

THE RELATIONSHIP OF  
INTELLIGENCE, ATTITUDES, AND STUDY HABITS  
TO ACADEMIC ACHIEVEMENT

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## THESIS ABSTRACT

### Problem

The purpose of the study was to investigate the relationship between (a) academic marks and the Survey of Study Habits and Attitudes Inventory (SSHA) scores and (b) academic marks and I.Q.'s. The I.Q.'s were determined by means of the Dominion Quick-Scoring Group Test of Learning Capacity. The effects on the SSHA scores of age, interest in the results of the test, pass-fail status, and composition of class were also investigated.

### Method

The marks of the June examinations, intelligence test, and SSHA test were used to calculate (a) multiple regression equations with the academic marks as the criterion and the I.Q.'s and attitude scores as the prediction variables, (b) simple regression equations with the academic marks as the criterion variable and the I.Q.'s as the prediction variable, and (c) simple regression equations with the academic marks as the criterion variable and the SSHA scores as the prediction variable. The multiple correlation coefficients were calculated and the standard errors of estimate were determined.

The differences in means, separately for boys and girls,

of SSHA group scores were tested for significance. Comparison groups included: (a) overage students versus normal age students, (b) students who were interested in their SSHA test scores versus students who were not interested, (c) students retarded one or more grades versus students who did not fail a grade in junior high school, (d) students who failed individual June examinations versus those who did not fail in grades seven, eight or nine. In addition, the SSHA scores of boys from all-boy classes were compared with the scores of boys from mixed classes; and the SSHA scores of girls from all-girl classes were compared with the scores of girls from mixed classes.

The reliability coefficient of the SSHA test was determined and tested for significance.

### Conclusions

1. The SSHA test is a reliable instrument.
2. All the correlations between I.Q.'s and academic marks were positive and statistically significant.
3. All the correlations but two between academic marks and the SSHA scores were positive and statistically significant. The two non-significant correlations were between Social Studies and the SSHA in the girls' and boys' sections.
4. The t-tests indicated that there were no significant differences between the SSHA group means of the following groups: the boys who were overage and those who were not,

the boys who were retarded academically and those who were not, the boys who failed one or more June examinations and those who did not, and the boys who were in an all-boy class and those who were in a mixed class.

5. The t-test indicated that the boys who requested an interpretation of their SSHA scores had a significantly higher mean attitude score than the boys who did not request such an interpretation.

6. The t-test indicated that there were no significant differences between the SSHA group means of the following groups: the girls who were overage and those who were not, the girls who were retarded academically and those who were not, the girls who failed one or more June examinations and those who did not, and the girls who requested an interpretation of their SSHA scores and those who did not.

7. The t-test indicated that the girls who were in mixed classes had a higher SSHA group mean score than the girls who were in an all-girl class.

8. Regression equations were calculated separately for boys and girls. In the following regression equations  $Y_1$  is the Language mark,  $Y_2$  is the Mathematics mark,  $Y_3$  is the Science mark,  $Y_4$  is the Social Studies mark,  $X_1$  is the I.Q., and  $X_2$  is the SSHA score. The regression equations for the boys are:

$$Y_1 = .27 X_1 + .18 X_2 + 25.94$$

$$Y_2 = .60 X_1 - 6.74$$

$$Y_3 = .23 X_1 + 36.05$$

$$Y_4 = .24 X_1 + 29.02$$

The regression equations for the girls are:

$$Y_1 = .15 X_1 + .29 X_2 + 40.07$$

$$Y_2 = .49 X_1 + .51 X_2 - 11.18$$

$$Y_3 = .35 X_1 + .40 X_2 + 11.10$$

$$Y_4 = .45 X_1 + 8.02$$

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## CHAPTER I

### PURPOSE, SETTING, AND PROCEDURE OF THE STUDY

Every teacher at some time in his experience has encountered students who are backward in one or more subjects but appear to be normal mentally. Many factors are responsible for this retardation and one authority has indicated the complexity of the problem. In his discussion of the causes of educational retardation, Baker said, "There are many mild causes, drawn from a great variety of fields, and often operating in combination."<sup>1</sup>

The realization that non-intellectual factors affect academic achievement suggests two important questions. The first question is concerned with educational diagnosis, that is, with the detection, correction, and prevention of the causes of educational retardation. The second question accepts the need for educational diagnosis but concerns itself with the predictive qualities of non-intellectual factors.

In the opinion of many teachers, attitudes and study habits are factors, certainly not the only ones and possibly not the most important, which must be considered when estimating a student's future academic success. Some educators are also of the opinion that attitudes and study habits are factors which

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<sup>1</sup>Harry J. Baker, Introduction to Exceptional Children (revised edition; New York: The Macmillan Company, 1953), p. 430.

condition the learning process. Ross and Stanley<sup>2</sup> consider: physical factors; intellectual factors such as general intelligence, specific talents and deficiencies; emotional factors such as attitudes, interests, drives, and prejudices; educational factors such as work habits and background; school environment; and extra-school environment as causative factors in the learning process.

Purpose of the study.--- The purpose of this study is threefold. An attempt is made:

1. to estimate the reliability of an attitude and study habits test, the Study Habits and Attitude Inventory;#
2. to identify factors that affect the attitude and study-habits scores of students; and
3. to predict the June marks in Mathematics, Science, Social Studies, and English using I.Q. scores and study-habits and attitude scores as prediction variables.

Definition of terms.--- To ensure clarity, the following definitions are included.

"Overage" means that the student was born before December, 1946.

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<sup>2</sup>C. C. Ross and Julian C. Stanley, Measurement in Today's Schools (New York: Prentice-Hall, Inc., 1954), p. 329.

#See Appendix C for test.

An "attitude" may be considered as a state of readiness<sup>3</sup> with unique characteristics. The features that distinguish an attitude from a state of readiness are:

1. Attitudes always imply a subject-object relationship. These may be objects, persons, groups of people, or institutions.
2. Attitudes are formed in relation to objects, persons, and values which may or may not have motivational appeal at first. The fact that attitudes are not innate but are formed as a result of the individual's contact with his environment means, of course, that attitudes are learned or conditioned.
3. Attitudes have affective properties of varying degrees. The affective property of attitudes may be due to motivational origins such as hunger, sex, or may be due to non-motivational sources.
4. Attitudes are more or less enduring states of readiness, quite independent, within limits, of the momentary states of the organism. But attitudes are not absolute, fixed states of readiness. Since they are formed as a consequence of contacts, with objects, values, or norms to which they are related, they may change, disintegrate.
5. Attitudes range in number and variety of stimuli to which they are referred. The usual process is that an attitude once established, will be related by the individual to a variety of objects or situations that have not necessarily been active in its original establishment.<sup>4</sup>

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<sup>3</sup>Lee J. Cronbach, Educational Psychology (New York: Harcourt, Brace and Company, Inc., 1954), p. 74.

<sup>4</sup>Muzafer Sherif and Hadley Cantril, "The Psychology of Attitudes," Psychological Review, 52:301, 1945.

Null hypothesis.-- In statistical work it is the practice to postulate the "null hypothesis" and then as a consequence of acquired information to accept or reject it. The null hypothesis may be defined as tentative proposal that there are no differences between the parameters under consideration except those differences which are introduced by errors of random sampling.<sup>5</sup>

The following hypotheses are postulated:

1. The reliability coefficient of the Brown-Holtzman Survey of Study Habits and Attitudes ~~##~~ is not significantly different from zero.

