

AN EXPERIMENTAL INVESTIGATION IN WINNIPEG  
SCHOOLS TO DETERMINE THE EXTENT TO WHICH  
THE LEARNING OF LATIN INCREASES THE  
COMPREHENSION OF ENGLISH

A THESIS  
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An Investigation of the Effect of the  
High School Latin Course on the  
Student's English Vocabulary

An Abstract

The purpose was to find out, (1) if, in the Winnipeg High Schools, method and content in Latin instruction succeed in bringing about an increase in English vocabulary knowledge and, if so, (2) to ascertain how many years of Latin training best serve this purpose.

Information collected from over a thousand students in Grades nine, ten and eleven matriculation course of six Winnipeg high schools enabled the investigator to match 115 Latin students with an equal number of non-Latin students for age, sex, grade and mental ability.

A statistically significant difference in knowledge of English vocabulary, measured by the Cooperative Vocabulary Test, was found in favour of the Latin students. This difference increased in significance with the number of years of Latin training, and a jump in significant gain was found at the completion of third-year Latin.

Measures were devised to assess three other factors which are known or suspected to affect English vocabulary knowledge. These factors are: (1) native language; (2) years of training in French; and (3) extent of reading. When the influence of these factors was held constant or eliminated,

the gain of the Latin students over the non-Latin students was still significant. It is therefore concluded that some of the superiority in English vocabulary knowledge can be attributed solely to instruction in Latin and that students who persist in taking Latin beyond the second year reap the greatest gain in English word knowledge.



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## CHAPTER I

### THE PROBLEM AND ITS IMPORTANCE: STEPS IN SOLUTION

#### 1. The Problem

Statement of the Problem. The problem, "Does the study of Latin in Grades nine, ten and eleven give the students greater facility in English vocabulary?" arises from the primary objective of the teaching of Latin, namely: to increase the pupils' command of the English language.<sup>1</sup>

Need for the Investigation. Until the middle of the eighteenth century when proficiency in Latin and Greek were the only university entrance requirements, the aim of Latin teachers was to enable students to read the language,<sup>2</sup> an objective which was difficult to attain and which was later superseded by a new "raison d'etre" for the course; that is -- to provide mental discipline. This aim was discarded in the thirties because, according to the Classical

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<sup>1</sup>Mason DeWitt Gray, The Teaching of Latin, (New York, London: D. Appleton & Co., 1929), p. vi.

<sup>2</sup>Harley F. Garrett, "A Review and Interpretation of Factors Related to Scholastic Success in Colleges of Arts and Sciences," Journal of Experimental Education, XVIII (Dec., 1949), p. 92.

Investigation Report<sup>3</sup> which appeared in 1924, it no longer provided justification for the study of Latin.

Content and method in Latin teaching changed with its purpose. Today the primary objective is, as has been stated, to bring about an improvement in English vocabulary and to give the pupil new facility with English. Yet, questions exist about the success of the course content and teaching method in bringing about the objective. Some evidence of this questioning is cited here:

1. Universities, one after another, are ceasing to require Latin for entrance.<sup>4</sup>

2. Talk in curriculum circles is of deleting Latin, even as an elective, from high school programs.<sup>5</sup>

3. In Manitoba, Brandon school system is one of the few still offering Latin all the way through.<sup>6</sup> Selkirk and

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<sup>3</sup>American Classical League. The Classical Investigation, Part One, General Report, Abridged Edition: Princeton University Press, 1924.

<sup>4</sup>News item in Winnipeg Free Press, February 20th, 1960.

<sup>5</sup>Report of the Winnipeg Teachers' Convention, Latin Section, February, 1960.

<sup>6</sup>News item in The Winnipeg Tribune, August 26th, 1960.

Flin Flon do also, but in smaller schools, opportunity to take Latin is lacking.

4. Popular demand for Latin in high school is decreasing. In 1957, in Winnipeg, one hundred and fifty-seven Grade eleven students chose Latin. In 1959, the figure was one hundred and twenty-nine, even though the total number of students in Grade eleven was greater.

5. Students who choose Latin in Grades nine and ten do not pursue the subject to Grade eleven.<sup>7</sup>

6. Teachers of Latin are becoming increasingly scarce.

Educationists agree that facility in English is desirable for the students but they are not sure that Latin provides it or that, if it does, the end result is proportional to the work of attaining it through a course in Latin.

Research claimed as early as 1927 that an equal amount of time spent in English class studying English vocabulary and derivatives would provide the same benefits.<sup>8</sup> Training in French might influence English vocabulary, though this is not its objective, as much as does the instruction in Latin, and has the extra advantage of being more useful in life.

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<sup>7</sup>Harl R. Douglass, The High School Curriculum, (New York: The Ronald Press Co., 1947), p. 48.

<sup>8</sup>Percival M. Symonds and Edith M. Penney, "The Increasing of English Vocabulary in English Class," Journal of Educational Research, Vol. XV (1927), pp. 93-103.

Other articles<sup>9, 10, 11</sup> illustrate the favourable influence of the study of Latin on marks in the first year college and on the knowledge of English words of Latin derivation. A review of these related studies is contained in Chapter II.

Because there are arguments on both sides, up-to-date research, of which this investigation is a segment, is needed to assess the value of Latin as it is taught today.

Objectives of the Latin course. The Department of Education, Province of Manitoba, divides objectives into two classes, ultimate and immediate.<sup>12</sup> They are based on research done by Mason D. Gray<sup>13</sup> as is the textbook used in

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<sup>9</sup>Herbert Sorenson, "High School Subjects as Conditioners of College Success. Implications and Theories Concerning Mental Factors and Faculties," Journal of Educational Research, Vol. XIX (Apr., 1929), pp. 237-254.

<sup>10</sup>Mary Elizabeth Smith and Harl Douglass, "The Relation of High School Latin to Marks in the First Year of Arts College," The School Review, Vol. XLV (Nov., 1937), pp. 697-701.

<sup>11</sup>E. E. Thorndike and G. J. Ruger, "The Effect of First-Year Latin upon Knowledge of English Words of Latin Derivation," School and Society, Vol. XVIII (1923), pp. 260-270.

<sup>12</sup>Course of Study in French, German and Latin, authorized by the Minister of Education, Province of Manitoba: C. E. Leach, Queen's Printer, 1954.

<sup>13</sup>Gray, op.cit., p.xv.

Manitoba, Latin for Today.<sup>14</sup> Except for the first, the aims of Latin are not the concern of this study, but are enumerated here:

1. The primary objective, that is, facility in English, includes ability to explain terms in all the sciences: mathematics, physics, chemistry, biology, pharmacy, medicine, and astronautics. It embraces spelling; the technique of putting the right word in the right place; and even thinking, since we think in words.

2. The second objective is related to the first. It is ability to apply grammatical principles. Because English has lost some of its inflections, it is not the best medium for teaching word relations. Latin is taught to reveal to the student word functions, which are more easily demonstrated through its inflections.

3. The third objective of the teaching of Latin is to familiarize students with Roman culture and history.

4. It has propaedeutic value for those entering some professions, and it is the language of the Catholic Church, Latin rite.

5. For a few, ability to read Latin is the fifth objective.

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<sup>14</sup> Mason D. Gray and Thornton Jenkins, Latin for Today, (London: Ginn & Co., 1932), pp. xxxi + 331.

The purpose of this investigation is to find out to what extent the content and method used in the teaching of Latin in Winnipeg fulfils its first objective. The aim of this study is to answer the question, "Does the study of Latin in Grades nine, ten and eleven give the students greater facility in English vocabulary?" and, if greater facility is found, to answer the question, "At which level: nine, ten or eleven is such increase most evident?"

## 2. Steps in Solution

Plan of the Study. The design of the investigation, to state it simply, involved testing, with the Cooperative English Vocabulary Test, the students of two groups: (1) Latin, and (2) non-Latin, who had been matched for mental ability, sex, age, and grade. Latin students are defined as students who take Latin. Non-Latin students are those who have never taken the subject.

Other factors which are known to affect vocabulary, namely (1) native language; (2) extent of reading; and (3) training in French, were considered in this way: where the groups - Latin and non-Latin - differed in these factors, adjustment had to be effected in the final results. When the groups were the same in, for example, percentage of natively English speaking students, the factor cancelled out.

A questionnaire, fully described in Chapter III and

affixed in Appendix A, was answered by one thousand, two hundred and thirty-three students in six Winnipeg High Schools, Grades nine, ten and eleven. This questionnaire, when completed, provided the necessary information (with the exception of mental ability) for equating groups, that is (1) the sex of the student; (2) his or her age; (3) the extent of reading; (4) years of French and Latin; and (5) where the student had written the Grade nine departmental examinations. The last was necessary because the determinant of mental ability for Grade ten and Grade eleven students was the score on the Otis Mental Ability Test (Appendix B), given to all Grade nine students in Manitoba and marked in the Department of Education. The students of Grade nine had not yet written this test but were paired according to their Dominion Intelligence Quotients. Dominion Tests of Learning Capacity are given to all Winnipeg students in Grade seven and the results were considered reliable for Grade nine students, since they were only two years removed from the test. As was stated for students beyond Grade nine, the pairing criteria were scores on the Departmental Mental Ability examination, which they had written when they completed Grade nine. These scores were available at the Department of Education, Registrar's Office.

Pairing. For a student in the Latin group having a certain mental ability, age, grade, and sex, there was

placed in the non-Latin group, a non-Latin student who had the same mental ability, age, grade and sex. The pairing covered a wide range of mental ability -- the highest being 137; the lowest being 90. If more than one such mate was found, the choice of which one to use was made at random.

Questionnaires were discarded (1) if no match could be found for the student; (2) if he omitted necessary information; (3) if he had taken Latin and dropped it, because this disqualified him as either a Latin student or a non-Latin student; or (4) if, because of his recent arrival or other reason, his mental ability score was not available.

Other Factors Which Affect Vocabulary. Three other factors which are known to, or, in the case of the third, suspected to affect English vocabulary, were assessed: (1) native language; (2) extent of reading; and (3) years of training in French. Chapter V deals with methods of effecting adjustments to allow for differences between the groups, which would weigh results in favour of one side or the other. Such differences had to be assessed and considered.

These three factors, while embracing the major variations in the previous experiences of the students, are not the only differences. Others which the students have encountered are (1) in teaching ability and method; (2) in forms of motivation; and (3) in the attitudes with which they faced the



learning situation. Since the equated groups contained one hundred and fifteen pupils each, the effect of extreme individual differences was lessened in the mean. Care was taken to find the match for the student from his own school, so that social conditions and school environment of each pair were, as far as possible, equated.

This investigation did not take into account proficiency in Latin. In covering a wide range of mental ability as well as a large number of students, the survey included the expert, the incompetent, and the mediocre students -- Latin and non-Latin.

Testing. After the two groups had been carefully matched, the investigator visited each of the schools and, with the cooperation of the principal, assembled in one or two sessions those who belonged to the matched groups. Pairs were tested together; time limits were the same for all - thirty minutes.

The Cooperative Vocabulary Test, published by the Cooperative Test Division, Educational Testing Service, Princeton, New Jersey, and Los Angeles, California, was chosen on the recommendation of Mr. Ewanchuk, Inspector of Schools. A description of the test and reasons for its choice are given in Chapter IV. It is a carefully constructed sample of two hundred and ten words from Thorndike Teachers' Word Book. Students were told that they were taking part in a survey

and that even the very best would fall short of a perfect score.

Papers were examined, scored and the scores interpreted by the investigator to assure one standard which could be tested for error. Statistical treatment of the data included finding the means and testing the significance of the differences between the means, first of the two Grade eleven equated groups, Latin and non-Latin; then of the whole group; thirdly, for the Grade ten students, and finally for the Grade nine students. The information thus accumulated provided the basis for an answer to the problem, "Does Latin training influence the English vocabulary of the student, and, if so, to what extent at each stage of his high school career?"

## CHAPTER II

### REVIEW OF THE LITERATURE

"Studies which aim to determine the validity of what is usually claimed to be the ultimate objective of Latin, i.e. the improvement of English vocabulary," make up one type of research in the Latin field worthy of more than usual interest, according to Ullman<sup>1</sup> who made a summary of what had been accomplished before 1943.

#### 1. Related Studies

This research was a product of the era of experimentation which followed the Classical Investigation of 1924.

(1) Boyer and Gordon,<sup>2</sup> with an aim to test for lowering scholastic standards, reported a general decline in English vocabulary between the years 1928 and 1938. They attributed the decline to a concomitant decline in the study of foreign languages. As a check, they compared Latin students in 1938 with non-Latin students of the same grade (12); same mental

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<sup>1</sup>B. L. Ullman, "The Teaching of Latin," Review of Educational Research, XIII, (1943), pp. 127-134.

<sup>2</sup>Philip Boyer and Hans Gordon, "Have High Schools Neglected Academic Achievement?" School and Society, XLIX (1939), pp. 810-812.

ability, sex, school; same English marks; and they found a significant difference between the means in favour of the Latin group.

(2) Dean and Wall<sup>3</sup> surveyed tenth grade students in four high schools in Washington, D.C. One group took Grade ten subjects with Latin and French. The other group took the same subjects without Latin and French but with Business Practice. Consistent advantage was found for the first group studying the languages, in both English marks and average of all marks. Ullman<sup>4</sup> says there is a weakness in this study because English marks were used instead of a vocabulary test.

(3) Ullman<sup>5</sup> quotes two studies from Classical Outlook articles. Wagner, he says, paired Latin and non-Latin pupils for mental ability and, by the use of specially constructed tests, found the Latin students superior in vocabulary, spelling and grammar. Mary Parcunagian used a hundred words of Latin derivation to test two groups matched for mental ability -- Latin students and non-Latin students -- the latter class being subdivided into a group with a foreign language

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<sup>3</sup>Mildred Dean and Bernice Wall, "The Value of Foreign Language Study to Tenth Grade Pupils," School and Society, LI (1940), pp. 717-720.

<sup>4</sup>Ullman, op.cit., p. 127.

<sup>5</sup>Ibid., p. 128.

and one without a foreign language. Those without any foreign language scored very low; those with a foreign language, higher; and those with Latin were far superior, taking up the first eighty-one places in rank.

(4) Ullman,<sup>6</sup> quoting from the Delaware State Journal, says that J. H. M. Darbie studied the English grades of two hundred and forty-one tenth-year pupils between the years 1932 and 1939 and, by matching ability, he found that groups who took Latin averaged five to eight points better in English than the non-Latin students. In fact, the Latin group with intelligence quotients between 90 and 99 outdid the non-Latin group with intelligence quotients from 120 to 129.

(5) Douglass and Kettelson<sup>7</sup> found that Latin students of less than two years do slightly better in vocabulary than do non-Latin students, but after two years of Latin there is a material increase in improvement of Latin students over non-Latin students in vocabulary, spelling and grammar.

(6) To quote one study in disagreement, J. B. Carroll<sup>8</sup> hypothesized thus, "It is doubtful if knowledge of roots and

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<sup>6</sup>Ibid., p. 129.

<sup>7</sup>H. R. Douglass and C. Kettelson, "The Transfer of Training in High School Latin to English Grammar, Spelling and Vocabulary," Journal of Experimental Education, IV (Sept., 1935), pp. 26-33.

<sup>8</sup>J. B. Carroll, "Knowledge of English Roots and Affixes as Related to Vocabulary and Latin Study," Journal of Educational Research, XXXIV (1940), pp. 102-111.

affixes derived from Latin is automatically obtained from the study of Latin, nor will it automatically aid in enlarging an individual English vocabulary."

Carroll concluded that the teaching of word derivation in Latin classes does not necessarily aid in enlarging English vocabularies. He cites two doctors' theses, by Hamblen and Haskell, who studied at the University of Pennsylvania in 1924. Hamblen found that rules and principles of derivation must be taught with the derivatives in order to increase English vocabulary through Latin. Haskell found that the results of teaching derivatives in class were about equal to the automatic transfer in Latin classes where no special attention was paid to derivation. The discrepancies in the research are, no doubt, due to the amount and kind of specific training in derivation given the classes involved. These two theses were written in 1924, before there was any agreement on method.

Carroll did his research in college, where he included students, as Latin students, even if they had had only one term of Latin in high school.<sup>9</sup>

(8) Another study proved that English vocabulary could be increased in English class.<sup>10</sup> Edith Penney took a class of

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<sup>9</sup>Ullman, op.cit., p. 129.

<sup>10</sup>Percival M. Symonds and Edith M. Penney, "The Increasing of English Vocabulary in English Class," Journal of Educational Research, XV (1927), pp. 93-103.

fifteen girls in Grade nine at the Horace Mann School and gave four months of special vocabulary instruction. The experimental group gained nine words per hundred. The control group gained two. All were Latin students.

(9) Some contradiction is present in the findings of Pond.<sup>11</sup> He concludes, "The matching of pupils on the basis of intelligence, sex, age, semesters in school, and school achievement indicated little, if any, difference in the vocabulary knowledge on the part of the Latin and non-Latin pupils." Yet, when he examined his findings, without consideration of the matched pairs, he found that the number of semesters of Latin study made as much contribution to vocabulary knowledge as did general intelligence. He had one hundred and twenty-nine non-Latin and seventy-nine Latin participants.

This era of experimentation ended before 1945, as far as research was concerned, and the evidence is that Latin, to put it negatively, does no harm. Yet, in spite of articles in the *Classical Journal* in its defence, it is being steadily forced from its former exalted position. To quote one article, "The most disturbing fact about Latin teaching is the small number of pupils who continue the language beyond the first two years."<sup>12</sup> Another says, "Inferential evidence is for Latin,

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<sup>11</sup>F. L. Pond, "Influence of the Study of Latin on Word Knowledge," *School Review*, XLVI (Oct., 1938, pp.611-618.

<sup>12</sup>Walter V. Kaulfus, "Latin by Popular Demand," *The Classical Journal*, XLV (1949), p. 85.

not against it, and on that basis its rejection in favor of other subjects of unknown validity is hardly sound."<sup>13</sup>

## 2. The Classical Investigation and Research Prior to 1924

Changes. As a result of the Classical Investigation, objectives, method, and content of the course were changed. Research, prior to this date, does not apply to present-day Latin. Nevertheless, it is so inclusive in quantity that it might be considered an oversight to omit it and it is interesting, if only as an illustration of the scope research on a large scale can display.

Before 1924, Latin was made up of the textbook, the grammar lessons, many rules and forms, dictation and homework. If a student were asked why he took Latin, his answer would be that of the climbers of Everest, "Because it's there."

Emphasis, in the present method, is on the psychological development of the pupil and not on the sequence of subject matter. It contributes to the general educational objectives of self-realization, human relationships, economic efficiency and civic responsibility. The improvement of English through Latin is the primary aim. It serves to sharpen the pupil's appreciation and to clarify his expression.

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<sup>13</sup>Herbert Serenson, "High School Subjects as Conditioners of College Success. Implications and Theories Concerning Mental Factors and Faculties," Journal of Educational Research, XIX (April, 1929), p. 253.



It affects his personality.

Many easy texts are used; reading Latin is stressed; syntax evolves naturally; oral Latin is practiced; Latin is correlated with other subjects such as English and Social Studies, even Science and Mathematics; plays and pageants enrich the study; vocabulary is learned through repetition of the word in the readings; pupils are taught to grasp the thought development in the Latin word-order, and derivation of words is stressed.

Wrightstone<sup>14</sup> compared the two methods, new and old, in 1935. The scores of one hundred and twenty-five pupils, taught by the newer method, showed superiority in Latin knowledge and skills to those taught by the older method. He had equated schools, teachers, and intelligence of the groups. His difference, although not statistically significant, was indicative of a change.

The Classical Investigation. As has been said, the review of research which follows is to be read with the understanding that its findings show only the result of the study of Latin under the old curriculum with the traditional class teaching and teachers.

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<sup>14</sup>J. W. Wrightstone, "Appraisal of Newer Practices in the Teaching of Latin," *School and Society*, XLII (1935), pp. 302-304.

(1) Thorndike<sup>15</sup> showed that in twenty-five Latin-derived words, the pupils who had studied Latin for one year gained five words while those who had not studied Latin gained two words. In words of non-Latin origin, the gain was the same for both groups. No mention is made of equating intelligence in this study.

Forms A, B and C of the Carr Vocabulary Test (every second word was Latin-derived) were given at the beginning, middle and end of the school year to Grade nine classes in forty-one schools. Two thousand and seventy-five of the pupils were studying Latin. Two thousand, nine hundred and forty-four were not. Instructions and time limit for the test were the same for all.

Thorndike's aim was

. . . to study results to determine to what extent the superior gain of the Latin pupils resulted automatically through the study of Latin and to what extent it was the conscious effort on the part of the teacher through organization of appropriate material and appropriate methods.<sup>16</sup>

He wished to find out, also, in which of three types

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<sup>15</sup>E. L. Thorndike and G. J. Ruge, "The Effect of First Year Latin upon English Words of Latin Derivation," School and Society, XVIII (1923), pp. 260-270.

<sup>16</sup>E. L. Thorndike, "The Influence of First-Year Latin upon Range in English Vocabulary," School and Society, XVII (Jan., 1923), pp. 82-84.

of words: (a) non-Latin words; (b) words derived from first-year Latin; or (3) words derived from Latin but not ordinarily found in the first-year course, there were superior gains.

He reported some unusual occurrences; for example, some pupils scored less at the end than at the beginning. He was criticized because the vocabulary test of one hundred words was said to be too short to measure vocabulary precisely. He argued that measurement of gain for any one pupil is unreliable, but in the average difference between hundreds of Latin students and hundreds of non-Latin students the unreliability is reduced to nearly zero.

Carr re-examined Thorndike's data later and found that the number of correct responses were 64 per cent for the Latin group and 22 per cent for the non-Latin group in the Latin-derived words. For the non-Latin words, the difference was much less.<sup>17</sup>

Ninth-grade Latin pupils made a median gain of seven words in a test of fifty words, one-half Latin-derived; non-Latin pupils gained three words in a test of fifty.

Another report of the Classical Investigation tells

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<sup>17</sup> Mark E. Hutchison, "Some Recent Research in the Teaching of Latin," Classical Journal, XXXIX (May, 1944), pp. 449-465.

of a large number of high schools being given four forms of one or more of these tests: (a) McCall Reading Scale; (2) Carr English Vocabulary Test; (3) Thorndike Test of Word Knowledge; (4) Charters' Diagnostic Language and Grammar Test; and (5) a general intelligence test.

The Latin and non-Latin results were recorded separately. The superiority of the Latin group was more clearly marked in word knowledge than in reading ability.

Edith I. Newcomb<sup>18</sup> found that those who begin Latin - that is, those who choose Latin - are already superior to the whole non-Latin group in word knowledge. Interest in words may be a reason for the choice of Latin.

The committee of the American Classical League which headed the Classical Investigation was made up of such notables as Carr, Thorndike, McCall, Mason D. Gray and others, and had the co-operation of principals and teachers in one hundred schools in thirty-five states and the financial support of the General Education Board. Its stated purpose was to discover to what extent the various objectives in the teaching of Latin were being realized and, by a study of results, to determine what content and method would be most

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<sup>18</sup>Edith I. Newcomb, "A Comparison of Latin and non-Latin Groups in High School," Teachers' College Record, XXIII (Nov. 1922), pp. 412-422.

effective in reaching these objectives.<sup>19</sup>

The Investigation has been criticized

- (a) for administering too many tests without a clear plan;
- (b) for not testing method in Latin teaching and for not giving teachers a new and practicable method;
- (c) for being negative, i.e. "Don't teach syntax!"
- (d) for advising that English be taught in Latin class; and
- (e) for doing the Latin cause harm by advocating "easy" Latin.<sup>20</sup>

Some of the criticisms are answered by replying that method is not given, it evolves; and that the need for "easy" Latin was caused by the beginning of mass education. Any subject must be useful for everybody -- even a little of it. It must have an apparent high surrender value to compete with other subjects as an elective. Students must be interested and successful in it.

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<sup>19</sup> A. T. West, W. L. Carr, Mason D. Gray, and W. V. McDaffee, *The Classical Investigation: The Work of the First Two Years*, Classical Journal, XVIII (1923), pp. 548-568.

<sup>20</sup> A. T. Walker, "Report of the Classical Investigation - 'A Criticism'", Classical Journal, XXV (1929), pp. 83-93.

Other Early Studies. These are set out briefly below.

1. Alvah Talbot Otis<sup>21</sup> picked out fifty non-Latin pupils whose school records during a period of two and one-half years matched in aggregate those of fifty Latin pupils. He gave both groups the Terman group intelligence test and found that although achievement had been the same over a period of two and a half years, the Latin group were superior in intelligence by an average of 27.3 units.

In order to find two equal groups, he was forced to omit the best Latin pupils and to "scur the school" for non-Latin pupils strong enough for those who were left. He finally found forty-two pairs.

The explanation for his equal achievement was that his non-Latins were achieving equal averages in drawing, manual training, domestic science, typing, shorthand, etc. to his Latins' averages in algebra, physics, chemistry and history.

Otis's test was made up of Latin-derived words only. He used the first Latin-derived word on every eighteenth page of a certain dictionary, skipping obsolete and technical words. There was no direct connection between these

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<sup>21</sup>Alvah Talbot Otis, "The Relation of Latin Study to Ability in English Vocabulary and Composition," The School Review, XXX (Jan., 1922), pp. 45-50.

words and the derivation studies of the Latin classes.

Otis concluded,

. . . Given two pupils of equal intelligence, working under like conditions of educational opportunity, the one who studies Latin for two and one-half years will, at the end of that time, have a passive English vocabulary 33 per cent larger on its Latin-derived side than his fellow who did not study Latin. And inasmuch as the Latin element in English is at least 60 per cent of the whole, that means that he knows 18 per cent more words than his fellow.<sup>22</sup>

2. "College freshmen with one, two, or three years of high-school Latin scored about the same as freshmen who had not studied Latin," according to Harris,<sup>23</sup> "while students with four years of Latin were distinctly superior in spelling, in ability to define words, and in rhetoric, to students who had not studied Latin."

3. Dallam<sup>24</sup> found that "Between groups equated on scholarship and tested in spelling, reproduction, dictation, Latin derivation, definition, English composition and grammar, Latin pupils were superior in derivation and grammar only."

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<sup>22</sup> Ibid., p. 47.

<sup>23</sup> Lynn Harold Harris, "A Study in the Relation of Latin to English Composition," School and Society, II (Aug., 1915), pp. 251-252,

<sup>24</sup> M. Theresa Dallam, "Is the Study of Latin Advantageous to the Study of English?" Educational Review, LIV (Dec., 1917), pp. 500-503.

4. Another early writer<sup>25</sup> says, "The meanings of a great number of Latin-derived words have undergone such change that Latin students are not guided in reasoning words meanings from the foundation provided by high school Latin."

Studies on College Success and High School Latin.

There are other studies not closely related to this one which test the hypothesis that students who take Latin through high school make better marks in college than do those who have not had instruction in Latin.

Mary Elizabeth Smith, Harl R. Douglass,<sup>26</sup> and Herbert Sorenson<sup>27</sup> verified the hypothesis, while Andrew MacPhail could find no evidence to support it.

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<sup>25</sup> Jacob S. Orleans, "Possible Transfer Value of the Study of Latin to English Vocabulary," School and Society, XVI (Nov., 1922), pp. 559, 560.

<sup>26</sup> Mary Elizabeth Smith and Harl R. Douglass, "The Relation of High-School Latin to Marks in the First Year of Arts College," The School Review, XLV (Nov., 1957), pp. 695-701.)

<sup>27</sup> Herbert Sorenson, "High School Subjects as Conditioners of College Success. Implication and Theories Concerning Mental Factors and Faculties," Journal of Educational Research, XIX, No. 4 (Apr., 1929), pp. 237-254.

<sup>28</sup> Andrew H. MacPhail, "Freshmen Academic Achievement in College of Students Presenting Four Years of Latin and Those Presenting No Latin," School and Society, XIX (March, 1924), pp. 261-262.



There are some questions and cautions connected with research of this type.

1. Students with four years of Latin do not pursue the same college course as those with no Latin. What then is the basis for comparison?

2. The same qualities that make good Latin students in High School make good college students. It has been said, "Students may choose Latin but Latin picks students."

3. Interest in intellectual and verbal activities often accounts for a pupil's choice of Latin. One study<sup>29</sup> found students just beginning Latin to already possess a greater vocabulary than the others.

4. A student who pursues Latin through four years of high school (and this is particularly true today) very probably has a cultural home background and does so with college in mind.

Summary: Some Observations.

1. Latin students are good students.
2. Latin students generally are of higher intelligence than those who do not choose Latin.
3. Any study which compares Latin and non-Latin stu-

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<sup>29</sup> Newcomb, op. cit., p. 420.

dents without consideration of intelligence is in error.

4. Latin, taught traditionally, contributed to English vocabulary.
5. These contributions were found to be even more outstanding with the new course.
6. If content and method have continued to improve since 1945, there should be more evidence of the greater value of Latin as it is taught today.
7. Studies of Latin students should stipulate the number of years of Latin the student has had because a beginner has, as yet, been untouched by the course. He may, however, be prompted to choose Latin by some inherent "word sense."
8. Students who persisted with Latin beyond two years stayed to reap the greater benefits in English vocabulary improvement.
9. In Manitoba, these findings should be reconsidered. Latin is forced into competition with other electives at the Grade eleven level, just when its students have completed two years of the course.

## CHAPTER III

### METHOD OF OBTAINING MATCHED PAIRS

#### 1. Asking Aid of the Superintendent's Department, Winnipeg Schools

Choosing a Time. Year-end, when the work of the grade could be considered finished, seemed to be the logical time to administer the vocabulary tests. In Winnipeg high schools, the month of June is taken up with field-days, graduation, and examinations. The month of May was chosen as the one in which tests were to be administered.

Early in March, a letter was sent to Mr. C. Henry, Director of Research, Winnipeg Schools, enclosing the plan of the survey and requesting an interview. It was arranged for March 17th. By that date, Mr. Henry had familiarized himself with the method of gathering data. He granted permission, subject to the consent of the principals of the schools involved.

Choosing Schools. The high school secretaries were contacted and asked for the figures of total enrolment as well as the numbers taking Latin. The schools were: Churchill, Daniel McIntyre, Elmwood, Gordon Bell, Grant Park, Kelvin, Sisler and St. John's. The Elmwood secretary replied that there were no Latin students there. Grant

Park School did not reply. For that reason, and because this was Grant Park's first year in operation, it was not included in the survey. Enrolment and numbers taking Latin in the six other schools are shown in Table I.

On March 28th, Mr. Henry wrote a letter (Appendix C) to the principals of the six high schools: (1) Mr. Scurfield, of Churchill; (2) Mr. McMurchy, of Daniel McIntyre; (3) Mr. Gow, of Gordon Bell; (4) Mr. Cochrane, of Kelvin; (5) Mr. Morgan, of Sisler; and (6) Mr. Ridd, of St. John's. Mr. Henry's letter explained the purpose and proposed method of the survey and expressed the need for the co-operation of the high schools in which Latin is taught.

The principals were given an information sheet which read as follows:

1. This is a survey to measure the effect of instruction in Latin on English vocabulary. It is in no way a test of any one school, teacher or method. No comparisons will be made.
2. Questionnaires requiring less than ten minutes are to go to students in the matriculation course, Grades nine, ten and eleven. The purpose of the ques-

tionnaire is to obtain necessary facts on age, grade, sex, extent of reading and native language of the students.

3. By means of information on the completed questionnaire and the mental ability scores which will be collected during the Easter recess, two groups (1) Latin and (2) non-Latin, are to be equated for mental ability, age, sex and grade.
4. Permission is requested for the investigator to come to the schools in May to test with the Co-operative Vocabulary Test, which takes thirty minutes, the students who fall into the two matched groups.
5. For each Latin group questioned, two non-Latin groups are needed, as nearly as possible equal to the Latin group in ability and number of students.
6. If Latin classes happen to be all one sex, two non-Latin groups of the same sex and grade are needed because pairing is done boy for boy, girl for girl.

When the above information sheet was prepared, items 5 and 6 were included because the figures shown in Table I seemed to indicate that it would not be difficult to obtain twice as many non-Latin participants as Latin students, thus

TABLE I

ENROLMENT AND NUMBER OF LATIN STUDENTS IN  
SIX WINNIPEG HIGH SCHOOLS

	Churchill	Daniel McIntyre	Gordon Bell	Kelvin	Sisler	St. John's
<u>Grade XI</u>						
Enrolment	186	369	258	361	194	229
Latin Students	15	17	46	28	13	38
<u>Grade X</u>						
Enrolment	143	178	186	294	178	236
Latin Students	30	35	37	123	35	66
<u>Grade IX</u>						
Enrolment	286	79	--	--	79	137
Latin Students	50	33	--	--	33	36

There were no Grade nine students at Gordon  
Bell or Kelvin.

facilitating the matching. In some schools, however, in Grades ten and eleven, the two groups were more nearly equal in number when all those who had once taken Latin and had dropped it were eliminated.

Mr. Henry's letter, the information sheet, and a copy of the questionnaire (Appendix A) went to each principal. Each was asked to phone Mr. Henry's secretary to signify his willingness to co-operate in the survey.

Pilot Survey. A very limited pilot survey, which yielded eight of the final one hundred and fifteen pairs, was conducted at Hugh John Macdonald Junior High School with three Grade nine classes of ninety-two students.

It was there, with the help of the principal, Mr. George Newfield, that the questionnaire was tested in one Latin and two non-Latin classes. The first pairing among these ninety-two students yielded two matched groups of sixteen students each. Later, when it was found that age and mental ability could be equated more exactly and still keep the desired quota of one hundred pairs, the sixteen were refined to eight pairs, four boys and four girls.

These sixteen students were given the first tests of the survey and contributed to the decisions made about timing and seating which were later used in the high schools.

## 2. The Questionnaire

Purpose of the Questionnaire. The questionnaire had been prepared; tested for clarity at Hugh John Macdonald School on a grade nine class; improved; then used on a second and third class.

As has been stated, its purpose was to collect data needed for equating groups as well as information on: (1) extent of reading; (2) native language, and (3) years of instruction in French. It was composed in this way:

1. To match the pairs, name, grade, sex and birthdate were requested.

(Mental ability scores were to be collected during the Easter recess. For Grade nine the scores were available at the school involved; for Grades ten and eleven the figures were recorded at the Office of the Registrar, Department of Education.)

2. To find a student's mental ability score, it was necessary to ask in what school he had written the Grade nine departmental examinations.

3. To locate the student for the vocabulary test, if he should fall into the matched groups, his school and room number were required.

4. To find out his native language, he was asked, "What other language besides English do you speak?" On the first



trial, so many students asked if they should mention "school French" that the words "at home" were added to this question.

5. Four questions were asked to assess the extent of reading:

(a) Do you use the school library?

not at all	for reference	for pleasure	in a class period
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(b) Do you use the public library?

not at all	for reference	for pleasure	very often
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(c) Approximately how many books other than textbooks have you read during the past year?

0 1 2 3 4 5 6 7 8 9 10 more than 10

(d) If you can, give author and title of two books you have read this year.

(In (a), (b) and (c), students were asked to circle the answer which applied.)

By means of the answers to these questions, extent of reading was quantified, that is, given a score. A student who said he had read ten books, used both libraries, and who gave the name and author of two books, was given a high reading score. Phone numbers were requested in order to check with a sample of parents on the validity of the student's self-rating as a reader. Parents are more qualified than classroom teachers to give this information, since it pertains

mostly to out-of-school reading habits.

Lastly, two other questions on the sheet were to ascertain the number of years of instruction the pupil had had in (1) Latin and (2) French.

In the pilot survey, this questionnaire was found to be completed in eight minutes without difficulty. It was fully contained on a single sheet.

A memo to teachers was sent out with the supply of questionnaires to the high schools. It read as follows:

1. One-third of the questionnaires are to go to Latin students, i.e. those taking Latin at the present time.
2. Twice as many are to go to non-Latin students, i.e. those who have never taken Latin. Please do not include those who have taken the subject and dropped it.
3. All students participating must be taking the academic course, and the non-Latin students, as a class, must be of the same age, sex, grade, and, as nearly as possible, of the same range of mental ability as the Latin class. The purpose is to obtain two equated groups, that is, to find for as many Latin students as possible, equivalents in the non-Latin group for age, grade, sex and mental ability.
4. Students are asked to give honest answers. In Section II more than one answer may be circled.

One thousand, three hundred and ninety-eight copies of the questionnaire were prepared and sent to the six high schools with a copy of the memo for each class teacher who would be asked to distribute the questionnaires, supervise the answering, and collect them.

### 3. Work of the Schools in the Survey

The principal of St. John's High School replied at once that he would be glad to assist in collecting data. The same day, March 29th, a reply was received from Gordon Bell High School, where the Latin teacher had agreed to take charge of the distribution of questionnaires.

Distributing the Questionnaires. Immediately, supplies were delivered to these two schools so that they might be answered before the students went off the regular timetable for the Easter examinations, which were due to begin at Gordon Bell on April 1st and at St. John's on April 4th. Both of these schools were asked for total participation -- that is, that all their Latin students be included in the survey with twice as many non-Latin students in each grade. For St. John's, the total was 322, Grades nine, ten and eleven; for Gordon Bell, the total was 249, Grades ten and eleven.

The principal of Daniel McIntyre High School said he would have his seventeen Grade eleven Latin students participate -- with twice as many non-Latin students -- but that he could not conveniently carry the survey to Grade ten. His offer of Grade eleven was accepted and fifty-one copies of the questionnaire were delivered to him on March 31st, also in time to be completed before Easter examinations.

These three high schools, in replying, had indicated urgency if the data were to be collected before Easter recess, which was early. It was decided, therefore, to contact the other three principals rather than wait for replies.

Churchill High School's heavy schedule of activities and examination preparations forced the principal to supervise personally the distribution of questionnaires. This he accomplished on April 1st, just before Easter examinations.

The principal of Sisler High School replied that he would be glad to co-operate and that there were three days left before Easter examinations. On April 4th, a supply of questionnaires was delivered to Sisler High School and a list of the names of the Latin students in Grades ten and eleven was obtained.

The principal of Kelvin High School agreed to talk over the survey at 3:30 o'clock on April 4th, which was the first day of the scheduled Easter examinations at Kelvin. It was then too late to distribute questionnaires before Easter. He had had his secretary working on a plan for pairing the students by using the record cards, without distributing the questionnaires. He had not realized that students who had taken Latin and dropped it would not qualify for the non-Latin group, and, when

this was explained to him, he said there were no students in the strictly non-Latin group to match the Latin students in ability.

Nothing could then be done until after Easter, in any event. Part of the Easter vacation was spent at Kelvin High School searching the record cards and preparing a list of prospective candidates from the index cards. After Easter, one hundred and fifty-two copies of the questionnaire were distributed in Kelvin High School.

Collecting the Completed Questionnaires. On April 5th, Churchill High School delivered the completed questionnaires, three hundred and forty-one in number, to the Child Guidance Clinic, where they were picked up by the investigator.

A first glance revealed that instruction No. 2 on the "Memo to Teachers" had been ignored and that students who had taken Latin and dropped it were included as non-Latin students. This meant a loss of thirty-six girls and nineteen boys from the Grade eleven non-Latin group, and five girls and ten boys from the Grade ten non-Latin group.

The loss from Grade eleven of fifty-five students of a group, already scarce, served as an indication that more schools might have to be canvassed for help, if one-

third of the equated pairs were to come from Grade eleven. The curriculum in Manitoba sets out four electives: (1) Latin; (2) French; (3) Physics; and (4) Chemistry, and requires the student of Grade eleven to choose three. Time-tabling rarely favours a choice of Latin, and only the persistent and those of high ability pursue the subject beyond these hurdles.

Two extra letters were sent out -- one to St. Paul's College High School, and one to St. Mary's Academy -- explaining the survey, its purpose and method, and asking if some Grade eleven students of these schools might participate.

St. Paul's replied in the affirmative but the principal made it clear that since Latin is a compulsory subject in Grade nine at St. Paul's College High School, there would be few truly non-Latin students in Grade eleven. This turned out to be the case and the completed questionnaires had to be discarded.

St. Mary's Academy did not reply to the letter and no further attempt was made to include the school. As the survey drew to a close, it became clear that the expected one hundred pairs, with one-third of them from Grade eleven, would be gathered without these two extra schools. The total tested was 115 pairs, thirty-six of them from Grade eleven.

On April 6th, a bundle of completed questionnaires was picked up at St. John's High School. The teachers had given the copies to two Grade eleven classes -- one Latin and one non-Latin; to only one Grade ten class, a non-Latin one; and to three Grade nine classes. From their notes it was apparent that their plan had been to include three other classes: Rooms 18, 36 and 37, two Grade ten classes and one Grade eleven class. Upon checking, this was found to be the case, but the teachers of these rooms had not been carefully informed and had neglected to present the questionnaires to their students. In fact, one teacher had thrown the supply into the waste basket.

The vice-principal, upon being told of the error, undertook to locate the students of these rooms even though they had been separated and scattered for purposes of examinations. Thirty-eight extra copies of the questionnaire were delivered to him to replace those which had been discarded and he succeeded in having most of the students assemble after one examination to complete the questionnaires. The total received from St. John's High School was 309, and, of these, thirty-five from Grade eleven and twenty-seven from Grade ten had to be eliminated because the students had taken Latin for one or two years and then dropped it and therefore did not qualify as non-Latin

students.

Sisler and Daniel McIntyre High Schools returned one hundred and ninety-seven and forty-six respectively of the completed questionnaires before Easter.

There was a delay at Gordon Bell High School until the Easter examination schedule was at hand and the distribution of questionnaires had to be postponed until after the Easter recess.

There, the situation was unique. There were five Grade eleven classes, two of girls and three of boys. One of the classes of girls was the Latin class, a few boys joining them for the subject. The second girls' class was low in ability -- no match for the Latin students. However, after some perseverance in searching the records, a list of potential participants was prepared and left with the secretary, with the result that this school contributed to the survey the majority of the matched pairs in Grade eleven.

