, and test median, scores and (i) final grades in five second year subjects, English, Economics, Geography, Mathematics and Accounting, and (ii) average final grades in second year Pharmacy. Coefficients of correlation in the first case ranged from -.03 to .45, and in the second case from .28 to .61. It was concluded that the Iowa test used alone as a predictive battery would be of little value.

The subtests tended to correlate more highly with grades in those courses which required more reading.

(10) Relationship between test scores and academic aptitude: Product-moment coefficients of correlation were determined between the subtest, and median scores, and scores of the Otis S.A.Test of Mental Ability administered in the fall of 1946. Although correction for attenuation was not made, these low correlations (with the exception of the correlation of .71 between the Otis and Test 4) indicate that the tests are not measuring identical factors. The relationship between scores on the two tests may be due to the nature of the common factors as revealed by factor analysis.

(11) Suggestions for revision: From the internal analysis of the test as a whole it will be noted that the tests tend to be somewhat too easy for the group. However, it is possible that by the elimination of several of the less difficult and non-discriminating items, particularly from Test 5, a shorter, effective, test might be constructed. By combining scores on Tests 1C, 5, and 6, which seem to measure the same factor, scoring would be facilitated. The low reliabilities of Tests 1C and 6 might also be

remedied by their inclusion in a longer subtest. The reliability of the test 1R might be increased by lengthening the test. In its present form only two one-minute time limits are used. Traxler (43) has shown that the reliability of rate of reading tests increases with increases in time limits up to five minutes.

(12) Limits of generalization: Generalizations from the present study concerning the reliability, validity and other characteristics of the test when used at the second year university or junior college level, are valid only insofar as the present group is representative of students at those two levels respectively. Also, generalizations concerning the other forms, Am, Bm, and Dm, of the Iowa Silent Reading Advanced Tests are valid insofar as form Cm is comparable to those forms.

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APPENDIX A

Table XVI.

Phi coefficients[X] of each item based on subtest scores as criteria; percentage of group passing each item.

Item No.	TEST: 1C COMPR. Ø	P	2 DIRECTED READING Ø	P	3 POETRY COMPR. Ø	P	4A WORD MEANING SOC.S. Ø	P	4B WORD MEANING SCIENCE Ø	P
1	.224	.916	.351	.775	.160	.782	.032	.978	.138	.957
2	.256	.897	.413	.703	.250	.540	.153	.911	.229	.815
3	.329	.856	.268	.667	.267	.257	.096	.978	.217	.964
4	.180	.861	.407	.669	.468	.736	.217	.966	.178	.875
5	.327	.727	.456	.767	.314	.458	.133	.904	.217	.969
6	.255	.815	.555	.818	.335	.592	.123	.988	.241	.959
7	.280	.921	.676	.801	.343	.604	.121	.962	.121	.959
8	.281	.782	.776	.770	.483	.621	.184	.966	.229	.966
9	.056	.921	.866	.698	.464	.808	.117	.974	.241	.962
10	.071	.983	.806	.477	.663	.741	.277	.916	.305	.942
11	.125	.930	.940	.508	.740	.585	.425	.849	.464	.712
12	.099	.806	.961	.415	.547	.235	.416	.871	.617	.731
13	.290	.837	.950	.365	.138	.300	.151	.602	.679	.693
14	.298	.890	.884	.295	.788	.321	.554	.842	.720	.477
15	.123	.990	.710	.201	.767	.278	.638	.777	.630	.362
16	.211	.871	.611	.173	.759	.247	.747	.655		
17	.270	.861	.508	.115	.670	.177	.874	.590		
18	.229	.815	.442	.101	.608	.158	.511	.218		
19	.258	.612	.420	.082	.523	.122	.595	.261		
20	.260	.842	.375	.077	.403	.082	.551	.230		
21	.319	.799								
22	.319	.856								
23	.402	.746								
24	.416	.722								
25	.340	.492								
26	.255	.429								
27	.596	.729								
28	.690	.487								
29	.399	.168								
30	.671	.489								
31	.297	.113								
32	.595	.374								
33	.578	.206								
34	.592	.269								
35	.532	.194								

X : Calculated from Jurgenson's (17) table for determining phi coefficients.

TABLE XVI continued

Item No.	TEST: 4C WORD M. MATH. Ø	P	4D WORD M. ENGL. Ø	P	5 SENTENCE MEANING Ø	P	6 PARAGR. MEANING Ø	P	7A USE OF INDEX Ø	P	7B SEL. OF KEY WORDS Ø	P
1	.051	.959	.140	.914	.143	.988	.197	.957	.347	.779	.247	.945
2	.082	.957	.334	.755	.071	.978	.096	.986	.134	.580	.314	.940
3	.235	.916	.235	.909	.000	.998	.197	.957	.041	.983	.337	.899
4	.252	.885	.329	.880	.101	.981	.256	.911	.696	.705	.395	.911
5	.227	.902	.337	.859	.101	.988	.138	.954	.410	.317	.395	.920
6	.100	.897	.147	.916	.117	.978	.161	.906	.614	.784	.436	.899
7	.235	.899	.308	.911	.071	.986	.166	.784	.587	.837	.375	.794
8	.295	.988	.240	.438	.143	.983	.215	.856	.725	.758	.403	.918
9	.245	.933	.371	.535	.101	.993	.136	.962	.860	.727	.255	.952
10	.197	.376	.328	.595	.123	.993	.185	.875	.922	.655	.355	.892
11	.500	.801	.433	.758	.176	.969	.101	.988	.641	.233	.320	.935
12	.639	.705	.497	.698	.153	.964	.229	.930	.940	.384	.563	.832
13	.712	.463	.531	.506	.032	.981	.336	.861	.734	.209	.546	.823
14	.523	.206	.604	.659	.169	.962	.207	.808	.631	.173	.547	.863
15	.436	.209	.750	.444	.169	.964	.082	.971	.523	.118	.574	.633
16			.595	.254	.101	.988	.161	.516			.550	.465
17			.461	.110	.308	.873	.190	.974			.761	.712
18			.641	.208	.336	.882	.267	.892			.796	.736
19			.395	.094	.085	.882	.082	.952			.665	.412
20			.395	.091	.160	.983	.233	.902			.402	.218
21					.123	.981	.071	.988				
22					.221	.935	.438	.576				
23					.071	.983	.256	.909				
24					.160	.978	.451	.758				
25					.032	.947	.307	.906				
26					.256	.930	.391	.894				
27					.160	.986	.360	.777				
28					.373	.847	.515	.765				
29					.360	.923	.645	.489				
30					.280	.938	.697	.767				
31					.416	.825	.710	.554				
32					.324	.945	.836	.674				
33					.324	.947	.851	.614				
34					.403	.902	.467	.156				
35					.435	.688	.852	.410				
36					.524	.839	.804	.393				
37					.617	.818						
38					.665	.815						
39					.718	.789						
40					.802	.686						
41					.810	.703						
42					.826	.650						
43					.877	.621						
44					.830	.516						
45					.890	.484						
46					.784	.412						
47					.812	.422						
48					.881	.434						
49					.759	.321						
50					.523	.170						

APPENDIX B.

A NOTE ON THE TABULATION OF DATA

In the present study, the considerable labour involved in the computation of phi coefficients and item difficulties and test intercorrelations made it feasible to employ some sort of mechanical aid. As a Hollerith machine was not available, a hand card sorting device was employed.

Cards similar to the sample presented in Figure 2 were used, one for each testee. Spaces in the columns under each test were used to score the items. Subtest scores were entered at the bottom of the card.

Over a three-sided box about two inches deep and the same size as the cards was hinged a master card which could be adjusted to indicate any desired item or score. Cards could rapidly be withdrawn from the open end and sorted into the desired category or test score interval.

In the computation of phi coefficients when several subtests were involved, this method has an advantage over item analysis charts in that the upper and lower 27 percent of the distributions can be readily separated.

The determination of subtest intercorrelations was facilitated in that it was only necessary to sort the scores of a subtest into intervals once for its series of correlations with other subtests.

When the number of a sample is large and a large number of items are involved, and if a Hollerith machine is not available, this method is suggested as a time saving device.

NAME S A F V S E M R

	1A COMP.	1B COMP.	2	3	4A	4B	4C	4D	5	5	6	6	7A	7B
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
Total														

ODD

EVEN

STAN.

Fig. 2: Sample of the cards used in the tabulation of data.

APPENDIX C

Copy of the Iowa Silent Reading Advanced Tests, Form Cm, and Manual of Directions.

IOWA SILENT READING TESTS

NEW EDITION

Median Score	
Grade Percentile	
Grade Equiv.	
Age Equiv.	

By H. A. GREENE
Director, Bureau of Educational Research and Service, University of Iowa

A. N. JORGENSEN
President, University of Connecticut

and V. H. KELLEY
University Appointment Office, University of Arizona, Tucson, Arizona

Adv.
CM
New Edition

ADVANCED TEST : FORM CM

Name..... Age..... Grade.....
Years Months

Sex..... Date.....19.... Teacher.....
Boy Girl

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

No.	Test	Stand. Score
1	Rate: A + B	
	Comprehension: A + B	
2	Directed Reading	
3	Poetry Comprehension	
4	Word Meaning	
5	Sentence Meaning	
6	Paragraph Comprehension	
7	Location of Information A. Use of Index	
	B. Selection of Key Words	

PROFILE CHART

Score Scale	TEST 1R	1C	2	3	4	5	6	7A	7B	Median Score
230										
220										
210										
200										
190										
180										
170										
160										
150										
140										
130										
120										
110										
100										

Patent No. 1,586,628

Published 1943 by World Book Company, Yonkers-on-Hudson, New York, and Chicago, Illinois

Edition a

2

TEST 1. RATE–COMPREHENSION — PART A

DIRECTIONS. This is a test to see how well and how rapidly you can read silently. Read the story below very carefully so that you can answer questions about it.

At the end of *one minute* you will hear the word "Stop." Put a circle around the word you are then reading and wait for further instructions.

CORK

[1] Cork is the outer layer of the bark of an evergreen oak tree which grows to an average height of about thirty feet. [2] It is cultivated principally in Spain and Portugal but may also be found in several other countries. [3] About seventy per cent of the commercial cork comes from these two countries. [4] The cork tree is also being experimentally grown in Southern California at the present time.

[5] The cork is first stripped from the trees when they are from 15 to 20 years of age. [6] The first yield, which is rough, uneven, and woody in nature, is called *virgin cork*. [7] This first trimming is not very valuable and is used extensively as a tanning substitute and for rustic decorations. [8] Thereafter, the bark is removed every eight or ten years and improves with each successive stripping. [9] The tree continues to live and thrive for a period of 150 years or more.

[10] In order to remove the cork, two horizontal cuts are made around the stem, one a little above the ground and the other just under the main branches. [11] Between these circular cuts three or four longitudinal incisions are then made. [12] The cork is carefully removed in sections, care being taken to avoid injuring the surface of the tree itself. [13] The operation of stripping the trees takes place during July and August. [14] The surfaces of the strips are cleaned and then flattened by pressure and heat. [15] This process closes the pores and gives a better texture to the material. [16] When properly done, the stripping of the corky layer is beneficial to the tree. [17] The average yield at each cutting for a tree is 45 pounds, but some trees yield as much as 500 pounds.

[18] Cork is especially suitable as a stopper for bottles because of its elasticity and its imperviousness to air and liquids. [19] Even the crown caps so widely used on soft-drink bottles have a thin inner lining of cork. [20] Huge quantities of cork are used in America for linoleum and other patent floor coverings. [21] Linoleum is a mixture of ground cork and linseed oil put through one or more of several secret processes. [22] Because of its lightness and strength, cork is used in life preservers and other life-saving apparatus. [23] High-grade artificial limbs are made from cork. [24] On account of its lightness, softness, and non-conducting properties, cork is used for hat linings and the soles of shoes.

Wait for further directions. Do not answer any of the questions until you are told to do so.

DIRECTIONS. Without looking at the story you have just read, answer these questions about it. You will have *two minutes* for this work.

Read each question and the answers given below it. Select the correct answer. Notice the number of this correct answer. In the answer spaces at the right fill the space under this number. The sample is answered correctly.

SAMPLE. From what kind of tree is cork secured?
1 maple 2 evergreen oak 3 birch

1. What is the first yield of cork called? 1
   1 initial cork 2 virgin cork 3 black cork
2. How long does the cork tree usually live? 2
   1 150 years 2 50 years 3 25 years
3. How high does the average cork tree grow? 3
   1 10 feet 2 30 feet 3 75 feet
4. What per cent of commercial cork comes from Spain and Portugal? 4
   1 20 2 55 3 70
5. How often is the cork bark removed? 5
   1 every year 2 every 8 to 10 years 3 every 20 to 25 years
6. At what time of the year is the cork taken from the tree? 6
   1 summer 2 winter 3 spring
7. What is the average yield per tree at each cutting of cork? 7
   1 10 lbs. 2 45 lbs. 3 120 lbs.
8. Stripping the cork from a tree when properly done is — 8
   1 beneficial 2 detrimental 3 of no effect
9. What is mixed with cork to make linoleum? 9
   1 tar 2 plastic cement 3 linseed oil
10. What quality of cork makes it satisfactory for stopping bottles? 10
    1 solidness 2 cheapness 3 elasticity

TEST 1. RATE–COMPREHENSION — PART B

3

DIRECTIONS. Read this story very carefully so that you can answer questions about it. When you hear the word "stop," put a circle around the word you are then reading and wait for further instructions.

THE ORGANIZATION OF A CITY GOVERNMENT

[1] Since the residents and taxpayers in a city share a common interest in maintaining good government, they elect officials to direct certain governmental responsibilities. [2] Most governmental services given by the city are tasks which no single family or small group of families could possibly accomplish. [3] Some of these group responsibilities assumed by the city are: police protection, fire protection, maintenance of a safe and dependable water supply, provision of light, power, and transportation, and the establishment and enforcement of health regulations. [4] Most cities offer many additional services, most of which are coöperative undertakings maintained on a large scale. [5] If the citizens should fail to give the local officers the power to carry on such activities, the results might be quite disastrous. [6] Many of the most progressive citizens would move away from such a city, and few strangers would care to move in to take their places.

[7] Each state determines how many inhabitants a community must have before it can become a city. [8] In Kansas a community with two hundred inhabitants can become a city, while in New York State ten thousand inhabitants are required. [9] About half of the states require a population of twenty-five hundred inhabitants before a community is designated as a city. [10] The United States census classifies all incorporated communities with twenty-five hundred inhabitants as cities. [11] Since each state also determines just what powers cities are permitted to exercise, there is, accordingly, wide variation in governmental authority in different cities.

[12] There are three types of city government. [13] The oldest and perhaps the most widely followed plan is that of the mayor-council type of organization. [14] The main function of the council is to enact such local laws or ordinances as may seem wise. [15] Of course these laws must conform to the state and national laws. [16] Appointments made by the mayor may be subject to the confirmation of the council. [17] Under this plan the mayor is the chief executive officer of the city, exercising supervisory power over the various administrative offices, and frequently appointing administrative heads of departments. [18] Because of the difficulty of locating responsibility and because it frequently becomes so complex that the citizens do not clearly understand its workings, the council-mayor type of government has fallen into bad repute in many places.

[19] The commission form of government has been developed in an attempt to remedy some of the weaknesses of the mayor-council form of government. [20] This plan largely centralizes the power and responsibility in a small group which takes the place of the mayor and council. [21] Each commissioner is the head of a department and thus assumes responsibility for its management on a business-like basis. [22] When the commissioners act together they form the council. [23] The most common charge against the commission plan is that often the commissioners fail to coöperate for the general good.

[24] The city-manager plan is really a modification of the commission form of city government. [25] Under this plan a small council is usually elected with power to select a city manager to become the chief executive officer. [26] The responsibility for the supervision of all administrative divisions is placed in the hands of the city manager. [27] This officer is directly responsible to the council, thus making it fairly easy to fix the blame if conditions are not satisfactory.

[28] Regardless of the form of the organization of the city government, the control of the city rests in the people themselves. [29] The citizens can control their government through their votes and the influence of public opinion. [30] Political parties and office holders are very reluctant to adopt any policy which they feel will be opposed by a majority of citizens. [31] When there is dishonesty in government, a few alert citizens can often arouse public opinion sufficiently to enforce an honest city administration.

◀3

Wait for further directions. Do not turn this page until you are told to do so.

RATE: A + B	0	1	2	3	4	5	6	7	8	9	10	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
Standard Score	79	81	86	88	91	95	98	100	102	107	110	112	118	121	124	127	134	137	141	144	151	154	157	160	163	166	169	172	175	178	181	183	185	187	189	191	193

RATE: A + B	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
Standard Score	195	197	199	202	204	206	207	209	211	213	215	216	218	220	222	223	225	227	229

TEST 7. LOCATION OF INFORMATION

PART B. SELECTION OF KEY WORDS

DIRECTIONS. This is a test of your ability to choose key words for use in looking up information in an index. Study the sample. Read each question and note that four numbered words or phrases are given below it. Three of these words or phrases would, if looked up in an index, be likely to lead to an answer to the question. One of the numbered parts would *not* help in locating the information. Locate this one word or phrase, *the one that would not help*, and note its number. Then fill in the answer space at the right of the exercise which has the same number as the word or phrase which you chose. The sample is answered correctly.

SAMPLE. What is the value of our annual corn crop?
1 crops 2 wheat 3 corn 4 sweet corn

1. How many transcontinental air routes were operating in the United States in 1940?
1 aviation 2 air routes 3 canals 4 U. S. mail 1
2. What is the value of our annual cotton crop?
1 sugar cane 2 Southern states 3 cotton 4 agriculture 2
3. Is Japan the most important industrial nation in the Orient?
1 Japan 2 Orient 3 fisheries 4 industrial nations 3
4. Was Napoleon defeated by the Duke of Wellington at Waterloo?
1 Waterloo 2 Wellington 3 Napoleon 4 defeat 4
5. Did the League of Nations settle the dispute between Italy and Ethiopia?
1 Ethiopia 2 dispute 3 League of Nations 4 Italy 5
6. Is nitrogen for fertilizer shipped into this country from Chile?
1 ships 2 fertilizer 3 nitrogen 4 Chile 6
7. How large an army did General Lee command at Appomattox?
1 Appomattox 2 Federals 3 General Lee 4 Civil War 7
8. Does erosion by wind cause any loss to the soil in the United States?
1 erosion 2 wind 3 soil 4 loss 8

16

9. Is the Antarctic more difficult to explore than the North Pole region?
1 Arctic 2 South Pole 3 Antarctic 4 equator 9
10. What was the total crop loss due to hail in 1938–39?
1 hail 2 insects 3 crops 4 crop damage 10
11. Was James Russell Lowell the author of the Biglow Papers?
1 poem 2 American literature 3 Lowell 4 Biglow Papers 11
12. Is the tuberculosis death rate declining in the United States?
1 tuberculosis 2 tuberculin 3 declining 4 public health 12
13. What is the value of our annual supply of cotton produce?
1 cotton 2 cotton goods 3 cotton products 4 annual supply 13
14. Was Lee the commander of the Union Army during the Civil War?
1 Lee 2 Civil War 3 commander 4 Union Army 14
15. What purpose did William Booth hope to serve when he organized the Salvation Army?
1 William Booth 2 Salvation Army 3 salvation 4 army 15
16. How does Russia rank among European countries in oil production?
1 oil 2 Russia 3 Europe 4 petroleum 16
17. Was Thomas Jefferson one of the original signers of the Constitution of the United States?
1 Thomas Jefferson 2 signer 3 constitution 4 constitutional convention 17
18. Was Joffre the commander of the French forces in the first World War?
1 commander 2 Joffre 3 French army 4 World War 18
19. When did the United States Army begin to use planes for combat purposes?
1 aeronautics 2 combat 3 aerial navigation 4 aircraft carriers 19
20. Is textile manufacturing an important industry in Massachusetts?
1 manufacturing 2 textiles 3 cotton industry 4 Massachusetts 20

Stop here. Wait for further instructions.