2. There is no significant difference between the means of:

(i) the SSHA scores of students who failed one or more grades in Junior High School and students who did not fail grades in Junior High School,

(ii) the SSHA scores of students who did not fail a grade in Junior High School but who failed one or more June examinations and students who did not fail a course in Junior High School,

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<sup>5</sup>Alan E. Treloar, Biometric Analysis; An Introduction (Minneapolis: Burgess Publishing Co., 1951), p. 96.

~~##~~For convenience, the abbreviation SSHA will be used to indicate the Brown-Holtzman Survey of Study Habits and Attitudes.

- (iii) the SSHA scores of students who are overage and students who are not overage,
- (iv) the SSHA scores of students who are in mixed classes and the scores of students who are not in mixed classes, and
- (v) the SSHA scores of students who requested an interpretation of their scores and students who did not request such an interpretation.

3. There is no significant loss in ability to predict academic marks when the attitude and the study habits score is eliminated from the multiple regression equation.

Assumptions.-- The following are assumed to be true:

1. There is a linear relationship between (a) the I.Q. and the academic marks and between (b) the SSHA scores and the academic marks.
2. The Study Habits and Attitude Inventory is a valid instrument, that is, it measures attitudes and study habits.
3. The SSHA scores of the student do not change significantly during the school year.

Population.-- The populations investigated in this study are hypothetical and consist of grade nine students. One population is made up of girls and the other population is made up of boys. Furthermore, the populations are such that



the students of Hugh John Macdonald Junior High School may be considered samples of the populations.

Setting. -- The student population of the Hugh John Macdonald School for the school year 1961-1962 consisted of 179 grade nine students. There were 96 boys in this group.

The characteristics of the students showed great variation. The I.Q.'s of the girls varied from 75 to 160; the I.Q.'s of the boys varied from 77 to 138. The ages of the students showed considerable variation. The boys' ages, as at June 1962, ranged from thirteen years nine months to nineteen years one month. The girls' ages showed less variation, varying from thirteen years eight months to seventeen years five months. Thirty-four students were studying two second languages, sixty-nine students were studying one second language, and the remainder were not studying a second language.

The research sample was made up of students who took the regular courses in grades seven and eight; students who were in "slow learner" classes and who completed these grades in three years; and students who came from other schools.

The academic aspirations of the students, as recorded on their Study Habits and Attitude Inventory, are indicated below. Four per cent gave no indication of their academic plans;

one per cent would leave school after grade nine; two per cent would leave school after grade ten; eleven per cent would leave school after grade eleven; forty-six per cent would leave school after grade twelve; and thirty-three per cent hoped to go to university.

Procedure. -- The grade nine students were given the SSHA test in October 1961. After all the students had written the test they were told that they would receive an interpretation of their scores if they would contact the investigator.

The academic marks and the I.Q.'s were obtained from the Department of Education score sheets in August, 1962, and were used with the SSHA scores in the calculations.

The next chapter contains a review of the literature. The third chapter contains a description of the investigation and includes all the formulas used in the study. The fourth lists the results of the study. The fifth contains a summary of the study and the conclusions.

## CHAPTER II

### REVIEW OF THE LITERATURE

An examination of publications including Educational and Psychological Measurements, Journal of Educational Psychology, School Review, Journal of Educational Research, and Psychological Review was made to get information about attitudes, study habits, and the survey of Study Habits and Attitudes Inventory and also to review the research done with the SSHA. The pertinent information and research that were found are contained on the following pages.

#### Relationship between actual and professed characteristics.-

It is generally assumed that test scores reflect the characteristics of the individual who is writing the test. Indeed, this assumption pervades numerous areas in Education and Psychology and often is the only justification for the existence and use of many of the test that are administered.

The articles that were read failed to reveal a single study that unequivocally stated that the SSHA test did or did not reflect true attitudes and study habits. The word "true" is used to indicate that the characteristics are both practised and professed. However, several attitude studies investigated the relationship between attitude scores and the actual and professed characteristics.

Stalnaker<sup>1</sup> investigated the attitude scores of interest in intercollegiate athletics of different groups of people. He found that the groups that indicated the most interest were the athletes, parents of athletes, and undergraduates. The groups that expressed the least interest towards intercollegiate athletics were parents of non-athletes, high school executives, graduate students, faculty, and college and university presidents.

Sims and Patrick<sup>2</sup> investigated the attitude scores of different groups of college students towards the Negro. They assumed that the Northern student because he lived in the North would have a more favourable attitude toward the Negro, that the Southern student because he lived in the South would have a less favourable attitude toward the Negro, and that the Northern student who studied in the South would also have a less favourable attitude toward the Negro. They found that significant differences in the attitude scores did exist and that these differences were as they had originally assumed.

Dutton<sup>3</sup> studied the attitudes of over four hundred

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<sup>1</sup>John M. Stalnaker, "Attitudes Towards Intercollegiate Athletics," School and Society, 37:502, April, 1933.

<sup>2</sup>Verner M. Sims and James R. Patrick, "Attitudes Toward the Negro of Northern and Southern College Students," Journal of Social Psychology, 7:202, 1936.

<sup>3</sup>Wilbur H. Dutton, "Attitudes of Junior High School Pupils to Arithmetic," School Review, 64:22, 1956.

Junior High School students and found that over eighty-seven per cent of the students enjoyed arithmetic problems when they knew how to solve them.

Types of attitudes present in various students.--

It is almost a truism to say that students have many, diverse, perhaps even conflicting attitudes. These attitudes may be directed towards the teacher, towards the school, towards the curriculum, or towards other students. However, there is a tendency to associate a particular attitude with a certain type of student. The literature was investigated for evidence about the types of attitudes found in different students.

Hamza<sup>4</sup> attempted to provide some evidence about the factors present in a group of mathematically retarded students. He factorially examined the scores of a battery of tests of two groups of students. One group was specifically retarded in mathematics whereas the other group was classified as normal. He concluded that the most important factor was the intellectual one. Other factors, however, were also present. These factors were identified as emotional factors, working habits, and social and environmental factors. Emotional factors were listed as unfavourable attitudes towards the

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<sup>4</sup>Mukhtar Hamza, "Retardation in Mathematics Amongst Grammar School Pupils," British Journal of Educational Psychology, 22:193, 1952-1954.

subject, towards the subject teacher, and towards the school. He found that a refusal to apply oneself was also an emotional factor.

Poffenberger and Norton<sup>5</sup> attempted to identify some factors present in the formation of attitudes towards mathematics. From a large group of students of both sexes they selected a group that expressed a strong dislike for mathematics. They compared their attitude scores with the group that expressed a strong liking for mathematics. They found no significant difference in their attitude scores toward school. However, the group that expressed a strong dislike for mathematics were more critical of their teachers than the other group.

Dye<sup>6</sup> compared the attitudes of gifted elementary school children with the attitudes of normal elementary school children. She matched the two groups on the basis of age, grade, sex, and school. She found that both groups expressed favourable attitudes towards the school, towards the curriculum, and towards their teachers. The only significant difference between the two groups was that the

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<sup>5</sup>Thomas Poffenberger and Donald Norton, "Factors in the Formation of Attitudes towards Mathematics," Journal of Educational Research, 52:175, January, 1959.

<sup>6</sup>Myrtle G. Dye, "Attitudes of Gifted Children towards School," Educational Administration and Supervision, 42:308, 1956.

students of the gifted group were consistently more critical of their teachers than the students of the normal group.

Fitt<sup>7</sup> investigated the attitude scores of over twelve hundred students from the public and private school in Auckland, New Zealand. He concluded that the attitude scores indicated the presence of significant differences: girls seemed to like school more than boys, elementary school students showed more favourable attitudes toward the school than the secondary school students, and students from the brighter forms tended to like school more than the students from the duller forms.

