

THE UNIVERSITY OF MANITOBA

A STUDY IN CRITICAL THINKING
IN THE
SOCIAL STUDIES

BEING A THESIS SUBMITTED TO THE COMMITTEE
ON POST-GRADUATE STUDIES IN PARTIAL
FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF
EDUCATION



by

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TABLE OF CONTENTS

	Page
LIST OF TABLES	v
Chapter	
I.	INTRODUCTION
	1
	1 Purpose of the Study
	2 The Social Studies
II.	CRITICAL THINKING
	6
	1 Critical Thinking
	2 Critical Thinking as an Objective
	3 Information vs Critical Thinking
	4 Drawing Conclusions
	5 Applying Generalizations
	6 Nature of Critical Thinking Test
III.	TESTING IN THE SOCIAL STUDIES
	14
	1 Objectives and Testing
	2 Essay-Type Questions
	3 Objective Questions
	4 Testing Critical Thinking
IV.	HISTORY OF THE TEST
	20
	1 Basis of the Test
	2 Construction of Test I
	3 Construction of Tests II and III
	4 Length of Test
	5 Scoring of Test
	6 Use of Test
V.	VALIDITY OF TEST ITEMS
	25
	1 Discriminating Power of an Item
	2 Cook's Index of Discrimination
	3 Validity of Items
	4 Final Form of the Test
VI.	RELIABILITY OF THE TEST
	31
	1 Meaning of Reliability
	2 Kuder-Richardson Reliability (Hoyt)
	3 Re-Test Reliability, Test II
	4 Re-Test Reliability, Test III

VII.	COMPARISON OF RESULTS	37
	1 The Schools Tested	
	2 Ability to Draw Conclusions	
	3 Ability to Apply Generalizations	
	4 Boys vs Girls	
	5 Low and High Intelligence Quotients	
	6 Age Differences	
	7 Correlation between I.Q. and Drawing Conclusions	
	8 Correlation between I.Q. and Applying Generalizations	
	9 Correlation between Critical Thinking Scores and Algebra Scores	
	10 Correlation between Critical Thinking Scores and History Scores	
VIII.	CRITICAL THINKING IN DEPARTMENTAL EXAMINATIONS.	50
	1 Departmental Examinations	
	2 Examination of Critical Thinking	
	3 Types of Essay Questions	
	4 Results of Departmental Examinations	
IX.	SUMMARY AND CONCLUSIONS	56
	1 The Results of the Tests	
	2 The Aims of the Social Studies	
	3 The School Situation	
	4 Critical Thinking in the Social Studies	
	5 Mental and Emotional Set	
	6 The Conclusions	
	BIBLIOGRAPHY	65
	APPENDIX A	
	Tables of Raw Scores for All Tests	69
	APPENDIX B	
	Validated Tests and Standard Examinations ...	81

LIST OF TABLES

Table	Page
I. Critical Values	27
II. Scale of Critical Values and Item Analysis	27
III. Validations of Test Items, Part I	29
IV. Validations of Test Items, Part II	30
V. Test and Re-Test Scores for Reliability	34
VI. Test and Re-Test Scores for Reliability	34
VII. Test and Re-Test Scores for Reliability	35
VIII. Mean Scores: Drawing Conclusions	39
IX. Mean Scores: Applying Generalizations	40
X. Mean Scores: Boy-Girl Comparative Scores	41
XI. Mean Scores: Low and High I.Q. Groups	42
XII. Mean Scores: All Age Groups	42
XIII. Critical Ratios: All Age Groups	43
XIV. Correlations: Critical Thinking Low and High I.Q. Groups	44
XV. Correlations: Critical Thinking and Algebra	46
XVI. Correlations: Critical Thinking and Q-Scores	47
XVII. Correlations: Critical Thinking and School Examination History	48
XVIII. Departmental Examination Failures	51
XIX. Analysis of June History III Examination Questions	54

XX.	Raw Scores Test III: High I.Q.'s	70
XXI.	Raw Scores Test III: Low I.Q.'s	71
XXII.	Raw Scores Test III: Boys	72
XXIII.	Raw Scores Test III: Girls	73
XXIV.	Comparative Scores Test III: Isaac Newton	74
XXV.	Comparative Scores Test III: St. John's	75
XXVI.	Comparative Scores Test III: Daniel McIntyre	76
XXVII.	Comparative Scores Test III: Isaac Newton 17	77
XXVIII.	Comparative Scores Test III: Isaac Newton 19	78
XXIX.	Critical Thinking Score: Test 1 Group 1	79
XXX.	Critical Thinking Score: Test 1 Group 11	80

CHAPTER 1
INTRODUCTION
PURPOSE OF THE STUDY

This study was undertaken with a view to discovering the ability of students in grade eleven in the high schools of Winnipeg to do critical thinking in the social studies. The problem grew out of the observation that the social studies are so replete with facts that in the learning situation these facts become ends in themselves rather than a means to an end. If the social studies are to serve their function in the educational process of cultivating in the student a critical attitude of mind and of developing in the student the ability to appraise objectively the elements of his social situations, to select or reject material in keeping with the needs of a particular action, then one of the important objectives of the social studies should be the development of the ability to think critically.

Critical thinking involves essentially the exercising of careful, exact judgment. In the social studies, judgment may be exercised in the selection of facts, the ability to draw conclusions from facts, and the ability to apply generalizations to social studies materials. This thesis concerns itself with the attempt to determine the ability of students to draw conclusions from, and to apply generalizations to social studies materials, as evidenced in examination conditions.

In order to make this study it was found necessary to devise a test the results of which would indicate the ability of students to draw conclusions from, and apply generalizations to, social studies materials, presented in an examination situation.

The primary purpose of this study was not the creation of a test for the purpose of measuring critical thinking, but rather the study of critical thinking as evidenced in the examination of the social studies.

THE SOCIAL STUDIES

The social studies have been variously defined, but the most comprehensive definition has been given by Krey when he states,

The social sciences embrace the traditional disciplines which are concerned directly with man and society, including history, economics, politics, ¹ sociology, geography, anthropology and psychology.

Although the area under investigation is critical thinking within the field of the social studies, the Manitoba grade eleven curriculum requires its students to study Canadian History and economics only. The nature of the Canadian History course however, is such as to demand of the student a background of sociology, geography and anthropology. Moreover, these several aspects of the social studies are not treated as separate social sciences, but are treated as a comprehensive unit having to do with the growth and development of a nation. The Canadian History course therefore serves as a valid sample of the social studies in which to examine critical thinking. Further to this point, Charles A. Beard states,

The social sciences are primarily concerned with those manifestations of human nature and those activities occurring within society which involve social consequences and relations--called for convenience political, economic, and cultural, and with the inter-relationships which accompany the func-

¹A.C. Krey, Conclusions and Recommendations of the Commission on the Social Studies (New York: Charles Scribner's & Sons, 1934), p. 6.

tioning of society as a whole in its world setting.¹

Again from this view, the Canadian History and Economics course in Manitoba may be defended as a valid social studies ground of investigation, for it is concerned with those manifestations of human nature and those activities occurring within society involving political, economic and cultural consequences and relations.

There is yet further ground for using the grade eleven level for the study of critical thinking in the social studies. By the time the student has arrived in grade eleven he has had seven years of social studies unbiased in favor of history. This background of social studies has by this time become imbedded in his cultural make-up. This residual knowledge will in effect be the primary factor in any thinking which the student might do at this level. The factual accretions of the grade eleven or even the grade ten course will as yet have been too fresh to affect the basic function of the thought-provoking situation. Yet one of the primary objectives of the social studies course is the development in the student of the ability to think for himself given the facts of history, or geography, or economics, or sociology, as the case might be. With reference to this point Beard says,

Owing to the relations of the thinker in the social sciences to the things thought about, the thought of the thinker in the social sciences is colored and formed more or less by the ideas and interests which he himself brings to bear upon subjects under consideration.²

¹Charles A. Beard, The Nature of the Social Sciences, Report of the Commission on the Social Studies, (New York: Charles Scribner's Sons, 1934), p. 11.

²ibid., p. 20.

It is the "relation of the thinker to the things thought about" that is of primary importance in the social studies. The student may have excellent facilities for recalling facts which he encounters in his reading; he may possess an interest in things social; he may delight in anecdote and tale, but unless he possesses the ability to draw conclusions from and the ability to apply generalizations correctly to real and vicarious social situations his function as a citizen, a voting citizen, will suffer.

The student in grade eleven has usually reached a stage of maturity that is measurable. Grade eleven students range between ages fifteen and eighteen. The ability to reason, to think critically, to judge, to come to conclusions, is possessed by these students in a more or less mature state. The power to reason will continue to develop, but the ability to reason is there, as it is in earlier ages. The student's ability to do critical thinking in the social studies in grade eleven is dependent upon his acquaintance with the material of his subject. It is further dependent upon his native ability. The extent to which students are able to think critically in terms of drawing conclusions and applying generalizations as measured in examination conditions is the object of this study.

The nature of the social studies is such that the end results require the student to put into practice in his day-to-day living what he has learned from the experience of others. Vicarious experience to be effective calls for the student's realizing the relationship between the fact of the story and the fact of his life. The transfer of this vicarious experience is a function of his critical thinking.

Kelley and Krey say this.

It (the social sciences) may hasten the pupil's grasp of functional facts essential to his dealings with the experiences of social life by supplying him with the typical range of illustrations involved in the functional facts.¹

Only in so far as the student has cultivated in him to the greatest possible degree the ability he possesses to think critically in the social studies are the social studies valid subjects of study in any curriculum.

Truman L. Kelley and A.C. Krey, Tests and Measurements in the Social Sciences, Report of the Commission on the Social Studies, (New York: Charles Scribner's Sons, 1934), p. 49.

CHAPTER 11

CRITICAL THINKING

Dewey defines thinking as,

That operation in which present facts suggest other facts (or truths) in such a way as to induce belief in what is suggested on the ground of real relation in the things themselves.¹

Thinking is therefore the act of association carried on by the mind. Critical thinking is the exercising of careful judgment upon observed relationships. Critical thinking is judgment applied to the pattern of associations which grow out of observation. Critical thinking has been defined as the

ability to recognize problems; to find, select and reject evidence bearing upon these problems; to organize materials; to weigh the evidence; to draw conclusions; and to test the conclusions by applying them to new situations.²

Critical thinking is essentially one of the major objectives which the school must attempt to have the student realize and exercise and attain. In such subjects as mathematics, chemistry and physics, the nature of the material requires the student to reason and reflect. The problem technique employed in these subjects precludes their being presented as informative subjects only. Of such an informational subject as the social studies, this may not be said. The tendency in the social studies has been, and is, to present the material for the information of the student without demanding of him skill in solving problems, weighing evidence, drawing conclusions. To consider mathematics and physics as skill subjects, and the

¹John Dewey, How We Think, (New York: D.C. Heath & Co. 1933), p. 12.

²Cardinal Objectives in Elementary Education, (Albany, New York: University of the State of New York Press, 1931).

social studies as informational subjects, has tended to group in stereotyped sections the thinking about these two types of subjects. In essence, the skill subjects and the informational subjects inherently possess equivalent functions in terms of critical thinking. Both skill subjects and informational subjects possess facts. In each instance the observer must be critical of these facts before using them. In each instance, too, the observer must see the relationships that exists among these facts before he is able to arrive at any conclusions. Again, there must be judgment exercised in applying these conclusions to new situations. Whereas in the informational subjects the number of facts is large in each problem, in the skill subjects the number of facts is usually small. There is then a greater degree of definiteness about the solution of a skill problem than there is about the solution of an informational problem, but the element of skill enters into both.

Traditional thinking in the social studies has tended to emphasize the informational values of geography, history and economics. But the real value inherent in these subjects is not in the information, for Dewey says,

The real desideratum is getting command of scholarship--or skill--under conditions that at the same time exercise thought.¹

Dewey goes on to say with respect to the informational studies,

The distinction between information and wisdom is old, and yet requires constantly to be redrawn. Information is knowledge that is merely acquired and stored up; wisdom is knowledge operating in the direction of powers to the better living of life. Information, merely as information, implies no special training of intellectual capacity; wisdom

¹John Dewey, op. cit., p. 63.

is the finest fruit of that training. In school, amassing information always tends to escape from the ideal of wisdom or good judgment. The aim often seems to be--especially in such a subject as geography--to make the pupil what has been called a 'cyclopedia of useless information'.¹

There is, therefore, real need for redirecting the aims of education in the field of the social studies. And one of the means of so doing is stressing the real need for critical thinking in the social studies to the end that students emerging from school will do so with skill in appraising real life situations based on their experience in school in thinking critically in their social studies.

Pedro T. Orata stresses the need of the individual to learn how to deal effectively with life problems when he writes,

Continuous, independent reconstruction of experience in terms of the emergence of new and expanding meanings and insights, interests, ideals and standards, and the development of more appropriate skills and techniques of procedure that will enable the individual to deal effectively with life problems and situations, most especially with those encountered outside of the school are the ultimate goal of education.²

The social studies provide the milieu, the situation in the school that is most closely akin to life situations. The problems that arise in the social studies, therefore, are in essence the problems that will arise in life situations for the student. If the student becomes accustomed in school to accepting facts unthinkingly, or with a minimum of critical appraisal, he will tend to do so in life situations when confronted with similar problems. Critical thinking in the social studies is as much an affective function as it is in the science studies.

¹ibid., p. 63

²Pedro T. Orata, Evaluation in the Field of Social Science, (Educational Method, December, 1936), p. 123.

The student in chemistry learns to apply the experimental method in school to all problems. In life, this learning is applied whenever a chemical problem arises. The same must be true in the social studies. Only if the student learns to subject all facts to criticism, to critical thinking, will he continue to do so in later life.

Critical thinking requires the individual to select facts, to draw conclusions from these facts, and to apply generalizations to specific situations. The study here undertaken considers only the last two functions of critical thinking. To draw conclusions from facts, the student must have had experience, real or vicarious, in order to have a valid conclusion. If, for example, the student reads the statement, "The Indian stood across the pathway of settlement, and the Americans were beginning to realize that the most effective means of removing the Indian menace was to exclude the Canadian trader," he must base his conclusions not only on the facts of the statement, but also on his previous experience, real and vicarious, in which obstruction meant the seeking of a solution by means of finding a way through the problem, or around it. The student is called upon here to understand what is meant by the Americans "realizing" the cause of obstruction, to see that the means adopted by them is inherent in "exclude" and that the consequences would be not only the solution, but would in turn set up other problems. This relational aspect of all factual material provides an inherent challenge to the student. Dewey says in this respect,

There is a challenge to understanding only when there is either a desired consequence for which

means have to be found by inquiry, or things are presented under conditions where reflection is required to see what consequences can be effected by their use.¹

Drawing conclusions calls upon the student to exercise that faculty which extracts from facts their relational function to all other facts, or as Wainwright says,

Drawing conclusions provides an index of a pupil's ability to interpret, to judge, to infer, and to generalize from social studies facts and data.²

In order to apply generalizations to specific situations the student is in reality called upon to relate an abstract principle to a concrete situation. However, the abstract principle if understood, may be quite concrete to the student if he is familiar with it, in the sense that he understands it. The concrete situation, by virtue of its being unfamiliar, may be quite abstract. The essence of the problem lies in the ability of the student to recognize and relate points of likeness in both situations. If for example, a student is confronted with a problem in which he meets the statement, "Capital is accumulated energy" and is required to apply this generalization to the specific statement, "Cartels are powerful organizations", and in the process differentiate this specific statement from such statements as, "The farmer is a capitalist" he is called upon to find the points of closest relationship between the generalization and one of the specific statements. The ability of the student to do this is an ability quite unlike that of drawing conclusions or observing facts.

¹op. cit., p. 147.

²J. Wayne Wrightstone, Manual for Test of Critical Thinking in the Social Studies, (New York: Bureau of Publication, Teachers' College, Columbia University, 1945), p. 1.

NATURE OF CRITICAL THINKING TEST

The two aspects of critical thinking under examination in this study were approached by means of two types of questions. In order to measure the ability of the student to draw conclusions, a paragraph is followed by four statements, each of which may be a statement that is a correct conclusion, or is not a correct conclusion, or because of the material in the paragraph the statement may not warrant coming to any conclusion.¹ Question 3, for example, of Test III, reads:

The discovery of gold on the Klondike River in 1896 started a mad rush of miners and adventurers into the Yukon. The favourite approach to the Yukon was by way of the Lynn Canal and the Alaskan ports of Dyea and Skagway. Doubts arose as to where the boundary between Alaska and Canada crossed the canal. These and other questions seemed to justify an international conference. In 1898 a Joint High Commission was appointed for the discussion of matters of common interest to Canada and the United States.

1. The Lynn Canal formed the boundary between Alaska and Canada. 1. (-)
2. The Joint High Commission of 1898 was set up to settle the Alaskan Boundary Dispute only. 2. (-)
3. The discovery of gold was one reason for the calling of the conference. 3. (+)
4. Canada and the United States were both interested in the discovery of gold. 4. (o)

After reading the paragraph, the student must, in order to answer the first item correctly, draw the conclusion that on the basis of the evidence in the paragraph the statement is a wrong conclusion. In the second question the student must again recognize that the evidence in the paragraph warrants him calling the statement a wrong conclusion. In the third statement, the answer is positive, and the student is required to recognize that this is a correct conclusion. The fourth statement provides the student with an opportunity to recognize that the statement made does not warrant coming to any

¹See Appendix B for Part I Instructions.

conclusion on the basis of the evidence in the paragraph. The student in each instance is limited to the material in the paragraph.

The extent to which his outside experience will affect his thinking is a factor which the objective nature of the questions has attempted to control. By limiting the conclusions to the specific paragraph, and by directing the student particularly to this aspect of his thinking, the experimental conditions set up attempted to restrict as far as possible the outside experience of the student. The same degree of limitation was set up in that portion of the test attempting to determine the ability of the student to apply generalizations.

In order to measure the ability of the student to apply generalizations to specific facts, each of several paragraphs in Part II of the test is followed by five generalizations and three statements referring to the material in the paragraph. In applying the generalization the student is called up to see the relationship that exists between the generalization and the specific explanation of a particular element of the subject-matter of the paragraph.¹ Question 2 of Part II, Test III reads:

The railways of Canada made it possible for many people to move to the West. The railways, too, made it possible for those who farmed to ship their grain to markets in the East. As new inventions bettered the service offered by the railways more and more people populated Western Canada. Canada's trade with outside countries increased as a result of increase in exportable farm products. With the opening of new territory by the railways, new forest areas and mining areas were made available.

- | | | |
|-------------------------------|---|----------------------------------|
| 1. New areas attract settlers | 4. Explains why
if there is easy
communication. | Canada's trade
increased. (5) |
|-------------------------------|---|----------------------------------|

¹See Appendix B for Part II Instructions.

- 2. New settlements result from new inventions.
- 3. Communications make it possible to develop new products.
- 4. New inventions make it possible to develop new products.
- 5. Greater trade is possible if new areas have communication.
- 6. Explains why population of the West increased. (1)
- 6. Explains why forest and mining areas became valuable. (3)

The student is here called upon to see that the first generalization is related to the paragraph by means of the fifth explanation. In the same way, the third generalization is related by means of the sixth explanation, and the fifth generalization by means of the fourth explanation. In each instance the measured ability of the student to apply the generalization to the material is a criterion of his ability to exercise exact judgment, that is, to think critically.

CHAPTER III

TESTING IN THE SOCIAL STUDIES

The purpose of testing in the social studies is to measure the student's achievement or progress in the field. The student's achievement must be considered in the light of the objectives which have been set in the field and the extent to which these objectives have been realized in the teaching situation. Testing in the social studies is, therefore, the testing of the objectives of the social studies in so far as these objectives have been realized and mastered by the student.

The fundamental purpose of instruction in the social studies is the creation of rich, many-sided personalities, equipped with practical knowledge and inspired by ideals so that they can make their way and fulfil their mission in a changing society which is a part of a world complex.¹

The two areas which are measurable here are knowledge and information, and skills. Of these two areas, the first is the easier to measure by virtue of its concrete and easily ascertainable nature. The second, the measurement of skills or judgment involves to a certain extent, the measurement of intangibles.

The factual information of the social studies, whether it be knowledge of maps, forces, governments, conceptions, assumptions, functions, or institutions, requires of the student memorization ability. The student may accept all of the facts of the social studies without subjecting them to any criticism

¹Charles A. Beard, The Nature of the Social Sciences, Report of the Commission on the Social Studies, American Historical Association, (New York: Charles Scribner's Sons, 1934), p. 178.

whatsoever. Tests for information in the social studies may therefore ignore some of the more important objectives, namely those objectives comprehending the skills, attitudes and interests of the student. In so far as information is a valid objective of the social studies, the test for information only is valid, too, but, in so far as the information the student possesses is valid only in terms of its function, then the test for information alone fails of its highest purpose.

The test for information is useful in determining the student's knowledge of factual material in terms of ascertaining how well prepared he is to enter into the realization of the second objective, namely skill in seeing relationships, creation of right attitudes, interest in the right fields. The implication in the following excerpt underwrites the relationships that exist between testing for information and testing for skills, when it says,

The social sciences as descriptive sciences may also indicate, to some extent at least, the objectives which are required if society is to continue and if the ends posited by society are to be attained, in part at all events, through instruction in the schools.¹

If instruction in the schools is to assist the student to "make his way" then this way cannot be by means of information alone, but by means of training in the use of this information. The extent to which the student is able to interpret, to infer, to conclude, to judge, to weigh, to criticize the material of the sciences, in other words, to deal critically with the facts of social science or social life, is the extent or degree in which he has benefitted from a social science or social studies course.

¹ibid., p. 226.

Testing in the social studies has usually taken the form of the essay-type examination. The essay-type question has as its failing the fact that the student is at complete liberty to interpret the question as factually as he may be able to do. By submitting fact upon fact, he is able to avoid original thinking in answering the problem. In the main, the essay-type question does not demand of the student the exercise of his critical faculties. Where it does, the student is free to make this a minimum rather than a maximum. The time taken to score the essay-type question and the variable factors which enter into any free expression on the part of the student impose difficulties in the way of adopting the essay-type question as a means of uniformly measuring the ability to do critical thinking in the social studies. Since the ability to do critical thinking in the social studies is an important element in the realization of the highest objectives to be achieved, it follows that some means of testing this faculty other than by means of the essay question must be used.

The short answer question permits focussing the attention of the student upon that phase of the work which it is desired to measure. Pressey, Gold, Kelty and Wesley, after examining the completion type of question, the true-false type, the matching type and the multiple-choice type concluded, that

.... the multiple-choice form of question was
best for testing understanding.¹

¹Truman L. Kelley and A.C. Krey, Tests and Measurements in the Social Science, Report of the Commission on the Social Studies, (New York: Charles Scribner's Sons), p. 20.

Kelley and Krey, in reporting the investigators' findings stated that,

The multiple-choice type permitted the use of phrases as well as single terms. It afforded opportunity to test relationship as well as recall. By use of four or five options the chance factor was cut down to more controllable proportions. The options in the test could be gauged to a relatively fine discrimination of the student's knowledge.¹

The objective type question, because of its ability to restrict the area of examination, lends itself to the examination of understanding. Critical thinking in so far as it includes drawing conclusions and applying generalizations is one aspect of understanding. There is, therefore, sufficient evidence to support the use of the objective type question in the measurement of critical thinking.

Smith and Tyler in their report dealing with the evaluation of (1) "the ability to see logical relations", (2) "the ability to evaluate arguments", (3) "the ability to judge the consistency of social policies with social goals", describe the instrument which was used to measure these types of behavior.

In part this description reads,

An exercise is composed of several parts, constructed in such a way as to give the evidence of the three abilities listed in the analysis of the objective. In the first part of the exercise a social problem is described, and one of the frequently suggested solutions is indicated. Various statements (some supporting, some contradicting, and some irrelevant) concerning the solution are presented. The student is asked to indicate whether each statement supports, contradicts, or is irrelevant to the suggested solution In the second part of the test the student is asked to indicate whether each of the statements can be proved to be either true

²ibid., p. 21.

or false.¹

The evaluation program undertaken by the Commission on the Relation of School and College was directed primarily towards the measurement of those hitherto intangible factors in education. In almost all instances the instruments used were of the objective type.

J. Wayne Wrightstone², in attempting to measure critical thinking at the grade four, five and six level used an objective instrument to do so. Wrightstone's findings were reported statistically valid and reliable in measuring the ability of students to obtain facts, draw conclusions and apply generalizations. Wrightstone's method followed closely the method reported by Smith and Tyler.

Basically, the purpose of measurement and evaluation is to determine the extent to which individual pupils are enabled to deal with new social situations by virtue of their increased ability to use concepts, meanings, techniques of procedure, to solve problems that confront them from time to time.³

This basic purpose of measurement comprehends the objectives of the social studies. The objectives of the social studies recognize not only inert facts but functional facts in terms of skills--skill in exercising judgment, and all that judgment implies. As Smith and Tyler state,

The aims of any educational program cannot well be stated in terms of the content of the program¹

Testing in the social studies must therefore attempt to test

¹Eugene R. Smith and Ralph W. Tyler, Appraising and Recording Student Progress, Adventure in American Education, Ill, (New York: Harper & Brothers), p. 197ff.

²J. Wayne Wrightstone, op. cit.

