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ABSTRACT

Designed to assess the reading comprehension ability of high school students, this measure contains items which were constructed to test the subskills found by R. T. Lennon, on the basis of factor analysis of thirty studies of comprehension tests, to be the four components of comprehension tests that may be measured reliably. These subskills are a general verbal factor, comprehension of explicitly stated material, comprehension of implicit or latent meaning, and appreciation. Average item validity for the final test for grade 10 is .35; for grade 11 .35; and for grade 12, .36; and reliability coefficients for each of the three grades, and for the total group, are respectively .83; .84; .84; and .85. [This document is one of those reviewed in The Research Instruments Project (TRIP) monograph "Measures for Research and Evaluation in the English Language Arts" to be published by the Committee on Research of the National Council of Teachers of English in cooperation with the ERIC Clearinghouse on Reading and Communication Skills. A TRIP review which precedes the document lists its category (Reading), title, author, date, and age range (secondary), and describes the instrument's purpose and physical characteristics.] (RB)

NCTE Committee on Research

The Research Instruments Project (TRIP)

U.S. DEPARTMENT OF HEALTH,
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S 201 374

CATEGORY: Reading
TITLE: The Jewell High School Reading Comprehension Test
AUTHOR: Cedric B. Jewell
GRADE RANGE: Senior High

DESCRIPTION OF THE INSTRUMENT:

Purpose - to assess the reading comprehension ability of high school students.

Date of Construction - 1969

Physical Description - Passages of 100-200 words were chosen from Provincial authorized textbooks on four subject areas - English, Mathematics, Social Studies, Science. Administration of the Dale-Chall readability formula ensured that the passages were at ninth-tenth, and eleven-twelfth grade levels of difficulty.

Items were constructed to test the subskills found by Lennon on the basis of factor analysis of thirty studies of comprehension tests, to be the four components of "comprehension tests" that may be measured reliably. These subskills are:

- 1) A general verbal factor - close to the scores on the verbal parts of some I.Q. tests.
- 2) Comprehension of explicitly stated material - understanding of the literal meaning, as in the ability to follow directions.
- 3) Comprehension of implicit or latent meaning - as in inference or prediction.

4) "Appreciation" - as in understanding the intent of the author, sensing mood, or recognizing library devices such as personification.

The words used in the items and in the alternate items were all taken from the authorized texts. The order of the correct answers was established by random selection.

Twelve passages, each with eight multiple choice questions were piloted in May 1967 with one average class from each of grades ten, eleven, twelve. A second and extended draft of the test was developed and contained 138 items. Further discussion with experienced teachers, reading specialists, and administrators regarding suitability of format, type of item, length, timing and general acceptability resulted in a reduction to 81 items. The relevant recommendations contained in Standards for Educational and Psychological Tests and Manuals were followed for the construction of the test and administrative instructions. This version of the test was administered to 92 grade ten students, 74 grade eleven, and 94 grade twelve students. Items for the final draft of the test were based on an item analysis of the second administration and the opinions of a panel of judges who rated each item on a five point scale. The majority of items chosen were at the 50 per cent level of difficulty and not outside the 20-80 per cent range. No item with a validity index lower than .20 was chosen as a final test item. The final test consisted of 44 items.

Validity, Reliability, and Normative Data:

Normative data are derived from 1052 students in grades ten, eleven, twelve who were chosen proportionately from academic and non-academic streams. The means standard deviations, and standard error of measurement respectively for each grade are as follows: grade ten (19.95, 7.42, 3.07), grade eleven (20.91, 7.57, 3.09), grade twelve (24.60, 7.66, 3.02). Percentile ranks for raw scores are also given. Content validity was established for the test through the method of selecting and the sources of the reading passages, the method of construction, a study of standardized tests used in the high schools of the province, opinions of local teachers, reading specialists, and administrators for decisions regarding format, length, timing, and general suitability of the test, and evaluation by a panel of judges. Homogeneity or internal consistency was assessed through item analysis to discriminate between the upper and lower halves of the students tested on the basis of their total raw scores. Average item validity for the final test for Grade ten is .35, for grade eleven .35 and for grade twelve .36. Average item difficulties per grade are, grade ten (45.86), grade eleven (48.26), grade twelve (56.77). Reliability coefficients for each of the three grades, and for the total group, respectively are .83, .84, .84, .85.

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Jewell, Cedric B. A Reading Comprehension Test for Senior High School Students in Large Urban Areas in Alberta,

Canada. Unpublished Doctoral Dissertation, The University of Oregon, 1969.

Lennon, R.T. "What Can Be Measured?" Test Service Bulletin, No 99. Yonkers-on-Hudson, New York: Harcourt, Brace and World, 1962, p. 1-2.

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A READING COMPREHENSION TEST FOR SENIOR HIGH
SCHOOL STUDENTS IN ALBERTA

DO NOT WRITE IN THIS BOOKLET

WAIT FOR INSTRUCTIONS

In this test are passages of prose taken from the authorized textbooks in senior high school English, Social Studies, Mathematics, and Science. Questions on these passages are designed to find out how well you read the material.