NUMBER RIGHT: B	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Standard Score	128	131	134	137	141	144	146	149	153	156	161	164	166	169	173	176	180	184	189	198	210

TEST 1. RATE–COMPREHENSION — PART B (*Cont'd*)

DIRECTIONS. Without looking again at the article, answer these questions. Study these statements carefully. Decide whether, in terms of the article, a statement is true, false, or not discussed. If, according to the article, the statement is true, fill in the answer space under T (for true); if false, fill in the space under F (for false). If a statement is not ussed in the article (even though true or false in itself), fill in the space under N (for not discussed). The sample is answered correctly.

SAMPLE. Small groups of citizens could organize and carry on effectively the activities of a city. ..... T F N

1. The number of inhabitants needed before a city can be established is determined by the state. 1
2. City officials should take responsibility for providing police protection. 2
3. The city officials need not be concerned about maintaining an adequate water supply. 3
4. In Kansas a community with two hundred inhabitants can become a city. 4
5. The average salary of the city manager is about ten thousand dollars. 5
6. In the commission form of government each commissioner is responsible for the management of a department. 6
7. The United States Chamber of Commerce report gives a list of all cities in the United States. 7
8. The oldest plan for city government is the commission form. 8
9. The mayor in the mayor-council plan does not appoint any officials. 9
10. When the commissioners sit together as a committee they act as a council. 10
11. There are about five hundred cities in the United States with a population above twenty-five hundred. 11

4

12. In most cities the people have very little influence on the kind of government they will have. 12
13. Lack of coöperation among the commissioners is one of the common criticisms of the commission form of government. 13
14. The United States Supreme Court must approve city ordinances before they become effective. 14
15. Cities usually maintain only the services mentioned in this article. 15
16. The laws which the council pass are sometimes called ordinances. 16
17. The governor of the state can veto the acts of the commission. 17
18. Political parties usually try to adopt a policy which they feel the majority of voters favor. 18
19. Cities secure their power to organize through the United States government. 19
20. The city-manager plan resembles the commission plan of city government. 20
21. In the mayor-council form of government the council exercises administrative authority. 21
22. All first-class cities follow the mayor-council plan of city government. 22
23. In the mayor-council plan the mayor acts only as the chairman of the council. 23

The city manager is usually elected by vote of the people. 24

25. In the commission form of government the mayor is appointed by the commissioners. 25

Do not turn this page until you are told to do so.

COMPREHENSION

No. Right: A + B	0	1	2	3	4	5	6	7	8	9	10	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
Standard Score	103	106	109	112	114	116	118	120	123	125	128	130	133	135	140	144	148	151	154	158	161	165	168	171	175	181	184	190	193	196	203	212	217	222	227	232

TEST 7. LOCATION OF INFORMATION

PART A. USE OF THE INDEX

DIRECTIONS. The answers to the questions in Column 2 are found in the index below. First read the question and then find the desired answer by looking under the proper topic in the index. Then locate your answer among the possible answers given with the question and fill in the answer space in the margin which is numbered the same.

Study the samples carefully before you try to answer the questions.

Look at Sample A. In the index under "Indiana" you will find the word "coal" and the page reference, 145. 145 is third among the answers given with the question; so the third answer space has been filled in.

Look at Sample B. See if you can find the answer in the index. The correct answer space is marked.

Answer the remaining exercises the same way.

INDEX

Alaska: agricultural possibilities, 213, 214; commerce, 214, 215; exports, 214 (Fig. 147); fisheries and forests, 210–212; fur farms, 210; imports, 214; map (Fig. 129), facing 197.

California: map of, 315; admission to Union, 318.

China: 22–24; deserts, 216; farming, 125, 124–131; lack of dairy cattle, 130; manufacturing, 262; map (Fig. 192), facing 127; plains, 129; rice, 131; silk, 131, 142; troubled condition, 124.

Citizenship: defined, 24; boys and girls, 26; responsibility of, 29, 84–85; duties of, 29–30, 49–50. *See also* Americans.

Communities: definition, *see* Community; kinds of, 9–18; origin of, 11–12; growth of, 12; large and small, 15–18; coöperation of, 19–20, 42, 49, 113; and health, 30–43; and the protection of life and property, 45; and education, 65–66; and beauty, 72–85; money for expenses, 87–98; organization of, 99–111; dependent upon each other, 139.

Corn: in America, 187; Argentina, 282; United States exports (Fig. 190), 282–284; plant, 187; industrial uses of, 189.

Courts: city, 108–110; county, 125; state, 120–127; national, 260–268. *See also* Constitution.

Dairy Products: 182–184; in Northern states, 182–183; states leading in production, 83. *See also* Cattle.

Denmark: commerce, 411, 414; exports, 180, 411 (Fig. 262), 411; map (Fig. 258), 408; possessions, 242; resources, 181–184.

Dyes: 148–155; ancient, 148–150; aniline, 153–155; cochineal, 150–152; discovery of native American, 150; dyewoods (*see* Forest); manufacture in the United States, 155; recent increase in value (Chart 15), 154; substitutes for natural, 153; value of aniline, 154–155 (Fig. 20), 158. *See also* Cochineal.

Flour: *See* Wheat.

Gas: 146–152; as fuel, 46; waste, 49–50. *See also* Power.

Indiana: coal, 145; corn, 44; hogs, 88; oil, 159; wheat, 85.

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Science: defined, 480; American Men of, 482.

Trade: 482–488; advantages for, 483–484; Arctic Ocean, 396; Eskimos with white people, 388; Hawaiian sugar, 465. *See also* Commerce.

Venice: 55, 340–344; Grand Canal, 341–343; manufacturing, 344.

Wheat: fertilizers for, 48; insects injurious to, 51; kinds of (Chart 15), 43; preparation of seed bed, 55; when to sow, 57; world's bread grain, 52; wheat diseases, 59.

SAMPLES.

A. On what page will you find information about coal in Indiana? 1 **85** 2 **88** 3 **145** 4 **146** 5 **159** A

B. Can you find information about the schools of Denmark? 1 **Yes** 2 **No** ..... B

1. Next to what page can you find a map of China?
   1 **125** 2 **126** 3 **127** 4 **131** 5 **142** ... 1
2. Does the index tell where to find information about the U. S. courts? 1 **Yes** 2 **No** 2
3. On what page can a definition of science be found?
   1 **465** 2 **467** 3 **475** 4 **480** 5 **482** ... 3

➡

4. Under what topic can you find additional references to citizenship? 1 **courts** 2 **communities** 3 **health** 4 **Americans** 5 **science** 4
5. What is the number of the figure which shows something about the number of miles of railroads in the United States?
   1 **24** 2 **224** 3 **226** 4 **275** 5 **239** 5
6. Under what entry does the index refer you to additional information about trade?
   1 **transportation** 2 **railroads** 3 **trucking** 4 **commerce** 5 **manufacturing** 6
7. On what page will be found information about the growth of communities?
   1 **9** 2 **10** 3 **12** 4 **20** 5 **139** 7
8. What is the number of the chart showing the different kinds of wheat? **15➡**
   1 **11** 2 **15** 3 **48** 4 **51** 5 **57** 8
9. Does the index tell you on what page you can find something about elephants? 1 **Yes** 2 **No** 9
10. On what page can you learn about substitutes for natural dyes? 1 **155** 2 **153** 3 **152** 4 **149** 5 **148** 10
11. On how many pages is a continuous discussion given about fisheries and forests of Alaska?
    1 **1** 2 **2** 3 **3** 4 **4** 5 **5** 11
12. Information about the admission of California to the Union is given on what page?
    1 **310** 2 **312** 3 **315** 4 **317** 5 **318** .. 12

➡

13. On how many different pages are brief references given to wheat in Indiana?
    1 **1** 2 **2** 3 **3** 4 **4** 5 **5** 13
14. On what page is a discussion of the possessions of Denmark given?
    1 **411** 2 **273** 3 **262** 4 **258** 5 **242** .. 14
15. Under what other word would you look for further information about the courts?
    1 **law** 2 **lawyers** 3 **judicial** 4 **legal** 5 **constitution** 15

Do not turn this page until you are told to do so.

NUMBER RIGHT: A	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Standard Score	111	123	135	143	150	155	159	164	169	175	181	185	189	193	202	213

15

1 2 3 4 5 | 1 2 | 1 2 3 4 5 | 1 2 | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5

TEST 2. DIRECTED READING

DIRECTIONS. A story is given below, with each sentence numbered. These numbers are to help you answer questions about the story. Read each question and find the sentence in the story which answers it. Notice the number of this sentence. Find this number among the answer spaces at the right of the question and fill in the space under it.

Look at the sample below. Space No. 1 is filled because the question in the sample is answered in sentence No. 1 in the article. Answer the other questions in a similar manner.

You will have *three minutes* for this work. You may reread parts of the story if you need to do so.

IRON

[1] Iron is by far the most useful of all the metals which man has discovered. [2] Fortunately it is found in many different areas and in much greater abundance than other metals. [3] One reason iron ore is abundant is that the deposits are formed in a number of different ways. [4] A second reason is that many iron ore regions have been formed by sedimentation, a process which makes large ore deposits. [5] Sedimentation accounts for at least seven out of ten of the world's great iron ore deposits.

[6] The United States obtains about eighty per cent of its supply from the Lake Superior region. [7] The iron ore in this region is a result of the sedimentary process. [8] Ore containing from fifty to sixty per cent iron may be found here. [9] This is considered a very valuable deposit. [10] The other principal region is found in Alabama, which furnishes about ten per cent of the supply for the United States.

[11] Iron ore is obtained by two methods, shaft mining and open pit mining. [12] When the ore deposits lie far below the earth's surface, shafts are put down to the ore and tunnels are dug out in all directions. [13] The miners work in these tunnels and send the iron to the surface through the shaft. [14] Some iron ore lies so near the surface that the covering of rocks and other material can be removed profitably by steam shovels. [15] After this waste has been stripped off, the iron ore is then loaded into cars by smaller steam shovels.

[16] The ore is shipped from the mine by rail and water to the iron and steel mills. [17] At the mills the furnaces are filled with iron ore, limestone, and coke in proper proportions. [18] Air, heated to a temperature of five thousand degrees in huge ovens, is blown into the furnace. [19] The coke burns and melts the iron ore and limestone. [20] The impurities of the iron ore combine with the melted limestone, leaving the nearly pure iron metal. [21] Since the melted iron is heavier than the impurities, it sinks to the bottom of the furnace. [22] The melted limestone and the impurities, called slag, run off through an opening above the heavier iron. [23] The molten iron is then poured into molds of sand where it cools and hardens into short bars, known as pig iron. [24] When the pig iron is further purified it becomes cast iron, wrought iron, and steel.

SAMPLE. Is iron the most useful of metals? .....

1. Can iron ore be found in greater quantities than other ores? 1
2. What is the process called by which large ore deposits are formed? 2
3. Are iron ore deposits formed in more than one way? 3
4. What percentage of the large ore deposits are sedimentary? 4
5. Is the Lake Superior region a result of the sedimentary process? 5
6. Where does the United States obtain most of its iron ore? 6
7. What per cent of iron is found in the iron ore of the Lake Superior region? 7
8. Is iron ore taken from the ground by more than one method? 8

5

9. Where is the second important iron-producing region in the United States? 9
10. Through what is the iron ore sent to the surface? 10
11. What is used to clear the top surface away when the iron ore is near the surface? 11
12. When are shafts sunk into the ground for mining ore? 12
13. What is the temperature of the air which is blown into the blast furnaces? 13
14. Where is the iron ore taken when it leaves the mine? 14
15. What substances are used in refining the iron ore? 15
16. Is iron ore heavier than the impurities? 16
17. With what do the impurities from the iron ore combine? 17
18. What becomes of the impurities in the furnace? 18
19. What products result from the more complete refinement of iron? 19
20. What is the iron called when it comes from the sand molds? 20

Do not turn this page until you are told to do so.

NUMBER RIGHT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Standard Score	121	131	142	149	154	159	164	169	174	179	182	185	188	193	197	201	204	207	209	212	216

TEST 6. PARAGRAPH COMPREHENSION (*Cont'd*)

9. The Industrial Revolution, which began about the middle of the eighteenth century, made many changes in the lives of workers. The handicraft system with its small shop and small group of workers, its close personal relations, and its limited production soon disappeared. In its place came the modern factory with its machinery, its countless numbers of workers, its regimentation, and its discipline. The worker, who previously owned his tools and worked at his own rate, now became merely a cog in the machinery of modern industry.

9

A. Choose the best title for the paragraph.
1 Industry and the Industrial Revolution
2 The Handicraft System 3 Modern Industrial Machinery ..... A

B. What was one of the main changes caused by the Industrial Revolution? 1 men worked more with hand tools
2 the home activities of men were increased
3 men began to work in factories ..... B

C. After the Industrial Revolution the individual craftsman as an independent worker was —
1 practically eliminated 2 markedly reduced
3 greatly increased C

10. Changes in the purposes of education which our forefathers brought to the New World from Europe soon began to be exhibited. The influence of pioneer and wilderness life and the social equality of the people tended to break down the class barriers of the Old World. The colonists soon demanded schools which would educate their children for their times and conditions. The inadequacy of the traditional education of the homeland soon became apparent and a program of education adapted to the New World gradually developed.

10

A. Choose the best title for the paragraph.
1 Social Conditions in the New World
2 Education in the New World 3 Pioneer Life and Society ..... A

B. Why did the European type of educational program fail to satisfy the American pioneers? B
1 it did not prepare for life in a new world
2 it preserved Old World culture
3 it broke down class barriers .....

C. The colonists began to demand schools which would —
1 give their children social distinction
2 give their children European culture
3 prepare their children for life in America C

11. The discovery of America gave the potato plant to civilization. It is interesting to know that although it is an American product, it is called the "Irish potato." The early settlers in this country were slow to adopt the potato. For a long time it was considered to be poisonous. It was thought that if a man ate it regularly he would surely die. The potato was early imported into Ireland, where it was regarded as a great delicacy. When Irish settlers came to America, they brought the potato with them. Neighbors observed its cultivation by the Irish and gave it the name "Irish potato."

11 14 ➔

A. Choose the best title for the paragraph.
1 Why Potatoes Are Called "Irish Potatoes"
2 Potatoes Came from America 3 Potatoes Were Poisonous ..... A

B. Why did the early settlers not grow potatoes?
1 potatoes were unknown in America
2 potatoes were thought to be poisonous
3 soil conditions were not good ..... B

C. Potatoes were called "Irish potatoes" because —
1 they were first grown in Ireland 2 they saved Ireland from famine 3 Irish settlers grew them in this country C

➔

12. Tillage practice in preparation for a crop should create a moisture condition favorable to growth and maintain a surface condition resistant to wind erosion. Plans should be made to reduce the rain runoff as well as to control the competing plant growth. For instance, the early working of wheat land after harvest is a very important means of storing water for the next wheat crop. Surface cultivation should be deep enough to control weed growth, fine enough to maintain a surface open to permit ready penetration of water, and coarse enough to leave clods to resist wind action.

12

A. Choose the best title for the paragraph.
1 Protecting Soil from Erosion 2 Preparing Soil for a Crop 3 Tilling Soil for Moisture Conservation ..... A

B. What is the most important reason for cultivating wheat land immediately?
1 to receive and conserve moisture 2 to prevent erosion 3 to kill weeds ..... B

C. Wind erosion can best be resisted in —
1 fine pulverized ground 2 dry sandy ground
3 cloddy ground C

Do not turn this page until you are told to do so.

Number Right	0	1	2	3	4	5	6	7	8	9	10	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
Standard Score	104	105	107	109	111	113	114	116	118	120	123	125	127	129	132	135	141	144	147	150	153	157	160	166	170	172	175	177	181	185	190	194	197	201	208	215	220

TEST 3. POETRY COMPREHENSION

6

DIRECTIONS. This is a test of your ability to read and interpret poetry. Read the poem below very carefully before attempting to answer any of the questions about it.

Notice that in this selection certain passages are marked by numbered brackets. Read each question and find the bracketed passage which contains the best answer to the question. Answer the question by filling in the answer space at the end of the question which has the same number as the bracketed passage which contains the correct answer.

You may reread parts of the poem if necessary.

The sample is answered correctly.

SAMPLE. To whom is the poet addressing her discourse?.....

1 2 3 4 5
■

LIFE

Life! I know not what thou art.
But know that thou and I must part;
And when, or how, or where we met,
I own to me's a secret yet.

But this I know, when thou art fled,
Where'er they lay these limbs, this head,
No clod so valueless shall be
As all that then remains of me.

O whither, whither, dost thou fly?
Where bend unseen thy trackless course?
And in this strange divorce,
Ah, tell where I must seek this compound I?

To the vast ocean of empyreal flame
From whence thy essence came
Dost thou thy flight pursue, when freed
From matter's base encumbering weed?

Or dost thou, hid from sight,
Wait, like some spellbound knight,
Through blank oblivious years th' appointed hour
To break thy trance and reassume thy power?

Yet canst thou without thought or feeling be?
O say, what art thou, when no more thou'rt thee?
Life! we have been long together,
Through pleasant and through cloudy weather;
'Tis hard to part when friends are dear;
Perhaps 'twill cost a sigh, a tear; —
Then steal away, give little warning,
Choose thine own time;
Say not Good-night, but in some brighter clime
Bid me Good-morning!

From "Life," by Anna L. Barbauld

1. How does the poet express her certainty that life will not remain forever?.....1
2. Does life appear as a mystery to the poet?.....2
3. Is the poet certain that the departure of life leaves behind nothing of human importance?.....3
4. Does the speaker know exactly how her life began?..4
5. Does it seem to matter where the body is placed after life departs?.....5
6. Does life leave any kind of trail as it departs?.....6
7. When life departs from the body is anything of value left behind?.....7
8. How is life's separation from the body described?....8
9. Where may life go when it disappears?.....9

6➡

10. How is man's body described by the poet?.....10
11. Is there a suggestion that life may take on a magical form?.....11
12. How is it suggested that life is everlasting?.....12
13. Is time of any importance to life itself?.....13
14. Does the poet seem doubtful that life is entirely cold and emotionless?.....14
15. Has the speaker's stay on earth been monotonous?..15
16. Has she evidently reached a mature age?.....16
17. Is life requested to disappear silently?.....17

➡

18. Who chooses the time of life's departure?.....18
19. Is death to be a parting or a cheerful greeting?....19
20. Does the poet wish life to leave without farewell?..20

Do not turn this page until you are told to do so.