³Pedro T. Orata, op. cit., p. 11

⁴op. cit., p. 11

not only the content of the program, but too, the functional objectives of the program if the objectives of the social studies in the schools are to be realized.

CHAPTER IV

HISTORY OF THE TEST

The experience of Pressey, Smith and Tyler, and Wrightstone showed that the objective test could be used effectively in the examination of some elements of understanding of the student. The objective test was therefore adopted as the best instrument to use in determining the ability of students in grade eleven to think critically in the social studies. The use of this instrument made it possible to control the conclusions and the generalizations for each question, thus making possible a finer measurement of critical thinking.

The form of the test adopted was based on the experience of J. Wayne Wrightstone¹ and of the Eight-Year Study reported by Smith and Tyler². In each question of Part I of the test, the student is presented with a brief paragraph dealing with material frequently arising in the social studies. The vocabulary, the composition, the general treatment of the subject-matter is in keeping with the experiences of the students in these areas. In order to measure the ability of the student to draw conclusions, the paragraph is followed by four statements, each of which may be a statement that is a correct conclusion, or is not a correct conclusion, or, because of the material in the paragraph the statement may not warrant coming to any conclusion. In order to measure the ability of the student to apply generalizations to specific facts, each of several paragraphs in Part II of the test is followed by five generalizations

¹J. Wayne Wrightstone, op. cit.

²Eugene R. Smith and Ralph W. Tyler, op. cit.

and three statements referring to the material in the paragraph. In applying the generalization the student is called upon to see the relation that exists between the generalization and the specific explanation of a particular element of the subject-matter of the paragraph.

Test 1 was submitted to 71 grade eleven students in the Isaac Newton High School in September, 1945. Thirty-five of these students were enrolled in the matriculation course; thirty-six were enrolled in the general course. Both groups of students studied the same course in History and Economics.

Test 1¹ consists of ten questions, four parts each, in which students draw conclusions from facts, and ten questions, three parts each, in which students relate general principles to facts contained in a paragraph. There was no time limit set for the paper, since this first test had to determine the amount of time the students would require to answer the test questions.

Students completed Part I of the paper in from 15 to 18 minutes, and completed Part II of the paper in from 34 to 32 minutes. These times were exclusive of the time required for giving instructions. The total instruction time for both parts of the test is approximately five minutes.

Part I of Test 1 consisted of ten questions, each question having four parts. Part II of Test 1 consisted of ten questions, each question having three parts. The total number of items the student was required to answer was 70 items. The results of Test 1 were studied with a view to determining the validity².

¹See Appendix B.

²See Chapter V for study of validations.

of the items. The items chosen on the basis of their validity were then set up in a second test, called Test 11¹.

The eleven questions chosen for Test 11, four questions from Part I and seven questions from Part II, constituted a test of sufficient length for the purposes of the study. Test 11 was then submitted to the same classes as had written Test I. After a period of ten days, Test 11 was again submitted to these same classes. This re-test was carried out in order to provide a re-check on the Hoyt formula used to determine the reliability² of the test. Analysis of the answers given to Test 11 suggested alterations in the arrangements of items in questions 1, 2, 5 and 6 of Part II. The alterations made in Test 11 were then incorporated in Test III which is the final form of the test. Test III was then submitted to 33 grade eleven students in the Isaac Newton High School. After ten days, the same test was given to the same class for the purpose of checking the reliability. Test III was also submitted to 34 grade eleven students in St. John's High School and 38 grade eleven students in the Daniel McIntyre Collegiate Institute.

In determining the length of the test, consideration had to be given to the length of time usually available in schools for testing purposes. Class periods are usually from 30 to 45 minutes in length. For any test to prove useful it is necessary that the student be able to complete the test within the time of his period. This administrative problem must be reconciled with the fact that the longer the test the greater the

¹See Appendix B

²See Chapter VI for study of reliability.

reliability. The length of a test is rather the function of the action time of the student than of the number of items on the test. In the critical thinking test here devised, it was found sufficient to have eleven questions, consisting in all of 37 answerable items, since the time taken by the student to answer these questions gave a good indication of his ability to think within the time usually given to class periods.

The scoring of the test is entirely objective. The conclusions submitted to the students' judgment in Part I of the test permit of no alternative answer. The application of generalizations in Part II of the test likewise permit of no alternative answer. A student's answer is in each instance either right or wrong. The findings of the test with respect to a student's ability to draw conclusions or apply generalizations are entirely objective in so far as the test measures what it is intended to measure.

The critical thinking test devised for this study may be used in selecting those students in a class whose ability to draw conclusions, or whose ability to apply generalizations is in doubt. Where a student in grade eleven falls below a raw score of 9.0 in the ability to draw conclusions and below 15.0 in the ability to apply generalizations, that student may be judged to require assistance in the process of thinking in the social studies. The test can be administered within a period of 35 minutes. The scoring is objective.

The traditional approach to the social studies, particularly where the deductive method of presentation is employed submerges the critical thinking aspect of the social studies. Where the social studies instructor is interested in the induc-

tive approach, and interested in achieving one of the major objectives of the social studies, i.e., the development of critical thinking, the critical thinking test may be used to advantage, in testing the efficacy of method.

CHAPTER V

VALIDITY OF TEST ITEMS

The purpose of the critical thinking test is to determine the extent to which students think critically in the social studies. In order to do this, it is necessary to determine the comparative thinking ability of the students. For a test to measure the comparative critical thinking ability of the students, it is necessary for the questions to discriminate between students of good ability and students of poor ability. W.W. Cook says,

The discriminating power of a single test item refers to the degree to which success or failure on the item by itself indicates ability. It may be defined as the accuracy with which a pupil can be placed with reference to one point in a general ability scale on the basis of his success or failure on the given item. An item may be said to be perfect in discriminating power when every pupil who scores successfully on the item ranks higher in the general ability scale than any pupil who fails the item. An item may be said to have zero discriminating power when there is no systematic difference between the general ability of the pupils who succeed on the item and those who fail.¹

Guilford states that,

When test items are scored as either right or wrong, or according to any two other categories, and when criterion groups are divided into two parts, a high group and a low, the simplest and most direct indicator of validity is to find a simple difference in the number of successes in the upper and the lower group.²

Tables III and IV show the simple percentage differences between the upper and the lower groups.

¹W.W. Cook, The Measurement of General Spelling Ability Involving Controlled Comparisons Between Techniques, p. 38, University of Iowa Studies, Vol. VI, No. 6, 1932.

²J.P. Guilford, Psychometric Methods, p. 433, McGraw-Hill Book Co., New York, 1936.

Validation, further, depends not alone upon objective techniques, but, as is the case in so complex a field as the social studies, upon internal analysis of the items,

For in the final analysis any method of test validation must be based on relatively subjective judgment concerning the degree to which the test covers the proper ground.¹

Careful scrutiny of each of the items showed that each item was limited to the field of study, and in so far as judgment could determine, measured what was sought within the field, the ability to draw conclusions, and the ability to apply generalizations.

The objective validating technique employed was the application of Cook's Index of Discrimination. Twenty-three questions comprising eighty items² were submitted to two grade eleven classes. The items were scored right or wrong, following which the upper and lower quartiles were determined. The proportion of those in the highest quartile passing an item to those in the lowest quartile passing an item was then determined and by means of Cook's Index of Discrimination, using the formula

$$CR = P_1 / P_4 \text{ wherein, according to Cook,}$$

This method consists of finding the ratio of the per cent of accuracy with which the upper one-fourth answers an item to the per cent of accuracy for the lower one-fourth.³

The Cook CR for each item on Test 1 was found and is shown in Tables III and IV at the end of this chapter.

In order to determine a scale of critical values for

¹H.A. Greene, A.N. Jorgensen and J.R. Gerberich, Measurement and Evaluation in the Secondary School, p. 54, Longmans, Green and Co., London: 1944.

²See Appendix A

³W.W. Cook, op. cit. p. 38.

Cook's formula, Table 1 based on 17 students in both the upper and lower groups was set up:

TABLE 1

CRITICAL VALUES

<u>U</u>	<u>L</u>	<u>Ratio</u>
17/17		1.00
17/16		1.06
17/15		1.13
17/14		1.21
17/13		1.36
17/12		1.42
17/11		1.54
17/10		1.70
17/ 9		1.89
17/ 8		2.12
17/ 7		2.43
17/ 6		2.84
17/ 5		3.40
17/ 4		4.25
17/ 3		5.66
17/22		8.50
17/ 1		17.00

To establish the scale the two extremes of the table were selected. These are the very poor and the excellent areas. The three areas within each of these two groups were fixed from 1.00 to 1.13 and from 4.26 to 17.00. The next areas in order are from 1.14 to 1.42 and from 2.44 to 4.25, again working from the extremes to the median group. The area remaining, from 1.43 to 2.43 represents the median critical area. The scale established on this basis is:

TABLE 11

SCALE OF CRITICAL VALUES AND ITEM ANALYSIS

<u>Scale</u>	<u>Criterion</u>	<u>Items Selected</u>
1.00 - 1.13	Poor	2 items
1.14 - 1.42	Fair	6 items
1.43 - 2.43	Good	23 items
2.44 - 4.25	Very good	5 items
4.26 - 17.00	Excellent	1 item

On the basis of this table of critical values 43 items were

cast out as being unable to discriminate effectively. Of the 37 items finally selected for testing, 78% fall within the good items or better. Table 11 shows the number of items falling within each of the categories.

Test 11 and Test 111¹, made up of questions 3, 4, 8 and 10 for Part 1, and questions 2, 4, 5, 6, 7, 8 and 10 for Part 11, provided a test with 16 items measuring the ability of students to draw conclusions, and 21 items measuring the ability of students to apply generalizations. The critical ratios for the testing items selected for the final form of the test show a mean CR for Part 1 of 2.09; a mean CR for Part 11 of 1.77, and a mean CR for the total test of 1.91. The results obtained would indicate that the items finally chosen for the test have sufficient discriminating power to select students in grade eleven on the basis of their ability to think critically in the social studies.

¹See Appendix B

TABLE III

TABLE OF VALIDATIONS OF TEST ITEMS ON TEST 1 - PART 1

Item		Simple Percentage Difference	Critical Ratio	Cook's Formula
<u>Question</u>	<u>Item</u>			
1.	1.	0.0	0.0	Rejected
	2.	5.9	1.1	Rejected
	3.	35.3	2.0	Rejected
	4.	29.4	1.7	Rejected
2.	1.	11.8	1.3	Rejected
	2.	0.0	0.0	Rejected
	3.	29.4	2.3	Rejected
	4.	17.7	1.5	Rejected
3.	1.	35.3	2.5	Accepted
	2.	29.4	2.0	Accepted
	3.	23.5	5.0	Accepted
	4.	23.5	3.0	Accepted
4.	1.	17.7	1.5	Accepted
	2.	35.3	2.2	Accepted
	3.	17.7	1.2	Accepted
	4.	47.1	2.0	Accepted
5.	1.	47.1	2.1	Rejected
	2.	0.0	0.0	Rejected
	3.	0.0	0.0	Rejected
	4.	23.5	1.3	Rejected
6.	1.	11.8	2.0	Rejected
	2.	0.0	0.0	Rejected
	3.	23.5	2.0	Rejected
	4.	23.5	2.0	Rejected
7.	1.	41.2	1.8	Rejected
	2.	0.0	0.0	Rejected
	3.	29.4	1.6	Rejected
	4.	5.9	1.3	Rejected
8.	1.	23.5	1.6	Accepted
	2.	17.7	1.3	Accepted
	3.	17.7	1.8	Accepted
	4.	29.4	2.0	Accepted
9.	1.	11.8	1.5	Rejected
	2.	23.5	1.3	Rejected
	3.	0.0	0.0	Rejected
	4.	11.8	2.0	Rejected
10.	1.	35.3	1.7	Accepted
	2.	23.5	1.5	Accepted
	3.	41.2	2.4	Accepted
	4.	47.1	1.9	Accepted
11.	1.	29.4	1.5	Rejected
	2.	0.0	0.0	Rejected
	3.	0.0	0.0	Rejected
	4.	0.0	0.0	Rejected

TABLE IV

TABLE OF VALIDATIONS OF TEST ITEMS ON TEST 1 - Part II

<u>Question</u>	<u>Item</u>	<u>Simple Percentage Difference</u>	<u>Critical Ratio Cook's Formula</u>
1.	1.	29.4	1.7 Rejected
	2.	0.0	0.0 Rejected
	3.	11.8	1.2 Rejected
2.	1.	35.3	1.6 Accepted
	2.	5.9	1.2 Accepted
	3.	29.4	1.5 Accepted
3.	1.	0.0	0.0 Rejected
	2.	0.0	0.0 Rejected
	3.	0.0	0.0 Rejected
4.	1.	5.9	1.0 Accepted
	2.	41.2	1.9 Accepted
	3.	23.5	1.6 Accepted
5.	1.	0.0	0.0 Accepted
	2.	35.3	1.9 Accepted
	3.	52.9	2.5 Accepted
6.	1.	23.5	1.4 Accepted
	2.	52.9	2.8 Accepted
	3.	41.2	1.9 Accepted
7.	1.	35.3	1.7 Accepted
	2.	52.9	4.0 Accepted
	3.	41.2	2.0 Accepted
8.	1.	47.1	2.1 Accepted
	2.	41.2	1.8 Accepted
	3.	23.5	2.0 Accepted
9.	1.	5.9	1.0 Rejected
	2.	0.0	0.0 Rejected
	3.	5.9	1.0 Rejected
10.	1.	17.7	1.2 Accepted
	2.	35.3	1.9 Accepted
	3.	17.7	1.3 Accepted
11.	1.	23.5	1.6 Rejected
	2.	0.0	0.0 Rejected
	3.	47.1	2.1 Rejected
12.	1.	17.7	1.2 Rejected
	2.	29.4	1.7 Rejected
	3.	17.7	1.2 Rejected

CHAPTER VI

RELIABILITY OF THE TEST

The reliability of a test refers to the consistency with which a test measures what it purports to measure. The reliability of a test is highly dependent upon the nature of the material, the length of the test and the conditions under which the test is being given. Where, as in this instance, critical thinking is the objective, the number of factors which may influence the results of the test are innumerable. As Lindquist points out,

In the field of United States history it is relatively easy to measure with high reliability the amount of descriptive information the pupil has acquired, but it is comparatively difficult to measure the extent to which he has integrated this information, has appreciated its significance, and can use it in the interpretation of contemporary institutions and practices.¹

The present test, because of administrative effectiveness has been limited to 11 questions and thirty minutes of testing time. The techniques for determining the reliability of a test on the basis of its inherent qualities, presume a test of considerable length both as to time and number of questions. These two conditions do not exist in the present test. However, a variant of the Kuder-Richardson Reliability Coefficient was applied in order to determine what the reliability of the test was on this basis. This technique makes use of all scores on all items in the test. The following calculations show the reliability of the test as measured by

¹E.F. Lindquist, A First Course in Statistics, (Boston: Houghton Mifflin, 1942), p. 225.

the Hoyt formula:

T = sum of scores of all subjects	1,534
S = sum of squares of scores of all subjects	34,671
S = sum of squares of items for all subjects	37,119
k = number of subjects taking the test	71
n = number of items in the test	37

$$\begin{aligned}
 R_t &= \frac{n}{n-1} \cdot \frac{kS_s + S_i - T(T+k)}{kS_s - T^2} \\
 &= \frac{37}{36} \cdot \frac{71(34671) + 37119 - 1534(1534+71)}{71(34671) - (1534)^2} \\
 &= \frac{37}{36} \cdot \frac{2,464,641 + 37,119 - 2,462,070}{2,464,641 - 2,353,156} \\
 &= \frac{37}{36} \cdot \frac{39,690}{111,485} \\
 &= \frac{1,468,530}{4,013,460} = .365 \\
 &= .365
 \end{aligned}$$

This value, .365 is low and indicates that the internal reliability of the test according to this formula is insufficient to ensure stability in repetition.

The test, re-test method was then used in order to determine the reliability of the test. In the test, re-test method the same test is given to the same students with a time interval between the two writings. If the second testing produces results significantly close to the results of the first test then the test may be considered as reliable, or, the percentage of the first results obtained in the second results is a measure of the degree of reliability of the test.

This technique requires first, testing of the student;

¹C.J. Hoyt, Note on a Simplified Method of Computing Test Reliability, Educational and Psychological Measurement, 1: 1, (January 1941), pp. 93-95.

second, lapse of a time interval of at least ten days; third, re-testing, using the same test; fourth, correlation of the two sets of results. The degree of correlation is the degree of reliability. The formula used for correlation in this instance is the Pearson product-moment coefficient of correlation in which

$$r = \frac{\sum f dx f dy - \frac{(\sum f dx)(\sum f dy)}{N}}{\sqrt{\sum f dx^2 - \frac{(\sum f dx)^2}{N}} \sqrt{\sum f dy^2 - \frac{(\sum f dy)^2}{N}}}$$

Tables V and VI show the raw scores obtained on the first and second testings.

TABLE V
TEST AND RE-TEST SCORES

	<u>Test 1</u>	<u>Test 11</u>
A.B.	16	24
A.T.	23	22
B.E.	22	26
C.O.	21	25
C.L.	22	23
D.G.	17	21
D.M.	11	17
E.H.	24	22
G.K.	24	22
H.J.	27	23
H.R.	26	26
J.K.	23	27
K.W.	24	25
K.H.	22	26
K.S.	23	25
K.H.	26	24
K.B.	28	29
L.J.	17	15
M.R.	20	26
M.O.	19	25
O.T.	21	25
O.J.	24	25
O.F.	28	32
P.F.	28	30
R.M.	19	25
S.W.	13	22
S.E.	30	27
S.M.	27	23
S.B.	19	23
S.W.	11	20
S.H.	18	30
S.H.	28	27
T.E.	25	26
W.G.	28	24

TABLE VI
TEST AND RE-TEST SCORES

	<u>Test 1</u>	<u>Test 11</u>
A.M.	23	23
B.G.	24	23
B.W.	27	27
B.R.	17	19
B.G.	17	19
C.L.	29	25
D.M.	20	26
D.E.	27	26
F.G.	20	26
G.N.	23	26
G.F.	11	19
H.L.	22	26
K.J.	13	16
K.R.	21	26
K.M.	18	17
K.B.	15	24
K.M.	27	27
K.H.	24	22
L.W.	15	19
L.J.	23	26
M.N.	15	25
M.V.	22	28
O.J.	22	22
R.J.	24	24
S.P.	29	30
S.H.	19	23
S.A.	21	20
S.J.	20	22
S.V.	23	22
S.O.	22	25
W.S.	25	25
Y.H.	24	25

The r for this correlation is .615 indicating that the reliability of the test is higher by this method than that obtained by the Hoyt formula.

Test III, a revision of Test II (involving change in positions of items 1, 2, 5 and 6 in Part II) submitted to 33 students in a third attempt to establish the reliability of the test. The first test was submitted on November 28 and the second test on December 7. Table VII shows the results obtained by this group of Grade XI students in the first and second testing:

TABLE VII
TEST AND RE-TEST SCORES FOR RELIABILITY

	<u>Test I</u>	<u>Test II</u>
F.A.	19	20
J.B.	27	27
J.Q.B.	19	24
E.B.	21	22
J.D.	22	25
M.G.	28	26
D.G.	20	23
S.G.	20	28
L.H.	26	25
G.H.	26	28
K.K.	25	26
E.K.	24	26
V.M.	30	27
I.M.	23	23
W.M.	14	15
J.M.	21	18
W.N.	12	12
G.O.	27	27
B.P.	19	26
L.S.	30	31
A.S.	27	29
H.S.	23	24
M.S.	22	28
S.S.	16	18
O.S.	20	23
E.S.	19	19
I.S.	25	25
D.S.	23	22
J.S.	25	22
A.S.	28	29
O.S.	22	24
E.T.	28	30
G.W.	21	20

The r for this correlation, again using the Pearson product-moment coefficient is .82 which indicates in this instance a high degree of reliability for the test.

CHAPTER VII
COMPARISON OF RESULTS

The three schools in which the experiments were carried on were the Daniel McIntyre Collegiate, situated in West Winnipeg, the St. John's High School, situated in North Winnipeg, and the Isaac Newton High School, situated in North-west Winnipeg. All of these high schools form a part of the Winnipeg Public School system.

The Daniel McIntyre Collegiate Institute has a population of approximately 1200 made up of students predominantly of English-speaking parentage. The class chosen in this school for testing was enrolled in the matriculation course and was taking Canadian History as a part of this course. The St. John's High School population approximates 900, the majority of students in this school coming from homes of foreign-born parentage. The experimental class in this school was enrolled in the general course and was taking Canadian History as a part of their course. The Isaac Newton population is approximately 600. In this school the majority of students come from homes of foreign-born parents. In the Isaac Newton, the critical thinking test was submitted to one class taking a matriculation course, one class taking a general course, and one class taking a general course with commercial option. All three classes took Canadian History as a part of the regular courses.

In all of the High Schools in which the experiments were carried on, the Canadian History course is taught in at least five 40-minute periods per week. The Programme of Studies for the Schools of Manitoba prescribes McArthur's History of Canada

for high schools and MacGibbon's An Introduction to Economics for Canadian Readers as the basic texts for the course in Canadian History and Economics. All of the high schools follow this programme.

In grade ten the Programme of Studies permits greater leeway. The Daniel McIntyre Collegiate bases the grade ten course on Arthur Antsey's The British People; the Isaac Newton bases its grade ten course on Mackies' A Short Social and Political History of Great Britain. Both the Daniel McIntyre and Isaac Newton High Schools use Burt's Manitoba High School Civics prescribed for the grade ten course. The St. John's High School, having been permitted to experiment in their institution with the ideas set forth in the Eight-Year Study, base their grade ten social studies curriculum on the social, economic and political development of Winnipeg, Manitoba and Canada.

The critical thinking test was submitted to 182 students in the three high schools described. The social and economic backgrounds of the students are sufficiently diversified to suggest that the findings are unbiased in respect of any of the aforementioned elements. The differences that exist in the matter of educational backgrounds indicates that again there is no bias in relation to any single course, method or procedure.

The ability of students in grade eleven to draw conclusions from the social studies material placed before them, is, according to the results obtained from the critical thinking test, limited. The scores of three classes tested are shown in Tables XXII, XXIII and XXIV¹.

¹See Appendix A

The mean scores for each of the classes tested, together with the percentage of the questions answered correctly are shown in the following table:

TABLE VIII
MEAN SCORES: DRAWING CONCLUSIONS

Class	N	Mean Scores	Percentage of questions answered correctly
Possible		16	100
D.M.C.I.	38	9.6	60%
St. John's	34	8.8	55%
Newton	33	8.8	55%

The evidence reveals that students were able to draw correct conclusions from between 55% and 60% of the social studies problems presented in the test. In coming to this conclusion on the basis of the present evidence, consideration must be given to the fact that on the test the conclusions were already formulated and the student had to exercise a choice of a number of possible conclusions. It is entirely possible that given a situation completely free from any restriction that students might register differently.

The ability of students to apply generalizations in the social studies may also be gleaned from the scores shown in Tables XXII, XXIII and XXIV¹. The mean scores for each of the classes tested are as follows:

¹See Appendix A

TABLE IX

MEAN SCORES: APPLYING GENERALIZATIONS

Class	N	Mean Scores	Percentage of questions answered correctly
Possible		21	100
D.M.C.I.	38	15.7	75%
St. John's	34	13.1	62%
Newton	33	14.9	71%

The students were able to apply generalizations correctly more frequently than they were able to draw conclusions as far as the tests in this study showed. Of the 21 possible correct applications students were able to apply correctly between 62% and 75% of the problems set on the test.

The difference that exists between the ability to draw conclusions and the ability to apply generalizations is explainable in terms of the nature of the material which students use in the social studies. Many of the tests use generalizations as a means of covering large aspects of social science under discussion. The student therefore gains experience with the application of generalizations and when called upon to exercise this ability is able to do so to the extent and degree he has observed and learned from his experience. On the other hand the ability to draw conclusions is a faculty that is essentially the prerogative of the reader. Where in the social studies the writer of a text may use generalizations liberally because the mode of presentation of his material lends itself to that, the writer usually does not adopt the argumentative medium inherent in the subject approach. The ability to draw conclusions is, it would appear, a faculty that requires exercising outside the

the textual sphere.

A comparison of the abilities of boys and girls in grade eleven to draw conclusions and apply generalizations is contained in the figures in Table X:

TABLE X

COMPARISONS OF BOYS' AND GIRLS' MEAN SCORES--CRITICAL THINKING

Ability	Mean Scores		$t \left(\frac{diff}{std} \right)$
	N Boys	N Girls	
Drawing Conclusions	9.1	8.9	.37
Applying Generalizations	15.3	15.0	.42

There is no significant difference apparent in the sampling between the abilities of boys and girls to draw conclusions from social studies material, or in their abilities to apply generalizations. Though the literature of social studies experiments reveals that boys usually score higher on social studies tests than do girls, these tests are almost always factual in nature. The higher scores of the boys may be explained in terms of the boys' greater interest in social studies, though this may not be so unqualifiedly. Where boys and girls are required to do critical thinking, the evidence, as indicated by the critical thinking test, shows that there is no significant difference.