Brown and Holtzman<sup>8</sup> administered the SSHA test to over seven hundred boys and girls. The students were then told that they could obtain an interpretation of their scores. The authors calculated the degree of association between the SSHA and the grade scores of the students and found that the boys and girls who were interested in their SSHA scores and asked for an interpretation of their scores had correlations of 0.71 and 0.65 respectively. The correlations of the students who did not request an interpretation of their scores were 0.41 and 0.43 respectively.

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<sup>7</sup>A. B. Fitt, "An Experimental Study of Children's Attitude in School in Auckland N.Z.," British Journal of Educational Psychology, 26:30, 1956.

<sup>8</sup>Wayne H. Holtzman, William F. Brown, and W.C. Farquhar, "The Survey of Study Habits and Attitudes: A New Instrument for the Prediction of Academic Success," Educational and Psychological Measurements, 14:732, 1954.

Relationship between study habits and academic achievement.--- It seems reasonable to assume that the student who has good study habits will do better on his examinations than the student who has poor study habits.

Cuff<sup>9</sup> investigated the study habits of students in grades four to twelve. He found that in every grade the superior student had better study habits than the weaker student. He concluded that students from all grades had many different methods of studying and that many students did not know how to study properly.

Reliability of the SSHA.--- The reliability of a test is often thought of as the consistency of a test. It can be calculated in several ways: the test-retest method, the split-test method, and the equivalent-forms method.

Garcia and Whigham<sup>10</sup> estimated the reliability of the SSHA by the test-retest method. They found with a sample of one hundred students that the reliability coefficient was 0.72. The report stated that a correlation coefficient of 0.20 was required for significance at the five per cent level.

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<sup>9</sup>Noel B. Cuff, "Study Habits in Grades Four to Twelve," Journal of Educational Psychology, 28:301, 1937.

<sup>10</sup>Dolores Garcia and Neil Whigham, "Validity of SSHA Administered before and after College Experience," Educational and Psychological Measurements, 18:850, 1958.



Holtzman, Brown, and Farquhar<sup>11</sup> calculated the reliability coefficient of the SSHA by the split-thirds method. They found that the reliability coefficients were 0.92 and 0.84 for the male and female keys respectively. They also calculated the reliability coefficient using the test-retest method. They found that the reliability coefficients with a two week interval between tests were 0.95 and 0.93 for the male and female keys respectively. With an eleven week interval the reliability coefficients were 0.88 and 0.84 respectively.

Validity of the SSHA.--- The validity of a test is usually considered the degree to which the test measures what it purports to measure.<sup>12</sup> The research that was found consistently assumed that the SSHA was designed to predict the academic success or failure of the student. The validity was defined in terms of grades and will be so used in this study.

Garcia and Whigham<sup>13</sup> investigated the validity of the SSHA. They used a random sample of approximately one hundred students and correlated their SSHA scores with their Quarter Average Grades. They reported a correlation

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<sup>11</sup>Holtzman, Brown, and Farquhar, loc. cit.

<sup>12</sup>Anne Anastasi, Psychological Testing (New York: The Macmillan Company, 1957), p. 29.

<sup>13</sup>Garcia and Whigham, loc. cit.

significant at the five per cent level.

Ahmann, Smith and Glock<sup>14</sup> studied the predictive effectiveness of the SSHA. They found, with a sample of three hundred students, that the correlations between the SSHA and the grade point averages, between the SSHA and the Cornell Mathematics Test, between the SSHA and the Cooperative Natural Science Test were not significant at the five per cent level. They found, however, significant correlations between the SSHA and the Cooperative English Test and between the SSHA and the Ohio State Psychological Test. These correlations were significant at the five per cent level.

Holtzmann, Brown, and Farquhar<sup>15</sup> administered the SSHA to over seventeen hundred men and one thousand women in ten different colleges. They reported that in every case the correlations between the scores on the SSHA and the grades were significant beyond the one per cent level. The report stated that the validity coefficients for men varied from 0.27 to 0.66 with an average validity coefficient of 0.42. The validity coefficients for the women varied from 0.26 to 0.65 with an average validity coefficient of 0.45.

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<sup>14</sup>J. Stanley Ahmann, William L. Smith, and Marvin D. Glock, "Predicting Academic Success in College by Means of A Study Habits and Attitude Inventory," Educational and Psychological Measurements, 18:857, 1958.

<sup>15</sup>Holtzman, Brown, and Farquhar, op. cit., p. 730.

Scoring of the SSHA.--- The authors of the SSHA<sup>16</sup> used the scores of over seven hundred men and women to assist them in the selection of a scoring system. They correlated the SSHA scores using two different systems of marking, a three point system and a five point system. The correlations between the two systems were 0.95 for the male key and 0.92 for the female key. This evidence decided them in the use of the three point system. The category of the response - continuum which characterized the superior student was assigned a weight of two, the next category received a weight of one, and the other three categories each received a weight of zero.

Readability of the SSHA.--- Brown, Holtzman, and Farquhar investigated the reading comprehension level of the directions and body of the SSHA test. The method they used was a system proposed by Flesch<sup>17</sup>. They concluded that the directions could be understood by the average grade eight student and that the test itself could be comprehended by the typical grade ten student.

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<sup>16</sup>Ibid., p. 728.

<sup>17</sup>Ibid., p. 730 citing R. F. Flesch, How to Test Readability. New York: Harper and Bros., 1951.

Uniqueness of traits measured by the SSHA.--

The authors in their study of the SSHA correlated the SSHA scores with A.C.E. scores.<sup>18</sup> They reported correlations varying from 0.13 to 0.48 for men and 0.16 to 0.42 for women. The report concluded that the SSHA measures important traits untouched by the usual college entrance examination.

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<sup>18</sup>  
Ibid., p. 729.

## CHAPTER III

### DESIGN OF THE INVESTIGATION

The setting.-- The investigation was carried out in the Hugh John Macdonald Junior High School which is located in the central part of Winnipeg. The school has classes in grades seven, eight, and nine as well as "slow learner" classes and "ungraded" classes. The population of the grade nine classes, that is, the random sample used in this study, was one hundred and seventy-nine. The total student population consisted of slightly fewer than eight hundred students.

The testing.-- The attitude and study habits testing was done during the month of October, 1961, in the Hugh John Macdonald School. One regular class period was sufficient to complete the testing of a class.

The intelligence and academic tests were administered by the class-room teachers and were written during the latter part of June, 1962.

The test supplies.-- Test supplies included the SSHA and SSHA answer sheets; examination papers in English, Science, Social Studies, and Mathematics; and form B of the Dominion Quick-Scoring Group Test of Learning Capacity. The test supplies also included such incidentals as pencils, paper, and the answer keys for the SSHA.

The test procedure.-- After the students had seated themselves they were given a pencil and an answer sheet. They were told what information was required on the answer sheet. After a sufficient period of time had elapsed, the test booklets were handed out. The tester read aloud the directions while the class read them silently. The class in silence and without interruption then answered the questions.

The only departure from the procedure outlined in the manual was the clarification of some words used in the test booklet. The word "semester" was defined as "term" and the words "cut classes" were defined as "skipping." The reworded questions were written on the blackboard and the students were instructed to change the questions in their test booklets. The changes were explained to all classes.

The marking.-- All the SSHA tests were collected and marked by the tester. The intelligence tests and the academic tests were sent to and marked by the Department of Education. The score sheets were available during the first week of the month of August, 1962.