NUMBER RIGHT	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Standard Score	115	125	135	141	149	157	163	168	175	181	187	191	196	199	203	206	210	212	213	214	215

1 2 3 4 5
1 2 3 4 5
5 6 7 8 9
5 6 7 8 9
6 7 8 9 10
10 11 12 13 14
10 11 12 13 14
10 11 12 13 14
14 15 16 17 18
17 18 19 20 21
19 20 21 22 23
24 25 26 27 28
24 25 26 27 28
27 28 29 30 31
28 29 30 31 32
28 29 30 31 32
32 33 34 35 36
34 35 36 37 38
38 39 40 41 42
39 40 41 42 43

Before the fifteenth century men knew very little about the earth upon which they lived. However, maps made in the fifteenth century outlined the Mediterranean Sea and Western Europe fairly accurately. The rest of the world, however, was not shown correctly. Africa was thought to be much smaller. Little was known of Asia and the maps showed that it extended out into a sea of mystery.

5

A. Choose the best title for the paragraph.
1 Map of Western Europe 2 A Fifteenth Century Map 3 The Mediterranean and Western Europe ..... A

B. Why were maps of the fifteenth century inaccurate?
1 people traveled only in the Mediterranean
2 the earth was so large 3 men were ignorant about the earth ..... B

C. The map makers pictured Africa —
1 as smaller than it was 2 as larger than it was
3 as we know it C

6. There has been a great reduction in the number of deaths from disease, both in the United States and in the rest of the world, as we have increased our information about communicable disease. Seventy-five years ago certain diseases were a constant terror to people everywhere. Smallpox and typhoid fever were widespread. From Asia came cholera, a terrible death-dealing scourge. During the summer months yellow fever from the tropics became a serious threat to life in America. These diseases are very rare now as a result of our study of bacteriology.

6

A. Choose the best title for the paragraph.
1 Communicable Diseases 2 Scientific Control of Disease 3 Cholera, the Scourge of Asia ..... A

B. Why has it been possible practically to stamp out certain diseases? 1 people fear the diseases
2 people become immune
3 more accurate knowledge about the diseases ..... B

C. Yellow fever came into America from —
1 Asia 2 the swamps of the South
3 the tropics C

13

7. Insects are found in nearly every place on earth — in the water, in the air, on land, and burrowing in the earth. One authority estimates that there are 400,000 species. Many insects are known to be harmful; others are useful; some apparently do not affect us at all; and of others we are quite ignorant. Most living things have insect enemies, and insects in turn have enemies that prey upon them.

7

A. Choose the best title for the paragraph.
1 Harmful Pests 2 Beneficial Insects
3 Insect Friends and Enemies ..... A

B. What helps to decrease the number of insects?
1 their enemies 2 their food supply
3 the large number of species ..... B

C. One estimate places the number of insect species at —
1 4,000 2 1,400,000 3 400,000 C

8. Every state has a written constitution which is the legal foundation of its government. The people of each state have the privilege of making and amending their own constitution. In making or changing laws, a state legislature must be careful not to conflict with anything in the state constitution. In other words, the constitution of the state is the fundamental law for the state just as the Federal Constitution is fundamental for the United States.

8

A. Choose the best title for the paragraph.
1 Every State Has a Constitution 2 States May Change Their Constitutions 3 The State Constitution Is the Fundamental Law ..... A

B. What must legislatures observe about laws when passing them? 1 that they must be passed by a two-thirds vote 2 that they do not conflict with state constitutions 3 that they may be amended ... B

C. Who has authority to amend a state constitution?
1 the voters of the state 2 the Federal congress
3 the state senate C

Go right on to the next page.

TEST 4. WORD MEANING

DIRECTIONS. Each of the exercises in Parts A, B, C, and D of this test consists of a statement which is correctly completed by one of the five numbered words or phrases. Find the number of this correct answer. Then, in the answer space at the right of the exercise, fill in the space which has the same number as the word or phrase you selected.

The sample is answered correctly.

SAMPLE. To *toil* is to —
1 read 2 play 3 work 4 fall 5 believe

PART A. SOCIAL SCIENCE

1. A *census* is a — 1 government agency 2 traffic violation 3 counting of population 4 hundred years 5 state bureau
2. A *budget* is a — 1 bureau 2 plan for spending 3 means of revenue 4 financial statement 5 legislative act
3. *Smuggling* is — 1 bringing in goods illegally 2 prohibiting sale 3 falsely arresting 4 convicting 5 pardoning
4. A *custom* is a — 1 financial statement 2 lawyer's charge 3 police officer 4 long-established practice 5 legislative act
5. A *bureau* is a — 1 democratic organization 2 legislature 3 citizen 4 politician 5 government department
6. *Treason* is — 1 law enforcement 2 trustworthiness 3 betrayal of one's country 4 use of armed forces 5 punishment for cowardice
7. *Resources* are — 1 taxes 2 import duties 3 officers' reports 4 customs duties 5 available funds
8. To *disfranchise* means to — 1 take away privileges 2 destroy property 3 distribute supplies 4 vote honors 5 commission an officer
9. To *appeal* means to — 1 compromise 2 settle 3 take to a higher court 4 carry away 5 annoy

7

10. *Arid* means — 1 windy 2 land which is not farmed 3 soft 4 unprofitable 5 dry
11. *Internal* means — 1 foreign 2 domestic 3 trade relations 4 suffrage 5 legislation
12. To *appraise* is to — 1 destroy 2 elevate 3 build up 4 set value on 5 appeal
13. *Reparations* are — 1 amends for injuries 2 war debts 3 war arms 4 hospitals 5 gifts
14. A *controversy* is — 1 a settlement 2 a dangerous practice 3 a dispute 4 an international agreement 5 a labor board
15. *Diplomacy* means — 1 caution 2 boldness 3 force 4 tact 5 concern
16. A *partisan* is a — 1 supporter of a cause 2 convicted person 3 generous person 4 socialist 5 believer in laws
17. To *subsidize* is to — 1 buy goods 2 aid by funds 3 destroy 4 censure a friend 5 cultivate land
18. A *quorum* is — 1 a business enterprise 2 a parliamentary action 3 a quota 4 an election 5 the number required to transact business
19. A *demagogue* is a — 1 statesman 2 selfish political leader 3 monthly magazine 4 naval officer 5 follower
20. *Reciprocity* means — 1 free trade 2 without tariff 3 trade barriers 4 mutual exchange 5 recognition

Go right on to the next page.

Number Right, Part A .....

TEST 6. PARAGRAPH COMPREHENSION

DIRECTIONS. Read each paragraph carefully, and then study the questions *A*, *B*, and *C* at the right. Select the correct answer. Notice the number of this answer. In the margin at the right, fill in the answer space under this number.

1. Corn usually requires a growing season of five months. A few varieties mature in three months. Corn thrives best when the average temperature ranges from 70 to 80 degrees during the growing season. A rainfall of from 3 to 4 inches per month is desirable. Gently sloping lands that have good drainage and deep, black, fertile soil produce the best corn. A yield of 100 bushels per acre is outstanding, and farmers call 35 to 40 bushels a good yield.

1

A. Choose the best title for the paragraph.
1 Effect of Soil on Corn Crop 2 Quick-maturing Varieties of Corn 3 Conditions Required for Corn Crop ..... A

B. What average temperature is best for corn?
1 60 to 70 degrees 2 70 to 80 degrees
3 80 to 90 degrees ..... B

C. The growth of corn requires a rainfall of three or four inches —
1 per month 2 per year 3 per season C

2. The National Geographic Society was founded in 1888 to spread geographic knowledge. In the interests of research it sends expeditions to many parts of the world. Some of these expeditions are financed entirely by the society, while others are partially financed by other agencies. The society attempts to spread knowledge through the National Geographic Magazine and other publications. The Hubbard Gold Medal is awarded by the society to explorers and other individuals for outstanding achievement.

2

A. Choose the best title for the paragraph.
1 Work of the National Geographic Society
2 A Geographic Society 3 Publications of the National Geographic Society ..... A

B. Why was the National Geographic Society organized?
1 to make explorations 2 to publish a geographic magazine 3 to increase and spread geographic knowledge ..... B

C. The National Geographic Society awards a medal for —
1 geographic lectures 2 outstanding achievement 3 making explorations C

3. It has been proved that almost anyone can greatly increase his speed of reading and yet retain his accuracy. In fact, some experiments show that the faster we read within certain limits the better we understand. When we read rapidly, we have to concentrate more closely. There is less mind-wandering. In rapid reading we take in more of the line at a single glance. This has a tendency to cause us to group words and phrases, and thus to grasp the author's ideas rather than his words only.

3

A. Choose the best title for the paragraph.
1 Speed and Accuracy in Reading 2 Speeding Up Reading 3 Reading Accurately ..... A

B. Why may speeding up reading increase accuracy?
1 Rapid reading helps to see the letters.
2 Grouping words may help to grasp ideas.
3 Experiments have proved it to be true. ..... B

C. When we read rapidly there is less —
1 concentration 2 mind-wandering 3 effort C

4. The Arlington National Cemetery, which is the national burial ground of our military heroes, is situated at Arlington, Virginia, on the banks of the Potomac River. Its use as a cemetery dates from 1864, when a Confederate soldier was first buried there. Since that time, more than 25,000 soldiers, of whom a majority were Civil War soldiers, have been buried in this cemetery. The best-known memorial in the cemetery is the Tomb of the Unknown Soldier. The monument erected for the victims of the Maine and the amphitheater erected through the efforts of the Grand Army of the Republic are also quite famous.

4

A. Choose the best title for the paragraph.
1 The Arlington National Military Cemetery
2 The Tomb of the Unknown Soldier
3 The Location of the National Military Cemetery A

B. What class of people are buried in Arlington National Cemetery?
1 political leaders 2 military heroes
3 financial leaders ..... B

C. The first soldier buried in Arlington National Cemetery was —
1 a Revolutionary War hero 2 a Union soldier
3 a Confederate soldier C

Go right on to the next page.

1. *Erosion* means —
1 evasion 2 gathering up 3 conservation 4 waste lands 5 wearing away 1

2. *Crystal* means —
1 extremely clear 2 dark 3 smooth 4 opaque 5 hard 2

3. *Combustion* means — 1 combined 2 destruction 3 the act of burning
4 chemical analysis 5 decomposition 3

4. To *liquefy* is to —
1 harden 2 dissolve 3 reshape 4 mold 5 make into gas 4

5. To *solidify* is to —
1 cause to harden 2 destroy 3 dissolve 4 discharge 5 change to a liquid 5

6. *Luminous* means —
1 heated 2 transparent 3 full of light 4 without light 5 perforated 6

7. *Humidity* refers to —
1 heat 2 dryness 3 suffocation 4 wind 5 moisture 7

8. *Microscopic* means —
1 very interesting 2 telescopic 3 bacteria 4 exceedingly small 5 light rays 8

9. *Equilibrium* means —
1 equilateral 2 equivalent 3 a state of balance 4 bound together 5 moving about 9

10. *Rigid* means the same as —
1 visible 2 calm 3 rough 4 round 5 stiff 10

11. To *digest* means to —
1 divert 2 assimilate physically 3 destroy completely 4 eat 5 control 11

12. To *preserve* means to —
1 put away 2 keep from decay 3 destroy 4 persevere 5 put in cans 12

13. *Sterile* means — 1 having unusual strength 2 weak 3 stern
4 incapable of reproducing 5 microscopic 13

14. To *repel* means to —
1 force apart 2 attract 3 restrain 4 call together 5 repeat 14

15. A *phenomenon* is — 1 something scientific 2 a distraction 3 a legal conference
4 an observable event or fact 5 scientific data 15

PART C. MATHEMATICS

1. To *simplify* is to —
1 make less complex 2 divide 3 add together 4 account for 5 bring down 1

2. To *depreciate* is to —
1 liquidate 2 falsify a report 3 decrease in value 4 destroy property 5 elevate 2

3. *Dimensions* mean —
1 distances 2 circumferences 3 areas 4 volume 5 measurements 3

4. A *fraction* is a —
1 decimal 2 fracture 3 complete number 4 part of a whole 5 reduced number 4

5. An *octagon* is — 1 a four-sided figure 2 an eight-sided figure 3 a circular figure
4 a measure of volume 5 a six-sided figure 5

6. *Proportional* means —
1 having the same ratio 2 different 3 rational 4 abstract 5 proved proposition 6

7. An *arc* is a part of a —
1 rectangle 2 diameter 3 radius 4 circle 5 triangle 7

8. To *calculate* is to —
1 cultivate 2 stimulate 3 converge 4 traverse 5 compute 8

9. *Quadrilateral* means —
1 six-sided 2 a right angle 3 a large area 4 four-sided 5 many-sided 9

10. To *reduce* means to — 1 invert 2 multiply 3 transpose
4 divide 5 change form without changing value 10

11. An *obtuse* angle is — 1 a right angle 2 exactly 360° 3 between 90° and 180°
4 an acute angle 5 less than 90° 11

12. To *evaluate* is to —
1 appraise 2 develop 3 reduce 4 collect 5 distribute 12

13. An *hypothesis* is a(n) — 1 general law 2 proved belief 3 tentative theory
4 infallible rule 5 mathematical equation 13

14. An *abstract* number is — 1 a whole number 2 used without specific application 3 a fractional value
4 applied to things 5 a partial answer 14

15. The *abscissa* is the —
1 *y*-distance 2 *x*-distance 3 hypotenuse 4 diagonal 5 circumference 15

Go right on to the next page.

Number Right, Part B .....

Number Right, Part C .....

TEST 5. SENTENCE MEANING (*Cont'd*)

26. Is the President considered the executive head of the United States? 26

27. Does the enemy ever attempt to confuse its opponents by several methods of attack? 27

28. Will education usually hinder an individual in securing an important position? 28

29. Will a good mathematician be likely to make excessive errors in arithmetic? 29

30. Will a bankrupt individual usually have a large bank balance? 30

31. Is social progress always secured by social legislation? 31

32. Does a man usually derive satisfaction from doing his work efficiently? 32

33. Will courtesy sometimes accomplish more than threatening? 33

34. Are economic conditions benefited by a prolonged depression? 34

35. Is international good will likely to be hindered by widespread use of a language which all people understand? 35

36. Is a measure likely to be passed by Congress if members unanimously favor it? 36

37. Is the publication of libelous statements an ethical practice? 37

38. Does a religious martyr adhere to his beliefs in spite of persecution? 38

11

39. Are individuals with low intelligence likely to graduate from college with honors? 39

40. Is harmony among nations fostered by border difficulties? 40

41. Does a metropolitan newspaper ever distort political news? 41

42. Does damming up a stream create an artificial lake? 42

43. Is promptness in arriving at work likely to be condemned by an employer? 43

44. Do illegal enterprises sometimes receive support from legal sources? 44

45. Does the usual police force provide adequate protection in times of great strife? 45

46. Do carefully verified calculations sometimes turn out to be in error? 46

47. Is procrastination a virtue which people admire? 47

48. Are efficient employees ever discharged during an industrial depression? 48

49. Will a public debater always possess the facts necessary to establish his position? 49

50. Are altruistic individuals constantly concerned about their selfish interests? 50

YES NO

Do not turn this page until you are told to do so. *No. Right*..... *No. Wrong*..... *Right minus Wrong*.....

Right minus Wrong	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Standard Score	121	121	121	122	122	123	124	125	127	128	130	131	133	135	137	140	142	143	145	147	150	152	154	156	158	160	162	165	167	169	171	173	175

Right minus Wrong	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Standard Score	177	179	182	183	185	186	189	191	193	196	198	201	206	209	212	217	220	226

TEST 4 (*Cont'd*). PART D. ENGLISH

1. To be *dramatic* is to be —
1 commonplace 2 unusual 3 polished 4 vividly expressive 5 established 1

2. A *proverb* is — 1 a statement from Franklin's Autobiography 2 an old saying
3 provincial language 4 prophetic speech 5 a dialogue 2

3. A *preface* is — 1 an appendix 2 a table of contents 3 an index
4 a prepared introduction 5 a type of bookbinding 3

4. A *fable* is a —
1 long poem 2 couplet 3 tale with a moral 4 morality play 5 mystery tale 4

5. *Pathetic* means —
1 patriarchal 2 arousing compassion 3 gloomy 4 gruesome 5 ludicrous 5

6. To *paraphrase* means to — 1 give meaning in another form 2 embody in a letter 3 speak
4 rhyme 5 translate into a foreign language 6

7. *Unabridged* means — 1 a dictionary 2 in condensed form 3 not shortened
4 an encyclopedia 5 having excellent definitions 7

8. A *syllabus* is a —
1 magazine 2 condensed statement 3 pamphlet 4 folio 5 complete discussion 8

9. *Conjugation* is — 1 arrangement of adjectives 2 case of nouns 3 connotation
4 declension 5 arrangement of verb forms 9

10. *Antonyms* are — 1 terse words 2 words similar in meaning 3 words spelled alike
4 vague words 5 words opposite in meaning 10

11. An *extract* is a(n) —
1 appendix 2 quotation 3 poem 4 anthology 5 bibliography 11

12. A *minstrel* in olden days was a —
1 Shakespearean actor 2 circus clown 3 novelist 4 lyric poet 5 history writer 12

13. An *appendix* is — 1 an anecdote 2 a table of contents 3 an index
4 a dramatization 5 supplementary material 13

14. *Trite* means —
1 commonplace 2 sacred 3 religious 4 tested 5 very rarely used 14

9

15. A *soliloquy* is a —
1 monologue 2 dialogue 3 dramatic play 4 Greek theater 5 musical comedy 15

16. An *epistle* is a —
1 song 2 figure of speech 3 letter 4 myth 5 legend 16

17. A *caricature* is a(n) — 1 short story 2 condensed novel 3 characterization
4 animated cartoon 5 ridiculous exaggeration 17

18. *Cadence* refers to —
1 suspense 2 verse form 3 plot 4 rhythm 5 portrayal 18

19. *Declension* is the — 1 inflection of nouns 2 conjugation of verbs 3 formation of objectives
4 use of Latin 5 past participle 19

20. *Vernacular* means —
1 foreign language 2 bilingual 3 mother tongue 4 monoglot 5 many languages 20

Do not turn this page until you are told to do so.

Number Right, Part D .....

No. Right: A + B + C + D	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Standard Score	95	98	101	103	106	111	113	116	119	121	124	127	129	132	134	137	139	142	144	146	148	150	152	154	156	158	160	162	164	166	168	169

Right: A + B + C + D	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
Standard Score	171	172	173	174	176	178	179	180	181	183	184	186	187	188	190	192	193	195	197	198	200	202	203	205	207	208	210	212	213	215	217	218

No. Right: A + B + C + D	64	65	66	67	68	69	70
Standard Score	222	224	225	227	229	233	235

TEST 5. SENTENCE MEANING

DIRECTIONS. You are to read each sentence and answer it by filling in the answer space under the right answer. Study the samples. Do not guess.