The question of whether students of high intelligence as measured by the Dominion Intelligence Test, possessed greater critical thinking abilities than did students of a lower intelligence, measured by the same intelligence test, is answered in part by the following table:



TABLE XI

COMPARISONS MEAN SCORES OBTAINED BY LOW AND HIGH I.Q. GROUPS.

	N	Drawing Conclusions	Applying Generalizations
Mean Scores High I.Q. (104 - 122)	19	9.3	15.7
Mean Scores Low I.Q. (87 - 99)	18	8.3	14.4
$t = \frac{\text{diff.}}{\sigma \text{ diff.}}$		1.85	1.48

The data in Table XI show that though the mean scores of high I.Q. students are higher than the mean scores of low I.Q. students in both the ability to apply generalizations, the differences, on the basis of the sample selected, are not significant.

The students in Grade XI, both boys and girls, range between the ages of 15 and 18, both inclusive. Of 182 students tested, 97 were 16 years of age, 60 were 17, 10 were 15 and 15 were 18 years of age. The mean scores, standard deviations, for each of the age groups are shown in Table XII:

TABLE XII

MEAN SCORES FOR ALL AGE GROUPS

Age	N	S.D.		Mean Scores		σ_{Pop}	Mean Scores	σ_{Pop}
		D.C.	A.G.	D.C.	A.G.			
15	10	.9	2.6	9.0	.28	.14.1	.81	
16	97	2.1	2.9	9.2	.21	15.1	.30	
17	60	2.1	3.7	8.8	.27	13.8	.47	
18	15	2.4	2.3	8.6	.63	13.7	.61	

It is to be noted that the 16 and 17-year age groups show higher mean scores than do the 15 and 18-year age groups. This is in conformity with the general distribution of intelligence scores for a single grade, where the older students

generally score less than do the students of the normal age groups.

In order to determine whether or not the differences between the means was significant use was made of the critical ratio technique, $\frac{M_1 - M_2}{\sigma_{M_1 - M_2}}$. These findings are tabulated in Table Xlll:

TABLE Xlll
CRITICAL RATIOS FOR ALL AGE GROUPS

Between Ages	t for D.C.	t for A.G.
15 and 16	.20	1.14
16 and 17	1.18	2.32
17 and 18	.29	.13

The data in Table Xlll show that the differences are significant between the 16 and 17-year age groups at the 5% level of significance for the ability to apply generalizations.

By means of correlation it was possible to make further study of the extent to which students are able to draw conclusions and apply generalizations. The index of relationship "r" obtained in the Pearson product-moment of correlation or "σ" in the formula $\sigma = 1 - \frac{\sum d^2}{N(N-1)}$, or again the "r" obtained by means of the raw score formula for correlation $r_{xy} = \frac{\sum xy - M_x M_y}{\sigma_x \sigma_y}$, are all subject to the interpretation given by Lindquist, who says,

Measures of two traits for a given group of individuals may be said to be related if all individuals in the group who have the same measure of one trait show less variability in the second trait than do individuals in the entire group.¹

The meaningfulness of "r" is dependent upon the rectilinearity

¹E.F. Lindquist, A First Course in Statistics, (New York: Houghton Mifflin Co., 1942), p. 157.

of the relationship between the two sets of scores that are being treated. In this connection Lindquist says,

The most practicable test of rectilinearity is that based upon an inspection of the scatter-diagram. If the curvilinearity is not so marked that it is not immediately apparent upon inspection of the scatter-diagram, the student need have no fear that the use of product-moment correlation techniques will lead to any serious error.¹

The scatter-diagrams used in the major correlations were inspected for rectilinearity and revealed that the "r's" obtained could be subject to cautious interpretation without any serious error.

What relationship exists between students' ability to draw conclusions and students' intelligence scores as measured by intelligence tests? The following table shows the correlations between low and high I.Q.'s and drawing conclusions, and between low and high I.Q.'s and applying generalizations:

TABLE XLV

CRITICAL THINKING CORRELATIONS--LOW AND HIGH I.Q. GROUPS

	N 19	High I.Q.	N 18	Low I.Q.
Drawing Conclusions		r .01		r -.5
Applying Generalizations		r .29		r .10

The relationship between intelligence and the ability to draw conclusions is shown to be nil. The relationship between intelligence and the ability to apply generalizations is somewhat higher. In both instances, however, it would appear that intelligence as measured by the Dominion Intelligence Test is significantly different from the ability to draw conclusions. There is evidence to support this view. Lindquist in seeking a

¹ E.F. Lindquist, A First Course in Statistics, (New York: Houghton Mifflin Co., 1942), p. 157.

definition for intelligence says,

In the last analysis, the only unambiguous definition of general intelligence is that it is what is measured by a general intelligence test.¹

The Dominion Intelligence Test seeks information in three areas, number relations, linguistic ability and spatial relations. The student's abilities in all three areas are dependent to a large extent upon his past experience with the types of problems presented. By contrast, the ability to draw conclusions is dependent upon pure judgment. In this respect what Dewey has to say is pertinent,

From one point of view the whole process of thinking consists of making a series of judgments that are so related as to support one another in leading to a final judgment--the conclusion.²

Whereas in an intelligence test of the nature cited, the facts presented are never in themselves subject to judgment but are accepted for what they are, the facts presented in the critical thinking test must in themselves be weighed. This difference in the nature of the facts presented for judgment suggests a reason for the difference between measured ability to draw conclusions. Dewey says,

Judging is the act of selecting and weighing the bearing of facts and suggestions as they present themselves, as well as of deciding whether the alleged facts are really facts and whether the idea used is a sound idea or merely a fancy.³

The element of decision as to whether a fact is really a fact enters more frequently into the measurement of a student's ability to do critical thinking in the social studies than it

¹E.F. Lindquist, op. cit., p. 207.

²op. cit., p. 119.

³ibid., p. 119.

does into the measurement of general intelligence and may therefore account for the difference.

The relationship between the ability to apply generalizations and intelligence is shown in Table XIV to be comparatively nil. The relationship between low and high I.Q.'s is, however, close. The nature of generalization has been clearly set forth by Dewey,

In reaching a generalization the mind does not naturally begin with objects a, b, c, d, and try to find the respect in which they agree. It begins with a single object or situation, more or less vague and inchoate in meaning, and makes excursions to other subjects in order to render understanding of the central object consistent and clear.¹

The intelligence test, in so far as it appeals to the student's past experience has him generalize this past experience in terms of present practice in relation to the items before him. There is therefore a closer relationship between measured ability to apply generalizations and measured intelligence, than there is between measured ability to draw conclusions and measured intelligence.

Comparison was further sought between critical thinking scores and algebra scores, as measured by the American Council of Education Cooperative Algebra Examination, Form R.² The following table shows the results:

TABLE XV
CORRELATIONS: CRITICAL THINKING AND ALGEBRA

	N 28	r
Drawing Conclusions and A.C.E. Algebra		.25
Applying Generalizations and Algebra		.30

libid., p. 272.

²

See Appendix B.

The correlations are higher between the two aspects of critical thinking and algebra than are the correlations between critical thinking and intelligence. This would suggest that critical thinking is more closely akin to quantitative thinking as measured by the A.C.E. Algebra Test than to general intelligence until the following table is examined showing the correlation results between critical thinking scores and quantitative scores as measured by the American Council of Education Psychological Examination (1942)¹:

TABLE XVI
CORRELATIONS CRITICAL THINKING AND A.C.E. Q-SCORES

	N 37	r
Drawing Conclusions and Q-Scores		-.25
Applying Generalizations and Q-Scores		-.04

The difference between the two sets of correlations in Tables Xlll and Xlv would suggest that the nature of the quantitative thinking demanded by the Algebra examination and by the Psychological examination is different. Whereas the Algebra is an achievement examination requiring the student to reveal knowledge of algebraic operations previously learned, the Psychological Examination requires the student to solve arithmetic problems and determine patterns of number series. The functional operations in each are essentially different, but the extent, degree and nature of this difference the correlation result does not permit of final determination. However, it may be concluded from the results, that, in terms of the measured findings, it would appear that critical thinking is more closely akin to algebraic thought processes than it is to the thought

¹See Appendix B.

processes measured by the Psychological Examination.

The extent to which critical thinking enters into the regular social studies course is revealed by the following Table XVII showing the results of correlation between critical thinking scores as measured by the critical thinking test and history scores as measured by a regular school examination.

TABLE XVII

CORRELATIONS: CRITICAL THINKING AND SCHOOL EXAMINATIONS
HISTORY SCORES

	N	r	σr
Drawing Conclusions and History	32	-.02	.177
Applying Generalizations and History	32	.27	.164

Since the obtained r 's are less than three times σr the obtained r 's are not significant. There is no evidence here that students are better able to draw conclusions than they are able to apply generalizations. In Tables VIII and IX, however, students do show a consistently better ability to apply generalizations than they do in the ability to draw conclusions.

The results of the critical thinking test thus far examined suggest, in so far as the test is able to reveal, that the ability to apply generalizations in the social studies do not correlate highly with general intelligence scores, nor with quantitative scores. Boys and girls possess almost equal ability in so far as applying generalizations and drawing conclusions is concerned, though boys tend to be superior. The results, according to the method of treating this data, show no significant difference between students of high I.Q. and students of low I.Q. in both the ability to draw conclusions and in the ability to apply generalizations. The test did show that there is a significant difference in the abilities of 16 and 17-year

students to apply generalizations. The facts, on the basis of the present test, reveal that the social studies in so far as history marks are concerned apparently do not demand of the student frequent performance of the ability to draw conclusions nor of the ability to apply generalizations, though the latter again shows superiority of position over the former.

CHAPTER VIII

CRITICAL THINKING IN DEPARTMENTAL EXAMINATIONS

Departmental examinations are a criteria of the abilities which the examinations attempt to measure. The High School Examination Board of Manitoba appoints committees made up of high school teachers and University professors who have specialized in various fields. Each committee then sets the examination for its particular subject-matter field. The high school curriculum serves as a guide for these committees and the resulting examination attempts to measure the students' achievements in specific areas in the curriculum. The curriculum, because it does not state the general or specific objectives to be realized at the high school level, leaves the interpretation of the objectives to the teacher. The examining committee, in setting the examination, has too, to interpret the objectives in the light of the greatest common denominator. The type of examination, therefore, tends to take on the complexion of the interpretations of objectives held by the several examining committees.

The tendency for a few years prior to 1938 was, at least on the part of the committees selected to set the paper on grade eleven history, to attempt to measure not only the student's knowledge of the facts of history, but too, the student's ability to do critical thinking in history. This concern over the student's ability to think in the social studies took the form of increasing the number of questions in which the student had to think rather than merely recall what he had learned from his readings or his lectures. The increasing tendency to score

the student for thought rather than for fact became a concern of the provincial marking committees as well as of the examining committees, until, in 1938, the results suddenly showed that this particular objective, that is critical thinking, had been over-emphasized at least in the unilateral approach from either the examiner's viewpoint, or the marker's viewpoint, or both. Table XVIII shows the comparative percentages of failures in the various subject fields for the years 1937, 1938 and 1939 based on the departmental examinations¹ written in those years in the Province of Manitoba:

TABLE XVIII
DEPARTMENTAL EXAMINATION FAILURES

Year	<u>Papers Written</u>			<u>Papers Failed</u>			<u>Per Cent Failures</u>		
	1937	1938	1939	1937	1938	1939	1937	1938	1939
<u>Subject</u>									
Composition	3008	2513	2504	517	418	575	17	17	23
Literature	3197	2523	2535	580	616	266	18	24	10
French	2230	1879	1857	377	355	565	17	19	30
Latin	853	603	600	205	190	150	24	31	25
German	169	139	157	60	44	35	36	32	22
History	3048	2612	2708	859	1256	607	28	48	23
Algebra	2957	2614	2509	751	559	365	25	21	14
Geometry	2622	2404	2401	495	795	623	19	35	26
Chemistry	2909	2524	2495	648	859	448	22	34	18
Physics	2150	2057	2071	558	696	691	26	33	33

For the year 1937, the 28 per cent failure in the grade eleven history examinations is approximately uniform with the percentages of failure which preceded this year, though there was an increasing tendency to add thought questions to the examination papers. In 1938, the 48 per cent failure provokes a question: What happened in this year that suddenly increased

¹ See Appendix B.

the percentage of failure in history without increasing the percentage of failures to the same extent in the other subject-matter fields? In 1938, the percentage of failures in Chemistry, Geometry, Algebra, German, Latin and Literature decreased rather than increased. It is evident that the examination in history as set by the examiners, together with the policy of the marking committee, must account for the difference.

The types of questions appearing on the High School Examinations in grade eleven history may be divided into three categories: (a) those questions requiring of the student recall only, (b) those questions requiring of the student recall of certain specific facts and the interpretation of the application of judgment to those facts, and, (c) those questions requiring judgment mainly. For example, question 6 on the 1937 grade eleven history paper reads:

What were the terms of the Reciprocity Treaty of 1854?
Why was the treaty negotiated? What were the results of this treaty in Canada?

In this question, the student is required to recall facts and as such does not demand of him critical thinking. Question 4 on the 1938 grade eleven history paper reads:

Make a list of the activities of the Church in New France. Which one of these activities do you consider most important? Describe this one activity in detail.

In this question, the student is required not only to recall facts, but, too, is required to exercise some judgment, viz. "do you consider"? Question 9 on the 1939 grade eleven history paper reads:

"As a resident of Red River, if you had been either

(a) a descendant of a Selkirk Settler, or (b) a recent arrival from Ontario, what would your attitude have been in 1869 to each of the following:

- (1) The Hudson's Bay Company
- (2) The United States
- (3) The Dominion of Canada
- (4) Louis Riel

In this question, the student is required to select very carefully the facts necessary and then to think critically about them in relation to the problem set.

The three types of question illustrated, apart from the short-answer objective type question which forms a part of each of the examination papers referred to, may be clearly differentiated as to type one and types two and three. The difference between type two and type three is not quite so great as between type one and the other two types. However, if type two is considered a question in which the facts are the predominant factor and type three a question in which the judgments exercised the predominant factor it is seen that the three categories are valid for purposes of analysis.

The examinations in grade eleven history for the years 1937, 1938 and 1939 were analyzed as to the types of questions asked on the basis of the foregoing categories. Table XIX shows the types of questions asked:

TABLE XLIX

ANALYSIS OF JUNE HISTORY 111 EXAMINATION QUESTIONS

1937			1938			1939		
F	F + T	THOUGHT T	F	F + T	T	F	F + T	T
1	2	3	1	2		1	2	
	2			3		3	4	
	4			4		6	5	
5			5			7	7	
6		7	6			8		
8				8		10		9
10	9		9			12(a)		
11				10		12(b)		11
12(b)	12(a)		12	11(a) 11(b)		13		
6	5	2	5	7	1	8	3	2
	7			8			5	

From Table XLIX it may be seen that in 1937 there were 7 questions requiring critical thinking; in 1938 there were 8 questions requiring critical thinking; and, in 1939, 5 questions requiring critical thinking. The difference in the number of questions between 1937 and 1938 requiring critical thinking is only one. If, however, it is considered that the attitude of a marking committee can stress the critical thinking aspect of answers under the influence of the thinking in the examining committee, then the 48 per cent failure for 1938 reflects the lack of critical thinking in the grade eleven history papers for that year. The 48 per cent failure for 1938 is reflected in the reduction of the number of critical thinking questions required in 1939 when the history examination required only 5 of these questions. The percentage failure in 1939 was reduced to 23 per cent; less than half of the previous year's failure. The percentage of critical thinking questions, however, was also

reduced from 8 to 5. It may therefore be concluded that the percentage of failure in the years 1937, 1938 and 1939 is directly associated with the number of critical thinking questions asked, together with the stress placed on the critical thinking aspect in the scoring of the answers to these examinations.

Critical thinking as an aspect of history and of the social studies may be seen in the examination results cited. Where critical thinking is only incidental in the program, the measurement of critical thinking may be reflected in a high percentage of failure, when critical thinking is demanded of students on an examination. The analysis of the examination results bear out the findings of the critical thinking study which is the subject of this thesis, in that, where critical thinking is not definitely recognized as an objective in the teaching procedure, the results may be reflected in any examination requiring critical thinking.

CHAPTER IX

SUMMARY AND CONCLUSIONS

The results of the two preceding chapters reveal that a minimum of critical thinking is being done in the social studies as evidenced in the testing situations. The ability to draw conclusions from social studies materials, as well as the ability to apply generalizations is of so great importance to the educational process that the examination of critical thinking is one of the fundamental aims of education which must perforce receive constant attention.

The results of the tests show that, (a) students of grade eleven were able to draw correct conclusions from only about 50% of the material in the test, (b) students of grade eleven were able to apply generalizations correctly to between 60 and 75% of the material, (c) boys and girls revealed approximately equal ability to draw conclusions from and apply generalizations to social studies materials in the test, (d) though the raw scores were consistently different between students of low intelligence and high intelligence, according to the method of treating this data, there is no significant difference (e) the ability to draw conclusions is distinct from any other measurable ability in so far as the technique of correlation reveals this, (f) the ability to apply generalizations is distinct from any measurable ability in so far as the correlation process reveals this, (g) students who approach or are in the normal age group show better critical thinking results under examination conditions than do those students who are retarded one or two years.

These findings bear significant implications for the

successful achievement of the aims of the social studies. It would be well to examine these aims at this point before dealing with the implication of these findings.

The aims of the social studies have been variously defined.

The creation of rich, many-sided personalities, equipped with practical knowledge and inspired by ideals so that they can make their way and fulfill their mission in a changing society which is a part of a world complex,¹

quoted earlier, represents the ultimate aim of the social studies. The school, however, must recognize many objectives, the sum total of which when fused in personality achieve the ultimate aim. The specific objectives may be stated in two categories, (a) knowledge and information, (b) individual qualities and powers.² The first specific recognizes the facts of geography, economics, cultural sociology, political science, history. The second specific, the qualities and powers of personality, considers health, the acquisition of skills in the development of the intellectual powers--e.g., the ability to draw conclusions and the ability to apply generalizations, the acquisition of attitudes, of cultural allegiances, of aesthetic appreciation, of powers of leadership.³ These two major divisions of the specific objectives clearly demonstrate the areas within which the social studies function, the elements of the total social studies situation which must be born in mind, whenever the ultimate aim is considered.

¹Charles A. Beard, The Nature of the Social Sciences, Report of the Commission on the Social Studies, American Historical Association, (New York: Charles Scribner's Sons, 1934), p. 178.

²Charles A. Beard, *ibid.*, p. 188.

³Charles A. Beard, *ibid.*, p. 192ff.

It is the function of the educational process to realize the aims and objectives of the social studies. What, however, is the essential function of the educative process? Is it to provide the student with a body of facts, or is it rather to train the student in the use of facts? The answer to this would appear obvious were it not for practice departing so far from thesis.

Knowledge and information, in so far as the school is concerned, is selected by the school because of the pertinency of the facts to the life of the student, and to society. The purpose of the school, in its status as the educative agency of society, is to train the student to think objectively and socially. In this respect Morrison says,

In the first place, if we accept the dictum as being sensible and well founded that education is becoming the kind of person who knows what to do, knowledge is evidently a source of education rather than education itself.¹

The facts of the social studies constitute a means rather than an end of education. And because they are a means the facts of the social studies, however well-possessed by the student will not in themselves educate him towards the aim.

The change wrought in personality by virtue of the change brought about in the qualities and powers of personality is essentially the educative process. The changes that take place through education may do so in three areas, the emotional, the physical and the mental. All three constitute the social change. The physical development of the individual is considered under the specific health objective. The emotional

¹H.C. Morrison, The Basic Principles in Education, (Boston: Houghton Mifflin, 1934, p. 341).

development of the individual is considered in the social studies objectives of cultural allegiances, aesthetic appreciation, powers of leadership. The mental development of the individual is considered in the acquisition of those acute abilities essential for the development of the intellectual powers. The end result of these changes is a personality aware of his society and competent to participate in it thoughtfully.

The implications of this view of the educative process for the social studies means that critical thinking is implicit in the function of the social studies. The social studies fail of their place on any program of studies if critical thinking is not developed as a specific ability. The student may possess the facts, but, if he is unable to draw valid conclusions from them, of what value are the facts? If, again, he is unable to apply generalizations to specific situations, wherein lies the value of his social studies? The conclusion here is that the social studies are valid only in so far as the total development of the individual is furthered both as to knowledge and as to judgments. The failure of the educative process to develop any single area is to invite the failure of the total process.

The school situation may in some way affect the achievement of the specific objective of the development of critical thinking. The teaching situation makes easy the presentation of facts and the memorized response to these same facts. However, it is entirely feasible that a portion of the time devoted to the social studies should be devoted to the development of the ability to draw conclusions and to apply genera-

lizations. This would not cease with the first few demonstrations but would become an integral part of the whole social science teaching process. Critical thinking is essentially a form of reasoning, and, as Rignano states,

The entire reasoning process, in whatever form it appears, is, in essence nothing else than a true and proper "Gedankenexperiment"; or, as we have just said, a mental combination of imagined experiments.¹

The classroom must therefore adopt the experimental technique in the teaching of the social studies. The student must come to look upon the ability to think critically as a process which can be achieved experimentally as well in the social studies laboratory as in the chemistry or physics laboratory. The onus of the experiment-minded student rests with the method adopted by the social studies teacher.

The ability to draw conclusions from social studies materials is an ability that can be learned. With respect to problem-solving, which is an ability carefully developed in the mathematics period, McConnell says,

It is undoubtedly true that problem-solving ability is greatly conditioned by native endowment. But there is also excellent reason to believe that few persons learn to think most rigorously and effectively without careful education in the process and a great deal of active experience in solving or attempting to solve problems.²

The findings of the present thesis showed that students of low and high intelligence quotients possessed almost equal ability whether of applying generalizations or in drawing conclusions. The fact that intelligence scores correlate below an r of .10

¹E. Rignano, The Psychology of Reasoning, (New York: Harcourt, Brace & Co., 1923), p. 82.

²T.R. McConnell, Learning by Thinking, School and Society, Volume 49, March 18, 1939, p. 343.

with either drawing conclusions scores or applying generalizations scores suggests that there is a sufficient difference in the character of the abilities to warrant their being treated as a developmental technique in the same way as is the ability to solve problems. E.M. Glaser, in "An Experiment in the Development of Critical Thinking", found

There was a correlation of .38 between I.Q. and amount of gain on the critical thinking tests after special instruction. Many individuals with I.Q.'s of less than a 100 (Otis) were found among those who profited most from the training.¹

This evidence suggests that critical thinking can be developed in students through the social studies, though adherence to a method of teaching stressing the factual nature of the course will not achieve critical thinking. The social studies possess material which can be thought about, but this thought process must be learned. H.C. Morrison points this out when he says,

We can say with a great deal of confidence that, given:
 (a) material to think about, (b) a method of thinking;
 (c) a motive for thinking, any normal individual will think within the limitations which his inherent organic mental structure determines.²

The students' environment and eagerness to live and grow provides the motive for the social studies; the social studies course possesses the material to think about; it devolves upon the school, as the educating agent, to provide the method of thinking. Glaser's experiment³ showed that many students with intelligence lower than 100 I.Q. (Otis) made greatest gains

¹E.M. Glaser, An Experiment in the Development of Critical Thinking, (Teachers' College Record, Volume 43, 1941-42), p. 409.

²H.C. Morrison, The Practice of Teaching in the Secondary School, (University of Chicago Press, 1942), p. 33.

³E.M. Glaser, op. cit.

in critical thinking. One may conclude from these findings that the social studies can and must adopt the laboratory-experiment method in the classroom with a view to developing the students' ability to think critically.

S.N.F. Chant, in his discussion of mental training, says,

Few people realize how judgments are formed. They make decisions with about as much understanding of how they do so as they have concerning how they go to sleep. As a result, there is little possibility of improving the accuracy of our decisions until the nature of the process is understood.²

Critical thinking, in terms of the ability to draw conclusions and of the ability to apply generalizations requires the student to weigh all of the evidence before him, select the relevant material, make certain specific judgments, and finally make his decision as to the elements of the conclusion or the generalization. This process is an involved one, and its complexity is not to be learned through absorption of ready-made generalizations nor the observation of accepted principles. The process is one that must become characteristic of his growth, characteristic of his mental and emotional development.

The social studies fields involve areas of emotional as well as of social, economic and political aspects. The emotional development of the individual is therefore involved in any study of critical thinking by virtue of the fact that the mental set of the student is a function of his emotional or motivated set. It is therefore incumbent upon the social studies instructor to cultivate not only the technique of critical thinking, but of fostering the right attitude. Students are

²S.N.F. Chant, Mental Training, (The MacMillan Co., 1934), p. 138.

interested in problems which they are capable of solving. Given the problem, shown how to select the facts of the problem, a method of attack, the process involved in the method and the nature of the student's attitude will resolve itself into a problem of innate ability and challenge. The social studies, then, rather than being factual fields of dissociated facts, will possess the character of closely related, integrated wholes capable of being resolved into a scheme of things possessing unity and comprehension.

The essence of this thesis is, on the basis of the results obtained from the critical thinking test under examination conditions, that critical thinking is a faculty possessed by grade eleven students; that the ability to draw conclusions from facts, and the ability to apply generalizations to facts are distinctly different thought processes and must be trained as such; that students of the normal age group for grade eleven show better ability to apply generalizations than do others. There is further evidence that critical thinking may be developed, and it may also be concluded that the social studies can only achieve their ultimate aim by adopting the experimental-laboratory method in the social studies classroom in inculcating the process of critical thinking.