Treatment of data.-- The raw scores of the SSHA, the I.Q.'s obtained from the Dominion Quick-Scoring Group Test of Learning Capacity, and the marks of the academic tests

were used in the calculations. In every case, the calculations were done separately for boys and girls.<sup>#</sup>

The treatment of the data is shown below:

1. The coefficient of reliability was calculated from a random sample of SSHA scores.<sup>##</sup>

2. The t-test technique was used to determine the significance of the difference between the means of the following:

- (i) the SSHA scores of students who failed or did not fail a grade,
- (ii) the SSHA scores of students who did not fail a grade but failed or did not fail one or more academic subjects in June,
- (iii) the SSHA scores of students who were or were not overage in grade nine,
- (iv) the SSHA scores of students who were or were not in a mixed class, and
- (v) the SSHA scores of students who asked for or did not ask for an interpretation of their SSHA scores.

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<sup>#</sup>Calculations were done separately since SSHA scores of the boys and the girls can not be compared.

<sup>##</sup>The method used to select the random sample is found in Appendix A.

3. Linear regression equations were calculated for the four academic subjects. In every case, the academic subject mark was the criterion while the I.Q.'s and SSHA scores were the prediction variables. The F-values, multiple correlation coefficients, and standard errors of estimate were calculated for each regression equation.

4. Simple regression equations were calculated for each of the four academic subjects. In every case, that is, for two sets of equations, the academic score was the criterion. In one set of equations the I.Q. was the prediction variable; in the other set of equations the SSHA score was the prediction variable.

5. The significance of the loss of one variable, the SSHA score, from the multiple regression equation was calculated.

6. The correlations between the variables, SSHA scores, I.Q.'s, and the academic marks were calculated.

Tests and marks.--- All the tests, intelligence test, SSHA test, and the academic tests, used are herewith attached in Appendix C.

The data, SSHA scores, I.Q.'s, and the academic marks are listed in Appendix B. Table VIII in the Appendix shows the scores obtained by the boys; Table IX shows the scores obtained by the girls. Tables X to XIX list the SSHA scores of the students



who were or were not overage, students who failed or did not fail one or more June examinations and so on. Table XX lists the SSHA scores of the boys and girls that made up the random samples which were used to calculate the reliability coefficient of the SSHA.

### The Formulas

Measure of variability.--- The standard deviation, sigma, is a measure of variability, that is, it measures the degree to which values cluster about the mean.<sup>1</sup> If, however, the scores represent a sample from a larger population then sigma cannot be calculated from this information. However, sigma can be estimated and the statistic "s" is the estimate of this parameter. The formula used for the estimate of the standard deviation is:

$$s = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}}$$

where s is the estimate of the standard deviation, X is the score, and n is the number of cases.

Measure of correlation.--- The coefficient of reliability is the value which represents the relationship between two sets

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<sup>1</sup>James E. Wert, Charles O. Neidt, and J. Stanley Ahmann, Statistical Methods in Educational and Psychological Research, (New York: Appleton-Century-Crofts, Inc., 1954) p. 59.

of data. The significance of the relation can be determined by the examination of standard tables of significance such as found in Wert, Neidt, and Ahmann.<sup>2</sup> It should be noted that a significant relationship between sets of data does not prove the existence of the relationship. The formula<sup>3</sup> used to calculate the coefficient of reliability is:

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}}$$

where X is the raw score of one test, Y is the raw score of a different test, N is the number of scores, and  $r_{xy}$  is the coefficient of correlation.

The Spearman-Brown "Prophecy" formula<sup>4</sup> can be used to estimate the reliability of a test. This reliability coefficient is based on the correlation between two parts of the same test. However, such a test can be sub-divided in a large number of ways. Therefore the method used to select the two parts of the test is described in Appendix A. The formula is:

$$r_{xx} = \frac{2r_{xy}}{1 + r_{xy}}$$

where  $r_{xy}$  is the coefficient of correlation between the two parts of the test and  $r_{xx}$  is the estimated reliability of the test.

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<sup>2</sup>Ibid., p. 424.

<sup>3</sup>Ibid., p. 83.

<sup>4</sup>Ibid., p. 332.

The measure of the significance:- The t-test is a technique which tests the significance of the difference between means. The use of this technique is valid if the sample variances are actually estimates of a single population variance. Therefore, it is customary to test the significance of the difference of the variances before the t-test is used.

The significance of the difference of the variances can be tested by means of the F-test<sup>5</sup>. The formula for the F-test is:

$$F = \frac{s_g^2}{s_s^2}$$

where  $s_g$  is the variance of the sample group with the greater variance and  $s_s$  is the variance of the sample group with the smaller variance. The degrees of freedom associated with the numerator is one less than the number of scores. The degrees of freedom associated with the denominator is one less than the number of scores used in the calculation of the variance. Since the larger variance is placed in the numerator the one per cent level indicated in the F table must be interpreted as a two per cent level. It is customary to assume homogeneity of variance if the null hypothesis is not rejected at the five per cent level.

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<sup>5</sup>Ibid., p. 134.

The formula for the t-test<sup>6</sup>, if the assumption of a single population variance is valid, is:

$$t = \frac{(M_x - M_y)^2 N_x N_y (N-2)}{\sqrt{N(\sum x^2 + \sum y^2)}}$$

where  $M_x$  is the mean score of one group,  $M_y$  is the mean of the second group,  $N_x$  is the number of scores in the first group,  $N_y$  is the number of scores in the second group,  $\sum x^2$  is the sum of the squared deviations of the scores taken from the mean of the first group,  $\sum y^2$  is the sum of the squared deviations of the second group, and  $N$  is the total number of scores. The degrees of freedom associated with  $t$  is  $N-2$ .

The calculation of regression equations.-- The existence of a linear relationship among sets of scores implies that there is an equation, known as a regression equation, which relates these scores. The equation permits us to calculate one set of scores if the other scores are known. The equation which relates three sets of scores is of the form:

$$Y = a X_1 + b X_2 + c$$

where  $Y$ ,  $X_1$ , and  $X_2$  are the score variables;  $a$ ,  $b$ , and  $c$  are constants. The variable  $Y$  is referred to as the criterion variable and  $X_1$  and  $X_2$  are called the prediction variables.

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<sup>6</sup>Ibid., p. 136 .

In other words, Y is predicted from a knowledge of  $X_1$  and  $X_2$ . The constants a, b, and c are determined in such a manner that the errors of prediction, also known as residuals, are a minimum.

In this study the constants a, b, and c were determined by solving the following equations:<sup>7</sup>

$$\begin{aligned}\sum X_1 Y &= a \sum X_1^2 + b \sum X_1 X_2 + c \sum X_1 \\ \sum X_2 Y &= a \sum X_1 X_2 + b \sum X_2^2 + c \sum X_2 \\ \sum Y &= a \sum X_1 + b \sum X_2 + cN\end{aligned}$$

where Y is the criterion score, that is the academic mark;  $X_1$  and  $X_2$  are the prediction variables, that is the I.Q. and the SSHA score respectively; a, b, and c are the constants; and N is the number of scores.

The relationship between academic marks and one prediction variable is of the form:

$$Y = aX + b$$

where Y is the academic mark, that is the criterion; X is the prediction variable; and a and b are constants. The constants, a and b, can be determined by solving the following equations:<sup>8</sup>

$$\begin{aligned}\sum Y &= a \sum X + Nb \\ \sum YX &= a \sum X^2 + b \sum X\end{aligned}$$

where Y is the criterion, X is the prediction variable, N is the number of scores, and a and b are constants.

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<sup>7</sup>Ibid., p. 239.

<sup>8</sup>Ibid., p. 227.