Each question is followed by five (5) choices. You are to select what you think is the best choice, and then mark your answer sheet in the correct space for that question and for the number of the choice that you have chosen.

Your teacher will give you full instructions. Follow the directions carefully.

SAMPLE PASSAGE

A normal childhood is normally dangerous. It is through an experience of dangers, graduated for his age, that any child can grow up emotionally. Excessive protection is, for him, famine. A real adult will have real self-reliance and true independence, and will be deeply trustworthy, only if he has successfully passed through a great many experiences in which his own mistake could have caused his serious injury or even his death.

159. " Excessive protection is, for him, famine.

- | | | |
|-----------------|-----------------|----------------|
| (1) adequate | (2) unnecessary | (3) immoderate |
| (4) superfluous | (5) plentiful | |

160. By "independence," the author means:

- | | |
|--------------------------|-------------------------------------|
| (1) to do as you like | (2) to have control over yourself |
| (3) to be able to vote | (4) to live in a democratic society |
| (5) to have adult rights | |

From "Safe and Insane" by Philip Wylie, THE ATLANTIC MONTHLY, January 1948. Copyright 1948. Used with permission.

DO NOT START THE TEST UNTIL TOLD TO DO SO

She suffered ceaselessly, feeling herself born for all the delicacies and all the luxuries. She suffered from the poverty of her dwelling, from the wretched look of the walls, from the worn-out chairs, from the ugliness of the curtains. All those things, of which another woman of her rank would never have been conscious, tortured her and made her angry. The sight of the little Breton peasant who did her humble housework aroused in her regrets which were despairing, and distracted dreams. She thought of the silent antechambers hung with Oriental tapestry, lit by tall bronze candelabra, and of the two great footmen in knee-breeches who sleep in the big armchairs, made drowsy by the heavy warmth of the hot air stove. She thought of the long salons fitted up with ancient silk, of the delicate furniture carrying price-less curiosities, and of the coquettish perfumed boudoirs made for talks at five o'clock with intimate friends, with men famous and sought after, whom all women envy and whose attention they desire.

1. The silent antechambers.

- | | | |
|--------------------|-----------------|------------------|
| {1} inner rooms | {2} bedrooms | {3} living rooms |
| {4} dressing rooms | {5} outer rooms | |

2. Coquettish perfumed boudoirs.

- | | | |
|----------------------|------------------------|-----------------------|
| {1} private rooms | {2} covered walks | {3} fragrant bouquets |
| {4} blooming flowers | {5} beautiful blossoms | |

3. The mood of the main character is:

- | | | |
|------------------|------------------|-------------------|
| {1} dreamy | {2} foolish | {3} disinterested |
| {4} discontented | {5} subconscious | |

4. In the first two sentences the major technique used is:

- | | | |
|--------------|-----------------|----------------|
| {1} contrast | {2} parallelism | {3} comparison |
| {4} balance | {5} irony | |

From "The Necklace" by Guy de Maupassant.

The approaching jungle night was, itself, a threat. As it deepened, an eerie silence enveloped the thatched village. People were silent. Tethered cattle stood quietly. Roosting chicken did not stir and wise goats made no noise. Thus it had been for countless centuries and thus it would continue to be. The brown-skinned inhabitants of the village knew the jungle. They had trodden its dim paths, forded its sulky rivers, borne its streaming heat and were intimately acquainted with its deer, tapir, crocodiles, screaming green parrots and countless other creatures.

That was the daytime jungle that they could see, feel and hear, but at night everything became different. When darkness came, the jungle was alive with strange and horrible things which no man had ever seen and no man could describe. They were shadows that had no substance and no one was aware of them until they struck and killed. Then, with morning, they changed themselves back into the shape of familiar things.

5. An eerie silence enveloped the thatched village.

- (1) timid (2) uncanny (3) lonely (4) frightened
(5) sad

6. They were shadows that had no substance.

- (1) purpose (2) soul (3) body (4) spirit
(5) movement

7. The best title for the passage from the following is:

- (1) "The Jungle at Night"
(2) "The Approaching Jungle"
(3) "The Daytime Jungle"
(4) "The Exotic Jungle"
(5) "The Jungle Village"

From "The Tiger's Heart" by Jim Kjelgaard.

An article I once wrote at the request of the general editor of one of the popular "home magazines" was vetoed by the editor of its mother-and-child department because I said that although parents should know the great truth that "children should be loved," it was more important for the children themselves to realize its corollary: "Children should be loveable." Thriftily I managed to use this notion elsewhere, but the mother-and-child editor said it would lead readers to conclude that the magazine was advising parents to beat their babies. The golden mean may seem to represent an easy sort of compromise. I remember that the first time it was expounded to me I was not at all impressed. But Aristotle must have made so much of it because he realized that there is nothing to which the human being takes less readily.