The scientific approach to the study of the social sciences rather than the social approach is necessary if the social studies are to be dealt with as educational functions in the school, for as Judd suggests,

The major function of a scientific study of society is to raise the learner to a level of objective thinking about men and their social relations which will make it impossible for him to live a narrow life circumscribed by social habits or purely per-

sonal adaptations cultivated through limitation.¹

Objective thinking is the essential function, and the findings of this study indicate that critical thinking in at least two areas is a distinct function of the social studies, but if to be realized, must be taught as such.

Throughout the entire study the writer has been conscious of the limitations of the analysis, especially with regard to the reading factor involved in the tests of critical thinking. Undoubtedly, the reading factor, if it could be adequately isolated, would have had some bearing on the interpretation. However, all the writer was able to do is indicate recognition of the factor and show that the conclusions must be tempered by the knowledge that this factor exists.

¹C.H. Judd, Educational Psychology, (Boston: Houghton Mifflin Co., 1939, p. 435.

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APPENDIX A

- | | | |
|-------|--------|--------------------------------------|
| Table | XX | High I.Q.'s and D.C. and A.G. Scores |
| Table | XXI | Low I.Q.'s and D.C. and A.G. Scores |
| Table | XXII | Boys' I.Q. and D.C. and A.G. Scores |
| Table | XXIII | Girls' I.Q. and D.C. and A.G. Scores |
| Table | XXIV | Newton Class 1 Scores |
| Table | XXV | St. John's Class 1 Scores |
| Table | XXVI | Daniel McIntyre Class 1 Scores |
| Table | XXVII | Newton Class 17 Scores |
| Table | XXVIII | Newton Class 19 Scores |
| Table | XXIX | Newton Test 1 Scores |
| Table | XXX | Newton Test 11 Scores |

TABLE XX

Raw Scores - High I.Q.'s

Name	I.Q.	D.C.	A.G.
R.H.	120	10	16
E.O.	118	14	18
T.A.	122	8	14
L.C.	109	8	15
G.D.	107	8	13
E.B.	106	8	18
J.H.	105	10	15
H.K.	105	11	15
S.K.	106	7	18
B.K.	109	10	19
O.M.	106	9	16
J.O.	105	11	14
M.S.	110	9	14
L.C.	110	10	15
E.D.	106	9	17
G.F.	105	9	17
M.K.	116	9	18
G.B.	104	9	14
W.S.	104	8	14

Number: 19

Median Drawing Conclusions: 9.3

Median Applying Generalizations: 15.7

Median Critical Thinking: 25.0

Per cent of questions answered correctly:
Drawing Conclusions: 58%Per cent of questions answered correctly:
Applying Generalizations: 75%

TABLE XXI

Raw Scores - Low I.Q.'s

Name	I.Q.	D.C.	A.G.
V.S.	87	8	14
J.R.	92	9	15
V.M.	90	9	19
J.K.	91	10	6
S.W.	93	10	15
R.K.	92	10	16
K.G.	95	7	15
J.L.	93	7	8
E.T.	94	10	16
H.K.	96	9	15
F.P.	99	12	18
W.S.	96	6	14
R.B.	97	7	12
N.G.	96	8	18
F.G.	96	7	12
L.H.	97	8	18
M.K.	97	4	13
H.K.	96	7	15

Number: 18

Median Drawing Conclusions: 8.3

Median Applying Generalizations: 14.4

Median Critical Thinking: 22.8

Per cent of questions answered correctly:
Drawing Conclusions: 52%Per cent of questions answered correctly:
Applying Generalizations: 69%

TABLE XXII

Raw Scores - Boys

Name	I.Q.	D.C.	A.G.
T.A.	122	8	14
L.C.	109	8	15
G.D.	107	8	13
K.G.	95	7	15
J.H.	105	10	13
W.K.	102	9	16
H.K.	105	11	15
S.K.	106	7	18
H.K.	96	9	15
B.K.	109	10	19
R.M.	102	11	15
E.O.	118	14	18
F.P.	99	12	18
W.S.	104	8	14
E.S.	103	12	15
M.S.	110	9	14
B.S.	100	5	18
W.S.	96	6	14
H.S.	103	11	18
W.B.	101	12	15
M.D.	99	9	17
E.D.	106	9	17
N.G.	96	8	18
J.K.	91	10	6
R.K.	92	10	16
M.K.	97	4	13
B.K.	100	9	15

Number: 27

Median Drawing Conclusions: 9.1

Median Applying Generalizations: 15.3

Median Critical Thinking: 24.4

Per cent of questions answered correctly:
Drawing Conclusions: 57%Per cent of questions answered correctly:
Applying Generalizations: 73%

TABLE XXIII

Raw Scores - Girls

Name	I.Q.	D.C.	A.P.
E.B.	106	8	18
O.C.	94	9	16
H.E.	102	9	13
R.H.	120	10	16
K.J.	100	10	17
J.L.	93	7	8
O.M.	106	9	16
J.O.	105	11	14
H.S.	102	11	16
G.W.	101	9	15
M.R.	102	10	15
M.A.	99	9	14
G.B.	104	9	14
L.C.	110	10	15
R.B.	97	7	12
G.F.	105	9	17
F.G.	96	7	12
L.H.	97	8	18
V.M.	90	9	19
J.R.	92	9	15
H.S.	96	10	13
O.S.	100	7	18

Number: 22

Median Drawing Conclusions: 8.9

Median Applying Generalizations: 15.0

Median Critical Thinking: 24.0

Per cent of questions answered correctly:
Drawing Conclusions: 56%Per cent of questions answered correctly:
Applying Generalizations: 71%

TABLE XXLV

Scores - Isaac Newton - Grade XI - Class 1

Name	D.C.	A.G.	I.Q.	Hist.	Alg.
F.A.	7	13	99	50	36
J.B.	10	17	101	55	43
J.B.	8	16	102	36	39
E.B.	8	14	103	67	55
J.D.	7	18	102	59	59
L.H.	9	16	116	77	39
K.K.	8	18	95	84	85
E.K.	13	13	112	66	32
V.M.	8	19	106	53	53
W.M.	9	6	106	50	24
J.M.	7	11	101	59	58
W.N.	9	3	105	53	34
G.O.	10	17	111	36	20
B.P.	8	18	105	78	52
L.S.	11	20	102	65	21
A.S.	12	17	106	85	69
H.S.	7	17	92	73	81
M.S.	10	18	97	65	50
S.S.	5	13	102	58	69
O.S.	6	17	100	76	62
E.S.	7	12	102	74	55
D.S.	10	12	96	50	66
J.S.	6	16	109	40	57
A.S.	10	19	106	68	57
O.S.	10	14	103	56	65
E.T.	12	18	105	53	38
G.W.	11	9	101	41	18

Number: 27

Median Drawing Conclusions: 8.8

Median Applying Generalizations: 14.9

D.C. drawing conclusions
I.Q. intelligence quotients

A.G. applying generalizations

TABLE XXV

Raw Scores - St. John's - Grade XI - Class 1

Name	Drawing Conclusions	Applying Generalizations	Critical Thinking
D.B.	6	12	18
B.B.	11	13	24
G.C.	6	15	21
P.G.	4	18	22
B.H.	5	5	10
S.J.	10	16	26
S.J.	14	11	25
J.K.	8	6	14
M.K.	7	15	22
J.L.	10	13	23
R.L.	9	17	26
M.L.	10	9	19
M.M.	5	6	11
C.M.	8	13	21
R.M.	7	13	20
H.M.	11	14	25
P.O.	10	8	18
L.P.	9	15	24
B.R.	6	17	23
R.R.	12	16	28
S.R.	6	11	17
D.R.	13	16	29
C.R.	6	11	17
B.S.	9	11	20
N.S.	9	11	20
C.S.	8	13	21
D.S.	11	9	20
F.S.	11	15	26

Number: 28

Median Drawing Conclusions: 8.8

Median Applying Generalizations: 13.1

Median Critical Thinking: 21.9

Per cent of questions answered correctly:

Drawing Conclusions: 55%

Per cent of questions answered correctly:

Applying Generalizations: 62%

TABLE XXVI

Scores - Daniel McIntyre - Grade XI - Class 1

Name	Drawing Conclusions	Applying Generalizations	Critical Thinking	A.C.E. Q-scores
G.B.	13	13	26	53
I.B.	11	14	25	34
P.B.	10	17	27	28
D.C.	9	18	27	60
B.D.	8	16	24	8
P.D.	10	19	29	96
E.E.	9	17	26	66
L.E.	8	19	27	40
V.F.	7	13	20	92
B.F.	10	18	28	78
T.F.	6	16	22	60
B.H.	9	16	25	66
H.H.	11	9	20	94
E.H.	10	19	29	53
S.J.	10	15	25	38
V.J.	9	16	25	28
B.J.	13	12	25	53
B.J.	9	9	18	34
O.J.	8	16	24	94
E.K.	8	14	22	
K.M.	9	16	25	83
A.M.	8	18	26	34
J.M.	7	15	22	60
L.M.	13	12	25	46
P.O.	10	19	29	92
P.O.	12	16	28	3
B.P.	10	16	26	86
J.P.	7	16	23	40
M.R.	11	18	29	23
M.R.	9	9	18	40
G.S.	5	17	22	86
M.S.	12	18	30	28
H.S.	10	16	26	78
D.S.	11	17	28	8
I.S.	8	15	23	66
J.I.	13	19	32	46
V.W.	10	18	28	28
D.Y.	10	14	24	60

Number: 38

Median Drawing Conclusions: 9.6

Median Applying Generalizations: 15.7

Median Critical Thinking: 25.2

Per cent of questions answered correctly: Drawing Conclusions
60%Per cent of questions answered correctly: Applying Generali-
zations: 75%

TABLE XXVII

Scores - Isaac Newton - Grade XI - Class 17

Name	I.Q.	D.C.	A.G.	Hist.
M.A.	99	9	14	55
G.B.	104	9	14	52
W.B.	101	12	15	29
R.B.	97	7	12	54
L.C.	110	10	15	66
M.D.	99	9	17	63
E.D.	106	9	17	57
G.F.	105	9	17	55
N.G.	96	8	18	58
F.G.	96	7	12	50
L.H.	97	8	18	65
J.K.	91	10	6	51
R.K.	92	10	16	--
M.K.	97	4	13	42
B.K.	100	9	15	50
M.K.	116	9	18	73
H.K.	96	7	15	46
W.L.	102	8	11	50
J.L.	101	13	13	48
N.M.	100	10	15	59
V.M.	90	9	19	65
J.O.	96	8	14	66
J.R.	92	9	15	64
P.S.	101	13	17	51
H.S.	96	10	13	60
V.S.	87	8	14	36
O.S.	100	7	18	60
S.W.	93	10	15	37
H.Y.	102	10	15	31

TABLE XXVIII

Scores - Isaac Newton - Grade XI - Class 19

Name	I.Q.	D.C.	A.G.	Hist.	Alg.
T.A.	122	8	14	45	71
E.B.	106	8	18	56	46
L.C.	109	8	15	75	78
O.C.	94	9	16	44	38
G.D.	107	8	13	59	60
H.E.	102	9	13	81	66
K.G.	95	7	15	57	33
J.H.	105	10	13	63	65
R.H.	120	10	16	77	51
K.J.	100	10	17	72	52
W.K.	102	9	16	68	80
H.K.	105	11	15	80	51
S.K.	106	7	18	34	57
H.K.	96	9	15	50	--
B.K.	109	10	19	72	55
J.L.	93	7	8	29	41
R.M.	102	11	15	80	96
O.M.	106	9	16	77	84
T.O.	-	8	17	35	30
J.O.	105	11	14	56	41
E.O.	118	14	18	82	94
F.P.	99	12	18	59	50
W.S.	104	8	14	69	79
E.S.	103	12	15	63	70
M.S.	110	9	14	38	50
B.S.	100	5	18	51	36
W.S.	96	6	14	33	18
H.S.	103	11	18	72	50
H.S.	102	11	16	64	55
E.T.	94	10	16	57	73
G.W.	101	9	15	45	59
M.R.	102	10	15	45	57

TABLE XXIX

Distribution of Scores on Critical Thinking Test 1

Name	Part 1	Part II	Total
J.O.	8	14	22
J.L.	12	11	23
R.K.	7	14	21
J.S.	6	14	20
N.G.	6	17	23
H.Y.	10	14	24
S.W.	10	15	25
L.C.	12	17	29
E.J.	10	9	19
M.A.	9	14	23
R.B.	6	11	17
G.F.	7	13	20
G.B.	6	11	17
O.S.	8	14	22
H.S.	8	11	19
L.H.	5	17	22
G.B.	9	15	24
F.G.	4	7	11
M.K.	4	14	18
A.G.	8	12	20
E.M.	6	8	14
V.M.	8	14	22
J.R.	9	15	24
A.S.	7	14	21
E.D.	10	17	27
J.K.	7	6	13
P.S.	11	18	29
B.K.	5	100	15
V.S.	9	14	23
N.M.	7	8	15
M.K.	9	18	27
H.K.	7	17	24
M.D.	9	11	20
W.B.	9	18	27
W.L.	7	8	15

TABLE XXX

DISTRIBUTION OF SCORES ON CRITICAL THINKING Test 1

Name	Part I	Part II	Total
K.M.	9	14	23
S.Y.	4	13	17
M.S.	11	16	27
W.S.	7	6	13
S.K.	5	18	23
E.O.	11	17	28
O.C.	8	13	21
M.D.	3	8	11
J.O.	9	15	24
G.W.	10	18	28
E.B.	9	13	22
H.S.	12	16	28
M.R.	9	10	19
O.M.	7	12	19
H.S.	7	11	18
T.O.	7	14	21
J.H.	11	16	27
H.M.	9	13	22
W.K.	9	15	24
J.L.	9	8	17
F.P.	12	16	28
I.G.	9	13	22
B.A.	8	8	16
H.E.	9	15	24
G.D.	7	10	17
E.S.	14	16	30
E.T.	8	17	25
D.O.	11	18	29
R.H.	9	17	26
B.S.	8	11	19
B.K.	10	16	26
R.M.	8	12	20
W.S.	4	7	11
K.G.	7	17	24
H.K.	100	16	26
T.A.	7	16	23

APPENDIX B

1. Critical Thinking Test I
2. Critical Thinking Test II
3. Critical Thinking Test III
4. Dominion Intelligence Test
5. American Psychological Examination
6. Departmental Examinations, 1937, 1938, 1939
7. Cooperative Algebra Examination, Form R

INSTRUCTIONS FOR "CRITICAL THINKING TEST"

The test for "Critical Thinking in the Social Studies" may be administered within a single forty (40) minute period. There is no time limit for the test as a whole, but for purposes of administration students are asked to stop at the end of ten minutes in order to go over the instructions for Part II of the test.

Procedure

1. After each student has received the test blank have each one complete the information asked for at the top of the test.
2. Explain the purpose of the test as given at the top of the first page.
3. Read the directions to the students carefully while they read them silently. Stress important points.
4. Explain any questions asked. No explanations after the test begins.
5. Explain that time will be called at the end of ten minutes in order to read directions for Part II but that students will be able to go back to Part I if necessary.
6. Allow ten minutes to answer Part I, then read Part II directions.
7. Explain any questions asked.
8. Allow each student to complete entire test.

CRITICAL THINKING IN THE SOCIAL STUDIES

Name Sex . . . Date
 Age . . . Birthday Grade . . . School
 City Teacher Course

The purpose of this test is to find out your ability to think
in the social studies.

Part I of the test is made up of questions in which you draw
conclusions from facts stated in paragraphs.

Part II of the test determines your ability to apply general
facts to statements based on your reading.

Do not spend too much time on any one question. Attempt the
easier questions first; then go back and do the harder.

The directions will be read to you by the teacher.

PART I DIRECTIONS

Mark with (+) every statement which is true and can be proved
by the facts stated.

Mark with (o) every statement which might be true but cannot
be proved by the facts stated.

Mark with (-) every statement which is false as shown by the
facts stated.

Example: The priestly class of Egypt were in control of all
lands. The lands and servants remained the property
of the priests. The farmers who used the land be-
longing to the priests had to pay so much that they
were always poor. The merchants who bought and sold
goods had to pay a fee to the priesthood for the pri-
vilege of trading.

- A. The priests who owned land in Egypt made every farmer
and merchant pay fees. A. ()
- B. The merchants were often rich men. B. ()
- C. Merchants and farmers were not under the power
of the priests. C. ()

Explanation:

Statement A. because it is a true explanation of what may be
proved by the facts in the paragraph is marked (+)

Statement B. though it may be a true explanation cannot be
proved by the facts in the paragraph and so is marked (o)

Statement C. is wrong because there is nothing in the para-
graph to prove it and so is marked (-)

PART 1

1. In the early days of coal mining the coal was broken loose with crude picks and thrown into baskets which were carried up and down long ladders. Later, carts replaced baskets. Women and children hauled it along the galleries to the foot of the shaft. A bucket and windlass operated by mules or horses, and ultimately by steam, hoisted the coal to the surface.

- | | |
|---|--------|
| 1 Coal mining was a costly undertaking. | 1. () |
| 2 Coal mining increased its output by more efficient methods. | 2. () |
| 3 Coal was used very widely. | 3. () |
| 4 Manufacturing was not yet dependent on coal. | 4. () |

2. The first rice fields of the south were land swamps, where the soil was rich and there were few large trees or heavy underbrush to be removed. Dams were built at the lower end of the swamp where the fresh water of the rivers backed up and receded according to the ebb and flow of the tide in the harbor, and draining ditches were dug throughout the fields. About the only implement needed in the cultivation of rice was the hoe: ground was broken up with it, ditches dug with it, and from time to time it was used to cultivate the growing plants.

- | | |
|--|--------|
| 1 Land easily irrigated was necessary for the growing of rice. | 1. () |
| 2 Rice cultivation could be carried on without many machines. | 2. () |
| 3 All rice must be grown on swamp-land. | 3. () |
| 4 Fresh water is necessary for the growing of rice. | 4. () |

3. In 1795, during the last of the three great divisions of Poland, Russia got 180,000 square miles with 6,000,000 people. Austria got 45,000 square miles with 3,700,000 people, and Prussia got 57,000 square miles with 2,500,000 people. This wrong was not undone until one hundred and twenty-five years later.

- | | |
|--|--------|
| 1 Poles constituted a minority of Russia, Prussia and Austria. | 1. () |
| 2 Prussia was a more powerful nation than Austria. | 2. () |
| 3 Poland was unable to prevent her division. | 3. () |
| 4 In 1920 Poland gained over 280,000 square miles. | 4. () |

4. The Treaty of Utrecht of 1713 had proved as unstable as other treaties during the long struggle between France and England from Louis XIV to Napoleon. War broke out again in 1744 and raged with its usual accompaniment of raid and massacre till 1748. It was signalized by the spectacular capture of the great Fort of Louisburg, Cape Breton, by ships, levies and leaders from New England. The Peace of Aix-la-Chapelle restored to France Cape Breton and its fortress but it brought only a calm before the storm.

- 1 Cape Breton was the scene of the struggle between England and France in America. 1. ()
 2 Louisburg was returned to France by England in 1748. 2. ()
 3 The Treaty of Aix-la-Chapelle brought only a temporary peace. 3. ()
 4 England lost many men in the struggle. 4. ()

5. Canada is richly endowed with water-power resources, the development of which dates from the arrival of the early French settlers at the beginning of the seventeenth century. During the past forty years this development has proceeded at such a rapid rate as to affect profoundly the entire national economy, influencing the growth of population, transportation systems, home and external trade, and national income. Water-power is as general and widespread in its availability that more than 98% of all electricity generated for sale is distributed from hydro-electric stations and all but the most isolated hamlets enjoy the amenities of electric lighting, radio, cooking and domestic appliances.

- 1 Every part of Canada is completely served by electricity. 1. ()
 2 Canadian electricity benefits only Canada. 2. ()
 3 Canada has had electricity from the beginning of the seventeenth century. 3. ()
 4 Electricity has played an important part in the development of Canada. 4. ()

6. Migration of population to the west was the result of several factors--the end of the supply of desirable land in Ontario; the decline of the lumber trade; increasing density of population in old areas; the desire of wheat-farmers, with decline of wheat-farming in Ontario, to find new areas for their crop; and railroad advertising of the new region. In 1871 about 1,500 persons, principally farmers, went to Manitoba. With the depression of the lumber trade in the seventies, many went from the Ottawa region.

- 1 Some wheat-farmers of Ontario moved to Manitoba because they could no longer farm wheat in Ontario. 1. ()
 2 Many lumbermen of Ontario went out West to farm. 2. ()
 3 Manitoba was the only Western province to attract Ontario farmers. 3. ()
 4 About 250 lumbermen moved to Manitoba in 1871. 4. ()

7. When World War I ended, many people predicted that the centre of world affairs would shift permanently away from Europe. There was some apparent justification for this view. In 1919 the United States was, financially and economically the strongest power in the world. Japan seemed to have the Far East at her mercy. The rest of Asia was seething with nationalism and impatient to throw off European control.

- 1 Before World War I the centre of world affairs was Europe. 1. ()
- 2 After World War I the U.S.A. was the centre of world affairs. 2. ()
- 3 Asia was the only nationalistic area in the world. 3. ()
- 4 Europe was in control of China, Indo-China, Manchuria. 4. ()

8. The discovery of gold on the Klondike River in 1896 started a mad rush of miners and adventurers into the Yukon. The favourite approach to the Yukon was by way of the Lynn Canal and the Alaskan ports of Dyea and Skagway. Doubts arose as to where the boundary between Alaska and Canada crossed the canal. These and other questions seemed to justify an international conference. In 1898 a Joint High Commission was appointed for the discussion of matters of common interest to Canada and the United States.

- 1 The Lynn Canal formed the boundary between Alaska and Canada. 1. ()
- 2 The Joint High Commission of 1898 was set up to settle the Alaskan Boundary Dispute only. 2. ()
- 3 The discovery of gold was one reason for the calling of the conference. 3. ()
- 4 Canada and the United States were both interested in the discovery of gold. 4. ()

9. Anne was the last surviving princess of the House of Stewart, for Mary had died eight years before her husband. The English Parliament had arranged by the Act of Settlement that Anne should be succeeded by the Electress Sophia of Hanover, a Protestant and a descendant of Princess Elizabeth, the daughter of James I. In 1704 the Scottish Parliament passed the Act of Security, a declaration that if the Scots did not get the same trading rights as the English they would take care that on the death of Anne the same monarch should not rule over both Scotland and England.

- 1 The Act of Security declared that England and Scotland should have separate kings. 1. ()
- 2 Scotland agreed to have the same King as England if Scottish merchants had the same trading rights. 2. ()
- 3 Scotland wanted to have a Catholic ruler. 3. ()
- 4 The Act of Settlement was not approved by Scotland. 4. ()

10. The cotton gin, invented by Eli Whitney in the United States in 1792, applied the machine to the removal of seeds from cotton, and thus sped up this process of production enormously. The effect upon commerce was astounding. In 1764 England imported a mere 4,000,000 pounds of raw cotton annually; by 1841 she was using nearly 500,000,000 pounds a year. By 1820 1000 workmen could do as much with the new machinery as all the operators in Scotland could do without it.

1. Eli Whitney was chiefly responsible for England's increased cotton imports. 1. ()
2. Scotland was not affected in any way by Whitney's invention. 2. ()
3. In 1820 England had only 1000 cotton workers. 3. ()
4. Cotton goods became much cheaper as a result of Whitney's invention. 4. ()

PART II DIRECTIONS

The left-hand statements below each paragraph help you to understand the statements in the right-hand column. Choose the statement from the left-hand column which explains a reference in the right-hand column. In the space after each statement in the right-hand column, write the number of the statement of the left-hand column you have chosen in explanation.

Example: Winnipeg is considered a large city. Most of the business section is centred in the heart of the city. Because people come from all parts of the city and do business here, the price of property is highest in this area. As one travels from the business section towards the outskirts of the city the price of land falls rapidly. On the outskirts of the city where there are few improvements and where few people pass except to and from their homes the cost of land is lower. The same conditions are true of such cities as Toronto, Montreal and Vancouver.

- | | |
|---|---|
| 1. Trade increases property value. | 1. Explains high cost of property in business section. () |
| 2. A large city has different property values. | 2. Explains high and low costs of property. () |
| 3. Improvements as well as position of property determines land values. | 3. Explains why homes are built away from the business section. () |
| 4. Large cities have large business sections. | |
| 5. Residential areas are built in low cost land areas. | |

Explanation: Statement 1 in the left-hand column explains reference 1 in the right-hand column, so 1 from the left-hand column is written in the space after 1 in the right-hand column.

Statement 2 in the left-hand column does not explain any reference in the right-hand column so we pass on to the next statement.

Statement 3 in the left-hand column explains reference 2 in the right-hand column so 3 is written in the space after reference 2 in the right-hand column.

Statement 4 does not explain any reference in the right-hand column so we pass on to the next statement.

Statement 5 explains reference 3 in the right-hand column so we write 5 in the space after reference in the right-hand column.