Analysis of the regression equation.--- The existence of a relationship between a criterion variable and prediction variables neither proves nor disproves the significance of the regression equation. The hypothesis that academic marks cannot be predicted from I.Q.'s and SSMA scores must be tested. The usual procedure is to test the significance of the regression. This can be done by using the formula:

$$F = \frac{s_1^2}{s_2^2}$$

where  $s_1^2$  is the mean square due to regression and  $s_2^2$  is the mean square due to residuals. The complete formula for the F-test is:<sup>9</sup>

$$F_{m, N-m-1} = \frac{a \sum X_1 Y + b \sum X_2 Y + c \sum Y - \frac{(\sum Y)^2}{N}}{m} \div \frac{\sum Y^2 - a \sum X_1 Y - b \sum X_2 Y - c \sum Y}{N-m-1}$$

where a, b, and c are constants; Y,  $X_1$  and  $X_2$  are scores; m is the number of prediction variables; and N is the number of scores.

The multiple correlation coefficient can be determined by means of the formula:<sup>10</sup>

$$R = \sqrt{\frac{a \sum X_1 Y + b \sum X_2 Y + c \sum Y - \frac{(\sum Y)^2}{N}}{\sum Y^2 - \frac{(\sum Y)^2}{N}}}$$

---

<sup>9</sup>Ibid., p. 240.

<sup>10</sup>Ibid., p. 238.

where a, b, and c are constants; Y is the criterion variable; X<sub>1</sub> and X<sub>2</sub> are prediction variables; and N is the number of scores.

The standard error of estimate is another statistic which can be determined by the analysis of regression equations. This statistic indicates the accuracy of prediction of the regression equation. The formula for the standard error of estimate is:<sup>11</sup>

$$\text{sigma}_{\text{est}} = \sqrt{\frac{\sum Y^2 - a\sum X_1 Y - b\sum X_2 Y - c\sum Y}{N-m-1}}$$

where Y, X<sub>1</sub>, and X<sub>2</sub> are variables; a, b, and c are constants; m is the number of prediction variables; and N is the number of scores.

Significance of the loss of a variable.-- The significance of the loss of one variable from a multiple regression can be tested by means of the formula:<sup>12</sup>

$$F_{1, N-m-1} = \frac{a\sum X_1 Y + b\sum X_2 Y + c\sum Y - (d\sum RS + e\sum S)}{\frac{\sum Y^2 - a\sum X_1 Y - b\sum X_2 Y - c\sum Y}{N-m-1}}$$

---

<sup>11</sup>Ibid., P. 240.

<sup>12</sup>Ibid., p. 245.

where  $Y$ ,  $X_1$ , and  $X_2$  are variables from the multiple regression equation;  $R$  and  $S$  are variables from the simple regression equation;  $a$ ,  $b$ , and  $c$  are constants from the multiple regression equation;  $d$  and  $e$  are constants from the simple regression equation;  $N$  is the number of scores; and  $m$  is the number of prediction variables in the multiple regression equation. The degrees of freedom are 1 and  $N-m-1$ .



## CHAPTER IV

### THE DATA AND THE ANALYSES OF THE DATA

This chapter will present the data obtained from the investigation. The data, that is, the raw scores and the analyses of the raw scores will be presented in three parts. The first section will contain a frequency distribution of the scores, means, and standard deviations. The section will also contain the statistics derived from the scores of the SSHA tests and the marks of the academic tests. The section will include the calculated coefficient of reliability of the SSHA test, the correlations between the SSHA test and the academic tests, the significance of the selected factors on the SSHA scores, and the regression equations that contain the SSHA score as a prediction variable.

The second part of the chapter will contain the statistics derived from the I.Q.'s and the academic test marks. The section will include the correlations between the intelligence test and the academic tests. The regression equations that use the intelligence test score as a prediction variable and the academic marks as a criterion variable will also be included in this section.

The final part of the chapter will contain the statistics

TABLE I

FREQUENCY DISTRIBUTION OF THE I.Q., S.S.H.A., ENGLISH, MATHEMATICS, SCIENCE, AND SOCIAL STUDIES SCORES OF THE GRADE NINE MALE STUDENTS OF THE HUGH JOHN MACDONALD JUNIOR HIGH SCHOOL, 1961 - 1962.

Score Interval	I.Q.	S.S.H.A.	ENGLISH	MATHEMATICS	SCIENCE	SOCIAL STUDIES
136-140	1					
131-135	3					
126-130	4					
121-125	13					
116-120	2					
111-115	9					
106-110	8					
101-105	19					
96-100	9					
91- 95	7			2	2	
86- 90	15			2	1	
81- 85	5		3	6	3	1
76- 80	1		3	7	6	9
71- 75			10	10	11	7
66- 70			15	10	14	10
61- 65		4	21	8	17	8
56- 60		6	19	11	12	17
51- 55		6	12	9	13	13
46- 50		7	9	6	3	6
41- 45		9	2	8	6	11
36- 40		20		2	1	2
31- 35		12	1	1	1	4
26- 30		8		6	3	3
21- 25		12	1	1	1	1
16- 20		7		3	1	3
11- 15		3		4		1
6- 10		2			4	
Total	96	96	96	96	96	96
Mean	104.86	36.39	60.94	56.61	60.70	55.23
S	14.30	13.15	10.10	19.60	15.27	15.70

TABLE II

FREQUENCY DISTRIBUTION OF THE I.Q., S.S.H.A., ENGLISH, MATHEMATICS, SCIENCE, AND SOCIAL STUDIES SCORES OF THE GRADE NINE FEMALE STUDENTS OF THE HUGH JOHN MACDONALD JUNIOR HIGH SCHOOL, 1961 - 1962

Score Interval	I.Q.	S.S.H.A.	ENGLISH	MATHEMATICS	SCIENCE	SOCIAL STUDIES
156-160	1					
151-155						
146-150						
141-145						
136-140						
131-135	1					
126-130	1					
121-125	2					
116-120	4					
111-115	5					
106-110	10					
101-105	10					
96-100	18					
91- 95	13			1		
86- 90	7			1	2	
81- 85	6		1	1	4	4
76- 80	4		4	2	4	3
71- 75	1		13	5	6	7
66- 70			16	6	11	4
61- 65			23	13	10	11
56- 60			14	13	11	10
51- 55		1	8	10	7	11
46- 50			2	8	9	9
41- 45		4	1	4	8	6
36- 40		8		5	5	7
31- 35		22	1	3	3	4
26- 30		10		2	1	4
21- 25		19		3	1	1
16- 20		12				1
11- 15		6		4	1	1
6- 10		1		2		3
Total	83	83	83	83	83	83
Mean	99.92	27.66	63.37	52.45	57.50	53.66
S	13.53	8.61	8.49	18.13	15.21	15.86

derived from the I.Q.'s and the SSHA scores. The section will also list the multiple regression equations and will include the results of the analysis of multiple regression.

#### SSHA Test and Academic Tests

Coefficient of reliability of the SSHA test.--- The coefficient of reliability of the SSHA was estimated by the use of the Spearman-Brown formula. The reliability coefficient of the boys' section of the test was 0.745 which was found to be significant at the one per cent level. The coefficient of reliability of the girls' section was 0.68 which was also significant at the one per cent level.

Coefficients of correlation of the SSHA test and the academic tests.--- The coefficients of correlation between the SSHA test and the academic tests were calculated and tested for significance. All the correlations of the boys' scores were significant. For example, English and Mathematics had correlations with the SSHA which were significant at the one per cent level; Science and Social Studies had correlations with the SSHA which were significant at the five per cent level.

Some of the girls' correlations were significant. The correlation between the Social Studies marks and the SSHA was not significant but the correlations of the other subjects with the

SSHA were significant. English and Mathematics were significant at the one per cent level; Science was significant at the five per cent level. The correlations and their levels of significance are shown below in Table III.