8. It was more important for the children themselves to realize its corollary.
- (1) further diagnosis (2) additional inference
 (3) following connotation (4) succeeding resolution
 (5) recurring synthesis
9. An easy sort of compromise.
- (1) concession (2) freedom (3) peace (4) possession
 (5) surrender
10. The main idea of the paragraph is that:
- (1) magazine editors know their readers.
 (2) parents know that they should love their children.
 (3) people should avoid extreme reactions.
 (4) children know that they should be lovable.
 (5) Aristotle did not explain what he meant.
11. The writer implies that he believes children should:
- (1) receive more attention. (2) receive less attention.
 (3) have more freedom. (4) have more discipline.
 (5) none of these.
12. A suitable title for the paragraph from the following is:
- (1) "Children Should Be Loveable" (2) "Mother-and-Child"
 (3) "Cruelty to Children" (4) none of these (5) any of these

Reprinted from the "American Scholar," volume 26, number 2, Spring, 1957. Copyright 1957 by the United Chapters of Phi Beta Kappa. By permission of the publishers.

Every pupil enters school with a set of attitudes. By the time he reaches high school many of his attitudes are rather firmly established. For example, in the field of family relationships, youth can express views not only about the power hierarchy in the home as it is, but also about how it should be. Should the mother or the father be the head of the household, or should they be equal partners? Should children be seen and not heard, or should they share in decision-making? How should the family work load be distributed? Should both mother and father work outside the home? If they do, does this affect the answer to the previous question? Similar questions would elicit answers in any area - opinions about ethnic groups may be stereotyped, attitudes to minority groups may be intolerant, views on the political situation may have strong emotional overtones, questions about religion might receive rather dogmatic responses, and so forth. The attitude may be well- or ill-founded, but it is there.

13. The power hierarchy in the home.

- (1) outlook (2) belief (3) rank (4) opinion
(5) prejudice

14. Similar questions would elicit answers.

- (1) solicit (2) evoke (3) request (4) suit
(5) demand

15. Questions . . . might . . . receive rather dogmatic responses.

- (1) dictatorial (2) factual (3) opinionated
(4) emphatic (5) careful

16. The phrase "and so forth" is an example of:

- (1) metaphor (2) irony (3) simile (4) idiom
(5) understatement

17. "Opinions about ethnic groups may be stereotyped" means that they may be:

- (1) unoriginal (2) all-embracing (3) unbiased
(4) well-founded (5) three-dimensional

From Problems and Values by G.L. Berry, Copyright 1967. J.M. Dent and Sons (Canada) Limited. Used with permission.

One way to help students to appreciate the value system of their own culture is to provide them with a competent knowledge of other systems for comparison purposes. In such a comparative study, one should be concerned more with function than with structure. It is more important to know the purpose of each part of the institution than to be able to identify the relationships between the parts. The social studies class should attempt to identify the good state, that is, the one organized in such a way as to make possible the good life for its citizens. Students should leave high school with an awareness of a whole field of inquiry in government and politics, and with some insight into and understanding of the complexity of many public problems.

18. One way . . . to appreciate the value system.

- (1) like
- (2) strengthen
- (3) extend
- (4) recognise
- (5) increase

19. The author states that high school graduates:

- (1) are aware of political problems.
- (2) understand the completeness of public problems.
- (3) only partly understand adult life.
- (4) are fully prepared for adult life.
- (5) none of these.

20. The main idea of the paragraph is that one should:

- (1) study little about how systems work.
- (2) study little about how systems are established.
- (3) study much about how systems work.
- (4) study much about how systems are established.
- (5) none of these.

From Problems and Values by G.L. Berry. Copyright 1967. J.M. Dent and Sons (Canada) Limited. Used with permission.

The political attitude associated with laissez-faire economics in the first part of the 19th century was liberalism. The strength of liberalism lay in the rising middle classes, who had most to gain from the individual freedom which was the cornerstone of their creed. Liberals held that all men are endowed with certain natural rights and they placed particular emphasis on the right of property. The early liberals, however, were not democrats: they were not in favor of giving every man the vote, for they feared the excesses of mob rule such as had occurred in France during the French Revolution. But they did believe strongly that the executive power in the state should be limited by a constitution: only thus could the danger of arbitrary rule by autocratic or despotic governments be avoided and the civil-right of the individual protected.

21. Nineteenth-century liberals believed in:

- (1) representation by population (2) universal suffrage
- (3) equally for all (4) democracy against despotism
- (5) none of these

22. The level of language used is mainly:

- (1) regional (2) standard (3) formal (4) colloquial
- (5) informal

23. Nineteenth-century liberalism was:

- (1) in favour of property owners (2) in favour of aristocratic rule
- (3) against the working classes (4) for organized labour
- (5) preparing for a revolution

24. The paragraph is developed mainly by means of:

- (1) example (2) statement (3) emphasis (4) illustration
- (5) repetition

25. Which of the following would be the best title for the paragraph?

- (1) "The Dangers of Autocratic Rule"
- (2) "Despotism and the Ruling Class"
- (3) "The Rights of Man"
- (4) "Laissez-faire Economics"
- (5) "The Rise of Liberalism"

From Conflict and Cooperation by J.S. Campsie. Copyright 1967. J.M. Dent and Sons (Canada) Limited. Used with permission.