PART 11

1. The seventeenth-century tobacco planter did not live like a lord. Until the importation of great numbers of slaves at the end of the century, the holdings of the planters consisted of only a few hundred acres each, worked by sturdy English yeomen. The style in which the typical planter lived was essentially simple. His house was poorly furnished and his servants were for the most part ragged, lazy and inefficient. When his tobacco brought him a profit he ordered his necessities and his luxuries from England, otherwise he bought them at home.

- | | |
|--|---|
| 1. Your manner of living depends upon your earnings. | 1. Explains laziness of slaves. () |
| 2. Slavery makes possible large plantations. | 2. Explains luxuries imported from England. () |
| 3. Willingness to work depends upon pay. | 3. Explains increase in size of holdings. () |
| 4. Tobacco cultivation is profitable. | |
| 5. Work depends upon interest. | |

2. Years ago all furniture was made by hand but now most of our furniture is made by machines. Machine-made furniture is cheaper than that made by hand. Machines run by one man in a cabinet factory can produce hundreds of tables and chairs in one day. A carpenter can make by hand only a few chairs and tables in a week. Even on the plantation tractors are now taking the place of horses in plowing and cultivating. A tractor is more efficient than an animal and can therefore do more in a day.

- | | |
|---|---|
| 1. More goods can be made by machines than by hand. | 4. Explains why it costs less to buy furniture today. () |
| 2. Machines lower the cost of goods. | 5. Explains why tractors take the place of animals. () |
| 3. Farming has been changed by the use of machines. | 6. Explains why machines are used in a cabinet factory. () |
| 4. Machines make work easier. | |
| 5. Some things can be made only by hand. | |

3. Liberalists overthrew the Metternich government at Vienna and forced that prince to flee. Revolutionists gained control of Berlin and of affairs in Hungary. A representative body framed a constitution and offered the crown of a united Germany to the Prussian King, but that monarch rejected it, largely through fear of Austria, and the forces of reaction everywhere triumphed. The need of Prussian leadership for unification was made plain.

1. Authority must have power. 7. Explains the invitation
 2. Monarchism depends upon to the Prussian King. ()
 liberalism. 8. Explains Prussian King's
 3. Reaction always triumphs refusal of the crown. ()
 over liberalism. 9. Explains revolution in
 4. Liberalism is international. Hungary and Prussia. ()
 5. Kings may rule in a demo-
 cratic country.

4. Napoleon made himself master of Europe. He conquered each country in turn, then introduced changes in its political, economic and social laws. In some countries he placed the rulers of his choice. The ruling classes of the conquered countries refused to recognize Napoleon's rule as final. Revolutions broke out in many parts of Europe. Not all of the revolutions were directed at Napoleon's rule, but were directed at the traditional limitations which surrounded popular liberties.

1. Kings are dethroned by revolutions. 10. Explains why Napoleon altered political and economic laws. ()
 2. Change to be permanent must benefit the people. 11. Explains why Napoleon's changes were not acceptable. ()
 3. Conquerors reserve the right to introduce changes. 12. Explains the revolution of the ruling classes. ()
 4. The people who lose power want it back.
 5. Revolution is the power of the weak.

5. In Argentina, wheat, corn, flax and oats are the principal crops. The sugar, wine, cotton and fruit industries are making great progress. Alfalfa is cultivated in huge quantities. Sheep, cattle, horses, goats and pigs form the chief wealth on the ranches. Packing houses have been established on a large scale and meat refrigeration has become the country's chief industry. Flour milling ranks second. The largest refrigerating plant in the world is in Buenos Aires. Argentina supplies more than half the hides imported into the United States.

1. A country's basic industries determine the kind of trading it will do. 13. Explains the trade between the U.S.A. and Argentina. ()
 2. Some industries are dependent upon the existence of other industries. 14. Explains the farming and ranching industries of Argentina. ()
 3. Industries are dependent upon labor. 15. Explains why ranching provides Argentina with hides, raw meat, () and meat products for trade.
 4. Good relations between countries determine the kind of trading they will do.
 5. One industry may produce many items for trade.

6. The railways of Canada made it possible for many people to move to the West. The railways, too, made it possible for those who farmed to ship their grain to markets in the East. As new inventions bettered the service offered by the railways more and more people populated western Canada. Canada's trade with outside countries increased as a result of the increase in exportable farm products. With the opening of new territory by the railways new forest areas and mining areas were made available.

- | | |
|--|--|
| 1. New areas attract settlers if there is easy communication. | 16. Explains why Canada's trade increased. () |
| 2. New settlements result from new inventions. | 17. Explains why the population of the West multiplied. () |
| 3. Greater trade is possible if new areas have communications. | 18. Explains why forest and mining areas were available. () |
| 4. New inventions make it possible to raise more grain. | |
| 5. Natural resources must be reached to be useful. | |

7. For centuries the possibility of finding a navigable route to the North of our continent has fired the imagination of brave men. Cabot was searching for such a path to the orient when he discovered Nova Scotia. Hudson was set adrift and deserted by a mutinous crew while in quest of a waterway to the Pacific. Sir John Franklin lost his life in the Arctic wasteland while attempting to solve the riddle of the ice-fields. So perished many other brave but less known heroes. And the ice king laughed at man's puny effort to conquer the region that he held in his iron grip.

- | | |
|--|--|
| 1. Not all men are inspired by the same ideals. | 19. Explains the death of Sir John Franklin. () |
| 2. Nature sometimes proves too great an obstacle to man's ambitions. | 20. Explains the death of Hudson. () |
| 3. Imagination is all that is required for exploration. | 21. Explains Cabot's search. () |
| 4. The East proved attractive to many explorers. | |
| 5. Water routes are always difficult to conquer. | |

8. In Ontario the county councils are composed of councillors elected by "county council divisions", the number of which depends on the population of the county. In Quebec the county councils are composed of the mayors of "the local municipalities" each of which is governed by seven councillors who elect the mayor from their own number. In New Brunswick the county councils consist of two councillors from each parish and of a warden chosen annually by the council. In Nova Scotia the councils are elected by the taxpayers, one councillor for each district; a few districts enumerated in the law have two councillors.

1. Representation may be indirect.
 2. Responsible government is always representative.
 3. Representative government differs from place to place.
 4. One person must usually assume responsibility for administration.
 5. Representation by population is usually the rule.
22. Explains why the different provinces have different forms of government. ()
 23. Explains why a mayor or warden is elected. ()
 24. Explains Quebec's form of government. ()

9. The Seven Year's War added to the colonial possessions of Britain but reduced those of France. The Napoleonic Wars gave France the position of supremacy in Europe. The Civil War in the United States cemented the union of the states. World War I was fought in order to prevent Germany from dominating the world. The Crimean War reduced Russian influence in the Near East. The War of 1812 in Canada helped to give Canada the unity of a nation.

1. Wars help advance scientific techniques.
 2. Wars never settle any questions.
 3. Wars may help to build a nation.
 4. Wars may prevent dictatorship.
 5. Wars may be fought to gain territory.
25. Explains Britain's part in the Seven Years' War. ()
 26. Explains the War of 1812. ()
 27. Explains World War I. ()

10. In the eighteenth century taxes fell most heavily on the lower and middle classes. The upper classes paid few taxes. This difference was due to the fact that the upper classes were the only ones privileged to sit in Parliament. They were thus able to pass laws to suit themselves. The industrial revolution, the increase in numbers and economic power of the middle classes enabled them to correct unequal taxation. By the twentieth century the middle and upper classes pay in proportion to their incomes.

1. Those in power seek their own benefit.
 2. Power is the only measure of success.
 3. People recognize the need for taxes.
 4. Increase in number tends to increase power.
 5. Social changes come about slowly.
28. Explains why the lower classes paid the heaviest taxes. ()
 29. Explains why proportionate taxation was introduced. ()
 30. Explains the progress over two centuries. ()

Key to First Critical Thinking Test

<u>Part I</u>	<u>Part II</u>
1. 1. -	1. 1. 3
2. \neq	2. 1
3. 0	3. 2
4. 0	
2. 1. \neq	2. 4. 2
2. \neq	5. 3
3. -	6. 1
4. 0	3. 7. 5
3. 1. 0	8. 1
2. 0	9. 4
3. \neq	4. 10. 5
4. \neq	11. 2
4.	12. 4
1. \neq	5. 13. 1
2. \neq	14. 2
3. \neq	15. 5
4. 0	
5. 1. -	6. 16. 3
2. -	17. 1
3. -	18. 5
4. \neq	7. 19. 2
6. 1. -	20. 1
2. \neq	21. 4
3. -	
4. 0	8. 22. 3
7. 1. \neq	23. 4
2. -	24. 1
3. 0	9. 25. 5
4. 0	26. 3
8. 1. -	27. 4
2. -	10. 28. 1
3. \neq	29. 4
4. 0	30. 5
9. 1. \neq	
2. \neq	
3. -	
4. \neq	
10. 1. \neq	
2. -	
3. -	
4. 0	

CRITICAL THINKING IN THE SOCIAL STUDIES

Name Sex . . . Date
 Age . . . Birthday . . . Grade . . . School
 City Teacher Course

The purpose of this test is to find out your ability to think
in the social studies.

Part I of the test is made up of questions in which you draw
conclusions from facts stated in paragraphs.

Part II of the test determines your ability to apply general
facts to statements based on your reading.

Do not spend too much time on any one question. Attempt the
easier questions first; then go back and do the harder.

The directions will be read to you by the teacher.

PART II DIRECTIONS

Mark with (+) every statement which is true and can be proved
by the facts stated.

Mark with (o) every statement which might be true but cannot
be proved by the facts stated.

Mark with (-) every statement which is false as shown by the
facts stated.

Example: The priestly class of Egypt were in control of all
lands. The lands and servants remained the property
of the priests. The farmers who used the land be-
longing to the priests had to pay so much that they
were always poor. The merchants who bought and sold
goods had to pay a fee to the priesthood for the
privilege of trading.

- A. The priests who owned land in Egypt made every farmer
and merchant pay fees. A. ()
- B. The merchants were often rich men. B. ()
- C. Merchants and farmers were not under the power
of the priests. C. ()

Explanation:

Statement A. because it is a true explanation of what may be
proved by the facts in the paragraph is marked (+)

Statement B. though it may be a true explanation cannot be
proved by the facts in the paragraph and so is marked (o)

Statement C. is wrong because there is nothing in the para-
graph to prove it and so is marked (-)

PART 1

1. In 1795 during the last of the three great divisions of Poland, Russia got 180,000 square miles with 6,000,000 people. Austria got 45,000 square miles with 3,700,000 people, and Prussia got 57,000 square miles with 2,500,000 people. This wrong was not undone until one hundred and twenty-five years later.

1. Poles constituted a minority of Russia, Prussia and Austria. 1. ()
 2. Prussia was a more powerful nation than Austria. 2. ()
 3. Poland was unable to prevent her division. 3. ()
 4. In 1920 Poland gained over 280,000 square miles. 4. ()

2. The Treaty of Utrecht of 1713 had proved as unstable as other treaties during the long struggle between France and England from Louis XIV to Napoleon. War broke out again in 1774 and raged with its usual accompaniment of raid and massacre till 1748. It was signalized by the spectacular capture of the great Fort of Louisburg, Cape Breton, by ships, levies and leaders from New England. The Peace of Aix-la-Chapelle restored to France Cape Breton and its fortress but it brought only a calm before the final storm.

1. Cape Breton was the scene of the struggle between England and France in America. 1. ()
 2. Louisburg was returned to France by England in 1748. 2. ()
 3. The Treaty of Aix-la-Chapelle brought only a temporary peace. 3. ()
 4. England lost many men in the struggle. 4. ()

3. The discovery of gold on the Klondike River in 1896 started a mad rush of miners and adventurers into the Yukon. The favourite approach to the Yukon was by way of the Lynn Canal and the Alaskan ports of Dyea and Skagway. Doubts arose as to where the boundary between Alaska and Canada crossed the canal. These and other questions seemed to justify an international conference. In 1898 a Joint High Commission was appointed for the discussion of matters of common interest to Canada and the United States.

1. The Lynn Canal formed the boundary between Alaska and Canada. 1. ()
 2. The Joint High Commission of 1898 was set up to settle the Alaskan Boundary Dispute only. 2. ()
 3. The discovery of gold was one reason for the calling of the conference. 3. ()
 4. Canada and the United States were both interested in the discovery of gold. 4. ()

4. The cotton gin, invented by Eli Whitney in the United States in 1792, applied the machine to the removal of seeds from cotton, and thus sped up this process of production enormously. The effect upon commerce was astounding. In 1764 England imported a mere 4,000,000 pounds of raw cotton annually; by 1841, she was using nearly 500,000,000 pounds a year. By 1820, 1000 workmen could do as much with the new machinery as all the operators in Scotland could do without it.

- | | | |
|---|---|--------|
| 1 | Eli Whitney was chiefly responsible for England's increased cotton imports. | 1. () |
| 2 | Scotland was not affected in any way by Whitney's invention. | 2. () |
| 3 | In 1820 England had only 1000 cotton workers. | 3. () |
| 4 | Cotton goods became much cheaper as a result of Whitney's invention. | 4. () |

PART II DIRECTIONS

The left-hand statements below each paragraph help you to understand the statements in the right-hand column. Choose the statement from the left-hand column which explains a reference in the right-hand column. In the space after each statement in the right-hand column, write the number of the statement of the left-hand column you have chosen in explanation.

Example: Winnipeg is considered a large city. Most of the business section is centred in the heart of the city. Because people come from all parts of the city and do business here, the price of property is highest in this area. As one travels from the business section towards the outskirts of the city the price of land falls rapidly. On the outskirts of the city where there are few improvements and where few people pass except to and from their homes the cost of land is lower. The same conditions are true of such cities as Toronto, Montreal and Vancouver.

- | | |
|---|---|
| 1. Trade increases property value. | 1. Explains high cost of property in business section. |
| 2. A large city has different property values. | 2. Explains high and low costs of property. |
| 3. Improvements as well as position of property determines land values. | 3. Explains why homes are built away from the business section. |
| 4. Large cities have large business sections. | |
| 5. Residential areas are built in low cost land areas. | |

Explanation: Statement 1 in the left-hand column explains Reference 1 in the right-hand column, so 1 from the left-hand column is written in the space after 1 in the right-hand column.

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Statement 3 in the left-hand column explains reference 2 in the right-hand column so 3 is written in the space after reference 2 in the right-hand column.

Statement 4 does not explain any reference in the right-hand column so we pass on to the next statement.

Statement 5 explains reference 3 in the right-hand column so we write 5 in the space after reference in the right-hand column.

PART 11

1. Napoleon made himself master of Europe. He conquered each country in turn, then introduced changes in its political, economic and social laws. In some countries he placed the rulers of his choice. The ruling classes of the conquered countries refused to recognize Napoleon's rule as final. Revolution broke out in many parts of Europe. Not all of the revolutions were directed at Napoleon's rule, but were directed at the traditional limitations which surrounded popular liberties.

- | | |
|---|--|
| 1. Kings are dethroned by revolutions. | 1. Explains why Napoleon altered political and economic laws. 1. () |
| 2. Change to be permanent must benefit the people. | 2. Explains why Napoleon's changes were not acceptable. 2. () |
| 3. Conquerors reserve the right to introduce changes. | 3. Explains the revolution of the ruling class. 3. () |
| 4. The people who lose power want it back. | |
| 5. Revolution is the power of the weak. | |

2. The railways of Canada made it possible for many people to move to the West. The railways, too, made it possible for those who farmed to ship their grain to markets in the East. As new inventions bettered the service offered by the railways more and more people populated Western Canada. Canada's trade with outside countries increased as a result of the increase in exportable farm products. With the opening of new territory by the railways new forest areas and mining areas were made available.

- | | |
|---|---|
| 1. New areas attract settlers if there is easy communication. | 4. Explains why Canada's trade increased. 1. () |
| 2. New settlements result from new inventions. | 5. Explains why the population of the West multiplied. 2. () |
| 3. Greater trade is possible if new areas have communication. | 6. Explains why forest and mining areas were made available. 3. () |
| 4. New inventions make it possible to raise more grain. | |
| 5. Natural resources must be reached to be useful. | |

3. For centuries the possibility of finding a navigable route to the North of our continent has fired the imagination of brave men. Cabot was searching for such a path to the orient when he discovered Nova Scotia. Hudson was set adrift and deserted by a mutinous crew while in quest of a waterway to the Pacific. Sir John Franklin lost his life in the Arctic wasteland while attempting to solve the riddle of the ice-fields. So perished many other brave but less known heroes. And the ice king laughed at man's puny effort to conquer the region that he held in his iron grip.

1. Not all men are inspired by the same ideals.
2. Nature sometimes proves too great an obstacle to man's ambitions.
3. Imagination is all that is required for exploration.
4. The east proved attractive to many explorers.
5. Water routes are always difficult to conquer.

4. In Ontario the county councils are composed of councillors elected by "county council divisions", the number of which depends on the population of the county. In Quebec the county councils are composed of the mayors of the "local municipalities" each of which is governed by seven councillors who elect the mayor from their own number. In New Brunswick the county councils consist of two councillors from each Parish and of a warden chosen annually by the council. In Nova Scotia the councils are elected by the taxpayers, one councillor for each district; a few districts enumerated in the law have two councillors.

1. Representation may be indirect.
2. Responsible government is always representative.
3. Representative government differs from place to place.
4. One person must usually assume responsibility for administration.
5. Representation by population is usually the rule.
10. Explains why the different provinces have different forms of government. ()
11. Explains why a mayor or warden is elected. ()
12. Explains Quebec's form of government. ()

5. In the eighteenth century taxes fell most heavily on the lower and middle classes. The upper classes paid few taxes. This difference was due to the fact that the upper classes were the only ones privileged to sit in Parliament. They were thus able to pass laws to suit themselves. The industrial revolution, the increase in numbers and economic power of the middle classes enabled them to correct unequal taxation. By the twentieth century the middle and upper classes pay in proportion to their incomes.

1. Those in power seek their benefit.
2. Power is the only measure of success.
3. People recognize the need for taxes.
4. Increase in numbers tends to increase power.
5. Social changes come about slowly.
13. Explains why the lower classes paid the heaviest taxes. ()
14. Explains why proportionate taxation was introduced. ()
15. Explains the progress over two centuries. ()

6. Years ago all furniture was made by hand but now most of our furniture is made by machines. Machine-made furniture is cheaper than that made by hand. Machines run by one man in a cabinet factory can produce hundreds of tables and chairs in one day. A carpenter can make by hand only a few chairs and tables in a week. Even on the plantation tractors are now taking the place of horses in plowing and cultivating. A tractor is more efficient than an animal and can therefore do more in a day.

1. More goods can be made by machines than by hand.
2. Machines lower the cost of goods.
3. Machines affect other industries than manufacturing.
4. Machines make work easier.
5. Some things can be made only by hand.
16. Explains why it costs less to buy furniture today. ()
17. Explains why tractors take the place of horses. ()
18. Explains why machines are used in a cabinet factory. ()

7. In Argentina, wheat, corn, flax and oats are the principal crops. The sugar, wine, cotton and fruit industries are making progress. Alfalfa is cultivated in huge quantities. Sheep, cattle, horses, goats, and pigs form the chief wealth on the ranches. Packing houses have been established on a large scale and meat refrigeration has become the country's chief industry. Flour milling ranks second. The largest refrigerating plant in the world is in Buenos Aires. Argentine supplies more than half the hides imported into the United States.

1. A country's basic industries determine its exports.
2. Some industries are dependent upon the existence of other industries.
3. Industries are dependent upon labor.
4. Industrial development raises the standard of living.
5. One industry may produce many items for trade.
19. Explains the farming and ranching industries of Argentina. ()
20. Explains why ranching provides Argentine with hides, raw meat, and meat products for trade. ()
21. Explains the trade between the U.S.A. and Argentina. ()

Key to Critical Thinking Test 11

Part I

1. 1. 0
2. 0
3. ~~7~~
4. ~~7~~
-
2. 1. ~~7~~
2. ~~7~~
3. ~~7~~
4. 0
-
3. 1. -
2. -
3. ~~7~~
4. 0
-
4. 1. ~~7~~
2. -
3. -
4. 0

Part II

1. 1. 3
2. 2
3. 4
-
2. 4. 3
5. 1
6. 5
-
3. 7. 2
8. 1
9. 4
-
4. 10. 3
11. 4
12. 1
-
5. 13. 1
14. 4
15. 5
-
6. 16. 2
17. 3
18. 1
-
7. 19. 2
20. 5
21. 1

CRITICAL THINKING IN THE SOCIAL STUDIES

Name Sex . . . Date
 Age . . . Birthday Grade . . School
 City Teacher Course

The purpose of this test is to find out your ability to think
in the social studies.

Part I of the test is made up of questions in which you draw
conclusions from facts stated in paragraphs.

Part II of the test determines your ability to apply general
facts to statements based on your reading.

Do not spend too much time on any one question. Attempt the
easier questions first; then go back and do the harder.

The directions will be read to you by the teacher.

PART I DIRECTIONS

Mark with (+) every statement which is true and can be proved
by the facts stated.

Mark with (o) every statement which might be true but cannot
be proved by the facts stated.

Mark with (-) every statement which is false as shown by the
facts stated.

Example: The priestly class of Egypt were in control of all
lands. The lands and servants remained the property
of the priests. The farmers who used the land be-
longing to the priests had to pay so much that they
were always poor. The merchants who bought and sold
goods had to pay a fee to the priesthood for the
privilege of trading.

- | | |
|--|--------|
| A. The priests who owned land in Egypt made every farmer
and merchant pay fees. | A. () |
| B. The merchants were often rich men. | B. () |
| C. Merchants and farmers were not under the power
of the priests. | C. () |

Explanation:

Statement A. because it is a true explanation of what may be
proved by the facts in the paragraph is marked (+)

Statement B. though it may be a true explanation cannot be
proved by the facts in the paragraph and so is marked (o)

Statement C. is wrong because there is nothing in the para-
graph to prove it and so is marked (-)

PART 1

1. In 1795 during the last of the three great divisions of Poland, Russia got 180,000 square miles with 6,000,000 people. Austria got 45,000 square miles with 3,700,000 people, and Prussia got 57,000 square miles with 2,500,000 people. This wrong was not undone until one hundred and twenty-five years later.

- 1 Poles constituted a minority of Russia, Prussia and Austria. 1. ()
 2. Prussia was a more powerful nation than Austria. 2. ()
 3. Poland was unable to prevent her division. 3. ()
 4. In 1920 Poland gained over 280,000 square miles. 4. ()

2. The Treaty of Utrecht of 1713 had proved as unstable as other treaties during the long struggle between France and England from Louis XIV to Napoleon. War broke out again in 1744 and raged with its usual accompaniment of raid and massacre till 1748. It was signalized by the spectacular capture of the great Fort of Louisburg, Cape Breton, by ships, levies and leaders from New England. The Peace of Aix-la-Chapelle restored to France Cape Breton and its fortress but it brought only a calm before the final storm.

1. Cape Breton was the scene of the struggle between England and France in America. 1. ()
 2. Louisburg was returned to France by England in 1748. 2. ()
 3. The Treaty of Aix-la-Chapelle brought only a temporary peace. 3. ()
 4. England lost many men in the struggle. 4. ()

3. The discovery of gold on the Klondike River in 1896 started a mad rush of miners and adventurers into the Yukon. The favorite approach to the Yukon was by way of the Lynn Canal and the Alaskan ports of Dyea and Skagway. Doubts arose as to where the boundary between Alaska and Canada crossed the canal. These and other questions seemed to justify an international conference. In 1898 a Joint High Commission was appointed for the discussion of matters of common interest to Canada and the United States.

1. The Lynn Canal formed the boundary between Alaska and Canada. 1. ()
 2. The Joint High Commission of 1898 was set up to settle the Alaskan Boundary Dispute only. 2. ()
 3. The discovery of gold was one reason for the calling of the conference. 3. ()
 4. Canada and the United States were both interested in the discovery of gold. 4. ()

4. The cotton gin, invented by Eli Whitney in the United States in 1792, applied the machine to the removal of seeds from cotton, and thus sped up this process of production enormously. The effect upon commerce was astounding. In 1764 England imported a mere 4,000,000 pounds of raw cotton annually; by 1841, she was using nearly 500,000,000 pounds a year. By 1820, 1000 workmen could do as much with the new machinery as all the operators in Scotland could do without it.

- 1 Eli Whitney was chiefly responsible for England's increased cotton imports. 1. ()
- 2 Scotland was not affected in any way by Whitney's invention. 2. ()
- 3 In 1820 England had only 1000 cotton workers. 3. ()
- 4 Cotton goods became much cheaper as a result of Whitney's invention. 4. ()

PART 11 DIRECTIONS

The left-hand statements below each paragraph help you to understand the statements in the right-hand column. Choose the statement from the left-hand column which explains a reference in the right-hand column. In the space after each statement in the right-hand column, write the number of the statement of the left-hand column you have chosen in explanation.

Example: Winnipeg is considered a large city. Most of the business section is centered in the heart of the city. Because people come from all parts of the city and do business here, the price of property is highest in this area. As one travels from the business section towards the outskirts of the city the price of land falls rapidly. On the outskirts of the city where there are few improvements and where few people pass except to and from their homes the cost of land is lower. The same conditions are true of such cities as Toronto, Montreal and Vancouver.