SAMPLES. *A*. Are all people dishonest? ..... A

B. Are authors often quoted? ..... B

1. Are generous people sometimes approached by people who have selfish interests? 1
2. Is a boastful person often disliked? 2
3. Does a person desire to meet ferocious animals when he is unarmed? 3
4. Do all athletes have the same scholastic ability? 4
5. Are exaggerated statements ever found in printed material? 5
6. Are people sometimes unintentionally discourteous to their friends? 6
7. Are all critical people free from prejudices? 7
8. Do people sometimes experience inconvenience because of their own disregard for law? 8
9. Does extensive reading help to increase a person's vocabulary? 9
10. Will a scientist be satisfied with crude measurements in conducting an important experiment? 10
11. Are house furnishings always chosen with artistic care? 11

10→

12. Will our international relations be improved by honesty and fair dealings? 12
13. Does opposition to the passage of a law mean that one is disloyal? 13
14. Are fresh air and sunshine conducive to recovery from tuberculosis? 14
15. Does the Supreme Court ever reverse the decision of a lower court? 15
16. Do members of different political parties sometimes disagree upon questions of government policy? 16
17. Is a fictitious name always assumed as an alias by a criminal? 17
18. Are people sometimes accused of serious crimes because of public sentiment? 18
19. Are parents usually proud of a disrespectful child? 19
20. Does a knowledge of geography help in the understanding of many economic problems? 20
21. Does an athlete usually eat rich pastry foods while training for a contest? 21
22. Is an undesirable reputation usually based upon the previous acts of an individual? 22
23. Will a newspaper sometimes print stories which later are found to be false? 23

Does compulsory military service mean that the government depends upon volunteers? 24

25. Does a person always choose his vocation with sufficient consideration of his abilities? 25

Go right on to the next page.

YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO
YES NO

IOWA SILENT READING TESTS

NEW EDITION

By H. A. GREENE
Director, Bureau of Educational Research and Service, University of Iowa

A. N. JORGENSEN
President, University of Connecticut

and V. H. KELLEY
University Appointment Office, University of Arizona

ADVANCED TEST: MANUAL OF DIRECTIONS

For Forms AM (*Revised*), BM (*Revised*), CM, and DM

This revised manual for use in administering, scoring, and interpreting the Advanced Test of the Iowa Silent Reading Tests, New Edition, embodies the results of an extensive experimental program carried out in constructing two entirely new alternative forms of the test, Forms CM and DM. As a part of this program of revision the two earlier widely used forms of the test, Forms AM and BM, have been rescaled, rearranged, and otherwise revised. All four forms of the test were equated, scaled, and standardized in a rotated group experiment in 1942 for a comprehensive national population. At the same time, a similar revision and extension of the Iowa Silent Reading Elementary Test (for Grades 4 to 8 inclusive) was carried out, and is fully discussed in a separate Manual of Directions.

The four comparable forms of the Advanced Test for use in high school and college should greatly extend the possibilities of classroom, supervisory, and clinical usefulness of these tests. The new arrangement of the subtests, the new standard scores, the revised and extended tables of norms, the improved methods of scoring and interpreting the tests, and additional suggestions for the remedial treatment of poor readers are discussed in this manual.

CONSTRUCTION OF THE TEST

The Iowa Silent Reading Advanced Test is designed to measure economically, accurately, and reliably the proficiency of pupils in high school and junior college in doing silent reading of the work-study type. Economy implies that it must be relatively inexpensive in proportion to the information it furnishes, and that its time consumption must be in keeping with the reliability of the results. Accuracy and reliability imply that it must consistently reveal the actual study and silent reading abilities of the groups of pupils for which it is designed. In the main these aims have been realized.

Every item in the four forms of this test has been carefully tried out under experimental conditions. Indexes of difficulty and of discrimination have been computed for each item, and items which did not perform properly were eliminated or were revised where elimination was not possible. The items in the several test parts are arranged in order of difficulty, and the subtests in the four forms are carefully balanced as to difficulty. Items which were over-easy or too difficult have been eliminated. In general, the percentages of pupils responding correctly to items in consecutive grades show the expected increases. As the four forms of the Advanced Test now stand, it is believed that each item contributes its share toward the correct evaluation of the pupil's silent reading abilities of the work-study type. The subtests are as long as the requirement of practical classroom testing conditions will permit. The evidence on the reliability of each of the subtests indicates that it is practicable to use the results effectively in the study of the reading difficulties of individual pupils.

VALUE AND FUNCTION OF THE IOWA SILENT READING TESTS

The aims and objectives of reading instruction in our schools have definitely shifted in recent years. A few years ago it was enough for the child glibly to *pronounce* words appearing on the printed page. Now it is considered much more important for him to be able to *comprehend* rapidly and indicate by specific reactions his understanding of the material. This is the application of a sound philosophy of education. Life situations demand an ability to grasp quickly and accurately the meaning of printed symbols. Only infrequently are we called upon to read orally. Classroom problems and many life situations also require the skillful use of books. Thus, reading is something more than the rapid perception of printed symbols and the memory and organization of materials read. It involves the abilities to use libraries and books as sources of information and pleasure.

As a means of gaining information and pleasure, reading is essential in every content subject, such as history, geography, science, and literature. In fact, progress in these subjects depends to a greater degree upon the ability of pupils to read rapidly and intelligently than upon any other single factor. Good teaching must, therefore, provide the methods and materials for the improvement and refinement of the reading habits and skills that are required in most school situations and in all life activities involving reading. By the same logic it follows that if this improvement is to be made effective, there must be reliable, accurate devices for measuring the desired abilities and identifying important weaknesses.

It must further be recognized that many reading disabilities arise in spite of what appears to be adequate initial teaching,

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and that prompt identification and proper remedial techniques may do much to eliminate these difficulties. The results of analytical and corrective work on silent reading rate and comprehension have been most encouraging, not only in the elementary school but also in high school and college.

The Iowa Silent Reading Advanced Test goes far beyond the ordinary general survey of a single phase of silent reading abilities. The test is designed to cover a wide range of the skills known to be indispensable to effective reading of the work-study type. The test measures three broad general areas of silent reading abilities; namely, (1) Rate of Reading at a Controlled Level of Comprehension, (2) Comprehension of Words, Poetry, Sentences, Paragraphs, and Longer Articles, and (3) Ability to Use Skills Required in Locating Information. Each of these fields is covered in a number of different ways by means of eleven different types of materials arranged in seven subtests, requiring a total testing time of 45 minutes and resulting in nine different subtest scores, each with special significance.

USES OF THE IOWA SILENT READING TESTS

One of the most important functions of these silent reading tests lies in the fact that their use in a class provides the teacher with a rather exact estimate of the level of development of a number of important elements of silent reading abilities in the class, as well as with specific information in certain important skill areas concerning the limitations of the individuals comprising the class. By comparing the results obtained from a class with the norms, a clear idea of the general ability of the class in silent reading of the work-study type can be obtained. By analyzing the scores made by individual pupils on the various parts of the tests, certain of the specific weaknesses or strengths of individual members may be discovered. It is only on the basis of such an analytical approach that a really constructive remedial program can be developed.

In addition to this analytical use of the tests, they have been found to be very valuable also for grouping pupils or classes for instructional purposes. The tests, measuring as they do such a wide range of abilities in a highly complex field, naturally correlate rather well with such measures of general mental ability as the Pintner General Ability Tests, the Terman Group Test of Mental Ability, the Terman-McNemar Test of Mental Ability, the Otis Group Intelligence Scale, and the Kuhlmann-Anderson Tests of Mental Ability. The correlation of Median Standard Scores on the Iowa Silent Reading Advanced Test (results from rotated group testing, one form to each student, with all four forms entering equally into the determination of the correlation) and Median Standard Scores on the Terman-McNemar Test of Mental Ability for 340 tenth-graders in Hampton, Virginia, was .78; for a sample of 173 tenth-graders in Newton, New Jersey, this correlation was .72.

DESCRIPTION OF THE PARTS OF THE TEST

TEST 1. RATE AND COMPREHENSION

The accurate and meaningful measurement of rate of reading involves the control of the comprehension level at which the reading takes place. In this test the pupil is asked to read two somewhat diverse types of prose at a rate which, for him, is best for clear comprehension. The first deals with science content and the second with social studies material. For the sake of simplicity in recording rate of reading, the Rate score is expressed in terms of the total number of sentences read in one minute in each of the articles. Comprehension exercises designed to hold the pupil to a given level of understanding of the content accompany the articles — a different type for each article. The Comprehension scores based on the exercises for the two selections are combined into a single score to represent one of the nine subtest scores for the test. Thus Test 1 is a measure of rate of reading under specific comprehension conditions. It yields two of the subtest scores.

TEST 2. DIRECTED READING

Research shows that there is no general silent reading ability; it is a composite of many skills. One who reads one kind of material well may read another type of content poorly. This part of the test is designed to measure the pupil's ability to comprehend general and specific situations expressed in the content without unduly stressing memory. While this test is designed to measure the ability to comprehend and answer questions of a rather detailed type, it makes a special effort to avoid pure identification or matching of words.

In the earlier quick-scoring edition of Forms Am and Bm, one selection used for measuring Rate in Test 1 was also repeated in similar form in this test of Directed Reading. The pupil thus read the same article twice. In the present forms the pupil is confronted with a different article on science content from an alternate form of the test. Thus in these revised forms the pupil does not reread any article encountered in the same form of the test. It is believed that this procedure results in making this test somewhat more difficult and more discriminating than was the case in the earlier edition of Forms Am and Bm.

TEST 3. POETRY COMPREHENSION

One important phase of silent reading is the reading and understanding of poetry. This test, by a series of questions based upon a poem, measures the understanding of the poem as shown by ability to find passages which answer questions.

TEST 4. WORD MEANING

Much of the difficulty that certain pupils have in studying their textbooks is due to lack of knowledge of the more or less technical words in the subject. To a certain extent pupils must be trained specifically for assimilative reading in each subject, and this training must consist primarily of development of a vocabulary in that subject.

Terminology in any subject is more than a mere list of words; it is a catalogue of the important concepts in that subject. A pupil's failure to grasp any portion of the subject matter will be indicated by vagueness regarding the meaning of the terms involved in that portion of the subject. Tests which will measure special or technical vocabulary of a school subject are tools of fundamental importance which a teacher may use in order to aid in determining the ability of pupils to study the subject efficiently. This test has been designed, therefore, to measure understanding of significant words in four high school subjects: social science, science, mathematics, and English.

TEST 5. SENTENCE MEANING

The sentences comprising this test are stated in such a way that in each case the meaning of the sentence as a whole must be comprehended. So far as possible, the content difficulty of each sentence has been kept on a level with the comprehensional difficulties involved. In general, the sentences are arranged in ascending order of difficulty of response. All key or basic words in the exercises were checked against the word

lists of Horn [1] and Thorndike,[2] and the social frequency of each word was determined in connection with the formulation of these exercises.

TEST 6. PARAGRAPH COMPREHENSION

Two specific aspects of paragraph comprehension are included in this test; namely, (1) the ability to select the central topic of the paragraph, and (2) the ability to identify details essential to the meaning of the paragraph. For each of the twelve paragraphs of this test, item A pertains to the first aspect and items B and C to the second. For most purposes the total number of items answered correctly may be taken as the score on this test. In cases in which a more exact analysis is needed it may be desirable to check the number of A items answered correctly, and the number of B and C items answered correctly. Norms are provided only for total score.

TEST 7. LOCATION OF INFORMATION

One of the major outcomes of instruction in silent reading of the work-study type is the ability to locate information quickly and accurately in the light of the problem at hand. This test includes two major elements involved in locating information. Part A refers the pupil directly to a simple index as a source of answers to specific questions. Part B measures the ability to select words under which information about a given question might be found. Each part yields a subtest score.

VALIDITY

Validity may be defined as an expression of the degree to which a test measures the qualities, abilities, and skills which it is designed and supposed to measure. Validity may be expressed statistically in terms of the correlation of the test with certain outside criteria. In general, validity may best be expressed in terms of the extent to which the test sets up situations calling into play the skills or abilities which experienced observers consider fundamental to success in the given field. Such judgments are represented by the opinions of experienced teachers, the recommendations of committees and other qualified authorities, etc.

In validating this silent reading test the major dependence has been placed upon the latter method. Logically, a valid silent reading test must duplicate a large number of the types of situations in life in which reading is used. An analysis of precisely what these situations are naturally forms a basis for the development of an effective course of study, and by the same logic provides the most defensible basis for the validation of silent reading tests.

The following is a quotation of the most significant skills, knowledges, attitudes, and abilities involved in typical silent reading situations:[3]

1. Skill in recognizing new words
2. Ability to locate material quickly
   - *a.* Knowledge of and ability to use an index
   - *b.* Ability to use a table of contents
   - *c.* Ability to use the dictionary
   - *d.* Ability to use library card files
   - *e.* Ability to use reference material
   - *f.* Ability to use keys, tables, graphs, etc.
   - *g.* Ability to skim
3. Ability to comprehend quickly what is read
   - *a.* Rhythmic and rapid eye movements
   - *b.* Absence of lip reading
   - *c.* Knowledge of meaning
4. Ability to select and evaluate material needed
5. Ability to organize what is read
   - *a.* To summarize
   - *b.* To assign topics to proper order or place
   - *c.* To discover related material
   - *d.* To outline
6. Remembrance of material read
7. Knowledge of sources
8. Attitude of attacking reading with vigor
9. Attitude of proper care of books

A comparison of this list of abilities and attitudes, upon which successful silent reading undoubtedly depends, with the list of unit skills specifically measured by the parts of the test will reveal the extent to which they represent really valid measuring instruments.

The Unit Skills Measured

The unit skills measured by the Iowa Silent Reading Advanced Test are as follows:

Test 1. Rate and Comprehension
- Science material
- Social studies material

Test 2. Directed Reading

Test 3. Poetry Comprehension

Test 4. Word Meaning
- Social studies
- Science
- Mathematics
- English

Test 5. Sentence Meaning

Test 6. Paragraph Comprehension
- Selection of central idea of paragraph
- Identification of details essential to the meaning of the paragraph

Test 7. Location of Information
- Use of index
- Selection of key words

Various Approaches to Measurement of Comprehension

The valid measurement of silent reading comprehension implies the need for sampling many different types of content and the use of a number of different techniques of measurement. In the Iowa Silent Reading Advanced Test, comprehension as related to rate is measured by a specific series of exercises following each of the reading passages of Test 1 (Test 1A and Test 1B). At a later time similar types of material of different content are utilized for a more specialized measure of comprehension in which the individual is directed in the identification of details within a long article (Test 2). Comprehension of poetry, words, sentences, and paragraphs is also measured in separate subtests (Tests 3, 4, 5, and 6). The ability to comprehend questions in specific situations is measured in connection with the test on the use of the index (Test 7A).

It is believed that these different approaches result in a measure of comprehension which is both valid and reliable.

[1] Horn, Ernest, *Basic Writing Vocabulary*. Bureau of Publications, University of Iowa, Iowa City, Iowa.

[2] Thorndike, E. L., *Teacher's Word Book*. Bureau of Publications, Teachers College, Columbia University, New York.

[3] Adapted from an outline of reading skills compiled from many sources and given in Greene, Jorgensen, and Gerberich, *Measurement and Evaluation in the Elementary School*. Longmans, Green and Company, New York; 1942.

Subtest and Item Performance

The various subtests of the Advanced Test are included because of their low interrelationships and the relatively high contribution of each subtest to the total measure of silent reading abilities. The intercorrelations of the subtest raw scores and their correlation with the Median Standard Scores for the total test are given in Table 1.

TABLE 1. Intercorrelations of Subtest Raw Scores and Their Correlation with the Median Standard Scores on the Total Test for 173 Pupils in Grade 10, Newton, New Jersey — Iowa Silent Reading Advanced Test: Form Am (Revised)

Test	1R	1C	2	3	4	5	6	7A	7B
1: Rate									
1: Comprehension	.11								
2: Directed Reading	.27	.28							
3: Poetry Comprehension	.30	.22	.38						
4: Word Meaning	.29	.52	.49	.45					
5: Sentence Meaning	.06	.49	.36	.25	.57				
6: Paragraph Comprehension	.30	.37	.51	.46	.61	.48			
7A: Use of Index	.10	.30	.45	.32	.47	.29	.41		
7B: Selection of Key Words	.10	.32	.30	.26	.36	.36	.37	.27	
Median Standard Score	.39	.57	.63	.59	.81	.63	.75	.61	.50

Items comprising the subtests were selected or retained because of (1) their power to discriminate between high and low levels of the special silent reading abilities measured by each subtest, and (2) their systematic decline in difficulty in successive grades. Table 2 shows for Part B of Test 7, Advanced Form Cm, the average per cent of failure on the twenty items comprising the subtest by high and by low ability groups for Grades 9 to 12 inclusive. The high group represents the pupils who achieved scores in the upper 50% of the distribution for each grade; the low group includes those who had scores in the lower 50% of the distribution. The table also shows the decline in average percentage of failure on these twenty items of Test 7, Part B, for the total population used in each grade.

Another aspect of this same factor of item validity is shown in Table 3 for the 50 items comprising Test 5, Advanced Forms Cm and Dm. This table also shows the exactness with which Forms Cm and Dm of this subtest parallel each other in arrangement of items according to average difficulty.

Space in this brief manual does not permit the presentation of further supporting data, but similar procedures were followed in the development of each subtest of the four forms.

RELIABILITY

The reliability of a test expresses the consistency with which it measures whatever qualities it does measure. In general, a test must sample systematically and extensively the field which it measures if it is to secure reliable results. Only when this is done can it secure from the pupil tested a response representative of his true ability. This means tests of many exercises and long testing periods. It means that chance factors, such as temporary physical disturbances, fatigue, etc., will be largely eliminated from the results.

High reliability, while desirable, is not the most significant feature of a useful classroom test. In fact, recent evidence shows that it is possible to add test items to a test which will distinctly step up its reliability but will actually reduce its discriminative power. This fact, however, does not relieve the test author of the responsibility for presenting objective evidence of the reliability of a test.

TABLE 2. Average (Mean) Per Cent of Failure per Item for High and Low Groups; Test 7B: Selection of Key Words — Iowa Silent Reading Advanced Test: Form Cm

Items	Grade 9		Grade 10		Grade 11		Grade 12	
	High N: 143 %	Low 122 %	High 149 %	Low 141 %	High 96 %	Low 104 %	High 114 %	Low 105 %
1–5	5.2	38.4	4.4	33.2	3.2	36.6	2.6	28.6
6–10	13.8	47.0	10.2	44.4	10.2	46.6	7.4	36.0
11–15	21.4	59.0	19.0	55.8	13.4	54.8	11.0	50.2
16–20	46.2	74.0	37.8	76.2	39.2	71.4	27.0	68.8
All	21.7	54.6	17.9	52.4	16.5	52.4	12.0	45.9
Total	37.2		34.3		33.8		28.3	

TABLE 3. Average (Mean) Item Difficulty[1] by Form and Grade Test 5: Sentence Meaning — Advanced Forms Cm and Dm

Items	Grade 9		Grade 10		Grade 11		Grade 12	
	Form Cm %	Form Dm %	Form Cm %	Form Dm %	Form Cm %	Form Dm %	Form Cm %	Form Dm %
1–10	6.2	5.7	4.5	4.6	4.8	4.2	3.8	4.2
11–20	11.3	11.7	9.2	9.3	7.8	8.2	5.7	4.8
21–30	15.2	17.0	14.9	15.0	16.0	15.3	10.2	10.1
31–40	27.4	24.1	26.2	25.8	24.5	23.4	15.7	16.9
41–50	45.6	45.8	43.0	44.6	42.6	41.5	30.3	32.7
All	21.1	20.9	19.6	19.9	19.1	18.5	13.1	13.7
Number of Cases	265	265	290	285	200	205	219	225

[1] Per cent of failure.