Analog computers deal in quantities that can be measured using the relation of likeness between two things. The resemblance, not of the things themselves, but of two or more attributes is used: that is, numbers are represented by directly measurable quantities such as voltages, resistance, or rotation. For instance, if a known input current is passed through known resistances, it will result in a proportionate voltage. Values are assigned to the swing of the voltmeter needle which is used as the output scale. One volt could be made to represent one inch, ten ounces, one hundred miles, or any other unit of measurement. The answer to the problem is shown immediately on the scale. The simplest form of the analog calculator is the slide rule, where a length along a scale is analogous to a number. Analog computers first used discs, balls, rods, cams, gears, levers, and cylinders; later developments used electric circuits and finally electronics.

26. Values are assigned to the swing of the voltmeter needle.

- (1) assimilated (2) consigned (3) allotted
 (4) supplemented (5) contributed

27. The paragraph is developed by means of:

- (1) emphasis (2) implication (3) repetition
 (4) illustration (5) cause-and-effect

28. Which of the following words best describes the system upon which an analog computer works?

- (1) multiplying (2) proportional (3) electrical
 (4) additive (5) none of these

From Canadian Business Mathematics by Catherine Lund. Copyright 1964. McGraw-Hill Book Company. Used with permission.

Real Estate is usually purchased through licensed agents called real estate brokers. Both buyers and sellers avail themselves of the services of the brokers, and the brokers endeavour to bring the buyer and seller together to their mutual satisfaction. For this service, brokers receive a commission which is paid by the seller of the property, not the purchaser. The commission charged ranges from 4% to 10% depending upon the type of property, the location of the property, and the type of listing desired. An exclusive listing with one broker in a large center may cost 5%. Sometimes, with the multiple listing, there will also be a photographic service. The pictures of houses for sale will be listed with a group of brokers in order that prospective buyers may look them over and visit only the houses in which they are interested. The brokerage rates charged in smaller centers will be somewhat higher than in large urban centers, with the rate for the sales of summer properties sometimes being as high as 10%.

29. To bring the buyer and seller together to their mutual satisfaction.

- (1) ensuing (2) complete (3) assured (4) joint
(5) insured

30. An exclusive listing with one broker.

- (1) prohibitive (2) debarred (3) undivided (4) exhibited
(5) suspended

31. A multiple listing . . . may cost 7%.

- (1) numerous (2) ample (3) abundant (4) wide
(5) profuse

32. City brokers are usually:

- (1) content with a small profit. (2) less expensive than country
brokers (3) more expensive than country brokers (4) after a
large profit (5) in favour of exclusive listing.

From Canadian Business Mathematics by Catherine Lund. Copyright 1964.
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To invest money in stocks is relatively simple to accomplish. Millions of people in all walks of life set aside sufficient cash to become investors. It is estimated that about 75% of these investors have incomes of less than \$7,500 and about 35% earn less than \$5,000 a year. Stock ownership is divided almost equally between men and women of every age. Everyone in Canada who can invest should own a share in Canadian business and hence in Canada's future. This, in a very few years, may well include you.

But why should you invest your money in stocks? In the first place, this is the best way to make the purchasing of your money keep pace with the growing economy and the inflation that has been taking place over the last few centuries, and more particularly in the last few decades, and which will probably continue into the foreseeable future.

33. It is estimated that about 75% of these investors . . .
- (1) judged (2) credited (3) supposed (4) believed
(5) assumed
34. The author implies that:
- (1) 75% of Canadians invest (2) 110% of Canadians invest
(3) 35% of Canadians don't invest (4) (1) and (3)
(5) none of these
35. Which of the following would be the most suitable title for this passage?
- (1) "The Small Investor" (2) "Investing in the Future"
(3) "Inflation and the Future" (4) "Canadian Business"
(5) "The Growing Economy"
36. The paragraph is developed mainly by:
- (1) contrast (2) implication (3) explanation
(4) emphasis (5) cause-and-effect

From Canadian Business Mathematics by Catherine Lund. Copyright 1964. McGraw-Hill Book Company. Used with permission.

For anyone, the study of chemistry provides an understanding of the thought processes used in science. Like other scientists, the chemist seeks to understand a large number of observed facts in terms of a few broad principles. The uncovering of these principles is the ultimate end of scientific research. Once the principles have been established, they not only account for experimental observations, but also make possible the systematic organization of knowledge and the prediction of behaviour in new situations. However, these principles can only be as good as the experimental observations on which they are based.

37. In terms of a few broad principles.

- (1) origins (2) truths (3) ideas (4) conducts
(5) concepts

38. The level of language used is mainly:

- (1) conversational (2) simple (3) technical
(4) scientific (5) formal

39. The style used is primarily:

- (1) concise (2) metaphoric (3) light (4) colourful
(5) loose

From Chemistry by M.J. Sienko and R.A. Plane. Copyright 1964. McGraw-Hill Book Company. Used with permission.

In his age-long history Man has always been engaged in exploring the world around him. He has been interested in finding where rivers have their courses: he has wanted to know what lay on the other side of a range of mountains, or beyond the ocean. In his ceaseless enquiries he has succeeded so well that, in its main outlines, geographical exploration may be regarded as complete.