Tables II to VIII show the loss of participants through the different stages of the survey. Some reasons for the loss were:

1. Not all questionnaires were handed to qualifying candidates.
2. A few questionnaires were returned incomplete.
3. The mental ability scores for Grades ten and



TABLE II  
SURVEY STATISTICS -- CHURCHILL HIGH SCHOOL

	Grade XI	Grade X	Grade IX	Total
Questionnaires sent	99	90	170	359
Questionnaires returned	87	84	170	341
Questionnaires discarded	55	15	0	70
No. of I.Q.'s unavailable	8	12	2	22
Number unmatchable	16	27	108	151
Number matched	8	30	60	98
Number tested	2	14	28	44

TABLE III  
SURVEY STATISTICS -- ST. JOHN'S HIGH SCHOOL

	Grade XI	Grade X	Grade IX	Total
Questionnaires sent	114	100	108	322
Questionnaires returned	108	103	98	309
Questionnaires discarded	35	27	18	80
No. of I.Q.'s unavailable	12	8	14	34
Number unmatchable	33	44	44	121
Number matched	28	24	22	74
Number tested	24	20	22	66



TABLE IV

## SURVEY STATISTICS -- DANIEL McINTYRE HIGH SCHOOL

	Grade XI	Total
Questionnaires sent	51	51
Questionnaires returned	46	46
Questionnaires discarded	23	23
Number of I.Q.'s unavailable	4	4
Number unmatchable	15	15
Number matched	4	4
Number tested	0	0

TABLE V

## SURVEY STATISTICS -- SISLER HIGH SCHOOL

	Grade XI	Grade X	Grade IX	Total
Questionnaires sent	39	105	99	243
Questionnaires returned	37	84	76	197
Questionnaires discarded	5	33	6	44
No. of I.Q.'s unavailable	2	3	8	13
Number unmatchable	28	24	52	104
Number matched	2	24	10	36
Number tested	2	22	8	32

TABLE VI  
SURVEY STATISTICS -- KELVIN HIGH SCHOOL

	Grade XI	Grade X	Total
Questionnaires sent	84	90	174
Questionnaires returned	72	85	157
Questionnaires discarded	15	4	19
No. of I.Q.'s unavailable	7	18	25
Number unmatchable	38	47	85
Number matched	12	16	28
Number tested	12	16	28

TABLE VII  
SURVEY STATISTICS -- GORDON BELL HIGH SCHOOL

	Grade XI	Grade X	Total
Questionnaires sent	138	111	249
Questionnaires returned	124	84	208
Questionnaires discarded	2	0	2
No. of I.Q.'s unavailable	35	16	51
Number unmatchable	51	46	97
Number matched	36	22	58
Number tested	32	14	46

TABLE VIII

SURVEY STATISTICS -- HUGH JOHN MACDONALD JR. HIGH

	Grade IX	Total
Questionnaires answered	92	92
No. of I.Q.'s unavailable	15	15
Number unmatchable	45	45
Number matched	32	32
Number tested	16	16

eleven were, in some cases, not recorded. For Grade nine students who had not taken Grade seven in Winnipeg, and for those who were not present on the day of the test, there were no scores.

4. Many for whom scores were available had no equivalent in age and mental ability in the other group.

5. Finally, some who were paired less accurately were dropped; some were absent on the day of the vocabulary test; some were excused from the test because of other commitments; and a few spoiled the papers.

Collecting Mental Ability Scores. During Easter week, all available mental ability scores for Sisler, Daniel McIntyre, Churchill, and St. John's students were collected and placed in the lower right-hand corner of their questionnaires. The Grade ten and eleven scores, as has been stated, were those of the Otis Mental Ability Test (Appendix B), written by these students in 1959 and 1958 respectively. These tests were marked by committees of teachers who used a standardized system of marking and the scores represent a maximum of uniformity. The scores are recorded, school by school, at the office of the Registrar, Department of Education. Permission had already been obtained by letter (affixed in Appendix D) from Mr. L. S. Bennett, Registrar, to use the information, on con-

dition that the names of individual students were not used.

The Grade nine scores were those obtained on the Dominion Test of Learning Capacity (Appendix F), which is given to all Grade seven classes in Winnipeg and which these students had written in 1958. All newcomers to Winnipeg had to be excluded from this survey on this basis, but the exclusion assured more similarity of background in the matched pairs.

#### 4. Matching Latin with non-Latin Students

It is most important to this investigation, and was reiterated many times to workers in the schools involved, that non-Latin students are those who have had no instruction at all in Latin. Latin students, of course, are those who at present take Latin.

At first it was not known how accurately the available candidates could be matched to yield the necessary one hundred pairs. Some aims were set down:

1. The mates must come from the same school.
2. They must be the same sex.
3. They must be in the same grade.
4. Their ages must be as close as possible; difference could be as high as eight months.
5. No more than three points difference in mental ability was considered desirable. An exception might be made in order to retain

scores at the top and bottom of the scale.

That is, a score of 150 might, if found, be matched with 145. However, scores as high as that were not matchable. The range finally obtained was from 90 to 137, when pairing was completed.

With these aims in view, separate lists were made from the questionnaires for each grade, school and sex. One such list, for example, was headed:

"Gordon Bell, Grade XI, Boys, Latin".

It contained their names, mental ability scores, birth-date and room number. The corresponding list was headed:

"Gordon Bell, Grade XI, Boys, non-Latin".

When these two lists were placed side by side, it was possible to find several pairs matched to within a few score-points of mental ability and a few months of age. This method was used for the three grades in the six schools, boys for boys, girls for girls. It yielded a satisfactory number of matched pairs. Later, some of the pairs were discarded and the matching was limited so that most pairs were equated to within one score-point in mental ability and only one pair differed in age by as much as eight months. The greatest difference in mental ability was three score-points and it occurred in only two pairs. (See Appendix E.)

### 5. Summary

Pairing was completed early in May and lists of matched pairs sent to each principal with a request for a testing appointment.

To sum up:

1. Aid was requested from, and arranged by, the Director of Research, Winnipeg Schools.
2. Principals were informed of the purpose and method of the investigation and asked to co-operate in collecting data. The matter was further pursued, in reluctant cases, until consent was obtained.
3. One thousand, three hundred and ninety-eight copies of a prepared and tested questionnaire and copies of directions to the teachers were sent to six high schools.
4. Collection of the completed questionnaires, sorting, and discarding were accomplished.
5. When all disqualified participants were eliminated, mental ability scores for as many others as possible were obtained, those for the Grade ten and eleven students being obtained from the Department of Education, and those for the Grade nine students being obtained from the school record cards.
6. Lists were made of Latin and non-Latin boys and girls from the same grade and school, with their birth-



dates and mental ability scores. From corresponding lists, matched pairs were chosen, boy for boy, girl for girl, of the same age equated to eight months, of the same grade, and of the same mental ability equated to within three score-points.

This procedure guaranteed that if a difference were found to exist between the Latin and non-Latin groups, in their knowledge of English vocabulary, such difference could not be due to any advantage of either group in age, sex, years in school or mental ability, as all these factors were eliminated by pairing.

## CHAPTER IV

### TESTING

An English standardized vocabulary test, constructed by trained experts to give a professionally accurate measure of the general word knowledge of students at the Grade nine, ten and eleven level was needed.

One test suitable for all three grades would be preferred since it is easily conceivable that some of the Grade nine students might equal in vocabulary knowledge some of the Grade eleven students, and vice versa.

Aids in interpretation of the scores, if available, would prove useful in the survey.

#### 1. Choosing the Test

With these specifications in mind, and some knowledge of tests and measurements, a search was made of available textbooks and catalogues to compile a tentative list of vocabulary tests with the names of their publishers.

On February 22nd, the following request was sent by mail to five test publishers:

Please recommend a vocabulary test for Grades nine, ten and eleven to be used in a survey of the effect of Latin instruction on English vocabulary. It is to be used to compare the word knowledge of Latin and non-Latin students in the aforementioned grades.

The letter went to:

1. Teachers' College, Columbia University;
2. Educational Testing Service, Hollywood Boulevard, Los Angeles, California;
3. The Public School Publishing Company, Test Division of the Bobbs-Merrill Co. Inc., 1720 E. 38th St., Indianapolis 6, Indiana;
4. Vocational Guidance Centre, Ontario College of Education, University of Toronto;
5. Education Test Bureau, 720 Washington Ave. S.E., Minneapolis, Minnesota.

No reply was received from the Vocational Guidance Centre, University of Toronto, although their catalogue offered the following three tests:

- (a) The Michigan Vocabulary Profile Test, by Edward B. Greene.

This test is for high school and college students and gives a profile of an individual's vocabulary in human relations, commerce, government, physical sciences, biological sciences, fine arts, and sports. It is recommended for Grade nine and above.

Its time limit of fifty minutes would not coincide with a class period in the schools; the cost of the test is high and the words more specialized than necessary in this survey.

- (b) The Dominion Vocabulary Test, by the Department of Educational Research.

This test is described as measuring extent of vocab-

ulary at the end of Grade eight. It might be inaccurate as a measure in Grades ten and eleven.

(c) The Columbia Vocabulary Test.

This test is for Grade three and above and was considered to cover too wide a range to be particularly useful.

Since all three tests were unsatisfactory for some reason, no follow-up letter was sent to the Vocational Guidance Centre. They may have failed to send a recommendation for the same reason.

The other four publishers replied, enclosing catalogues. One misunderstood the question and recommended a Latin vocabulary test. The Teachers' College expressed regret that they had no test which would serve the purpose.

The most satisfactory recommendation was dated March 3rd, and came from the Educational Testing Service, publishers of the Cooperative Vocabulary Test. Their letter described and recommended the same test as the inspector, Mr. Ewanchuk, had approved for the purpose. It was decided to keep the Cooperative Vocabulary Test in mind while continuing the investigation of others.

The Markham English Vocabulary Test, published by the Public School Publishing Company (who had in error recommended a Latin vocabulary test) is made up of one hun-

dred and twenty-five words, perhaps too small a sample to test high school vocabulary. It has no time limit but one class period is suggested. This test is based on a true sampling of the field covered by general reading vocabulary of both high school and college students.

Specimen copies of this test and of the Cooperative Vocabulary Test were sent for, and received, before the final choice was made.

The Cooperative Vocabulary Test is made up of 210 words, thirty on each page. A time limit of thirty minutes is suggested, but the score obtained is not dependent upon the time spent nor upon the number of items attempted. The raw score is the number correct minus one-quarter of the number wrong, the total responses for any student being counted from those pages only which he managed to complete. This test is based on a careful sampling of words in Thorndike's Teachers' Word Book, arranged in seven equivalent scales of thirty words each.

The Teachers' Word Book, 1944 edition, lists thirty thousand words of the English language with their frequency of use in general literature and in four different sets of reading matter. Grade placements for the words are suggested. The book is by E. L. Thorndike and Irving Lorge and has two hundred and seventy-four pages.

Carr<sup>1</sup> studied the derivation of Thorndike's words and found that almost 49 per cent are Latin-derived. On the second page of the Cooperative Vocabulary Test, form Z, twelve of the thirty words are Latin-derived; some, such as friend and plea, are not obviously so. The Cooperative Vocabulary Test does not measure knowledge in Latin-derived English particularly.

The Department of Professional Services, Cooperative Test Division, invites questions about the technical characteristics of tests. Accordingly, a letter was addressed to this Department asking for information on the percentage of Latin-derived words contained in the test. A reply from Mr. Alexander I. Law, written on April 1st, said that no one had attempted to find the etymology of the words nor did he know of any test which supplies this information. A copy of his letter can be found in Appendix G.

When the two specimen sets arrived and were compared, the format of the Cooperative Vocabulary Test was the deciding factor. It is arranged in such a way as to eliminate errors of placing answers in wrong spaces. Reading across closely spaced lines in the Markham Test could result in an

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<sup>1</sup>Mark E. Hutchison, "Some Recent Research in the Teaching of Latin," Classical Journal, Vol. XXXIX (May, 1944), pp. 449-465.

answer being placed on the wrong line, causing an error in results.

In the Cooperative Test, the examinee indicates which one of the five numbered response words or phrases most nearly corresponds in meaning to the word in boldface type at the head of the group. The following is a sample item.

**Callous**

1. hardened
2. difficult
3. noisy
4. sensitive
5. wicked

Great care has been taken to make sure that the keyed answer is clearly justifiable as the best answer.

The Cooperative Test (Appendix H) was ordered on April 11th. It was decided to cut costs by using separate answer sheets. They also facilitate scoring and special tables are provided for converting raw scores obtained from answer sheets into Scaled Scores, which give equality of units throughout the scale. The raw score units have been replaced by units so scaled that the scores from a single school system will tend to form a normal distribution. Standard deviation of the scores is taken into account in order to effect this distribution.

## 2. Administering the Test

Two schools which contributed to the survey were omitted in testing: (1) St. Paul's College High School, because there were few non-Latin students there; and (2) Daniel McIntyre High School, because there were only two matched pairs among the Grade eleven students. Letters were sent thanking these schools and explaining that no testing would be done there.

As soon as the pairing was complete, lists of students with their room numbers were sent to each school. Since these were specially selected students and came from several rooms in each school, it would be a problem for the principal to arrange a testing time when none of the classes involved was at shops, games or other activities which might take them away from the building. Ample time was allowed by mailing lists and letters requesting testing appointments early in May.

In some cases, the lists were shortened by discarding certain pairs, usually those not so closely matched, in order to arrive at a number which could be accommodated at a single sitting.

The following is a sample letter. It was sent to Mr. Cochrane of Kelvin High School on May 4th:



Enclosed is a list of students who have fallen into the matched groups at your school. You will note that there are twenty-eight which I hope can be gathered together at one sitting.

I respectfully request that you assign me a forty-minute period for testing so that the first ten minutes in excess of testing time can be used for seating, checking names and giving instructions.

The spirit of cooperation which your school has shown in assisting in this survey is very much appreciated. Will you kindly advise me of the time most suitable for you?

A similar letter was sent to five high school principals.

Dates assigned, following this request, were:

St. John's (two sittings) - May 13th

Gordon Bell (two sittings) - May 13th and  
June 14th

Sisler (one sitting) - May 27th

Churchill (one sitting) - May 26th

Kelvin (one sitting) - May 31st

In all schools except Churchill, arrangements were made to include nearly all the students requested. At Churchill, however, the choirs were practising for graduation and the principal excused some students from the test so that the loss was greater than anticipated. In St. John's and in Sisler the groups were surprisingly complete when a roll of those expected was called. At Gordon Bell, Miss Kiernan had told the students the test had priority over other activities.

Students were told that they were taking part in a city-wide survey of vocabulary knowledge and that even the very best would fall short of a perfect score.

The same testing routine was used in all schools and all were tested by the same person. The trial test given to sixteen students of Grade nine in Hugh John MacDonald School on May 10th was satisfactory and the results are included.

Pairs were tested in the same group or sitting. Standard procedure for administering the test was followed to the letter to insure uniformity. Ten minutes were allowed for assembly, roll call, and giving directions, and thirty minutes working time was allowed in each case.

As has been stated, the results of the test, however, are not dependent upon the number of items attempted; that is, speed is not a factor in success.

The procedure for testing, as given in the directions, was as follows:

Directions for Administering with  
Separate Answer Sheets

1. When all are seated, the examiner should say:

"We shall now pass out the test booklets and answer sheets. In this test, you are to mark your answer on a separate sheet instead of on the pages of the test booklet. Do not write anything at all in the booklet. Your name and your answers to the questions on the test are to be put on the separate answer sheet."

When the booklets and answer sheets have been passed out, the examiner should show the students an answer sheet to illustrate the different points and say:

"Print your name on the line at the left side of the answer sheet, fill in the other items of information called for, and read the directions on both the answer sheet and cover of the booklet. Do not write on the booklet, and do not open the booklet to the test itself until I tell you to do so."

2. Allow sufficient time for filling in the spaces and reading the directions, then say:

"In taking this test, you are to mark each answer on the answer sheet by making a black pencil mark between the pair of dotted lines numbered the same as the answer you think is correct. You are not to write the answer in the test booklet."

The examiner then continues:

"Are there any questions? No questions may be asked after the examination begins."

Answer all legitimate questions, and make sure that all pupils understand how to mark the answer sheets. During the examination, examiners should check occasionally, especially at the beginning of new parts, to see that the students are recording their answers properly on the answer sheets.

3. After answering all legitimate questions, the examiner should say:

"When I say 'Begin', open the booklet to the test and fold the page over. Keep the booklet folded back so you will have only one page at a time in front of you. Read the directions at the top of the page and start work. Work as fast as you can without making mistakes. Ask no questions. Read the directions again if you do not understand. You are not expected to answer all the questions in the time limit. Begin."

4. Note the exact time when you say "Begin" and write it down. Allow exactly the number of minutes specified for the test, counting from the moment you say "Begin." Do not allow extra time for reading the specific directions above item one. At the end of the allotted time, say:

"Stop! Even if you have not finished, close your booklets. See that you have filled in all the blanks at the side of the answer sheet and that you have clearly printed your name."

5. Have the students put their answer sheets inside the booklets, and collect all booklets and answer sheets at once.

These are the directions for use with answer sheets. Similar precise directions are given for the use of booklets and these were followed at the last two sittings where the booklets were used. Examiners, using standardized tests, are always advised not to deviate from the directions because variation of method or even vocabulary may destroy the comparability of results. For these reasons, the above instructions were carefully followed in administering the Cooperative Vocabulary Test.

### 3. Marking the Test

Marking the test was done during the month of June. Tests were hand-scored and checked very carefully by the same person following a uniform procedure as outlined in the directions.

With the answer sheets, the procedure is as follows:

Use the Rights Scoring Stencil which has all the right answers punched out. The following procedure should be carefully followed for each test or part of a test for which a separate score is being obtained, and each step should be checked thoroughly.

1. Unless otherwise indicated in the test directions, multiple responses should be lined through with red pencil and omitted when scoring.
2. Count the remaining number of spaces the student has blackened on the entire test or part.
3. Place the Rights Scoring Stencil over the answer sheet with the right-hand edges together. Make any necessary slight adjustment so that answer spaces show in the centre of all punched holes.
4. Count the number of blackened spaces exclusive of those marked in red, appearing through the punched holes. This gives the number of right answers.
5. Subtract the number of right (Step 4) answers from the total number of responses (Step 2). This remainder is the number of wrong answers.
6. You now have the number of right answers and the number of wrong answers. The formula for the raw score is found on the Rights Scoring Stencil. Subtract one-quarter of the wrong answers from the right answers. Fractions of one-half or less are dropped before subtracting. For fractions greater than one-half, increase the amount to be subtracted to the next higher integer.
7. For the Cooperative tests which have Scaled Scores, look up the raw score, as obtained in Paragraph Six, in the raw score - Scaled Score conversion tables provided on the answer sheets and circle the corresponding Scaled Scores.

Directions for the use of the fan key in cases where the students' answers are recorded in booklets:

The scoring keys for the Cooperative tests are printed on sheets which, when folded back along the heavy vertical lines become "fan" or "accordion" type keys. The answers for the test pages appear on successive folds of the "fan" in the same sequence as the pages of the test. The successive folds are numbered at the top to correspond with the successive pages of the test.

The raw scores are obtained according to the directions on the fan key, using the formula  $R-W$ . After the raw scores are computed, Scaled Scores are obtained by referring to the conversion tables.

A copy of the Cooperative Vocabulary Test can be found in Appendix H.

All counting, scoring, addition, subtraction and division was completed once, then checked before the scores were recorded.

#### 4. Results of the Test

The highest mark obtained was 79. It was scored by a Grade eleven boy in Sisler High School with mental ability of 115. The mean score for Grade eleven in eleven grade systems in the United States is quoted as 47 by the Co-operative Test Division. Only the Grade nine non-Latin students (Mean = 46.18) failed to reach this figure. All others, Latin and non-Latin, exceeded it. The mean for the 230 students was 54.

The lowest score and the second highest belong to Grade nine students, the second highest being 77 and the second lowest being 28.

Table IX shows the distribution of the scores. The median for the Latin students was 56.22 and for the non-Latin students 51.64. These figures and other statistical data are dealt with in detail in Chapter V.

TABLE IX

DISTRIBUTION OF THE SCALED SCORES  
COOPERATIVE VOCABULARY TEST FORM Z  
FOR TWO HUNDRED AND THIRTY STUDENTS

Scaled Scores	Grade XI		Grade X		Grade IX		Totals	
	Latin	non- Latin	Latin	non- Latin	Latin	non- Latin	Latin	non- Latin
78 - 79	1						1	
76 - 77					1		1	
74 - 75								
72 - 73	2		1	1			3	1
70 - 71								
68 - 69	1	1	2				3	1
66 - 67	7		1				8	
64 - 65	3	2	2	2	1		6	4
62 - 63	7	2	3	1			10	4
60 - 61	1	3	4	1			5	4
58 - 59	3	1	5	2	1		9	3
56 - 57	6	4	6	4	6		18	8
54 - 55	2	7	3	3	3	3	8	13
52 - 53	1	8	7	9	5	5	13	22
50 - 51	1	2	3	7	1	3	5	12
48 - 49	1	1	3	4	5	5	9	10
46 - 47		3	1	3	7	5	8	11
44 - 45		2		4	2	7	2	13
42 - 43			1	1	1	3	2	4
40 - 41					2	2	2	2
38 - 39					2	2	2	2
36 - 37								
34 - 35								
32 - 33								
30 - 31						1		1
28 - 29						1		1
Totals	36	36	42	42	37	37	115	115



Tables X, XI and XII show the complete lists of scores in pairs, Latin and non-Latin. These tables show also the mental ability scores and the ages according to which the students were matched.

To comply with Department of Education stipulations, in releasing mental ability scores the students are identified by initial and the small letter "b" for boy and "g" for girl.

Table XIII repeats the scores from Table X in the same order, pair for pair, assigning identification to each by which said pairs will be designated throughout the remainder of this paper. This new identity is made up of the school initials plus a number. The students of the first pair are G.B. (for Gordon Bell) 1, Latin and non-Latin. In Table XIII, columns three and four show the Latin gains and the non-Latin gains respectively. The total Latin gain is two hundred and seventy-six and the non-Latin gain is twenty-five. In Grade eleven, then, with thirty-six pairs, the Latin students gained in score over the non-Latin students in the proportion of 11.4 to 1.

Table XIV treats the forty-two Grade ten scores in the same manner, and Table XV, the Grade nine scores.

TABLE X

THIRTY-SIX GRADE ELEVEN PAIRS, THEIR INITIALS, SEX, SCALED  
SCORES, MENTAL ABILITY SCORES, BIRTHDATES AND SCHOOLS

Pair No.	Latin				Non-Latin				School		
	Stu- dent	Score	I.Q.	Birth- date	Stu- dent	Score	I.Q.	Birth- date			
1	M.H.	b	66	122	10/10/43	G.D.	b	56	121	13/12/43	Gordon Bell
2	A.B.	b	57	114	25/1/43	D.P.	b	64	116	14/2/43	"
3	D.S.	g	66	117	1/10/43	L.M.	g	57	117	24/7/43	"
4	D.K.	g	66	116	21/6/43	R.J.	g	64	116	9/6/43	"
5	S.S.	g	62	117	4/10/43	P.M.	g	49	116	5/12/43	"
6	O.J.	g	72	113	2/8/43	S.B.	g	53	113	9/8/43	"
7	G.P.	g	62	95	15/8/43	S.S.	g	57	94	27/2/43	"
8	S.M.	g	67	118	7/4/43	U.P.	g	69	116	30/7/43	"
9	MJJ.	g	48	108	9/12/43	T.L.	g	53	108	8/3/44	"
10	A.C.	g	59	109	7/8/43	C.B.	g	50	109	12/9/43	"
11	DMK.	g	62	110	29/1/43	L.B.	g	55	109	5/2/43	"
12	H.G.	g	61	107	14/9/43	G.L.	g	54	107	2/5/43	"
13	S.P.	g	53	103	4/8/43	W.E.	g	44	103	30/3/43	"
14	M.H.	g	62	105	23/14/43	E.M.	g	55	105	20/1/43	"
15	M.A.	g	59	102	16/10/42	D.A.	g	45	103	5/5/43	"
16	D.G.	g	67	113	6/10/43	C.N.	g	62	115	11/11/43	"
17	J.J.	b	58	113	22/5/42	J.M.	b	61	115	29/4/42	Churchill
18	N.M.	b	79	115	30/3/43	B.S.	b	46	113	26/10/42	Sisler
19	B.U.	b	63	116	19/11/43	J.L.	b	63	116	7/8/43	St. John's
20	P.W.	b	67	117	15/8/43	W.D.	b	53	116	26/7/43	"
21	S.P.	b	55	107	6/9/43	R.K.	b	57	107	19/9/43	"
22	M.S.	b	57	114	21/12/43	H.C.	b	52	114	20/9/43	"
23	R.G.	b	57	112	4/7/43	S.H.	b	50	112	24/8/43	"
24	M.G.	b	66	104	7/2/43	B.E.	b	47	103	13/9/43	"
25	L.S.	b	56	106	21/2/43	W.W.	b	60	103	27/2/43	"
26	J.S.	g	62	117	28/8/43	D.R.	g	61	119	29/1/44	"
27	C.L.	g	62	107	17/12/43	L.S.	g	52	106	20/12/43	"
28	R.S.	g	56	107	28/17/43	KSM.	g	53	106	5/8/43	"
29	L.C.	g	50	106	26/11/44	S.L.	g	53	108	26/4/44	"
30	CAM.	g	54	99	23/11/43	M.K.	g	46	100	25/5/43	"
31	L.M.	g	73	114	24/1/44	A.L.	g	55	115	18/1/44	Kelvin
32	L.W.	g	56	109	22/6/43	M.T.	g	53	109	24/8/43	"
33	D.L.	b	69	113	19/5/43	B.G.	b	55	113	26/4/43	"
34	DBR.	b	65	114	18/9/43	R.C.	b	58	113	22/8/43	"
35	D.M.	b	65	112	6/8/43	V.D.	b	57	114	19/6/43	"
36	D.C.	b	64	118	1/5/43	B.D.	b	54	116	13/6/43	"

TABLE XI

FORTY-TWO GRADE TEN PAIRS, THEIR INITIALS, SEX, SCALED SCORES, MENTAL ABILITY SCORES, BIRTHDATES AND SCHOOLS

Pair No.	Latin				Non-Latin				School		
	Stu- dent	Score	I.Q.	Birth- date	Stu- dent	Score	I.Q.	Birth date			
1	M.T.	b	57	119	4/11/45	B.B.	b	57	119	5/6/45	St. John's
2	J.R.	b	52	117	24/1/45	H.O.	b	56	118	23/12/44	"
3	S.S.	b	55	120	4/1/44	F.W.	b	53	120	24/5/44	"
4	S.K.	b	64	122	20/9/44	R.O.	b	52	119	4/12/44	"
5	R.K.	b	53	113	20/7/44	S.S.	b	44	111	29/5/44	"
6	S.R.	b	57	115	9/5/44	D.M.	b	58	116	6/5/44	"
7	A.B.	g	69	132	22/4/45	C.P.	g	73	131	5/1/45	"
8	R.B.	g	60	121	11/2/45	L.Z.	g	64	120	18/5/45	"
9	J.L.	g	60	115	1/5/44	L.P.	g	52	116	28/2/44	"
10	A.D.	g	69	127	27/10/44	R.W.	g	61	128	24/9/44	Sisler
11	EJC.	g	62	121	30/5/44	MCS.	g	52	122	13/5/44	"
12	CPH.	g	53	109	3/6/44	W.R.	g	48	107	24/3/44	"
13	D.H.	g	52	116	5/5/44	M.F.	g	51	115	4/12/44	"
14	R.S.	b	58	117	25/12/44	K.C.	b	46	117	29/11/44	"
15	E.D.	b	61	123	4/4/44	D.Z.	b	52	124	13/6/44	"
16	J.S.	b	50	117	12/5/44	HJC.	b	56	118	9/8/44	"
17	J.S.	b	58	104	21/3/44	L.D.	b	48	105	3/2/44	"
18	R.K.	b	51	111	10/9/44	J.S.	b	62	112	19/4/44	"
19	J.S.	b	56	115	1/1/44	TWO.	b	43	116	23/12/43	"
20	K.B.	b	49	103	28/8/44	S.S.	b	45	103	22/9/44	"
21	L.S.	b	55	109	1/8/43	T.H.	b	52	109	19/8/43	Churchill
22	G.K.	b	61	109	10/9/44	B.R.	b	45	109	7/7/44	"
23	D.H.	b	58	111	16/3/44	R.F.	b	55	111	26/12/43	"
24	P.M.	b	73	118	18/11/44	R.K.	b	49	118	22/3/44	"
25	R.D.	b	53	115	7/3/44	G.U.	b	58	114	12/6/44	"
26	B.C.	b	59	120	23/1/44	F.K.	b	65	119	15/3/44	"
27	M.K.	g	63	114	27/7/44	G.M.	g	53	115	6/6/44	"
28	M.R.	g	48	113	15/11/44	E.C.	g	51	113	14/1/45	Kelvin
29	V.S.	g	53	113	17/10/44	L.D.	g	52	114	31/5/44	"
30	L.S.	g	52	106	12/10/44	S.D.	g	46	107	2/8/44	"
31	R.T.	g	66	116	9/9/45	T.P.	g	55	118	11/2/45	"
32	E.T.	b	50	115	8/2/44	L.B.	b	54	116	2/6/44	"
33	RNL.	b	59	118	23/8/44	J.G.	b	53	118	23/7/44	"
34	L.N.	b	56	115	22/5/44	P.K.	b	50	113	1/5/44	"
35	E.R.	g	57	120	18/6/44	M.R.	g	57	119	26/10/44	Gordon Bell
36	V.B.	g	57	112	12/3/44	M.M.	g	50	112	25/8/44	"
37	G.R.	g	48	101	21/7/43	D.R.	g	50	101	20/3/43	"
38	C.Y.	g	47	106	29/8/44	J.K.	g	48	105	16/8/44	"
39	C.R.	b	54	122	11/4/44	B.S.	b	51	122	25/8/44	"
40	L.S.	b	65	115	14/7/44	C.P.	b	47	115	12/7/44	"
41	W.W.	b	42	90	4/9/42	T.M.	b	44	92	31/1/43	"
42	JDW.	b	62	108	27/12/43	M.C.	b	51	108	15/10/43	"

TABLE XII

THIRTY-SEVEN GRADE NINE PAIRS, THEIR INITIALS, SEX, SCALED SCORES, MENTAL ABILITY SCORES, BIRTHDATES AND SCHOOLS

Pair No.	Latin				Non-Latin				School		
	Stu- dent	Score	I.Q.	Birth- date	Stu- dent	Score	I.Q.	Birth- date			
1	D.K.	g	47	111	16/5/45	S.S.	g	53	111	24/12/44	Hugh John McD
2	P.M.	g	49	120	22/12/45	R.S.	g	51	121	24/11/45	"
3	C.W.	g	47	109	10/1/45	H.W.	g	44	109	17/5/45	"
4	I.R.	g	40	94	26/12/44	R.J.	g	28	94	16/5/44	"
5	G.B.	b	41	106	21/1/45	K.M.	b	48	105	4/12/44	"
6	R.I.	b	47	114	7/4/45	R.C.	b	44	114	10/9/45	"
7	R.K.	b	38	100	1/1/45	V.L.	b	45	100	9/10/44	"
8	D.S.	b	52	114	15/4/45	L.K.	b	46	113	5/7/45	"
9	D.C.	b	77	137	30/2/45	V.G.	b	53	136	7/5/45	Churchill
10	T.G.	b	65	129	25/2/46	JCM.	b	47	130	2/4/46	"
11	D.W.	b	52	125	8/6/45	GDH.	b	55	126	14/6/45	"
12	K.S.	b	52	117	26/7/45	K.W.	b	54	117	24/8/45	"
13	J.R.	b	49	109	26/6/45	JPS.	b	46	110	4/3/45	"
14	B.W.	b	48	114	11/6/45	DMcC.	b	45	114	27/9/45	"
15	EMcL.	g	53	113	6/5/45	M.T.	g	53	113	27/6/45	"
16	M.G.	g	46	114	1/4/45	G.W.	g	49	115	23/6/45	"
17	K.S.	g	56	116	5/7/45	S.F.	g	43	115	30/7/45	"
18	D.P.	g	54	121	7/2/46	L.C.	g	47	121	27/2/46	"
19	M.P.	g	52	104	7/1/45	E.R.	g	38	104	10/1/45	"
20	P.L.	g	56	120	10/6/45	LDO.	g	50	120	31/8/45	"
21	E.F.	g	54	111	15/8/45	B.B.	g	48	111	19/11/45	"
22	S.H.	g	57	110	15/9/45	REH.	g	47	110	15/6/45	"
23	M.H.	g	59	103	24/10/44	G.P.	g	41	102	24/9/44	Sisler
24	D.G.	g	44	116	6/7/45	L.Z.	g	55	115	21/12/45	"
25	J.B.	g	43	93	31/1/45	C.K.	g	31	93	25/4/45	"
26	C.M.	b	51	103	31/8/45	R.S.	b	39	103	4/6/45	"
27	T.M.	b	47	122	17/8/45	R.S.	b	41	122	7/6/45	St. John's
28	D.E.	b	55	116	3/3/45	S.C.	b	52	116	13/6/45	"
29	D.S.	b	46	115	13/5/45	N.C.	b	45	115	17/5/45	"
30	G.L.	b	47	113	15/6/45	SARC	b	53	113	5/1/45	"
31	S.Y.	b	56	116	24/7/45	DMN.	b	43	116	5/12/45	"
32	M.B.	b	56	116	23.8/45	B.K.	b	48	115	11/12/45	"
33	L.P.	b	44	98	29/6/45	L.M.	b	43	97	5/7/45	"
34	O.W.	b	48	108	5/6/45	G.H.	b	49	109	1/6/45	"
35	A.P.	g	39	108	2/10/45	L.N.	g	51	108	4/8/45	"
36	J.P.	g	48	109	8/8/45	C.F.	g	44	108	29/11/45	"
37	F.E.	g	57	112	22/11/45	E.N.	g	45	112	4/8/45	"

TABLE XIII

THIRTY-SIX GRADE ELEVEN PAIRS AND THEIR SCORES  
SHOWING THE RATIO OF LATIN GAINS  
TO NON-LATIN GAINS

Pair Identification	Latin Score	Non-Latin Score	Latin Gains	Non-Latin Gains
G.B. 1	66	55	11	
G.B. 2	57	64		7
G.B. 3	66	57	9	
G.B. 4	66	64	2	
G.B. 5	62	49	13	
G.B. 6	72	53	19	
G.B. 7	62	57	5	
G.B. 8	67	68		1
G.B. 9	48	53		5
G.B. 10	59	50	9	
G.B. 11	62	55	7	
G.B. 12	61	54	7	
G.B. 13	53	44	9	
G.B. 14	62	55	7	
G.B. 15	59	45	14	
G.B. 16	67	62	5	
C. 17	58	61		3
S. 18	79	46	33	
S.J. 19	63	63		
S.J. 20	67	53	14	
S.J. 21	55	57		2
S.J. 22	57	52	5	
S.J. 23	57	50	7	
S.J. 24	66	47	19	
S.J. 25	56	60		4
S.J. 26	62	61	1	
S.J. 27	62	52	10	
S.J. 28	56	53	3	
S.J. 29	50	53		3
S.J. 30	54	46	8	
K. 31	73	55	18	
K. 32	56	53	3	
K. 33	68	55	13	
K. 34	65	58	7	
K. 35	65	57	8	
K. 36	64	54	10	
		Totals	276	25

TABLE XIV

FORTY-TWO GRADE TEN PAIRS AND THEIR SCORES SHOWING  
THE RATIO OF LATIN GAINS TO NON-LATIN GAINS

Pair Identification	Latin Score	Non-Latin Score	Latin Gains	Non-Latin Gains
S.J. 1	57	57		
S.J. 2	52	56		4
S.J. 3	55	53	2	
S.J. 4	64	52	12	
S.J. 5	53	44	9	
S.J. 6	57	58		1
S.J. 7	69	73		4
S.J. 8	60	64		4
S.J. 9	60	52	8	
S. 10	69	61	8	
S. 11	62	52	10	
S. 12	53	48	5	
S. 13	52	51	1	
S. 14	58	46	12	
S. 15	61	52	9	
S. 16	50	56		6
S. 17	58	48	10	
S. 18	51	62		11
S. 19	56	43	13	
S. 20	49	45	4	
C. 21	55	52	3	
C. 22	61	45	16	
C. 23	58	55	3	
C. 24	73	49	24	
C. 25	53	58		5
C. 26	59	65		6
C. 27	63	53	10	
K. 28	48	51		3
K. 29	53	52	1	
K. 30	52	46	6	
K. 31	66	55	11	
K. 32	50	54		4
K. 33	59	53	6	
K. 34	56	50	6	
G.B. 35	57	50		
G.B. 36	57	50	7	
G.B. 37	48	50		2
G.B. 38	47	48		1
G.B. 39	54	51	3	
G.B. 40	65	47	18	
G.B. 41	42	44		2
G.B. 42	62	51	9	
		Totals	226	53

TABLE XV

THIRTY-SEVEN GRADE NINE PAIRS AND THEIR SCORES SHOWING  
THE RATIO OF LATIN GAINS TO NON-LATIN GAINS

Pair Identification	Latin Score	Non-Latin Score	Latin Gains	Non-Latin Gains
H.J.M. 1	47	53		6
H.J.M. 2	49	51		2
H.J.M. 3	47	44	3	
H.J.M. 4	40	28	12	
H.J.M. 5	41	48		7
H.J.M. 6	47	44	3	
H.J.M. 7	38	45		7
H.J.M. 8	52	46	6	
C. 9	77	53	24	
C. 10	65	47	18	
C. 11	52	55		3
C. 12	52	54		2
C. 13	49	46	3	
C. 14	48	45	3	
C. 15	53	53		
C. 16	46	49		3
C. 17	56	43	13	
C. 18	54	47	7	
C. 19	52	38	14	
C. 20	56	50	6	
C. 21	54	48	6	
C. 22	57	47	10	
S. 23	59	41	18	
S. 24	44	55		11
S. 25	43	31	12	
S. 26	51	39	12	
S.J. 27	47	41	6	
S.J. 28	55	52	3	
S.J. 29	46	45	1	
S.J. 30	47	53		6
S.J. 31	56	43	13	
S.J. 32	56	48	8	
S.J. 33	44	43	1	
S.J. 34	48	49		1
S.J. 35	39	51		12
S.J. 36	48	44	4	
S.J. 37	57	45	12	
Totals			218	60

## CHAPTER V

### STATISTICAL ANALYSIS OF THE DATA

From Tables XII, XIV and XV, which present results in Grades nine, ten and eleven respectively, the ratio of Latin gains to non-Latin gains is seen to be highest in Grade eleven, next highest in Grade ten and least in Grade nine.

The statistical treatment of the data which follows in the next pages includes finding the correlation between Latin and non-Latin scores, finding of means, medians and standard deviation of all the groups, and testing the significance of the difference between the means, first of the two Grade eleven equated groups, Latin and non-Latin; then of the whole group; thirdly, for the Grade ten students; and finally for the Grade nine students. The information thus accumulated provided, as has been stated, the basis for an answer to the question, "Does Latin training influence the English vocabulary of the student and, if so, to what extent at each stage of his high school career?"

The calculations which follow show the difference between Latin and non-Latin means to be statistically significant in all cases: (1) Grade eleven; (2) the group as a whole; (3) Grade ten; and (4) Grade nine. The Latin stu-



dents scored significantly higher. The second part of this chapter deals with possible initial differences between the groups which might have accounted for some of this difference.

The correlation between the Latin and non-Latin scores, brought about by the matching, is  $.44 \pm .07$ .

LATIN SCORES

NON-LATIN SCORES

	38-40	41-43	44-46	47-49	50-52	53-55	56-58	59-61	62-64	65-67	68-70	71-73	74-76	77-79	fy	dy	fydy	fydy <sup>2</sup>	Σfxydx	Σfxydxdy
71-73											4 <sup>1</sup> 7				1	7	7	49	4	28
68-70											3 <sup>1</sup> 6				1	6	6	36	3	18
65-67								1 <sup>1</sup> 5							1	5	5	25	1	5
62-64					-2 <sup>1</sup> 4		0 <sup>1</sup> 4	1 <sup>1</sup> 4	2 <sup>1</sup> 4	6 <sup>2</sup> 8					6	4	24	96	7	28
59-61							0 <sup>2</sup> 6	2 <sup>1</sup> 3			4 <sup>1</sup> 3				4	3	12	36	6	18
56-58					-2 <sup>4</sup>	-2 <sup>4</sup>	0 <sup>3</sup> 6	2 <sup>1</sup> 2	9 <sup>3</sup> 6						11	2	22	44	5	10
53-55			-4 <sup>1</sup>	-9 <sup>3</sup>	-8 <sup>4</sup>	-2 <sup>2</sup>	0 <sup>3</sup> 3	2 <sup>2</sup> 2	8 <sup>4</sup>	9 <sup>3</sup> 3	4 <sup>1</sup>	10 <sup>2</sup>		7 <sup>1</sup>	26	1	26	26	17	17
50-52	-6 <sup>1</sup> 0			3 <sup>0</sup>	1 <sup>0</sup>	4 <sup>0</sup>	5 <sup>0</sup>	3 <sup>0</sup>	8 <sup>4</sup>						21	0	0	0	-10	0
47-49		-5 <sup>1</sup>	-4 <sup>1</sup>	-6 <sup>2</sup>		-3 <sup>3</sup>	3 <sup>3</sup>		2 <sup>1</sup>	9 <sup>3</sup>		5 <sup>1</sup>			15	-1	-15	15	-2	2
44-46	-6 <sup>2</sup>	-5 <sup>2</sup>	-4 <sup>2</sup>	-6 <sup>12</sup>	-4 <sup>2</sup>	-3 <sup>6</sup>	0 <sup>2</sup> 4	2 <sup>2</sup> 4						7 <sup>1</sup>	19	-2	-38	76	-31	62
41-43			-4 <sup>3</sup>	-3 <sup>3</sup>			0 <sup>3</sup> 9	1 <sup>3</sup>							6	-3	-18	54	-6	18
38-40					-2 <sup>8</sup>										2	-4	-8	32	-4	16
35-37															0	-5	0	0	0	0
32-34															0	-6	0	0	0	0
29-31		-5 <sup>7</sup>													1	-7	-7	49	-5	35
26-28	-6 <sup>8</sup>														1	-8	-8	64	-6	48
fx	3	3	4	15	12	14	22	10	12	12	3	3	0	2	115		8	602	-21	305
dx	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7						
fxdx	-18	-15	-16	-45	-24	-14	0	10	24	36	12	15	0	14	-21					
fxdx <sup>2</sup>	108	75	64	135	48	14	0	10	48	108	48	75	0	98	831					
Σfxydy	-10	-10	-5	-14	0	-3	3	4	12	20	11	1	0	-1	8					
Σfxydxdy	60	50	20	42	0	3	0	4	24	60	44	5	0	-7	305					

$$r = \frac{305 - \frac{-21 \times 8}{115}}{\sqrt{831 - \frac{(-21)^2}{115}}} \quad \Gamma = 0.44$$

$$Gr = \frac{0.8064}{10.724} = 0.07$$

Figure 1. Correlation between Scaled Vocabulary Scores of 115 Latin Students and 115 non-Latin Students.