The reliability of a test is ordinarily measured in either of two ways; first, by correlating the scores on one form of a test with scores on a successive administration of an alternate form of the test; or secondly, by correlating the scores on the odd-numbered items of a test with scores on the even-numbered items of the test and correcting the resulting coefficient by application of the Spearman-Brown formula to yield an estimate of the reliability of the whole test rather than of half of the test. The second method has been used here, and the reliability data thus obtained are shown in Table 4. The coefficients reported in this table are based on a 10th-grade population of 181 cases from Newton, New Jersey, where the four forms of the Advanced Test were administered to random fourths of each class tested, one form to each pupil, and the Bm, Cm, and Dm scores were converted to Am equivalents for the reliability calculations.

Additional evidence on the reliabilities of the Advanced Test is given in Table 5 for the total national population participating in the comprehensive standardization program of 1942 (see "Standardization," page 6). The reliabilities in this table were computed by means of the Kuder-Richardson[1] formula (21), which may underestimate the true reliability but should never overestimate it. All four forms of the Iowa Silent Reading Advanced Test entered equally into the determination of these reliability coefficients since random fourths of each testing unit took each test form, and scores on Bm, Cm, and Dm were converted to Am equivalents for the reliability calculations.

Reliability coefficients of whatever kind have one serious disadvantage. They fluctuate in accordance with the range of talent on which they are based. The probable error of

[1] Kuder, G. F., and Richardson, M. W., "The Theory of the Estimation of Test Reliability." *Psychometrika*, Vol. 2, No. 3, September, 1937, pages 151–160.

TABLE 4. ODD-EVEN RELIABILITY DATA BASED ON 181 CASES, GRADE 10, NEWTON, NEW JERSEY — IOWA SILENT READING TEST: ADVANCED FORMS BM, CM, AND DM SCORES CONVERTED TO AM

TEST	r_{11}[1]	STANDARD DEVIATION[2]	$PE_{MEAS.}$[2]
1: Rate[3]	.689	23.1	9
1: Comprehension	.722	18.8	7
2: Directed Reading	.822	16.3	5
3: Poetry Comprehension	.683	21.0	8
4: Word Meaning	.871	16.8	4
5: Sentence Meaning	.751	18.2	6
6: Paragraph Comprehension	.759	18.7	6
7A: Use of Index	.841	17.4	5
7B: Selection of Key Words	.863	19.0	5
Total: Median Standard Score	.918	12.9	2

[1] Corrected by Spearman-Brown formula.
[2] In terms of standard score scale.
[3] Selection A against selection B.

measurement is a very valuable adjunct to the reliability coefficient because it is not influenced by the range of talent upon which it is based. The probable errors of measurement for each subtest and the total are given in Tables 4 and 5. The formula used in computing these probable errors is $.6745\ \sigma_{Test}\sqrt{1 - r_{11}}$ (or r_{tt}). All probable errors of measurement reported are in terms of the standard score scale. It should be borne in mind that probable errors of measurement in terms of the raw score scale are much smaller — on the average, about one third as large as those for the standard score scale. Further discussion of the use of these probable errors will be found in the section on interpretation (page 13).

STANDARD SCORES

The purpose of subtest standard scores is to provide a method of direct comparison of scores from one subtest to another, thus facilitating the use of the Profile Chart without resorting to age or grade equivalents, which may be quite misleading when used with subtests as short as these. It also makes it possible to use the median of the subtest standard scores as the average for the whole test. This method has the double advantage of ease of computation and freedom from excessive influence of very high or very low subtest scores.

In order to have adequate mental or educational measurement, a score scale must have (1) a single origin and (2) comparable units in all parts of the scale. It is generally recognized that raw scores do not insure comparability at all points along a scale. A difference of five raw score points in one part of a scale may represent a different amount of ability from five raw score points in another part of the scale. Similarly, a difference of five raw score points at an early age may represent quite a different amount of intellectual growth from five raw score points at a later age. For each of the Advanced Iowa Silent Reading subtests, a standard score scale has been devised which uses the median of the 16-year age group of the national standardization population as the origin and the standard deviation of this age group, arbitrarily made 20 standard score points, as the unit of measurement. A standard score of 166 has been assigned to the median raw score for each subtest. For each subtest, scores on this type of scale for all age groups are thus measured from a single origin and provide comparable units throughout all parts of the scale, as well as being comparable from one subtest to another.

TABLE 5. RELIABILITY DATA BASED ON KUDER-RICHARDSON[4] FORMULA 21 FOR THE TOTAL 1942 IOWA SILENT READING NATIONAL STANDARDIZATION POPULATION: ADVANCED FORMS BM, CM, AND DM SCORES CONVERTED TO AM

TEST	GRADE	NUMBER	r_{tt}[5]	STANDARD DEVIATION[6]	$PE_{MEAS.}$[6]
1: Rate	9	2201	.730	21.8	8
	10	1981	.707	20.9	8
	11	1581	.683	20.2	8
	12	878	.736	21.6	8
	13	3607	.744	21.8	7
1: Comprehension	9	2201	.728	18.6	7
	10	1981	.742	18.3	6
	11	1581	.741	18.2	6
	12	878	.776	18.8	6
	13	3606	.839	20.8	6
2: Directed Reading	9	2201	.682	18.6	7
	10	1981	.706	18.5	7
	11	1581	.724	19.1	7
	12	878	.748	20.0	7
	13	3603	.769	19.9	6
3: Poetry Comprehension	9	2201	.750	20.4	7
	10	1981	.765	20.0	7
	11	1581	.757	19.1	6
	12	878	.774	19.1	6
	13	3597	.826	20.6	6
4: Word Meaning	9	2201	.830	18.2	5
	10	1981	.845	18.8	5
	11	1581	.828	17.5	5
	12	878	.856	18.6	5
	13	3609	.877	19.3	5
5: Sentence Meaning	9	2201	.867	17.9	4
	10	1981	.868	18.4	4
	11	1581	.847	17.6	5
	12	878	.852	18.4	5
	13	3609	.891	20.4	5
6: Paragraph Comprehension	9	2201	.763	18.9	6
	10	1981	.762	19.0	6
	11	1581	.711	17.6	6
	12	878	.718	18.0	6
	13	2080	.800	20.8	6
7A: Use of Index	9	2201	.694	17.5	6
	10	1981	.730	18.0	6
	11	1581	.711	17.5	6
	12	878	.696	17.1	6
	13	1976	.794	20.7	6
7B: Selection of Key Words	9	2201	.777	16.9	5
	10	1981	.787	17.3	5
	11	1581	.817	18.6	5
	12	878	.799	18.2	5
	13	1976	.695	16.0	6
Total	9	2201	.935	14.6	3
	10	1981	.938	14.6	2
	11	1581	.934	14.1	2
	12	878	.939	14.5	2
	13	2074	.949	15.8	2

[4] Kuder, G. F., and Richardson, M. W., "The Theory of the Estimation of Test Reliability." *Psychometrika*, Vol. 2, No. 3, September, 1937, pages 151–160.
[5] Calculations based on raw scores.
[6] In terms of the standard score scale.

Age 16, including 1756 cases from 15 years 6 months to 16 years 5 months inclusive, was chosen as the most unselected age group for the Advanced Test scaling. Most of the students of this age should be in the grade range tested; i.e., Grades 9 through 12. Subtest raw scores for this age group were distributed and the cumulative per cents getting respec-

tive raw scores were plotted on Otis Normal Percentile Charts [1] which made it possible very quickly to convert the raw scores for each subtest into standard scores which would yield normal distributions. The standard score equivalents of the raw scores were determined from the chart, assuming a standard deviation of 20 for the standard scores at age 16 and calling the median of the 16-year-olds a standard score of 166.

Advanced subtest medians were each called 166 standard score at age 16 because this value gave continuity of the standard score age norm line for comparable subtests from the Elementary Test to the Advanced Test. This value was decided upon by first scaling the Elementary Test, calling the median performance of the 12-year-olds, 150 standard score, and the standard deviation for the 12-year-olds, 20 standard score points. With this Elementary standard score scale available, an experiment was then conducted in which 816 14-year-olds (13 years 6 months to 14 years 5 months inclusive) from several communities took Form AM of both the Elementary and Advanced Iowa Silent Reading Tests, 1939 New Edition. Scores on these tests were translated into equivalent scores on the revised tests and the raw scores on the Advanced Test equated to standard scores on the Elementary Test. From this equating, the standard score equivalents of the national standardization raw score medians at age 16 were determined for the Advanced subtests. These values hovered around 166 standard score. The Elementary standard score age norm line for each subtest was also projected up to its most likely value at age 16, and since the median of these values for the nine subtests was also 166, 166 standard score was chosen as the median for the scaling age 16 for the Advanced Test.

The procedure just described gives a single standard score scale for each subtest measured from the median of the 16-year-olds in units of the standard deviation of the 16-year-olds which can be used for the whole range of each subtest and for direct comparison between subtests. The underlying assumption of such scales is that the distributions of the scores in the abilities tested would be normally distributed in an unselected population if you had equal units in all parts of each scale. The standard scores should be very stable, since they were determined on the scores for all the 16-year-olds derived from testing some 7000 pupils in Grades 9 through 12 in the national standardization population, and since the performance of the standardization group was checked against a 25 per cent random sample of another population of 18,000.

Median Standard Scores for the total test were not rescaled. The observed median of the Median Standard Scores for the standardization group at the scaling age 16 was 166, the same as the value assigned to the subtest medians for scaling. The standard deviation of these scores at age 16 was 16, which is the same as the variability of IQ's for several well-known intelligence tests, such as the Otis Quick-Scoring Mental Ability Tests, the Pintner General Ability Tests: Verbal Series, and the Terman-McNemar Test of Mental Ability.

STANDARDIZATION

In the spring of 1942, 17 communities in 11 states widely distributed geographically administered all four forms of the revised Iowa Silent Reading Advanced Test to students in Grades 9 through 12. Two thirds of these communities tested all students in all four grades; all but three of the remaining communities tested all students in Grades 9 through 11. In the same program, these communities also administered the Elementary Test to Grades 4 through 8. Approximately 7000 students took the Advanced Test. Since three or four consecutive grades were tested by each community, these results should yield at least two or three unselected age groups. The communities in this testing were chosen at each grade level to yield an average of 100 IQ on the Terman-McNemar Test of Mental Ability. The median testing date was the eighth month of the school year.

Experimental conditions were controlled in this testing so that random fourths of each class tested took each test form — one form only to each student. All testing was done according to uniform directions provided by the authors and the Division of Research of World Book Company. All test booklets were returned to World Book Company for check scoring, tabulation of results on Hollerith cards, and analysis of the data.

Raw score distributions for each subtest by year-age groups and by grade provided the basic data for the standardization. Scores on Forms BM, CM, and DM were converted to their AM equivalents before making these distributions. Equivalent scores were determined on approximately 1700 cases for each test form (all grades combined) by equating percentiles on Form AM with percentiles for each of the other forms, BM, CM, and DM, and reading the equivalent scores from the lines of relation resulting.

Standard scores were established on the 1756 cases of the 16-year age group according to the procedure described under "Standard Scores." Standard scores were then assigned to equivalent raw scores for the four test forms. These standard scores are printed in the test booklets for each subtest. The standard scores have the advantage not only of being comparable from form to form but from subtest to subtest.

Percentiles were determined on the grade distributions of the experimental population for each subtest and the Median Standard Scores for the total test. These norms appear in Tables 9–18 on pages 14 and 15. These percentiles should be quite stable, for the calculations were not only based on large numbers of cases (see Table 6), but they were also checked against the revised AM equivalents of a 25 per cent random sample of scores reported to the authors for the 1939 New Edition of the Iowa Silent Reading Advanced Test. Thus, for Grade 9 the actual calculations were based on 2201 cases, but these results were checked against a population of 5008 additional cases.

The data for Grade 13 represent results from some 3600 entering college freshmen, largely at the State University of Iowa, who took Form AM or Form BM of the 1939 New Edition of the Iowa Silent Reading Advanced Test. The results on these tests were converted to revised Form AM equivalents for the computation of the percentiles.

TABLE 6. NUMBER OF CASES FOR GRADE NORMS: IOWA SILENT READING ADVANCED SUBTESTS AND MEDIAN STANDARD SCORE

GRADE	NUMBER	25% RANDOM SAMPLE USED AS CHECK	TOTAL POPULATION USED AS CHECK
9	2201	1252	5008
10	1981	1244	4976
11	1581	1123	4492
12	878	961	3844
13	3600*		
Total	10241	4580	18320

* Approximate; varies for subtests.

[1] These Normal Percentile Charts proved extremely helpful in many phases of the statistical work involved in the Iowa Silent Reading standardization. The Chart and its uses are described in the Manual of Directions for the Otis Normal Percentile Chart.

Age and grade equivalents of the Median Standard Scores (see Table 19 on page 16) were determined by drawing smoothed norm lines through the age and grade medians of the Median Standard Scores, and extending these curves downward by means of experimental data on the Elementary Iowa Silent Reading Test. The age norm line was continuous from the Elementary to the Advanced Test. The grade medians were determined on the same number of cases listed for Grades 9–12 in Table 6. The number of cases for the age medians are indicated in Table 7 below.

TABLE 7. NUMBER OF CASES FOR AGE NORMS: IOWA SILENT READING ADVANCED TEST

AGE	NUMBER
13–6 through 14–5	410
14–6 through 15–5	1684
15–6 through 16–5	1756
16–6 through 17–5	1571
17–6 through 18–5	889
18–6 through 19–5	220
Total	6530

COMPARABILITY OF OLD AND NEW TEST FORMS

Two communities in the 1942 national standardization population — namely, Salem, Massachusetts, and Rochester, New Hampshire — administered Form AM of the 1939 New Edition of the Iowa Silent Reading Advanced Test to random halves of the pupils in each class tested, and gave the four forms of the revised test (one form to each pupil) to the other half of each class in order to furnish data for equating scores on the old and new test forms. All pupils in Grades 9 through 12 were tested in this manner. This resulted in 865 pupils taking Form AM of the 1939 New Edition and 842 taking the four revised forms. Scores on the four revised forms were all expressed as revised Form AM equivalents, and percentiles for the old and new test forms were equated to derive equivalent scores for corresponding old and new subtests and Median Standard Scores. The values resulting from this equating are presented in Table 8. The equality of Forms AM and BM of the 1939 New Edition had been previously established in 1939.

DIRECTIONS FOR ADMINISTERING THE TEST

GENERAL SUGGESTIONS TO THE EXAMINER

It is a matter of prime importance that the conditions under which the test is given be made as ideal as possible. This is not difficult to accomplish if reasonable care is taken.

The Iowa Silent Reading Tests can be given satisfactorily by any teacher or principal who is willing to adhere conscientiously to the directions and who is reasonably skillful in discipline. A few general directions will be useful.

1. Before beginning the test have the desks cleared and see that each pupil is provided with one or more *soft* lead pencils and an eraser. Have extra pencils available for emergencies.

2. Require strict attention to the directions and see that the pupils follow your instructions at once. If the group tested is large, or if the pupils are inexperienced in taking tests, a second person may act as an assistant. He should move quietly and see that changes from one part of the test to another are properly made so that all pupils may get started correctly and together on each new test.

3. The examiner should pass down the aisles and place a test booklet on the desk of each pupil, with the title page (page 1) facing the pupil.

4. All directions to the pupils should be given carefully in a tone which carries proper emphasis and suggests authority. The voice should be just loud enough to be heard in all parts of the room used for testing. The examiner should demonstrate very clearly the turning of each page.

5. Follow the directions for each test strictly and adhere rigidly to the time limits. A stop watch, while not indispensable, is highly desirable, since some of the time limits are as short as one minute. Certainly if a stop watch is not available, a watch with a second hand should be used and the time of beginning each test be recorded. DO NOT depend upon a clock whose minute hand jumps a whole minute at a time.

6. See that all pupils start and stop instantly upon the signal. The tests as well as test parts are timed separately and pupils should not be allowed to return to an unfinished test, nor should they be permitted to work ahead. Pupils should be instructed that if they finish a test before time is called, they may go over the work of *that* test and look for mistakes.

7. Before a new test is begun, make sure that each pupil has found the correct page. Watch this especially at first and when the pupils start back through the booklets on page 10.

8. During the first test the examiner should observe whether the pupils are marking too lightly or too painstakingly in the answer spaces. Try to avoid loss of time in marking the answers. A down-up-down stroke is satisfactory.

9. Ample time should be allowed for the administering of the test, so that pupils will not feel rushed or that they are being held overtime. Since the sum of the time limits of the separate tests is 45 minutes, about an hour should be allowed for the administration of the entire test.

PRELIMINARY INSTRUCTIONS TO THE PUPILS[1]

After the booklets have been distributed, say to the pupils: **"Write your name, age, grade, and other facts called for on the front page. Write your name here** (Point to place.)**; write plainly.** (Pause.) **Now write your age here."** (Point to place.)

Continue for the other information blanks in the same manner, pausing to allow the pupils time to fill the blanks. (*For separate answer sheet, turn back here to item 5, bottom of page 11.*)

After the blanks have been filled in, say: **"Listen carefully and be sure to do exactly what I tell you. Do not begin to work until I say 'Go.' When I say 'Stop,' you must stop at once. You will find at the bottom of some pages the words, 'Do not turn this page until you are told to do so,' or, 'Go right on to the next page,' etc. Be sure to follow these directions. If you break your pencil, hold up your hand and you will be given another. Are there any questions?"**

Proceed immediately to the specific directions for Test 1, unless additional instruction on the mechanics of marking the test items is desired. Some pupils may find the general scheme of marking their responses on this test quite different from other objective tests they may have used. The following suggestions are made to help them overcome this possible difficulty. This pre-test training may not be necessary for all pupils, but it will certainly prove beneficial to those who have not taken this kind of test before.

1. Write or print on the blackboard the following questions, making them look as nearly like the test items as possible. This should be done before the test booklets are given out.

[1] If the tests are to be administered with separate answer sheets, use the special directions on pages 11–12 of this manual.