But geographical exploration is only part of the quest. We see the point very well illustrated in Scott's expedition to the Antarctic, already referred to in these pages. Certainly his work had a geographical side, but he took with him a remarkable team of highly trained scientists, who brought back with them a wealth of information about wind velocities and air temperatures, atmospheric humidity, the depth and salinity of the ocean and the plant and animal life contained in it. The magnetic laboratory was set up in a cave in a small glacier. There, by an ingenious arrangement which included a clockwork mechanism, they obtained continuous records of the direction and intensity of the earth's magnetic force. There, too, they made careful measurements of declination and inclination.

40. But geographical exploration is only part of the quest.

- (1) question (2) search (3) adventure (4) undertaking
(5) problem

41. By an ingenious arrangement.

- (1) curious (2) composite (3) shrewd (4) repeating
(5) temporary

42. Scott's expedition was mainly concerned with:

- (1) the depth and salinity of the ocean.
(2) the wild plant and animal life around the South Pole.
(3) the influence of the South Pole on magnetism.
(4) the type of weather around the South Pole.
(5) none of these.

43. The paragraphs are developed mainly by means of:

- (1) example (2) emphasis (3) implication (4) simplification
(5) cause-and-effect

44. Which of the following was involved in Scott's Expedition?

- (1) geographical exploration (2) biological study
(3) botanical study (4) all of these (5) none of these.

From Elementary Physics by W. Littler .. Copyright 1965. G.Bell & Sons Limited. Used with permission.

E N D O F T E S T

If time remains, check over items which you are uncertain of. When your teacher says STOP, hand in your test booklet, your answer sheet, and your 2B pencil.

APPENDIX B

THE TEST MANUAL

General Information

This test was designed to provide a valid, reliable and relevant normative instrument with which to assess the general reading comprehension skills of the senior high school students in large urban areas in Alberta, Canada. It has been so designed that the classroom teacher with a minimum of formal training in standardized testing may use it, as well as more sophisticated testers. It is easy to administer and to score.

The test items were constructed to test the reader's ability to apply his general reading skills through his understanding of the vocabulary, literal comprehension, inferential reading and critical reading of the passages of continuous prose randomly selected from the Provincially-authorized textbooks in English, Social Studies, Mathematics, and Science. The passages used in this test are at the ninth-tenth or eleventh-twelfth grade difficulty level as assessed by the Dale-Chall Readability Formula.

Selection of the Random Samples

Prior permission to administer the pilot test and trial test was obtained from the Superintendent's office of the Edmonton Public School Board and the principal of a typical senior high school in the system. The pilot test was administered to one class of average ability in each of Grades Ten, Eleven, and Twelve. The results obtained as well as the

suitability of the length, format, timing, passages and general acceptability of the test were then discussed with experienced teachers, reading specialists and administrators. No time limit was put on the test in order that all students could finish. A short break after forty minutes was permitted to offset the effects of fatigue. After revisions in accordance with the discussions above-mentioned, the trial test was administered to ninety-two tenth graders, seventy-four eleventh graders, and ninety-four twelfth graders randomly selected by intact English class from the population of a representative senior high school. An item analysis of the results was made in order to eliminate undesirable items and to select items for the final test. All items used in the trial test were evaluated by a panel of judges consisting of university teachers of reading, and local reading specialists, teachers, and administrators.

Permission to administer the final test was obtained from the Superintendents of the four school systems of Edmonton and Calgary and the principals of the thirty-four senior high schools in the system. The final test was then given to thirty-nine randomly-selected English classes in these systems. Results of this testing are reported in the Manual.

Validity

To be valid, this test must assess the relative ability of senior high school students in large urban areas in Alberta to read with comprehension the passages randomly selected from the Provincially-authorized textbooks. By the method of selection and through the sources of the passages, content validity was obtained. All the items in the trial test were subjected to item analysis. Items which did not show a discrimination

coefficient between the top half and the bottom half of the students taking the test on the basis of the total raw score of at least .20 were discarded. Items which failed to discriminate between the three grades were also removed, as were items on which more students were successful in a lower grade than a higher. Furthermore, items whose difficulty index was less than twenty percent or more than eighty percent in terms of the percentage of students making the correct responses were not used in the final test. Items which remained were then subjected to evaluation by a panel of judges. In the final test, the average item difficulty for grade ten was 45.86, for grade eleven 48.26, for grade twelve 56.77, and for the total tested group 50.20. Average item validity for the four groups was .35, .35, .36 and .36 respectively.

Reliability

The reliability of this test is an expression of the consistency with which the test assesses the ability to read with comprehension. It may be affected by factors inherent in the test, by factors which primarily affect the student, and by factors connected primarily with the scoring of the test results. In order to control the factors contributing to reliability which are inherent in the test, explicitly stated directions to the examiner have been provided and must be followed exactly. These directions are the result of the pooled experience and advice of teachers and administrators, together with reading specialists, who have taken the test or who administered it. The relevant recommendations contained in Standards for Educational and Psychological Tests and Manuals⁴² were followed. In this manner, ambiguous or inadequate directions were removed,

⁴²American Psychological Association. Standards for Educational and Psychological Tests and Manuals, Washington, D.C. 1966.

as were items revealing similar weaknesses. Factors affecting the students taking the test include inadequate lighting and heating of the classroom, and noise. These are controlled by the standards for classrooms set, in the cities of Edmonton and Calgary, by the local Health authorities. Variations within the individual are beyond the control of the test maker, but the test should be treated as part of the normal term's work in order to reduce test tension as far as possible. Uniformity in scoring the test is achieved by machine-scoring. Where scoring is performed by hand, the marking template should be used.