Significance of selected factors on the SSHA score.--

The SSHA scores of the boys were separated into two groups. One group consisted of the scores of the students who were overage, the other group consisted of the students who were not overage. The variances of these groups were calculated and tested for significance by means of the F-test. The means of the scores of the groups were tested by the use of the t-test. The same procedure was followed with the girls' scores. The results of all the tests are recorded below in Table IV.

The same procedure was followed with all the factors. Group I is the overage group and group II is the group that is not overage. Group III consists of the SSHA scores of students who failed one or more June examinations and group IV is the group that did not fail any June examinations. The scores in group V are the students who failed one or more grades, group VI represents the students who did not fail a grade in Junior High School. The scores of group VII represent students from unmixed classes and group VIII from mixed classes. The scores of group IX are those students who requested an interpretation of their SSHA scores; the last group of scores represent the students who did not request an interpretation of their SSHA scores.

TABLE III  
COEFFICIENTS OF CORRELATION BETWEEN SSHA SCORES AND  
ACADEMIC MARKS AND SIGNIFICANCE PROBABILITIES

Academic Subjects	N	r	P
Boys' Section			
ENGLISH	96	.35	< .01
MATHEMATICS	96	.28	< .01
SCIENCE	96	.20	< .05
SOCIAL STUDIES	96	.16	> .05
Girls' Section			
ENGLISH	83	.32	< .01
MATHEMATICS	83	.28	< .01
SCIENCE	83	.26	< .05
SOCIAL STUDIES	83	.19	> .05

The results for all groups for both sexes indicate that the variance ratios are not significant. That is, the assumption of homogeneity of variance of the sample variances cannot be rejected. The results of the F-tests are found in Table IV.

The t-test indicated a significant difference between the means of the SSHA scores of the boys who requested an interpretation of their SSHA scores and the means of the scores of the boys who did not request such an interpretation. The group who asked for an interpretation had a significantly higher mean score. The level of significance was at the one per cent level.

The t-test indicated a significant difference between the mean of the SSHA scores of the girls who were in mixed classes and the mean of the SSHA scores of the girls who were not in mixed classes. Girls in mixed classes had a significantly higher mean SSHA score than students from the unmixed classes. The level of significance was at the five per cent level. The results of the F-test and t-test are contained in Table IV.

TABLE IV  
SIGNIFICANCE OF SELECTED FACTORS<sup>#</sup>

Male Group	N	S <sup>2</sup>	d/f	F	P	$\bar{x}$	d/f	t	P
I	39	157.939	38	1.15	> .05	34.538	94	1.14	> .05
II	57	182.476	56			37.666			
III	22	143.515	21	1.23	> .05	34.090	80	1.14	> .05
IV	60	177.549	59			37.816			
V	82	164.978	81	1.30	> .05	37.097	94	1.43	> .05
VI	14	215.912	13			32.285			
VII	66	161.283	65	1.26	> .05	36.030	94	.40	> .05
VIII	30	204.648	29			37.200			
IX	66	140.612	65	1.48	> .05	38.818	94	2.76	< .01
X	30	209.236	29			31.066			

Female Group	N	S <sup>2</sup>	d/f	F	P	$\bar{x}$	d/f	t	P
I	40	68.664	39	1.16	> .05	27.050	81	.62	> .05
II	43	80.468	42			28.232			
III	13	60.089	12	1.28	> .05	26.384	66	.59	> .05
IV	55	76.924	54			27.963			
V	68	73.152	67	1.15	> .05	27.661	81	.002	> .05
VI	15	84.666	14			27.666			
VII	55	67.129	54	1.21	> .05	26.381	81	1.93	< .05
VIII	28	81.263	27			30.178			
IX	52	77.466	51	1.10	> .05	28.153	81	.67	> .05
X	31	70.073	30			26.838			

# Factors: I - overage VI - did not fail grade  
 II - not overage VII - unmixed classes  
 III - failed June Exams VIII - mixed classes  
 IV - did not fail June exam IX - requested interpretation  
 X - no interpretation  
 V - failed grade



Regression equations of academic scores and SSHA scores.

Regression equations were calculated using the SSHA score as a prediction variable and the academic scores as the criterion.

$Y_1$  is the Language mark,  $Y_2$  is the Mathematics mark,  $Y_3$  is the Science mark,  $Y_4$  is the Social Studies mark, and  $X$  is the SSHA score. The regression equations for the scores of the boys are:

$$Y_1 = .267464605 X + 51.21331960$$

$$Y_2 = .408747054 X + 41.73789382$$

$$Y_3 = .23646216 X + 52.10209594$$

$$Y_4 = .19613936 X + 48.10092784$$

The accuracy of the method that was used to determine the constants was evaluated by solving the right hand side of the equation and by comparing this figure with the actual number. The list of the calculated values and the actual values is:

$$217351 \dots 217350.99974$$

$$204534 \dots 204533.99978$$

$$216004 \dots 216003.99986$$

$$196233 \dots 196232.99992$$

The regression equations for the girls' scores are listed below. The order of the equations and the meaning of the symbols are the same as the above equations.

$$Y_1 = .3199606403 X + 54.52253450$$

$$Y_2 = .608524811 X + 35.62442209$$

$$Y_3 = .468272959 X + 44.55235299$$

$$Y_4 = .35382155 X + 43.87500868$$

The check values are:

$$147453 \dots 147452.99975$$

$$124147 \dots 124146.99989$$

$$134884 \dots 134883.99978$$

$$125363 \dots 125362.99980$$

#### Intelligence Test and Academic Tests

Correlations between intelligence test and the academic tests.--- Coefficients of correlation were calculated between the intelligence test results and the academic scores. All the correlations were significant at the five per cent level and some were significant at the one per cent level. The results are shown below in Table V.

Regression equations of I.Q.'s and academic scores.--- Regression equation were calculated using the I.Q. as the prediction variable and the academic scores as the criterion variable. The symbolism and the order of the equations are the same as the equations listed above. The I.Q., however, is the prediction variable and is  $X_1$ . The equations for the boys' scores and the check values are:

$$Y_1 = .319421067 X_1 + 27.444510$$

$$Y_2 = .604230407 X_1 - 6.74778563$$

$$Y_3 = .23512945 X_1 + 36.05158157$$

$$Y_4 = .24998993 X_1 + 29.02449668$$

The check values are:

$$619774 \dots 619773.9922$$

$$581686 \dots 581686.0004$$

$$615722 \dots 615722.000043$$

$$560957 \dots 560957.03168$$

The equations and the check values for the girls'

scores are:

$$Y_1 = .174744796 X_1 + 45.91164706$$

$$Y_2 = .53342510 X_1 - .84611782$$

$$Y_3 = .38468527 X_1 + 19.06530559$$

$$Y_4 = .45673016 X_1 + 8.02265125$$

$$528244 \dots 528243.99992$$

$$443096 \dots 443095.9998$$

$$482732 \dots 482731.9997$$

$$451937 \dots 451936.9996$$

#### SSHA Test and Intelligence Test

#### Correlations between SSHA test and Intelligence test.---

Coefficients of correlation were calculated between the intelligence test scores and the SSHA scores. The correlation for the boys' scores was 0.29 which was significant at the

TABLE V  
COEFFICIENTS OF CORRELATION BETWEEN I.Q. AND ACADEMIC  
SCORES AND SIGNIFICANCE PROBABILITIES

Academic Subject	N	r	P
Boys' Section			
ENGLISH	96	.45	< .01
MATHEMATICS	96	.44	< .01
SCIENCE	96	.22	< .05
SOCIAL STUDIES	96	.22	< .05
Girls' Section			
ENGLISH	83	.28	< .01
MATHEMATICS	83	.39	< .01
SCIENCE	83	.34	< .01
SOCIAL STUDIES	83	.39	< .01



one per cent level. The correlation for the girls' scores was 0.11 which was not significant at the five per cent level.