LATIN SCORES

	38-40	41-43	44-46	47-49	50-52	53-55	56-58	59-61	62-64	65-67	68-70	71-73	74-76	77-79	fy	dy	fydy	fydy <sup>2</sup>	Σfxydx	Σfxydx <sup>2</sup>
53-55				-2 <sup>6</sup>	0 <sup>2</sup> 6	1 <sup>1</sup> 3								9 <sup>1</sup> 3	6	3	18	54	8	24
50-52	-4 <sup>1</sup> 2			-1 <sup>1</sup> 2		1 <sup>1</sup> 2	2 <sup>1</sup> 2								4	2	8	16	-2	-4
47-49		-3 <sup>1</sup> 1	-2 <sup>1</sup> 1	-1 <sup>1</sup> 1		1 <sup>1</sup> 1	6 <sup>3</sup> 3			5 <sup>1</sup> 1					8	1	8	8	6	6
44-46			-4 <sup>0</sup>	-5 <sup>0</sup>	0 <sup>1</sup> 0		2 <sup>1</sup> 0								9	0	0	0	-7	0
41-43			-2 <sup>1</sup> 1	-1 <sup>1</sup> 1			4 <sup>2</sup> 2	3 <sup>1</sup> 1							5	-1	-5	5	4	-4
38-40			-2 <sup>1</sup> 2		0 <sup>2</sup> 4										3	-2	-6	12	-2	4
35-37															0	-3	0	0	0	0
32-34															0	-4	0	0	0	0
29-31		-3 <sup>1</sup> 5													1	-5	-5	25	-3	15
26-28		-3 <sup>1</sup> 6													1	-6	-6	36	-3	18
fx	1	3	5	10	5	3	7	1	0	1	0	0	0	1	37		12	156	1	59
dx	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9						
fxdx	-4	-9	-10	-10	0	3	14	3	0	5	0	0	0	9	1					
fxdx <sup>2</sup>	16	27	20	10	0	3	28	9	0	25	0	0	0	81	219					
Σfxydy	2	-10	-2	8	2	6	3	-1	0	1	0	0	0	3	12					
Σfxydx <sup>2</sup>	-8	30	4	-8	0	6	6	-3	0	5	0	0	0	27	59					

$$r = \frac{59 - \frac{1 \times 12}{37}}{\sqrt{219 - \frac{(1)^2}{37}} \sqrt{156 - \frac{(12)^2}{37}}}$$

$$r = 0.32$$

$$Gr = \frac{0.8976}{6.08} = 0.15$$

Figure 2. Correlation between Scaled Vocabulary Scores of Grade Nine Students - - - 37 Latin Students and 37 non-Latin Students.



TABLE XVI

FREQUENCY DISTRIBUTION OF VOCABULARY  
SCORES OF 36 GRADE XI LATIN STUDENTS

x	f	d	fd	fd <sup>2</sup>	cf
78 - 79	1	8	8	64	36
76 - 77	0	7	0	0	35
74 - 75	0	6	0	0	35
72 - 73	2	5	10	50	35
70 - 71	0	4	0	0	33
68 - 69	1	3	3	9	33
66 - 67	7	2	14	28	32
64 - 65	3	1	4	4	25
62 - 63	7	0	0	0	22
60 - 61	1	-1	-1	1	15
58 - 59	3	-2	-6	12	14
56 - 57	6	-3	-18	54	11
54 - 55	2	-4	-8	32	5
52 - 53	1	-5	-5	25	3
50 - 51	1	-6	-6	36	2
48 - 49	1	-7	-7	49	1
Totals	<u>36</u>		<u>-12</u>	<u>364</u>	

$$M = A + \left( \frac{\sum fd}{N} \right) h$$

$$= 62.5 + \left( \frac{-12}{36} \right) \times 2$$

$$= 62.5 - .66$$

$$= 61.8$$

$$\text{Mdn.} = 61.5 + \left( \frac{3}{7} \times 2 \right)$$

$$= 61.5 + .86$$

$$= 62.36$$

$$\text{S.D.} = h \cdot \sqrt{\frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2}$$

$$= 2 \times \sqrt{\frac{364}{36} - \left( \frac{-12}{36} \right)^2}$$

$$= 2 \times \sqrt{10.11 - .11}$$

$$= 2 \times \sqrt{10}$$

$$= 2 \times 3.16$$

$$= 6.32$$

TABLE XVII

FREQUENCY DISTRIBUTION OF VOCABULARY SCORES  
OF 36 GRADE XI NON-LATIN STUDENTS

x	f	d	fd	fd <sup>2</sup>	cf
68 - 69	1	7	7	49	36
66 - 67	0	6	0	0	35
64 - 65	2	5	10	50	35
62 - 63	2	4	8	32	33
60 - 61	3	3	9	27	31
58 - 59	1	2	2	4	28
56 - 57	4	1	4	4	27
54 - 55	7	0	0	0	23
52 - 53	8	-1	-8	8	16
50 - 51	2	-2	-4	8	8
48 - 49	1	-3	-3	9	6
46 - 47	3	-4	-12	48	5
44 - 45	2	-5	-10	50	2
Totals	36		3	289	

$$M = A + \left( \frac{\sum fd}{N} \right) h$$

$$= 54.5 + \left( \frac{3}{36} \right) \times 2$$

$$= 54.5 + .17$$

$$= 54.67$$

$$\text{Mdn.} = 53.5 + \left( \frac{2}{7} \times 2 \right)$$

$$= 53.5 + .57$$

$$= 54.07$$

$$\text{S.D.} = h \cdot \sqrt{ \frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2 }$$

$$= 2 \times \sqrt{ \frac{289}{36} - \frac{9}{1296} }$$

$$= 2 \times \sqrt{ 8.0201 }$$

$$= 2 \times 2.84$$

$$= 5.68$$

TABLE XVIII

TEST OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS  
GRADE XI -- LATIN AND NON-LATIN

N = 36

Grade eleven Latin Mean = 61.84      S.D. = 6.32  
Grade eleven non-Latin mean = 54.67      S.D. = 5.68

$$\sigma_M = \frac{\sigma(\text{pop.})}{\sqrt{N-1}} = \frac{6.32}{\sqrt{36-1}}$$

$$\sigma_{M_L} = \frac{6.32}{5.916} = 1.068$$

$$\sigma_{M_{NL}} = \frac{5.68}{5.916} = .960$$

$$\sigma_{\text{diff.}} = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2} = \sqrt{1.068^2 + .960^2} = 1.44$$

Difference between means = 61.84 - 54.67 = 7.17

$$\text{Significance ratio} = \frac{7.17}{1.44} = 5.0$$

The ratio is so great that the null hypothesis can be rejected with certainty. There is a significant difference between the means. Since the difference between the means is not insignificant using the formula  $\sigma_{\text{diff.}} = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}$ , it would be even more significant if the formula for related groups,

$$\sigma_{\text{diff.}} = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r_{12} \sigma_{M_1} \sigma_{M_2}} \quad \text{were used.}$$

TABLE XIX

FREQUENCY DISTRIBUTION OF VOCABULARY SCORES OF 115 LATIN STUDENTS IN GRADES IX, X AND XI

x	f	d	fd	fd <sup>2</sup>	cf	cf in percent
78 - 79	1	11	11	121	115	100
76 - 77	1	10	10	100	114	99.1
74 - 75	0	9	0	0	113	98.2
72 - 73	3	8	24	192	113	98.2
70 - 71	0	7	0	0	110	95.6
68 - 69	3	6	18	108	110	95.6
66 - 67	8	5	40	200	107	93
64 - 65	6	4	24	96	99	86.1
62 - 63	10	3	30	90	93	80.8
60 - 61	5	2	10	20	83	72.2
58 - 59	9	1	9	9	78	67.8
56 - 57	18	0	0	0	69	60
54 - 55	8	-1	-8	8	51	44.2
52 - 53	13	-2	-26	52	43	37.3
50 - 51	5	-3	-15	45	30	26.1
48 - 49	9	-4	-36	144	25	21.7
46 - 47	8	-5	-40	200	16	13.9
44 - 45	2	-6	-12	72	8	6.9
42 - 43	2	-7	-14	98	6	5.2
40 - 41	2	-8	-16	128	4	3.4
38 - 39	2	-9	-18	162	2	1.7
Totals	115		-9	1845		

$$\begin{aligned}
 M &= A + \left( \frac{\sum fd}{N} \right) h \\
 &= 56.5 + \left( \frac{-9}{115} \right) \times 2 \\
 &= 56.5 - .156 \\
 &= 56.34
 \end{aligned}$$

$$\begin{aligned}
 \text{Mdn.} &= 55.5 + \left( \frac{6.5}{18} \times 2 \right) \\
 &= 55.5 + .72 \\
 &= 56.22
 \end{aligned}$$

$$\begin{aligned}
 \text{S.D.} &= h \cdot \sqrt{\frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2} \\
 &= 2 \times \sqrt{\frac{1845}{115} - \left( \frac{-9}{115} \right)^2} \\
 &= 2 \times \sqrt{16.034} \\
 &= 2 \times 4.00 \\
 &= 8.00
 \end{aligned}$$

TABLE XX

FREQUENCY DISTRIBUTION OF VOCABULARY SCORES OF 115  
NON-LATIN STUDENTS IN GRADES IX, X AND XI

x	f	d	fd	fd <sup>2</sup>	cf	cf in per cent
72 - 73	1	10	10	100	115	100
70 - 71	0	9	0	0	114	99.1
68 - 69	1	8	8	64	114	99.1
66 - 67	0	7	0	0	113	98.2
64 - 65	4	6	24	144	113	98.2
62 - 63	3	5	15	75	109	94.7
60 - 61	4	4	16	64	106	92.1
58 - 59	3	3	9	27	102	88.7
56 - 57	8	2	16	32	99	86.1
54 - 55	13	1	13	13	91	79.1
52 - 53	22	0	0	0	78	67.8
50 - 51	12	-1	-12	12	56	48.7
48 - 49	10	-2	-20	40	44	38.2
46 - 47	11	-3	-33	99	34	29.5
44 - 45	13	-4	-52	208	23	20
42 - 43	4	-5	-20	100	10	8.7
40 - 41	2	-6	-12	72	6	5.2
38 - 39	2	-7	-14	98	4	3.4
36 - 37	0	-8	0	0	2	1.7
34 - 35	0	-9	0	0	2	1.7
32 - 33	0	-10	0	0	2	1.7
30 - 31	1	-11	-11	121	2	1.7
28 - 29	<u>1</u>	-12	<u>-12</u>	<u>144</u>	1	.87
	115		-75	1413		

$$\begin{aligned}
 M &= A + \left( \frac{\sum fd}{N} \right) h \\
 &= 52.5 + \left( \frac{-75}{115} \right) \times 2 \\
 &= 52.5 - 1.304 \\
 &= 51.2
 \end{aligned}$$

$$\begin{aligned}
 \text{Mdn.} &= 51.5 + \frac{1.5}{22} \times 2 \\
 &= 51.5 + .136 \\
 &= 51.636
 \end{aligned}$$

$$\begin{aligned}
 \text{S.D.} &= h \sqrt{ \frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2 } \\
 &= 2 \times \sqrt{ \frac{1413}{115} - \left( \frac{-75}{115} \right)^2 } \\
 &= 2 \times \sqrt{ 11.862 } \\
 &= 2 \times 3.44 \\
 &= 6.88
 \end{aligned}$$



TABLE XXI

TEST OF SIGNIFICANCE OF DIFFERENCE BETWEEN MEANS  
TOTAL GROUPS -- LATIN AND NON-LATIN

N = 115

Latin mean = 56.3 S.D. = 8.00  
Non-Latin mean = 51.2 S.D. = 6.88

$$\sigma_M = \frac{\sigma(\text{pop.})}{\sqrt{N - 1}} = \frac{8.00}{\sqrt{115 - 1}}$$

$$\sigma_{M_L} = \frac{8.00}{10.677} = .748 \quad \sigma_{M_{NL}} = \frac{6.88}{10.677} = .6444$$

$$\sigma_{\text{diff.}} = \sqrt{.748^2 + .6444^2} = \sqrt{.5600 + .4152} = .99$$

Difference between the means = 56.3 - 51.2 = 5.1

$$\text{Significance ratio} = \frac{5.1}{.99} = 5.15$$

This ratio is so great that the null hypothesis may be rejected with certainty. Such a difference could not be due solely to chance.

It is not necessary to apply the formula for related means because it yields a smaller standard error of the difference and therefore gives a higher significance ratio.

TABLE XXII

FREQUENCY DISTRIBUTION OF VOCABULARY SCORES OF 42  
GRADE X LATIN STUDENTS

x	f	d	fd	fd <sup>2</sup>	ef
72 - 73	1	8	8	64	42
70 - 71	0	7	0	0	41
68 - 69	2	6	12	72	41
66 - 67	1	5	5	25	39
64 - 65	2	4	8	32	38
62 - 63	3	3	9	27	36
60 - 61	4	2	8	16	33
58 - 59	5	1	5	5	29
56 - 57	6	0	0	0	24
54 - 55	3	-1	-3	3	18
52 - 53	7	-2	-14	28	15
50 - 51	3	-3	-9	27	8
48 - 49	3	-4	-12	48	5
46 - 47	1	-5	-5	25	2
44 - 45	0	-6	0	0	1
42 - 43	<u>1</u>	-7	<u>-7</u>	<u>49</u>	1
Totals	42		5	421	

$$\begin{aligned}
 M &= A + \left( \frac{\sum fd}{N} \right) h \\
 &= 56.5 + \left( \frac{5}{42} \right) \times 2 \\
 &= 56.5 + .24 \\
 &= 56.74
 \end{aligned}$$

$$\begin{aligned}
 \text{Mdn.} &= 55.5 + \left( \frac{3}{6} \times 2 \right) \\
 &= 56.5
 \end{aligned}$$

$$\begin{aligned}
 \text{S.D} &= h \cdot \sqrt{\frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2} \\
 &= 2 \sqrt{\frac{421}{42} - \left( \frac{5}{42} \right)^2} \\
 &= 2 \sqrt{10.006} \\
 &= 2 \times 3.16 \\
 &= 6.32
 \end{aligned}$$

TABLE XXIII

FREQUENCY DISTRIBUTION OF VOCABULARY SCORES OF 42  
GRADE X NON-LATIN STUDENTS

$\bar{x}$	f	d	fd	$fd^2$	cf
72 - 73	1	10	10	100	42
70 - 71	0	9	0	0	41
68 - 69	0	8	0	0	41
66 - 67	0	7	0	0	41
64 - 65	2	6	12	72	41
62 - 63	1	5	5	25	39
60 - 61	1	4	4	16	38
58 - 59	2	3	6	18	37
56 - 57	4	2	8	16	35
54 - 55	3	1	3	3	31
52 - 53	9	0	0	0	28
50 - 51	7	-1	-7	7	19
48 - 49	4	-2	-8	16	12
46 - 47	3	-3	-9	27	8
44 - 45	4	-4	-16	64	5
42 - 43	<u>1</u>	-5	<u>-5</u>	<u>25</u>	<u>1</u>
Totals	42		3	389	

$$\begin{aligned}
 M &= A + \left( \frac{\sum fd}{N} \right) h \\
 &= 52.5 + \left( \frac{3}{42} \right) \times 2 \\
 &= 52.5 + .143 \\
 &= 52.64 \\
 \text{Mdn.} &= 51.5 + \left( \frac{2}{9} \times 2 \right) \\
 &= 51.5 + .44 \\
 &= 51.94
 \end{aligned}$$

$$\begin{aligned}
 \text{S.D.} &= h \cdot \sqrt{\frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2} \\
 &= 2 \times \sqrt{\frac{389}{42} - \left( \frac{3}{42} \right)^2} \\
 &= 2 \times \sqrt{9.257} \\
 &= 2 \times 3.04 \\
 &= 6.08
 \end{aligned}$$

TABLE XXIV

SIGNIFICANCE OF DIFFERENCE TEST BETWEEN GRADE  
X MEANS - LATIN AND NON-LATIN

N = 42

Grade X Latin mean = 56.74 S.D. = 6.32  
Grade X non-Latin mean = 52.64 S.D. = 6.08

$$\sigma M = \frac{\sigma(\text{pop.})}{\sqrt{N - 1}} = \frac{6.32}{\sqrt{42 - 1}}$$

$$\sigma M_L = \frac{6.32}{6.403} = .987 \quad \sigma M_{NL} = \frac{6.08}{6.403} = .9495$$

$$\begin{aligned} \sigma \text{ diff.} &= \sqrt{\sigma M_1^2 + \sigma M_2^2} \\ &= \sqrt{.9742 + .9015} \\ &= \sqrt{1.8757} \\ &= 1.37 \end{aligned}$$

Difference between means = 56.74 - 52.64 = 4.10

$$\text{Significance ratio} = \frac{4.1}{1.37} = 2.99$$

The null hypothesis may be rejected at the 1 per cent level of confidence. Ninety-nine per cent of the time, such a difference would not exist due to chance.

TABLE XXV

FREQUENCY DISTRIBUTION OF THE SCALED VOCABULARY  
SCORES OF 37 GRADE IX LATIN STUDENTS

x	f	d	fd	fd <sup>2</sup>	cf
76 - 77	1	12	12	144	37
74 - 75	0	11	0	0	36
72 - 73	0	10	0	0	36
70 - 71	0	9	0	0	36
68 - 69	0	8	0	0	36
66 - 67	0	7	0	0	36
64 - 65	1	6	6	36	36
62 - 63	0	5	0	0	35
60 - 61	0	4	0	0	35
58 - 59	1	3	3	9	35
56 - 57	6	2	12	24	34
54 - 55	3	1	3	3	28
52 - 53	5	0	0	0	25
50 - 51	1	-1	-1	1	20
48 - 49	5	-2	-10	20	19
46 - 47	7	-3	-21	63	14
44 - 45	2	-4	-8	32	7
42 - 43	1	-5	-5	25	5
40 - 41	2	-6	-12	72	4
38 - 39	2	-7	-14	98	2
Totals	37		35	527	

$$M = A + \left( \frac{\sum fd}{N} \right) h$$

$$= 52.5 + \left( \frac{-35}{37} \right) \times 2$$

$$= 52.5 - 1.89$$

$$= 50.61$$

$$\text{Mdn.} = 47.5 + \left( \frac{4.5}{5} \times 2 \right)$$

$$= 47.5 + 1.8$$

$$= 49.3$$

$$S.D. = h \cdot \sqrt{\frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2}$$

$$= 2 \times \sqrt{\frac{527}{37} - \left( \frac{-35}{37} \right)^2}$$

$$= 2 \times \sqrt{14.24 - .89}$$

$$= 2 \times \sqrt{13.34}$$

$$= 2 \times 3.65$$

$$= 7.30$$

TABLE XXVI

FREQUENCY DISTRIBUTION OF SCALED VOCABULARY SCORES  
OF 37 GRADE IX NON-LATIN STUDENTS

x	f	d	fd	fd <sup>2</sup>	cf
54 - 55	3	5	15	75	37
52 - 53	5	4	20	80	34
50 - 51	3	3	9	27	29
48 - 49	5	2	10	20	26
46 - 47	5	1	5	5	21
44 - 45	7	0	0	0	16
42 - 43	3	-1	-3	3	9
40 - 41	2	-2	-4	8	6
38 - 39	2	-3	-6	18	4
36 - 37	0	-4	0	0	2
34 - 35	0	-5	0	0	2
32 - 33	0	-6	0	0	2
30 - 31	1	-7	-7	49	2
28 - 29	1	-8	-8	64	1

$$M = A + \left( \frac{\sum fd}{N} \right) h$$

$$= 44.5 + \left( \frac{31}{37} \right) \times 2$$

$$= 44.5 + (.84 \times 2)$$

$$= 46.18$$

$$\text{Mdn.} = 45.5 + \left( \frac{2.5}{5} \times 2 \right)$$

$$= 46.5$$

$$\text{S.D.} = h \sqrt{ \frac{\sum fd^2}{N} - \left( \frac{\sum fd}{N} \right)^2 }$$

$$= 2 \times \sqrt{ \frac{349}{37} - \left( \frac{31}{37} \right)^2 }$$

$$= 2 \times \sqrt{ 9.43 - .702 }$$

$$= 2 \times \sqrt{ 8.728 }$$

$$= 2 \times 2.96$$

$$= 5.92$$

TABLE XXVII

SIGNIFICANCE OF DIFFERENCE TEST BETWEEN GRADE IX MEANS  
 LATIN AND NON-LATIN N = 37 r = .32 ± .15

Grade IX Latin mean = 50.61 S.D. = 7.3  
 Grade IX non-Latin mean = 46.18 S.D. = 5.92

$$\sigma M = \frac{\sigma (\text{pop.})}{\sqrt{N - 1}} = \frac{7.3}{\sqrt{37 - 1}}$$

$$\sigma M_L = \frac{7.3}{6} = 1.216 \quad \sigma M_{NL} = \frac{5.92}{6} = .987$$

$$\begin{aligned} \sigma \text{ diff.} &= \sqrt{\sigma M_1^2 + \sigma M_2^2 - 2r_{12}\sigma M_1\sigma M_2} \\ &= \sqrt{1.216^2 + .988^2 - 2 \times .32 \times 1.216 \times .988} \\ &= \sqrt{1.478 + .974 - .7689} = \sqrt{1.683} \\ &= 1.29 \end{aligned}$$

Difference between the means 50.61 - 46.18 = 4.43

$$\text{Significance ratio} = \frac{4.43}{1.29} = 3.43$$

The null hypothesis can be rejected with certainty. There is a significant difference. (Using the formula for unrelated means gives a significance ratio of 2.82. With this ratio, the null hypothesis can be rejected at the 1 per cent level of confidence.) Means for all these groups are related because they are equated groups. There is no doubt that the difference in all cases is significant.

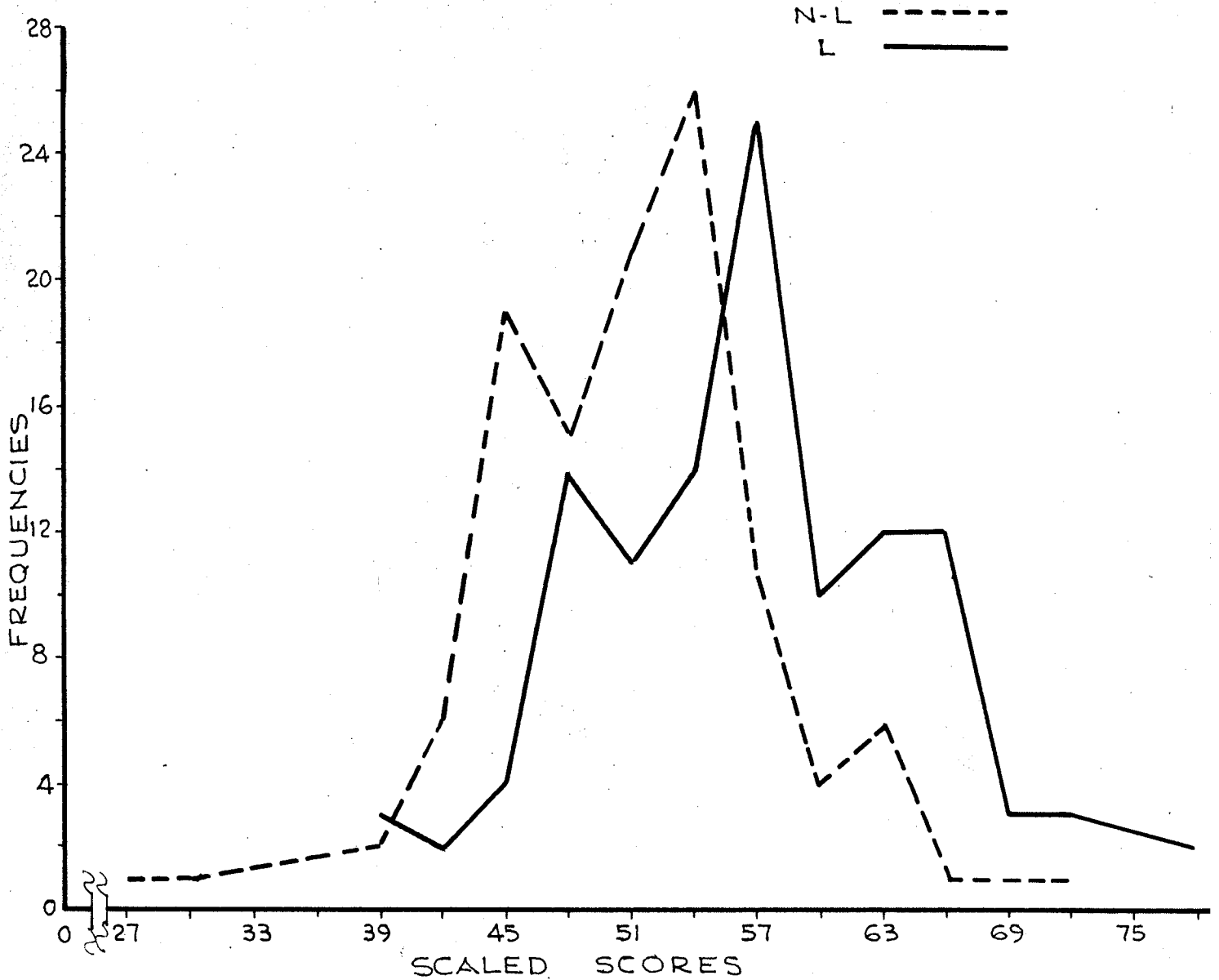


Figure 3. Frequency Polygons Showing the Distributions of the Scaled Vocabulary Scores of 115 Latin Students and 115 non-Latin Students.



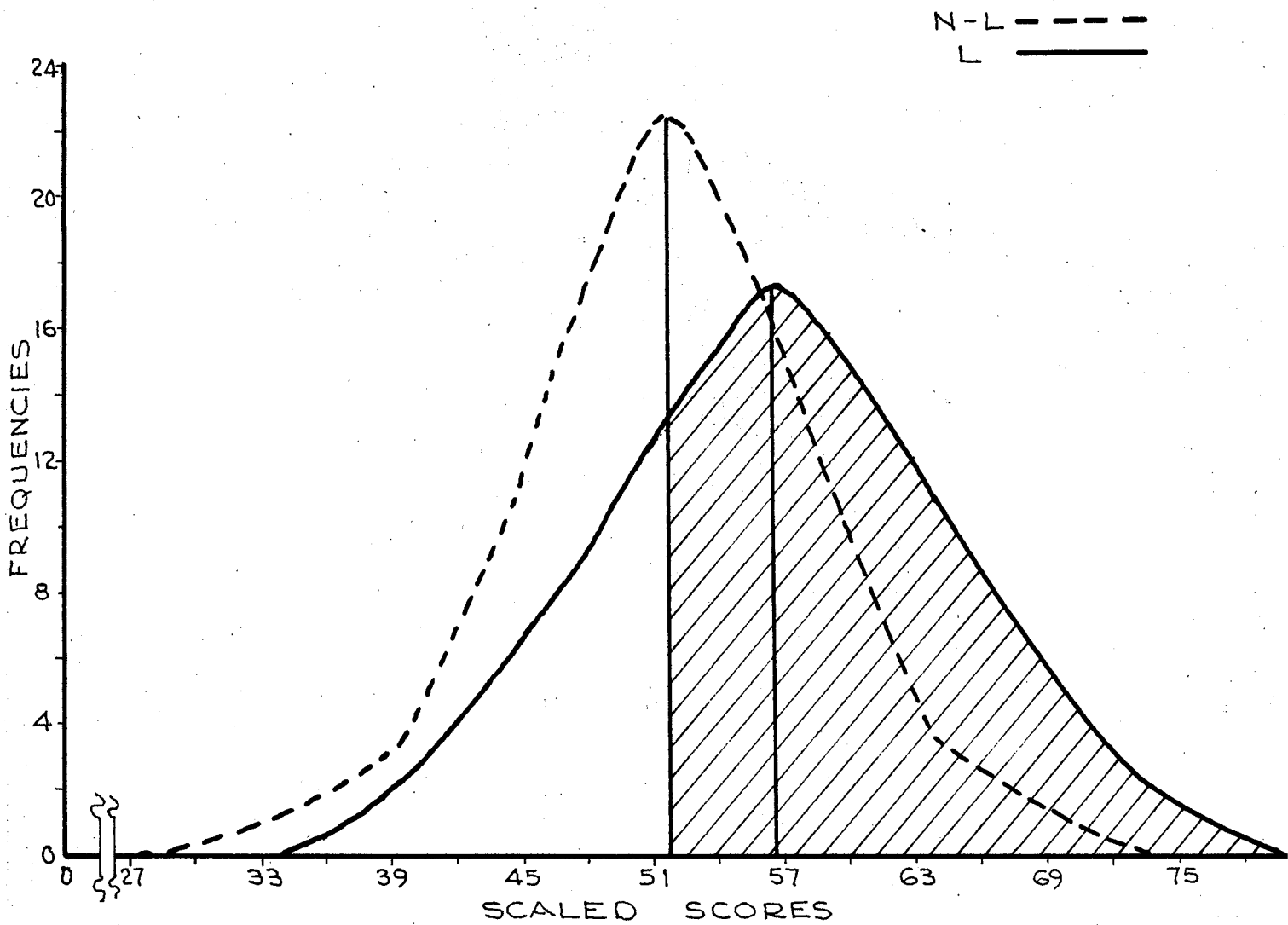


Figure 4. 73.9 Per Cent of the Latin Students Exceed the Mean of the non-Latin Students.

## OTHER FACTORS WHICH AFFECT ENGLISH VOCABULARY

The statistical treatment of the data shows a significant difference in the mean of the scaled scores in favor of the Latin students.

For information on factors, other than instruction in Latin, in which the groups might differ, it was necessary to refer to the questionnaires completed by each one of these 230 students, and to summarize (1) the number of years of French each student had had; (2) the native language of each; and (3) an "extent of reading" score for each. (Appendix I).

Native language. Each student had answered the question, "What other language besides English do you speak at home?" The answers when summarized yielded the results given in Table XXVIII.

Table XXVIII shows that there were more natively English speaking students in the non-Latin group. Even if being born to English-speaking parents is an aid to knowledge of English vocabulary, the small difference is in favor of the non-Latin students, 89 of whom were natively English-speaking.

Years of French Instruction.--The next "possible influence" to be considered was the number of years of training in French each student had had. This information was col-

lected by means of the question, "In what grades have you taken French?" One student in the Grade eleven non-Latin group had had nine years of French, but most students in Grade eleven, both groups, replied, "four -- Grades eight, nine, ten and eleven." For Grade ten the most common answer was "three," and for Grade nine, "two." These results were expected since all these students were in matriculation classes. The non-Latin students need a language and the Latin students commonly elect one other. When all the pairs who matched exactly in years of French had been eliminated, the results for the others were tabulated and added. The results are shown in Table XXIX.

The total difference in years of French instruction was three in favour of the non-Latin group. That is, the non-Latin group, as a whole, had three more years of French than the Latin group. Seventy-four of the pairs were exactly matched in number of years of French and the difference for the others was very slight, totalling only three years more for the non-Latin students.

Extent of Reading. From each student's reply to the questionnaire, he was given an "extent of reading" score.

The questions asked to assess reading were as follows:

TABLE XXVIII

THE NUMBER OF NATIVELY ENGLISH-SPEAKING  
STUDENTS IN EACH GROUP

	Grade IX		Grade X		Grade XI		Total	
	L	NL	L	NL	L	NL	L	NL
English	24	30	29	33	27	26	80	89
Other Language	13	7	13	9	9	10	35	26

TABLE XXIX

DIFFERENCES IN YEARS OF FRENCH INSTRUCTION  
BETWEEN LATIN AND NON-LATIN STUDENTS

12 Pairs Differed in Grade IX		18 Pairs Differed in Grade X		11 Pairs Differed in Grade XI	
L	NL	L	NL	L	NL
27	22	51	47	38	50

Do you use the school library?

not at	for	for	in a
all	reference	pleasure	class period

Do you use the public library?

not at	for	for	very
all	reference	pleasure	often

Approximately how many books, other than textbooks, have you read during the past year?

0 1 2 3 4 5 6 7 8 9 10 more than 10

If you can, give author and title of two books that you have read during the past year.

In the first three questions, the student was asked to circle correct responses and, for the fourth, space was given for authors and titles. The highest possible "extent of reading" score was five. A student could earn it by (1) circling one or more ways he used the school library; (2) circling one or more ways he used the public library; (3) having read from six to more than ten books; (4) giving the titles of two books he had read; and (5) giving authors of two books. If he missed one of these, his score was four, and so on down to zero. A few students scored zero and some, by missing half a point, scored four and one-half, three and one-half, etc.

The repetition in these questions provided some

TABLE XXX

DIFFERENCE IN EXTENT OF READING SCORES BETWEEN  
LATIN AND NON-LATIN PAIRS

30 Pairs Differed in Grade IX		36 Pairs Differed in Grade X		28 Pairs Differed in Grade XI	
L	NL	L	NL	L	NL
135.5	111	115	98.5	121	95.5

indication of the validity of the answers, but a check with some thirty parents, whose names were drawn, was made in an attempt to verify the student's rating of himself as a reader. Parents, when called, were told that the investigator was a teacher surveying the reading habits of students, and were requested to class son or daughter as a (1) wide reader; (2) average reader; or (3) non-reader. As a rule, no change in the score was made. There was enough agreement to indicate that these students were fairly reliable self-raters.

Scores of all the pairs who differed were recorded and added. Some difference was found between Latin and non-Latin students. The difference is shown in Table XXX. In each grade the Latin students were wider readers than the non-Latin students - in Grade nine, 1.2 times more; in Grade ten, 1.2 times more; in Grade XI, 1.3 times more. These ratios are not large, but are consistent enough to be considered correct.

There might, then have been some gain in vocabulary on the side of the Latin students which was due to the wider extent of their reading.

To find out if the difference in vocabulary knowledge was still significant when the difference in extent of reading was eliminated, it was necessary to test the

significance of the difference in the scaled scores of the twenty-one pairs, Latin and non-Latin, who matched in "extent of reading" scores, as well as in mental ability, age, sex and grade.

The difference was found to be still statistically significant in the scaled vocabulary scores of these twenty-one pairs.



TABLE XXXI

TEST OF SIGNIFICANCE OF DIFFERENCE IN THE SCALED  
VOCABULARY SCORES OF 21 PAIRS WHO MATCH IN  
READING SCORE, AS WELL AS MENTAL ABIL-  
ITY, AGE, SEX, AND GRADE

Pairs	L Score	NL Score	Difference	x	x <sup>2</sup>
Grade XI					
G.B.1	66	55	11	5.3	28.09
G.B.2	57	64	-7	-12.7	161.29
G.B.7	62	57	5	-.7	.49
S.J.20	67	53	14	8.3	68.89
S.J.25	56	60	-4	-1.7	2.89
S.J.26	62	61	1	-4.7	22.09
S.J.28	56	53	3	-2.7	7.29
K. 31	73	55	18	12.3	151.29
Grade X					
S. 11	62	52	10	4.3	18.49
S. 13	52	51	1	-4.7	22.09
S. 15	61	52	9	3.3	10.89
K. 31	66	55	11	5.3	28.09
K. 33	59	53	6	.3	.90
G.B.37	48	50	-2	-7.7	59.29
Grade IX					
H.J.M.1	47	53	-6	-11.7	136.89
H.J.M.3	47	44	3	-2.7	7.29
C.9	77	53	24	18.3	334.89
C.15	53	53	0	-5.7	32.49
C.20	56	50	6	.3	.90
S.J.31	56	43	13	7.3	53.29
S.J.36	48	44	4	-1.7	2.89
			21	<u>120</u>	<u>1150.71</u>
				5.7	

$$\text{Mean } D = 5.7$$

$$\text{S.D.}_D = \sqrt{\frac{\sum x^2}{N - 1}} = \sqrt{\frac{1150.71}{20}} = 7.58$$

$$\text{S.D.}_{M_D} = \frac{7.58}{\sqrt{21}} = \frac{7.58}{4.583} = 1.65$$

$$t = \frac{5.7}{1.65} = 3.4$$

The null hypothesis may be rejected with certainty.

Summary. The Latin students scored more than the non-Latin students in English vocabulary. For each group tested: (1) Grade nine, (2) Grade ten, (3) Grade eleven, and (4) for all these combined, the difference was high enough to be statistically significant. The greatest difference of all was at the Grade eleven level. The significance ratio found by using the formula for unrelated means diminishes from Grade eleven to Grade nine. It was 5 for the Grade eleven groups, 2.99 for Grade ten and 2.8 for Grade nine. This signifies that the Grade eleven students gained most significantly, next Grade ten and least Grade nine. In Grade eleven, the ratio of Latin gains to non-Latin gains was 11.4 to one. This was a considerable jump from the Grade ten ratio of 4.26 to one, and the Grade nine ratio of 3.63 to one. These figures are in agreement with the findings cited in Chapter II that the greatest gain in word knowledge comes after the student has persisted with his Latin study beyond two years.<sup>1</sup>

The Latin and non-Latin groups did not differ in the percentage of natively English-speaking students, nor in the number of years of French instruction they had had, but they did differ (in the ratio of Latin 6: non-Latin 5) in the extent of their reading. The Latin students were slightly wider

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<sup>1</sup>H.R. Douglass and C. Kettelson, "The Transfer of Training in High School Latin to English Grammar, Spelling and Vocabulary," Journal of Experimental Education, IV (Sept., 1935), p.32.

readers. There were, however, twenty-one pairs who matched in reading score as well as in mental ability, age, sex and grade. Their scaled vocabulary scores showed a significant difference in favour of the Latin students. There must, then, have been some increase in vocabulary facility which could be attributed solely to Latin instruction, -- the influence of all other contributing factors having been held constant.

## CHAPTER VI

### SUMMARY, CONCLUSIONS AND SUGGESTIONS

The makers of forthcoming high school curricula for Manitoba no doubt will again ask the question, "What is the place of Latin?" Is it a basic subject of a "frill"? Is it for the brilliant and the specialist, or can it be useful to most high school students?

#### 1. SUMMARY AND CONCLUSIONS

This investigation was undertaken to find out (1) if, in the Winnipeg High Schools, method and content in Latin instruction contribute sufficiently to the attainment of its primary objective, i.e. an increase of English vocabulary, and, if so, (2) to ascertain how many years of Latin training best serve this purpose.

Information collected from over a thousand students in six Winnipeg high schools enabled the investigator to match 115 Latin students with an equal number of non-Latin students for age, grade, sex, and mental ability. The survey aimed to embrace all students from the expert to the incompetent. It included the mental ability range from ninety to one hundred and thirty-seven. These were found to be the matchable limits, since mates are harder to find in a very high or very low category.

A statistically significant difference in knowledge of English vocabulary, as measured by the Cooperative Vocabulary Test, was found in favour of the Latin students. This difference increased in significance with the number of years of Latin training. That is, the Grade nine Latin students, as a group, were significantly ahead of their non-Latin fellows; the Grade ten Latin students were even more significantly higher in score than their non-Latin mates; and, in Grade eleven, the Latin students gained over their non-Latin partners in the ratio of 11.4 to 1. In other words, there was a jump in significant gain in English vocabulary knowledge of those students who were completing their third year of Latin instruction.

Influence of three other factors on English vocabulary of students was taken into account. These factors are (1) native language; (2) years of training in French; and (3) extent of reading. The two groups proved to be nearly equal in number of natively English-speaking students and number of years' training in French. The Latin students were the wider readers. However, twenty-one pairs of the 115 could be matched for extent of reading score, as well as for sex, age, grade and mental ability. When this was done and the significance of difference test for small groups made, the twenty-one Latin students surpassed in English vocabulary score their twenty-one non-Latin mates by a statistically significant mar-

begin. It can be concluded that Latin instruction accounted for the increase in the English vocabulary knowledge of these students, all other influencing factors having been eliminated.

## 2. STRENGTH AND WEAKNESS OF THE STUDY

### Strengths

1. There were no artificial conditions. Students were taken, as found, from regular matriculation classes for testing, which was done by the investigator in all schools using uniform directions and the same time limit. Latin and non-Latin partners were tested together. The same scorer marked all tests, using recommended procedure. There were no experimental and control groups, as such. The teachers of Latin over the past three years had no way of knowing that its influence on English vocabulary would be assessed.

2. The Cooperative Vocabulary Test contains 210 words, - an ample sample, not weighted on the side of Latin-derived words. About 45 per cent are Latin-derived.

3. There was no superiority in either group in intelligence nor background. All were in matriculation classes; none was from high school leaving, commercial or terminal courses. Age, sex, grade, and mental ability were equated. Care was taken to find the match for the student from his own school, so that home conditions and school environment might be as nearly equal as possible. The two groups were

balanced in number of years of French instruction. Eighty-nine members of the non-Latin group were natively English-speaking as compared with eighty of the Latin group.

4. The fact that the Latin students were wider readers was taken into account by finding a smaller number within the group who could be matched, student by student, for extent of reading score as well as age, sex, grade, and mental ability. In this group of twenty-one matched pairs, the English vocabulary scores of the Latin students were again significantly superior.

5. The survey was city-wide. A large enough number of 115 pairs was used. The effect of extreme individual differences, which the students had encountered - differences in teaching ability, method, forms of motivation - and the effect of differences in their own attitudes to learning situations, would be diminished in the mean of a large group.

6. The consistency of the findings indicate reliability.

#### Weakness

It is not known if these groups differed in word knowledge at the time of their entrance to Grade nine, before the Latin students had begun the subject. It may be true that students who choose Latin have an inherent "word sense."

### 3. SUGGESTIONS FOR FURTHER STUDY

1. A study arising out of the above-mentioned weakness would involve testing a large sample of Grade nine students as they begin Latin, to find out if they have more English vocabulary knowledge than students of equal ability who do not choose Latin.

2. In order to ascertain whether high proficiency in Latin increases its effect on English vocabulary, a study is to be made of the correlation of the June Latin marks of the 115 Latin students with their scores on the Cooperative Vocabulary Test.

3. It would be advantageous, when groups such as these have been equated - a considerable amount of work - to carry on a wide testing program in spelling, reading, comprehension, effectiveness of expression, grammar, and, perhaps, literary appreciation. Such a testing program would provide worthwhile information regarding the influence of Latin on all aspects of English language. However, programs of testing cross-sections of classes are not compatible with high school timetabling and even the thirty-minute vocabulary test proved to be a disturbance in the school.

### 4. IMPLICATIONS

1. If Latin influences English vocabulary significantly, as these findings from six Winnipeg high schools indicate, it should have a place among the basic subjects.



2. Latin, as an aid to reading and writing English, is beneficial and useful to all students.

3. In this investigation, the greatest gain in English vocabulary appeared after third-year Latin. The implication for Manitoba's curriculum is that, if Latin is to continue to be forced into competing, as an elective, with Physics, Chemistry and French at the Grade eleven level, then a beginning in the subject should come at Grade eight, to allow students a chance for maximum benefit.

4. Other timely considerations and deliberations might question Manitoba's failure to offer Latin in some rural schools as well as in one Winnipeg senior high school, and the possible future scarcity of Latin teachers because of (1) present-day demand by students for the sciences, in Grade eleven; and (2) a curriculum which, in most cases, forces the students to choose between these and Latin.

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APPENDIX

APPENDIX A

For Students of Grades IX, X, XI.

SECTION I.

- 1. Name: \_\_\_\_\_
- 2. Boy or girl: \_\_\_\_\_
- 3. Grade: \_\_\_\_\_
- 4. Room: \_\_\_\_\_
- 5. School: \_\_\_\_\_
- 6. Birthdate: Day \_\_\_\_\_ Month \_\_\_\_\_ Year \_\_\_\_\_
- 7. Phone Number: \_\_\_\_\_

1. If you have written Grade IX Departmental Examinations, in what school did you write?

2. What other language besides English, do you speak at home?

SECTION II.

In answering this section, please circle the correct answers:

- 1. In what grades have you taken French?  
 none    4    5    6    7    8    9    10    11
- 2. In what grades have you taken Latin?  
 none    8    9    10    11
- 3. Do you use the school library?  
 not at all                      for reference                      for pleasure                      in a class period
- 4. Do you use the public library?  
 not at all                      for reference                      for pleasure                      very often
- 5. Approximately how many books, other than text books, have you read during the past year?  
 0    1    2    3    4    5    6    7    8    9    10    more than 10

SECTION III.