- | | |
|---|---|
| 1. Trade increases property value. | 1. Explains high cost of property in business section. () |
| 2. A large city has different property values. | 2. Explains high and low costs of property. () |
| 3. Improvements as well as position of property determines land values. | 3. Explains why homes are built away from the business section. () |
| 4. Large cities have large business sections. | |
| 5. Residential areas are built in low cost land areas. | |

Explanation: Statement 1 in the left-hand column explains Reference 1 in the right-hand column, so 1 from the left-hand column is written in the space after 1 in the right-hand column.

Statement 2 in the left-hand column does not explain any reference in the right-hand column so we pass on to the next statement.

Statement 3 in the left-hand column explains reference 2 in the right-hand column so 3 is written in the space after reference 2 in the right-hand column.

Statement 4 does not explain any reference in the right-hand column so we pass on to the next statement.

Statement 5 explains reference 3 in the right-hand column so we write 5 in the space after reference in the right-hand column.

PART 11

1. Napoleon made himself master of Europe. He conquered each country in turn, then introduced changes in its political, economic and social laws. In some countries he placed the rulers of his choice. The ruling classes of the conquered countries refused to recognize Napoleon's rule as final. Revolutions broke out in many parts of Europe. Not all of the revolutions were directed at Napoleon's rule, but were directed at the traditional limitations which surrounded popular liberties.

- 1. Kings are dethroned by revolutions.
- 2. Change to be permanent must benefit the people.
- 3. Masters may rule as they please.
- 4. The people who lose power want it back.
- 5. Revolution is the power of the weak.
- 1. Explains why Napoleon altered political and economic laws. ()
- 2. Explains why Napoleon's changes were not acceptable. ()
- 3. Explains the revolution of the ruling class. ()

2. The railways of Canada made it possible for many people to move to the West. The railways, too, made it possible for those who farmed to ship their grain to markets in the East. As new inventions bettered the service offered by the railways more and more people populated Western Canada. Canada's trade with outside countries increased as a result of increase in exportable farm products. With the opening of new territory by the railways new forest areas and mining areas were made available.

- 1. New areas attract settlers if there is easy communication.
- 2. New settlements result from new inventions.
- 3. Communications make it possible to develop new products.
- 4. New inventions make it possible to develop new products.
- 5. Greater trade is possible if new areas have communication.
- 4. Explains why Canada's trade increased. ()
- 5. Explains why the population of the West increased. ()
- 6. Explains why forest and mining areas became valuable. ()

3. For centuries the possibility of finding a navigable route to the North of our continent has fired the imagination of brave men. Cabot was searching for such a path to the orient when he discovered Nova Scotia. Hudson was set adrift and deserted by a mutinous crew while in quest of a waterway to the Pacific. Sir John Franklin lost his life in the Arctic wasteland while attempting to solve the riddle of the ice-fields. So perished many other brave but less known heroes. And the ice king laughed at man's puny effort to conquer the region that he held in his iron grip.

1. Not all men are inspired by the same ideals.
2. Nature sometimes proves too great an obstacle to man's ambitions.
3. Imagination is all that is required for exploration.
4. The east proved attractive to many explorers.
5. Water routes are always difficult to conquer.

4. In Ontario the county councils are composed of councillors elected by "county council divisions", the number of which depends on the population of the county. In Quebec the county councils are composed of the mayors of the "local municipalities" each of which is governed by seven councillors who elect the mayor from their own number. In New Brunswick the county councils consist of two councillors from each parish and of a warden chosen annually by the council. In Nova Scotia the councils are elected by the taxpayers, one councillor for each district; a few districts enumerated in the law have two councillors.

1. Representation may be indirect.
 2. Responsible government is representative always.
 3. Representative government differs from place to place.
 4. One person must usually assume responsibility for administration.
10. Explains why the different provinces have different forms of government. ()
 11. Explains why a mayor or warden is elected. ()
 12. Explains Quebec's form of government. ()

5. In the eighteenth century taxes fell most heavily on the lower and middle classes. The upper classes paid few taxes. This difference was due to the fact that the upper classes were the only ones privileged to sit in Parliament. They were thus able to pass laws to suit themselves. The industrial revolution, the increase in numbers and economic power of the middle classes enabled them to correct unequal taxation. By the twentieth century the middle and upper classes pay in proportion to their incomes.

1. Those in power seek their own benefit.
 2. Power is the only measure of success.
 3. People recognize the need for taxes.
 4. Increase in numbers tends to increase power.
 5. Social changes come about slowly.
13. Explains why proportionate taxation was introduced. ()
 14. Explains why the lower classes paid the heaviest taxes. ()
 15. Explains the progress over two centuries. ()

6. Years ago all furniture was made by hand but now most of our furniture is made by machines. Machine-made furniture is cheaper than that made by hand. Machines run by one man in a cabinet factory can produce hundreds of tables and chairs in one day. A carpenter can make by hand only a few chairs and tables in a week. Even on the plantation tractors are now taking the place of horses in plowing and cultivating. A tractor is more efficient than an animal and can therefore do more in a day.

- 1. More goods can be made by machines than by hand.
- 16. Explains why it costs less to buy furniture today. ()
- 2. Machines cost a great deal.
- 3. Machines affect other industries than manufacturing.
- 17. Explains why tractors take the place of horses. ()
- 4. Machines lower the cost of goods.
- 18. Explains why machines are used in a cabinet factory. ()
- 5. Some things can be made only by hand.

7. In Argentina, wheat, corn, flax and oats are the principal crops. The sugar, wine, cotton and fruit industries are making progress. Alfalfa is cultivated in huge quantities. Sheep, cattle, horses, goats and pigs form the chief wealth on the ranches. Packing houses have been established on a large scale and meat refrigeration has become the country's chief industry. Flour milling ranks second. The largest refrigerating plant in the world is in Buenos Aires. Argentina supplies more than half the hides imported into the United States.

- 1. A country's basic industries determine its exports.
- 19. Explains the farming and ranching industries of Argentina. ()
- 2. Some industries are dependent upon the existence of other industries.
- 20. Explains why ranching provides Argentina with hides, raw meat, and meat products for trade. ()
- 3. Industries are dependent upon labor.
- 4. Industrial development raises the standard of living.
- 21. Explains the trade between the U.S.A. and Argentina. ()
- 5. One industry may produce many items for trade.

Key to Critical Thinking Test III

Part I

1. 1. 0
 2. 0
 3. 7
 4. 7
2. 1. 7
 2. 7
 3. 7
 4. 0
3. 1. -
 2. -
 3. 7
 4. 0
4. 1. 7
 2. -
 3. -
 4. 0

Part II

1. 1. 3
 2. 2
 3. 4
2. 4. 5
 5. 1
 6. 3
3. 7. 2
 8. 1
 9. 4
4. 10. 3
 11. 4
 12. 1
5. 13. 4
 14. 1
 15. 5
6. 16. 4
 17. 3
 18. 1
7. 19. 2
 20. 5
 21. 1

Paper No. 29
High School Examination Board of Manitoba
Examinations, 1937
History III (Canadian History and Economics)
Friday, June 25, 9:00 to 12:00

Part A

Values

- 10 1. Mark on the accompanying map: Routes of Champlain's explorations; The Boundary Settlement of 1818; Richelieu River; Fort Chipewyan; Queenston Heights; Michilimackinac; Capital of British Columbia.

Part B

Two (2) questions to be attempted)

- 15 2. "The fur trade had been the life blood of Canada from the day of its birth." Discuss in detail why this was so.
- 15 3. "The method of holding land greatly influenced the character of the French-Canadian community and the life of its people." Show by concrete examples in what respect this statement is true.
- 15 4. What were the terms of the Quebec Act? How was the Act received by each of the following groups: (a) habitants, (b) Seigniors, (c) priests, (d) English merchants of Quebec, (e) American colonists. Explain why each of these groups reacted as it did.
- 15 5. "The problems confronting the people of Upper Canada (after 1791), growing out of the opening of a new country and the rapid extension of settlement, were administrative and economic rather than legislative and constitutional." Explain, and give specific illustrations.

Part C

(Three (3) questions to be attempted)

- 15 6. What were the terms of the Reciprocity Treaty of 1854? Why was the treaty negotiated? What were the results of this treaty in Canada?
- 15 7. Suppose you were a voter in 1864 in one of the following: Canada East, New Brunswick, Nova Scotia. Give specific reasons for your support of or opposition to the Federation movement.
- 15 8. What problems confronted the government of Manitoba from 1871 to 1900? Discuss fully any one of these.

- 15 9. What were the achievements of the Canadian government in the period 1896-1911? Which one of these do you consider the most important? Give reasons for your choice.
- 15 10. Trace the development of Canadian autonomy (nationhood) since 1914.

Part D

(Answer question 11 and either (a) or (b) of question 12)

- 5 11. Explain briefly five (5) of the following terms in public finance: budget, direct tax, debenture, public domain, license, succession duty, subsidy.
- 10 12. (a) Name and explain the advantages of large scale production in a manufacturing industry. Show how each of these advantages would be applicable in the manufacturing of automobiles.

or

- (b) How does Labour organize to protect its interests? How does this organization function? What have labour organizations achieved in Canada?

Paper No. 33

Examination, June, 1938

High School Examination Board of Manitoba

History III (Canadian History and Economics)

Monday, June 27, 9:00 to 12:00 a.m.

Paper A

Paper A must be detached and with the map firmly fastened to the answer booklet.

Values

15 1. Fill in the blanks in the following statements:

- (a) The religious order that began the Christianization of the Indians in New France was called the Order.
- (b) The Company of was granted a monopoly of the Fur Trade in 1627.
- (c) Quebec was captured in 1629 by an expedition under the command of
- (d) The founder of Montreal was
- (e) The obligation of the habitant to render a certain amount of labour to the seigneur was called the
- (f) The Loyalist migration led to the formation in 1784 of the province of
- (g) The Treaty of ended the War of 1812.
- (h) The Company secured and settled the Huron Tract.
- (i) The settlers of Upper Canada generally used instead of sugar.
- (j) was the first Superintendent of Education in Upper Canada.
- (k) Goldwin Smith, Principal Grant, William A. Foster, Col. George T. Denison and others organized the party.
- (l) Sir John Macdonald's platform in 1878 was called the
- (m) The minister in the Laurier Government who promoted a vigorous immigration policy was
- (n) The permanent commission set up in 1909 to settle disputes between Canada and the United States was called the

- (o) The Union Government of 1917 was formed by Prime Minister
2. Mark on the accompanying map; Alaskan Boundary Settlement; three regions settled by the Loyalists; Capital of New Brunswick, Detroit River, York Factory, Fort Frontenac, Fort William.

Paper B

Section I

Values

- 15 3. What do you consider to have been the primary importance of the explorations of any five of the following: The Cabots, Hudson, Joliet, Mackenzie, Thompson, La Salle, Radisson, Du Lhut?
- 15 4. Make a list of the activities of the Church in New France. Which one of these activities do you consider most important? Describe this one activity in detail.
- 15 5. "Lord Durham found the main cause of discontent in the Canadas in two factors--the lack of harmony between the Legislature (Assembly) and the Executive Council, and the unprogressive character of the French Canadians." Discuss fully these two important causes of discontent in Upper and Lower Canada between 1791 and 1837.
- 15 6. Describe the founding of the Selkirk Settlement in the Red River Valley. What difficulties did the settlers have to overcome in the first quarter century of the colony's existence?

Section II

- 15 7. To what extent did each of the following Governors carry out the principle of Responsible Government as it was recommended in Durham's Report: Sydenham, Bagot, Metcalfe, Elgin?
- 15 8. Outline the career of Joseph Howe. Discuss fully the reasons for his opposition to Confederation.
- 15 9. Why was there an insurrection in the Red River Settlement in 1869-70? What were the results of the Insurrection?
- 15 10. What were the chief problems that faced the Canadian Government between the end of the Great War and 1930? Discuss any two of these in detail.

Section III

- 10 11. (a) What do you understand by the term capital? State its most important forms. Indicate the difference between capital and land as factors of production.

or

(b) What are the essential services that money renders to society? What qualities of gold and silver make them suitable for use as money? What is the most efficient way to employ gold as the basis of a monetary system?

- 5 12. Define five (5) of the following terms: bond, corporation, extractive industry, division of labor, partnership, entrepreneur, law of diminishing terms.

Paper No. 30
 High School Examination Board of Manitoba
 Examinations, June, 1939
 History III (Canadian History and Economics)
 Tuesday, June 27, 9:00 to 12:00 a.m.

Section I

Candidates must attempt this section. The map must be firmly attached to the answer booklet.

Values

10 1. On the accompanying map:

- (a) Mark by ----- the routes of La Verendrye's explorations.
- (b) Mark by xxxxx the main line of the Canadian Pacific Railway.
- (c) Mark by ° the following: the capital of Nova Scotia, Fort Niagara, Michilimachinac, Port Royal.
- (d) Mark by inserting the name, the Fraser River, the St. Croix River.

Section II

Candidates must attempt three questions from this section. If question two is answered, this sheet must be detached and with the map firmly fastened to the answer booklet.

2. In the following sentences fill in the blanks:

- 1 1/2 (a) The Indians of Canada may be classified into three groups of tribes: the the and the
- 1/2 (b) The disease ... killed off many of the earliest colonists in Canada.
- 1/2 (c) was the first Canadian farmer.
- 1/2 (d) Jeanne Mance was the pioneer of Canadian
- 1 (e) The representatives who were permitted to attend the Council meetings after 1647, but who could not vote, were known as
- 1 (f) In King William's War, Sir William Phipps captured the French post as but he failed to take
- 1 (g) The first elected legislature in what is now Canada met at in the year
- 2 (h) Name four Governors of Canada between 1840 and 1850,, and
- 1 (i) and formed the first "Responsible Government" in Canada.

Section III

Candidates must attempt two questions from this section.

- 1 (j) The leaders of the Reform movement in Nova Scotia and New Brunswick in the 1840's were and
- 2 (k) The British North America Act provided for a union of the provinces of, and
- 1/2 (l) Canadians were given the right to vote by ballot when was Prime Minister.
- 1 (m) In 1871 outstanding disputes between Canada and the United States were settled by the Treaty of In 1903 the dispute between these two countries over the boundary was settled.
- 1 1/2 (n) The three churches,, and combined to form the United Church of Canada.

Section II (continued)

- 15 3. "Champlain was more than a dreamer. He saw clearly that two things were necessary: the fur trade must be regulated and there must be some authority in the colony to preserve order." What was Champlain's dream? Make a list of Champlain's activities in the New World. To what extent were Champlain's expectations for the new colonies realized during his lifetime?
- 15 4. Assuming that you are either a seignior or a habitant residing in New France, write a letter to some individual in Old France describing your life in the New World, and emphasizing particularly your privileges and obligations under the seigniorial system.
- 15 5. "As Carleton learned more of the conditions in Quebec he came gradually to accept Murray's view of the political situation." Describe the steps by which General Murray established British rule in Canada. In what respects did Carleton continue Murray's policies, and in what respects did he alter them?
- 15 6. "Since the acquisition of Canada by Great Britain there have been five important periods of immigration into this country." List the approximate dates of four of these five periods. Describe the causes and character of each of the four movements of immigration which you select.
15. 7. "The movement which took the form of a struggle for Responsible Government had its roots deep down in the actual life of the people." Discuss the causes of discontent in Upper Canada 1791-1837, showing how social and economic factors laid the basis for the constitutional struggle.

Section III

Candidates must attempt Two questions from this section.

- 15 8. What suggestions were made before 1850 to unite the provinces of British North America? Why did Confederation become a practical political issue in the 1860's? What specific contributions to the federation movement were made by George Etienne Cartier and by Alexander Tilloch Galt?
- 15 9. As a resident of Red River, if you had been either (a) a descendant of a Selkirk Settler, or (b) a recent arrival from Ontario, what would your attitude have been in 1869 to each of the following:
- (1) The Hudson's Bay Company
 - (2) The United States
 - (3) The Dominion of Canada
 - (4) Louis Riel
- 15 10. Trace the growth of Canadian autonomy within the British Empire since 1867.
- 16 11. Compare and contrast the contributions of the governments of Macdonald and Laurier to the development of Canada.

Section IV

Candidates must attempt Two questions from this section.

- 10 12. (a) What are the advantages of international trade? What are the chief elements that enter into the computation of a country's international trade?
- OR
- (b) Distinguish between a direct and an indirect tax. Give an example of each type. State the advantages and disadvantages of each of these types of tax. Account for the great increase in taxation in recent years.
5. 13. Describe and give an illustration of five (5) of the following:
 price, legal tender, preferred stock, fiduciary currency, industrial union, Industrial Disputes Act 1907, clearing house.

THE DOMINION TESTS

GROUP TEST OF INTELLIGENCE

(Advanced)

FORM A

DO NOT OPEN THIS PAPER OR TURN IT OVER 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..... Age last birthday..... Years
 LAST NAME FIRST NAME

Birthday..... Grade..... Today's Date.....
 MONTH DAY YEAR

School..... Town or City.....

Four sample questions are given below to show you what the test is like. In questions such as 1 and 2 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. Questions in which no choices are given, such as 3 and 4 below, make 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. Skip any questions which appear to be too difficult and return to them later if you have any time left. Spend your time now in studying the samples below.

1. Which word does not belong in this list?
 1 green 2 purple 3 red 4 sweet 5 yellow.....(4)
2. Bird is to air as fish is to
 1 water 2 swim 3 bait 4 net 5 catch.....(1)
3. What number comes next in the following series?
 2, 4, 6, 8, 10, 12,(14)
4. are Canada small cold in winters?
 If one word were omitted from the above the others could be rearranged to form a sentence. Print the first letter of the word to be omitted.....(S)

DO NOT OPEN THIS PAPER OR TURN IT OVER UNTIL YOU ARE TOLD TO DO SO.

1. Which word does not belong in this list?
1 piano 2 harp 3 violin 4 guitar 5 cornet.....()
2. What number comes next in the following series?
192, 96, 48, 24,.....()
3. She is to hers as I is to
1 my 2 me 3 our 4 mine 5 we.....()
4. Which word does not belong in this list?
1 grouse 2 lark 3 partridge 4 pheasant 5 quail.....()
5. Examination is to fail as game is to
1 fun 2 work 3 lose 4 baseball 5 play.....()
6. If Mary had 7 cents more, she would have 3 times as much money as Lucy. Lucy has 5 cents. How much has Mary?.....()
7. Which word does not belong in this list?
1 build 2 damage 3 strengthen 4 repair 5 improve.....()
8. Canoe is to paddle as airplane is to
1 wings 2 air 3 aviator 4 propeller 5 steer.....()
9. Which proverb means the same as the proverb, "Company in misery makes it light"?
 1. Birds of a feather flock together.
 2. He who is in the mud likes to pull another into it.
 3. Misery acquaints men with strange bed-fellows.
 4. Two in distress makes sorrow less.
 5. A friend in need is a friend indeed.....()
10. Picture is to frame as lake is to
1 shore 2 water 3 river 4 island 5 fish.....()
11. 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
Find the fourth letter before the letter which comes midway between G and K in the alphabet. Print it.....()
12. Equestrian is to pedestrian as ride is to
1 horse 2 gallop 3 walk 4 sit 5 saddle.....()
13. Destitute persons are
1 shrewd 2 needy 3 famous 4 despised 5 wealthy.....()
14. Breeze is to gale as brook is to
1 spring 2 torrent 3 wind 4 pond 5 water.....()
15. When a city is sacked it is
1 pillaged 2 burned 3 evacuated 4 beleaguered 5 fortified.....()

46. 5, 26, 12, 27, 15, 9, 7, 10, 23, 1, 22, 14, 31, 17, 3.
In the line above, how many odd numbers are greater than 7 and smaller than 23? ..()
47. If ten horses eat ten sacks of oats in ten days, how many days will it take one horse
to eat one sack of oats?()
48. What number comes next in the following series?
68, 84, 44, 22, 32, 16, 26, 13,()
49. Dick stands at the head of the class and Jack at the foot. Bill stands somewhere
between Dick and Jack, Tom between Dick and Bill, and Harry between Dick and
Tom. The middle boy is
1 Dick 2 Jack 3 Bill 4 Tom 5 Harry.....()
50. Except for one letter the letters of the word 'TRIFLED' follow one another in the word
in the opposite order to that in which they occur in the alphabet. Print this letter. ()
51. A **gullible** person is easily
1 satisfied 2 offended 3 deceived 4 taught 5 frightened.....()
52. **Lend** is to **borrow** as **rich** is to
1 wealthy 2 poor 3 money 4 poverty 5 beg.....()
53. Which word does not belong in this list?
1 me 2 us 3 him 4 she 5 them.....()
54. A **char-à-banc** is a
1 riot 2 vehicle 3 confection 4 decoration 5 flower.....()
55. I gave Tom half my money, and a dollar and a half besides. I have 4 dollars left.
How many dollars had I in the beginning?.....()
56. A **contrite** person is
1 reluctant 2 repentant 3 serious 4 dependable 5 insidious.....()
57. most to salaries a men living work earn must
If one word were omitted from the above, the others could be rearranged to
form a sentence. Print the **first** letter of the word to be omitted.....()
58. **Impromptu** means the same as
1 expedient 2 speech 3 prompted 4 tardy 5 extempore.....()
59. A clock which loses two minutes a day shows the correct time at 9 a.m. How many
seconds slow will it be by 5 p.m. of the same day?.....()
60. **Pecuniary** matters refer to
1 money 2 ability 3 law 4 humour 5 manner.....()
61. form creeks build to logs dams across beavers ponds
If one word were omitted from the above, the others could be rearranged to
form a sentence. Print the **first** letter of the word to be omitted.....()

30. home soldiers defending hardest their bravery when fight
If one word were omitted from the above, the others could be rearranged to form a sentence. Print the first letter of the word to be omitted.....()
- 16.
31. 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
What letter comes just as far after L in the alphabet as V comes before T in the word UNIVERSALITY? Print it.....()
- 17.
32. What number comes next in the following series?
7, 5, 10, 8, 16, 14, 28,()
- 18.
33. Land is to isthmus as water is to
1 ocean 2 strait 3 island 4 bay 5 peninsula.....()
34. A candid person is one who is
1 innocent 2 shrewd 3 polite 4 friendly 5 frank.....()
- 19.
35. What number comes next in the following series?
17, 12, 14, 9, 11, 6,()
- 20.
36. We raze a house by
1 tearing it down 2 heating it 3 plundering it 4 building it 5 increasing its value.....()
- 21.
37. What number comes next in the following series?
75, 74, 72, 68, 60, 44,()
- 22.
38. Square is to cube as circle is to
1 circumference 2 compasses 3 area 4 radius 5 sphere.....()
- 23.
39. To contaminate is to
1 pollute 2 germinate 3 approximate 4 slander 5 strengthen.....()
- 24.
40. What number comes next in the following series?
54, 52, 49, 45, 40, 34,()
- 25.
41. == is to || as // is to
(1) \ \ (2) == (3) // (4) == (5) //()
- 26.
42. What number comes next in the following series?
8, 3, 8, 9, 8, 27, 8,()
- 27.
43. If a boy can run 25 feet while a car travels 60 feet, how many feet can the boy run while the car travels 100 yards?.....()
- 28.
44. The opposite of convene is
1 recall 2 reject 3 disperse 4 acquit 5 resign.....()
- 29.
45. What number comes next in the following series?
5, 10, 12, 24, 26, 52,()

16.  is to  as  is to
(1)  (2)  (3)  (4)  (5) 
17. What number comes next in the following series?
1, 3, 8, 10, 15, 17,()
18.  is to  as  is to
(1)  (2)  (3)  (4)  (5) 
19. Print the letter of the word 'INDESCRIBABLE' that is as far from the beginning of the word as it is from the beginning of the alphabet.()
20. What number comes next in the following series?
1, 3, 7, 15, 31,()
21. July is to May as September is to
1 August 2 November 3 July 4 October 5 May.....()
22. What number comes next in the following series?
2, 3, 5, 8, 12,()
23. Which word does not belong in this list?
1 happiness 2 bliss 3 joy 4 rapture 5 fun.....()
24. What number comes next in the following series?
50, 40, 31, 23, 16, 10,()
25.  is to  as  is to
(1)  (2)  (3)  (4)  (5) 
26. windy often season and rainy autumn are days
If one word were omitted from the above, the others could be rearranged to form a sentence. Print the first letter of the word to be omitted.()
27. If 5 and 4 make 9, write 9, unless 4 and 4 make 7, in which case write 8.....()
28. What number comes next in the following series?
6, 10, 8, 13, 10, 16, 12,()
29.  is to  as  is to
(1)  (2)  (3)  (4)  (5) 

30. home
 form
31. A B C
 the
32. What
 7,
33. Land
 1 oc
34. A can
 1 in
35. What
 17,
36. We ran
 1 tea
 its v
37. What
 75,
38. Square
 1 cir
39. To con
 1 pol
40. What n
 54,
41. — is
 (1)
42. What n
 8,
43. If a boy
 while
44. The opp
 1 reca
45. What n
 5,
62. **Grotesque** means the same as
 1 fantastic 2 solemn 3 huge 4 horrible 5 wicked.....(
63. A man stands some distance from a high cliff, and on shouting hears the echo after
 5 seconds. If sound travels 1100 feet a second, how many feet is the man from the
 cliff?.....(
64. **Taciturn** persons are
 1 inquisitive 2 villainous 3 eminent 4 haughty 5 reticent.....(
65. It was 2.45 by Tom's watch when he left home to go to the post office. While at the
 office he corrected his watch by setting it forward from 3.13 to 3.21. It was 3.39
 by his watch when he arrived home. How many minutes was he away?.....(
66.  is to  as  is to
 (1)  (2)  (3)  (4)  (5) 
67. Which of the following is a **piscatorial** activity?
 1 farming 2 fishing 3 reading 4 hunting 5 sleeping.....(
68. If in the army there is one officer for 15 privates, how many officers are there in a
 corps consisting of 1200 officers and privates?.....(
69. **Respite** means the same as
 1 hatred 2 protection 3 delay 4 release 5 injury.....(
70. If Jack and Don together weigh 260 pounds and Don is 20 pounds heavier than Jack,
 how many pounds does Don weigh?.....(
71. The sum of my marks in Algebra and French was 124. I was poorer than George in
 Algebra by 3 marks, although I got 4 more marks in Algebra than in French. What
 was George's mark in Algebra?.....(
72. To **requite** is to
 1 acquit 2 desert 3 silence 4 reward 5 admire.....(
73. What number is 3 less than what 4 is 3 less than one-third of?.....(
74. I am half as old again as my brother, who is 10 years younger than I am. What is
 my age in years?.....(
75. A bag of marbles is divided among a group of boys in such a manner that Bill gets
 exactly three times as many as each of the others. If his share is one-fourth of all
 the marbles, how many boys are in the group?.....(

END OF TEST

1942 Edition

AMERICAN COUNCIL ON EDUCATION
Psychological Examination
For High School Students

Prepared by L. L. Thurstone and Thelma Gwinn Thurstone



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General Instructions

This examination is different from the ordinary school examinations to which you have been accustomed. The plan for each of these tests is as follows. First, you are given detailed *instructions* about the test, so that you know just what you are expected to do. Then you have some *practice problems*. Then you go to the *test proper*. This is the procedure for each of the four tests in this examination.