Multiple regression equations with the SSHA scores and the I.Q.'s as prediction variables and academic marks as criterion.

Multiple regression equations were calculated<sup>£</sup> using the academic scores as the criterion variable and the SSHA scores and I.Q.'s as prediction variables. The equations for the boys' scores are listed below:

$$Y_1 = .2707871X_1 + .1816339X_2 + 25.9412231$$

$$Y_2 = .540570857X_1 + .23740383X_2 - 8.71265735$$

$$Y_3 = .18767358X_1 + .1769757X_2 + 34.5868519$$

$$Y_4 = .2157313X_1 + .1277595X_2 + 27.9670970$$

The check values are:

$$619774 \dots 619773.997969$$

$$581686 \dots 581686.0715$$

$$615722 \dots 615722.1132$$

$$560957 \dots 560957.0750$$

The regression equations for the girls are:

$$Y_1 = .15255572 X_1 + .291287690X_2 + 40.07116320$$

$$Y_2 = .49414506 X_1 + .51564960X_2 - 11.18518806$$

$$Y_3 = .35408372 X_1 + .40172246X_2 + 11.01054037$$

$$Y_4 = .436020168 X_1 + .27187099X_2 + 2.57148194$$

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£

The solution of a regression equation is given in Appendix A.

The check values for the girls' equations are:

528244 ..... 528244.00004678

443096 ..... 443095.99993

482732 ..... 482731.9996

451937 ..... 451937.00646

Analyses of multiple regression equations.--- The multiple regression equations were analyzed<sup>ff</sup> by means of analysis of variance. The F value, that is, the ratio of the regression mean square to residual mean square was found to be significant for all the multiple regression equations. The probability in all cases was less than five per cent. The multiple correlation coefficients were calculated and found to vary from a high of 0.505 to a low of 0.24. The standard error of estimate ranged from 7.79 to 17.52. The estimated standard deviation, s, varied from 8.49 to 19.60. The complete results of the analyses are found below in Table VI.

Significance of the loss of the SSHA scores from prediction scheme.--- The significance of the loss of the SSHA score from the prediction scheme, <sup>fff</sup> that is, the multiple regression equation, was calculated. The loss was significant

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<sup>ff</sup>The analysis of a regression equation is shown in Appendix A.

<sup>fff</sup>The calculation of the significance of the loss of the SSHA score from the regression equation is shown in Appendix A.

TABLE VI  
ANALYSIS OF MULTIPLE REGRESSION EQUATIONS

Criterion	d/f	F	P	R	est	s
Male Section						
ENGLISH	2,93	15.992	<.01	.50	8.807	10.10
MATHEMATICS	2,93	12.9344	<.01	.46	17.526	19.604
SCIENCE	2,93	3.486	<.05	.26	14.53	15.27
SOCIAL STUDIES	2,93	3.190	<.05	.24	15.13	15.70
Female Section						
ENGLISH	2,80	7.956	<.01	.40	7.79	8.49
MATHEMATICS	2,80	11.119	<.01	.46	16.244	18.13
SCIENCE	2,80	8.087	<.01	.41	14.044	15.21
SOCIAL STUDIES	2,80	8.382	<.01	.41	14.60	15.86

in both sections when the criterion was the English mark. The loss was also significant in the girls' section when the criterion was the Science mark and the Mathematics mark. There was no loss in ability to predict Social Studies marks in the boys' and girls' sections. Also, there was no loss in ability to predict the Mathematics and Science mark when the SSHA score was eliminated from the regression equation. The results are shown below in Table VII.

Regression equations selected on the basis of tests of significance of loss of SSHA variable.-- The results of Table VII indicated that the SSHA variable could be dropped from four of the regression equations. The regression equations for the boys' marks are:

$$Y_1 = .2707871 X_1 + .1816339X_2 + 25.9412231$$

$$Y_2 = .604230407 X_1 - 6.74778563$$

$$Y_3 = .23512945 X_1 + 36.05158157$$

$$Y_4 = .24998993X_1 + 29.02449668$$

where  $Y_1$ ,  $Y_2$ ,  $Y_3$ , and  $Y_4$  are the English, Mathematics, Science, and Social Studies marks respectively. The prediction variables,  $X_1$  and  $X_2$ , are the I.Q.'s and SSHA marks respectively.

The regression equations for the girls' marks are:



TABLE VII  
ANALYSIS OF THE SIGNIFICANCE OF THE LOSS DUE TO THE  
ELIMINATION OF THE S.S.H.A. SCORES FROM  
THE PREDICTION SCHEME

Criterion	d/f	F	P
Male Section			
ENGLISH	1,93	6.4	.05 > p > .01
MATHEMATICS	1,93	2.46	> .05
SCIENCE	1,93	2.1259	> .05
SOCIAL STUDIES	1,93	1.0731	> .05
Female Section			
ENGLISH	1,80	8.3727	< .01
MATHEMATICS	1,80	6.0452	.05 > p > .01
SCIENCE	1,80	4.9134	.05 > p > .01
SOCIAL STUDIES	1,80	2.0788	> .05

$$Y_1 = .15255572X_1 + .291287690X_2 + 40.0711632$$

$$Y_2 = .49414506X_1 + .51564960X_2 - 11.18518806$$

$$Y_3 = .35408372X_1 + .40172246X_2 + 11.10154037$$

$$Y_4 = .45673016X_1 + 8.02265125$$

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### SUMMARY

Purpose of the study.--- The purpose of the study was to investigate the relationship between (a) academic marks and the Survey of Study Habits and Attitudes Inventory (SSHA) scores and (b) academic marks and I.Q.'s.

A secondary purpose was the comparison separately for boys and girls of SSHA group-means. Comparison groups included: overage students versus normal age students, students who were interested in their SSHA scores versus students who were not interested in their SSHA scores, students retarded one or more grades versus students who did not fail a grade in junior high school, and students who failed individual June examinations versus students who did not fail June examinations in grades seven, eight, or nine. Also, the SSHA scores of boys from all-boy classes were compared with the scores of boys from mixed classes; the SSHA scores of girls from all-girl classes were compared with the scores of girls from mixed classes.

Null hypotheses.--- It was postulated that:

1. the relationships between SSHA scores and academic marks, between the I.Q.'s and the academic marks, and between the I.Q.'s and the SSHA scores were not significant;

2. the difference of the means of the factors was not significantly different from zero; and
3. the reliability coefficient of the SSHA was not significantly different from zero.

Population.--- The population studied was a hypothetical one and consisted of grade nine boys and girls. The students of the Hugh John MacDonald Junior High School for the school year, 1961-1962, were a representative sample of this hypothetical population.

Testing.--- The SSHA testing was done in October, 1961, and the academic and intelligence testing was done in June of the following year.

Design of the investigation.--- The raw scores from the academic tests and the standardized tests were used to determine the relationships between the tests. Correlation coefficients between the SSHA scores and the academic marks, between the I.Q.'s and the academic marks, and between the I.Q.'s and the SSHA scores were calculated and tested for significance. Academic test scores and the standardized test scores were used to develop regression equations. The multiple regression equations provided a means of predicting academic marks (criterion variable) from the intelligence test scores and the SSHA marks (prediction variables.)

Simple regression equations connected (a) academic scores with SSHA scores, and (b) academic marks with intelligence test scores.

The degree of the relationship and the significance of the relationship of the variables of the regression equations were investigated. The size of the relationship between the prediction variables and the criterion variable was estimated by calculating the multiple correlation coefficient,  $R$ .