The reliability coefficient provides only a general indication of the confidence which one can place in a measuring instrument. The Kuder-Richardson Formula 20 for assessing internal consistency yields a coefficient equal to the mean of all the possible split-half coefficients of a test. By using item statistics, it gets away from such biases as may arise from arbitrary splitting into halves. However, it is generally accepted that internal-consistency formulas that depend upon a single administration of a test probably underestimate the reliability. The internal-consistency coefficient for the final test was .83 for Grade X, .84 for Grade XI, .84 for Grade XII, and .85 for the total tested group. The median reliability for reading comprehension tests reported by Buros⁴³ was .85; therefore, the reliability of the final test was taken as satisfactory.

In interpreting individual scores, the standard error of measurement indicates how closely the individual's obtained score approximates his

43Buros, O.K. Fourth Mental Measurement Yearbook. Highland Park, New Jersey: Gryphon, 1953.

true score. The chances are two to one that his obtained score will not differ from his true score by more than the standard error of measurement, and nineteen to one by more than twice the standard error of measurement. The standard error of measurement for the Grade X group was 3.07, for the Grade XI group was 3.09, for the Grade XII group was 3.02, and for the total tested group 3.06.

The arithmetical average, or mean, is the 'centre of gravity' in a distribution, has the greatest stability of the several measures of central tendency, provides a point in the distribution which enables the teacher to tell whether the score of a particular student is above, at or below the average performance of the class, and enables comparisons to be made between groups that have taken the same test. The means for Grade X, XI, XII, and Total tested group were 19.95, 20.91, 24.60 and 21.79 respectively.

The standard deviation is the most stable index of variability, that is, of the 'scatter' of scores around the mean. By knowing the standard deviation, the teacher can realize that approximately two-thirds (68.26 percent) of the students earned scores between plus one and minus one of the standard deviation from the mean. For example, the standard deviation of 7.80 would mean that two-thirds of the total tested group scored between 13.98 and 29.58. The teacher can also discover that roughly 95 percent of the students should have scored within two standard deviations from the mean, and that 99.74 percent scored between three standard deviations. These figures apply to the 'normal' distribution, but are acceptable guidelines for the distribution of the final test. The standard deviations for the final test were 7.42, 7.57, 7.66, and 7.80 for Grade X, XI, XII, and Total tested group respectively.

Skewness

The term skewness refers to the extent to which the curve produced by the distribution of scores bears resemblance to the bell-shaped, or 'normal', curve. Where such a curve represents results in which the mean, the median, and the mode coincide (i.e. there is perfect balance between the right and left halves of the curve), skewness is 0.00. When scores are massed toward the high or right end of the scale, the distribution is said to be negatively skewed. Scores below the mean are spread out more gradually toward the low or left end. The reverse applies for positively skewed distributions. On the final test, the extent of skewness for Grade X was .17, for Grade XI -.04, for Grade XII -.22, and for the total tested group -.01. The Grade X distribution was positively skewed to a negligible degree; the Grade XII distribution negatively to a negligible degree. Near-normality is indicated for Grade XI and the total group.

Kurtosis

Kurtosis refers to the pointedness or flatness of the distribution as compared with the 'normal' curve, or leptokurtic and platykurtic respectively. The kurtosis of a normal curve is 0.00. If the kurtosis of a distribution is positive, it is leptokurtic; if negative, platykurtic. The amount of kurtosis desirable in a given distribution depends upon the purpose of the test. As Horst⁴⁴ points out:

⁴⁴Horst, Paul. Psychological Measurement and Prediction. Belmont: Wadsworth, 1966, p. 68.

In general, the frequencies of a distribution for the various values of a measure should be smallest in that interval of the range where it is desired to have the greatest discrimination....if one wishes to discriminate mostly in the middle range of the distribution, the more platykurtic the distribution the better.

For the purpose of this test, it was considered more desirable for the kurtosis to be to some extent greater than obtains in the 'normal' curve, in order that more discrimination would be available where the frequencies were greatest, namely, within the range of plus and minus one standard deviation. The figures for the final test were -.68, -.67, -.62, and -.71 for Grades X, XI, XII, and the total group respectively. All distributions were therefore platykurtic to some extent, as was desired.

Selection of Items for the Final Test

In the construction of the pilot and trial tests, discussions with experienced teachers and administrators and with reading specialists were held regarding the length, format, timing, suitability of items and passages, and general acceptability of the test. After a study of the standardized reading tests most popular in North America and the item analysis of the trial test items, a panel of judges made up of subject area specialists and university teachers of reading assessed each item in terms of the following criteria⁴⁵:

1. A general verbal factor, i.e. breadth, depth and scope of vocabulary.
2. Comprehension of explicitly stated material, i.e. such skills as the comprehension of literal meaning of what is written.
3. Comprehension of implicit or latent meaning, i.e. the ability

⁴⁵Lennon, R.T. "What Can Be Measured?" Reading Teacher, 15: 333 - 34, March, 1962.

to draw inferences, to perceive the main idea and the organization of the passage, to make generalizations from what is read.