If you can, give author and title of two books that you have read during the past year.

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APPENDIX B  
OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

By ARTHUR S. OTIS

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

HIGHER EXAMINATION: FORM B

For High Schools and Colleges

20

Score.....

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

*Do not open this paper, or turn it over, until you are told to do so. Fill these blanks, giving your name, age, birthday, etc. Write plainly.*

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

Birthday.....Class.....Date.....19....  
Month Day

School or College.....City.....

This is a test to see how well you can think. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered:

Which one of the five words below tells what an apple is?

- 1 flower, 2 tree, 3 vegetable, 4 fruit, 5 animal.....( 4 )

The right answer, of course, is "fruit"; so the word "fruit" is underlined. And the word "fruit" is No. 4; so a figure 4 is placed in the parentheses at the end of the dotted line. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer; just draw a line under it and then put its number in the parentheses:

Which one of the five words below means the opposite of north?

- 1 pole, 2 equator, 3 south, 4 east, 5 west.....( )

The answer, of course, is "south"; so you should have drawn a line under the word "south" and put a figure 3 in the parentheses. Try this one:

A foot is to a man and a paw is to a cat the same as a hoof is to a — what?

- 1 dog, 2 horse, 3 shoe, 4 blacksmith, 5 saddle.....( )

The answer, of course, is "horse"; so you should have drawn a line under the word "horse" and put a figure 2 in the parentheses. Try this one:

At four cents each, how many cents will 6 pencils cost?.....( )

The answer, of course, is 24, and there is nothing to underline; so just put the 24 in the parentheses. If the answer to any question is a number or a letter, put the number or letter in the parentheses without underlining anything. Make all letters like printed capitals.

The test contains 75 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

*Do not turn this page until you are told to begin.*

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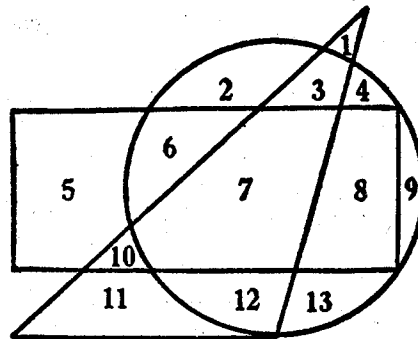


## EXAMINATION BEGINS HERE :

1. The opposite of love is (?)  
1 like, 2 anger, 3 hate, 4 strange, 5 lover..... ( )
2. If 2 pencils cost 5 cents, how many pencils can be bought for 50 cents?..... ( )
3. A man does not always have (?)  
1 bones, 2 heart, 3 teeth, 4 nerves, 5 lungs..... ( )
4. What letter in the word WILMINGTON is the same number in the word (counting from the beginning) as it is in the alphabet?..... ( )
5. If the following words were arranged to make the best sentence, the first word of the sentence would begin with what letter? Print the letter as a capital.  
tests pupils mental thousands have of taken..... ( )
6. A word meaning the same as effect is (?)  
1 cause, 2 result, 3 affect, 4 change, 5 answer..... ( )
7. Gold is more costly than silver because it is (?)  
1 heavier, 2 scarcer, 3 yellower, 4 harder, 5 prettier..... ( )
8. A circle is related to a square in the same way that a sphere is related to (?)  
1 circumference, 2 cube, 3 round, 4 corners, 5 ball..... ( )
9. If 10 boxes full of oranges weigh 500 pounds, and each box when empty weighs 5 pounds, how many pounds do all the oranges weigh?..... ( )
10. The opposite of graceful is (?) 1 rough, 2 homely, 3 miserable, 4 awkward, 5 stout... ( )
11. Which one of the six statements below explains the following proverb? "A bird in the hand is worth two in the bush."..... ( )
  1. It is easier to carry eggs in two baskets than in one.
  2. A man of action has a loud voice.
  3. Tame birds are more expensive than wild ones.
  4. It is better to be content with what you have than to lose it gambling for more.
  5. It is safer not to risk all on one venture.
  6. What a man does is a better indication of his character than what he says.
12. Which statement explains this proverb? "Actions speak louder than words."..... ( )
13. Which statement explains this proverb? "Don't put all your eggs in one basket."..... ( )
14. In general it is safer to judge a man's character by his (?)  
1 voice, 2 clothes, 3 deeds, 4 wealth, 5 face..... ( )
15. Ordinary is related to exceptional as many is to (?)  
1 all, 2 none, 3 few, 4 common, 5 more..... ( )
16. A father is always (?) than his son.  
1 wiser, 2 stronger, 3 richer, 4 older, 5 taller..... ( )
17. The opposite of extravagant is (?)  
1 miser, 2 humble, 3 economical, 4 poor, 5 wasteful..... ( )
18. One number is wrong in the following series. What should that number be?  
1 5 2 6 3 7 4 9 5 9..... ( )
19. What people think about a person constitutes his (?)  
1 personality, 2 character, 3 reputation, 4 biography, 5 career..... ( )
20. A party consisted of a man and his wife, his three sons and their wives, and three children in each of the sons' families. How many were there in the party?..... ( )
21. At a wedding there is always (?)  
1 minister, 2 music, 3 flowers, 4 bride, 5 cake..... ( )
22. To insist that stones have thoughts is (?)  
1 absurd, 2 misleading, 3 improbable, 4 unfair, 5 wicked..... ( )
23. Which word is needed to begin the following sentence? — the four sides of a rectangle are equal, it is a square.  
1 Although, 2 If, 3 Since, 4 Now that, 5 Because..... ( )
24. If the first two statements following are true, the third is (?) All members of this committee are Democrats. Jones is not a Democrat. Jones is a member of this committee.  
1 true, 2 false, 3 not certain..... ( )
25. The opposite of always is (?)  
1 sometimes, 2 often, 3 occasionally, 4 seldom, 5 never..... ( )

26. Which one of these five things is most unlike the other four?  
1 nut, 2 turnip, 3 rose, 4 apple, 5 potato..... ( )
27. Sanitation is related to disease as (?) is to accident.  
1 doctor, 2 hospital, 3 bandage, 4 cleanliness, 5 care..... ( )
28. The two words pertinent and permanent mean (?)  
1 the same, 2 the opposite, 3 neither same nor opposite..... ( )
29. The opposite of loyal is (?)  
1 treacherous, 2 enemy, 3 thief, 4 coward, 5 jealous..... ( )
30. Count each Y in this series that is followed by an E next to it if the E is not followed by an S next to it. Tell how many Y's you count.  
Y E Y S F Z Y E S Z E Y E E S F Z S Y E F Y E S E Y Z E Y E Z..... ( )
31. If a boy can run at the rate of 5 feet in  $\frac{1}{5}$  of a second, how many feet can he run in 10 seconds?..... ( )
32. Which one of the six statements below explains the following proverb? "An ounce of discretion is worth a pound of wit."  
1. Storms wreck many ships.  
2. Food is seldom as well cooked as it might be.  
3. It is easy to appear wise after an event has happened.  
4. It is easier to keep out of trouble than to lie out of it.  
5. Leadership is easy when all goes well.  
6. Division of responsibility brings poor results.
33. Which statement explains this proverb? "Too many cooks spoil the broth."..... ( )
34. Which statement explains this proverb? "In a calm sea every man is a pilot."..... ( )
35. If the words below were rearranged to make a good sentence, the last word of the sentence would begin with what letter? Print the letter as a capital.  
preparation training life A excellent an college is for..... ( )
36. If the first two statements following are true, the third is (?). George is younger than Frank. James is younger than George. Frank is older than James.  
1 true, 2 false, 3 not certain..... ( )
37. One who pretends to be what he is not is said to be (?)  
1 sensitive, 2 artless, 3 vain, 4 hypocritical, 5 prejudiced..... ( )
38. The opposite of abolish is (?)  
1 alter, 2 create, 3 continue, 4 destroy, 5 change..... ( )
39. If  $2\frac{1}{2}$  yards of cloth cost \$2, how many dollars will 10 yards cost?..... ( )
40. Which of the five things following is most unlike the other four?  
1 ax, 2 knife, 3 razor, 4 hammer, 5 shears..... ( )
41. Sunlight is to darkness as (?) is to stillness.  
1 quiet, 2 sound, 3 dark, 4 loud, 5 moonlight..... ( )
42. The opposite of fickle is (?)  
1 silly, 2 constant, 3 stationary, 4 solid, 5 sober..... ( )
43. If the first two statements following are true, the third is (?) Some of our citizens are Methodists: Some of our citizens are doctors. Some of our citizens are Methodist doctors.  
1 true, 2 false, 3 not certain..... ( )
44. If  $3\frac{1}{2}$  yards of cloth cost 70 cents, how many cents will  $2\frac{1}{2}$  yards cost?..... ( )
45. A point is to a line as a line is to (?)  
1 surface, 2 pencil, 3 dot, 4 curve, 5 solid..... ( )
46. The two words superfluous and requisite mean (?)  
1 the same, 2 the opposite, 3 neither same nor opposite..... ( )
47. One can measure a city block — by pacing.  
1 evenly, 2 carefully, 3 cautiously, 4 approximately, 5 correctly..... ( )
48. Suppose that the first and second letters of the alphabet were interchanged, also the third and fourth, the fifth and sixth, etc. Write the letter which would then be the eighteenth letter of the series..... ( )
49. If a strip of cloth 36 inches long will shrink to 33 inches when washed, how many inches long will a 48-inch strip be after shrinking?..... ( )
50. Which one of the five words following is most unlike the other four?  
1 strong, 2 bad, 3 ripe, 4 round, 5 come..... ( )
51. A home always has (?)  
1 a mother, 2 hearth, 3 congeniality, 4 familiarity, 5 music..... ( )

52. A word meaning the same as controversy is (?)  
 1 dispute, 2 conversation, 3 discussion, 4 lawsuit, 5 dialogue..... ( )
53. Find the two letters in the word LATER which have just as many letters between them in the word as in the alphabet. Write the one of these two letters that comes first in the alphabet... ( )
54. The law of gravitation is (?)  
 1 obsolete, 2 absolute, 3 approximate, 4 conditional, 5 constitutional..... ( )
55. Which one of the five words below is most like these three: joy, anger, and fear?  
 1 habit, 2 memory, 3 hate, 4 life, 5 hearing..... ( )
56. A peninsula is to a continent as (?) is to the ocean.  
 1 river, 2 cape, 3 gulf, 4 lake, 5 island..... ( )
57. If all the even-numbered letters in the alphabet were crossed out, the tenth letter left, not crossed out, would be what letter? Print it. *Do not mark the alphabet.*  
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z..... ( )
58. A hotel serves a mixture of 3 parts cream and 2 parts milk. How many pints of cream will it take to make 25 pints of the mixture?..... ( )
59. Write the letter of the alphabet which is the third to the right of the letter which is midway between M and Q..... ( )
60. Which of the following is a trait of character?  
 1 wealth, 2 strength, 3 reputation, 4 loyalty, 5 admiration..... ( )
61. If a prosperous son neglects his poor, aged parents, he is considered (?)  
 1 thrifty, 2 extravagant, 3 unwise, 4 thoughtless, 5 shrewd..... ( )
62. One number is wrong in the following series. What should that number be?  
 1, 2, 4, 8, 16, 36, 64..... ( )
63. Evolution is to revolution as crawl is to (?)  
 1 baby, 2 floor, 3 stand, 4 run, 5 hands and knees..... ( )
64. How many of the following words can be made of the letters in the word FREIGHT, using any letter twice?  
 retire, height, grief, trigger, neither, thrift, relief, eighty..... ( )
65. If Frank can ride a bicycle 300 feet while George runs 200 feet, how many feet can Frank ride while George runs 300 feet?..... ( )
66. If the words below were rearranged to make a good sentence, the *fifth* word in the sentence would begin with what letter? Print the letter as a capital.  
 life friends valuable to The make asset in a is ability..... ( )
67. If the first two statements following are true, the third is (?) It takes perseverance to become a skillful juggler. This boy has perseverance. He will become a skillful juggler.  
 1 true, 2 false, 3 not certain..... ( )
68. If a wire 20 inches long is to be cut so that one piece is  $\frac{2}{3}$  as long as the other piece, how many inches long must the longest piece be?..... ( )
69. Find the letter which in this sentence itself appears a second time nearest the beginning..... ( )
70. Which of the five things following is most like these three: ivory, snow, and milk?  
 1 butter, 2 rain, 3 cold, 4 cotton, 5 water..... ( )
71. One number is wrong in the following series. What should that number be?  
 1 2 4 7 11 16 23..... ( )
72. What number is in the space which is in the rectangle and in the triangle but not in the circle? ( )



73. What number is in the same geometrical figure or figures as the number 6?..... ( )
74. How many spaces are there which are in any two but only two geometrical figures?..... ( )
75. What is the greatest number of spaces that could be made to be in any one but only one geometrical figure by overlapping any triangle, circle, and rectangle in any way?..... ( )

**PREPARING FOR USE**

First separate strips A, B, C, and D by cutting on the lines between them. If desired, these strips may be mounted on cardboard. Next, with a razor blade or sharp knife cut out the four rectangles in strips A and C, making "windows" through which the IQ is to be read.

**TO FIND AN IQ BY THE INTERMEDIATE EXAMINATION**

Find the pupil's score in the right-hand column of strip B (the column headed "Score"). Put your pencil on the pupil's score in this column.

Next lay strip A upon strip B in such a position that the age of the pupil as found on strip A is directly opposite his score on strip B. The pupil's IQ is then read in the window labeled "IQ" at either the top or the bottom of the strip.

For example, suppose the pupil has made a score of 50 and his age is 12 years 10 months. In that case adjust strip A upon

strip B so that the line reading 12:9-12:11 is opposite the score of 50. (12:10 is in the interval 12:9-12:11.) It will be seen that the IQ appearing at the window at the top of strip A is 107.

**TO FIND AN IQ BY THE HIGHER EXAMINATION**

An IQ by the Higher Examination is found in the same way, using strips C and D. When first using these scales it would be well to check a few IQ's by means of the method given on page 6 of the Manual of Directions, in order to be sure that the scales are being properly used.

**A REFINEMENT IN FINDING IQ'S**

It will be noted that the method of figuring IQ's as provided in the Manual is such that the highest IQ obtainable by a pupil of 17 years 6 months or over in the Higher Examination is 133, whereas much higher IQ's than this can be obtained by pupils of lower ages. This is because the distribution of IQ's of adults by the Higher Examination is skewed. When the skewness of this distribution of IQ's has been corrected by statistical means, it is found that the IQ of a pupil of 17 years 6 months or over who has made a score of 75 should be 144, and there should be a corresponding increase in the IQ's of such pupils making scores above 67. It is for this reason that the scores from 67 to 75 in strip D have been spaced out. The use of this refinement in figuring IQ's from high scores in the Higher Examination is optional, but IQ's so derived are more comparable to IQ's obtained by the younger pupils.

**A**

**INTERMEDIATE EXAMINATION**

AGE  
(IN YEARS AND MONTHS)  
(16:8 - 17:5 means  
all ages from 16 yr.,  
8 mo. to 17 yr., 5 mo.)

IQ → **Cut out**

17: 6 or over	158
16: 8 - 17: 5	157
16: 3 - 16: 7	156
15: 10 - 16: 2	155
15: 6 - 15: 9	154
15: 3 - 15: 5	153
14: 11 - 15: 2	152
14: 8 - 14: 10	151
14: 5 - 14: 7	150
14: 2 - 14: 4	149
13: 11 - 14: 1	148
13: 9 - 13: 10	147
13: 7 - 13: 8	146
13: 4 - 13: 6	145
13: 2 - 13: 3	144
13: 0 - 13: 1	143
12: 9 - 12: 11	142
12: 7 - 12: 8	141
12: 5 - 12: 6	140
12: 3 - 12: 4	139
12: 1 - 12: 2	138
12: 0	137
11: 10 - 11: 11	136
11: 8 - 11: 9	135
11: 6 - 11: 7	134
11: 4 - 11: 5	133
11: 3	132
11: 2	131
11: 1	130
11: 0	129
10: 10 - 10: 11	128
10: 9	127
10: 7 - 10: 8	126
10: 6	125
10: 4 - 10: 5	124
10: 3	123
10: 1 - 10: 2	122
10: 0	121
9: 10 - 9: 11	120
9: 9	119
9: 7 - 9: 8	118
9: 6	117
9: 4 - 9: 5	116
9: 3	115
9: 1 - 9: 2	114
9: 0	113
8: 10 - 8: 11	112
8: 9	111
8: 7 - 8: 8	110
8: 6	109
8: 4 - 8: 5	108
8: 3	107
8: 1 - 8: 2	106
8: 0	105
8: 0	104
8: 0	103
8: 0	102
8: 0	101
8: 0	100
8: 0	99
8: 0	98
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8: 0	67
8: 0	66
8: 0	65
8: 0	64
8: 0	63
8: 0	62
8: 0	61
8: 0	60
8: 0	59
8: 0	58
8: 0	57
8: 0	56
8: 0	55
8: 0	54
8: 0	53
8: 0	52
8: 0	51
8: 0	50

**Cut out** ← IQ

**B**

**INTERMEDIATE EXAMINATION**

IQ	115
IQ	114
SCORE	75
	74
	73
	72
	71
	70
	69
	68
	67
	66
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	7
	6
	5
	4
	3
	2
	1
	0

**C**

**HIGHER EXAMINATION**

AGE  
(IN YEARS AND MONTHS)  
(16:9 - 17:5 means  
all ages from 16 yr.,  
9 mo. to 17 yr., 5 mo.)

IQ → **Cut out**

17: 6 or over	151
16: 9 - 17: 5	150
16: 3 - 16: 8	149
15: 10 - 16: 2	148
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13: 2 - 13: 4	138
12: 11 - 13: 1	137
12: 8 - 12: 10	136
12: 6 - 12: 7	135
12: 3 - 12: 5	134
12: 1 - 12: 2	133
12: 0	132
12: 0	131

**Cut out** ← IQ

**D**

**HIGHER EXAMINATION**

IQ	160	SCORE	75
IQ	159		
	158	130	73
	157	129	
	156	128	71
	155	127	
	154	126	70
	153	125	
	152	124	69
	151	123	
	150	122	68
	149	121	
	148	120	67
	147	119	66
	146	118	65
	145	117	64
	144	116	63
	143	115	62
	142	114	61
	141	113	60
	140	112	59
	139	111	58
	138	110	57
	137	109	56
	136	108	55
	135	107	54
	134	106	53
	133	105	52
	132	104	51
	131	103	50
		102	49
		101	48
		100	47
		99	46
		98	45
		97	44
		96	43
		95	42
		94	41
		93	40
		92	39
		91	38
		90	37
		89	36
		88	35
		87	34
		86	33
		85	32
		84	31
		83	30
		82	29
		81	28
		80	27
		79	26
		78	25
		77	24
		76	23
		75	22
		74	21
		73	20
		72	19
		71	18
		70	17
		69	16
		68	15
			14
			13
			12
			11
			10

Classes plotted.....Number.....Form used.....Time limit.....min. Date.....IQ.....

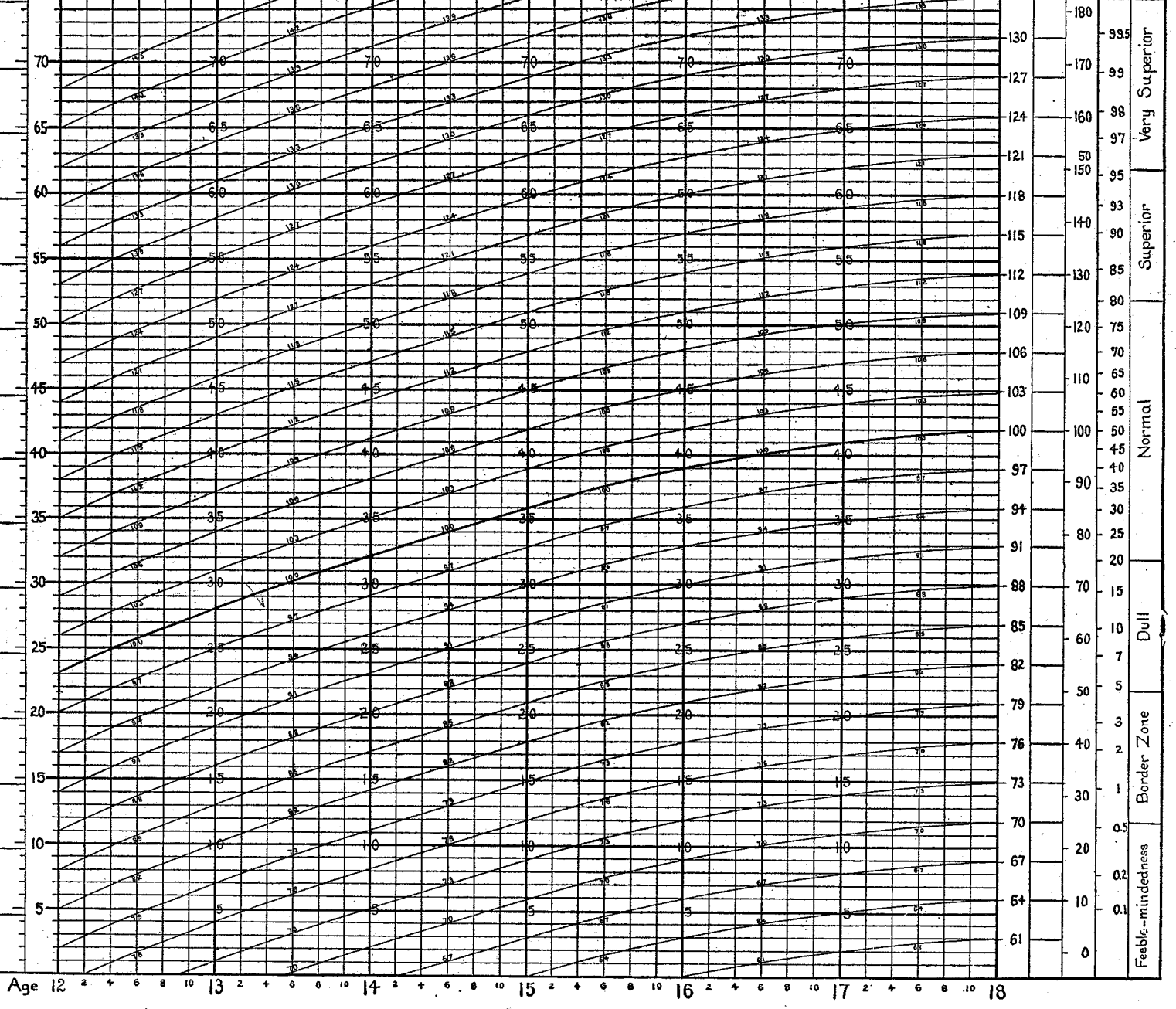
Measures of Mental Ability

T Binet Adv. Inter. Higher Totals Higher  
Score MA Exam. Exam. 20m. 30m.

90	5	205	67
89	4	2	65
88	3	200	63
88	2	8	61
87	9	195	59
86	11	2	58
85	9	190	56
84	8	75	55
83	6	8	54
83	5	73	54
83	5	73	53
82	3	72	50
81	8	72	50
80	5	71	49
79	11	71	48
78	9	70	47
78	8	7	46
77	5	69	45
76	5	68	44
75	3	67	44
74	2	67	43
73	7	66	42
73	11	66	41
72	9	65	40
71	8	65	40
70	5	64	39
69	5	63	38
68	3	63	37
68	2	62	36
67	5	61	36
66	2	61	35
65	8	60	34
64	7	59	33
63	6	59	32
63	4	58	32
62	2	58	31
61	10	57	30
60	7	56	30
60	8	55	29
59	6	54	29
58	4	53	28
58	2	52	27
57	5	51	26
56	10	50	26
55	7	49	25
54	5	48	24
53	3	47	23
53	3	46	22
52	10	44	22
51	8	43	21
50	6	42	20
49	4	41	19
48	2	40	19
47	10	38	18
46	8	37	17
46	7	35	16
45	5	34	16
44	3	33	15
43	10	31	14
43	8	30	13
42	6	28	12
41	2	27	12
40	4	26	11
39	2	24	10
38	4	23	9
38	9	21	9
37	7	20	8
36	4	19	7
35	2	17	6
34	11	15	6
33	9	14	5
33	6	12	4
32	4	11	3
31	2	10	2
30	0	9	2
29	10	7	1

Measures of Brightness

IQ Totals IB PR Classifi

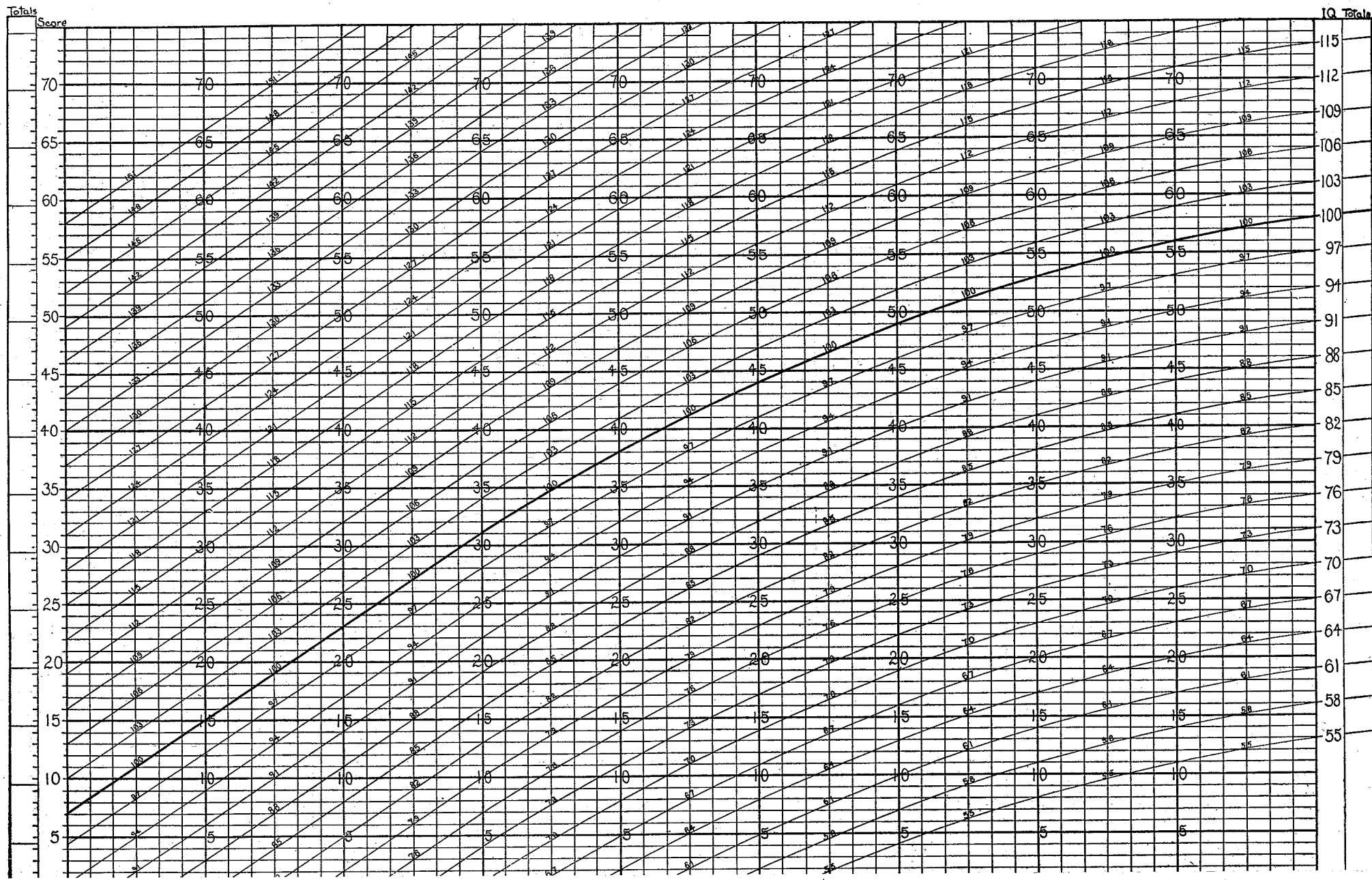


[ 4 ]

# OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

## INTERPRETATION CHART. For Intermediate Examination

Grades plotted ..... Number ..... Form used ..... Time limit ..... min. Date ..... 19 .....



# OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

## CLASS RECORD

### For Intermediate and Higher Examinations

Examination ..... Form used ..... Date of exam ..... 19 .....

..... Intermediate or Higher .....  
Grade or class ..... School or college ..... Examiner .....

Pupil Number	Name	Age		20-Minute Score	30-Minute Score	Optional		Classification
		Years	Months			IQ	PR	

(Class Record continued on next page)

This Class Record is to be kept for filing by the examiner or the school principal.

PRINTED IN U.S.A.





# OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

By ARTHUR S. OTIS, PH.D.

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

## MANUAL OF DIRECTIONS AND KEY (Revised) For Intermediate and Higher Examinations

KEY

Higher  
Form D

Page 2

1. ( 3 )

2. ( 20 )

3. ( 2 )

4. ( G )

5. ( T )

6. ( 4 )

7. ( 2 )

8. ( 5 )

9. ( 540 )

10. ( 2 )

11. ( 4 )

12. ( 3 )

13. ( 1 )

14. ( 4 )

15. ( 2 )

16. ( 4 )

17. ( 4 )

18. ( 8 )

19. ( 3 )

20. ( 31 )

21. ( 3 )

22. ( 1 )

23. ( 2 )

24. ( 2 )

25. ( 5 )

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### INTRODUCTORY

**Contents.** In this manual will be found the complete directions for administering and scoring the Intermediate and Higher Examinations, directions for interpreting the scores in the light of the educational problems which the tests will help solve, and directions for applying the results of the test to the solution of those problems.

**Scope.** The Higher Examination together with the Intermediate Examination constitute the Otis Self-Administering Tests of Mental Ability, covering the range from the 4th grade to the university. The Higher Examination is designed for high school students and college freshmen. The Intermediate Examination is designed for Grades 4 to 9. The Higher and Intermediate Examinations are similar in form, but they differ in content and difficulty.

**Forms.** Each examination is issued in four alternative forms, Forms A, B, C, and D, alike except in content.

### SPECIAL FEATURES

**Self-administration.** In each of these examinations provision is made for the student to read for himself on the first page of the examination booklet all the directions needed for the examination. As the 75 items constituting each examination are in a single list, these are answered by the examinee without interruption. The examiner, therefore, has merely to distribute the blanks, see that all understand the printed directions, and give the signal to begin. He may then leave the class in charge of an assistant. For this reason the tests have been called "self-administering" tests.

**Simplified scoring.** In addition to the underlining of the correct one of several alternative answers, as is customary in group tests of mental ability, provision is made in these examinations for placing the number of the answer in a single column at the edge of each page. This simplifies the scoring to the extent that the whole examination can be scored in less than one minute.

**Variety of test material.** The form of the examinations admits of the use of a wide variety of types of questions instead of the limited number of types in the ordinary examination.

**Flexible time limit.** Provision is made for administering the examinations with a time limit of either 20 or 30 minutes. The 20-minute time limit may be used for general survey purposes or with normal school and college students. The 30-minute time limit should be used when time allows, as it will give a more accurate measure.

**Ease of figuring IQ's.** A chart is provided by which the IQ of the examinee can be found directly from the score and age in years and months merely by locating a point on the intersection of two lines. No arithmetical calculation or reference to tables is necessary.

**Improved Percentile Graph.** There is provided in each package of Examinations a new form of percentile graph on which percentile curves may be drawn, if desired, showing vividly the distributions of scores of any group or groups of examinees. With each percentile graph is furnished a scale chart by which the drawing of the percentile curves is reduced to the simplest terms.

**Interpretation Chart.** A chart is provided upon which the scores of a class or school may be plotted and the pupils divided into fast-moving, regular, and slow-moving groups and regraded within these groups, or otherwise classified, merely by drawing lines on the chart. Account is taken of mental ability, brightness, and chronological age in classifying by this method. It is not necessary to use the Interpretation Chart in order to interpret scores in these tests. However, it will be found a distinct aid and convenience.

### HISTORICAL

These examinations are modeled after a group test of mental ability designed by the author in January, 1918, for use in a large commercial establishment in Connecticut. In that test the principle of self-administration was embodied, involving the single list of questions, the printed initial directions, and the provision for answers in single columns.

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75. ( 2 )  
74. ( 13 )  
73. ( 16 )  
72. ( 2 )  
71. ( 32 )  
70. ( 0 )  
69. ( 1 )  
68. ( 4 )  
67. ( 2 )  
66. ( 4 )  
65. ( 5 )  
64. ( 2 )  
63. ( 2 )  
62. ( E )  
61. ( L )  
60. ( 1 )  
59. ( 6 )  
58. ( E )  
57. ( 4 )  
56. ( 3 )  
55. ( 2 )  
54. ( 9 )  
53. ( 4 )  
52. ( 5 )

ACKNOWLEDGMENTS

The author is indebted to many persons for helpful suggestions and criticisms in connection with the Self-Administering Tests of Mental Ability. Special mention is due the following, who gave hearty cooperation in the administration of tests for standardization purposes: Mr. J. C. Amon, Bellevue, Pennsylvania; Mr. H. H. Murphy, Hastings, New York; Mr. T. H. Schutte, State Teachers' College, Moorhead, Minnesota; Dr. John P. Herring, Bloomsburg State Normal School, Bloomsburg, Pennsylvania; Dr. Virgil E. Dickson, Oakland, California; Dr. E. E. Lewis, Rockford, Illinois; Mr. Henry D. Rinsland, Ardmore, Oklahoma; Mr. E. D. Price, Enid, Oklahoma; and Mr. Franklin Thomas, Professor of Civil Engineering, California Institute of Technology, Pasadena, California. Mrs. Otis has devoted many hours to scoring, tabulating, and correlating.

The author is indebted to Dr. E. E. Keener, Director of Instructional Research, Chicago Public Schools, and C. Everett Myers, Research Secretary, Pennsylvania State Education Association, for assistance in standardizing Form C.

DIRECTIONS FOR ADMINISTERING

**Who may administer examination.** Any teacher after a little preparation can satisfactorily administer either the Intermediate or Higher Examination. The best preparation for administering either is to take it. The principal should invite his teachers to take the examination and score their own papers. Any teacher who is interested in mental-ability testing should welcome the opportunity to experience the taking of an examination, as this will give her the best appreciation of what the examination tests. Those administering an examination should realize that it is very important that conditions be uniform throughout the school and must be the same in the school being tested as in every other school where the examination has been given. For this reason, everything which needs to be said in administering the test is given below in boldface type, and the teacher should give these instructions verbatim, reading if necessary. If one teacher urges the students to work as rapidly as possible and another teacher urges them to work as carefully as possible, the results may be entirely different and not comparable. The teacher, therefore, should say nothing that is not prescribed, except to make clear the meaning of what is on the first page of the examination blank.

**When to give examination.** The best time to give the examination is probably at the opening of school in the morning, although the time of day probably does not have a serious effect upon the score.

**Directions for administering.** To administer either the Intermediate or the Higher Examination, Form A, B, C, or D, begin by addressing the students as follows:

**"We are going to give you this morning [afternoon] some new and interesting tests. We will now pass the test papers and as soon as you receive a paper you may begin to read the first page and do as it directs, filling the blanks, etc. Do not open or turn over the paper. Part of the test is to see if you can follow directions."**

Have monitors pass the papers, one to each student, right side up. See that every student is supplied with two pencils (or a pen) and an eraser.

Allow a reasonable time for all to finish reading the first page and trying the samples. A few laggards may be disregarded. Then say, **"Is there any one who does not understand the first page?"** Give any explanations necessary to make sure that all understand what is explained on the first page.

If a time limit of 20 minutes is to be used, say, **"This will be a short test. You will be told to stop at the end of 20 minutes instead of 30. Find the number 20 in the upper left-hand corner of the page and make a ring around it."** Be sure that all do this.

Then say, **"Now turn the page and begin,"** and note the exact time. No further instructions are necessary.

If the principal or superintendent is administering the examination, he may now leave the class in charge of the teacher or an assistant, with instructions to give no further directions and answer no questions; to stop the work at the end of exactly 30 (or 20) minutes and have the papers collected. The person in charge during the examination will do well to move quietly about the room at the beginning of the examination and see that all are indicating the answers in a proper manner. If an examinee is found who is not placing the numbers in the parentheses, he should be told to do so.

DIRECTIONS FOR SCORING

The correct answers to the 75 items of both forms of the Intermediate and Higher Examinations are given on the margins of this manual. To score the examination, open the manual to the pages containing the answers to the form of the examination to be scored, fold open the manual and clip the pages together. Place the manual over the examination paper so that the appropriate Key is adjacent to the answers given on the examination paper. Place a check mark after each correct answer or a cross after each incorrect or omitted answer, or both checks and crosses.

If two answers are given for any one item, count the item wrong. This is quite likely to occur with Item 55 in Form A of the Higher Examination.

Number 37 in Form A and Number 57 in Form B of the Higher Examination count as wrong if the alphabet has been marked in any way.

If a paper is found in which the examinee has omitted to place the numbers in the parentheses but has otherwise indicated the answers, the scorer should write in the parentheses the numbers representing the answers of the examinee so far as these may be determined, and then score accordingly, but deduct one point from the total score for failure to follow the direction to place the numbers in the parentheses.

If the examinee has failed to make all his letters like printed capitals, score the paper as if all letters were printed capitals, but deduct one point for failure to follow the direction.

Whenever an examinee has used an irregular method of taking the examination, score the paper according to the obvious intent of the examinee and then deduct one point for each general direction not followed. Indicate such deduction by placing a -1 with a circle around it opposite the first instance where the direction has not been followed. Let his score represent the fairest measure of his ability that can be estimated.

The score in the examination is the number of correct answers. First, count up the correct answers and write the number on

the margin of the last page. Then verify the score by counting the incorrect and omitted answers. Thus, suppose the number of correct answers counted is 40. Count the incorrect and omitted answers beginning 41, 42, etc., and see that you end with 75. Then enter the score in the space provided on the first page of the blank. Do not trust the counting of correct answers only, as it is very easy to make a mistake. The checking of correct answers should be gone over by a second scorer, for even the best scorers will make mistakes.

**RECORDING SCORES**

**The Class Record.** The scores should be entered on the Class Record which is provided with each package of examination blanks. Before entering the scores, arrange the papers of a class either in alphabetical order or in the order of magnitude of the score, according to preference. Next, enter the name of each student and his age in years and months. Then enter his score in the proper column according to the time limit used. Directions for filling the remaining columns will be given under "Interpretation of Results."

**20-Minute time limit.** If a 20-minute time limit has been used, the scores may be transmuted into terms of 30-minute time-limit scores in order that they may be compared with norms or other 30-minute scores. This may be done by means of Table 1.

TABLE 1<sup>1</sup>

20-MIN.	30-MIN.	20-MIN.	30-MIN.	20-MIN.	30-MIN.	20-MIN.	30-MIN.	20-MIN.	30-MIN.
1	1	16	20	31	40	46	59	61	71
2	2	17	22	32	41	47	60	62	71
3	4	18	23	33	43	48	61	63	72
4	5	19	24	34	44	49	62	64	72
5	6	20	26	35	45	50	63	65	73
6	7	21	27	36	46	51	64	66	73
7	9	22	28	37	48	52	64	67	74
8	10	23	30	38	49	53	65	68	74
9	11	24	31	39	50	54	66	69	74
10	13	25	32	40	51	55	67	70	75
11	14	26	33	41	53	56	68	71	75
12	15	27	35	42	54	57	68	72	75
13	17	28	36	43	55	58	69	73	75
14	18	29	37	44	56	59	70	74	75
15	19	30	39	45	58	60	70	75	75

**STANDARDIZATION**

**Selection of items.** In selecting items for the Intermediate and Higher Examinations, the Advanced Examination was drawn upon freely. An equal number of items of other types, some of which are new, were included in order that the examination might cover a large variety of questions and therefore afford a more comprehensive measure of mental ability. Preliminary editions containing more than enough items were administered to about 1000 high school students in Oakland, California, and Rockford, Illinois, and to 1000 grammar school

<sup>1</sup> This table was derived from a study of 20- and 30-minute scores in the Higher Examination only. It is therefore only approximate for the Intermediate Examination. It is assumed, however, that the 20-minute time limit will seldom be used with the Intermediate Examination.

pupils in Moorhead, Minnesota. These students were divided in each case into two groups, a "good group" and a "poor group." The same number were taken from each grade for both groups. The good group constituted the young students, and the poor group the old students. These groups had reached the same average educational status, therefore, but at different rates. Now it is the rate at which a student can progress through school that the mental-ability test is chiefly used to predict. Therefore this is believed to be the best criterion by which to judge the validity of each item that goes into the test. The number of times each item was passed by each group was then found and only those items chosen which showed a distinct gain in number of passes by the good group over the number of passes by the poor group in spite of the fact that the median age of the good group was over two years less than that of the poor group. Each item justified its inclusion, therefore, because it distinguished between students who progressed slowly and those who progressed rapidly.

**Arrangement in order of difficulty.** The items in each form of each examination have been arranged in the order of difficulty, according to the number of passes of each item by the students taking the preliminary editions.

**PRACTICE EFFECT**

Whenever a second form of a test is given after a first form, especially when the two forms have been made very much alike, students tend to do better on the second test. The effect of the first test is generally termed "practice effect," but it may include a number of effects. Among these is general familiarity with the method, resulting in ability to get under way more quickly, lessened nervousness, memory of mode of attack of certain types of problems, etc.

A study was made of the effect of practice when a second form of the Intermediate or Higher Examination was given the next day after the first form. The average gain in the second score was 4 points in each case. Therefore in such a case 4 points would have to be subtracted from the score in the second test to make allowance for the effect of practice.

**INTERPRETATION OF RESULTS**

**Mental ability and brightness.** There are two aspects of the mental quality of an individual which must not be confused. One is his degree of **mental ability** and the other his degree of **brightness**. The term "mental ability" refers to that innate mental quality which increases with age, whereas the term "brightness" refers to that constant quality which determines the rate of growth of the mental ability of an individual and the degree of mental ability which he will eventually reach.

Mental ability is measured by the individual's score in the test. A measure of his brightness is obtained by comparing his score with that of others of his own age. The distinction is best shown by reference to the Interpretation Chart.