The four tests in this examination represent a variety of tasks. Two of them involve thinking of a quantitative sort, while the other two require more linguistic ability. If you find one test hard, do not be discouraged. You may find the next test easier. But you should do your best on all the tests.

People differ markedly in the speed with which they can do these different tests. The tests are long enough to keep everyone busy for the whole time, and you are not expected to complete the tests in the time allowed. By noting how many questions you can answer in a certain length of time, we can determine your speed on each kind of test. You must begin to work on a test promptly when the examiner calls the starting time and stop immediately when he says: "Stop." Do not begin a test until the examiner gives the starting signal for that particular test. Do not turn back to a test after the time for it has expired. You are to work on each test during, and only during, the specified time as announced by the examiner in charge.

You are to record your answers on a separate answer sheet rather than on the pages of the test booklet. Instead of writing down your answers in the usual manner, you will record each answer by blackening the space between a pair of lines. *Do not make any marks or record any answers on the pages of this test booklet.*

Your answer sheet will be scored accurately if you observe carefully the following directions:

1. On the answer sheet, find the *section* which corresponds to the practice problems or test proper on which you are working.

2. Then find the *row of answer spaces* which is numbered the same as the question you are answering.

3. Then find the *pair of dotted lines* which corresponds to the answer you choose and blacken the space.

MISPLACED ANSWERS ARE COUNTED AS WRONG ANSWERS.

4. Indicate each answer with SOLID BLACK PENCIL MARKS drawn vertically between the two dotted lines. Solid black marks are made by going over each mark two or three times and by pressing firmly on the pencil.

5. Make your marks as long as the dotted lines.

6. If you change your answer, erase your first mark completely.

7. Make no unnecessary marks in or around the dotted lines.

8. Keep your answer sheet on a hard surface while marking your answers.

9. Make no folds or creases in the answer sheets.

10. *No scratch paper* is allowed in any of these tests. The answer sheet contains a special section which may be used for scribbling.

11. Fold the pages of your test booklet back so that *only one page is visible*. Place the test booklet to the left. Keep the answer sheet under the test booklet so that the answer spaces being marked are as close as possible to the questions being answered.

(Omit the next paragraph unless the tests are to be machine-scored.)

The examination will be scored by an electric test-scoring machine, which makes use of the fact that a solid black pencil mark will carry a current of electricity in the same way that a copper wire does. **LIGHT PENCIL MARKS MADE WITH A HARD PENCIL WILL NOT CARRY A CURRENT OF ELECTRICITY!** The machine will not give you a correct score unless you indicate your answers with solid black pencil marks made with the *special* pencil which is provided. Do not use any pencil other than the special one provided. The machine cannot distinguish between intended answers and stray pencil marks. If you are careless in erasing, or if you leave unnecessary marks on or near the pairs of lines, such marks may be counted by the machine as wrong answers so that your score will be lower than it should be.

Wait until the examiner gives the starting signal for the first set of practice problems.

Same-Opposite

PRACTICE PROBLEMS

The word at the left in the following line is "many."

- | | | | | |
|---------|---------|---------|----------|----------|
| 1. many | (1) ill | (2) few | (3) down | (4) sour |
|---------|---------|---------|----------|----------|

One of the four words at the right means either the *same* as or the *opposite* of "many." The word "few," which is numbered 2, is the opposite of "many." In the section of the answer sheet labeled "SAME-OPPOSITE, Practice Problems, Page 3," space number 2 in the first row has been blackened.

The word at the left in the second example is "ancient." Select one of the four words at the right that means the *same* as or the *opposite* of "ancient." In the second row on the answer sheet, blacken the space which corresponds to the answer you have selected.

- | | | | | |
|------------|---------|----------|-----------|---------|
| 2. ancient | (1) dry | (2) long | (3) happy | (4) old |
|------------|---------|----------|-----------|---------|

You should have blackened the space numbered 4, because 4 corresponds to "old," which means the same as "ancient."

In each of the following lines select the word that means the *same* as or the *opposite* of the word at the left. On the answer sheet, blacken the space which corresponds to the answer you have selected.

- | | | | | |
|------------|------------|-------------|-------------|------------|
| 3. deep | (1) blue | (2) shallow | (3) tense | (4) watery |
| 4. awkward | (1) clumsy | (2) loyal | (3) passive | (4) young |
| 5. hot | (1) dry | (2) cooked | (3) red | (4) cold |

When the starting signal is given (not yet), turn the page and work more problems of the same kind. Work rapidly because your rating will be the total number of correct answers. You may not be able to finish in the time allowed.

Stop here. Wait for the signal.

In each row, select the word at the right which means the *same* as or the *opposite* of the first word in the row. Blacken the space which corresponds to the word you have selected.

SAME-OPPOSITE

1. agreeable	(1) new	(2) stalwart	(3) dark	(4) pleasant	26. inimitable	(1) matchless	(2) optical	(3) outlined	(4) parental
2. legendary	(1) unselfish	(2) true	(3) pleasant	(4) noisy	27. austere	(1) narrow	(2) stern	(3) unhappy	(4) vile
3. elderly	(1) drab	(2) brotherly	(3) absurd	(4) youthful	28. evil	(1) heedless	(2) frantic	(3) volatile	(4) pernicious
4. seasonable	(1) dutiful	(2) dauntless	(3) timely	(4) gracious	29. skeptical	(1) vague	(2) believing	(3) constant	(4) unwise
5. tremendous	(1) brilliant	(2) crude	(3) slight	(4) past	30. incessant	(1) demandable	(2) intermittent	(3) foreign	(4) unhappy
6. nonchalant	(1) actual	(2) indifferent	(3) varied	(4) unruly	31. suave	(1) prevalent	(2) neuter	(3) old	(4) brusque
7. variable	(1) conquered	(2) shifting	(3) bitter	(4) sudden	32. romantic	(1) facial	(2) subdued	(3) judicial	(4) prosaic
8. respectful	(1) deferential	(2) physical	(3) remedial	(4) several	33. energetic	(1) apathetic	(2) balmy	(3) criminal	(4) heroic
9. barbarous	(1) tidal	(2) haughty	(3) cultured	(4) abrupt	34. buoyant	(1) dejected	(2) bestial	(3) clear	(4) savage
10. zestful	(1) stormy	(2) tough	(3) eager	(4) lengthy	35. cavernous	(1) matted	(2) smooth	(3) unsuitable	(4) hollow
11. important	(1) adequate	(2) dishonest	(3) trifling	(4) open	36. effectual	(1) tired	(2) unarmed	(3) wide	(4) adequate
12. staunch	(1) cozy	(2) uneven	(3) unwavering	(4) stupid	37. seemly	(1) poetic	(2) scribbled	(3) local	(4) fit
13. brawny	(1) clever	(2) dim	(3) hazy	(4) puny	38. solicitous	(1) natural	(2) fearless	(3) thoughtful	(4) calm
14. absolute	(1) ungainly	(2) eligible	(3) gaudy	(4) partial	39. intense	(1) likely	(2) supple	(3) vivid	(4) respectful
15. raw	(1) silken	(2) slick	(3) cooked	(4) stale	40. formidable	(1) mystic	(2) obscene	(3) menacing	(4) nodal
16. aqueous	(1) literal	(2) watery	(3) manual	(4) informal	41. precocious	(1) nodding	(2) hairy	(3) endless	(4) backward
17. sublime	(1) liberal	(2) straight	(3) exalted	(4) brisk	42. sinister	(1) auspicious	(2) settled	(3) diligent	(4) tacit
18. immense	(1) prodigious	(2) bloody	(3) wistful	(4) vulgar	43. ignominious	(1) indecisive	(2) degrading	(3) forward	(4) inconstant
19. elastic	(1) trivial	(2) resilient	(3) valid	(4) humorous	44. canonical	(1) flushed	(2) willful	(3) orthodox	(4) frozen
20. ethical	(1) perishable	(2) moral	(3) eloquent	(4) garish	45. staid	(1) frivolous	(2) open	(3) tabular	(4) harsh
21. turbulent	(1) eastern	(2) selective	(3) interested	(4) peaceful	46. pungent	(1) sleepy	(2) bland	(3) doleful	(4) lavish
22. envious	(1) spicy	(2) brainless	(3) covetous	(4) vain	47. impeccable	(1) fearless	(2) grudging	(3) faultless	(4) secret
23. fastidious	(1) musical	(2) famed	(3) negligent	(4) early	48. furtive	(1) drab	(2) rugged	(3) stealthy	(4) placid
24. sorrowful	(1) tolerant	(2) blunt	(3) unsteady	(4) blithe	49. cognizant	(1) next	(2) acquired	(3) unofficial	(4) unaware
25. transient	(1) glib	(2) sensitive	(3) surly	(4) fleeting	50. ductile	(1) plenteous	(2) regional	(3) flexible	(4) silent

Completion

PRACTICE PROBLEMS

Look at the following definition. You are to think of the word that fits the definition.

- 1. A contest of speed.**

B F M P R

The word is *race*. The letter *R* is the first letter in the word *race*. In the section of the answer sheet labeled "COMPLETION, Practice Problems, Page 5," the space indicated by *R* in the first row has been blackened.

Blacken the space corresponding to the first letter of the word which fits the following definition.

- 2. A place or building for athletic exercises.**

C D G H T

The word is *gymnasium*. You should have marked *G* because it is the first letter in the word *gymnasium*.

Do the following examples in the same way:

- 3. The thin cutting part of an instrument, as of a knife or sword.**

A B D H W

- 4. The wife of a king.**

F N P Q V

- 5. A small or portable bed, as of canvas stretched on a frame.**

C H N P T

When the starting signal is given (not yet), turn the page and work more problems of the same kind. Work rapidly because your rating will be the total number of correct answers. You may not be able to finish in the time allowed.

Stop here. Wait for the signal.

Think of the word that fits the definition. Then mark the first letter of that word on the answer sheet.

COMPLETION

1. A fertile or green spot in a waste or desert.
L N O T U

2. The missile weapon used with a bow.
A G N R U

3. The part of a house appropriated to the care of children.
D F H L N

4. A feast, often ceremonious and followed by speeches.
A B E H J

5. The early part of the day.
C H J M P

6. Time that is to come.
B D F G I

7. The sixtieth part of an hour.
L M N O P

8. Explanation of the meaning of a word.
A B D F J

9. A fastening, as for a door, operated by a key.
C G I J L

10. A period of one hundred years.
B C D F G

11. A fluid preparation, as of the essence of flowers, used for scenting.
M P R U V

12. A seat for a rider on a horse's back.
C D J R S

13. A missile, usually of lead, to be shot from a small firearm.
A B D E H

14. A small elementary book for teaching children to read.
D F K L P

15. An enclosing border of a picture.
A C D F I

16. One who violates his allegiance and betrays his country.
D G P T U

17. A place devoted to experimental study in any science.
A D E F L

18. The price of transportation for a person.
B F H K O

19. A stopper for a bottle to prevent the flow of liquid.
C D G H M

20. A bride's personal outfit, as of clothes, jewelry, etc.
E G K M T

21. Memoirs of one's life written by oneself.
A F K S U

22. A thickly populated street marked by wretched living conditions.
F J S U V

23. A child in the first period of life.
G H I L M

24. A human head represented sidewise.
H N P R W

25. A roundabout way temporarily replacing part of a route.
C D G O V

26. A person who retires from society and lives in solitude.
B D F H K

27. One who performs daring gymnastic feats.
A E I O U

28. The official residence of a sovereign.
D E J O P

29. A first public appearance, as of an actor.
A C D H M

30. One who travels to some holy place as a devotee.
A F H N P

Think of the word that fits the definition. Then mark the first letter of that word on the answer sheet.

COMPLETION

- | | |
|---|---|
| 31. One who enters into, or offers himself for, any service of his own free will.
D J K U V | 46. A very large funnel used as a speaking trumpet.
E J M N R |
| 32. A three-wheeled vehicle propelled by pedals.
D F N T W | 47. The natural abode of an animal or plant.
B H I J U |
| 33. The long projecting nose of a beast, as of swine.
L R S U V | 48. One without means except such as come from charity.
A K P U Y |
| 34. An instrument used for looking out over the water from a submerged submarine.
A G N P W | 49. The spirit, usage, or manners of knighthood.
A C D I N |
| 35. A person, animal, or plant that has reached maturity.
A C I N T | 50. One who is inclined to put the least favorable construction upon actions and happenings.
H J P R S |
| 36. An imaginary circle dividing the earth's surface into the northern and southern hemispheres.
A B D E F | 51. A kind of very large nail.
C I S U W |
| 37. A distinguishing mark, device, or symbol used on merchandise.
A G J T V | 52. A light spear for hurling.
C F H J K |
| 38. A lure to catch fish or other animals.
B J K O V | 53. The resistance to motion between two surfaces in contact.
B C D E F |
| 39. The working room of a painter or sculptor.
C J K P S | 54. A specified or regular course of study.
C M N O T |
| 40. A glass in one compartment of a window frame.
C E H P T | 55. A short fictitious narrative from which a moral or spiritual truth is drawn.
G H N P U |
| 41. A visible mass of fog or haze suspended at a height in the air.
B C G L O | 56. A small shrill flute.
E H J M P |
| 42. The malicious burning of property.
A E K O U | 57. One who works in stone.
D F M R Y |
| 43. Prolonged inability to obtain due sleep.
G H I J K | 58. A representation of the outlines of an object filled in with some uniform color.
G L N S W |
| 44. Recovery, especially gradual recovery, of health after sickness.
A B C D E | 59. A soft pillow or pad to rest on or against.
A C F L O |
| 45. A unit of weight for precious stones, especially diamonds and pearls.
A C H N T | 60. The mass of leafage of a plant as produced in nature.
A E F J R |

Stop here.

Find the correct answer to each problem below. Then blacken the corresponding space on the answer sheet.

1. Twelve girls rented a cottage for 3 months at \$40 per month. What was the total rent paid by each girl?
 (a) \$3.33 (b) \$9.00 (c) \$10.00 (d) \$12.66 (e) \$120.00
2. If $3\frac{1}{2}$ tons of coal cost \$21, what will $7\frac{1}{2}$ tons cost?
 (a) \$9.80 (b) \$42 (c) \$45 (d) \$75 (e) \$98
3. A has \$320, B has $\frac{1}{4}$ as much as A, and C has $\frac{1}{2}$ as much as A and B together. How much have all together?
 (a) \$400 (b) \$480 (c) \$500 (d) \$520 (e) \$600
4. A tank which holds 260 gallons of oil is $\frac{1}{4}$ full. How many gallons of oil are needed to fill the tank?
 (a) 65 (b) 195 (c) 200 (d) 205 (e) 220
5. A boy walked for $2\frac{1}{4}$ hours. He started at 10 minutes to 9 o'clock. When did he finish?
 (a) 10:35 (b) 11:05 (c) 11:20 (d) 11:55 (e) 12:05
6. Ray raised 60 heads of cabbage averaging 5 pounds each. He sold them at \$.03 a pound. He spent \$1.25 for plants and \$.58 for fertilizer. What was his profit?
 (a) \$6.17 (b) \$6.67 (c) \$7.17 (d) \$7.27 (e) \$7.87
7. If it takes 8 barrels of oil at \$1.35 per barrel to sprinkle $\frac{1}{2}$ mile of road, how much will oil cost for 5 miles?
 (a) \$27 (b) \$54 (c) \$81 (d) \$90 (e) \$108
8. In a fort there are 60 men and enough food to keep the 60 men for 20 days. If 20 new men come and 40 of the first go, how many days will the food last?
 (a) 10 (b) 20 (c) 30 (d) 40 (e) 60
9. A grocer bought 160 boxes of berries. From the first 8 boxes examined he had to throw away 1 box. At this rate, how many boxes will he be able to sell?
 (a) 20 (b) 21 (c) 120 (d) 139 (e) 140
10. A U-boat makes 8 miles an hour under water and 15 miles an hour on the surface. How many hours will it take to cross a 100-mile channel, if it has to go $\frac{2}{5}$ of the way under water?
 (a) 4 (b) 5 (c) 6 (d) 8 (e) 9

ARITHMETIC

11. Two carpenters received \$150 for the work they did on a house. One worked 20 days and the other 30 days. How much more did one get than the other?
 (a) \$30 (b) \$35 (c) \$40 (d) \$45 (e) \$50
12. Soldiers march 2 feet 6 inches per step and take 100 steps to the minute. How many feet do they march in $\frac{1}{2}$ of an hour?
 (a) 1000 (b) 1250 (c) 1320 (d) 1500 (e) 1600
13. If $\frac{2}{3}$ of a yard of silk costs \$3, how many yards can be bought for \$22.50?
 (a) 4 (b) 5 (c) $5\frac{1}{2}$ (d) $5\frac{2}{3}$ (e) $7\frac{1}{2}$
14. John has 4 times as many marbles as James, and together they have 75 marbles. If Henry buys $\frac{1}{6}$ of John's marbles and $33\frac{1}{3}$ per cent of James', how many will he gain?
 (a) 10 (b) 12 (c) 15 (d) 17 (e) 23
15. The average person attends school 1,080 days. What part of a 12-year course does he complete, counting 180 days as a school year?
 (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{5}{8}$ (d) $\frac{2}{3}$ (e) $\frac{3}{4}$
16. A fruit dealer buys 10 dozen oranges for \$2.40. If two dozen spoil, at what price per dozen must he sell the good ones to gain $\frac{1}{3}$ of the whole cost?
 (a) \$.20 (b) \$.25 (c) \$.30 (d) \$.33 (e) \$.40
17. If a fowl loses $\frac{1}{3}$ in dressing, how many pounds of undressed fowl will be necessary to dress 9 pounds?
 (a) 12 (b) $12\frac{1}{2}$ (c) $13\frac{1}{2}$ (d) 15 (e) 18
18. A can do a piece of work in 8 days, while B would take 20 days. After A has worked alone for 3 days, how many days will it take B to finish the work?
 (a) 8 (b) 9 (c) 10 (d) 12 (e) $12\frac{1}{2}$
19. Five lamp posts are placed along a street 35 yards apart. How many yards is the first lamp post from the last?
 (a) 95 (b) 140 (c) 175 (d) 420 (e) 525
20. If $\frac{3}{4}$ of A's money equals $\frac{1}{2}$ of B's money, and they have \$40 together, how much has A?
 (a) \$8 (b) \$10 (c) \$12 (d) \$16 (e) \$24

Number Series

PRACTICE PROBLEMS

The numbers in each series proceed according to some rule. For each series you are to find the *next number*.

In the first series below, each number is 2 larger than the preceding number. The *next number* in the series would be 14. Of the five answers at the right, answer (e) is, therefore, correct. In the section of the answer sheet labeled "NUMBER SERIES, Practice Problems, Page 11," space (e) in the first row has been blackened.

	Series						Next Number					
1.	2	4	6	8	10	12		10	11	12	13	14
								(a)	(b)	(c)	(d)	(e)

Find the rule in the series below, and blacken one of the answer spaces in the second row on the answer sheet.

2.	20	19	18	17	16	15		10	12	14	15	16
								(a)	(b)	(c)	(d)	(e)

Each number in this series is 1 less than the preceding number. You should have blackened space (c), which corresponds to 14, the next number in the series.

Find the rule in the series below, and blacken the space on the answer sheet which corresponds to the next number.

3.	10	8	11	9	12	10		9	10	11	12	13
								(a)	(b)	(c)	(d)	(e)

The series above goes by alternate steps of subtracting 2 and adding 3. You should have blackened space (e), which corresponds to 13, the next number.

In each series below, find the rule and blacken the space on the answer sheet which corresponds to the next number. There is a different rule for each series. Go right ahead. Do not wait for any signal.

4.	8	11	14	17	20	23		10	13	23	25	26
								(a)	(b)	(c)	(d)	(e)
5.	27	27	23	23	19	19		15	16	17	18	19
								(a)	(b)	(c)	(d)	(e)
6.	16	17	19	20	22	23		18	20	22	24	25
								(a)	(b)	(c)	(d)	(e)

When the starting signal is given (not yet), turn the page and work more problems of the same kind. Work rapidly because your rating will be the total number of correct answers. You may not be able to finish in the time allowed.

Stop here. Wait for the signal.

Find the rule in each problem below and blacken the space which corresponds to the next number.