TABLE 8. EQUIVALENT STANDARD SCORES: IOWA SILENT READING ADVANCED TEST: 1939 NEW EDITION, FORMS AM AND BM, AND 1942 NEW EDITION REVISED, FORMS AM, BM, CM, AND DM

1: Rate			1: Comprehension			2: Directed Reading			3: Poetry Comprehension			4: Word Meaning			5: Sentence Meaning			6: Paragraph Comprehension				7A: Use of Index			7B: Selection of Key Words		
New Edition		Revised New Edition [1]	New Edition		Revised New Edition	New Edition		Revised New Edition	New Edition		Revised New Edition	New Edition		Revised New Edition	New Edition		Revised New Edition	New Edition Average [2]	Revised New Edition Total [3]	New Edition Average [2]	Revised New Edition Total [3]	New Edition		Revised New Edition	New Edition		Revised New Edition
AM	BM		AM	BM		AM	BM		AM	BM		AM	BM		AM	BM		AM-BM		AM-BM		AM	BM		AM	BM	
16	12	79	33	30	103	51	47	128	43	51	115	30	30	95	47	49	126	30	104	74	159	44	44	111	51	51	134
18	14	*81* [1]	35		106	55	51	135	49	55	119	32	32	98	49	51	128	31	105	75	160	48	48	119	54	54	137
20	16	81	37	32	109	*55*	55	*135*	55	61	130	34	34	101	51	53	*130*	32	106	76	162	52	52	127	57	57	141
22	19	84	40	35	112	59	59	142	61	65	135	35	35	103	53	54	130	33	107	77	163	57	57	135	60	60	145
24	22	86	42	37	115	63	63	149	65		141	37	37	106	54	56	133	34	108	78	164	62	62	143	63	63	149
26	24	88	45	40	118	67	67	154	69	69	146	38	38	108	56	*56*	135	35	109	79	166	66	68	150	66	66	153
28	27	*88*	*45*	42	*118*	70	70	159	73	75	152	39	39	111	58	58	137	36	111	80	167	71	74	159	68	68	156
30	30	91	47	45	122	*70*	72	*159*	76	80	157	41	41	113	*58*	59	140	37	112	81	168	75	80	164	*68*	70	*156*
32	32	93	50	47	126	74	75	164	80	83	163	42	42	116	59	61	142	38	113	82	170	80		175	72	72	161
34	35	95	52	50	130	78	78	169	83		168	43	43	119	*61*	*61*	145	39	114	83	171	84	84	181	74	74	*161*
36	38	98	55	52	135	82	82	174	86	86	173	45	45	121	61	63	147	40	115	84	173	89	89	*187*	77	77	165
38	40	*98*	57	55	140	85	85	183	90	90	177	47	47	124	63	65	150	41	116	85	174	94	94	187	80	80	169
40	43	100	60	58	144	89	89	188	93		181	48	50	127	65	*66*	152	42	117	86	175	98	98	193	83	83	173
42	46	102	62	62	148	93	93	193	96	93	184	50	51	129	*65*	66	154	43	118	87	177	103	103	*202*	86	86	176
44		105	65	65	151	97	97	197	99	96	187	51	53	134	66	68	156	44	120	88	178	107	107	202	89	89	180
46	48	107	67	67	154	100	100	201	102	99	191	53	54	137	68	70	158	45	121	89	180	*112*	112	*213*	93	91	*184*
48		110	70	70	158	104	104	204	106	102	191	54	55	139	70	*70*	160	46	122	90	181	112	116	213	96	93	184
50	51	112	72	72	161	108		208	*106*	106	*191*	55	57	142	72	*72*	162	47	123	91	183				101	96	189
52	54	115	75	75	165	112	108	*212*	110	110	196	57	58	144	74	72	164	48	124	92	184				106	101	198
54		118	78	80	168	115	112	212	114	114	201	58	60	146	*75*	74	165	49	125	93	186				*106*	106	*198*
56	57	121	80	83	171	119	115	216	118	118	208	60	61	148	75	75	167	50	127	94	187				112	112	210
58	60	124	83		175	122	119	220	*118*	123	*208*	61	63	150	77	*77*	169	51	128	95	188				119		222
60	62	130	86	86	178	126		*220*	*123*	127	*215*	63	64	152	79	77	171	52	129	96	190				128		234
62	65	134	88	88	181				123	132	215	64	65	154	81	79	173	53	131	97	191						
64		137	91	91	184							65	67	156	83	81	175	54	132	98	193						
66	68	141	93	93	187							67	68	158	85	83	177	55	133	99	195						
68	70	144	96	96	190							68	70	160	*85*	85	*179*	56	135	100	196						
70	73	147	99	101	193							70	71	162	85	87	179	57	136	101	198						
72	76	151	101	104	196							71	73	164	87	*87*	182	58	137	102	200						
74		154	104		199							73	74	166	89	89	184	59	139	103	201						
76	78	157	107	107	203							74	77	168	91	91	186	60	140	104	203						
78	80	160	110	110	207							76	78	169	*91*	93	*186*	61	141	105	205						
80	83	163	113	113	212							77	80	171	91	95	189	62	143	106	206						
82	86	166	116	116	217							78	81	173	95	97	191	63	144	107	208						
84	88	169	120	120	222							80	83	174	*97*	99	193	64	145	108	210						
86	90	172	*120*	124	*222*							81	84	176	97	101	196	65	147	109	211						
88	92	175	124	130	227							83	86	178	101	103	198	66	148	110	212						
90	94	178	*130*	135	*232*							84	87	180	103	105	201	67	149	111	214						
92	96	181	130	141	232							86	89	181	105	107	203	68	151	112	215						
94	98	184										87	90	183	*107*	109	*206*	69	152	113	216						
96	100	187										89	92	185	107	111	206	70	153	114	217						
98	102	189										90	93	187	109	114	209	71	155	115	219						
100	104	192										92	94	188	111	*114*	212	72	156	116	220						
102	105	195										93	96	190	114	116	214	73	158								
104	106	197										94	97	192	*114*	118	*214*										
106	108	202										96	99	193	114	120	214										
108	109	204										97	100	195	*116*	*122*	217										
110	110	206										99	101	197	116	122	220										
112	*110*	209										100	103	198	*118*		223										
114		211										101	104	200	118		226										
116	111	213										103	105	202	*120*		229										
118	112	216										104	107	203	120		231										
120	113	218										105	108	205	122		234										
122		222										107	110	207	*122*		237										
124	114	225										108	111	208	122		240										
126	115	227										110	113	210													
128		229										111	115	212													
130	116	232										113	116	213													
	117	234										115	117	215													
												116	119	*217*													
												117	120	217													
												119	122	218													
												120	123	220													
												122	125	222													
												123	126	224													
												125	128	225													
												126	129	227													
												128	131	229													
												129	132	231													
												131	133	233													
												132	134	235													

Total: Median Standard Score					
New Edition [4]		Revised New Edition [5]	New Edition [4]		Revised New Edition [5]	New Edition [4]		Revised New Edition [5]
AM-BM			AM-BM			AM-BM		
40		103	72		159	104		199
41		106	73		161	105		200
42		108	74		162	106		201
43		110	75		163	107		202
44		112	76		165	108		*203*
45		114	77		166	109		203
46		116	78		168	110		204
47		118	79		169	111		205
48		120	80		170	112		206
49		122	81		172	113		207
50		124	82		173	114		208
51		126	83		175	115		*209*
52		127	84		176	116		209
53		129	85		177	117		210
54		131	86		179	118		211
55		133	87		180	119		212
56		134	88		181	120		213
57		136	89		182	121		*213*
58		138	90		184	122		214
59		139	91		185	123		215
60		141	92		186	124		*216*
61		143	93		187	125		216
62		144	94		188	126		217
63		146	95		189	127		218
64		148	96		191	128		219
65		149	97		192	129		*219*
66		151	98		193	130		220
67		152	99		194	131		221
68		153	100		195	132		*221*
69		155	101		196	133		222
70		156	102		197	134		223
71		158	103		198			

[1] Where repeated entries occur, the value in italics is the one closest to point-0; for example, in this case, the standard score 81.0 on the revised test is more nearly equivalent to a standard score of 18 on the unrevised Form AM and 14 on the unrevised Form BM than it is to 20 and 16 respectively for these test forms.

[2] Average of standard scores on A items and on B + C items.

[3] Standard score on all items combined: A + B + C.

[4] Median of 7 subtest standard scores (averages on Tests 1, 6, and 7).

[5] Median of 9 subtest standard scores (each subtest separately).

X. Columbus discovered America in — 1 2 3 4
1 1513 2 1492 3 1776 4 1385

YES NO

Y. Is today Sunday? .....

Z. November is — 1 a woman's name
2 an automobile 3 the name of a month 1 2 3

2. Call attention to the questions on the board by saying: "Here are some questions to which you all know the answers. I have put them here to show you how to answer the questions you will find in the test you are about to take. Look at question X. Since Columbus discovered America in 1492, and 1492 is the second answer suggested, I shall fill in the answer space under 2 like this. (Fill in the space, using a down-up-down mark.) Similarly, for question Y, since today is not Sunday, I shall fill in the answer space under 'No.' Question Z is answered by filling in the answer space under 3. Is there any question about marking your answers?"

Specific Directions for the Examiner

TEST 1. RATE-COMPREHENSION

PART A

Say to the class: "Turn the page and fold it back so that Test 1, Part A, is on top. This is on page 2, as marked by the heavy black number found in the upper left-hand margin of the page. Be sure that you have page 2. (Observe carefully to see that everyone has found the right page.) Read the directions silently while I read them aloud to you." (Read the directions from the test booklet.) Then say: "Ready; go!"

At the end of *one (1) minute* say: "Stop! Put a circle around the word you read last, and then continue reading until time is called. You will have two more minutes in which to read as much of this story as you can. Remember you are to answer questions about it later."

At the end of *two (2) additional minutes* say: "Stop!

"At the bottom of this page you see some words and numbers which are upside down. Turn your booklet around so that these words and numbers are at the top and are right side up, like this. (Demonstrate by rotating the booklet.) Read silently while I read the directions to you." (Read the directions from the test booklet, and explain the sample item.) Then say: "Ready; go!"

At the end of *two (2) minutes* say: "Stop!"

PART B

"Take hold of the middle of the test booklet where the heavy numbered arrow is and turn it over by lifting the bottom of the booklet and letting it fall over where the top was (Demonstrate.) so that Test 1, Part B, is on top. This is on page 3, as shown by the large black number in the upper right-hand corner of the page. (See that all have found the correct page.) Listen carefully while I read the directions to you." (Read the directions from the test booklet.) Then say: "Ready; go!"

At the end of *one (1) minute* say: "Stop! Put a circle around the word you read last, and then continue reading until time is called. You will have two more minutes in which to read as much of this story as you can. Remember you are to answer questions about it later."

At the end of *two (2) additional minutes* say: "Stop!

"Turn the page and fold it back so that Test 1, Part B (*Continued*), is on top. This is on page 4, as shown by the large number in the upper right-hand corner of the page. Be sure that you have page 4. Read the directions silently while I read them to you. (Read the directions from the test booklet, but *not* the sample item.) Now read the sample item." (Pause.) Then say: "Ready; go!"

At the end of *three (3) minutes* say: "Stop!"

TEST 2. DIRECTED READING

"Turn the page and fold it back so that Test 2, Directed Reading, is on top. This is on page 5, as shown by the large number in the upper right-hand margin. Read the directions to yourself as I read them to you." (Read the directions from the test booklet.) Then say: "Ready; go!"

At the end of *three (3) minutes* say: "Stop!"

TEST 3. POETRY COMPREHENSION

"Turn the page and fold it back so that Test 3, Poetry Comprehension, is on top. This is on page 6 of the booklet. Read the directions to yourself as I read them to you. (Read the directions from the test booklet, but *not* the sample.) Now look at the sample item." (Pause.) Then say: "Ready; go!"

At the end of *five (5) minutes* say: "Stop!"

TEST 4. WORD MEANING

"Turn the page and fold it back so that Test 4, Word Meaning, is on top. This is on page 7. Read the directions silently while I read them aloud. (Read the directions from the test booklet, but *not* the sample.) Now read the sample." (Pause.) Then say: "This test is divided into four parts and it covers three pages. As soon as you have finished Part A on page 7, go right on to Parts B and C on page 8, and then to Part D on page 9. Stop at the end of page 9.

"Each part has a time limit; I will tell you when to begin each part. If you have already started that part, pay no attention but keep on working. If you have not started the next part, begin working on it as soon as I tell you to. Ready; go!"

At the end of *two (2) minutes* say: "Begin Part B on page 8."

At the end of *one and one-half ($1\frac{1}{2}$) additional minutes* say: "Begin Part C in the middle of page 8."

At the end of *one and one-half ($1\frac{1}{2}$) additional minutes* say: "Begin Part D on page 9."

At the end of *two (2) additional minutes* say: "Stop!"

TEST 5. SENTENCE MEANING

"Turn the page. Then turn your booklet around so that you can see Test 5, Sentence Meaning, at the top. This is on page 10, as indicated by the heavy black number in the upper right-hand margin of the page. The directions for the test are: — (Read the directions from the test booklet, but *not* the samples.) Read the samples." (Pause.) Then say: "There are two pages to this test. As soon as you have finished page 10, go right on to page 11. Ready; go!" (During the test see that the pupils continue to page 11.)

At the end of *four (4) minutes* say: "Stop!"

TEST 6. PARAGRAPH COMPREHENSION

"Turn the page and fold it back so that Test 6, Paragraph Comprehension, is on top. This is on page 12. Watch the directions while I read them aloud to you." (Read the directions from the test booklet.) Then say: "This test is on three pages. As soon as you have finished answering the

questions on page 12, go right on to page 13 and then to page 14. Stop when you have completed page 14. Ready; go!" (During the test see that pupils continue to pages 13 and 14.)

At the end of *nine (9) minutes* say: **"Stop!"**

TEST 7. LOCATION OF INFORMATION

PART A

"Turn the page and fold it back so that Test 7, Part A, Use of the Index, is on top. This is on page 15. Read the directions silently while I read them aloud to you. (Read *only* the first two paragraphs of the directions from the test booklet.) **Study silently the directions concerning the samples and the samples themselves."** (Pause.) Then say: **"Ready; go!"**

At the end of *three (3) minutes* say: **"Stop!**

PART B

"Turn the page and fold it back so that Test 7, Part B, Selection of Key Words, is on top. This is on page 16. Read the directions to yourself as I read them aloud to you. (Read the directions from the test booklet, but *not* the sample.) **Now read the sample."** (Pause.) Then say: **"Ready; go!"**

At the end of *three (3) minutes* say: **"Stop! Turn over two pages to the front of the test booklet. While you are waiting for tests to be collected, fill in any blanks on the front which you may have omitted."**

Collect the test booklets at once.

DIRECTIONS FOR SCORING THE TEST

The scoring of the test is entirely objective. When answers are recorded on the test booklet, all tests except the Rate tests are scored by means of a perforated stencil scoring key. If answers are recorded on separate answer sheets, scoring may be done either by the test scoring machine or by hand-scoring, using the same perforated stencil keys provided for booklet scoring. Detailed directions for booklet scoring are given below. Directions for using the perforated stencil scoring keys also appear on the keys themselves. Special directions for scoring separate Answer Sheets are given on pages 12–13 of this manual.

General Directions

1. Questions are scored either right or wrong. No partial credits are given. Where two or more answers have been indicated for one item, mark through that row of answer spaces with a colored pencil before any scoring is done. *Treat double-marked items as if they were omitted.*

2. Score page 2 first *without turning the booklet around.* From this point on, *score all right-hand pages first.* This will avoid turning the booklet around until you finish scoring page 9. Then turn the booklet around and continue to score right-hand pages until you complete the last subtest on page 16.

3. The Rate score for Test 1 is based upon the *sum* of the number of sentences read in one minute in each of the selections on pages 2 and 3 of the test.

4. The score on all other tests except Test 5 is the number of correct responses. The score for Test 5 is the difference between the number of right responses and the number of wrong ones. For a method of obtaining the "right minus wrong" score, see section 2 *h* under "Specific Directions."

5. Standard scores corresponding to the raw scores for each subtest are given in a table at the bottom of the page concluding the subtest. As the raw score for each subtest is found, put a check mark after it in the table and encircle its corresponding standard score value. Later these standard scores are to be entered in the test record form on the title page of the booklet.

6. Pupils are permitted to make corrections, provided their intent is clear.

7. If a pupil does not use the correct method of indicating his answer but otherwise gives a correct response, he should be given credit.

8. Standard scores are provided corresponding to zero raw scores even though the significance of zero scores is not always clear. Median Standard Scores which are based in part on standard scores corresponding to zero raw scores on any of the subtests should be identified in some fashion on the Class Record or on the Profile Chart, if a profile is drawn, to indicate to the teacher that they do not have quite the same significance as scores based on complete information.

If any pupil has raw scores of zero on more than one subtest, it is suggested that individual study be made of this pupil.

Specific Directions

1. The directions for using the answer keys are as follows:

a. Separate the three pages by cutting along the folds.

b. Before any scoring is done on a subtest scan each page and mark through with a colored pencil any row of spaces in which more than one answer is indicated. *Count double-marked items as omitted.*

c. Place the key for each test on the answer spaces for that test so that the heavy black arrow in the center of the test page shows through the large opening in the center of the key column, and the two arrows on the test booklet and the key are point to point, thus: . Adjust the key with a slight rotary motion so that the answer spaces on the test papers show through the openings in the key. Notice each small number (or letter) printed above the first and last holes in each column of the key. Make sure that the *same* small numbers (or letters) are above the answer spaces that show through these holes before starting to score.

d. Count the number of correct responses — i.e., the responses which appear through the openings.

e. The raw scores for all tests are the number right, except Test 1, Rate (see 2 *a* below) and Test 5. (See 2 *h* under "Specific Directions" before scoring Test 5.)

f. Put a check mark after the raw score for each subtest in the score box provided at the end of the subtest. *Encircle* the standard score corresponding to this raw score in the same score box.

2. While the exact procedure of scoring is in part a matter of personal preference, the following steps are recommended:

a. Score Test 1, Rate, Parts A and B, first. This score is the *sum* of the *number of sentences* read *per minute* in the two selections on pages 2 and 3. Get this sum by reading the number of the sentence in which a word is encircled in Part A and adding this number to the number of the sentence in Part B which has a word encircled. Put a check mark after this sum in the row marked "Rate: A + B" of the score box at the end of page 3 and encircle the standard score corresponding to it.

b. Then score Test 1, Comprehension. The raw score for this test is the total number of exercises right on pages 2 and 4, Parts A and B combined.

Score Part A, the ten exercises following the reading selection on page 2, first, *without turning the booklet around*. Note that the scoring stencil has been arranged with the perforations in the lower half of the key column for booklet scoring of Test 1, Part A, so that the responses to the exercises are scored upside down to avoid turning the booklet around.

Keep the score for Test 1, Comprehension, Part A, in mind and continue counting the Comprehension score through Part B on page 4. Put a check mark after the total number right, Parts A and B combined, in the score box at the end of page 4 and encircle the standard score corresponding to it.

c. From page 4 on, score all right-hand pages of the test booklet first. When you have finished Test 4, Part D, on page 9, turn the booklet around so that Test 5, Sentence Meaning, is on top. This is on page 10. Continue scoring right-hand pages until you complete the last subtest, Test 7, Part B, on page 16.

d. Put a check mark after the raw score for each subtest in the score box provided at the end of the subtest and *encircle* the standard score corresponding to it.

e. The raw score for Test 2, Directed Reading, is the number right on page 5.

f. The raw score for Test 3, Poetry Comprehension, is the number right on page 6.

g. The raw score for Test 4, Word Meaning, is the total number right on pages 7, 8, and 9. Space is provided to record part scores on this test for analysis by subject matter if this is desired. Standard scores and norms, however, are provided only for total score on this test. If total score only is desired, the scoring will be simplified by folding back pages 7 and 8 so that the answer spaces on pages 7, 8, and 9 are all visible at one time.

h. The scoring of Test 5, Sentence Meaning, will be simplified if page 10 is folded so that the answer spaces on pages 10 and 11 are visible at one time. To find the "right minus wrong" score, first scan the answers on both pages of Test 5 and count any omitted items. Record this number at the bottom of the page. Then, by using the answer key, count the number of right responses and record in the space provided at the bottom of page 11. To find the number of wrong items, add the number omitted to the number right and then subtract that sum from 50. If there are no omitted items, the number wrong will be the difference between the number right and 50. The raw score for Test 5 is obtained by subtracting the number wrong from the number right. Count any negative score as zero.