**The Interpretation Chart.** An Interpretation Chart is provided in each package of Examinations to facilitate the interpretation of scores. Interpretation Charts for the Intermediate and Higher Examinations are given on the two sides of the same sheet. In the sample Interpretation Chart shown in Figure 1 (page 9) a point is plotted for each of the 276 pupils in Grades 5 to 8 of a grammar school. The height of each point

- 1. ( 4 )
- 2. ( 2 )
- 3. ( 3 )
- 4. ( 2 )
- 5. ( 5 )
- 6. ( 3 )
- 7. ( 4 )
- 8. ( 2 )
- 9. ( 1 )
- 10. ( 4 )
- 11. ( H )
- 12. ( 2 )
- 13. ( 5 )
- 14. ( 2 )
- 15. ( 1 )
- 16. ( 3 )
- 17. ( 3 )
- 18. ( 9 )
- 19. ( 3 )
- 20. ( 2 )
- 21. ( 6 )
- 22. ( 4 )
- 23. ( T )
- 24. ( 2 )
- 25. ( 2 )
- 26. ( 1 )

( 2 ) 75 represents the score of an individual in the Intermediate Examination according to the scale at the left. The horizontal position of each point represents the age of the individual according to the scale at the foot of the chart.

( 17 ) 74  
( 9 ) 73  
( 5 ) 72  
( 13 ) 71  
( 2 ) 70  
( C ) 69  
( M ) 68  
( 16 ) 67  
( 2 ) 66  
( 3 ) 65  
( T ) 64  
( 2 ) 63  
( O ) 62  
( 1 ) 61  
( 8 ) 60  
( 3 ) 59  
( 5 ) 58  
( G ) 57  
( 3 ) 56  
( D ) 55  
( 2 ) 54  
( M ) 53  
( 2 ) 52

The normal or "average" individual of the age of just 10 years is expected to make a score of just 23 points.<sup>1</sup> The normal individual of the age of just 11 years is expected to make a score of just 31 points, etc., as indicated by the heavy curved line through the middle of the chart (best seen in the blank chart). This may be called the normal curve and shows the norm or normal score to be expected from an individual of any given age. The curve becomes level at the age of 18 years, as shown in the Interpretation Chart for the Higher Examination, and may be considered as extending to the right indefinitely beyond 18 years at the same level. The derivation of this curve will be described below.

**Mental maturity.** A child's mental ability increases from birth, year by year, month by month, just as does his height, until he reaches his maximum, when he is said to have reached mental maturity. The normal curve may be thought of as the curve of growth in mental ability of the hypothetical exactly normal individual.

The age at which mental maturity is reached is difficult to decide, since the amount of mental development during the last year in which there is any development is very slight. In the Interpretation Chart for the Higher Examination the age at which mental maturity is reached is taken to be 18 years.

While individuals may reach mental maturity at about the same age, they nevertheless reach it with widely differing amounts of mental ability, just as they reach mature adult stature at differing heights. The degree of mental ability at which the normal individual reaches mental maturity is also very difficult to determine, since it is not possible to obtain a large group of completely unselected individuals (chosen at random from the whole population) at the various ages between 15 and 18. The norm for adults (persons of 18 years or over), however, has been called 42 in the Higher Examination, as shown by the upper limit of the normal curve. This is the equivalent of 59 points in the Intermediate Examination. The choice of this norm for adults is only an estimate based on all available data.

**Derivation of norms.** The positions of the normal curves in the two charts were established according to the judgment of the author upon consideration of (1) the median scores of the various age groups among about 120,000 pupils whose scores in the Higher or Intermediate Examinations have been reported to date, (2) the median scores of the several grade groups in relation to the median ages of these grade groups, (3) the norms for the various ages obtained from the norm table for the Advanced Examination by means of tables for converting scores into terms of the Higher and Intermediate Examinations, (4) the correlations between scores in the Higher and Intermediate Examinations and mental ages by the Herring Revision of the Binet-Simon Tests, and (5) correspondence between the Intermediate and Higher Examinations themselves. The position of the normal curve in neither chart accords exactly with any of these data, but it constitutes in either case a sort of average of the various groups of data.

<sup>1</sup> Unless otherwise stated the score referred to is the 30-minute time-limit score.

The aim has been to establish scores which are normal for unselected age groups, not merely for public school pupils. The scores of high school students, therefore, tend to average somewhat higher than the norms.

**True mental age.** Originally the term "mental age" referred to the degree of mental ability which is normal for a given age. Thus, "having a mental age of 15 years" meant "having a degree of mental ability just normal for the age of 15 years." This degree of mental ability is measured by a score of 36 in the Higher Examination. Having a mental age of 17, according to this definition, meant making a score just normal for 17-year-olds, which is a score of 41. Mental ages so found may be called true mental ages. Since the score of 42 is the norm for adults (taken to mean any person of 18 years or over), there is no age for which a score above 42 is the norm; therefore, of course, no score above 42 can be expressed as a true mental age.

The term "Mental Age" (capitalized), however, has now come to have a special meaning and to denote measures of mental ability — i.e., scores — in the Binet-Simon Tests. Binet Mental Ages below about 13 years are true mental ages. Above that, especially above 16 years, they are merely scores. They are called Mental Ages merely for the sake of consistency. The Binet Mental Age of 17, for example, represents a degree of mental ability considerably above that which is normal for the age of 17 or, indeed, for any age.

The Binet Mental Age of 16 years is generally taken as the norm for adults in figuring IQ's. There is a growing opinion among psychologists, however, that the Binet Mental Age which is the norm for adults is appreciably lower than 16 years.<sup>1</sup> The correlations between the Binet Scale and the Higher Examination confirm this belief. The correspondence between Binet Mental Ages and Scores in the Higher Examination, as indicated in the Interpretation Chart, is based partly upon the correlation between the Higher Examination and the Herring Revision of the Binet-Simon Tests and partly upon the age norms. At any rate, Binet Mental Ages appear to express degrees of mental ability in excess of that normal for the corresponding chronological ages even below the age of 15 years. For this reason IQ's obtained by the method provided herein<sup>2</sup> may be slightly higher than those obtained by the Binet Scale for the older students, but it is believed that they more nearly correspond with what the Binet IQ's of these students were when they were younger.<sup>3</sup>

**Measures of mental ability.** Each of the six scales at the left side of the Interpretation Chart for the Higher Examination is a measure of mental ability. The scales are so placed that values having the same height are corresponding measures of mental ability as far as may be determined. Thus a score of 40 points in the Higher Examination with a 30-minute time limit is the equivalent of a score of 31 in the Higher Examination with a 20-minute time limit, a score of 57 in the Intermediate Examination, a score of 120 in the Advanced Examination, a Binet Mental Age of 15 years 0 months, and a T-score of 62.<sup>4</sup>

<sup>1</sup> See Lewis M. Terman, "Mental Growth and the IQ," *Journal of Educational Psychology*, September, 1921.

<sup>2</sup> See "Measures of brightness" below.

<sup>3</sup> See "Validity of Mental Age equivalents" below.

<sup>4</sup> For the meaning and significance of a T-score, see William A. McCall, "A Uniform Method of Scale Construction," *Teachers College Record*, January, 1921.

Any individual whose score is plotted above the normal curve may be considered as brighter than normal, and any individual whose score is plotted below the normal curve may be considered as duller than normal.<sup>1</sup> The distance at any point above or below the normal curve is a measure of the brightness of the individual. A 14-year student making a score of 35 in the Higher Examination has a lesser degree of mental ability but a greater degree of brightness than a 15-year student making a score of 37.

**Measures of brightness.** Brightness is generally measured in terms of the Intelligence Quotient (IQ), which is customarily found by dividing the individual's Binet Mental Age by his chronological age (decimal point dropped). In the case of mental-ability tests other than the Binet Tests it is customary to give Binet Mental Age equivalents of scores in order that these may be used in finding IQ's. It has been found, however, that IQ's so derived have an appreciably wider range than those obtained by means of the Binet Tests and are therefore not comparable with the latter. Now the IQ was invented for use with the Binet Tests and should retain its original significance, or else it will become relatively meaningless. It seems that the term "Intelligence Quotient" is coming to have a legal recognition, but IQ's as sometimes derived from group tests of mental ability bear little relation to IQ's derived by the Binet Tests. It is the purpose of the author to use the term "IQ" only in its original significance.

Unless it is distinctly understood how IQ's were derived in any case, however, they should be designated by some means such as National IQ's, Otis IQ's, or Binet IQ's. The term "IQ," when not so qualified or understood, must be interpreted as referring to actual Intelligence Quotients found by means of the Binet Tests.

**Validity of Mental Age equivalents.** It follows from the above statements regarding the greater range of IQ's for each age group when obtained by group tests than when obtained by the Binet Tests, that Binet Mental Age equivalents are actual equivalents for normal children only. Thus a score of 38 in the Intermediate Examination corresponds to a Binet Mental Age of 12 years when made by a child of approximately 12 years. But if made by a 10-year child, for example, it represents a Binet Mental Age of only 11½ years, since according to the chart a 10-year child making a score of 38 has an IQ of only 115. This lack of constant correspondence between scores and Binet Mental Ages is inherent in all group tests and is due to the lesser accuracy of group tests. This phenomenon seems not to be generally appreciated, as witnessed by the now prevalent custom of converting scores into Binet Mental Age equivalents. There is no Binet Mental Age equivalent of a score in any group test of mental ability which is valid for all ages of individuals. For that reason it is believed that the most scientific method of obtaining IQ's from scores in group tests, which are comparable with Binet IQ's, is by comparison of the variabilities of scores of individuals of the various age groups in the group test and in Binet Tests, as described below.

Mental Age equivalents as such are not necessary to the use of the Higher or Intermediate Examinations. Scores are quite sufficient as measures of mental ability and IQ's as measures of

brightness. IQ's can be obtained from scores in the Otis Self-Administering Tests without Mental Age equivalents.

In order to compare scores with Mental Age equivalents of scores in other group tests or to find IQ's comparable with those obtained from other group tests, however, Binet Mental Age equivalents are given to scores in both examinations. These may be obtained from the Interpretation Chart for the Higher Examination. Binet Mental Age equivalents of scores in the Intermediate and Higher Examinations are given also in Tables 2 a and 2 b.

TABLE 2 a

BINET MENTAL AGE EQUIVALENTS OF SCORES IN THE INTER-MEDIATE EXAMINATION

SCORE	MA	SCORE	MA	SCORE	MA	SCORE	MA	SCORE	MA
1	7-4	16	9-0	31	11-0	46	13-1	61	15-11
2	7-5	17	9-2	32	11-2	47	13-3	62	16-1
3	7-6	18	9-3	33	11-3	48	13-5	63	16-3
4	7-7	19	9-5	34	11-5	49	13-7	64	16-6
5	7-8	20	9-7	35	11-6	50	13-10	65	16-8
6	7-9	21	9-8	36	11-8	51	14-0	66	16-11
7	7-10	22	9-10	37	11-10	52	14-2	67	17-2
8	7-11	23	10-0	38	12-0	53	14-4	68	17-5
9	8-0	24	10-1	39	12-1	54	14-6	69	17-8
10	8-2	25	10-3	40	12-2	55	14-8	70	17-10
11	8-4	26	10-4	41	12-4	56	14-10	71	18-0
12	8-5	27	10-6	42	12-6	57	15-0	72	18-3
13	8-7	28	10-7	43	12-8	58	15-2	73	18-5
14	8-9	29	10-9	44	12-10	59	15-5	74	18-7
15	8-11	30	10-10	45	12-11	60	15-8	75	18-9

TABLE 2 b

BINET MENTAL AGE EQUIVALENTS OF SCORES IN THE HIGHER EXAMINATION

SCORE	MA	SCORE	MA	SCORE	MA	SCORE	MA	SCORE	MA
1	7-10	16	10-8	31	13-5	46	16-0	61	17-11
2	8-0	17	10-10	32	13-7	47	16-2	62	18-0
3	8-2	18	11-0	33	13-10	48	16-3	63	18-2
4	8-4	19	11-3	34	14-0	49	16-5	64	18-3
5	8-6	20	11-5	35	14-2	50	16-6	65	18-5
6	8-9	21	11-7	36	14-4	51	16-8	66	18-6
7	8-11	22	11-10	37	14-6	52	16-9	67	18-8
8	9-2	23	12-0	38	14-8	53	16-10	68	18-9
9	9-4	24	12-2	39	14-10	54	17-0	69	18-11
10	9-7	25	12-4	40	15-0	55	17-2	70	19-0
11	9-9	26	12-6	41	15-2	56	17-3	71	19-2
12	10-0	27	12-8	42	15-4	57	17-5	72	19-3
13	10-2	28	12-10	43	15-6	58	17-6	73	19-4
14	10-4	29	13-0	44	15-8	59	17-8	74	19-5
15	10-6	30	13-3	45	15-10	60	17-9	75	19-6

**Age norms.** The norms in the Intermediate or Higher Examination for the various ages may be read from the appropriate Interpretation Chart by noting the points at which the normal curve cuts the vertical age lines, or may be taken from Table 3 or Table 4.

<sup>1</sup> Here "normal" means exactly median in brightness. The term "normal," however, is often used to refer to all individuals whose scores are reasonably close to the norms for their respective ages.

( 8 ) 75.  
 ( 3 ) 74.  
 ( 4 ) 73.  
 ( 6 ) 72.  
 ( 2 ) 71.  
 ( R ) 70.  
 ( 3 ) 69.  
 ( 4 ) 68.  
 ( 5 ) 67.  
 ( 6 ) 66.  
 ( 10 ) 65.  
 ( M ) 64.  
 ( 3 ) 63.  
 ( 4 ) 62.  
 ( 45 ) 61.  
 ( 243 ) 60.  
 ( 3 ) 59.  
 ( 58 ) 58.  
 ( 4 ) 57.  
 ( 33 ) 56.  
 ( 5 ) 55.  
 ( 2 ) 54.  
 ( 2 ) 53.

TABLE 3

AGE NORMS IN INTERMEDIATE EXAMINATION (30-MINUTE TIME LIMIT)

YEARS	8	9	10	11	12	13	14	15	16	17	18 or over
0	7	15	23	31	38	44	49	53	56	58	59
1	8	16	24	32	39	44	49	53	56	58	
2	8	16	24	32	39	45	50	53	56	58	
3	9	17	25	33	40	45	50	54	57	58	
4	10	18	26	34	40	46	50	54	57	58	
5	10	18	26	34	41	46	51	54	57	58	
6	11	19	27	35	41	46	51	55	57	59	
7	12	20	28	35	42	47	51	55	57	59	
8	12	20	28	36	42	47	52	55	58	59	
9	13	21	29	36	43	48	52	55	58	59	
10	14	22	30	37	43	48	52	56	58	59	
11	14	22	30	37	43	49	53	56	58	59	

TABLE 4

AGE NORMS IN HIGHER EXAMINATION (30-MINUTE TIME LIMIT)

YEARS	12	13	14	15	16	17	18 or over
0	23	28	32	36	39	41	42
1	24	28	32	36	39	41	
2	24	29	33	37	39	41	
3	25	29	33	37	40	41	
4	25	29	33	37	40	41	
5	25	30	34	37	40	41	
6	26	30	34	38	40	42	
7	26	30	34	38	40	42	
8	27	31	35	38	40	42	
9	27	31	35	38	41	42	
10	27	31	35	39	41	42	
11	28	32	36	39	41	42	

**Norms for college students.** The scores of 2516 college students in the Higher Examination have been reported to date from 21 colleges and universities. Ten of the 21 used 20-minute time limits. Reducing all the scores to a 30-minute basis, the median score of these 2516 students is 53 points. The median scores of the 21 colleges and universities were as follows (30-minute time limit): 37, 39, 45, 46, 51, 51, 52, 53, 53, 54, 55, 56, 56, 57, 59, 61, 62, 64, and 65.

Various percentile scores of the 2516 college students are shown in Table 5.

TABLE 5

SHOWING VARIOUS PERCENTILE SCORES OF 2516 COLLEGE STUDENTS IN THE HIGHER EXAMINATION

Percentile	(Lowest)			(Median)			(Highest)		
	0	3	10	25	50	75	90	97	
20-MINUTE BASIS	16	25	30	36	41	49	55	16	75
30-MINUTE BASIS	20	32	39	46	53	62	69	71	75

**Derivation of IQ Scale.** According to Dr. Terman,<sup>1</sup> IQ's found by the Stanford Revision of the Binet-Simon Tests are distributed very closely in accordance with the law of normal distribution and with the middle 50 per cent falling within the range of IQ's from 92 to 108.

Due partly, no doubt, to the form of the Intermediate and the Higher Examinations, the steps in difficulty between items being smaller in the first part of each examination than in the last part, the distributions of scores of the several age groups have approximately the same variability, as far as can be determined. These distributions tend to be approximately normal, and are such that the middle 50 per cent of scores of each age group tend to fall within 8 points above and below the norm for that age. Fortunately, therefore, each point in the score of an individual above or below the norm for his age represents a point in IQ above or below 100. If an individual's score exceeds the norm for his age by 12 points, his IQ is 112.

**How to find the IQ of an individual.** The IQ of an individual may be found in either of two ways. One is as follows: Add to 100 the number of points by which a pupil's score exceeds the norm for his age, or subtract from 100 the number of points by which a pupil's score falls below the norm for his age. A simple and easy way to obtain the same result is to add 100 to the score of the individual and subtract from this sum the score which is the norm for his age. (The norm for individuals over 18 years may be taken as 42 points in the Higher Examination and as 59 points in the Intermediate Examination.) Thus, if a 15-year student's score in the Higher Examination is 34, the norm for his age being 36, his IQ is  $34 + 100 - 36 = 98$ .

A second method of finding an IQ is to plot the score of the individual in the appropriate Interpretation Chart by placing a dot on the horizontal line representing his score and on the vertical line representing his age. If the dot falls on a curve, the IQ of the individual will be stated at the end of the curve in the IQ column at the right. Thus, if a student of 15 years, 4 months, makes a score of 31 in the Higher Examination, his IQ is 94. If the point falls between two curves, the IQ may be estimated closely enough by noting its position relative to the curve above or below.

The IQ of each student may be entered after his name on the Class Record, in the column headed "IQ."

**Index of Brightness.** A measure of brightness used in connection with the Otis Group Intelligence Scale is the Index of Brightness. The relation between IQ's obtained by the Higher Examination and the Index of Brightness as found by the Advanced Examination is shown in the IQ and IB columns in the Interpretation Chart. This same correspondence holds good for IQ's obtained by the Intermediate Examination. If IQ's are used, it is not necessary to find IB's. Both IQ's and IB's serve the same purpose.

**Percentile Rank.** Another measure of brightness is called the "Percentile Rank." If a student exceeds 75 per cent of unselected individuals of his own age in score, he is said to have a Percentile Rank (PR) of 75, and the same for any other per cent. The scale of Percentile Ranks extends, therefore, from 0 to 100. A PR of 50 represents exact normality and corresponds to an IQ or IB of 100.

<sup>1</sup> L. M. Terman, *Measurement of Intelligence* (Houghton Mifflin Company, Boston), page 79.

Assuming distributions of scores for the various age groups to be in accord with the law of normal distribution, the Percentile Rank of an individual may be found from his IQ or IB by reference to the PR column at the right of the Interpretation Chart for the Higher Examination. This correspondence holds also between IQ's, IB's, and PR's for the Intermediate Examination. If desired, the student's PR may be entered also on the Class Record. This is optional.

Grade status. Table 6 shows the grade status corresponding to various 30-minute scores in the Intermediate and Higher Examinations. For example, a score of 11 in the Intermediate Examination is a grade status of 2.8 — that is, it is the norm for the end of the eighth month of the second grade; a score of 30 in

TABLE 6 (Revised)

INTERMEDIATE EXAMINATION						HIGHER EXAM.	
GRADE SCORE STATUS	GRADE SCORE STATUS	GRADE SCORE STATUS	GRADE SCORE STATUS	GRADE SCORE STATUS	GRADE SCORE STATUS	GRADE SCORE STATUS	
11	2.8	26	4.8	41	6.8	30	8.0
12	3.0	27	4.9	42	7.0	31	8.3
13	3.2	28	5.0	43	7.2	32	8.5
14	3.3	29	5.1	44	7.4	33	8.8
15	3.4	30	5.2	45	7.6	34	9.1
16	3.5	31	5.4	46	7.9	35	9.4
17	3.6	32	5.5	47	8.1	36	9.7
18	3.7	33	5.6	48	8.3	37	10.0
19	3.9	34	5.8	49	8.5	38	10.3
20	4.0	35	5.9	50	8.8	39	10.7
21	4.1	36	6.0	51	9.1	40	11.0
22	4.3	37	6.2	52	9.4	41	11.4
23	4.4	38	6.3	53	9.7	42	11.8
24	4.5	39	6.4	54	10.0	43	12.2
25	4.7	40	6.6	55	10.3	44	12.6

TABLE 7

SHOWING DISTRIBUTION OF SCORES OF 24,724 PUPILS IN THE 6TH GRADE IN THE INTERMEDIATE EXAMINATION

SCORE	AGE								TOTALS
	9 to 9-11	10 to 10-11	11 to 11-11	12 to 12-11	13 to 13-11	14 to 14-11	15 to 15-11	16 or over	
	75			1					
70-74		3	19	8					30
65-69		31	116	49	10	6			212
60-64	1	66	344	193	28	2	3		637
55-59	3	97	551	336	87	24	5	1	1104
50-54	3	142	912	586	197	79	21		1940
45-49	7	183	1130	1084	340	138	34	7	2923
40-44	6	162	1193	1061	491	208	50	11	3182
35-39	6	207	1221	1241	668	280	106	11	3740
30-34	9	155	1003	1180	761	338	150	24	3620
25-29	7	115	784	935	700	360	171	27	3099
20-24		83	457	612	556	328	179	8	2223
15-19	1	34	241	341	353	220	117	26	1333
10-14	1	7	75	134	150	89	58	14	528
5-9		2	11	27	25	31	23	6	125
0-4			6	7	4	4	4	2	27
Totals	44	1287	8064	7704	4370	2107	921	137	24724

Median age: 12 yr. 5 mo. Median score: 41.

the Higher Examination is the norm for the beginning of the eighth grade. These values are based on the tables of norms and Table 31 of *Statistical Method in Educational Measurement* (World Book Company).

Tables 7, 8, and 9 show the distributions of scores in the Intermediate and the Higher Examinations. Similar data have been compiled for the other grades but cannot be given for lack of space.

TABLE 8

SHOWING DISTRIBUTION OF SCORES OF 35,278 PUPILS IN THE 8TH GRADE IN THE INTERMEDIATE EXAMINATION

SCORE	AGE								TOTALS
	11 to 11-11	12 to 12-11	13 to 13-11	14 to 14-11	15 to 15-11	16 to 16-11	17 to 17-11	18 or over	
	75		1	3	6	1			
70-74	14	96	303	182	48	9			652
65-69	28	324	1177	740	213	50	4		2536
60-64	53	227	1710	1327	432	93	10		3852
55-59	39	426	1828	1753	732	168	16	2	4964
50-54	44	441	1771	1933	1025	219	42	2	5477
45-49	22	313	1468	1822	1102	295	54	2	5088
40-44	28	253	1187	1567	1052	313	38	6	4444
35-39	26	197	790	1122	849	268	50	10	3312
30-34	16	139	513	820	605	237	28	6	2364
25-29	9	76	244	393	423	160	28	2	1335
20-24	9	38	146	242	221	106	28	10	800
15-19	1	17	60	102	63	50	4		297
10-14		7	12	33	28	13	4		97
5-9	2	1	10	5	7	4			29
0-4			2	6	9	3			20
Totals	301	2556	11224	12053	6810	1988	306	40	35278

Median age: 14 yr. 3 mo. Median score: 49.

TABLE 9

SHOWING DISTRIBUTION OF SCORES OF 15,715 PUPILS IN THE 12TH GRADE IN THE HIGHER EXAMINATION

SCORE	AGE							TOTALS
	14 to 14-11	15 to 15-11	16 to 16-11	17 to 17-11	18 to 18-11	19 to 19-11	20 or over	
	75			1				
70-74		5	19	11	5	2	1	43
65-69	2	31	78	128	43	10	4	296
60-64	4	40	283	312	123	31	11	804
55-59	3	75	465	454	227	62	23	1309
50-54	10	125	628	970	484	147	52	2416
45-49	7	96	770	1247	462	219	76	2877
40-44	4	78	532	1280	750	227	92	2963
35-39		40	415	960	686	268	101	2470
30-34	1	28	211	495	455	172	66	1428
25-29		10	85	213	216	112	43	679
20-24		1	27	85	97	60	17	287
15-19		5	11	31	27	18	5	97
10-14			4	10	5	3	5	27
5-9				5	4	4		13
0-4				1	1	2		4
Totals	32	534	3529	6202	3585	1337	496	15715

Median age: 17 yr. 7 mo. Median score: 44.

- 1. ( 3 )
- 2. (30)
- 3. ( 4 )
- 4. ( 2 )
- 5. ( 1 )
- 6. ( 2 )
- 7. (14)
- 8. ( 4 )
- 9. ( 3 )
- 10. ( 2 )
- 11. ( 5 )
- 12. ( 6 )
- 13. ( 3 )
- 14. ( 1 )
- 15. (240)
- 16. ( 4 )
- 17. ( 1 )
- 18. ( 4 )
- 19. ( 5 )
- 20. ( 4 )
- 21. ( 8 )
- 22. ( 2 )
- 23. ( 2 )
- 24. ( 5 )
- 25. ( 2 )
- 26. ( 2 )



(14) 75

(5) 74

(8) 73

APPLICATION OF RESULTS

Purposes of mental-ability tests. The chief administrative purposes for which mental-ability tests are given are: (1) the division of the pupils of a grade or the students of a class into more homogeneous divisions, usually in order that instruction of different degrees of enrichment may be given, (2) the regrading of pupils so that the pupils of each grade are more homogeneous in mental ability and are therefore more easily taught together, (3) the division of pupils of a school into groups which will progress at different rates.

The reader should consult Intelligence Tests and School Reorganization, by L. M. Terman and others (World Book Company), for a detailed discussion of the purposes and uses of tests of mental ability in regrading and classifying.

Division of classes. If it is desired to divide the students of a class into more homogeneous groups for instruction purposes, this may be done either on the basis of score or on the basis of IQ. Division on the basis of score would be made as follows:

Classification according to score. Find the distribution of the scores of the class. If the scores are plotted on the Interpretation Chart, this may be done by placing in the column under "Totals" at the left the number of dots on each horizontal line. (If desired, the frequencies of the various class intervals, 0-4, 5-9, etc., may be entered in the same column. These will be used in drawing a percentile curve on the Percentile Graph.) By means of this distribution the class may be divided into any number of divisions for differentiated instruction. Thus, let us suppose it is desired to divide a class into three divisions, A, B, and C, on the basis of score. This would be done as follows: Count down the distribution until one third the total number of scores has been counted. At this point draw a line across the distribution to mark the lower limit of score of Group A. Next count down another third and draw another line marking off Group B from Group C. Referring now to the Class Record, where each student's score appears opposite his name, the division designation, A, B, or C, may be placed opposite each student's name in the column headed "Classification."

This method is illustrated in the sample Interpretation Chart in Figure 2. Here 105 9th-year students are divided into three classes of 35 students each on the basis of score.

Classification according to brightness. If it is desired to divide the students of a class into divisions on the basis of brightness, this may be done by dividing the distribution of IQ's in the same way as suggested above for dividing the distribution of scores. To find the distribution of IQ's, count the dots between each two adjacent curves, including those which touch the lower but not the upper curve. Place the number of dots in the column headed "Totals" at the right, as shown in the sample charts. As a check on accuracy in counting the dots, it will be well to add these numbers and see that the sum corresponds to the number of students in the class.

Considerations governing method of classification. Two methods of classification have been described. Which should be used? It will be found that the dispersion of scores of any age group is so great in comparison with the rather narrow range of age norms for high school ages, that the resulting classifications by the two methods are very nearly the same. Even when classified by IQ, the superior division consists of students whose scores are nearly all higher than those of the

next division, etc. It remains for further research to discover which is the better method. It is possible that if the classification is made for the purpose of determining groups which will cover the curriculum of the high school in different amounts of time, classification on the basis of IQ may be the better method, whereas if it is to establish sections which will take work of differing degrees of intensity, classification on the basis of score may be the better.

Regrading. If it is felt that the pupils of a school are very badly graded, so that the 6th grade, for example, is believed to contain some pupils who could do satisfactory work in the 7th or 8th grade and some who should be in the 5th grade to do the best work, the pupils may be regraded on the basis of score in a mental-ability test. The ideal grading would be that in which the pupils of the 6th grade all make scores higher than those in the 5th grade and lower than those in the 7th grade, etc. Practically this is impossible.

The next best procedure is to select those pupils from the 6th grade who make very high or very low scores and to promote or demote these. No hard and fast rule can be laid down for this. The number of pupils to be shifted depends partly on the amount of overlapping of ability between grades and partly on the character of the instruction possible in the school. Where relatively individual instruction is possible, homogeneous grouping is not so essential. It is probably best to begin re-grouping slowly, taking first those whose scores deviate most from the median score of the grade and whose scholarship in the judgment of the teacher accords with their scores, and promoting or demoting these pupils one grade or one-half grade. If conditions warrant or seem to require it, they may be further promoted or demoted later. Later, also, more pupils may be regraded, until by degrees the grades will become more nearly homogeneous.

Multiple-track plan. A plan of school organization called the "multiple-track plan," in use in Oakland, California, and elsewhere, is one in which the pupils of the school are divided into groups (generally three, sometimes five) which progress at different rates. Thus there may be fast-moving, normal, and slow-moving classes, covering the first eight grades in say 7, 8, and 9 years, respectively.

A situation illustrating the need of reclassification is that shown in the sample Interpretation Chart in Figure 1. In this chart are plotted the scores of 276 pupils in Grades 5 to 8 of a grammar school. The scores of the different grades are plotted by different marks. It will be seen that the different grades overlap very markedly. Each grade contains both young pupils making high scores, who are therefore very bright, and old pupils making low scores, who are therefore very dull.

Division of pupils into groups to progress at different rates should be made on the basis of brightness. It is recommended by Terman that the brightest 15 per cent of the pupils of a school be placed in fast-moving classes (where numbers permit) and the dullest 15 per cent in slow-moving classes. The selection of these pupils should be made, therefore, on the basis of IQ (or IB or PR). A convenient method of making the division is illustrated in Figure 1 in the case of the 276 pupils. Of this number 15 per cent is about 40. Therefore the brightest 40 (according to IQ) should be placed in the fast-moving group and the dullest 40 in the slow-moving group.

The method of making the division by means of the chart



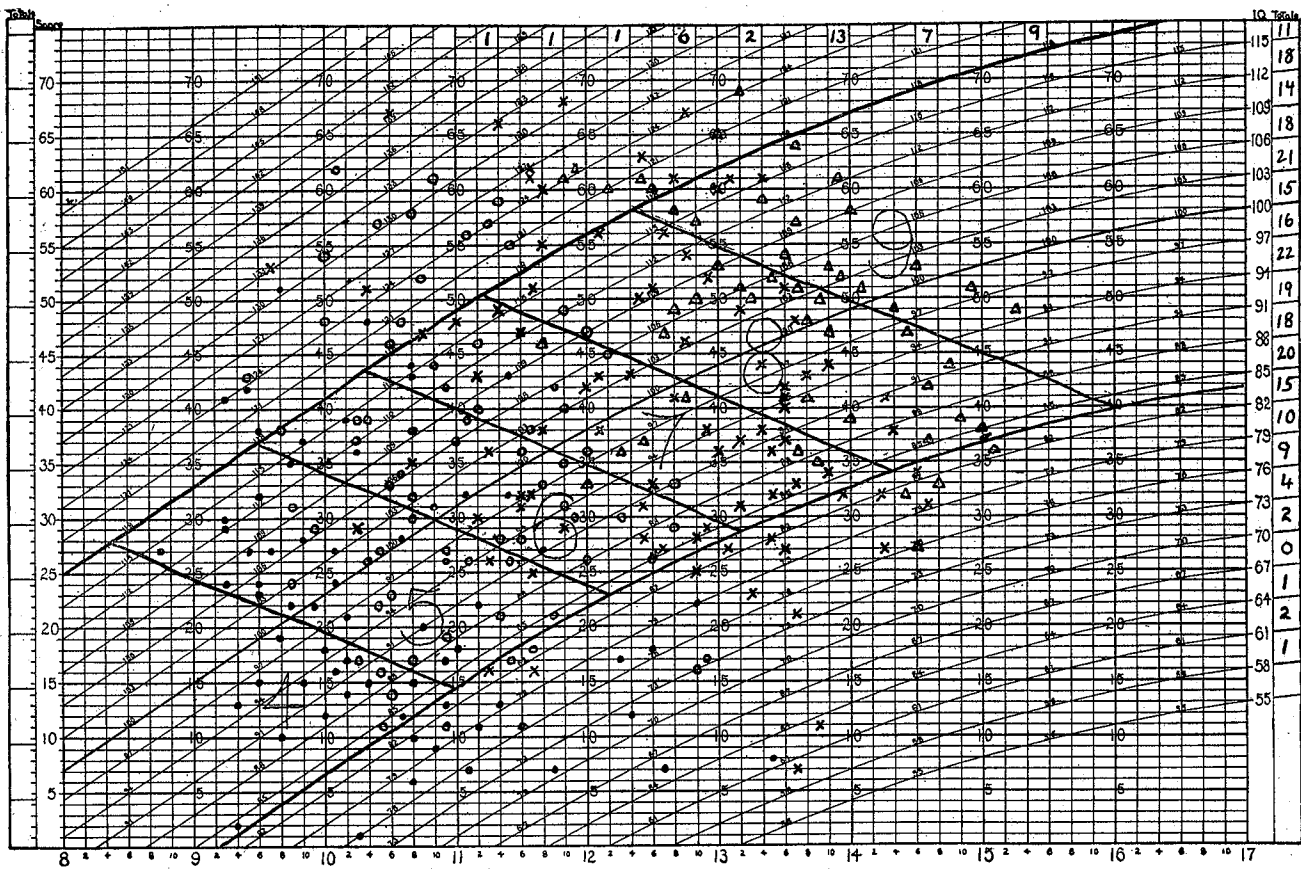


FIG. 1

INTERPRETATION CHART. For Higher Examination

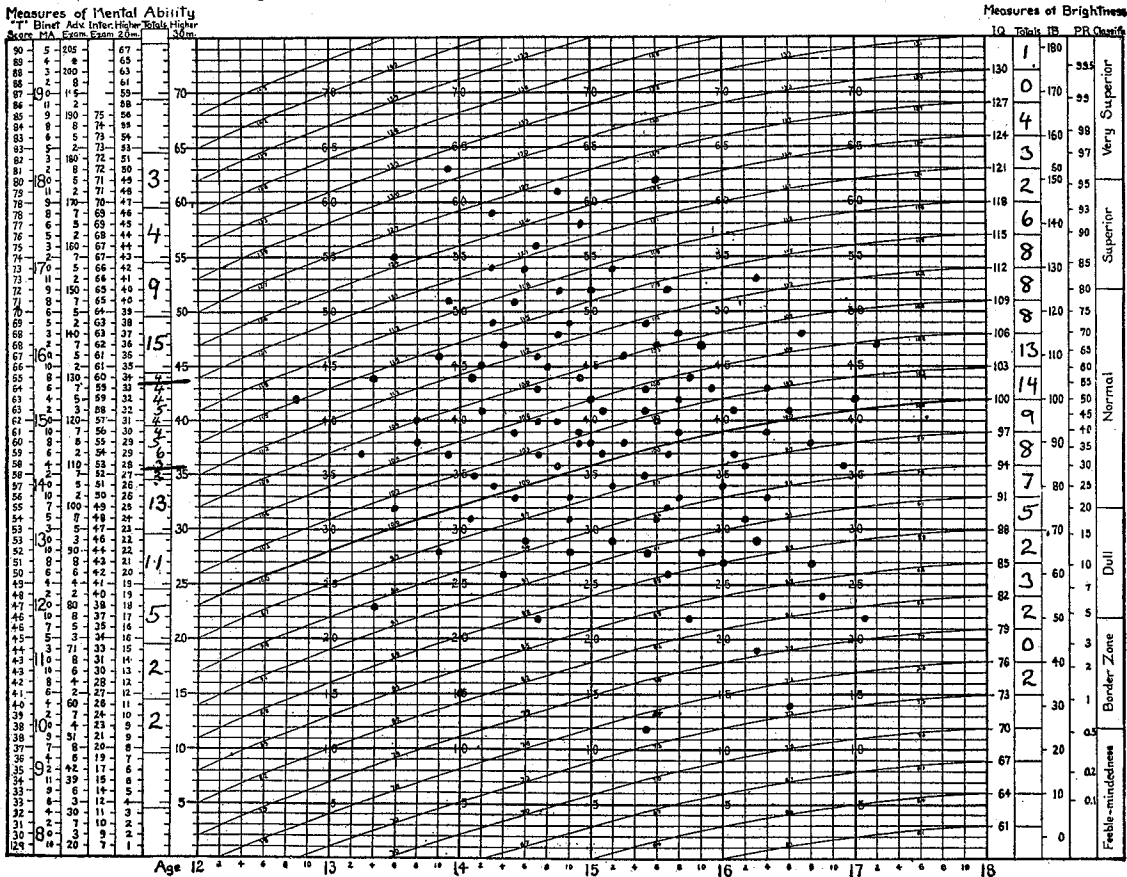


FIG. 2

- 1. ( 3 )
- 2. ( 20 )
- 3. ( 3 )
- 4. ( G )
- 5. ( T )
- 6. ( 2 )
- 7. ( 2 )
- 8. ( 2 )
- 9. ( 450 )
- 10. ( 4 )
- 11. ( 4 )
- 12. ( 6 )
- 13. ( 5 )
- 14. ( 3 )
- 15. ( 3 )
- 16. ( 4 )
- 17. ( 3 )
- 18. ( 8 )
- 19. ( 3 )
- 20. ( 17 )
- 21. ( 4 )
- 22. ( 1 )
- 23. ( 2 )
- 24. ( 2 )
- 25. ( 5 )

( 1 ) . 75

( 4 ) . 74

( 3 ) . 73

( 15 ) . 72

( 5 ) . 71

( 8 ) . 70

( 3 ) . 69

( 2 ) . 68

( 7 ) . 67

( 12 ) . 66

is as follows: Find the curve which separates the upper 40 cases according to IQ. If no curve cuts off approximately 40 cases, draw a curve which does, making it parallel to the printed curves. The pupils whose scores are plotted above this curve should be placed in the fast-moving class. Similarly find or draw a curve which separates the lower 40 cases according to IQ. The pupils whose scores are plotted below this curve should be placed in the slow-moving group.

**Grading within the group.** The pupils of the three groups, fast-moving, normal, and slow-moving, are still to be graded. Ideally this would be done on the basis of score. Thus, if the 196 pupils in the normal group are to be placed in Grades 5, 6, 7, and 8, the lowest fourth or 49, according to score, would be placed in the 5th grade, the next 49, according to score, would be placed in the 6th grade, etc.

This would result, however, in placing in one grade pupils who, although very homogeneous as to score, had a very wide range of ages. The pupils of the 6th grade, for example, according to this plan, might range in age from a little over 9 years to nearly 16 years. Practically, therefore, it may seem more desirable to take some account of the age of the child. A very simple way to do this is by drawing lines across the middle band of the chart at a slight slant instead of horizontally, as shown in Figure 1; in this way age is automatically taken account of. The pupils represented by the dots in each area so marked out, while somewhat less homogeneous as to score, are much more homogeneous as to age. The greater the slant, the more weight is given to age.

In the sample chart provision is made for skipping certain pupils into the 9th grade, demoting others into the 4th grade, and dividing the remaining pupils into four groups of 40 each which would be placed in the 5th, 6th, 7th, and 8th grades.

If the slanting-line method is used, the dots plotted in the Interpretation Chart must be identified, or else it will be necessary to plot the score of each pupil again to determine in what grade he should be. It has been found feasible to do this by numbering the pupils consecutively on the Class Record and writing each pupil's number in small figures near the dot representing his score. If this is done, the pupils whose scores fall within a given area may be identified at once.

The number of cases represented in the sample chart is too small to illustrate the division of the fast- and slow-moving groups into grades — and, indeed, in a school of this size the establishment of fast- and slow-moving classes would doubtless entail grave administrative difficulties; but in a school where there are many more pupils, this would be done in exactly the same way as shown in the case of the normal group.

It must be remembered that the classification which would be effected by any of the above methods is rather in the nature of a goal to be worked toward gradually. It is doubtful whether it would ever be wise to reorganize a school completely on any of these plans at one time, especially on the basis of one test. It would be better, doubtless, to promote or demote extreme cases, as explained above, and as these show themselves to be properly placed others may be shifted. The teachers' independent judgments should weigh equally with the test results in determining which pupils should be regraded or in what grade any individual pupil should be placed. Indeed, the regrading should be done according to the judgment of the teachers *in the light of the test results.*

**Educational and vocational guidance.** In advising a young high school student regarding his educational future or his vocation, his degree of brightness should be considered. It seems probable that an entering student with a PR of 90 or higher may safely be permitted to attempt to finish high school in 3½ or even 3 years. A student with a PR of 50 or less should certainly be prevented from attempting more than the regular course. Any one interested in research will do well to investigate the degree of brightness necessary to complete successfully the high school in 3½ or 3 years.

A boy or girl having a PR of 75 or over may be safely encouraged to go to college. Doubtless many whose PR's are between 50 and 75 will succeed in college if industrious. A boy or girl whose PR is less than 25 probably should be dissuaded from going to college. Here again there is need of research.

Similarly the degree of brightness of a student should be considered in advising him regarding a vocation. Bright students should be encouraged to enter the professions. Dull ones should be helped to choose a trade. The Stenquist Mechanical Aptitude Tests<sup>1</sup> may help to discover the proper trend of a boy's education.

**Classification Test.** If it is desired to give a general achievement test in any grade from the fourth to the ninth in addition to the Intermediate Examination, it is recommended that the Classification Test<sup>1</sup> be used. The Classification Test is a combination of the Intermediate Examination and a general achievement test covering reading, arithmetic, spelling, grammar and diction, geography, history and civics, literature, vocabulary, physiology and hygiene, and general information, including music and art. Form A of the Classification Test contains Form A of the Intermediate Examination, and Form B of the Classification Test contains Form B of the Intermediate Examination. The time limit on each of the two parts is one-half hour. The correlation of the Classification Test and the Stanford Achievement Test was found by Dr. E. E. Keener to be .83.

#### THE PERCENTILE GRAPH

In order to compare the score of any pupil with the scores of the class as a whole or to compare two or more classes, the most effective way is to draw a percentile curve for each grade or class on the Percentile Graph, a copy of which is included in each package of Examinations.

**Definition of percentile curve.** A percentile curve is a smooth line having a horizontal length representing 100 per cent of the scores of any group of individuals and so drawn that any point on the curve has a height representing the amount of a given score and a horizontal position on the graph representing the per cent of the scores of the group that is exceeded by the given score. The method of drawing a percentile curve is given in full below. One not familiar with percentile curves will appreciate their significance after studying the directions for drawing them.

A percentile curve shows at a glance not only the median score of a class but also the range and variability of the scores. It shows at a glance just what per cent of the scores of the class is exceeded by the score of any given individual and just what per cent of the class attains or exceeds any given score. Two or

<sup>1</sup> Published by World Book Company, Yonkers-on-Hudson, New York.

more curves on the same graph show very vividly the amount of overlapping of the scores of different classes.