4. "Appreciation", i.e. sensing the intent of the author, judging the mood or tone, perceiving the literary devices used, etc.

The panel also assessed each item in terms of its contribution to the test according to the following ratings:

1. Essential that every student be able to identify.
2. Very important that every student be able to identify.
3. Fairly significant.
4. Comparatively unimportant.
5. Inconsequential; should be deleted from the test.

Items which had an average value rating of four or five on this scale were eliminated from the final test.

Instructions for Administering the Test

Each student shall have:

- 1 test booklet
- 1 Digitek answer sheet number DC 1389
- 2 soft lead pencils with erasers (e.g. HB, 2B)

These materials shall be placed on each desk before the period begins.

The test booklets and answer sheets are to be placed face down on the desks. When the students enter, they are to be instructed not to touch the materials until told to do so. In addition, the examiner shall have:

- 6 extra Digitek answer sheets number DC 1389
- 6 extra soft lead pencils with erasers (e.g. HB, 2B)

If the test is to be hand-scored, an answer sheet of essentially the same format as the Digitek answer sheet DC 1389 is required in order that the answer template may be used for scoring.

Instructions must be given carefully prior to the start of the test in exactly the same words as are given in capital letters in this Manual. No questions or disturbances are to be allowed after the test is started.

Questions from the students for the purpose of clarification must be asked by the students before the start of the test. Such clarification must be limited to explanation and example of the method of answering only. An atmosphere of concentration and challenge should be sought during the writing of the test.

Students who finish ahead of time should be encouraged to check over their responses carefully. Strict adherence to the time limit of thirty minutes for the test itself is essential.

Completion of Personal Data on the Answer Sheet

Students are to be instructed to turn over the answer sheet and fill in the following sections:

Last name and initials
Term, grade, birth date, and sex
School, city, test, grade and instructor

After the students have filled in the necessary sections of the answer sheet, say the following:

"TURN OVER YOUR TEST BOOKLET BUT DO NOT OPEN IT UNTIL I TELL YOU TO.

FOLLOW ME AS I READ THE INFORMATION ON THE FRONT PAGE.

IN THIS TEST ARE PASSAGES OF PROSE TAKEN FROM THE AUTHORIZED TEXTBOOKS IN SENIOR HIGH SCHOOL ENGLISH, SOCIAL STUDIES, MATHEMATICS, AND SCIENCE. QUESTIONS ON THESE PASSAGES ARE DESIGNED TO FIND OUT HOW WELL YOU READ THE MATERIAL.

EACH QUESTION IS FOLLOWED BY FIVE (5) CHOICES.
YOU ARE TO SELECT WHAT YOU THINK IS THE BEST CHOICE, AND THEN

MARK YOUR ANSWER SHEET IN THE CORRECT SPACE FOR THAT QUESTION AND FOR THE NUMBER OF THE CHOICE THAT YOU HAVE MADE. YOUR TEACHER WILL GIVE YOU FULL INSTRUCTIONS. FOLLOW THE DIRECTIONS CAREFULLY.

LOOK AT YOUR ANSWER SHEET. DO NOT MARK IT YET. YOU SEE THAT EACH QUESTION IS MATCHED BY THE SAME NUMBER ON YOUR ANSWER SHEET AND THAT THERE ARE FIVE (5) SPACES AFTER EACH QUESTION WHICH MATCH THE FIVE CHOICES FROM WHICH YOU SELECT. WHEN YOU START THE TEST, YOU WILL MARK THE NUMBER YOU HAVE CHOSEN IN THE SPACE PROVIDED FOR IT BY THE SIDE OF THE QUESTION NUMBER.

DO NOT MARK MORE THAN ONE SPACE FOR EACH QUESTION. IF YOU WANT TO CHANGE YOUR ANSWER, BE SURE TO ERASE THE MARK YOU HAVE ALREADY MADE BEFORE MARKING IN YOUR NEW CHOICE.

NOW TURN TO THE SECOND FACE OF YOUR TEST BOOKLET. YOU SEE THAT THERE IS A SAMPLE PASSAGE FOLLOWED BY TWO (2) QUESTIONS NUMBERED 159 AND 160. AFTER YOU HAVE READ THE PASSAGE, ANSWER THE TWO QUESTIONS BY MARKING IN THE SPACES 159 AND 160 ON YOUR ANSWER SHEET AT THE BOTTOM RIGHT HAND CORNER OF THE SHEET.

NOW READ THE PASSAGE AND ANSWER THE TWO QUESTIONS."

(allow up to two (2) minutes for the students to do this. You may shorten the time if you see that everyone has finished. After the time is up, say:)

"WE WILL NOW CHECK TO SEE IF YOU ANSWERED THE TWO SAMPLE QUESTIONS CORRECTLY. THE ANSWER TO NUMBER 159 SHOULD BE 4,

THE ANSWER TO NUMBER 160 SHOULD BE 2.