The "right minus wrong" score may be found directly from number right and number omitted by substituting in the following formula, where S = score, R = number right, and O = number omitted:

$$S = 2R + O - 50.$$

i. To simplify the scoring of Test 6, Paragraph Comprehension, fold back pages 12 and 13 so that the answer spaces on pages 12, 13, and 14 are visible at one time. The raw score for Test 6 is the total number of A, B, and C items right on pages 12, 13, and 14.

j. The raw score for Test 7, Part A, is the number of items right on page 15.

k. The raw score for Test 7, Part B, is the number of items right on page 16.

3. After all the papers in the class have been scored, transfer the standard scores to the test record form on the front page of the test. If this page is to be permanently filed, as is recommended, the recording of the scores is simplified by detaching the title page from the rest of the booklet.

There are nine (9) standard score entries to make: two for Test 1 (one for Rate and one for Comprehension); one each for Tests 2, 3, 4, 5, and 6; and two for Test 7 (one for Part A and one for Part B).

4. Plot the standard scores on the Profile Chart by making a small cross on the proper staff, using the scale at the side to locate the score. That is, on the staff for Test 1, Rate (1R), plot the standard score for Rate and on the staff for Test 1, Comprehension (1C), plot the standard score for Comprehension, etc. Thus there will be points located for each of the nine subtest scores for the test. Draw the profile by connecting the standard score points for each of the nine subtests.

5. The median of the nine subtest standard scores is used as a measure of average silent reading ability. This median is the fifth subtest standard score when the scores are arranged in rank order.

To find the Median Standard Score, slide a ruler across the Profile Chart from bottom to top, counting the points plotted for each subtest until the fifth is reached. This is the Median Standard Score. With a colored pencil draw a line horizontally through the Profile Chart to show the position of the Median Standard Score. The correctness of your work may be checked by observing whether four subtest standard scores fall above and four below the Median Standard Score line.

6. Subtest and Median Standard Scores for a class or other testing unit may be recorded on the Class Record supplied with each package of tests.

SPECIAL DIRECTIONS FOR USING MACHINE-SCORING ANSWER SHEETS

Two separate machine-scoring answer sheets are provided for the Iowa Silent Reading Advanced Test — one for use with Form AM or BM and the other for use with Form CM or DM.

ADMINISTERING WITH SEPARATE ANSWER SHEET

Note the "General Suggestions to the Examiner" (except pencil reference) on page 7 before administering tests with the separate Answer Sheet. The following special directions should be observed if machine-scoring Answer Sheets are used:

1. Tear off the columns of answer spaces at the perforations at the edge of each page of the test booklet.

2. Distribute the test booklets to the pupils, telling them not to write anything until all instructions have been given.

3. Distribute also the separate Answer Sheets, which are in the form of 4-page folders, and the *special mechanical pencils which must be used for machine-scored tests.* These pencils may be obtained from International Business Machines Corporation, manufacturers of the Test Scoring Machine.

4. After each pupil has been provided with a copy of the test, a separate Answer Sheet, and a mechanical pencil, the first page of the Answer Sheet should be filled out according to the "Preliminary Instructions to the Pupils" as found on page 7 of this manual.

5. Before proceeding to the directions for administering Test 1, say: **"Do not make any marks on the test booklet itself. All answers must be indicated in the proper space on this separate Answer Sheet.**

"Now open your Answer Sheet to page 3, where you will see at the top of the page a place for your name and the test form that you are taking. Fill in these blanks. (Pause.) **In this answer booklet there are three pages of answer spaces arranged in columns — a column for each page in the test booklet. At the center of each column of answer spaces is a large numbered arrow which corresponds to a large numbered arrow in the center of the right edge of each page of the test. There are also two smaller arrows in each column which match two smaller arrows similarly placed on each page of the test booklet.**

"To use this Answer Sheet, slip it under your test booklet so that the arrows on the Answer Sheet are point-to-point with the arrows on the page of the test booklet on which you are working. See that the numbers of the center arrows on the column of the Answer Sheet and on the booklet are the same. Notice that the answer spaces for pages 2, 4, 5, and 6 are on page 2 of the Answer Sheet, the spaces for pages 7, 8, 9, 10, and 11 are on page 3, and the remainder are on page 4. Now turn to page 2 of your Answer Sheet for the first test in the booklet.

"Mark all answers with the special pencil which I have given you. Make your marks heavy and black, for otherwise your paper may not be scored correctly. A down-up-down stroke is satisfactory. If you make a mistake, do not cross out an incorrect answer, but erase it and make a mark in the correct space." Read the remainder of the "Preliminary Instructions to the Pupils" from page 7 and give the practice exercise in marking answers if the pupils are not familiar with the scheme used for recording responses. Then proceed immediately to the "Specific Directions" for Test 1 as given below. *Do not* use the directions for Test 1 that are given on page 9; these are intended for recording answers in the booklet.

TEST 1. RATE–COMPREHENSION

PART A

Specific Directions to the Pupils

Say to the class: **"Open your test booklet and fold the page back so that Test 1, Part A, is on top. Be sure that you have Test 1, Part A.** (Observe carefully to see that everyone has found the right page.) **Read the directions for the test silently while I read them aloud to you."** (Read the directions from the test booklet.) Then say: **"Ready; go!"**

At the end of *one* (*1*) *minute* say: **"Stop! Put your finger on the last word you read; *do not mark it.* Now, in the lower left-hand corner of page 2 of the Answer Sheet where it says '*Sentences read: Part A*' under 'Test 1: Rate,' write the number of the sentence you were reading when time was called."** (Pause and make sure each one enters the number in the appropriate place.) Then say: **"Now continue reading until you are told to stop. You will have two more minutes in which to read as much more of the story as you can. Remember that you are to answer questions about it later."**

At the end of *two* (*2*) *additional minutes* say: **"Stop!**

"At the bottom of this page are some words and numbers which are upside down. Turn your booklet around so that these words and numbers are at the top and are right side up, like this. (Demonstrate.) **Slip the Answer Sheet under the test booklet so that the tip of the arrow numbered 2 on the Answer Sheet touches the tip of the arrow numbered 2 on your test booklet.** (When the arrows are matched correctly for this page, the number "2" next to the arrow on the test booklet will be upside down. The numbers will be right side up for all other pages.) **Read the directions silently while I read them to you."** (Read the directions from the test booklet and explain the sample item.) Then say: **"Ready; go!"**

At the end of *two* (*2*) *minutes* say: **"Stop!"**

PART B

"Take hold of the middle of the test booklet where the large arrow is and turn it over by lifting the bottom of the booklet and letting it fall where the top was (Demonstrate.) **so that Test 1, Part B, is on top.** (See that all have found the correct page.) **Do not put your Answer Sheet under the test booklet. Listen carefully while I read the directions to you."** (Read the directions from the test booklet.) Then say: **"Ready; go!"**

At the end of *one* (*1*) *minute* say: **"Stop! Put your finger on the last word you read; *do not mark it.* Now in the lower left-hand corner of page 2 of the Answer Sheet where it says '*Sentences read: Part B*' under 'Test 1: Rate,' write the number of the sentence you were reading when time was called.** (Pause and make sure each one enters the number in the appropriate place.) **Now add the number of sentences read in Part A to the number of sentences read in Part B and record the sum in the space marked 'Total' on the Answer Sheet."** Then say: **"Now continue reading until you are told to stop. You will have two more minutes in which to read as much more of the story as you can. Remember you are to answer questions about it later."**

At the end of *two* (*2*) *additional minutes* say: **"Stop!**

"Turn the page and fold it back so that Test 1, Part B (*Continued*), is on top. This is on page 4 as shown by the numbered arrow. Be sure that you have page 4. Adjust your Answer Sheet, and read the directions silently while I read them to you. (Read the directions from the test booklet, but *not* the sample item.) **Now read the sample item."** (Pause.) Then say: **"Ready; go!"**

At the end of *three* (*3*) *minutes* say: **"Stop!"**

The directions for Tests 2 through 7 as given on pages 9–10 of this manual may be used as they are, except that in the directions for Tests 2 and 5, where the page is identified by **"the large number in the upper right-hand margin,"** the examiner must substitute **"the numbered arrow in the center of the page."** Check carefully to see that pupils are recording responses in the correct columns of the Answer Sheet.

Before collecting the Answer Sheets have the pupils erase any stray marks on them not intended for correct answers. Also have them erase all marks on the test booklets.

Scoring the Separate Answer Sheet

All tests except Test 1, Rate, Parts A and B, may be scored by machine. The score for Test 1, Rate, is recorded on the Answer Sheet by the pupil as he takes the test.

The score for all other subtests is the number right except for Test 5, where the score is the number right minus the number wrong. Care must be taken to set the machine for "right minus wrong" when scoring Test 5. Directions for using the machine-scoring keys appear on the keys themselves. Three insertions in the machine are necessary to score all subtests.

Tables of standard scores corresponding to raw scores appear on each page of the Answer Sheet for the subtests on that page. As a score for a subtest is obtained in the machine, identify it in the score table on the Answer Sheet in the top row marked "Raw Score" and put a circle around the standard score corresponding to it for the subtest and the form of the test being scored. *Be sure to encircle the standard score for the correct test form*, since standard scores for two test forms are included on each Answer Sheet.

The total raw score (total number of sentences read per minute, Parts A and B combined) for Test 1, Rate, has already been recorded in the lower left-hand corner of page 2 of the Answer Sheet by each pupil. Encircle the standard score corresponding to this total raw score in the table provided on page 2 of the Answer Sheet. Then transfer all encircled standard scores to the test record form on the front of the Answer Sheet. Plot the standard scores on the Profile Chart and determine the Median Standard Score in the same manner as described in steps 4 and 5 on page 11 of this manual.

The separate Answer Sheet may be scored by hand by using the same perforated scoring stencil key provided for scoring responses recorded on the test booklets. Directions for this scoring are printed on the hand-scoring keys.

INTERPRETATION OF SCORES

The primary purpose of a general achievement test is to determine how an individual or a group stands in relation to the population used in the standardization. A further purpose of a test with diagnostic features is to determine how the individual or the group stands in the various sub-skills measured by the test in relation to the average score. The Iowa Silent Reading Tests serve these two purposes.

The group unit, whose score is to be evaluated, may be a class, a grade within a school, or an entire grade within a community.[1]

Percentile norms are provided to make possible the comparison of local achievement with the achievement of the standardization population, both with respect to average score and variability within the group. Percentiles corresponding to each standard score are given for each subtest and the Median Standard Score in Tables 9–18. As previously discussed, these norms for the Advanced Test were determined upon over 10,000 cases and checked against an additional population of over 18,000. These data represent a wide sampling of the high school population of the United States.

These norms may be generalized to an even wider population, however, since the cases have been so selected as to represent a normal population according to the standards of the Terman-McNemar Test of Mental Ability; i.e., the median IQ at each grade level is approximately 100, and the distribution of IQ's is normal.

In evaluating the achievement of a group, first distribute the Median Standard Scores of the group and compute the median and the major deciles of this distribution (space is provided for this distribution on the Class Record provided with each package of tests). Then compare these values with the corresponding values in the table of percentile norms (Table 18) for the proper grade level. For example, if Community X has a median (of Median Standard Scores) in the ninth grade of 164 points, this corresponds to the 57th percentile of the ninth-grade standardization group and is about 2.7 standard score points above the median of this group.

The percentile norms as given apply for the eighth month of the school year. Norms for any intermediate point may be obtained by interpolation. For most practical purposes, these norms may be used as end-of-year norms.

An even more desirable procedure would be to make use of a percentile graph such as the Otis Normal Percentile Chart (published by World Book Company). The distribution of scores for the local group may be plotted on this graph, making it possible to compare the two distributions at all points. Thus, account may be taken not only of the average ability in the group, but also its variability with reference to the standardization population. Most local communities will find that their scores are less variable than the standardization group, which is, of course, to be expected. The standardization group, however, provides a stable reference point for evaluating the variability of any local group, whether it be one class or all classes in a grade.[2]

When making an analysis of achievement of the group within subtest areas, distribute the subtest standard scores and find the median of each of these distributions. The percentile rank corresponding to these subtest medians may be found in Tables 9–17. This will evaluate the achievement of the group with reference to the national standardization population.

If you wish to analyze the group achievement on the subtests with reference to achievement on the test as a whole, use the group median of the Median Standard Scores as a reference point and determine the deviations of the subtest standard score medians from it. It would be helpful to use a Profile Chart of an unused test booklet on which to plot the median scores for each of the subtests and for the whole test, in order to obtain a graphic picture — i.e., a profile of the group as a whole. Deviations should be evaluated statistically by finding the probable error of the difference between each subtest standard score median and the median of the Median Standard Scores for the group. After *statistical* significance has been established, the *practical* significance of such deviations is an administrative and supervisory problem.

To illustrate, let us consider the hypothetical case where the median of the Median Standard Scores for a ninth-grade class is 165 points. Let us suppose that the median of the Test 6 standard scores for the class is 175. The deviation would then be 10 standard score points, and the problem is to determine whether this is a significant amount. In a class of 25 or more any difference greater than eight standard score points is statistically significant; i.e., it cannot be accounted for by chance or, to put it another way for the case above, if the class were to be retested with the same test, proper allowance being made for practice effect, there would be a negligible chance that the median of the second testing would be as low as the median[3] of the Median Standard Scores for the group.

[1] At the high school level, percentile norms by grade rather than by age are customary because the gradual slowing up of growth in mental ability reduces to negligible proportions the gain in score from one age to another.

[2] Additional suggestions concerning the treatment of test scores and, more particularly, the uses of the Normal Percentile Chart may be found in *Test Method Help No. 4*, "Statistical Methods Applied to Test Scores" (published by World Book Company).

[3] The probable error of measurement of a median is given by the formula $P.E._{M_{Md}} = 1.253\left(\frac{.6745\,\sigma\sqrt{1 - r_{11}\text{ (or } r_{tt})}}{\sqrt{N - 1}}\right)$. Since $.6745\,\sigma\sqrt{1 - r_{11}\text{ (or } r_{tt})}$ is the probable error of measurement for a single score, this reduces to $P.E._{M_{Md}} = 1.253\,\frac{(P.E._M)}{(\sqrt{N - 1})}$. (The probable errors for each subtest for all grades are given in Table 5.) Computing this value for N = 25 for each test separately for Grade 9, we get the following values for the Probable Error of Measurement of the Median: Test 1, Rate, 2.0; Test 1, Comprehension, 1.7; Test 2, 1.8; Test 3, 1.8; Test 4, 1.3; Test 5, 1.1; Test 6, 1.6; Test 7A, 1.7; Test 7B, 1.4. If we take four times the probable error as the significant ratio, in the case of Test 1, Rate, there would be only 7 chances in a thousand that a difference as great as eight standard score points would occur as the result of errors of measurement. Since the probable errors of the remaining tests are all smaller and the probable errors for higher grades are usually equal to or smaller than those for ninth grade, there would be even less chance that a difference of eight standard score points could be accounted for by chance. As the number of cases in the group increases, the probable errors decrease; hence the generalization made above.

GRADE PERCENTILES[1] CORRESPONDING TO EACH SUBTEST STANDARD SCORE FOR THE IOWA SILENT READING ADVANCED TEST: FORMS AM, BM, CM, AND DM

TABLE 9. TEST 1: RATE

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
112	1				
115	1	1			
118	*1*[2]	*1*	1		
121	*2*	1	*1*	*1*	1
124	2	2	1	1	*1*
127	4	3	2	2	*2*
130	5	4	3	3	2
134	7	6	5	4	4
137	9	8	7	6	6
141	13	11	9	9	8
144	16	13	12	12	11
147	19	17	15	15	14
151	24	22	21	20	19
154	29	27	26	26	24
157	34	32	31	31	29
160	39	37	36	35	34
163	45	43	42	41	40
166	50	49	47	46	45
169	56	54	53	52	51
172	62	59	58	58	57
175	67	65	64	64	63
178	72	70	70	69	68
181	76	75	75	74	73
183	79	78	78	77	76
184	81	80	80	79	78
185	82	82	81	80	80
187	84	84	83	82	82
189	87	86	85	85	84
191	89	88	88	87	87
192	90	89	89	88	88
193	91	90	90	89	*89*
194	92	91	91	90	89
195	*92*	92	92	91	90
197	94	93	93	92	91
199	95	95	94	93	93
201	*96*	96	95	*94*	94
202	96	*96*	96	94	94
203	97	97	*96*	*95*	95
204	*97*	*97*	97	95	*95*
205	97	97	97	*96*	96
206	98	97	*97*	96	*96*
207	98	98	97	97	96
208	*98*	*98*	98	*97*	97
209	98	98	*98*	97	*97*
211	99	99	98	*98*	97
213	*99*	*99*	99	98	*98*
215	99	99	*99*	99	98
216	99	99	99	*99*	99
218		99	99	99	*99*
220			99	99	99
222					99
223					99
225					99
227					99
NUMBER	2201	1981	1581	878	3607
MEDIAN	165.8	166.8	167.6	168.0	168.4
SIGMA	21.5	20.2	20.2	20.2	20.2

[1] Percentiles for Grades 9 through 12 are for the eighth month of the school year; Grade 13 percentiles are for beginning college freshmen.

[2] Where repeated entries occur, the value closest to point-0 is given in italics; for example, here 118 standard score is the one most nearly approximating 1.0% of the cases for Grade 9.