**DIRECTIONS FOR DRAWING A PERCENTILE CURVE**

**General procedure.** The steps taken in drawing the percentile curve are: (1) distributing the scores, (2) finding the sub-totals — number of cases to and including those in each class interval, (3) reducing these subtotals to per cents of the number of cases in the group, (4) locating points in the graph representing these per cents, and (5) drawing a smooth curve through these points.

Provision is made for distributing the scores of two groups of individuals on one Percentile Graph sheet, and from these distributions two percentile curves may be drawn. This does not mean, however, that only two curves may be drawn on one graph. The scores of additional groups may be distributed on other Percentile Graph sheets or any sheet of paper and as many curves drawn on one graph as may be conveniently distinguished.

**Distributing the scores.** In one of the columns headed "Tallying," distribute the scores of a class by putting a short mark opposite the interval of score within which the score of each individual falls. The sample Percentile Graph (Fig. 3) shows that in the freshman class two individuals had scores between 60 and 64, two had scores between 55 and 59, five had scores between 50 and 54, etc. If the scores of a class have been plotted on an Interpretation Chart, the number of scores falling within each interval of score may be copied directly on to the Percentile Graph sheet in figures, as shown in the sample in the case of the sophomore class. This will save distributing the scores again. The number of tallies or the figure in the Tallying column which tells the number of scores falling within any given interval of scores is called a "frequency." The frequency of freshman scores between 45 and 49, for example, is 8.

**Finding the subtotals.** Begin at the bottom of the column of frequencies and place in the square to the right of each frequency the sum of the frequencies up to and including those in that group. In the "Subtotal" column, under "Freshman," there is 1 score in the first interval, a subtotal of 2 to and including the second interval, a subtotal of 4 to and including the third interval, etc., and 50 to and including the last interval. This last "subtotal" (50) should equal the number of students in the class, as entered at the top of the column.

**Reducing subtotals to per cents.** In the column headed "Per cents," write opposite each subtotal the per cent that subtotal is of the whole number of students in the class. In the sample, under Freshman, 1 is 2 per cent of 50, 2 is 4 per cent of 50, 4 is 8 per cent of 50, etc., and 50 is 100 per cent of 50.

It is not necessary to reduce subtotals to per cents when use is made of the Scale Chart printed on the back of the Percentile Graph. The manner of using the Scale Chart is given below.

**Locating points in the graph.** First place a dot at the left edge of the graph on the horizontal line representing the lower limit of the lowest class interval containing a score. Next, place on the next line above, a dot having a distance to the right of the left margin of the graph equal to the first number in the per cents column, according to the scale at the foot of the graph. (In the sample the second dot in the percentile curve for the freshmen is placed 2 units from the edge of the graph.) Next, place on the next line above, a dot having a distance to

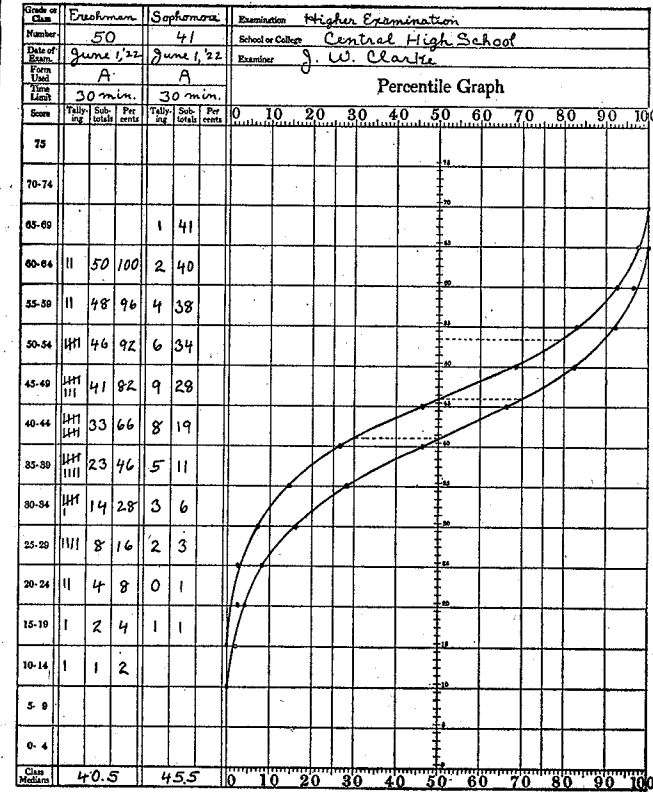


FIG. 3

the right of the margin representing the next per cent, etc. (The third dot represents 4 per cent, etc., and the last dot represents 100 per cent.)

**Use of Scale Chart.** The Scale Chart on the back of the Percentile Graph is provided to simplify the process of plotting the points in the graph. It is used as follows: Let us take the case of the freshman class, there being 50 students in the class. Find Scale 50 on the Scale Chart according to the numbers at the right. This line is divided into exactly 50 equal parts by the slanting lines in the chart. Each space, therefore, represents  $\frac{1}{50}$  or 2 per cent of the width of the graph. The second dot in the freshman percentile curve is to be placed just  $\frac{2}{50}$  of the distance to the right of the margin. This is just 1 space on Scale 50. The third dot is to be placed just 2 spaces to the right of the margin, the fourth point just 4 spaces to the right of the margin, etc., according to Scale 50 in the Scale Chart. By the use of Scale 41 the points have been plotted in the same way for the sophomore class.

By folding the Scale Chart on the proper scale and applying it to the Percentile Graph,<sup>1</sup> the width of the graph may be divided into any number of equal parts from 40 to 100. By letting 2 or 4 graduations represent 1 unit or letting 1 graduation represent 2 units, the width of the graph may be divided into any number of equal parts from 10 to 200.

**Drawing the curve.** Draw a smooth curve through the dots plotted as described above. This is the percentile curve.

**Finding median score of class.** The point where the percentile curve cuts the 50-percentile line represents the median

<sup>1</sup> If only one Percentile Graph is at hand, the proper distances may be transferred from the Scale Chart on the back by means of a strip of paper.

- I. ( 3 )
- 2. ( 15 )
- 3. ( 4 )
- 4. ( 2 )
- 5. ( 3 )
- 6. ( 1 )
- 7. ( 14 )
- 8. ( 2 )
- 9. ( 5 )
- 10. ( 2 )
- 11. ( 3 )
- 12. ( 5 )
- 13. ( 2 )
- 14. ( 2 )
- 15. ( 240 )
- 16. ( 4 )
- 17. ( 3 )
- 18. ( 1 )
- 19. ( 3 )
- 20. ( 2 )
- 21. ( 6 )
- 22. ( 2 )
- 23. ( 4 )
- 24. ( 3 )
- 25. ( 4 )
- 26. ( 2 )

( 3 ) .75  
 ( 7 ) .74  
 ( 3 ) .73  
 ( 5 ) .72  
 ( 29 ) .71  
 ( 2 ) .70  
 ( L ) .69  
 ( 24 ) .68  
 ( 3 ) .67  
 ( H ) .66  
 ( 90 ) .65  
 ( 6 ) .64  
 ( 5 ) .63  
 ( 49 ) .62  
 ( 3 ) .61  
 ( 4 ) .60  
 ( 9 ) .59  
 ( L ) .58  
 ( W ) .57  
 ( 4 ) .56  
 ( 3 ) .55  
 ( 2 ) .54  
 ( L ) .53  
 ( 1 ) .52

score of the group.<sup>1</sup> This may be read on the vertical scale along the 50-percentile line. The median scores of the freshman and sophomore classes in the sample are 40.5 and 45.5, respectively. These medians may be entered at the foot of the data columns as shown.

**Finding variability of scores.** The points at which the curve cuts the 25 and 75 percentile lines represent the lower and upper quartile scores of a distribution. The interval between these is the interquartile range — a very convenient measure of the scatter of the distributions. In the sample Percentile Graph the interquartile ranges for the two classes are about 14 points each (freshmen, 33.5 to 47, and sophomores, 39 to 53).

**Overlapping of classes.** It will be seen by a glance at the percentile curves that the sophomore class is only slightly better than the freshman class and that the distributions of scores of the two classes overlap very markedly. A convenient way to express this overlapping is to say that 30 per cent of the sophomore class fall below the median of the freshman class, or that 30 per cent of the freshman class exceed the median of the sophomore class.

**Percentile rank in class.** If an individual makes a score exceeding 25 per cent of the scores of his class, he is said to have a percentile rank of 25 in his class; and the same for other percentages. The percentile rank of any individual among the members of his class may be found from the percentile curve representing the scores of his class as follows: Suppose an individual in the sophomore class has made a score of 53. Find the point 53 on the vertical scale in the Percentile Graph and move the pencil horizontally to the point at the same height on the percentile curve. This point represents on the horizontal scale a percentile rank of 79. The percentile rank of the individual among the members of his class is, therefore, 79, which means that his score exceeds the scores of 79 per cent of his class. A score of 53 represents a Percentile Rank of 89 among the members of the freshman class.

In so far as mental ability, as measured by this examination, is an indication of the scholarship to be expected from a student, the percentile rank of a student in class may be taken as showing how he should stand in this regard to the class as a whole.

The meaning of "percentile rank in class" must be distinguished from that of "Percentile Rank," a measure of brightness, referring to the rank of an individual among a large unselected group of his own age.

#### RELIABILITY AND VALIDITY

**Reliability.** By "reliability" is meant the degree to which the scores of the test are consistent in measuring whatever the test measures. Reliability is determined by means of correlation between different forms of the same test. The coefficients of correlation were found between Forms A and B of both examinations as follows:

Higher Examination, Grades 7 to 12:  
 Group I, Form A first, 128 cases,  $r = .917 \pm .009$   
 Group II, Form B first, 125 cases,  $r = .925 \pm .009$  } avg. .921  
 Intermediate Examination, Grades 4 to 9:  
 Group I, Form A first, 215 cases,  $r = .953 \pm .006$   
 Group II, Form B first, 212 cases,  $r = .943 \pm .007$  } avg. .948

<sup>1</sup> The value so found may not be exactly the same as the median found in the usual way by counting to the middle paper in order of score, but if not, the median score found by means of the curve is considered to represent the distribution better and to be in that sense more accurate.

The values of the probable error of a score determined from these groups were respectively 2.56 and 2.68 points for the Higher Examination and 2.85 and 2.78 for the Intermediate Examination. The probable error of a score in either examination, therefore, is slightly over 2½ points. This means that the score in either examination will be correct within about 2½ points in half the cases. As has been shown, this means also that the probable error of an IQ is about 2½ points.

**Validity.** There is no direct method, of course, of finding the true validity of the tests — the degree to which they measure the hypothetical quality we call mental ability. The method of standardization is perhaps the best assurance as to the validity of the tests. Various other indications are available, however. The coefficient of correlation between the Higher Examination and the Advanced Examination taken two years earlier was .889 for 180 cases in Grades 7 to 12. The average of four coefficients of correlation between the Higher and Intermediate Examinations, averaging about 100 cases each in groups covering Grades 7 to 9, was .842. The correlation between scores in the Higher Examination and "scholarship" is reported by Clarence W. Proctor, Principal of High School, Bangor, Maine, as follows:

Grade 11, number of cases 240,  $r = .55$   
 Grade 12, number of cases 204,  $r = .57$

The correlation between scores in the Higher Examination and scholarship as reported by the teachers of 157 high school freshmen in Oakland, California, was .59.

The correspondence between scores in the Higher Examination and letter ratings used in connection with Alpha is shown in Table 10.

TABLE 10

ALPHA RATINGS	ALPHA SCORES	SCORES IN HIGHER EXAMINATION
A . . . .	135-212	58-75
B . . . .	105-134	49-57
C+ . . . .	75-104	39-48
C . . . .	45-74	28-38
C- . . . .	25-44	20-27
D . . . .	15-24	15-19
E . . . .	0-14	0-14

**A high score.** One student has been reported to have made a perfect score of 75 points in the Higher Examination in 20 minutes. This student is characterized by the professor of educational psychology of the college as follows:

"The person is a young man just past 21 years of age. He had very poor high school training due to the fact that the schools in his section of North Carolina are not what they should be. He is finishing college in 3½ years with about 8 quarter-hours to spare. I have looked up his college record and find that he has grades of A's or B's. There are no C's, D's, or F's. He won the scholarship medal at college before he came to this institution. (He entered here as a senior.) He is a good mixer, and I do not believe that he puts in very many hours on his studies.

"The father is a rather successful farmer. In fact, from what I can gather, he is the best farmer in his neighborhood. An older brother is a professor in a college. I have had this young man in several classes. It is my firm conviction that he could finish the average college course in two years."

**Test Service Bulletins.** The reader is invited to send to the World Book Company for free copies of the Test Service Bulletins for further information about testing.

APPENDIX C  
THE WINNIPEG SCHOOL DIVISION No. 1  
CORNER WILLIAM AVENUE AND ELLEN STREET  
WINNIPEG 2, MANITOBA

March 28, 1960.

For your information

Dear .....

One of our teachers, Mrs. Mary MacBride, is preparing an M.Ed. thesis on the effects of instruction in Latin on English vocabulary. In order to collect the necessary data, she requires the co-operation of the Winnipeg high schools in which Latin is taught.

I am enclosing a summary of Mrs. MacBride's proposed method of procedure and questionnaire for your consideration. May I note that Mrs. MacBride is desirous of keeping the amount of work done by the schools to the minimum and is prepared to come to the schools to secure lists of mental ability scores for the students concerned -- preferably during the Easter recess.

If you are willing to assist Mrs. MacBride in the collecting of the necessary data, would you please have your secretary telephone Miss Block at WH 3 8581.

Yours very truly,

C. E. Henry  
Director of Research

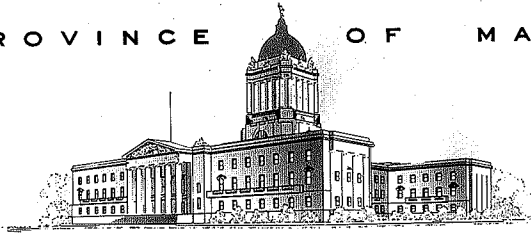
CEH/fb

Mr. McMurchy - Daniel McIntyre  
Mr. Scurfield - Churchill  
Mr. Morgan - Sisler  
Mr. Gow - Gordon Bell  
Mr. Cochrane - Kelvin  
Mr. J. E. Ridd - St. John's

APPENDIX D



PROVINCE OF MANITOBA



L. S. BENNETT  
REGISTRAR

DEPARTMENT OF EDUCATION  
140 LEGISLATIVE BUILDING - WINNIPEG 1

April 6th, 1960.

Mrs. J. M. MacBride,  
765 Warsaw Ave.,  
Winnipeg 9, Man.

Dear Mrs. MacBride:

Recently you wrote to us requesting permission to use the score of the Grade IX Mental Ability Tests for pupils now enrolled in Grade X and XI in the Winnipeg High Schools. The only condition under which this information can be made available to you is that the names of individual students and the names of schools may not be used. It is also mandatory that no publicity be given to these figures other than for the purposes of your survey in its relationship to your degree at the Master of Education level.

If this proves acceptable to you I would suggest that you write to us to inform us of the fact and we shall arrange a time for you to make use of the records.

Yours truly,

L.S.Bennett,  
Registrar.

LSB/ME

APPENDIX "E"

TABLE ILLUSTRATING THE PAIRING OF 230 STUDENTS -  
LATIN AND NON-LATIN - FOR MENTAL ABILITY,  
AGE, SEX AND GRADE

<u>Grade XI</u> Difference			<u>Grade X</u> Difference			<u>Grade IX</u> Difference		
Stu- dent Pair	M. A. in Points	Age in Months	Stu- dent Pair	M. A. in Points	Age in Months	Stu- dent Pair	M. A. in Points	Age in Months
1 b	1	2	1 b	0	-5	1 g	0	-6
2 b	-2	1	2 b	-1	-2	2 g	-1	-1
3 g	0	-3	3 b	0	4	3 g	0	4
4 g	0	0	4 b	3	3	4 g	0	-7
5 g	1	2	5 b	2	-2	5 b	1	-2
6 g	0	0	6 b	-1	0	6 b	0	5
7 g	1	-6	7 g	1	-3	7 b	0	-3
8 g	2	3	8 g	1	3	8 b	1	3
9 g	0	4	9 g	-1	-3	9 b	1	3
10 g	0	1	10 g	-1	-1	10 b	-1	2
11 g	1	1	11 g	-1	0	11 b	-1	0
12 g	0	-4	12 g	2	-3	12 b	0	1
13 g	0	-5	13 g	1	7	13 b	-1	-3
14 g	0	-3	14 b	1	-1	14 b	0	3
15 g	-1	5	15 b	-1	0	15 g	0	-1
16 g	-2	-1	16 b	-1	3	16 g	-1	2
17 b	-2	1	17 b	-1	-1	17 g	1	0
18 b	2	-5	18 b	-1	-5	18 g	0	0
19 b	0	-3	19 b	-1	-2	19 g	0	0
20 b	1	-1	20 b	0	1	20 g	0	2
21 b	0	0	21 b	0	0	21 g	0	3
22 b	0	-3	22 b	0	-2	22 g	0	-3
23 b	0	-1	23 b	0	-4	23 g	1	-1
24 b	1	-5	24 b	0	-8	24 g	1	5
25 b	3	0	25 b	1	3	25 g	0	3
26 g	-2	5	26 b	1	2	26 b	0	-2
27 g	1	0	27 g	-1	-1	27 b	0	-2
28 g	1	1	28 g	0	3	28 b	0	3
29 g	-2	3	29 g	-1	-5	29 b	0	0
30 g	-2	4	30 g	-1	-2	30 b	0	-5
31 g	-1	0	31 g	-2	-7	31 b	0	5
32 g	0	2	32 b	-1	4	32 b	1	4
33 b	0	-1	33 b	0	-1	33 b	1	1
34 b	1	-1	34 b	2	0	34 b	-1	0
35 b	-2	-2	35 g	1	4	35 g	-0	-2
36 b	2	1	36 g	0	5	36 g	1	3
			37 g	0	-4	37 g	0	-3
			38 g	1	0			
			39 b	0	4			
			40 b	0	0			
			41 b	-2	5			
			42 b	0	-2			

## THE DOMINION TESTS

## GROUP TEST OF LEARNING CAPACITY

INTERMEDIATE—GRADES 7, 8, 9

CAT. NO. 139

(1950 OMNIBUS EDITION)

FORM **A****DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO**

Fill in the blanks below, giving your name, age, etc., and when you have done so, read the rest of this cover page. Only a short time will be given for this so you will need to work rapidly.

Name ..... Boy or Girl.....  
 (IN CAPITALS) LAST FIRST

Age ..... Birthdate ..... Grade .....  
 MONTH DATE YEAR

School ..... Teacher ..... Today's Date .....

City, Town, or Municipality ..... Province .....

Five sample questions are given below to show you what this test is like. In questions such as 1, 2, and 3, you must in each case select the best answer from the five choices presented, and write the number of your choice in the brackets following the question. In questions in which no choices are given, such as 4 and 5 below, it will be quite clear what you are expected to do. The sample questions have all been answered for you. The questions in the test must be answered in the same manner.









In doing this test you must work as rapidly as possible, since you are not likely to do all the questions in the 30 minutes allowed for it. Each question is worth one point. Skip any questions which appear to be too difficult, or which take up too much of your time, and return to them later if you have any time left. Spend your time now studying the samples below. **Do not open the booklet until you are told to do so.**









1. Which word does not belong in this list?  
 (1) green (2) purple (3) red (4) sweet (5) yellow ..... ( 4 )
2. Fish is to Swim as Bird is to  
 (1) feathers (2) fly (3) nest (4) chirp (5) egg ..... ( 2 )
3. Which word means the opposite of Come?  
 (1) late (2) home (3) run (4) ride (5) go ..... ( 5 )
4. What number comes next in this list?  
 12, 11, 10, 9, 8, ..... ( 7 )
5. Jim spent half of his money and has 15 cents left. How much did he have at first? ..... ( 30 )

DEPARTMENT OF EDUCATIONAL RESEARCH  
 ONTARIO COLLEGE OF EDUCATION  
 371 BLOOR STREET WEST, TORONTO 5








1. Which word means the opposite of **Create**?  
(1) acquire (2) disband (3) destroy (4) resume (5) finish.....( )
2. **Teacher** is to **Pupil** as **Doctor** is to  
(1) patient (2) medicine (3) nurse (4) sick (5) hospital.....( )
3. What number comes next in this list?  
1, 8, 2, 7, 3, 6, 4.....( )
4. If Sam had 5 cents more he would have twice as much money as Bill. Bill has 30 cents. How many cents has Sam?.....( )
5. Which word does not belong in this list?  
(1) stoop (2) bow (3) jump (4) bend (5) curtsy.....( )
6. **Sheep** is to **Flock** as **Bee** is to  
(1) sting (2) flowers (3) shepherd (4) honey (5) swarm.....( )
7. I had 9 apples and John had 10 apples. I gave him 7 of mine. How many more has he than I now?.....( )
8. What number comes next in this list?  
2, 3, 3, 3, 4, 3, 5, 3,.....( )
9. Which word means the opposite of **Uncertain**?  
(1) possible (2) doubtful (3) careful (4) positive (5) hopeful.....( )
10. It is 76 yards around a square lawn. How many yards is it along each side?.....( )
11. **Fish** is to **Water** as **Bird** is to  
(1) nest (2) egg (3) air (4) feather (5) fly.....( )
12. Which word does not belong in this list?  
(1) valley (2) hill (3) gully (4) ravine (5) gorge.....( )
13. What fraction comes next in this list?  
 $\frac{11}{5}, \frac{10}{7}, \frac{9}{9}, \frac{8}{11},$ .....( )
14. What is the smallest number that may be subtracted from 77 to make the remainder exactly divisible by 9?.....( )
15. Which word means the opposite of **Hasten**?  
(1) tarry (2) quiet (3) return (4) hurry (5) late .....( )
16. Which word does not belong in this list?  
(1) girl (2) maid (3) damsel (4) lass (5) child .....( )
17. **Spade** is to **Earth** as **Spoon** is to  
(1) fork (2) soup (3) table (4) silver (5) bread .....( )
18. What number added to 6 gives a number 2 more than half of 16?.....( )
19. What fraction comes next in this list?  
 $\frac{2}{3}, \frac{3}{5}, \frac{4}{7}, \frac{5}{9},$ .....( )

20. Which word means the opposite of **Generous**?  
 (1) wicked (2) miserly (3) rich (4) careless (5) poor.....( )
21. Which word does not belong in this list?  
 (1) measure (2) gauge (3) disagree (4) reckon (5) estimate.....( )
22. What number comes next in this list?  
 29, 30, 28, 29, 27, 28,.....( )
23. **Torrid** means the same as  
 (1) ugly (2) hostile (3) gloomy (4) rainy (5) hot.....( )
24. What number added to 7 gives a number 2 less than one-third of 36?.....( )
25. To **Predict** is to  
 (1) recall (2) describe (3) remind (4) foretell (5) prevent.....( )
26. What number comes next in this list?  
 1, 2, 4, 5, 7, 8,.....( )
27. **Wheat** is to **Granary** as **Books** are to  
 (1) pages (2) print (3) read (4) paper (5) library.....( )
28. Bill is taller than Joe and Joe is shorter than Harvey. Therefore of the three boys  
 (1) it is certain that Bill is the tallest  
 (2) it is certain that Joe is the tallest  
 (3) it is certain that Harvey is the tallest  
 (4) it is impossible to tell just who is the tallest.....( )
29. Which word does not belong in this list?  
 (1) shrink (2) contract (3) enlarge (4) reduce (5) diminish.....( )
30.  is to  as  is to  
 (1)  (2)  (3)  (4)  (5) .....( )
31. What number comes next in this list?  
 4, 2, 5,  $2\frac{1}{2}$ , 6, 3, 7,  $3\frac{1}{2}$ , 8,.....( )
32. Which word does not belong in this list?  
 (1) tremble (2) taunt (3) mock (4) jeer (5) jibe.....( )
33. **Mouse** is to **Cat** as **Fly** is to  
 (1) moth (2) kitten (3) insect (4) spider (5) cheese.....( )
34. What number comes next in this list?  
 25, 20, 16, 13, 11,.....( )

35. Which word means the opposite of **Depart**?  
 (1) meet (2) walk (3) embark (4) journey (5) return.....( )
36. A horse walks 4 miles per hour and trots 12 miles per hour. How many hours will it take to go 24 miles if it trots half the distance?.....( )
37. What number comes next in this list?  
 6, 21, 8, 19, 10, 17,.....( )
38. A prize is to be given to the most proficient pupil in the class. Mary is more proficient than Alice; Alice is in advance of the rest of the class. Therefore  
 (1) Alice will get the prize  
 (2) Mary will get the prize  
 (3) One of the other girls will get the prize  
 (4) Mary will not get the prize  
 (5) We do not know who should get the prize.....( )
39. Which word means the opposite of **Probable**?  
 (1) unlikely (2) possible (3) certain (4) never (5) always.....( )
40. What must I divide 32 by in order to get twice 4?.....( )
41. What fraction comes next in this list?  
 $\frac{15}{3}$ ,  $\frac{13}{6}$ ,  $\frac{11}{9}$ ,  $\frac{9}{12}$ ,.....( )
42. Which word means the opposite of **Double**?  
 (1) enlarge (2) halve (3) decrease (4) couple (5) treble.....( )
43. Which word does not belong in this list?  
 (1) swamp (2) slough (3) river (4) bog (5) marsh.....( )
44. What number, if halved, gives us one-third of 24?.....( )
45. What number comes next in this list?  
 3, 9, 27, 81,.....( )
46. Which word means the opposite of **Answer**?  
 (1) inquire (2) dictate (3) explain (4) retort (5) reply.....( )
47. Which word does not belong in this list?  
 (1) bark (2) yelp (3) growl (4) bay (5) purr.....( )
48.  is to  as  is to  
 (1)  (2)  (3)  (4)  (5) .....( )

49. What number comes next in this list?  
3, 5, 13, 15, 23, 25..... ( )
50. Which word means the opposite of **Vengeance**?  
(1) disgust (2) gratitude (3) justice (4) forgiveness (5) jealousy..... ( )
51. It rained yesterday. Tomorrow is Thursday. Therefore  
(1) it will rain tomorrow (2) Tuesday was wet  
(3) it rained on Wednesday (4) it is raining today  
(5) yesterday was Wednesday..... ( )
52. What number is 2 more than the number which 3 is one-half of?..... ( )
53. What number comes next in this list?  
2, 3, 5, 8, 12,..... ( )
54. Which word does not belong in this list?  
(1) seven (2) nine (3) three (4) four (5) five..... ( )
55. **Room** is to **Door** as **Field** is to  
(1) gate (2) farm (3) wheat (4) fence (5) plough..... ( )
56. What number comes next in this list?  
92, 97, 72, 77, 52, 57,..... ( )
57. What is the number one-third of which is 9?..... ( )
58. I have three packets of mixed seed—L, M, N. All the varieties of seeds in packet M are also in packet L, but L has varieties that M does not contain. Packet N has seeds that are in neither L nor M. If I wish to grow as many varieties of seeds as possible I can give away  
(1) L (2) M (3) N (4) none..... ( )
59. Which word means the opposite of **Acquire**?  
(1) lose (2) borrow (3) accept (4) receive (5) detain..... ( )
60. **Was** is to **Now** as **Yesterday** is to  
(1) tomorrow (2) hour (3) after (4) today (5) soon..... ( )
61. It is 16 feet around the edge of my table. If it is 3 feet wide, how many feet long is it?..... ( )
62. **Gaudy** means the same as  
(1) worthless (2) expensive (3) showy (4) noisy (5) clumsy..... ( )
63. How many sheets of tin 3 inches by 5 inches can be cut from a sheet 15 inches by 12 inches?..... ( )
64. **Stand** is to **Sit** as **Sit** is to  
(1) fly (2) walk (3) rest (4) run (5) lie..... ( )
65. What number comes next in this list?  
1, 4, 9, 16, 25..... ( )

GO ON TO PAGE 5

66. Multiply each of the numbers, 9, 8, by a number 7 less than itself. What is the sum of the two products?..... ( )
67. **Mouse** is to **Mice** as **He** is to  
(1) they (2) we (3) us (4) him (5) she..... ( )
68. The faces of a cube are numbered, 1, 2, 3, 4, etc. What is the sum of all the numbers on the faces?..... ( )
69. An **Adversary** is  
(1) a misfortune (2) an opponent (3) a gossip (4) a counsellor  
(5) a superior..... ( )
70. Jack is one year older now than Jim was 2 years ago. Jack is 7. How old is Jim?..... ( )
71. Which word means the opposite of **Cautious**?  
(1) rash (2) confident (3) severe (4) quick (5) angry..... ( )
72. What number comes next in this list?  
5, 6, 8, 12, 20..... ( )
73. I spent half of my money and one-third of the remainder. How many cents have I left if I had 84 cents at first?..... ( )
74. J is to C as F is to  
(1)  (2)  (3)  (4)  (5) ..... ( )
75. If the day before yesterday was the day after Tuesday, the day after tomorrow will be  
(1) Thursday (2) Friday (3) Saturday (4) Sunday (5) Monday..... ( )

END OF TEST

**Dominion Group Test of Learning  
Capacity—Intermediate**

(1950 Edition, Omnibus Type)

**KEY—FORM A**

( 4 )

( 2 )

( 28 )

( 36 )

( 1 )

( 8 )

( 2 )

( 21 )

( 1 )

( 26 )

66-75

**A Pg. 5**

**Fold inwards along this line**

**Cut along this line**

**Dominion Group Test of Learning  
Capacity—Intermediate**

(1950 Edition, Omnibus Type)

**KEY—FORM B**

(BC)

( 4 )

( 33 )

( 2 )

( 45 )

( 1 )

( 5 )

69-75

**B Pg. 5**

**Fold inwards along this line**

A Pg. 1 1-19	A Pg. 4 49-65	A Pg. 2 20-34	A Pg. 3 35-48	B Pg. 1 1-19	B Pg. 4 52-68	B Pg. 2 20-35	B Pg. 3 36-51
(11)	(10)	(4)	(5)	(4)	(3)	(1)	(3)
(4)	(4)	(26)	(3)	(4)	(7)	(10)	(2)
(2)	(33)	(3)	(5)	(7)	(11)	(6)	(9)
(5)	(4)	(3)	(4)	(2)	(1)	(8)	(6)
(1)	(4)	(2)	(12)	(1)	(8)	(1)	(4)
(5)	(2)	(5)	(1)	(9)	(4)	(1)	(4)
(5)	(8)	(5)	(2)	(5)	(3)	(4)	(5)
(17)	(17)	(243)	(2)	(4)	(10)	(20)	(5)
(2)	(4)	(1)	(2)	(1)	(19)	(12)	(24)
(3)	(1)	(10)	(4)	(17)	(3)	(5)	(5)
(19)	(32)	(4)	(1)	(3)	(5)	(5)	(6)
(4)	(27)	(3)	(4)	(4)	(5)	(3)	(2)
(6)	(5)	(5)	(5)	(1)	(4)	(1)	(8)
(15)	(2)	(10)	(2)	(3)	(16)	(16)	(5)
(5)	(1)	(4)	(3)	(3)	(2)	(3)	(4)
(3)	(4)	(3)	(19)	(2)	(2)	(70)	(3)
(55)	(5)	(5)	(3)	(3)	(2)	(2)	(3)
(5)	(5)	(26)	(1)	(4)	(5)	(5)	(11)
(1)	(3)	(3)	(5)	(7)	(6)	(10)	(4)
(3)	(12)	(2)	(5)	(5)	(2)	(3)	(4)
(5)	(5)	(2)	(5)	(5)	(4)	(4)	(3)

APPENDIX G

**EDUCATIONAL TESTING SERVICE**



640 Hollywood Boulevard • Los Angeles 27, California

Normandy 5-4155

April 5, 1960

Mrs. J. M. MacBride  
Hugh J. MacDonald School  
William Ave. at Kate Street  
Winnipeg 2, Manitoba, Canada

Dear Mrs. MacBride:

I have your recent letter in which you request information regarding the per cent of English words with Latin derivation in the Cooperative Vocabulary Test. Such a breakdown of the etymology of these words has never been attempted, nor do I know of any current test in usage that has such information.

Your study does sound interesting, and I feel that since a good majority of the English vocabulary is based on Latin derived words that you would see some appreciable difference between those students who have had three years of Latin and those who have had none.

Very sincerely yours,

Alexander I. Law  
Associate  
Advisory Services

AIL:ce

EDUCATIONAL TESTING SERVICE

COOPERATIVE VOCABULARY TEST

FORM Z

by

FREDERICK B. DAVIS, Hunter College, and  
CHARLOTTE CROON DAVIS, Test Research Service

with the editorial assistance of

IVAN A. BOOKER, National Education Association; W. W. COOK, University of Minnesota; G. V. LANNHOLM, Graduate Record Examination; DOROTHEA M. NEVILLE, Northport (New York) Junior High School; MARION C. SHERIDAN, James Hillhouse High School (New Haven); and GERALDINE SPAULDING, Educational Records Bureau

Please print:

Name ..... Date .....

Last                      First                      Middle

Grade or Class ..... Age ..... Date of Birth .....

Yrs.                      Mos.

School ..... City ..... Sex .....

M. or F.

Title of the English course you are now taking ..... Instructor .....

**Directions:** Do not turn this page until you are told to do so. This test consists of 210 items, 30 on each page. A time limit of 30 minutes is suggested. Answer all the items you can on each page before going on to the next. Answer the items as they come; be careful not to skip pages. This is not a speed test, and your score does not depend as much on how many items you try to answer as it does on how many you get right on each page you attempt.

On the other hand, the accuracy of your score will be decreased if you spend too much time on any one page. If you don't know the answer to an item after a second reading, go on to the next one. You may answer items even when you are not perfectly sure that your answers are correct, but you should avoid wild guessing, since wrong answers will result in a subtraction from the number of your correct answers.

In each group of words, select the numbered word or phrase which **most nearly** corresponds in meaning to the word at the head of that group, and puts its **number** in the parentheses at the right.

Computation of Score																																																																																																																																					
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="border: none;">Number wrong on completed pages</td> <td>0</td><td>3</td><td>7</td><td>11</td><td>15</td><td>19</td><td>23</td><td>27</td><td>31</td><td>35</td><td>39</td> </tr> <tr> <td style="border: none;">Amount to be subtracted</td> <td>2</td><td>6</td><td>10</td><td>14</td><td>18</td><td>22</td><td>26</td><td>30</td><td>34</td><td>38</td><td>42</td> </tr> <tr> <td style="border: none;"></td> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>43</td><td>47</td><td>51</td><td>55</td><td>59</td><td>63</td><td>67</td><td>71</td><td>75</td><td>79</td><td>83</td><td>87</td><td>91</td><td>95</td><td>99</td><td>103</td><td>107</td><td>111</td> </tr> <tr> <td>46</td><td>50</td><td>54</td><td>58</td><td>62</td><td>66</td><td>70</td><td>74</td><td>78</td><td>82</td><td>86</td><td>90</td><td>94</td><td>98</td><td>102</td><td>106</td><td>110</td><td>114</td> </tr> <tr> <td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>115</td><td>119</td><td>123</td><td>127</td><td>131</td><td>135</td><td>139</td><td>143</td><td>147</td><td>151</td><td>155</td><td>159</td><td>163</td><td>167</td> </tr> <tr> <td>118</td><td>122</td><td>126</td><td>130</td><td>134</td><td>138</td><td>142</td><td>146</td><td>150</td><td>154</td><td>158</td><td>162</td><td>166</td><td>+</td> </tr> <tr> <td>29</td><td>30</td><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td><td>41</td><td>42</td> </tr> </table>	Number wrong on completed pages	0	3	7	11	15	19	23	27	31	35	39	Amount to be subtracted	2	6	10	14	18	22	26	30	34	38	42		0	1	2	3	4	5	6	7	8	9	10	43	47	51	55	59	63	67	71	75	79	83	87	91	95	99	103	107	111	46	50	54	58	62	66	70	74	78	82	86	90	94	98	102	106	110	114	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	115	119	123	127	131	135	139	143	147	151	155	159	163	167	118	122	126	130	134	138	142	146	150	154	158	162	166	+	29	30	31	32	33	34	35	36	37	38	39	40	41	42	<p>Number of <i>completed</i> pages _____</p> <p>(A page is considered <i>completed</i> if the last item has been marked or if any items have been marked on subsequent pages. E.g., if the last item marked by a student is Item 30 on Page 5 or Items 1, 2, . . . , 29 on Page 6, five pages have been completed. If less than one page is completed, score as if one page had been completed.)</p> <p>Number right _____ (on <i>completed</i> pages only)</p> <p>Subtract _____ (Look up in table at left amount to be subtracted corresponding to the number wrong on <i>completed</i> pages)</p> <p>Raw Score = Difference _____</p> <p>Scaled Score _____ (See table on key under column corresponding to number of pages <i>completed</i>)</p>
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Column A	Column B	Column
1. <b>mumble</b> 1-1 speak indistinctly 1-2 complain 1-3 handle awkwardly 1-4 fall over something 1-5 tear apart . . .1( )	11. <b>cougar</b> 11-1 candy 11-2 messenger 11-3 panther 11-4 outlaw 11-5 dancer . . .11( )	21. <b>deplore</b> 21-1 send away 21-2 regret deeply 21-3 mention 21-4 tempt 21-5 investigate . .21( )
2. <b>bayonet</b> 2-1 small tent 2-2 basket 2-3 helmet 2-4 sharp weapon 2-5 short gun . . .2( )	12. <b>massive</b> 12-1 strong and muscular 12-2 thickly populated 12-3 ugly and awkward 12-4 huge and solid 12-5 everlasting . .12( )	22. <b>meander</b> 22-1 marvel 22-2 predict 22-3 slope 22-4 forget 22-5 wind . . . .22( )
3. <b>perspire</b> 3-1 struggle 3-2 sweat 3-3 happen 3-4 penetrate 3-5 submit . . . .3( )	13. <b>amplify</b> 13-1 electrify 13-2 expand 13-3 cut off 13-4 signify 13-5 supply . . . .13( )	23. <b>orthodox</b> 23-1 conventional 23-2 straight 23-3 surgical 23-4 right-angled 23-5 religious . . .23( )
4. <b>shellac</b> kind of 4-1 varnish 4-2 cardboard 4-3 dessert 4-4 soap 4-5 coin . . . . .4( )	14. <b>feign</b> 14-1 pretend 14-2 prefer 14-3 wear 14-4 be cautious 14-5 surrender . .14( )	24. <b>stripling</b> 24-1 stream 24-2 narrow path 24-3 engraving 24-4 lad 24-5 beginner . . .24( )
5. <b>astound</b> 5-1 scold severely 5-2 make angry 5-3 surprise greatly 5-4 drive out 5-5 ascertain . . . .5( )	15. <b>mural</b> pertaining to 15-1 growth 15-2 manners 15-3 the eyes 15-4 war 15-5 a wall . . . .15( )	25. <b>duplicity</b> 25-1 extent 25-2 double-dealing 25-3 agreement 25-4 cleverness 25-5 overlapping . .25( )
6. <b>surf</b> 6-1 fountain 6-2 breaking waves 6-3 celestial being 6-4 grass 6-5 peasant . . . .6( )	16. <b>unwary</b> 16-1 unusual 16-2 deserted 16-3 incautious 16-4 sudden 16-5 tireless . . . .16( )	26. <b>mundane</b> 26-1 worldly 26-2 obstinate 26-3 deafening 26-4 servile 26-5 penniless . . .26( )
7. <b>gush</b> 7-1 giggle 7-2 spout 7-3 sprinkle 7-4 hurry 7-5 cry . . . . .7( )	17. <b>hale</b> 17-1 glad 17-2 fortunate 17-3 tall 17-4 robust 17-5 ready . . . .17( )	27. <b>limpid</b> 27-1 lazy 27-2 crippled 27-3 clear 27-4 hot 27-5 slippery . . .27( )
8. <b>jovial</b> 8-1 refreshing 8-2 scarce 8-3 thickset 8-4 wise 8-5 jolly . . . . .8( )	18. <b>zest</b> 18-1 applause 18-2 sincerity 18-3 talent 18-4 joke 18-5 gusto . . . .18( )	28. <b>deleterious</b> 28-1 injurious 28-2 hysterical 28-3 critical 28-4 slow 28-5 thinned out . .28( )
9. <b>soar</b> 9-1 break 9-2 fly 9-3 look 9-4 shift 9-5 feel . . . . .9( )	19. <b>crony</b> 19-1 servant 19-2 ugly woman 19-3 informer 19-4 intimate companion 19-5 dirty old man .19( )	29. <b>fraught</b> 29-1 distorted 29-2 frightened 29-3 laden 29-4 unhappy 29-5 concealed . . .29( )
10. <b>contamination</b> 10-1 contradiction 10-2 contempt 10-3 warning 10-4 pollution 10-5 continuation .10( )	20. <b>veer</b> 20-1 change direction 20-2 hesitate 20-3 catch sight of 20-4 cover with a thin layer 20-5 slide . . . .20( )	30. <b>dross</b> 30-1 froth 30-2 waste material 30-3 dry spell 30-4 undivided whole 30-5 swamp . . . .30( )