NUMBER SERIES

1. 14 18 22 26 30 34 38	39 (a) (b) (c) (d) (e)	40 (a) (b) (c) (d) (e)	41 (a) (b) (c) (d) (e)	42 (a) (b) (c) (d) (e)	43 (a) (b) (c) (d) (e)	16. 100 90 81 73 66 60 55	46 (a) (b) (c) (d) (e)	50 (a) (b) (c) (d) (e)	51 (a) (b) (c) (d) (e)	52 (a) (b) (c) (d) (e)	53 (a) (b) (c) (d) (e)
2. 7 10 9 12 11 14 13	12 (a) (b) (c) (d) (e)	14 (a) (b) (c) (d) (e)	16 (a) (b) (c) (d) (e)	18 (a) (b) (c) (d) (e)	20 (a) (b) (c) (d) (e)	17. 12 6 8 16 14 7 9	7 (a) (b) (c) (d) (e)	11 (a) (b) (c) (d) (e)	12 (a) (b) (c) (d) (e)	18 (a) (b) (c) (d) (e)	36 (a) (b) (c) (d) (e)
3. 17 20 23 26 29 32 35	36 (a) (b) (c) (d) (e)	37 (a) (b) (c) (d) (e)	38 (a) (b) (c) (d) (e)	39 (a) (b) (c) (d) (e)	40 (a) (b) (c) (d) (e)	18. 4 8 9 18 22 23 46	48 (a) (b) (c) (d) (e)	50 (a) (b) (c) (d) (e)	69 (a) (b) (c) (d) (e)	70 (a) (b) (c) (d) (e)	90 (a) (b) (c) (d) (e)
4. 8 12 11 15 14 18 17	16 (a) (b) (c) (d) (e)	18 (a) (b) (c) (d) (e)	20 (a) (b) (c) (d) (e)	21 (a) (b) (c) (d) (e)	24 (a) (b) (c) (d) (e)	19. 40 42 21 24 8 12 3	1 (a) (b) (c) (d) (e)	4 (a) (b) (c) (d) (e)	6 (a) (b) (c) (d) (e)	7 (a) (b) (c) (d) (e)	8 (a) (b) (c) (d) (e)
5. 20 18 21 17 22 16 23	9 (a) (b) (c) (d) (e)	12 (a) (b) (c) (d) (e)	15 (a) (b) (c) (d) (e)	21 (a) (b) (c) (d) (e)	24 (a) (b) (c) (d) (e)	20. 9 12 8 10 13 9 11	10 (a) (b) (c) (d) (e)	11 (a) (b) (c) (d) (e)	14 (a) (b) (c) (d) (e)	16 (a) (b) (c) (d) (e)	17 (a) (b) (c) (d) (e)
6. 72 36 40 20 24 12 16	4 (a) (b) (c) (d) (e)	8 (a) (b) (c) (d) (e)	12 (a) (b) (c) (d) (e)	16 (a) (b) (c) (d) (e)	20 (a) (b) (c) (d) (e)	21. 40 33 27 21 16 11 7	1 (a) (b) (c) (d) (e)	2 (a) (b) (c) (d) (e)	3 (a) (b) (c) (d) (e)	5 (a) (b) (c) (d) (e)	7 (a) (b) (c) (d) (e)
7. 8 6 4 12 10 8 16	6 (a) (b) (c) (d) (e)	10 (a) (b) (c) (d) (e)	12 (a) (b) (c) (d) (e)	14 (a) (b) (c) (d) (e)	16 (a) (b) (c) (d) (e)	22. 4 5 7 4 8 13 7	14 (a) (b) (c) (d) (e)	15 (a) (b) (c) (d) (e)	16 (a) (b) (c) (d) (e)	21 (a) (b) (c) (d) (e)	22 (a) (b) (c) (d) (e)
8. 2 4 12 14 42 44 132	133 (a) (b) (c) (d) (e)	134 (a) (b) (c) (d) (e)	260 (a) (b) (c) (d) (e)	268 (a) (b) (c) (d) (e)	396 (a) (b) (c) (d) (e)	23. 44 40 42 14 10 12 4	0 (a) (b) (c) (d) (e)	2 (a) (b) (c) (d) (e)	6 (a) (b) (c) (d) (e)	7 (a) (b) (c) (d) (e)	10 (a) (b) (c) (d) (e)
9. 82 73 64 55 46 37 28	14 (a) (b) (c) (d) (e)	18 (a) (b) (c) (d) (e)	19 (a) (b) (c) (d) (e)	20 (a) (b) (c) (d) (e)	27 (a) (b) (c) (d) (e)	24. 2 3 5 5 10 11 13	13 (a) (b) (c) (d) (e)	15 (a) (b) (c) (d) (e)	16 (a) (b) (c) (d) (e)	26 (a) (b) (c) (d) (e)	28 (a) (b) (c) (d) (e)
10. 0 1 3 6 10 15 21	23 (a) (b) (c) (d) (e)	25 (a) (b) (c) (d) (e)	28 (a) (b) (c) (d) (e)	29 (a) (b) (c) (d) (e)	30 (a) (b) (c) (d) (e)	25. 20 2 12 60 6 16 80	2 (a) (b) (c) (d) (e)	4 (a) (b) (c) (d) (e)	6 (a) (b) (c) (d) (e)	8 (a) (b) (c) (d) (e)	100 (a) (b) (c) (d) (e)
11. 4 5 6 7 5 6 7	3 (a) (b) (c) (d) (e)	6 (a) (b) (c) (d) (e)	7 (a) (b) (c) (d) (e)	8 (a) (b) (c) (d) (e)	9 (a) (b) (c) (d) (e)	26. 4 6 3 7 9 6 10	4 (a) (b) (c) (d) (e)	7 (a) (b) (c) (d) (e)	12 (a) (b) (c) (d) (e)	14 (a) (b) (c) (d) (e)	16 (a) (b) (c) (d) (e)
12. 18 20 17 21 16 22 15	8 (a) (b) (c) (d) (e)	17 (a) (b) (c) (d) (e)	21 (a) (b) (c) (d) (e)	23 (a) (b) (c) (d) (e)	30 (a) (b) (c) (d) (e)	27. 10 6 24 28 7 3 12	3 (a) (b) (c) (d) (e)	6 (a) (b) (c) (d) (e)	16 (a) (b) (c) (d) (e)	24 (a) (b) (c) (d) (e)	48 (a) (b) (c) (d) (e)
13. 8 9 12 13 15 16 19	17 (a) (b) (c) (d) (e)	20 (a) (b) (c) (d) (e)	21 (a) (b) (c) (d) (e)	23 (a) (b) (c) (d) (e)	24 (a) (b) (c) (d) (e)	28. 7 9 12 8 3 9 16	8 (a) (b) (c) (d) (e)	9 (a) (b) (c) (d) (e)	19 (a) (b) (c) (d) (e)	23 (a) (b) (c) (d) (e)	24 (a) (b) (c) (d) (e)
14. 20 16 8 24 20 10 30	15 (a) (b) (c) (d) (e)	23 (a) (b) (c) (d) (e)	26 (a) (b) (c) (d) (e)	28 (a) (b) (c) (d) (e)	90 (a) (b) (c) (d) (e)	29. 95 92 46 42 21 16 8	2 (a) (b) (c) (d) (e)	4 (a) (b) (c) (d) (e)	6 (a) (b) (c) (d) (e)	8 (a) (b) (c) (d) (e)	10 (a) (b) (c) (d) (e)
15. 7 4 12 15 5 2 6	0 (a) (b) (c) (d) (e)	1 (a) (b) (c) (d) (e)	5 (a) (b) (c) (d) (e)	6 (a) (b) (c) (d) (e)	9 (a) (b) (c) (d) (e)	30. 9 3 8 4 7 5 6	4 (a) (b) (c) (d) (e)	5 (a) (b) (c) (d) (e)	6 (a) (b) (c) (d) (e)	7 (a) (b) (c) (d) (e)	8 (a) (b) (c) (d) (e)

AMERICAN COUNCIL ON EDUCATION

COOPERATIVE ALGEBRA TEST

ELEMENTARY ALGEBRA THROUGH QUADRATICS
REVISED SERIES FORM R

by

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and LEONE E. CHESIRE, Cooperative Test Service

with the editorial assistance of

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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 algebra course you are now taking..... Instructor.....

In what grade did you begin the study of algebra?.....

Number of years you have studied algebra (one semester = $\frac{1}{2}$ year; one quarter = $\frac{1}{3}$ year).....

General Directions: Do not turn this page until the examiner tells you to do so. This examination consists of three parts, and requires 40 minutes of working time. The directions for each part are printed at the beginning of the part. Read them carefully, and proceed at once to answer the questions. DO NOT SPEND TOO MUCH TIME ON ANY ONE ITEM. ANSWER THE EASIER QUESTIONS FIRST; then return to the harder ones if you have time. There is a time limit for each part. You are not expected to answer all the questions in any part in the time limit; but if you should, go on to the next part. If you have not finished Part I when the time is up, stop work on that part and proceed at once to Part II. If you finish the last part before the time is up, you may go back and work on any part. No questions may be asked after the examination has begun.

You may answer questions 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.

Part	I	II	III	Total
Minutes	15	10	15	40

Scaled Score	Percentile

PART I

Directions: Each problem below is followed by five answers, only one of which is correct. By working each problem find the correct answer and put its **number** in the parentheses at the right.

1. $5a - 3a$ equals

1-1 $-2a$
1-2 $2a$
1-3 $-8a$
1-4 $8a$
1-5 $-15a$

2. $\frac{r}{r}$ equals

2-1 1
2-2 r
2-3 $\frac{1}{2}r$
2-4 0
2-5 r^2

3. What is the quotient when $-12b^{10}c^4$ is divided by $-6b^2c^4$?

3-1 $2b^8$
3-2 $-2b^5$
3-3 $2b^5$
3-4 $-2b^8$
3-5 $2b^8c$

4. What is the sum of $3.5c$ and $21.34c$?

4-1 13.66c
4-2 17.84c
4-3 21.69c
4-4 24.84c
4-5 $74.69c^2$

5. What is the result when $-13b^4$ is subtracted from $5b^4$?

5-1 $-18b^8$
5-2 $18b^4$
5-3 $8b^4$
5-4 $-8b^4$
5-5 $-8b^8$

6. Express $b^2 - 16$ as the product of two factors.

6-1 $(b - 4)(b - 4)$
6-2 $(b - 4)(b + 4)$
6-3 $(b + 4)(b + 4)$
6-4 $(b + 2)(b - 8)$
6-5 $(b - 1)(b + 16)$

7. If $\frac{5m + 1}{4} = 9$, what does m equal?

7-1 $\frac{6}{5}$
7-2 7
7-3 $\frac{7}{5}$
7-4 8
7-5 11

8. If $7n - 5p = 2$, what is the value of p when n equals 6?

8-1 8
8-2 -8
8-3 $\frac{4}{5}$
8-4 4
8-5 $\frac{4}{7}$

9. What is the product of $3n^4$ and $4n^2$?

9-1 $\frac{3}{4}n^2$
9-2 $\frac{4}{3}n^2$
9-3 $7n^6$
9-4 $12n^6$
9-5 $12n^8$

10. Simplify $17n + 5 - 3(4n - 3)$ by removing the parentheses and combining like terms.

10-1 $29n + 14$
10-2 $13n + 2$
10-3 $5n + 14$
10-4 $5n + 8$
10-5 $5n - 4$

11. If $r = 2$, $s = -1$, and $t = -3$, what is the numerical value of $4r - 3s + 2t$?

11-1 -1
11-2 11
11-3 17
11-4 8
11-5 5

12. If $5k - 1 - (3k + 4) = 9$, what does k equal?

12-1 $\frac{1}{2}$
12-2 2
12-3 3
12-4 6
12-5 7

Go on to the next page.

13. If $\frac{4m+5}{3} = \frac{7m+6}{5}$, what does m equal?

13-1 $\frac{1}{41}$

13-2 $\frac{1}{15}$

13-3 - 7

13-4 7

13-5 43 13()

14. The relation between k and n is indicated by the formula $k = \frac{3}{2}n + 50$. What is the value of k when n equals - 30?

14-1 95

14-2 $-53\frac{1}{3}$

14-3 - 45

14-4 30

14-5 5 14()

15. Combine $8\sqrt{7} - 3\sqrt{7} + \sqrt{7}$.

15-1 6

15-2 $6\sqrt{7}$

15-3 $12\sqrt{7}$

15-4 $5\sqrt{7}$

15-5 5 15()

16. If $4s + t = 40$ and $s - t = 5$, what does s equal?

16-1 15

16-2 $11\frac{2}{3}$

16-3 9

16-4 8

16-5 7 16()

17. If the graph of the equation $4x + 3y = 3$ passes through the point $(k, - 7)$, what is the value of k?

17-1 $10\frac{1}{3}$

17-2 $-8\frac{1}{3}$

17-3 6

17-4 8

17-5 $-4\frac{1}{2}$ 17()

18. Change $\frac{3an - 9a^2}{n^2 - 9a^2}$ to lowest terms.

18-1 $\frac{3a}{n - 3a}$

18-2 $\frac{3a}{n + 3a}$

18-3 $\frac{1}{n}$

18-4 $\frac{3a}{n}$

18-5 $\frac{n - 3a}{n(n + 3a)}$ 18()

19. What is the positive square root of $64x^{16}$?

19-1 $8x^8$

19-2 $8x^{16}$

19-3 $8x^4$

19-4 $4x^4$

19-5 $16x^4$ 19()

20. Simplify $49^{\frac{1}{3}} - 27^{\frac{1}{3}}$.

20-1 10

20-2 - 2

20-3 $15\frac{1}{2}$

20-4 4

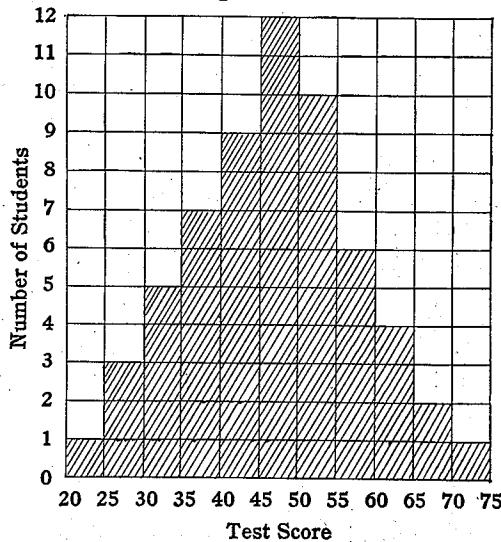
20-5 $22\frac{1}{6}$ 20()

Go on to the next part.

PART II

Directions: Continue as in the preceding part.

Frequency of Scores Made by 60 Students on an Algebra Test

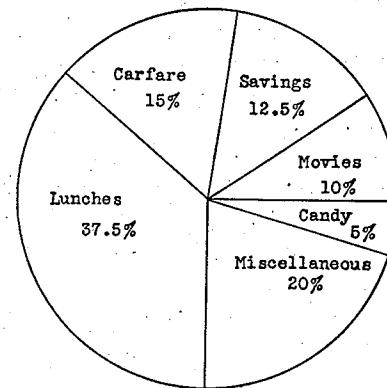


1. The graph above shows that the largest number of students have scores in the interval
 1-1 20-25
 1-2 40-45
 1-3 45-50
 1-4 50-55
 1-5 70-75 1()

2. Charles paid 20¢, 30¢, 25¢, and 35¢ for lunches Monday through Thursday in the school cafeteria. What did he pay for lunch on Friday if his average for the week was 25¢?
 2-1 15¢
 2-2 20¢
 2-3 25¢
 2-4 27¢
 2-5 30¢ 2()

3. The number of people present at a baseball game if the receipts were d dollars and each person paid c dollars admission was
 3-1 cd
 3-2 $d-c$
 3-3 $c-d$
 3-4 $\frac{d}{c}$
 3-5 $\frac{c}{d}$ 3()

4. Tom cut x yards of cord into pieces one foot long. How many pieces should he have?
 4-1 $\frac{x}{3}$
 4-2 $3x$
 4-3 x
 4-4 $\frac{x}{12}$
 4-5 $12x$ 4()
5. The interest on x dollars for one year at 3% simple interest is
 5-1 $\frac{x}{.03}$ dollars
 5-2 $x - .03$ dollars
 5-3 $1.03x$ dollars
 5-4 $x + .03$ dollars
 5-5 $.03x$ dollars 5()
6. If Robert had \$6 more he would have as much money as John. Together they have \$80. How much money has Robert?
 6-1 \$37
 6-2 \$40
 6-3 \$43
 6-4 \$74
 6-5 \$86 6()



7. Dan earns \$4 each week. If he spends it as indicated in the circle graph above, how much money does he save each week?
 7-1 67¢
 7-2 50¢
 7-3 40¢
 7-4 $12\frac{1}{2}$ ¢
 7-5 5¢ 7()

Go on to the next page.

8. Central High School scored 24 points in a football game. If they made n points in the first quarter, twice as many points in the second quarter, the same number of points in the third quarter as in the first, but failed to score in the last quarter, how many points did they score in the second quarter?

8-1 6
8-2 8
8-3 12
8-4 16
8-5 18 8()

9. Three newsboys challenge one another to a ten-minute paper-selling contest. John sells 4 fewer papers than Harry, and Bill sells twice as many as John. All three together sell 108 papers. If Harry sells x papers, which equation would you use to find x ?

9-1 $3x - 8 = 108$
9-2 $3x - 12 = 108$
9-3 $4x - 8 = 108$
9-4 $4x + 4 = 108$
9-5 $4x - 12 = 108$ 9()

10. The length of a given rectangle is 4 times its width. If w is the width in inches, what is the area of the rectangle?

10-1 w^4 sq in.
10-2 $10w$ sq in.
10-3 $4w^2$ sq in.
10-4 $4w$ sq in.
10-5 $5w$ sq in. 10()

11. A railway ticket for a journey of 60 mi costs x dollars. If the cost is directly proportional to the distance traveled, what would you pay for a ticket for a trip of 200 mi?

11-1 $\frac{200x}{60}$ dollars
11-2 $\frac{60(200)}{x}$ dollars
11-3 $60(200)x$ dollars
11-4 $\frac{200}{60x}$ dollars
11-5 $\frac{60x}{200}$ dollars 11()

x	2	4	6	8	10
y	1	3	5	7	9

12. The table above gives values of y corresponding to values of x . The equation showing the relationship between x and y is

12-1 $y = \frac{x}{2}$
12-2 $y = 2x$
12-3 $y = x + 1$
12-4 $y = x - 1$
12-5 $y = x + 2$ 12()

13. If a taxicab fare is 25¢ for the first mile and 20¢ for each additional mile, then c , the cost in cents for n miles, is represented by

13-1 $c = n(20 + 25)$
13-2 $c = 25 + 20n$
13-3 $c = (n - 1)(20 + 25)$
13-4 $c = 25 + 20(n - 1)$
13-5 $c = 25 + \frac{n}{20}$ 13()

14. The formula for the area of a rug to be used in a room l ft long and w ft wide, if a border 2 ft wide is to be left all around the room, is

14-1 $A = lw - 2$
14-2 $A = lw + 4$
14-3 $A = lw - 4$
14-4 $A = (l - 2)(w - 2)$
14-5 $A = (l - 4)(w - 4)$ 14()

15. My car cost 25% more than Mr. Smith's. If I paid x dollars for mine, what did Mr. Smith pay for his?

15-1 $\frac{100x}{125}$
15-2 $\frac{125x}{100}$
15-3 $.25x$
15-4 $x + .25x$
15-5 $x - .25x$ 15()

PART III

Directions: Continue as in the preceding part.

1. d multiplied by d equals

1-1 1

1-2 $2d$

1-3 d^2

1-4 $\frac{d}{d}$

1-5 $\frac{d}{2} \dots \dots \dots 1()$

2. The fourth power of r is

2-1 $\frac{r}{4}$

2-2 r^4

2-3 $4r$

2-4 $\sqrt[4]{r}$

2-5 $r^4 \dots \dots \dots 2()$

3. $5c + 3 - (-3c) - 4c$ equals

3-1 $12c + 3$

3-2 $-2c + 3$

3-3 $-8c$

3-4 $4c + 3$

3-5 $10c \dots \dots \dots 3()$

4. The number of weeks in r days is

4-1 $7r$

4-2 $52r$

4-3 $\frac{7}{r}$

4-4 $\frac{r}{52}$

4-5 $\frac{r}{7} \dots \dots \dots 4()$

5. If $\frac{s}{w} = t$, then w equals

5-1 $\frac{s}{t}$

5-2 $t - \frac{1}{s}$

5-3 st

5-4 $\frac{1}{t} - \frac{1}{s}$

5-5 $\frac{t}{s} \dots \dots \dots 5()$

6. $\frac{12k^5 - 15k}{-3k}$ equals

6-1 $-4k^4 + 5k$

6-2 $-4k^4 + 5$

6-3 $4k^4 - 5$

6-4 $-4k^4 - 15k$

6-5 $12k^5 + 5 \dots \dots \dots 6()$

7. If $\frac{c}{2} = \frac{n}{b}$, then b equals

7-1 $\frac{2}{c} - \frac{1}{n}$

7-2 $\frac{c}{2n}$

7-3 $\frac{n - c}{2}$

7-4 $\frac{c}{2} - n$

7-5 $\frac{2n}{c} \dots \dots \dots 7()$

8. Which one of the following is true?

8-1 $a^2 + b^2 = (a + b)(a + b)$

8-2 $(a - b)^2 = (b - a)^2$

8-3 $\frac{a^2 - b^2}{a - b} = a - b$

8-4 $(a - b)^2 = (a + b)(a - b)$

8-5 $\frac{(a - b)^2}{a + b} = a - b \dots \dots \dots 8()$

9. If $px + e = v$, then x equals

9-1 $p(v - e)$

9-2 $v - \frac{e}{p}$

9-3 $\frac{v}{p} - e$

9-4 $\frac{v - e}{p}$

9-5 $v - e - p \dots \dots \dots 9()$

10. $\frac{\sqrt{21}}{\sqrt{7}}$ equals

10-1 $\sqrt{3}$

10-2 $3\sqrt{7}$

10-3 3

10-4 $7\sqrt{3}$

10-5 $\sqrt{14} \dots \dots \dots 10()$

Go on to the next page.

11. The volume of a pyramid is one-third the area of the base times the altitude,

$V = \frac{Ba}{3}$. If the volume of a pyramid is 14 and the area of the base is x , the altitude is

11-1 $\frac{x}{42}$

11-2 $\frac{3x}{14}$

11-3 $\frac{42}{x}$

11-4 $\frac{14x}{3}$

11-5 $\frac{3}{14x} \quad 11()$

12. $\frac{5c+3}{2} - \frac{4c-5}{3}$ equals

12-1 $\frac{7c-1}{6}$

12-2 $\frac{7c+19}{6}$

12-3 $\frac{23c+19}{6}$

12-4 $\frac{-2c-9}{6}$

12-5 $\frac{c-2}{5} \quad 12()$

13. If $\frac{6}{x} = \frac{x}{4}$, one value of x is

13-1 $\frac{2}{3}$

13-2 $\frac{1}{2}$

13-3 $2\sqrt{6}$

13-4 -4

13-5 $24 \quad 13()$

14. $\frac{3}{r} + \frac{8}{z}$ equals

14-1 $\frac{3r+8z}{rz}$

14-2 $\frac{3r+8z}{r+z}$

14-3 $\frac{3z+8r}{rz}$

14-4 $\frac{3z+8r}{r+z}$

14-5 $\frac{11}{r+z} \quad 14()$

15. How many baskets, holding k apples each, can be filled from a barrel containing c apples?

15-1 $\frac{c}{k}$

15-2 $k - c$

15-3 ck

15-4 $c - k$

15-5 $\frac{k}{c} \quad 15()$

16. "When x is divided by y , the quotient is a and the remainder is $b + c$," may be expressed algebraically as

16-1 $\frac{x}{y} = a + b + c$

16-2 $\frac{x}{y} = a + \frac{b+c}{y}$

16-3 $\frac{x}{y} = a + b + c$

16-4 $\frac{x}{y} = a + y(b+c)$

16-5 $\frac{x}{y} = ay + b + c \quad 16()$

17. If $r^2 = 9d$, r equals

17-1 $\pm 9\sqrt{d}$

17-2 $\pm 3d$

17-3 $\pm 3\sqrt{d}$

17-4 $\pm 9d$

17-5 $\pm \sqrt{3d} \quad 17()$

18. If $Rx = px - 5$, then x equals

18-1 $\frac{R}{p-5}$

18-2 $\frac{-5}{R-p}$

18-3 $\frac{-5}{Rp}$

18-4 $\frac{R-p}{5}$

18-5 $R - \frac{5}{p} \quad 18()$

19. Ben is paying off a debt of D dollars in monthly installments of d dollars each. He has made x payments. Which formula tells what sum, S , he still has to pay?

19-1 $S = \frac{D}{x} - d$

19-2 $S = x(D - d)$

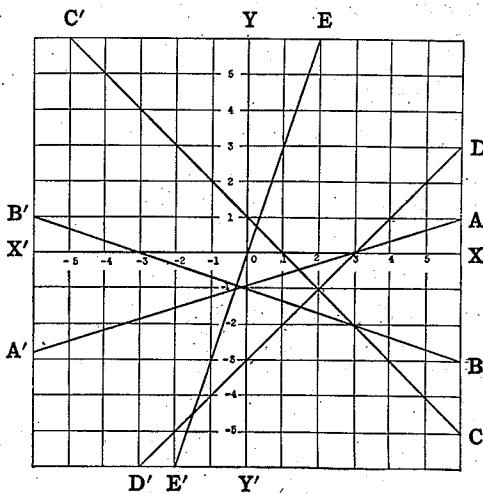
19-3 $S = D - d - x$

19-4 $S = D - xd$

19-5 $S = x\left(\frac{D}{d}\right) \quad 19()$

Go on to the next page.

Questions 20 through 24 refer to the graph below.



20. For the line DD' , when $y = -2$, x equals
 20-1 1
 20-2 -2
 20-3 0
 20-4 4
 20-5 -5 20()
21. $x - y = 3$ is the equation of line
 21-1 AA'
 21-2 BB'
 21-3 CC'
 21-4 DD'
 21-5 EE' 21()
22. $3x - y = 0$ is the equation of line
 22-1 AA'
 22-2 BB'
 22-3 CC'
 22-4 DD'
 22-5 EE' 22()
23. $x + 3y = -3$ is the equation of line
 23-1 AA'
 23-2 BB'
 23-3 CC'
 23-4 DD'
 23-5 EE' 23()

142

24. The solution of the pair of equations represented by lines BB' and CC' is

- 24-1 $x = -3, y = -2$
 24-2 $x = -3, y = 2$
 24-3 $x = -2, y = 3$
 24-4 $x = 3, y = -2$
 24-5 $x = 3, y = 2$ 24()

* * * * *

25. If $\frac{1}{a} = \frac{1}{n} + k$, then a equals

$$25-1 \frac{n}{1+nk}$$

$$25-2 n - \frac{1}{k}$$

$$25-3 n - k$$

$$25-4 n + \frac{1}{k}$$

$$25-5 \frac{1+nk}{n} 25()$$

26. The product of $c^{1/2}$ and c^2 is

- 26-1 c
 26-2 $c^{3/2}$
 26-3 $c^{-3/2}$
 26-4 $c^{5/2}$
 26-5 c^4 26()

27. The value of the fraction $\frac{100}{x+5}$

- 27-1 is doubled if x is doubled.
 27-2 is $\frac{1}{3}$ as great if x is divided by 3.
 27-3 is squared if x is squared.
 27-4 decreases when x increases.
 27-5 decreases when x decreases. . . 27()

28. Which one of the following is true?

- 28-1 $(n^a)^2 = n^{a+2}$
 28-2 $\frac{n^3}{\sqrt{n}} = n^2\sqrt{n}$
 28-3 $(-n)^4 = -(n^4)$
 28-4 $(n^3)^4 = n^7$
 28-5 $n^{-4} = (-n)^4$ 28()

Number wrong	0	3	7	11	15	19	23	27	31	35	39	43	47
Amount to be subtracted	0	1	2	3	4	5	6	7	8	9	10	11	12

Number right _____

Subtract _____
(See table above)

Raw Score = Difference _____

Scaled Score _____
(See table on key)