TABLE 10. TEST 1: COMPREHENSION

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
118	1				
120	*1*				
122	1	1			
123	2	*1*			
125	3	1			
126	*3*	2	1	1	
128	4	*2*	*1*	*1*	1
130	6	3	2	1	*1*
133	8	4	*2*	2	1
135	9	6	3	3	2
140	14	9	5	4	3
144	19	13	7	6	4
148	25	17	10	9	5
151	31	21	14	11	6
154	38	26	18	14	9
158	45	33	25	19	12
161	52	38	31	23	14
165	59	45	38	28	18
168	65	54	45	34	21
171	71	62	52	41	24
175	78	69	60	49	30
178	82	73	65	54	35
181	86	77	70	60	42
184	89	82	76	67	48
187	91	85	80	71	53
190	93	88	84	75	59
193	95	91	88	80	65
196	97	94	91	85	71
199	98	96	93	89	77
203	99	97	95	92	81
207	*99*	98	97	94	86
210	99	*99*	98	96	90
212		99	99	97	92
214		99	*99*	98	94
215		99	99	99	95
217			99	*99*	96
219				99	97
222					99
NUMBER	2201	1981	1581	878	3606
MEDIAN	159.8	166.9	170.1	175.4	185.3
SIGMA	19.2	19.0	18.8	19.8	21.0

TABLE 11. TEST 2: DIRECTED READING

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
121	2	1	1	*1*	
126	3	2	2	1	
128	4	*2*	*2*	2	
130	*5*	3	2	*2*	1
131	5	*3*	2	2	*1*
135	7	4	4	4	3
142	14	9	9	9	4
149	26	17	17	16	7
154	36	26	25	23	12
159	46	35	34	30	20
164	56	45	44	39	25
169	66	55	53	46	32
174	74	63	60	56	41
179	83	73	70	67	48
182	88	79	75	73	52
183	89	81	77	75	53
185	91	84	81	79	54
188	93	87	85	84	58
193	96	91	89	88	70
197	97	93	92	91	80
199	98	94	94	93	84
201	*99*	96	95	94	88
204	99	98	97	95	90
206		98	*98*	*96*	91
207		99	98	96	92
208		99	98	97	*92*
209		*99*	99	*97*	93
212		99	*99*	98	95
215			99	99	98
216				99	*98*
217				99	98
218				*99*	98
219					99
NUMBER	2201	1981	1581	878	3603
MEDIAN	160.8	166.2	166.9	171.2	180.6
SIGMA	18.2	18.5	19.5	19.7	21.1

TABLE 12. TEST 3: POETRY COMPREHENSION

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
115	*1*				
119	1	1			
125	3	2	1	1	1
130	6	4	3	2	2
135	9	7	5	4	3
141	15	12	9	8	6
146	21	17	14	13	9
149	24	19	16	15	11
152	30	25	21	19	15
157	40	33	29	26	22
163	51	44	40	35	28
168	62	55	51	45	32
173	69	63	57	51	39
175	71	65	59	52	43
177	74	68	63	57	48
181	82	76	72	69	55
184	86	80	77	75	60
187	89	84	82	79	69
191	92	89	87	85	76
194	94	92	90	88	81
196	95	93	92	90	84
197	96	93	*92*	91	85
199	97	95	*94*	93	88
200	*97*	*95*	94	*93*	89
201	97	96	95	94	90
203	98	97	96	95	92
206	99	98	97	97	95
208	*99*	99	98	98	97
209	99	99	99	*98*	*98*
210	99	*99*	*99*	99	98
212		99	99	99	99
NUMBER	2201	1981	1581	878	3597
MEDIAN	162.7	165.8	167.7	171.9	177.9
SIGMA	20.4	21.4	19.8	20.1	21.7

TABLE 13. TEST 4: WORD MEANING

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
113	1				
116	*1*	1			
119	2	1			
121	*2*	1			
122	3	*1*	1		
124	*3*	2	1		
127	5	*2*	1	1	
129	6	2	*1*	1	
132	7	3	1	*1*	
134	8	4	*2*	1	
137	11	6	2	2	1
139	14	7	3	2	*1*
140	15	8	4	*2*	1
142	17	10	5	2	1
144	20	12	6	3	2
146	23	14	7	4	*2*
148	26	16	8	5	2
150	29	19	11	7	3
152	34	23	13	8	4
154	37	27	16	10	*4*
156	41	31	19	12	5
158	46	35	21	14	6
160	51	39	24	17	7
162	54	43	28	19	8
163	56	45	30	21	9
164	58	47	32	22	10
165	61	49	34	24	11

TABLE 13. TEST 4: WORD MEANING (*Cont'd*)

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
166	63	52	36	26	12
168	67	56	41	29	13
169	69	58	44	32	14
170	72	60	46	34	15
171	73	61	48	36	16
172	75	63	50	38	17
173	77	66	53	42	18
174	79	68	56	45	20
176	82	71	60	49	23
177	83	72	62	51	24
178	84	73	63	53	26
179	85	75	65	56	27
180	87	77	67	58	29
181	89	79	70	61	31
182	*90*	80	72	63	32
183	90	81	73	65	34
184	91	83	75	67	36
185	*92*	84	77	69	37
186	92	85	79	71	39
187	93	86	81	72	41
188	94	87	82	74	43
190	95	89	84	77	49
192	96	91	86	79	55
193	*96*	92	88	81	57
194	96	93	89	83	59
195	97	*93*	90	84	61
196	*97*	94	91	85	62

TABLE 13. TEST 4: WORD MEANING (*Cont'd*)

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
197	98	95	*91*	86	64
198	*98*	*95*	92	87	65
200	98	96	93	89	68
202	98	97	94	90	71
203	99	*97*	*95*	*91*	73
204	*99*	97	95	91	74
205	99	98	96	92	76
207	99	*98*	97	93	80
208	99	99	*97*	94	81
210		99	97	95	84
212		*99*	*98*	*95*	87
213		99	98	*96*	89
215		99	98	96	91
217			*99*	98	94
218			99	*98*	95
219			99	98	*96*
220			99	98	96
221				99	97
222				*99*	*98*
224				99	98
225					*99*
227					99
NUMBER	2201	1981	1581	878	3609
MEDIAN	159.7	165.3	171.9	176.5	190.4
SIGMA	18.4	18.5	17.8	18.2	19.5

GRADE PERCENTILES[1] CORRESPONDING TO EACH SUBTEST STANDARD SCORE AND EACH MEDIAN STANDARD SCORE FOR THE IOWA SILENT READING ADVANCED TEST: FORMS AM, BM, CM, AND DM

TABLE 14. TEST 5: SENTENCE MEANING

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
121	2	*1*	1		
122	*2*[2]	1	1	1	
123	2	2	1	1	
124	2	2	1	1	
125	*3*	*2*	1	1	
126	3	2	1	1	
127	4	2	*1*	1	
128	*4*	*3*	1	1	
130	5	3	1	*1*	1
131	6	4	1	1	1
133	7	5	2	1	1
135	9	*5*	*2*	1	1
137	11	7	3	2	1
138	12	8	4	*2*	1
140	14	9	*4*	2	*1*
142	16	10	*5*	*3*	1
143	17	11	5	3	1
145	20	13	7	4	*2*
147	24	16	8	*6*	2
148	26	17	9	6	3
150	29	19	10	7	*3*
151	31	21	11	8	3
152	33	23	12	9	4
153	36	25	14	*9*	*4*
154	38	27	15	10	5
156	42	31	18	12	*5*
158	46	35	21	14	6
159	48	37	22	15	*7*
160	50	39	24	17	7
161	53	41	26	19	8
162	55	44	28	20	9
164	58	47	32	23	10
165	61	49	34	25	11
167	65	53	39	28	12
169	68	57	43	31	14
171	72	61	48	35	16
172	74	63	51	38	17
173	76	65	54	40	18
174	78	68	57	42	20
175	79	70	59	44	21
177	82	73	63	49	24
179	84	76	66	53	28
182	87	79	71	59	33
183	88	81	73	61	35
184	89	82	75	64	37
185	90	84	77	67	39
186	91	85	78	68	41
189	*93*	88	82	72	47
190	93	89	84	74	49
191	94	90	85	76	51
192	95	91	87	79	53
193	96	92	88	80	55
196	97	94	91	84	61
198	*98*	95	92	86	65
199	98	96	93	87	67
201	99	*97*	94	89	71
203	*99*	97	95	91	75
206	99	98	96	92	80
209	99	99	*97*	94	84
211		*99*	97	95	87
212		99	98	96	88
214		99	*98*	97	91
217			99	98	94
220			*99*	99	96
223			99	*99*	98
226					99
NUMBER	2201	1981	1581	878	3609
MEDIAN	160.0	165.3	171.8	177.7	190.4
SIGMA	18.5	19.1	17.8	18.0	19.0

TABLE 15. TEST 6: PARAGRAPH COMPREHENSION

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
120	*1*				
123	1	*1*			
125	2	1			
127	4	2	1	1	
129	5	3	*1*	1	1
132	7	4	2	*1*	1
135	8	5	3	*2*	*1*
138	11	7	4	2	2
141	14	9	5	3	3
144	18	12	7	5	4
147	23	16	10	7	5
149	26	18	12	9	7
150	29	20	14	11	8
151	31	23	16	13	9
153	34	26	18	15	11
157	41	33	24	20	16
160	47	39	29	25	20
163	52	44	35	30	23
165	55	47	39	33	25
166	58	50	42	36	27
168	63	54	47	41	30
170	67	58	51	45	33
172	70	61	55	49	35
173	73	64	58	52	37
175	77	68	63	56	41
177	80	71	67	60	44
181	84	78	74	67	51
185	88	83	80	74	58
190	92	88	87	82	68
194	94	91	90	85	76
195	95	92	91	87	78
197	96	93	93	89	81
201	97	96	95	93	87
208	*99*	*98*	*98*	97	94
210	99	98	98	98	96
215		99+	99+	99	99
NUMBER	2201	1981	1581	878	2080
MEDIAN	161.8	166.2	169.5	172.1	180.0
SIGMA	19.0	19.3	18.3	19.0	20.8

TABLE 16. TEST 7A: USE OF INDEX

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
119	1				
123	3	1	1	1	
127	4	2	*1*	*1*	1
135	8	5	4	3	2
143	17	12	9	8	6
150	28	21	16	13	11
155	39	30	24	20	16
159	48	36	30	26	19
164	58	45	39	35	24
169	68	56	50	46	30
175	78	67	62	59	37
181	85	76	72	70	48
185	88	81	78	77	55
187	91	84	82	80	59
189	93	87	85	83	63
193	95	90	89	88	71
202	98	96	96	94	89
208	99	98	98	97	96
213		99+	99+	99+	99+
NUMBER	2201	1981	1581	878	2066
MEDIAN	160.4	166.3	168.9	170.8	182.1
SIGMA	19.1	20.4	19.4	18.3	22.0

TABLE 17. TEST 7B: SELECTION OF KEY WORDS

STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
128	3	3	2	2	1
131	4	4	3	3	*2*
134	6	6	5	4	2
137	8	7	6	5	*3*
139	10	8	7	6	3
141	11	9	8	7	4
143	13	10	9	*7*	5
144	14	11	10	8	*5*
145	16	12	11	*9*	5
146	17	14	12	9	6
147	19	15	13	10	*6*
149	22	17	16	12	7
151	25	20	18	14	9
153	29	23	21	17	11
156	36	28	25	20	14
158	40	32	28	23	16
159	42	34	30	25	17
161	47	39	34	29	19
162	49	41	36	31	20
164	53	45	40	34	22
165	55	47	42	36	23
166	57	49	44	37	24
169	63	56	49	43	29
173	72	65	57	51	37
176	78	70	63	57	43
180	84	77	70	64	54
184	88	83	77	72	65
189	92	88	83	79	74
196	96	94	90	88	85
198	97	95	92	91	87
203	*98*	97	96	95	92
204	98	98	*96*	96	93
210	99	99	99	98	98
222				99+	99+
NUMBER	2201	1981	1581	878	2066
MEDIAN	162.3	166.6	169.4	172.5	178.6
SIGMA	17.5	18.5	20.4	20.0	18.8

TABLE 18. TOTAL: MEDIAN STANDARD SCORE

MEDIAN STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
128	1				
129	1				
130	*1*				
131	1	1			
132	1	1			
133	1	1			
134	2	1			
135	*2*	*1*	1		
136	2	1	1		
137	3	2	1		
138	4	*2*	*1*	1	1
139	5	2	1	1	1
140	6	*3*	1	*1*	1
141	7	3	2	1	*1*
142	8	4	*2*	1	1
143	10	5	2	2	1
144	12	6	*3*	*2*	2
145	13	7	3	2	*2*
146	15	8	4	*3*	2
147	16	9	5	3	3
148	18	10	*5*	4	*3*
149	20	11	6	5	4
150	22	12	7	*5*	*4*
151	24	14	8	6	5
152	27	16	10	7	6
153	30	19	11	8	*6*
154	33	21	13	10	7
155	35	24	15	11	8

TABLE 18. TOTAL: MEDIAN STANDARD SCORE (*Cont'd*)

MEDIAN STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
156	37	26	17	12	*8*
157	39	27	18	13	9
158	42	29	20	15	10
159	44	32	22	16	11
160	47	34	24	18	12
161	49	37	26	20	13
162	52	40	29	22	14
163	55	42	32	25	16
164	57	45	35	27	17
165	60	48	38	30	19
166	63	51	41	32	20
167	66	54	43	35	22
168	69	57	46	38	23
169	71	60	49	40	24
170	74	62	52	43	26
171	75	64	54	45	28
172	77	66	56	47	30
173	79	68	58	49	32
174	80	69	60	52	34
175	82	71	63	54	37
176	83	73	65	57	39
177	85	75	68	59	42
178	86	77	70	62	45
179	87	79	72	65	46
180	88	81	75	67	48
181	90	83	77	70	50
182	91	84	79	73	52
183	92	86	82	75	54

TABLE 18. TOTAL: MEDIAN STANDARD SCORE (*Cont'd*)

MEDIAN STANDARD SCORE	PERCENTILE RANK IN GRADE				
	9	10	11	12	13
184	93	88	84	78	57
185	*94*	89	86	79	59
186	94	90	87	81	62
187	95	91	89	83	64
188	*96*	92	90	85	67
189	96	93	91	86	70
190	*97*	94	92	87	73
191	97	95	93	89	76
192	98	*96*	*94*	90	79
193	*98*	96	94	91	82
194	98	97	95	92	84
195	99	98	*96*	93	86
196	*99*	*98*	96	94	88
197	99	98	*97*	*95*	90
198	99	99	97	95	92
199	99	*99*	*98*	96	93
200		99	98	97	95
201		99	99	*97*	96
202		99	99	98	97
203			*99*	*98*	98
204			99	99	*98*
205			99	*99*	99
206				99	*99*
207				99	99
208					99
NUMBER	2201	1981	1581	878	2074
MEDIAN	161.3	165.7	169.2	173.3	181.1
SIGMA	15.0	15.0	14.3	14.4	15.4

[1] Percentiles for Grades 9 through 12 are for the eighth month of the school year; Grade 13 percentiles are for beginning college freshman.

[2] Where repeated entries occur, the value closest to point-0 is given in italics.

In evaluating the achievement of an individual in relation to the group, a percentile rank should be assigned to his Median Standard Score by using Table 18. Thus one might find that individual A in the ninth grade has a Median Standard Score of 160. This corresponds to a percentile rank of 47, which means that 47 per cent of the standardization group in the ninth grade had Median Standard Scores of 160 or lower; or, in other words, individual A's score is exceeded by 53 per cent of the ninth-grade pupils in the standardization group.

Percentile norms for the subtest standard scores are given in Tables 9–17. From these tables it is possible to assign to each individual pupil's record his percentile placement on each of the nine cross sections of reading abilities measured by these tests.

In evaluating the achievement of an individual within the subtest areas, it is desirable also to plot his standard scores on the Profile Chart. The standard scores have been so derived as to make the units nearly equal at all levels and comparable from one test to another. (Percentile-rank units are obviously not equal from one level to another.) The specific procedure in plotting the Profile Chart is described under the section on scoring the test. When the profile has been plotted and the Median Standard Score line drawn across the chart to indicate the typical achievement of the individual, it is possible to determine the significance of his deviation in each of the subtests. This can be done by means of the probable errors of measurement given in Table 4 or 5 for subtest standard scores. If the deviation of the standard score on a subtest from the Median Standard Score for the pupil is three times, or preferably four times, the probable error of measurement for that subtest at the given grade level, the deviation may be considered statistically significant. Its practical significance is an administrative problem.

For those who desire to turn the Median Standard Scores for the total test into grade equivalents or age equivalents, Table 19 is included. Due to the fact that grade and age equivalents lose some of their significance in the higher grades, it is recommended that this table be used primarily with results from ninth-grade classes.

TABLE 19. GRADE AND AGE EQUIVALENTS CORRESPONDING TO MEDIAN STANDARD SCORES ON THE IOWA SILENT READING ADVANCED TEST: FORMS AM, BM, CM, DM

(For use primarily in 9th-grade classes)

Median Standard Score	Grade Equivalent	Age Equivalent	Median Standard Score	Grade Equivalent	Age Equivalent
120	4.3	8–3	148	7.6	11–9
121	4.4	8–4	149	7.7	11–10
122	4.5	8–6	150	7.9	12–0
123	4.6	8–7	151	8.0	12–1
124	4.7	8–9	152	8.2	12–3
125	4.8	8–10	153	8.3	12–5
126	4.9	9–0	154	8.5	12–7
127	5.0	9–1	155	8.6	12–8
128	5.1	9–3	156	8.8	12–10
129	5.2	9–4	157	9.0	13–0
130	5.3	9–6	158	9.2	13–2
131	5.4	9–7	159	9.4	13–4
132	5.5	9–9	160	9.6	13–6
133	5.6	9–10	161	9.8	13–9
134	5.8	10–0	162	10.0	14–0
135	5.9	10–1	163	10.2	14–4
136	6.0	10–3	164	10.4	14–10
137	6.1	10–4	165	10.6	15–4
138	6.2	10–5	166	10.9	16–0
139	6.4	10–7	167	11.1	16–8
140	6.5	10–8	168	11.3	17–4
141	6.6	10–10	169	11.6	18–2
142	6.8	10–11	170	11.8	
143	6.9	11–1	171	12.1	
144	7.0	11–2	172	12.4	
145	7.2	11–4	173	12.7	
146	7.3	11–5	174	13.0	
147	7.4	11–7			

USE OF THE CLASS RECORD

With each package of tests a Class Record is provided for recording standard scores on the subtests and the Median Standard Score on the total test for all pupils of each class or other testing unit. Space is provided for indicating the standing of each pupil in relation to the norms in terms of percentile rank, grade equivalent, and age equivalent; space is also available on this Class Record for making a distribution of Median Standard Scores for the group.

SUGGESTIONS FOR REMEDIAL TREATMENT

A careful examination of the Profile Charts, percentile scores, grade equivalents, and age equivalents of poor readers reveals in a striking manner the nature and the extent of their reading deficiencies. The peaks in the profiles are interesting but not particularly significant. The dips and valleys, showing deviation below the norms, are significant features for the teacher interested in improving the reading-study skills of his pupils. The space limitations of this manual permit only a few suggestions for remedial treatment of such cases.

To the extent that the skills measured by these tests represent important and basic abilities required in silent reading and in work-study procedures, low scores on the subtests indicate low abilities in these areas. Accordingly, a logical approach to the problem would be to increase the efficiency of these skills. Deliberate coaching on the test content is very undesirable, but the alert teacher will find many examples of content material suitable for use in developing greater reading speed and more accurate comprehension of material read under acceptable speed conditions. Exercises similar in design to those used in Tests 1 and 2 but differing in content may be readily prepared from subject-matter material selected from textbooks in the social studies and the sciences as well as from other supplementary reading sources. Vocabulary exercises in important subject fields may be constructed along lines similar to those used in Test 4. Drill on the comprehension of paragraphs may also be developed from supplementary sources, as booklets and magazines. Such exercises should improve low abilities revealed by Test 6. Sentence exercises based on subject matter suggested in course work will develop the types of vocabulary and sentence comprehension measured by Test 5.

Drill materials and workbooks in silent reading may be secured from many different sources. Teacher-made exercises, closely paralleling the type of content used in the tests and utilizing similar if not identical testing techniques, will be found to be very economical and effective remedial instruments.