Column D

Column E

Column F

- thicket
  - 1-1 dark cavern
  - 1-2 dense undergrowth
  - 1-3 heavy fog
  - 1-4 rushing water
  - 1-5 swirling snow . .1( )
- artery
  - 2-1 art museum
  - 2-2 spring
  - 2-3 throat
  - 2-4 blood vessel
  - 2-5 web . . . . .2( )
- cider
  - 3-1 berry wine
  - 3-2 flavoring extract
  - 3-3 punch
  - 3-4 spice
  - 3-5 apple juice . . .3( )
- glossy
  - 4-1 transparent
  - 4-2 cold and unfriendly
  - 4-3 bold
  - 4-4 well-dressed
  - 4-5 smooth and shining . . . .4( )
- plea
  - 5-1 gift
  - 5-2 appeal
  - 5-3 situation
  - 5-4 meadow
  - 5-5 charge . . . . .5( )
- recuperation
  - 6-1 relapse
  - 6-2 recollection
  - 6-3 summary
  - 6-4 breathing
  - 6-5 recovery . . . .6( )
- polo
  - kind of
  - 7-1 disease
  - 7-2 game
  - 7-3 tree
  - 7-4 weapon
  - 7-5 beverage . . . .7( )
- browse
  - 8-1 graze
  - 8-2 sew
  - 8-3 cultivate
  - 8-4 cook
  - 8-5 alarm . . . . .8( )
- mimic
  - 9-1 sing softly
  - 9-2 imitate
  - 9-3 recall
  - 9-4 make smaller
  - 9-5 attract . . . . .9( )
- pry
  - 10-1 enter
  - 10-2 tell
  - 10-3 snoop
  - 10-4 yield
  - 10-5 desire . . . .10( )
- 11. drudgery
  - 11-1 group of shrubs
  - 11-2 large pantry
  - 11-3 worry
  - 11-4 hatred
  - 11-5 toil . . . . .11( )
- 12. immaculate
  - 12-1 enclosed
  - 12-2 unreal
  - 12-3 clean
  - 12-4 saintly
  - 12-5 submerged . .12( )
- 13. din
  - 13-1 rumor
  - 13-2 herald
  - 13-3 noise
  - 13-4 grain
  - 13-5 darkness . . .13( )
- 14. deliberation
  - 14-1 freedom
  - 14-2 great exultation
  - 14-3 escape
  - 14-4 careful consideration
  - 14-5 disposition . .14( )
- 15. wheedle
  - 15-1 turn around
  - 15-2 breathe hoarsely
  - 15-3 coax
  - 15-4 squeeze
  - 15-5 wriggle . . .15( )
- 16. parry
  - 16-1 shun
  - 16-2 vanquish
  - 16-3 ward off
  - 16-4 gamble
  - 16-5 discuss . . . .16( )
- 17. pilfer
  - 17-1 search
  - 17-2 punch
  - 17-3 steal
  - 17-4 trap
  - 17-5 differ . . . .17( )
- 18. chink
  - 18-1 insect
  - 18-2 machine
  - 18-3 crack
  - 18-4 lining
  - 18-5 bell . . . . .18( )
- 19. nostalgia
  - 19-1 odor
  - 19-2 mild insanity
  - 19-3 plants
  - 19-4 homesickness
  - 19-5 irritation . . .19( )
- 20. retaliate
  - 20-1 repeat
  - 20-2 keep track of
  - 20-3 recover
  - 20-4 recount
  - 20-5 strike back . .20( )
- 21. burnish
  - 21-1 polish
  - 21-2 wave
  - 21-3 dye
  - 21-4 heat
  - 21-5 consume . . .21( )
- 22. barrister
  - 22-1 lawyer
  - 22-2 staircase
  - 22-3 obstacle
  - 22-4 bartender
  - 22-5 barbarian . .22( )
- 23. visage
  - 23-1 passport
  - 23-2 shadow
  - 23-3 face
  - 23-4 clamp
  - 23-5 measurement .23( )
- 24. adversity
  - 24-1 wisdom
  - 24-2 similarity
  - 24-3 dislike
  - 24-4 stubbornness
  - 24-5 misfortune . .24( )
- 25. jobber
  - 25-1 middleman
  - 25-2 employment agent
  - 25-3 good worker
  - 25-4 laborer
  - 25-5 manufacturer .25( )
- 26. salubrious
  - 26-1 mirthful
  - 26-2 indecent
  - 26-3 salty
  - 26-4 mournful
  - 26-5 healthful . . .26( )
- 27. frond
  - 27-1 water basin
  - 27-2 leaf
  - 27-3 forehead
  - 27-4 imposter
  - 27-5 shady nook . .27( )
- 28. mullion
  - 28-1 vertical support
  - 28-2 clear soup
  - 28-3 church steeple
  - 28-4 hot drink
  - 28-5 sheep . . . .28( )
- 29. procreate
  - 29-1 sketch
  - 29-2 inhabit
  - 29-3 imitate
  - 29-4 beget
  - 29-5 encourage . .29( )
- 30. nascent
  - 30-1 colorful
  - 30-2 broad
  - 30-3 unpleasant
  - 30-4 floating
  - 30-5 beginning . .30( )

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- | Column G  | Column H  | Column   |
|---|---|--|
| 1. <b>demonstrate</b><br>1-1 show<br>1-2 emphasize<br>1-3 blame<br>1-4 command<br>1-5 spread . . . . .1( )                    | 11. <b>hilarity</b><br>11-1 angry shouting<br>11-2 rapidity<br>11-3 excitement<br>11-4 boisterous mirth<br>11-5 friendliness . .11( )     | 21. <b>turnkey</b><br>21-1 thief<br>21-2 doorman<br>21-3 jailer<br>21-4 locksmith<br>21-5 magician . . .21( )                                  |
| 2. <b>emerald</b><br>2-1 island<br>2-2 messenger<br>2-3 lamp globe<br>2-4 printer's measure<br>2-5 precious stone . .2( )     | 12. <b>amiable</b><br>12-1 agreeable<br>12-2 graceful<br>12-3 elastic<br>12-4 reasonable<br>12-5 definite . . .12( )                      | 22. <b>splice</b><br>22-1 sharp tool<br>22-2 splinter<br>22-3 separation<br>22-4 connection<br>22-5 herb . . . . .22( )                        |
| 3. <b>commotion</b><br>3-1 amendment<br>3-2 incentive<br>3-3 disturbance<br>3-4 advancement<br>3-5 proposal . . . .3( )       | 13. <b>exterminate</b><br>13-1 extend farther<br>13-2 excuse<br>13-3 clean<br>13-4 destroy completely<br>13-5 fight against .13( )        | 23. <b>strop</b><br>23-1 hang<br>23-2 mend<br>23-3 sharpen<br>23-4 enforce<br>23-5 pause . . . .23( )  |
| 4. <b>amazement</b><br>4-1 brightness<br>4-2 interest<br>4-3 amusement<br>4-4 astonishment<br>4-5 anger . . . . .4( )         | 14. <b>vagrant</b><br>14-1 vagueness<br>14-2 inhabitant<br>14-3 fragrance<br>14-4 wanderer<br>14-5 farm hand . .14( )                     | 24. <b>corporeal</b><br>24-1 rich<br>24-2 brutal<br>24-3 strict<br>24-4 physical<br>24-5 hearty . . . .24( )                                   |
| 5. <b>yelp</b><br>5-1 harsh laugh<br>5-2 swallow<br>5-3 harness<br>5-4 puppy<br>5-5 shrill bark . . .5( )                     | 15. <b>ponderous</b><br>15-1 clean and airy<br>15-2 self-important<br>15-3 calm<br>15-4 low-hanging<br>15-5 heavy and unwieldy . . .15( ) | 25. <b>duress</b><br>25-1 period of time<br>25-2 distaste<br>25-3 courage<br>25-4 hardness<br>25-5 compulsion . .25( )                         |
| 6. <b>lather</b><br>6-1 strap<br>6-2 foam<br>6-3 pantry<br>6-4 oil<br>6-5 tool . . . . .6( )                                  | 16. <b>bayou</b><br>16-1 hunter's knife<br>16-2 cry or call<br>16-3 marshy inlet<br>16-4 mountain hut<br>16-5 prairie dog . .16( )        | 26. <b>comestible</b><br>26-1 explosive<br>26-2 valuable<br>26-3 sweet<br>26-4 eatable<br>26-5 useful . . . .26( )                             |
| 7. <b>clinch</b><br>7-1 argue<br>7-2 strike hard<br>7-3 measure<br>7-4 fix securely<br>7-5 pursue . . . . .7( )               | 17. <b>acclaim</b><br>17-1 protest<br>17-2 run after<br>17-3 applaud<br>17-4 acquire<br>17-5 demand . . .17( )                            | 27. <b>irrefragable</b><br>27-1 unbearable<br>27-2 undeniable<br>27-3 impudent<br>27-4 safe<br>27-5 radical . . . .27( )                       |
| 8. <b>nimble</b><br>8-1 quick and light<br>8-2 stiff and cold<br>8-3 sluggish<br>8-4 sentimental<br>8-5 nervous . . . .8( )   | 18. <b>priority</b><br>18-1 precedence<br>18-2 size<br>18-3 sequence<br>18-4 monastery<br>18-5 authority . . .18( )                       | 28. <b>prolific</b><br>28-1 freely reproductive<br>28-2 prehistoric<br>28-3 talented<br>28-4 highly temperamental<br>28-5 frivolous . . .28( ) |
| 9. <b>obituary</b><br>9-1 long speech<br>9-2 funeral services<br>9-3 coffin<br>9-4 funeral chapel<br>9-5 death notice . .9( ) | 19. <b>heather</b><br>kind of<br>19-1 rope<br>19-2 paper<br>19-3 plant<br>19-4 carriage<br>19-5 pottery . . .19( )                        | 29. <b>devious</b><br>29-1 deep<br>29-2 devout<br>29-3 vicious<br>29-4 defective<br>29-5 winding . . .29( )                                    |
| 10. <b>sloop</b><br>kind of<br>10-1 ivy<br>10-2 fish<br>10-3 bird<br>10-4 porridge<br>10-5 boat . . . . .10( )                | 20. <b>pretentious</b><br>20-1 dishonest<br>20-2 earnest<br>20-3 showy<br>20-4 humble<br>20-5 quarrelsome .20( )                          | 30. <b>vendetta</b><br>30-1 saleswoman<br>30-2 feud<br>30-3 dagger<br>30-4 head covering<br>30-5 street fair . .30( )                          |

- | Column J   | Column K  | Column L  |
|--|---|---|
| 1. <b>holster</b><br>1-1 strap for a saddle<br>1-2 bridle<br>1-3 stableman<br>1-4 case for a gun<br>1-5 peddler . . . .1( )            | 11. <b>monocle</b><br>11-1 sacred stone<br>11-2 eyeglass<br>11-3 emperor<br>11-4 handcuff<br>11-5 insignia . . .11( )         | 21. <b>pittance</b><br>21-1 severe hardship<br>21-2 small allowance<br>21-3 strenuous opposition<br>21-4 unexpected help<br>21-5 undeserved reward . . . .21( ) |
| 2. <b>soggy</b><br>2-1 damp and heavy<br>2-2 sad and discouraged<br>2-3 shapeless<br>2-4 dull and lifeless<br>2-5 sour . . . . .2( )   | 12. <b>sham</b><br>12-1 false<br>12-2 foreign<br>12-3 serious<br>12-4 reckless<br>12-5 sympathetic . .12( )                   | 22. <b>replete</b><br>22-1 full<br>22-2 elderly<br>22-3 resentful<br>22-4 discredited<br>22-5 restful . . . .22( )  |
| 3. <b>davenport</b><br>3-1 hammock<br>3-2 large sofa<br>3-3 six-legged table<br>3-4 canopy<br>3-5 desk . . . . .3( )                   | 13. <b>repentant</b><br>13-1 suspended<br>13-2 curved<br>13-3 unattractive<br>13-4 imprisoned<br>13-5 contrite . . .13( )     | 23. <b>anarchical</b><br>23-1 illogical<br>23-2 heedless<br>23-3 lawless<br>23-4 impractical<br>23-5 immoral . . .23( )   |
| 4. <b>emblem</b><br>4-1 spot<br>4-2 jewel<br>4-3 scar<br>4-4 honor<br>4-5 symbol . . . . .4( )   | 14. <b>affix</b><br>14-1 torment<br>14-2 attach<br>14-3 repair<br>14-4 cut off<br>14-5 cling . . . .14( )                     | 24. <b>paroxysm</b><br>24-1 bleach<br>24-2 disaster<br>24-3 storm<br>24-4 fit<br>24-5 revolution . .24( )   |
| 5. <b>geranium</b><br>kind of<br>5-1 mineral<br>5-2 gas<br>5-3 drug<br>5-4 flower<br>5-5 insect . . . . .5( )                          | 15. <b>benevolent</b><br>15-1 serviceable<br>15-2 charitable<br>15-3 respectable<br>15-4 remedial<br>15-5 free . . . . .15( ) | 25. <b>frieze</b><br>25-1 fringe of curls on the forehead<br>25-2 statue<br>25-3 ornamental band<br>25-4 embroidery<br>25-5 sherbet . . . .25( )                |
| 6. <b>hostage</b><br>6-1 institution<br>6-2 enemy<br>6-3 large crowd<br>6-4 wounded soldier<br>6-5 captive . . . . .6( )               | 16. <b>attest</b><br>16-1 certify<br>16-2 condemn<br>16-3 dislike<br>16-4 boast<br>16-5 pardon . . . .16( )                   | 26. <b>contemn</b><br>26-1 scorn<br>26-2 consult<br>26-3 judge<br>26-4 discard<br>26-5 isolate . . . .26( )   |
| 7. <b>galosh</b><br>7-1 legging<br>7-2 overshoe<br>7-3 suspender<br>7-4 garter<br>7-5 mitten . . . . .7( )                             | 17. <b>rapier</b><br>17-1 warrior<br>17-2 sudden attack<br>17-3 wharf<br>17-4 sword<br>17-5 rapid thrust .17( )               | 27. <b>redundant</b><br>27-1 wavy<br>27-2 hammering<br>27-3 undesirable<br>27-4 finished<br>27-5 superfluous . .27( )   |
| 8. <b>stagnant</b><br>8-1 active<br>8-2 swaying<br>8-3 motionless<br>8-4 notable<br>8-5 impatient . . . .8( )                          | 18. <b>dissension</b><br>18-1 deceit<br>18-2 ignorance<br>18-3 disagreement<br>18-4 doubt<br>18-5 expansion . .18( )          | 28. <b>antipodal</b><br>28-1 outmoded<br>28-2 slanted<br>28-3 melodious<br>28-4 opposite<br>28-5 four-footed . .28( )   |
| 9. <b>litter</b><br>9-1 musical composition<br>9-2 scattered rubbish<br>9-3 public show<br>9-4 decoration<br>9-5 coloring matter .9( ) | 19. <b>bizarre</b><br>19-1 odd<br>19-2 beautiful<br>19-3 bitter<br>19-4 eager<br>19-5 clever . . . .19( )                     | 29. <b>treacle</b><br>29-1 sewing machine<br>29-2 framework<br>29-3 leak<br>29-4 apple butter<br>29-5 molasses . . .29( )                                       |
| 10. <b>moreover</b><br>10-1 however<br>10-2 nevertheless<br>10-3 though<br>10-4 furthermore<br>10-5 therefore . . .10( )               | 20. <b>succulence</b><br>20-1 sweetness<br>20-2 juiciness<br>20-3 assistance<br>20-4 success<br>20-5 softness . . .20( )      | 30. <b>arbitrary</b><br>30-1 despotic<br>30-2 willing<br>30-3 settled<br>30-4 defiant<br>30-5 lenient . . . .30( )  |

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Column M	Column N	Column C
1. <b>gallantry</b> 1-1 wastefulness 1-2 good fortune 1-3 folly 1-4 bravery 1-5 alertness . . . .1( )	11. <b>foil</b> 11-1 fold 11-2 tie 11-3 shine 11-4 rouse 11-5 thwart . . . .11( )	21. <b>disburse</b> 21-1 deceive 21-2 pay out 21-3 get off 21-4 pass through 21-5 unlock . . . .21( )
2. <b>expel</b> 2-1 force out 2-2 order 2-3 blot out 2-4 lose 2-5 leave . . . .2( )	12. <b>transition</b> 12-1 location 12-2 explanation 12-3 change 12-4 delay 12-5 prediction . .12( )	22. <b>acrimony</b> 22-1 promptness 22-2 boredom 22-3 divorce 22-4 stupidity 22-5 bitterness . .22( )
3. <b>coyote</b> 3-1 clever person 3-2 shy person 3-3 ravine 3-4 body louse 3-5 small wolf . . .3( )	13. <b>ebony</b> kind of 13-1 stone 13-2 bone 13-3 wood 13-4 glass 13-5 metal . . . .13( )	23. <b>composite</b> 23-1 revision 23-2 composure 23-3 combination 23-4 companion 23-5 position . . .23( )
4. <b>handicap</b> 4-1 sun helmet 4-2 glove 4-3 halter 4-4 late evening meal 4-5 disadvantage . .4( )	14. <b>transverse</b> 14-1 crosswise 14-2 reverse 14-3 twisted 14-4 vertical 14-5 parallel . . .14( )	24. <b>aversion</b> 24-1 false accusation 24-2 strong dislike 24-3 declaration 24-4 detour 24-5 translation . .24( )
5. <b>compulsory</b> 5-1 required 5-2 chosen 5-3 intended 5-4 trembling 5-5 voluntary . . .5( )	15. <b>naïve</b> 15-1 affected 15-2 experienced 15-3 neat 15-4 unsophisticated 15-5 pious . . . .15( )	25. <b>ignominious</b> 25-1 inflammable 25-2 elflike 25-3 unintelligent 25-4 disgraceful 25-5 mysterious . .25( )
6. <b>pimento</b> kind of 6-1 musical notation 6-2 pepper 6-3 pony 6-4 biscuit 6-5 paint . . . .6( )	16. <b>euphonious</b> 16-1 confused in meaning 16-2 happy 16-3 complimentary 16-4 sleepy 16-5 pleasing in sound . . . .16( )	26. <b>peruse</b> 26-1 employ 26-2 read carefully 26-3 wear out 26-4 overtake 26-5 write slowly .26( )
7. <b>destiny</b> 7-1 plan 7-2 success 7-3 fate 7-4 fame 7-5 revolt . . . .7( )	17. <b>dexterous</b> 17-1 skillful 17-2 correct 17-3 rapid 17-4 sugar-coated 17-5 covered . . .17( )	27. <b>culpable</b> 27-1 endurable 27-2 pliable 27-3 heavy 27-4 noticeable 27-5 guilty . . . .27( )
8. <b>unanimous</b> 8-1 nameless 8-2 without exception 8-3 uninterested 8-4 rather unfriendly 8-5 gentle . . . .8( )	18. <b>foyer</b> 18-1 closet 18-2 booth 18-3 lobby 18-4 doorway 18-5 balcony . . .18( )	28. <b>remiss</b> 28-1 returned 28-2 misplaced 28-3 hopeless 28-4 negligent 28-5 unsteady . . .28( )
9. <b>pike</b> kind of 9-1 bird 9-2 insect 9-3 herb 9-4 fish 9-5 snake . . . .9( )	19. <b>astute</b> 19-1 shrewd 19-2 conservative 19-3 superstitious 19-4 undernourished 19-5 shrill . . . .19( )	29. <b>lissome</b> 29-1 lonely 29-2 young 29-3 dreamy 29-4 supple 29-5 dainty . . . .29( )
10. <b>molten</b> 10-1 frozen 10-2 melted 10-3 aged 10-4 overripe 10-5 metallic . . .10( )	20. <b>mercenary</b> 20-1 traitor 20-2 hired soldier 20-3 mute person 20-4 admirer 20-5 loose robe . .20( )	30. <b>gratuitous</b> 30-1 unwarranted 30-2 gracious 30-3 merciful 30-4 envious 30-5 proud . . . .30( )

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- | Column P   | Column Q  | Column R   |
|--|---|--|
| 1. mahogany<br>kind of<br>1-1 cloth<br>1-2 china<br>1-3 wood<br>1-4 vehicle<br>1-5 rock . . . . .1( )                  | 11. unflinching<br>11-1 steadfast<br>11-2 boastful<br>11-3 blind<br>11-4 colorfast<br>11-5 merciless . . .11( )                           | 21. reverie<br>21-1 sleep<br>21-2 reverence<br>21-3 distraction<br>21-4 discovery<br>21-5 daydream . .21( )                |
| 2. ballot<br>2-1 weight<br>2-2 dance<br>2-3 song<br>2-4 cargo<br>2-5 vote . . . . .2( )                                | 12. fickle<br>12-1 changeable<br>12-2 sparkling<br>12-3 doubtful<br>12-4 silly<br>12-5 playful . . . .12( )                               | 22. blandish<br>22-1 flatter<br>22-2 disfigure<br>22-3 suspect<br>22-4 wave<br>22-5 flicker . . . .22( )                   |
| 3. gauze<br>3-1 meter<br>3-2 railroad track<br>3-3 long view<br>3-4 thin cloth<br>3-5 wound . . . . .3( )              | 13. gaunt<br>13-1 lame<br>13-2 sick<br>13-3 thin and bony<br>13-4 short and stout<br>13-5 ugly . . . . .13( )                             | 23. expunge<br>23-1 rub out<br>23-2 establish<br>23-3 soak up<br>23-4 discolor<br>23-5 torture . . . .23( )                |
| 4. brim<br>4-1 ocean<br>4-2 handle<br>4-3 decoration<br>4-4 edge<br>4-5 hoop . . . . .4( )                             | 14. ecclesiastical<br>pertaining to the<br>14-1 church<br>14-2 government<br>14-3 arts<br>14-4 poorer classes<br>14-5 army . . . . .14( ) | 24. whim<br>24-1 hoax<br>24-2 pretext<br>24-3 intuition<br>24-4 freakish notion<br>24-5 amusement . .24( )                 |
| 5. feeble<br>5-1 old<br>5-2 temporary<br>5-3 weak<br>5-4 crippled<br>5-5 nasty . . . . .5( )                           | 15. garnish<br>15-1 harvest<br>15-2 illuminate<br>15-3 decorate<br>15-4 surround<br>15-5 devour . . . .15( )                              | 25. abjure<br>25-1 make certain<br>25-2 arrest<br>25-3 renounce<br>25-4 abuse<br>25-5 lose . . . . .25( )                  |
| 6. myth<br>6-1 prophecy<br>6-2 legend<br>6-3 love potion<br>6-4 supernatural<br>being<br>6-5 religious song . .6( )    | 16. amity<br>16-1 laughter<br>16-2 friendship<br>16-3 calmness<br>16-4 partice<br>16-5 patriotism . .16( )                                | 26. succinct<br>26-1 sudden<br>26-2 concise<br>26-3 prosperous<br>26-4 literary<br>26-5 cunning . . . .26( )               |
| 7. auburn<br>7-1 grayish-white<br>7-2 reddish-brown<br>7-3 blue-green<br>7-4 greenish-gray<br>7-5 reddish-purple .7( ) | 17. prevalent<br>17-1 customary<br>17-2 healthy<br>17-3 preventive<br>17-4 accidental<br>17-5 widespread . .17( )                         | 27. dilatory<br>27-1 hasty<br>27-2 large<br>27-3 pleasant<br>27-4 slow<br>27-5 icy . . . . .27( )                          |
| 8. role<br>8-1 part<br>8-2 circle<br>8-3 retreat<br>8-4 stake<br>8-5 quality . . . . .8( )                             | 18. exonerate<br>18-1 worship<br>18-2 free from blame<br>18-3 entwine<br>18-4 dry up<br>18-5 lift out of . .18( )                         | 28. ephemeral<br>28-1 girlish<br>28-2 dense<br>28-3 introductory<br>28-4 impractical<br>28-5 short-lived . .28( )          |
| 9. loam<br>kind of<br>9-1 grass<br>9-2 strap<br>9-3 soil<br>9-4 fertilizer<br>9-5 liquid . . . . .9( )                 | 19. qualm<br>19-1 misgiving<br>19-2 pool<br>19-3 vibration<br>19-4 contest<br>19-5 drink . . . . .19( )                                   | 29. anathema<br>29-1 pithy saying<br>29-2 patriotic song<br>29-3 fable<br>29-4 curse<br>29-5 disease . . . .29( )          |
| 0. enunciate<br>10-1 command<br>10-2 inform<br>10-3 appoint<br>10-4 pronounce<br>10-5 summon . . .10( )                | 20. admonish<br>20-1 permit<br>20-2 notify<br>20-3 warn<br>20-4 decrease<br>20-5 insist . . . .20( )                                      | 30. recrudescence<br>30-1 renewal<br>30-2 impoliteness<br>30-3 remembrance<br>30-4 reclamation<br>30-5 enlistment . .30( ) |

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Column S	Column T	Column 1
1. hornet 1-1 musician 1-2 small horn 1-3 wasp 1-4 dark-haired person 1-5 siren . . . . .1( )	11. pleat 11-1 lure 11-2 surround 11-3 finish 11-4 cry 11-5 fold . . . . .11( )	21. candor 21-1 soreness 21-2 frankness 21-3 deceit 21-4 gaiety 21-5 disgust . . . . .21( )
2. fragile 2-1 lively 2-2 ragged 2-3 sickly 2-4 tiny 2-5 easily broken . . .2( )	12. disconsolate 12-1 expensive 12-2 wavering 12-3 dejected 12-4 unwilling 12-5 unwise . . . . .12( )	22. lassitude 22-1 scope 22-2 slumber 22-3 boldness 22-4 discouragement 22-5 weariness . . .22( )
3. garlic kind of 3-1 wax 3-2 trimming 3-3 jelly 3-4 seasoning 3-5 cereal . . . . .3( )	13. fraudulent 13-1 ladylike 13-2 ornate 13-3 insipid 13-4 deceitful 13-5 violent . . . . .13( )	23. itinerant 23-1 hard working 23-2 scholarly 23-3 brief 23-4 wandering 23-5 uneducated . . .23( )
4. tweed kind of 4-1 tobacco 4-2 bird call 4-3 cloth 4-4 straw 4-5 dye . . . . .4( )	14. brocade kind of 14-1 waterfall 14-2 passageway 14-3 procession 14-4 feather 14-5 fabric . . . . .14( )	24. vestige 24-1 priestess 24-2 trace 24-3 stain 24-4 fragment 24-5 risk . . . . .24( )
5. restrict 5-1 limit 5-2 pledge 5-3 mistake 5-4 load 5-5 cross . . . . .5( )	15. colossal 15-1 bony 15-2 brightly colored 15-3 rich 15-4 enormous 15-5 showy . . . . .15( )	25. castigate 25-1 bind tightly 25-2 congratulate 25-3 criticize severely 25-4 question 25-5 fascinate . . . . .25( )
6. regain 6-1 profit from 6-2 save 6-3 overcome 6-4 entertain 6-5 get back . . . . .6( )	16. impeccable 16-1 faultless 16-2 precious 16-3 imperfect 16-4 sturdy 16-5 sophisticated .16( )	26. caracul kind of 26-1 vegetable 26-2 fur 26-3 reptile 26-4 carpet 26-5 grain . . . . .26( )
7. brawl 7-1 rude person 7-2 poor handwriting 7-3 storm at sea 7-4 physical fitness 7-5 noisy quarrel . .7( )	17. posterity 17-1 barrenness 17-2 display of posters 17-3 great haste 17-4 future generations 17-5 successful progress . . .17( )	27. lintel 27-1 shelf 27-2 small window 27-3 silver paper 27-4 pulpit 27-5 horizontal support . . .27( )
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NAME	DATE OF BIRTH	AGE	M. OR F.	INSTRUCTOR	PAGE 1					PAGE 2					PAGE 3					PAGE 4					PAGE 5				
					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
2					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
3					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
4					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
5					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
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8					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
9					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
10					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
11					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
12					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
13					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
14					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
15					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
16					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
17					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
18					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
19					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
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23					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
24					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
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26					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
27					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
28					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
29					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
30					1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

NAME \_\_\_\_\_ DATE \_\_\_\_\_ TITLE OF THE ENGLISH COURSE YOU ARE NOW TAKING \_\_\_\_\_

FIRST \_\_\_\_\_ MIDDLE \_\_\_\_\_ CITY \_\_\_\_\_

SCHOOL \_\_\_\_\_

SIX PAGES COMPLETED		SEVEN PAGES COMPLETED	
RAW SCORE ON FIRST SIDE OF ANSWER SHEET			
RAW SCORE ON SECOND SIDE OF ANSWER SHEET			
RAW SCORE TOTAL (See table below for converting Raw Score into Scaled Scores)			

RAW SCORE	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	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Scaled Score	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	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85						

RAW SCORE	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150															
Scaled Score	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	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85


RAW SCORE	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210																				
Scaled Score	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	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85

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*M. MacBride*

THE  
COOPERATIVE  
TESTS  
  
MANUAL  
OF  
DIRECTIONS

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COOPERATIVE TEST DIVISION  
EDUCATIONAL TESTING SERVICE

20 Nassau Street  
Princeton, New Jersey

4640 Hollywood Boulevard  
Los Angeles, 27, California

## GENERAL INFORMATION

The Cooperative Test Division of Educational Testing Service is a non-profit organization which was established to promote the effective use of tests in educational institutions. Its primary function is to construct and to distribute professionally sound tests of scholastic aptitude and achievement which meet common educational measurement and guidance needs. To insure the effective use of its tests, the Cooperative Test Division also develops materials and provides services to aid the test user in his application of its offerings.

### THE COOPERATIVE TESTS

The tests, materials, and services available to test users are described in the current catalog of Cooperative Tests. However, a few general characteristics of the tests and services offered may be described here in order to aid the examiner in understanding the use of these tests.

**Construction.** The tests themselves have been constructed by a trained staff with the direct cooperation of teachers and subject-matter experts. Some of the distinctive features of these offerings may be illustrated by the construction and experimentation steps which are followed in the development of Cooperative Tests. The following outline of procedures will indicate the care which is exercised to insure the validity and reliability of each test form:

- a. Preliminary planning and selection of content
  - Analyses of curricula, textbooks, research studies, etc.
  - Formulation of objectives and determination of general plan
  - Preparation of detailed outlines based upon survey of materials
  - Submission of outlines to authorities for criticism
  - Revision of test outlines in accordance with suggestions of critics
- b. Preparation and editing of test items
  - Writing of items by test editors and cooperating experts
  - Submission of items to authorities for criticism
  - Revision of items in view of suggestions received
  - Preparation of experimental forms of test
- c. Administration of experimental forms to a representative sampling of students to obtain item difficulty and validity indices and to detect items which may be weak or ambiguous
- d. Preparation of final form
  - Selection and revision of items for tentative final form

Obtaining from experts in subject matter field test technicians, etc., suggestions and criticisms of the tentative final form

Revision and final editing of the test, based on criticisms and suggestions received

- e. Administration of final form of test with experimental forms for equating and determination of Scaled Scores and percentile norms.

**Comparability.** There are several equivalent forms available for most subject-matter tests, making possible a record of achievement of individual students or classes over a period of time. Scores on different forms of test are comparable because of the system of Scaled Scores which was developed for the Cooperative Tests and which provides a common scale for many of the tests. The raw scores may be converted to Scaled Scores by means of tables printed on the fan key or answer sheet. To a limited degree, these Scaled Scores also provide general comparability among tests in different subjects.

### THE TEST MATERIALS

**Test Booklets.** Each student must be provided with a copy of the test booklet containing the test questions. Most of the booklets are designed to be used either with or without special answer sheets. If the student records his answers directly in the booklet, the booklet may be used only once, but if separate answer sheets are used, test booklets may be re-used as often as desired.

**Answer Sheets.** Most of the Cooperative Tests are given with separate answer sheets. When answer sheets are used, each student must be supplied with one designed for the particular test he is taking. The answer sheets may be scored either by hand or by machine. In general, the use of separate answer sheets facilitates scoring.

If the examination period is not long enough to allow ample time for making the necessary explanations, it is desirable to explain the use of the answer sheets at some time prior to the examination period. Sample answer sheets are available for practice purposes.

**Special Pencils.** The marking of the answer sheets requires a soft pencil with which a clear black line can be quickly made. When the answer sheets are to be scored by machine, it is important to use very soft pencil of good quality, which will make a smooth, glossy black line. These special *electrographic pencils* may be obtained from the Cooperative Test Division.

**Scoring Materials.** The scoring materials needed vary depend upon how the tests are administered. If student responses are recorded in the test booklet, a *fan key*

ed for hand-scoring. If responses are recorded on answer sheets, a *scoring stencil* is used for either hand- or machine-scoring.

**Directions.** A manual giving directions for administering and scoring the Cooperative Tests is supplied with each package of tests. A few of the tests require special manuals, but the directions in this general manual may be used for the majority of the tests. Specific directions for each test are given in the test booklets.

**Interpretative Data.** One of the most useful features of the Cooperative Tests is the provision of tables of percentile ranks, based on large numbers of students, for almost all of the tests. The Scaled Scores previously mentioned are also aids in the interpretation of test

results. Further discussion of the percentile rank tables and the Scaled Scores, with suggestions for their uses in interpreting test results, will be found in the last section of this manual.

## ADVISORY SERVICES

Teachers and administrators are invited to consult the Evaluation and Advisory Service of the Educational Testing Service concerning their testing problems. The staff is glad to assist in the choice of suitable tests, whether for testing a single class, for testing an entire department, for a scholarship program, or for a large survey or state-wide testing program. Questions concerning the interpretation and use of the test results are also welcomed.

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## DIRECTIONS FOR ADMINISTERING THE COOPERATIVE TESTS

### GENERAL DIRECTIONS FOR ADMINISTERING

The cover page or the first inside page of each Cooperative test contains the essential information needed in administering the test, but there are certain general rules that should always be followed, as well as special directions for certain tests and for particular conditions of administration. The examiner should study the directions in this manual, and then follow exactly the procedure described in the appropriate set of instructions below.

**The Examiner's Preparation.** In addition to his study of this manual, the examiner should thoroughly familiarize himself with all parts of each test that he is to administer. Perhaps the best way for him to do this is by trying each test himself in a bona fide manner. By doing so, he can anticipate many of the questions that examinees will ask, and he can also foresee problems of organization and prepare for them.

When a large group is to be tested, proctors are needed to help administer the tests. There should be one proctor for every thirty examinees. The proctors should understand in advance exactly what they are to do in order that the booklets may be quickly distributed and collected without confusion.

The examiner should see that the used and unused booklets are carefully counted, classified, and labeled at the end of the examination.

**Announcing the Examination.** The preliminary announcement of the examination should name the place, day, and hour at which it will be given. Allow from 5 to 10 minutes for seating and preliminary arrangements in the examination room. *The time allowances printed on the booklets are for actual work on the test questions, exclusive of time taken for preliminaries.* Examinees should be told to bring two well-sharpened No. 2 (or B) pencils with good erasers unless tests are to be machine-scored, in which case examiner will provide special mechanical pencils. The use of fountain pens or ink in any form should be specifically forbidden. Examiners should have a supply of pencils on hand and should

provide scratch paper for all mathematics and science tests.

**Directions in the Examination Room.** The seating order in the examination room should be carefully arranged in advance. In taking objective examinations it is comparatively easy for students to observe the answers of their neighbors and to be influenced or disturbed by such observations. The students should always be seated as far apart as possible, *never closer than in alternate seats.* If it seems necessary, the disturbing character of such observation may be explained to the students.

Directions for taking the tests are printed on the test booklets. The examiner must see that the examinees understand the essential points in the directions *before* they begin work on the test. This can be done by allowing sufficient time at the beginning of the examination for the students to read the directions carefully, by emphasizing points that seem to need emphasis, and by answering any legitimate questions that may be asked. In testing large groups, the carrying power of the examiner's voice is an important factor in avoiding confusion and in creating good morale.

**Fidelity to Printed Directions.** In answering questions and in orally emphasizing the directions, *it is essential that the examiner stay within the meaning and, so far as possible, use the vocabulary of the directions printed on the test booklet.* Any deviation from these directions may destroy the comparability and impair the meaning of the test results. The directions concerning guessing are especially susceptible to distortion; questions by examinees on this point should *invariably* be answered by reading the directions *verbatim*.

**Order and Discipline in the Test Situation.** Once a test is under way, the chief function of the examiner and proctors is to keep everyone seriously at work all the time, without producing an atmosphere of nervous tension. Disturbances are to be avoided at all cost. It is just as bad for the examiner to disturb the group in enforcing order as it is for the examinee to create a disturbance.

DIRECTIONS FOR ADMINISTERING WHEN ANSWERS ARE RECORDED IN BOOKLETS

Standard Procedure for Administering Tests  
Not Divided into Parts

1. When all are seated, the examiner should say:  
"We shall now pass out the test booklets. Do not open them to the test now. As soon as you get the booklet, fill in your name and the other items of information called for on the cover page. Print your name. When you have finished filling in the blanks, read carefully the directions on the cover (or first inside) page; then wait for further directions. Do not open the booklet to the test itself until I tell you to do so."
2. Allow sufficient time for filling in the spaces and reading the directions. When each student has done this, the examiner may orally emphasize any points that need emphasis and say:  
"Are there any questions? No questions may be asked after the examination begins."
3. Answer all legitimate questions, and then say:  
"When I say 'Begin,' turn to the first page of questions, read the directions at the top of the

page, and start work. Work as fast as you can without making mistakes. Ask no questions. Read the directions again if you do not understand. You are not expected to answer all the questions in the time limit. Begin."

4. Note the exact time when you say "Begin" and write it down. Allow exactly the number of minutes specified for the test, counting from the moment you say "Begin." Do not allow extra time for reading the specific directions above item 1. At the end of the allotted time, say:

"Stop! Even if you have not finished, close your booklets. See that you have clearly printed your name and that you have given all the other information asked for."

5. Have the booklets collected at once. In doing so make sure that all the information necessary for identification and classification has been entered. Supply any necessary missing items of information.

Standard Procedure for Administering Tests  
Having Two or More Parts

1. When all are seated, the examiner should say:  
"We shall now pass out the test booklets. Do not open them to the test now. As soon as you get the booklet, fill in your name and the other items of information called for on the cover page. Print your name. When you have finished filling in the blanks, read carefully the directions on the cover (or first inside) page; then wait for further directions. Do not open the booklet to the test itself until I tell you to do so."
2. Allow sufficient time for filling in the spaces and reading the directions. When each student has done this, the examiner may orally emphasize any points that need emphasis and say:  
"Are there any questions? No questions may be asked after the examination begins."
3. Answer all legitimate questions, and then say:  
"When I say 'Begin,' turn the page to Part I, read the directions carefully, and start work. Work as fast as you can without making mistakes. Ask no questions. Read the directions again if you do not understand. You are not expected to answer all the questions in any part in the time limit, but if you should finish before time is called, go on to the next part. If you finish the last part before time is called, you may go back and work on any earlier part. Begin."

4. Note the exact time when you say "Begin" and write it down. Allow exactly the number of minutes specified for the part of the test which you are administering, counting from the moment you say "Begin." Do not allow extra time for reading the specific directions at the beginning of the part.

At the end of the allotted time for Part I, say:

"Stop! Even if you have not finished Part I, begin Part II. Read the directions for Part II carefully. If you finish Part II before the time is up, you may go back and work on Part I again, or you may go on to the next part."

5. The examiner should see that all students begin Part II promptly. Allow exactly the specified number of minutes, and then say (if there is a Part III):

"Stop! Even if you have not finished Part II, begin Part III. Read the directions for Part III carefully."

6. Thus each part of the test is administered until all parts have been given. Then say:

"Stop! Even if you have not finished, close your booklets. See that you have clearly printed your name and that you have given all the other information asked for."

7. Have the booklets collected at once. Make sure that all the information necessary for identification and classification has been entered. Supply any necessary missing items of information.

## DIRECTIONS FOR ADMINISTERING WITH SEPARATE ANSWER SHEETS

### Standard Procedure for Administering Tests Not Divided into Parts

1. When all are seated, the examiner should say:

**"We shall now pass out the test booklets and answer sheets. In this test, you are to mark your answers on a separate answer sheet instead of on the pages of the test booklet. Do not write *anything at all* in the booklet. Your name and your answers to the questions on the test are to be put on the separate answer sheet."**

When the booklets and answer sheets have been passed out, the examiner should show the students an answer sheet to illustrate the different points and say:

**"Print your name on the line at the left side of the answer sheet, fill in the other items of information called for, and read the directions on both the answer sheet and the cover (or first inside page) of the booklet. Do not write on the booklet, and do not open the booklet to the test itself until I tell you to do so."**

2. Allow sufficient time for filling in the spaces and reading the directions; then say:

**"In taking this test, you are to mark each answer on the answer sheet by making a black pencil mark between the pair of dotted lines numbered (or lettered) the same as the answer you think is correct. You are *not* to write the answer in the test booklet."**

At this point, the two paragraphs printed in small type could be read to the examinees if the answer sheets are to be scored by machine. The two paragraphs should not be read if the answer sheets are to be scored by hand.

**"The answer sheet will be scored by an electrical test-scoring machine. This machine will score the test accurately if each answer indicated with a solid black pencil mark. Solid black marks are made by using a soft pencil, by going over each mark two or three times, and by pressing firmly on the pencil. The answer sheet could be marked on a hard surface.**

**"The scoring machine cannot distinguish between intended answers and stray pencil marks. If you are careless in erasing or make unnecessary marks on or near the short dotted lines, such marks may be counted by the machine as wrong answers, and your**

score will be lower than it should be. If you keep your place on the answer sheet with your pencil, it will help to avoid stray marks if you rest the pencil on the large item number at the left while you are reading the question, and do not let the pencil touch any of the answer spaces until you are ready to mark your answer for that item."

The examiner then continues:

**"Are there any questions? No questions may be asked after the examination begins."**

Answer all legitimate questions, and make sure that all pupils understand how to mark the answer sheets. During the examination, examiners should check occasionally, especially at the beginning of new parts, to see that the students are recording their answers properly on the answer sheets.

3. After answering all legitimate questions, the examiner should say:

**"When I say 'Begin,' open the booklet to the test, and fold the page over. Keep the booklet folded back so you will have only one page at a time in front of you. Read the directions at the top of the page and start work. Work as fast as you can without making mistakes. Ask no questions. Read the directions again if you do not understand. You are not expected to answer all the questions in the time limit. Begin."**

4. Note the exact time when you say "Begin" and *write it down*. Allow exactly the number of minutes specified for the test, counting from the moment you say "Begin." Do not allow extra time for reading the specific directions above item 1. At the end of the allotted time, say:

**"Stop! Even if you have not finished, close your booklets. See that you have filled in all the blanks at the side of the answer sheet and that you have clearly printed your name."**

5. Have the students put their answer sheets inside the booklets, and collect the booklets and answer sheets at once. Make sure that all booklets are returned.

### Standard Procedure for Administering Tests Having Two or More Parts

1. When all are seated, the examiner should say:

**"We shall now pass out the test booklets and answer sheets. In this test, you are to mark your answers on a separate answer sheet instead of on the pages of the test booklet. Do not write *anything at all* in the booklet. Your name and your answers to the questions on the test are to be put on the separate answer sheet."**

When the booklets and answer sheets have been passed out, the examiner should show the students an answer sheet to illustrate the different points and say:

**"Print your name on the line at the left side of the answer sheet, fill in the other items of information called for, and read the directions on both the answer sheet and the cover (or first inside page) of the booklet. Do not write on the booklet, and do not open the booklet to the test itself until I tell you to do so."**

(Continued Next Page)

2. Allow sufficient time for filling in the spaces and reading the directions; then say:

**"In taking this test, you are to mark each answer on the answer sheet by making a black pencil mark between the pair of dotted lines numbered (or lettered) the same as the answer you think is correct. You are *not* to write the answer in the test booklet."**

At this point, the two paragraphs printed in small type should be read to the examinees **if the answer sheets are to be scored by machine**. The two paragraphs should *not* be read if the answer sheets are to be scored by hand.

**"The answer sheet will be scored by an electrical test-scoring machine. This machine will score the test accurately if each answer is indicated with a solid black pencil mark. Solid black marks are made by using a soft pencil, by going over each mark two or three times, and by pressing firmly on the pencil. The answer sheet should be marked on a hard surface.**

**"The scoring machine cannot distinguish between intended answers and stray pencil marks. If you are careless in erasing or leave unnecessary marks on or near the short dotted lines, such marks may be counted by the machine as wrong answers, and your score will be lower than it should be. If you keep your place on the answer sheet with your pencil, it will help to avoid stray marks if you rest the pencil on the large item number at the left while you are reading the question, and do not let the pencil touch any of the answer spaces until you are ready to mark your answer for that item."**

The examiner then continues:

**"Are there any questions? No questions may be asked after the examination begins."**

Answer all legitimate questions and make sure that all pupils understand how to mark the answer sheets. During the examination, examiners should check occasionally, especially at the beginning of new parts, to see that the students are recording their answers properly on the answer sheets.