ARE THERE ANY QUESTIONS ABOUT HOW TO SELECT YOUR CHOICES AND HOW TO MARK THEM ON THE ANSWER SHEET?

(If necessary, quickly review how to mark the answer sheet.)

I SHALL NOT BE ABLE TO ANSWER ANY QUESTION ON THE TEST ITSELF. HOWEVER, IF THERE IS ANY OTHER REASON WHY YOU NEED HELP DURING THE TEST, PUT UP YOUR HAND. THERE MUST BE COMPLETE QUIET. DO NOT HAVE YOUR ANSWER SHEET WHERE OTHERS MAY SEE WHAT YOU HAVE MARKED.

WHEN YOU MARK YOUR ANSWER SHEET, BE SURE TO MAKE YOUR MARK FIRMLY, AND BETWEEN THE TWO LINES.

DO THE BEST YOU CAN. DO NOT SPEND TOO MUCH TIME ON ANY ONE QUESTION BUT GO ON TO THE OTHERS. RETURN TO QUESTIONS NOT ANSWERED OR WHICH YOU FEEL THAT YOU NEED TO CHECK IF YOU HAVE TIME. DO NOT BEND YOUR ANSWER SHEET.

OPEN YOUR BOOKLETS AT PAGE THREE AND START. YOU HAVE EXACTLY THIRTY MINUTES."

(The examiner should walk quietly around the room to make sure that students are marking their answer sheets in the proper manner, and that they have filled in the personal data sections. If personal data is missing, list the individual's name and check with him as he hands in his answer sheet. After thirty minutes exactly, say:)

"STOP, BRING YOUR BOOKLETS, PENCILS AND ANSWER SHEETS TO MY DESK. DO NOT BEND THE ANSWER SHEETS."

Instructions for Scoring the Test

Scoring machines for the Digitek answer sheets DC 1389 are available at the Universities of Alberta, Calgary and Lethbridge. The machine will print the obtained score on the right hand side of the margin. This score can be converted into a percentile ranking by using the Table of Percentile Norms provided in this Manual.

If the hand-scoring method is used, place the template over the answer sheet so that all edges are level with one another. Mark the correct responses in the holes of the template which represent the correct answer. A red pencil is suitable for this. Having done this, remove the template and count up the obtained scores. Where more than one space is marked for a given number, count the number wrong. Convert the obtained score into a percentile ranking as explained in the following paragraph.

Converting Raw Scores to Percentile Norms

Percentile norms were developed for all of the raw scores obtained on the final test. To convert a raw score to a percentile rank, locate the raw score in the appropriate column. To the right of the raw score is the individual's percentile rank, under his particular grade, and under the column headed "Total Tested Group." For example, a raw score of 18 represents a percentile rank of 43 if the student is a tenth grader, 37 if the student is an eleventh grader, and 21 if the student is a twelfth grader. A score of 18 represents a percentile rank of 34 in the total tested group. Because of the considerable range in reading ability of students in senior high schools, the percentile rank in the total tested group is given for cross-grade comparison purposes.

Interpretation of Percentile Ranks

Whenever norms are used, it must be remembered that they are not standards to be obtained, but rather are a method of reporting the performance of students used in the final testing. Other groups and individuals which use this test may be compared with the tested group by means of the percentile ranking. The final tested group was made up of 1052 randomly-selected students from the senior high school grades in the four school systems of Edmonton and Calgary, the two large urban areas in Alberta, Canada. The final test was given in February and early March, 1969.

A percentile rank is determined entirely by the relation between a particular student's score and the scores of other students in the group tested; thus, the ranks range from 0 to 100, regardless of how well the group did on the test. The percentile corresponding to a given raw score indicated the number of students out of a hundred who obtained scores below that score. For example, if a grade ten student obtained a score of 18, 43 students out of a hundred earned scores below his. By this method, the obtained score of any individual taking the test may be compared with the scores obtained by students taking the final test.

TABLE I

PERCENTILE NORMS

Raw Score	Grade X	Percentile Ranks Grade XI	Grade XII	Total Group
42	99	--	99	99
40	99	--	99	99
39	99	99	99	99
38	99	99	97	99
37	99	99	96	98
36	99	99	94	98
35	98	97	92	96
34	96	96	89	94
33	96	95	86	92
32	95	92	82	90
31	93	91	77	87
30	90	88	72	83
29	87	84	68	80
28	84	80	63	76
27	80	75	59	72
26	76	71	55	68
25	72	68	50	64
24	69	63	45	59
23	65	60	40	55
22	60	55	36	51
21	57	50	32	46
20	52	45	29	42
19	47	41	25	38
18	43	37	21	34
17	38	33	18	30
16	34	29	15	26
15	29	25	12	22
14	24	21	10	18
13	19	17	8	15
12	16	13	7	12
11	13	10	5	9
10	9	7	3	6
9	6	5	2	4
8	4	3	1	3
7	3	2	1	2
6	2	1	0	1
5	1	1	0	1
4	0	1	0	0
3	0	0	0	0
2	0	0	0	0
1	0	0	0	0