3. After answering all legitimate questions, the examiner should say:

**"When I say 'Begin,' open the booklet to the test, and fold the page over. Keep the booklet**

**folded back so you will have only one page at a time in front of you. Read the directions at the top of the page and start work. Work as fast as you can without making mistakes. Ask no questions. Read the directions again if you do not understand. You are not expected to answer all the questions in any part in the time limit, but, if you should finish before time is called, go on to the next part. If you finish the last part before time is called, you may go back and work on any earlier part. Begin."**

4. Note the exact time when you say "Begin" and *write it down*. Allow exactly the number of minutes specified for the part of the test which you are administering, counting from the moment you say "Begin". Do not allow extra time for reading the specific directions at the beginning of the part. At the end of the allotted time for Part I, say:

**"Stop! Even if you have not finished Part I, begin Part II. Read the directions for Part II carefully. If you finish Part II before the time is up, you may go back and work on Part I again, or you may go on to the next part."**

5. The examiner should see that all students begin Part II promptly. Allow exactly the specified number of minutes; then say (if there is a Part III):

**"Stop! Even if you have not finished Part II, begin Part III. Read the directions for Part III carefully."**

6. Thus each part of the test is administered until parts have been given. Then say:

**"Stop! Even if you have not finished, close your booklets. See that you have filled in all the blanks at the side of the answer sheet and that you have clearly printed your name."**

7. When the entire test has been administered, have the students put their answer sheets inside the booklet and collect the booklets and answer sheets at once. Make sure that all booklets are returned.

## DIRECTIONS FOR SCORING THE COOPERATIVE TESTS

### GENERAL DIRECTIONS FOR SCORING

There are several alternative methods of scoring Cooperative Tests. If the student's responses are recorded in the test booklet, a *fan key* is used and hand-writing is necessary. If responses are recorded on a separate answer sheet, *scoring stencils* are used whether the tests are to be scored by hand or by machine.

If the students tested are not accustomed to the use of separate answer sheets, an occasional student may put his answers in the booklet, despite all directions to the contrary. Such booklets should be watched for when the answer sheets are taken out of the booklets. If the booklets are to be used more than once, they must be carefully inspected after each administration. Those which have any items marked in any way should not be used.

The essential information needed in scoring the Cooperative Tests is printed on the scoring keys and stencils. For almost all the tests, the scoring is entirely objective and can be done by clerks or dependable high-school pupils, if they are adequately trained and supervised and their work is systematically checked.

Fidelity to the key is essential. If there is an obvious error or misprint in the key or in the test, the error should be corrected and the fact reported to the Cooperative Test Division. Any such correction should be made on all copies of the key which are in use. Mere differences of opinion should never lead to deviations from the key. Unless the key is strictly followed, test results will not be comparable.

**Organization of Scoring Procedure.** The entire scoring procedure should be arranged in advance, and each scorer should have a general understanding of the whole scheme. A certain amount of division of labor adds to the efficiency and accuracy of scoring. For example, when hand-scoring, marking and counting should usually be separate operations, since most of the Cooperative Tests require the marking and counting of both correct and incorrect answers. It should be possible to trace each error unmistakably to the scorer who made it. For this reason, each scorer should initial each task completed, and a record should be kept of each scorer's "error count."

Experience has shown that accuracy of scoring is as difficult to secure as it is necessary for good test results. A systematic routine is indispensable in even the smallest scoring projects, as many errors can be prevented by careful organization of the scoring work. However, some errors will be made in spite of the most careful arrangements. It is therefore essential that adequate provision be made for finding and correcting the errors which do occur. This means that checking and rechecking must be a regular part of the routine of the scoring procedure.

**Computing Raw Scores.** The scoring keys and stencils give directions for computing raw scores on each part of the tests. These directions must be followed exactly. Spaces are provided in the booklets or on the answer

sheets for entering the necessary figures for computing the raw scores. The number of right answers are counted and entered in the appropriate space. The amount to be subtracted depends on the number of wrong answers according to the scoring formula given on the scoring key or stencil. The amount to be subtracted is always a whole number. Fractions of  $\frac{1}{2}$  or less are dropped, and fractions greater than  $\frac{1}{2}$  increase the amount to be subtracted to the next higher integer. If the resulting difference is negative, the raw score is zero.

Part scores are not obtained unless they are necessary for obtaining the Total Scaled Score (as in the case of the languages) or unless there is a difference in the scoring formulas. For example, the scoring formula for Part I of a test may be Rights minus Wrongs, while for Parts II and III it is Rights minus one-fourth of the Wrongs. Here it is necessary to get separate scores for Part I, but Parts II and III should be scored as a unit. These scores are then added to give the total raw score.

**Obtaining the Scaled Scores.** After the raw scores are computed, the Scaled Scores are obtained by referring to the conversion tables provided on the scoring key or answer sheet (except for a few tests for which there are no Scaled Scores).

Experiments have shown that the use of separate answer sheets introduces a factor of clerical facility into the test scores. In general, this has only a slight effect on group achievement for tests in which speed is not an important factor. Allowance is made for this factor, however, in the special tables for converting raw scores into Scaled Scores which are printed on the answer sheets. These tables therefore differ from the corresponding tables printed on the fan keys in that the Scaled Scores are usually slightly higher. How much effect the use of separate answer sheets may have on the score of any particular pupil has not been determined.

For the **language tests**, there are Scaled Scores for the parts as well as for the total. The raw score on each part is converted into a Scaled Score by referring to the appropriate table on the scoring key or answer sheet. This Scaled Score is entered in the test booklet or on the answer sheet in the space provided at the end of each part. The Scaled Scores for the parts are then added. This total is converted to a Total Scaled Score by referring to the table for totals on the scoring key or answer sheet. Note that on the language test booklets **only Scaled Scores appear on the cover page**. The Total Scaled Score for these tests must be obtained by converting the sum of the Scaled Scores for the parts by the use of the special table for totals.

The illustration on the next page shows the relative ease with which one of the more complicated tests may be scored—a three-part language test. Raw scores are obtained for each part; these raw scores are converted to Scaled Scores; and the Total Scaled Score is obtained by a final conversion of the sum of the Scaled Scores for the parts.

ILLUSTRATION OF THE METHOD OF SCORING THE COOPERATIVE FRENCH TEST, ADVANCED FORM R

**Computing the Raw Scores**

Using the Scoring Formula on the Fan Key or Rights Scoring Stencil

(The same method for computing raw scores is used whether answers are recorded in test booklets or on separate answer sheets.)

Scoring Formula for All Parts:  $R - W/4$

Part I, Reading

Total number of answers marked on Part I	45
Number of right answers on Part I (R)	(-)23
Number of wrong answers on Part I (W)	<u>22</u>
$R - W/4 = 23 - 22/4 = 23 - 5$ (dropping the $\frac{1}{2}$ ) = 18	

**Part I Raw Score: 18**

Part II, Vocabulary

Total number of answers marked on Part II	40
Number of right answers on Part II (R)	(-)19
Number of wrong answers on Part II (W)	<u>21</u>
$R - W/4 = 19 - 21/4 = 19 - 5$ (dropping the $\frac{1}{4}$ ) = 14	

**Part II Raw Score: 14**

Part III, Grammar

Total number of answers marked on Part III	40
Number of right answers on Part III (R)	(-) 4
Number of wrong answers on Part III (W)	<u>36</u>
$R - W/4 = 4 - 36/4 = 4 - 9 = -5$ , which is called 0	

**Part III Raw Score: 0**

**Obtaining the Scaled Scores**

Using the Conversion Tables on the Fan Key or Answer Sheet

(The conversion tables on the fan key are used when answers are recorded in test booklets, and the tables on the answer sheet are used when answers are recorded on separate answer sheets.)

	Raw Score (Computed Above)	Booklet Scaled Score (from Fan Key)	Answer Sheet Scaled Score (from Answer Sheet)
Part I	18	51	53
Part II	14	56	56
Part III	0	38	39
Sum of Scaled Scores for Parts		<u>145</u>	<u>148</u>
<b>Total Scaled Score</b>		<b>48</b>	<b>49</b>



**DIRECTIONS FOR SCORING WHEN ANSWERS ARE RECORDED IN BOOKLETS**

If the students' answers are recorded in the test booklets, the scoring must be done by hand, and a fan key is used.

**Use of the Fan Key.** The scoring keys for nearly all Cooperative Tests are printed on sheets which, when folded back along the heavy vertical lines, become "fan" "accordion" type keys. The answers for the test pages appear on successive folds of the "fan" in the same sequence as the pages of the test. The successive folds are numbered at the top to correspond with the successive pages of the test. The folding of the key sheets must be done carefully with the heavy line on the outside of the fold, so that the sequence of folds will correspond to the page numbers on them. For some tests, the key sheets must be cut into sections, but no key sheet should be cut at all unless cutting is specifically indicated on the key itself.

**Marking and Counting Right and Wrong Answers.** When using "fan" keys, scorers must compare the page number on the key fold with the number of the page that is being scored. This comparison must be made for each successive page of each test scored.

The answers given on the key are then compared with the student's answers, and the right and wrong answers are carefully marked.

The following rules will be useful to all scorers and will be indispensable in large scoring centers:

- a. All *original scoring* should be done with pencils of the same color, and *rescoring* should be done with a second color.
- b. All *correct answers* in all tests should be marked at the right with a short horizontal line, and these short lines should be in a straight vertical column. The short lines should never pass through any part of the examinees' answers, or otherwise impair their legibility.
- c. *Wrong answers* in all true-false, multiple-choice, and matching sections of all tests (unless specifically excepted on the scoring keys) should be marked at the right with a small neat x, and these x's should be in a vertical column slightly to the right of the short horizontal lines marking the right answers. It is important that each error be marked with a small x, and not with a plus sign, +.
- d. *Omissions*, if marked at all, should be marked with a small neat 0. Illegible answers should be marked and counted as omissions, never as wrong answers. When two answers are given for any item, the item should be marked as an omission.
- e. If a scorer errs, and wishes to change a — to an x, or vice versa, he should scratch out (never erase) the erroneous mark thus ~~—~~ or ~~x~~ and write the correct mark at one side of the scratched-out mark, in the proper column. Erasures take more time and also involve the risk of erasing part of the student's answers. Corrections should never be superimposed on incorrect marks, thus ~~—~~—; nor should any attempt be made to blot out incorrect marks, thus ~~—~~ or ~~0~~.

**ILLUSTRATION OF GOOD AND POOR SCORING TECHNIQUE WHEN ANSWERS ARE RECORDED IN BOOKLETS**

A	B
(3) —	(3) ✓
(1) —	(1) ✓
(2) —	(2) ✓
(5) x	(5) ✓
(4) x	(4) ✓
(2) —	(2) ✓
(4) x	(4) ✓
(4) —	(4) ✓
(1) —	(1) ✓
(5) x	(5) ✓
(2) —	(2) ✓
(1) —	(1) ✓
158	100

Many of the most troublesome errors in scoring are directly due to lack of neatness and uniformity in the marks and figures which scorers put on the test blanks. The common checking mark (✓) is the source of many costly errors and should never be used in scoring tests. The facsimile of the work of Scorer A, reproduced at the left, illustrates the desirable neatness and uniformity with which scoring should be done. Work such as that of Scorer B will certainly lead to errors.

**Computing the Scores.** The raw scores are obtained according to the directions on the fan key. After the raw scores are computed, Scaled Scores are obtained by referring to the conversion tables which are also provided on the fan keys for all tests having Scaled Scores. For information on computing the scores, see the General Directions for Scoring, pages 7 and 8.

**Checking and Rechecking.** Neatness and uniformity not only tend to prevent errors, but are essential to the certain detection of errors which occur despite every precaution. The checking schedule below represents a minimum for acceptably accurate test results. All checking should be done by trained and accurate scorers, and no scorer should check his own work.

- a. The initial scoring of all new clerks should be completely checked until the results indicate acceptable accuracy.
- b. A sample of about 10 per cent of all tests scored should be rescored. The sample should be selected to represent every scorer, and a record of the number and kinds of errors of each scorer should be kept.
- c. All counting of right and wrong answers on each test should be checked.
- d. All transfers of the scores, additions, subtractions, divisions, etc., should be checked, and a sample of at least 10 per cent should be rechecked.

It has been found that more than half of all significant errors are errors of addition, subtraction, or division; about 15 per cent are transfer errors; and about 10 or 15 per cent are errors of counting, such as dropping or adding 10's, omitting (or counting twice) whole pages, etc. Thus it is obvious that c. and d. above are indispensable to good results.

## DIRECTIONS FOR SCORING SEPARATE ANSWER SHEETS

**Use of Scoring Stencils.** Rights Scoring Stencils are necessary for scoring all Cooperative Tests which are administered with separate answer sheets, whether the scoring method is manual or by machine. A special stencil is supplied for each test, giving the scoring formula or formulas to be used and the specific directions necessary for scoring the particular test.

**Procedure for Hand-Scoring Separate Answer Sheets.** Only one stencil is needed, the Rights Scoring Stencil, which has all the right answers punched out. The following procedure should be carefully followed for each test or part of a test for which a separate score is being obtained, and each step should be checked thoroughly.

1. Unless otherwise indicated in the test directions, multiple responses should be lined through with red pencil and omitted when scoring.

2. Count the remaining number of spaces the student has blackened on the entire test or part.

3. Place the Rights Scoring Stencil over the answer sheet with the right-hand edges together. Make any necessary slight adjustment so that answer spaces show in the center of all punched holes.

4. Count the number of blackened spaces, exclusive of those marked in red, appearing through the punched holes. This gives the number of right answers.

5. Subtract the number of right answers (Step 4) from the total number of responses (Step 2). This remainder is the number of wrong answers.

6. You now have the number of right answers and the number of wrong answers. The formula for the raw score is found on the Rights Scoring Stencil. Subtract the indicated fraction of the wrong answers from the number of right answers. Fractions of  $\frac{1}{2}$  or less are dropped before subtracting. For fractions greater than  $\frac{1}{2}$ , increase the amount to be subtracted to the next higher integer. Negative scores are called zero.

7. For the Cooperative tests which have Scaled Scores look up the raw score, as obtained in Paragraph 6, in the raw score-Scaled Score conversion tables provided on the answer sheets, and encircle the corresponding Scaled Score. Note the directions and illustration of how scores are computed, given on pages 7 and 8

For tests on which part scores are obtained, the procedure described above should be followed separately for each part. In counting the number of responses as the number of right answers, care should be taken not to include items in a subsequent or earlier part, particularly where one part ends in the middle of a column, with a different part occupying the lower part of the column. Care must also be taken to apply the appropriate scoring formula to each part, as this formula sometimes differs for various parts of the same test.

Note particularly that, in obtaining the Scaled Score for the total of a test which has Scaled Scores for its various parts, the sum of these Scaled Scores for the parts is used in obtaining from the table the Scaled Score for the total test. (See the illustration on page 8.)

**Procedure for Machine-Scoring Separate Answer Sheets.** Papers should first be scanned for stray marks, use of ineffective pencils, and other failures to follow directions. Multiple responses should be covered with a strip of cellophane tape.

The scoring directions given on the Rights Scoring Stencil should be strictly followed. For tests having Scaled Scores, raw score-Scaled Score conversion tables are given along the left-hand margin of the answer sheet. As the operator reads the raw score on the meter, she can encircle the corresponding Scaled Score and thus save the necessity for later conversion. Consult pages 7 and 8 for general directions for obtaining Raw Scores and Scaled Scores.

The insertion of test sheets in the machine at intervals during the scoring of a batch of papers and a certain amount of hand-checking are urgently recommended.

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## DIRECTIONS FOR INTERPRETING COOPERATIVE TEST RESULTS

### THE SCALED SCORES

The Scaled Scores which are provided for most of the Cooperative Tests were devised to enable the teacher and administrator to gain directly as much interpretative information as possible, without reference to norms, equivalent scores, percentiles, or other aids to interpretation. The principal characteristics of the Scaled Scores are:

1. Equality of units throughout the scale. The raw-score units have been replaced by units so scaled that the scores from a single school system will tend to form a normal distribution.

2. A common scale for all tests. The scale to which all tests are referred is so defined that a score of 50

represents the score which the average child would make at the end of the particular course if he attended an average school and had taken the usual amount of the subject in question. The size of the unit on the common scale is defined as a tenth of the standard deviation of the distribution of scores which would be made by an unselected group of students if they were all to take the particular subject.

The tables of Scaled Scores are printed on the scoring keys and on the special answer sheets.

At various points along these Scaled Score tables there are short vertical lines which indicate the standard error (laid off in both directions) of scores at those points

tice that the length of each line is equivalent to *twice* standard error. The length of any of these lines shows graphically the range within which would fall the scores obtained by approximately two thirds of the individuals whose "true" scores\* are at the particular point. For example, if the line at the Scaled Score of 50 extends two units above and two units below this point,

The "true" score may be defined as the average of all the scores that would be obtained by giving the student a very large number of similar tests.

this is interpreted as indicating that about two thirds of the individuals whose "true" scores are 50 would actually obtain scores on this test between 48 and 52.

For a more detailed discussion of Scaled Scores, see *The Cooperative Achievement Tests: A Booklet of Norms (Introduction)*; and *The Cooperative Achievement Tests: A Bulletin Reporting the Basic Principles and Procedures Used in the Development of Their System of Scaled Scores*.

### USE OF PERCENTILE RANK TABLES

The norms for the Cooperative Tests are given in the form of percentile rank tables, which are furnished free with test orders. For some tests, a number of different tables are provided for different amounts of study and different grade levels. In comparing the scores of a particular group with the norms, the appropriate tables should be used.

It should be kept in mind that these statistics report only the performance of the groups on which the statistics are based. Other groups may perform differently. It is therefore important to remember that norms do not by themselves set standards of performance. In interpreting test scores in comparison with such data, allowance must always be made for dissimilarities of the groups and their environments. Standards of performance can be established only by those who are in a position to make a professional judgment of the desired quality of performance of the particular group in particular circumstances.

The percentile value corresponding to a given score shows what percentage of the students in that group achieve scores below that score. For instance, if a student with 2 semesters of study in a public high school in a 12-grade school system makes a Total Scaled Score 54 on the Cooperative French Test, Advanced Form R, reference to the percentile rank tables shows that this score corresponds to a percentile rank of 82. This means that the pupil's score is higher than the scores of 82% of a large group of students who have taken this

test after completing 2 semesters of study of French in public secondary schools in 12-grade school systems. Such comparisons with the norms may be made both for individual students and for class averages.

The percentile rank tables also facilitate the study of the relative standing of an individual or a class on various parts of such tests as the English and language tests. Suppose, for instance, that the average Scaled Score of a second-year French class on the Cooperative French Test given at the end of the year is at the 55th percentile on the 4-semester norms table on the reading part, at the 60th percentile on the vocabulary part, and at the 45th percentile on the grammar part. This does not necessarily indicate that the teacher of this class ought to put more stress on grammar and less on reading. It does mean that, in grammar, the average achievement of this class is less than that of the average student in the norms group with the same amount of study, but that, in reading and vocabulary, it is greater. The individual teacher must decide whether he is satisfied to have it so; many instructors prefer to emphasize reading, and a relatively lower average on grammar would be entirely in accord with the objectives of their course. On the other hand, if the teacher had endeavored to lay a particularly good foundation of grammar knowledge in this course and found his pupils' average score relatively lower on that part, this would indicate the advisability of reconsidering methods in the light of the desired objectives.

### SUGGESTED USES OF COOPERATIVE TESTS

The uses of test results reported by schools and colleges are many and varied, but the immediate purpose of these examinations, upon which all ultimate uses depend, may be very simply stated. That purpose is to provide objective and reliable measures of the educational achievement of the pupils tested.

Each teacher or administrator must decide how the tests can be most helpful in his own situation, but the following uses will illustrate the ways in which they have been found helpful in adapting education to the individual. Cooperative Test results have been used:

1. To furnish information about the capabilities and achievements of each student, thus making possible the identification of those individuals who merit special

provisions because of distinct handicaps or markedly superior performance.

2. To indicate the pattern of achievement for each student, so that information about his areas of relative strength and weakness may serve as a sounder basis for educational and vocational guidance than school marks, which are not only unreliable but are not comparable from class to class.

3. To implement, through the provision of a number of comparable forms in each field, studies of individual growth in defined types of achievement from year to year.

4. To provide a more realistic method than a mere counting of numbers of semesters of study for determin-

ing when a student has attained competence in a given field.

5. To give a preview of the status of an individual or of an entire class at the beginning of a course or curriculum so that appropriate placement may be made and later instruction intelligently modified.

6. To serve both as a partial basis for appraising the relative effectiveness of curriculum materials and methods of instruction in the various major areas of high-school and college instruction and as a general incentive toward improved teaching and learning.

7. To establish meaningful and objective standards for admission, placement, promotion, certification, and graduation, and for transfer and advanced standing relations with other institutions; and to maintain such standards uniformly from year to year.

It should be emphasized once more that test scores provide only one type of information about the needs, achievements, and interests of individuals, and that sound educational guidance requires that as much relevant information as possible be collected from all available sources. Test results form a valuable part of the informational background needed for guidance, but they are only a part, and should be interpreted in conjunction with information of many other types.

It is important to remember that scholastic achievement, both of individuals and of classes, teaching effectiveness, relative value of different curricula and methods and other aspects of the educational process cannot be judged on the basis of test scores alone. Many other factors must be taken into account, such as differences in native ability of the pupils, environmental conditions, motivation, course emphases and objectives, and other differences which may influence the test scores.

If there are any questions concerning the Cooperative Tests which have not been covered by this Manual of Directions, inquiries may be addressed to the Advisory Service of the:

**COOPERATIVE TEST DIVISION  
EDUCATIONAL TESTING SERVICE**

20 Nassau Street  
Princeton, New Jersey

4640 Hollywood Boulevard  
Los Angeles 27, California

# COOPERATIVE VOCABULARY TEST

## ALL FORMS

### Percentile Ranks for Public and Independent Secondary Schools

Public Secondary Schools of the East, Middle West, and West (12 grade systems). Percentile Ranks based on 90,000 students in 200 schools.\*

Public Secondary Schools of the South (11 grade systems). Percentile Ranks based on 20,000 students in 60 schools.\*

Independent Secondary Schools mostly in New England (12 grade systems). Percentile Ranks based on 40,000 students in 100 schools.\*

End-of-Year Percentile Ranks in Terms of Scaled Scores							End-of-Year Percentile Ranks in Terms of Scaled Scores					Percentile Ranks for Students Tested in April in Terms of Scaled Scores														
Scaled Score	7	8	Grade			11	12	Scaled Score	8	Grade			11	Scaled Score	7	8	Grade			11	12					
			9	10	Percentiles**					9	10	Percentiles**					9	10	Percentiles**							
86							86						86								99					
84							84						84								98					
82							82						82							99	97					
80							80						80							98	96					
78							78						78							99	97	94				
76							76						76							98	96	91				
74							74						74							97	93	87				
72							72						72							99	96	90	82			
70							70						70							98	93	86	76			
68							68						68							99	96	90	81	69		
66							66						66							98	94	86	75	61		
64							64						64							99	96	91	80	67	53	
62							62						62							98	94	86	74	59	44	
60							60						60							99	97	91	81	66	51	36
58							58						58							98	95	90	86	74	61	36
56							56						56							97	94	88	80	67	59	36
54							54						54							99	96	91	86	75	61	36
52							52						52							98	94	88	80	67	53	36
50							50						50							97	91	81	66	51	36	36
48							48						48							99	96	90	86	74	61	36
46							46						46							98	94	88	80	67	53	36
44							44						44							99	96	91	86	74	61	36
42							42						42							98	94	88	80	67	53	36
40							40						40							97	91	81	66	51	36	36
38							38						38							99	96	90	86	74	61	36
36							36						36							98	94	88	80	67	53	36
34							34						34							99	96	91	86	74	61	36
32							32						32							98	94	88	80	67	53	36
30							30						30							97	91	81	66	51	36	36
28							28						28							99	96	90	86	74	61	36
26							26						26							98	94	88	80	67	53	36
24							24						24							99	96	90	86	74	61	36
22							22						22							98	94	88	80	67	53	36
20							20						20							97	91	81	66	51	36	36
Mean	33.8	39.2	43.8	47.5	50.9	53.8		35.9	40.3	44.1	47.1		43.8	48.0	52.1	56.1	59.8	63.4								
Standard Deviation	8.6	8.8	8.9	9.1	9.3	9.6		9.0	9.2	9.5	9.8		8.7	8.9	9.0	9.2	9.4	9.5								

\* Percentile Ranks checked by administration of test to 3879 students in 13 schools.

\*\* The percentile values in the tables are those closest to the actual Scaled Scores listed. Interpolation may be used to obtain the closest percentiles for odd-numbered Scaled Scores.

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4146 Hollywood Boulevard  
 Los Angeles, California

# COOPERATIVE VOCABULARY TEST

## ALL FORMS

### Percentile Ranks for College Students

These percentile ranks are in terms of Scaled Scores. The Entering Freshmen were tested at the beginning of the school year, and the other groups at the end of the year.

TYPE I Percentile Ranks Based on 10,000 Students in 15 Colleges.*						TYPE II Percentile Ranks Based on 50,000 Students in 90 Colleges.*						TYPE III Percentile Ranks Based on 14,000 Students in 35 Colleges.*					
Scaled Score	Entering Freshman	Freshman	Sophomore	Junior	Senior	Scaled Score	Entering Freshman	Freshman	Sophomore	Junior	Senior	Scaled Score	Entering Freshman	Freshman	Sophomore	Junior	Senior
	Percentiles**						Percentiles**						Percentiles**				
94					99	94						94					
92				99	98	92						92					
90			99	98	97	90						90					
88		99	98	97	95	88						88					
86	99	98	97	95	93	86					99	86					
84	98	97	95	92	90	84			99	99	98	84					
82	97	95	92	89	86	82			98	98	97	82					99
80	95	93	88	84	80	80		99	97	96	95	80				99	98
78	93	89	84	79	74	78	99	98	96	94	93	78			99	98	96
76	89	85	78	72	67	76	98	96	94	92	90	76		99	98	96	94
74	85	79	72	65	59	74	96	94	91	88	85	74		98	97	94	91
72	79	72	64	57	51	72	94	92	87	83	80	72	99	97	95	92	88
70	73	65	56	48	43	70	91	88	82	78	74	70	98	95	92	88	83
68	65	57	47	40	35	68	87	83	76	71	67	68	97	93	89	83	77
66	57	48	39	32	27	66	83	77	69	63	59	66	95	90	84	78	71
64	49	40	31	25	21	64	77	70	61	55	51	64	92	85	79	71	63
62	40	32	24	19	15	62	70	63	53	47	43	62	88	80	73	64	55
60	32	25	18	14	11	60	62	55	45	39	35	60	84	74	65	56	47
58	25	19	13	10	8	58	54	46	37	31	27	58	78	67	57	48	39
56	19	13	9	7	5	56	45	38	29	24	21	56	71	59	49	39	32
54	14	9	6	4	3	54	37	30	22	18	16	54	64	50	41	32	25
52	10	6	4	3	2	52	30	23	17	13	11	52	56	42	33	25	19
50	6	4	3	2	1	50	23	17	12	9	8	50	48	34	26	19	14
48	4	3	2	1		48	17	13	8	6	5	48	39	27	20	14	10
46	3	1	1			46	12	9	6	4	3	46	32	21	15	10	7
44	2					44	8	6	4	3	2	44	25	15	10	7	4
42	1					42	6	4	2	2	1	42	19	11	7	4	3
40						40	4	2	1	1		40	13	7	5	3	2
38						38	2	1				38	9	5	3	2	1
36						36	1					36	6	3	2	1	
34						34						34	4	2	1		
32						32						32	3	1			
30						30						30	2				
28						28						28	1				
Mean	64.3	66.4	68.6	70.4	71.8		57.1	58.9	61.3	62.7	63.8		50.6	53.9	56.2	58.6	60.7
Standard Deviation	9.4	9.4	9.5	9.6	9.6		9.5	9.5	9.6	9.6	9.7		9.6	9.6	9.7	9.7	9.8

\* Percentile Ranks are based on an equating to Part III of the Cooperative English Test. The basis for defining the three types of percentile ranks reported is the performance of the entering college freshmen on the American Council on Education Psychological Examination. (See "Introduction to the Norms," page 4.) Possibly the best single designation of Type I would be preprofessional college students; Type II may be thought of as most appropriate for students in typical liberal arts colleges; Type III is representative of the type of student found in many junior colleges and teachers colleges.

\*\* The percentile values in the tables are those closest to the actual Scaled Scores listed. Interpolation may be used to obtain the closest percentile for odd-numbered Scaled Scores.

(See reverse side for Percentile Ranks for Secondary Schools)

# THE COOPERATIVE VOCABULARY TEST

## INFORMATION CONCERNING ITS CONSTRUCTION, INTERPRETATION, AND USE

### Purpose of the Test

This test is intended to provide a measure of level of vocabulary which is not dependent upon the number of items attempted. The test is suitable for use in grades 7 through 12 and at all college and adult levels.

### Content of the Test

The test contains 210 five-choice items; in each, the examinee indicates which one of the five numbered response words or phrases most nearly corresponds in meaning to the word in boldface type at the head of the group. The following is a sample item.

- callous**
- 1 hardened
  - 2 difficult
  - 3 noisy
  - 4 sensitive
  - 5 wicked

The 210 words selected for testing represent a sampling from many subject-matter fields. The items range in difficulty from very easy words with widely divergent responses to very difficult words with responses separated only slightly in meaning. In the easy items, only one of the response words is close in meaning to the word being tested; in the difficult items, the response words approach closely the meaning of the word being tested. In the latter case, great care has been taken to make sure that the keyed answer is clearly justifiable as the best answer. By requiring fine discriminations of meaning, it has been possible to obtain adequate difficulty without resorting to the use of the uncommon words of little practical value which vocabulary tests designed for use with superior adults have often included.

In an effort to provide a contextual setting for the words whose meanings are to be tested, some vocabulary tests present each word in a phrase or sentence. This practice usually results in an apparatus rather than a real advantage because the phrases or sentences are ordinarily so short and generalized that they provide no truly meaningful context for the word to be tested. If they were to be made sufficiently long to be meaningful, the test would measure the ability to infer meanings from the context rather than recognition vocabulary level and the number of items which could be answered in a given amount of time would be greatly reduced. Other things being equal, this second result tends to lower the accuracy of measurement of the test.

On the basis of these considerations, the present format of the *Cooperative Vocabulary Test* was adopted. Ability to infer the meanings of words from the context is one of the skills measured by the reading sections of the *Cooperative Reading Comprehension Tests*.

All of the words in the *Cooperative Vocabulary Test* were selected from the Thorndike Word Lists; their distribution by thousands, as indicated by the *Teacher's Word Book of Twenty Thousand Words*,<sup>1</sup> is shown in the following table.

<i>Teacher's Word Book</i> Frequency Level in Thousands	Words in Form Q Vocabulary Test
4	1
5	4
6	7
7	3
8	5
9	7
10	25
11	29
12	15
13	26
14	15
15	12
16	7
17	6
18	4
19	4
20	4
above 20	36

In constructing the items, one of the most common meanings of each word was ordinarily selected for testing. The correct response and each of the decoys for every item were carefully checked to make sure that they were listed in the *Teacher's Word Book of Twenty Thousand Words* as of more frequent occurrence than the word being tested. Because the frequency level of a given word in the *Teacher's Word Book of Twenty Thousand Words* is not highly indicative of the difficulty of the word, the subjective judgment of the author was used to supplement the frequency-level data in excluding from the responses words which appeared to be more difficult than the word being tested.<sup>2</sup>

Validity and difficulty indices were obtained for each item in the experimental forms of this test. Items at the proper levels of difficulty having relatively high correlations with total scores were then selected for inclusion in the final form, revisions being made on the basis of the item analysis.

The 210 items in the final form have been arranged in seven scales of thirty items each. These scales are equivalent except for the fact that the most discriminative items, as determined by the experimental

<sup>1</sup> E. L. Thorndike, *The Teacher's Word Book of Twenty Thousand Words*. New York: Bureau of Publications, Teachers College, Columbia University, 1932 (revised).

<sup>2</sup> F. B. Davis, Interpretation of Frequency Ratings Obtained From The Teacher's Word Book. *Journal of Educational Psychology*, xxxv (March 1944), 169-74.

tryout, have been placed in the first scale, the next most discriminative items in the second scale, and so on. The average correlation coefficient between the individual items and the total score is .49, but because the more discriminative items have been placed first in the test, the functioning items tend to be of greater than average validity. This is a highly desirable feature of the test which tends to increase its accuracy of measurement. In scoring, only items in "completed scales" are counted. A "completed scale" is defined as one in which the last item in the scale or items in the following scales have been marked.

### Interpretation of Scores

Scores on the *Cooperative Vocabulary Test* indicate the extent and precision of an individual's knowledge of word meanings. The scores are expressed as Scaled Scores.<sup>3</sup>

The accuracy of measurement of the Cooperative Tests is expressed in terms of the standard error of measurement at several Scaled Score levels. These data are shown on the scoring keys as vertical lines placed beside each column of Scaled Scores.<sup>4</sup>

### Norms

Percentile ranks for each grade level in three types of secondary schools and three types of colleges are

<sup>3</sup> Introduction to the Norms.

<sup>4</sup> Ibid. p. 5.

presented herewith for the *Cooperative Vocabulary Test*. Individual schools will find it valuable, however, to use the scores obtained by their own students to build up their own sets of norms. Such local norms are frequently more meaningful than norms based on a large but less well defined and less relevant population.

The percentile in the ranks tables represent the percentage of students who received scores at or below the given score. For example, 48 per cent of the entering freshmen in Type III colleges received scores of 50 or less.

### Suggestions for Use

Knowledge of word meanings is an important element in determining scholastic success. The *Cooperative Vocabulary Test* provides an accurate measure of this fundamental knowledge in such a way that an individual's score is not affected by the number of items which he attempts. Because of this fact, the time limit for the test is unusually flexible. Although a time limit of 30 minutes is suggested, either more or less time may be allowed, depending on the purpose of the examiner and the amount of time available. For maximum reliability, the test may be given without a time limit, everyone being allowed enough time in which to attempt all of the items. On the other hand, a reasonably accurate measure of level of vocabulary can be obtained in as little as ten minutes, especially in college classes.



RIGHTS SCORING STENCIL NO. 340-94-3

COOPERATIVE VOCABULARY TEST (FIRST SIDE)

SCORING FORMULA: R - W/4 FORM Z

Separate the answer sheets into piles according to the number of pages completed. (See cover page of test for an explanation of "number of pages completed.") It will be necessary to score both sides of the answer sheets of those who have completed 6 or 7 pages. To obtain their score on the first side, put them with those who have completed 5 pages. Those who have completed 5, 6, or 7 pages: Throw Fields A, B, and C together. (Note that this is only a part score for those who have completed 6 or 7 pages. See directions on key for second side to obtain their total raw score.)

Those who have completed 4 pages: Throw Fields A and B together.

Those who have completed 3 pages: Score on Field A.

To score those who have completed only 1 or 2 pages, fill in the field control holes at the top and bottom of the second and third columns; punch out the B field control holes at the top and bottom of the second column.

Those who have completed 2 pages: Throw Fields A and B together.

{ Note that these directions refer to Fields A and B  
after repunching control holes as directed above. }

Those who have completed 1 page: score on Field A.



Those who have completed 7 pages: Throw Fields A and B together.

Those who have completed 6 pages: Score on Field A.

This will give part scores on these papers. This score must be added manually to the score obtained on the first side of the answer sheet. The sum is the total raw score.

APPENDIX "I"

COMPARISON OF PAIRS, SHOWING VOCABULARY SCORE,  
NATIVE LANGUAGE, EXTENT OF READING SCORE,  
AND YEARS OF FRENCH INSTRUCTION

GRADE NINE										
School	Pair	Sex	Latin				Non-Latin			
			Vocab Score	Native Language	Read. Score	Yrs. Fr.	Vocab Score	Native Language	Read. Score	Yrs. Fr.
H.J.M.	1	g	47	English	3	3	53	English	3	3
	2	g	49	Greek	5	3	51	English	2	1
	3	g	47	English	4	3	44	Danish	4	3
	4	g	40	English	3	3	28	English	2	3
	5	b	41	Ukrainian	2	3	48	English	4	3
	6	b	47	German	3	3	44	English	2	2
	7	b	38	English	2	3	45	English	4	3
	8	b	52	Italian	4	3	46	English	3	3
Ch.	9	b	77	English	5	3	53	English	5	2
	10	b	65	English	5	3	47	English	2	2
	11	b	52	English	4	2	55	English	4.5	2
	12	b	52	English	3	2	54	English	2	2
	13	b	49	English	2	3	46	Ukrainian	0	2
	14	b	48	English	3	2	45	English	4.5	2
	15	g	53	English	3	2	53	English	3	2
	16	g	46	English	5	2	49	English	3	2
	17	g	56	English	4.5	2	43	English	5	2
	18	g	54	German	5	2	47	English	3	1
S.	19	g	52	English	4	2	50	English	4	2
	20	g	56	English	4	2	50	English	4	2
	21	g	54	English	4	2	48	English	3	2
	22	g	57	English	4.5	2	47	English	5	2
	23	g	59	English	3	0	41	Ukrainian	3.5	2
	24	g	44	Ukrainian	4	2	55	Ukrainian	5	2
	25	g	43	Polish	5	2	31	English	3	2
	26	b	51	English	4	0	39	English	2	2
S.J.	27	b	47	English	2	2	41	English	4.5	1
	28	b	55	English	2	2	52	English	5	2
	29	b	46	English	5	2	45	English	0	2
	30	b	47	English	5	2	53	English	3	2
	31	b	56	Ukrainian	5	2	43	Hebrew	5	2
	32	b	56	Hebrew	5	3	48	English	4	2
	33	b	44	Hebrew	5	3	43	English	3	2
	34	b	48	Hebrew	3	2	49	English	4	2
	35	g	39	Hebrew	4	2	51	Hebrew	5	2
	36	g	48	English	5	2	44	English	5	2
	37	g	57	Hebrew	5	2	45	Hebrew	4.5	2

APPENDIX "I" (cont'd)

COMPARISON OF PAIRS, SHOWING VOCABULARY SCORE,  
NATIVE LANGUAGE, EXTENT OF READING SCORE,  
AND YEARS OF FRENCH INSTRUCTION

School Pair Sex			GRADE TEN							
			Latin				Non-Latin			
			Vocab Score	Native Language	Read. Score	Yrs. Fr.	Vocab Score	Native Language	Read. Score	Yrs. Fr.
S.J.	1	b	57	Hebrew	3	5	57	English	4	3
	2	b	52	English	3	3	56	English	0	3
	3	b	55	Ukrainian	2	4	53	Ukrainian	4	3
	4	b	64	Hebrew	4.5	3	52	English	4	3
	5	b	53	English	4.5	3	44	English	3	3
	6	b	57	Hebrew	1	3	58	English	2	3
	7	g	69	English	4.5	4	73	Ukrainian	5	3
	8	g	60	English	5	4	52	Ukrainian	4	3
	9	g	60	English	5	4	52	Ukrainian	2	3
S.	10	g	69	English	5	3	61	Ukrainian	4	3
	11	g	62	Ukrainian	5	3	52	English	5	3
	12	g	53	English	4	0	48	English	2.5	3
	13	g	52	Polish	4.5	3	51	English	4.5	3
	14	b	58	English	4	3	46	English	1	3
	15	b	61	Ukrainian	5	3	52	Ukrainian	5	2
	16	b	50	English	4	4	56	English	1.5	2
	17	b	58	English	2.5	0	48	Ukrainian	1	2
	18	b	51	Ukrainian	4	3	62	English	1	3
Ch.	19	b	56	Ukrainian	4	4	43	English	2	3
	20	b	49	Ukrainian	3.5	3	45	Ukrainian	1	3
	21	b	55	German	5	3	52	English	2	3
	22	b	61	English	4	3	45	English	2	3
	23	b	58	English	4.5	3	55	English	5	3
	24	b	73	English	4	3	65	English	5	3
	25	b	53	English	4.5	3	58	English	3	3
	26	b	59	English	4.	3	65	English	5	3
	27	g	63	English	4.5	3	53	English	4	1
K.	28	g	48	English	3	2	51	English	4	3
	29	g	53	German	4	5	52	English	4	3
	30	g	52	English	4	3	46	English	3	3
	31	g	66	English	5	3	55	English	5	3
	32	b	50	English	3	3	54	English	5	3
	33	b	59	English	4	3	53	English	4	2
G.B.	34	b	56	English	4.5	3	50	English	4	2
	35	g	57	English	5	3	57	English	4	3
	36	g	57	English	3	3	50	English	4	3
	37	g	48	German	4	3	50	English	4	2
	38	g	47	English	4	1	48	English	3	3
	39	b	54	English	2	3	51	English	1	4
	40	b	65	English	2	3	47	Dutch	5	3
	41	b	42	English	4	0	44	English	2	1
	42	b	62	English	4	3	51	English	5	3

APPENDIX "I" (cont'd)

COMPARISON OF PAIRS, SHOWING VOCABULARY SCORE,  
NATIVE LANGUAGE, EXTENT OF READING SCORE,  
AND YEARS OF FRENCH INSTRUCTION

GRADE ELEVEN

			Latin				Non-Latin			
School	Pair	Sex	Vocab Score	Native Language	Read. Score	Yrs. Fr.	Vocab Score	Native Language	Read. Score	Yrs. Fr.
G.B.	1	b	66	English	5	4	55	English	5	4
	2	b	57	English	5	4	64	Ukrainian	5	4
	3	g	66	English	3	4	57	English	4	4
	4	g	66	Danish	5	4	64	English	4	9
	5	g	62	Ukrainian	5	4	49	English	2	4
	6	g	72	English	5	4	53	English	2	8
	7	g	62	German	5	4	57	English	5	3
	8	g	67	English	5	4	68	English	4.5	
	9	g	48	Ukrainian	5	2	53	Icelandic	2	5
	10	g	59	English	3	2	50	English	2	4
	11	g	62	English	4	2	55	English	2	4
	12	g	61	English	5	4	54	English	4	4
	13	g	53	English	4	4	44	English	2	3
	14	g	62	English	4.5	4	55	English	4	3
	15	g	59	English	5	4	45	English	3	4
	Ch. S. S.J.	16	g	67	English	5	2	62	English	4
17		b	58	German	4	4	61	English	2	4
18		b	79	English	5	4	46	Polish	3	4
19		b	63	English	4.5	4	63	Ukrainian	5	4
20		b	67	English	5	4	53	Ukrainian	5	4
21		b	55	English	4.5	4	57	Ukrainian	2	4
22		b	57	English	4.5	4	52	English	5	4
23		b	57	German	2	4	50	English	4.5	4
24		b	66	Hebrew	5	4	47	English	3	4
25		b	56	English	2	4	60	English	2	4
26		g	62	English	4.5	4	61	Hebrew	4.5	4
27		g	62	Polish	3	5	52	English	4	4
28		g	56	Hebrew	4	4	53	Hebrew	4	4
29		g	50	English	5	4	53	Hebrew	4	4
30		g	54	English	3	4	46	Hebrew	2	4
31		g	73	English	5	5	55	English	5	4
32		g	56	English	5	4	53	English	4	4
33		b	68	English	4.5	4	55	English	5	4
34		b	65	English	4.5	4	58	English	5	4
35		b	65	English	4	4	57	English	4.5	4
36	b	64	English	4	4	54	English	3	4	