The confidence which could be placed in the predicted score, that is, the score obtained from the multiple regression equation was estimated by calculating the standard error of estimate.

The differences between the means of the SSHA scores of several groups were calculated. These groups consisted of students who were overage and students who were not overage, students who failed a grade in junior high school and students who did not fail a grade, students who failed a June examination in junior high school and students who did not fail an examination, students who were in mixed classes and students who were not in mixed classes, and students who requested an interpretation of their SSHA score and students who did not request such an interpretation. The variances of these groups were calculated and tested for homogeneity. The significance of the difference between the means of the groups was tested.

The coefficient of reliability of the SSIA was estimated by means of the Spearman-Brown formula. The samples consisted of the scores of fifty boys and fifty girls selected by means of a table of random numbers.

#### Limitations

1. The data were obtained from two sample groups, the scores of a group of boys and the scores of a group of girls. These two groups of scores were originally assumed to be samples of two hypothetical populations. Therefore, the statistics obtained from these scores are estimates of the parameters of these hypothetical populations. These statistics can be used as estimates of the parameters of real populations only to the extent to which the real populations resemble the hypothetical populations.

2. The use of statistics as a basis for accepting or rejecting hypotheses involves a certain amount of risk. For example, if the means of two groups are compared and are found to be quite similar then the hypothesis that the two populations are similar becomes tenable. However, this similarity of means does not prove that the populations are similar. There is a probability that the absence of a large difference between the means is due to the manner in which the sample groups were selected and not because of the actual similarity of the populations. The statistician, then, must decide how much risk he will accept and evaluate the statistic on the basis of the probability.

It is customary, although arbitrary, to reject the Null hypothesis if the probability is at the five per cent level.// Such a level of probability is considered significant. However, the term "significant" must not be considered a synonym for "important." That is, it is possible to get a significant difference between two statistics and yet, because of the size of the sample and the type of population studied, to label such a difference unimportant. The converse is also true. A non-significant difference between statistics may be very important because it exists in a real population.

3. The SSHA test is constructed in such a manner that the scores of the boys and girls cannot be easily compared. Therefore, in this study, regression equations were calculated separately for each sex.

#### Conclusions

1. The reliability coefficients of the SSHA test were 0.745 and 0.682 for the boys' and girls' scores respectively. These coefficients are both significant at the one per cent level. It was concluded that the SSHA is a reliable instrument.

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# This means that the difference between the means is so great that it would occur in less than five per cent of the samples drawn from populations with zero differences between their means.

2. All the correlations obtained were positive and all but two were significantly different from zero. The correlations of the boys' marks between English and the I.Q. (0.45), Mathematics and I.Q. (0.44), Science and I.Q. (0.22), and Social Studies and I.Q. (0.22) were all significant. The correlations of the boys' marks between English and SSHA (0.35), Mathematics and SSHA (0.28), and Science and SSHA (0.20) were also significant.

The correlation between the Social Studies mark and the SSHA score (0.16) was not significant.

The correlations of the girls' marks between English and I.Q. (0.28), Mathematics and I.Q. (0.39), Science and I.Q. (0.34), and Social Studies and I.Q. (0.39) were all significant. The correlations of the girls' marks between English and SSHA (0.32), Mathematics and SSHA (0.28), and Science and SSHA (0.26) were all significant.

The correlation between the Social Studies mark and the SSHA (0.19) was not significant.

It was concluded that there is a direct relationship among SSHA scores, intelligence test scores, and the academic scores.

4. The t-test indicated that there was a significant difference in the mean SSHA score of the boys who requested an interpretation of their SSHA scores and the mean SSHA score of the boys who did not request such an interpretation. The boys



who requested an interpretation had the higher mean SSHA score. It was concluded that boys who show an interest in their attitude scores are significantly different as a group from those who did not request such an interpretation. That is, the former group tend to have better attitudes; the literature describes them as having traits characteristic of the better student.

The t-tests also indicated that there were no significant differences between the SSHA group means of the following: boys who were average versus those who were not, boys who were retarded academically versus those who were not, boys who failed one or more June examinations in Junior High School and those who did not, and boys who were in an all-boy class versus those who were in mixed classes.

5. The t-test indicated that there was a significant difference between the SSHA group mean score of the girls who were in an all-girl class and those who were not. The girls in the mixed classes tend to have better attitudes than those who are not in mixed classes.

The t-test indicated that there were no significant differences between the SSHA group means of the following: the girls who were average versus those who were not, the girls who were retarded academically and those who were not, the girls who failed one or more June examinations in junior high school and those who did not, and the girls who requested an interpretation of their SSHA scores and those who did not.

6. The analyses of the multiple regression equations yielded F-values which were significant in all cases. It was concluded that the null hypotheses could not be accepted. That is, the hypothesis that academic marks can be predicted from I.Q.'s and SSHA marks may be accepted.

7. The analyses indicated that the SSHA variable could be eliminated from some of the regression equations. In the boys' section no significant loss in ability to predict academic scores occurred if the SSHA variable was dropped from the equations that predicted the Mathematics, Science, and Social Studies scores. In the girls' section the data indicated that the SSHA prediction variable could be eliminated from the equation that contained the Social Studies criterion variable. The null hypothesis is not rejected for the regression equations which predict Mathematics, Science, and Social Studies in the boys' section.

The null hypothesis is not rejected for the regression equations which predict Social Studies in the girls' section. That is, there is no significant loss in ability to predict the academic scores listed directly above if the SSHA variable is eliminated from the equations.

8. In the significant regression equations listed below,  $Y_1$  is the Language mark,  $Y_2$  is the Mathematics mark,  $Y_3$  is the Science mark,  $Y_4$  is the Social Studies mark,  $X_1$  is the I.Q., and  $X_2$  is the SSHA score. The equations for the boys are:

$$Y_1 = .27X_1 + .18X_2 + 25.94$$

$$Y_2 = .60X_1 - 6.74$$

$$Y_3 = .23X_1 + 36.05$$

$$Y_4 = .24X_1 + 29.02$$

The equations for the girls are:

$$Y_1 = .15X_1 + .29X_2 + 40.07$$

$$Y_2 = .49X_1 + .51X_2 - 11.18$$

$$Y_3 = .35X_1 + .40X_2 + 11.10$$

$$Y_4 = .45X_1 + 8.02$$

#### Recommendations and Implications

The findings of this investigation indicate the need for more research in our understanding of and use of attitudes and study habits.

It is not uncommon for parents and teachers to state that students who fail a grade have a poorer attitude than those who did not fail a grade. Indeed, common sense seems to indicate that this must be so. However, a comparison between the attitudes and study habits scores of a group of students who failed a grade and the scores of a group of students who did not fail a grade did not confirm such a belief.

An apparent contradiction of this sort contains implications which could be the basis for more research. Is this contradiction true for other populations or is it true only for the hypothetical population defined by this study? Does the SSHA definition of attitudes and study habits agree with the teacher's definition of attitudes and study habits? In fact, what is the teacher's definition or concept of attitudes and study habits? If a contradiction exists with respect to attitudes and study habits do other contradictions also exist? In other words, to what extent are teachers guilty of "pigeon-holing" or stereotyping students?

In many schools, students are placed in classes on the basis of past performance and, sometimes, academic potential. Some of the results of this investigation indicate that it might be worthwhile to give consideration to other factors when making up a class. For example, in the sample used in this study the girls in all-girls classes had a lower SSHA group-mean score than girls who were in mixed classes. It might be surmised that, to the extent that attitudes and study habits affect their achievement, girls should be placed in mixed classes.

Correlations were calculated between all the academic marks and the SSHA scores. All the correlations but two were significant. The only correlations which were not significant were the correlations between Social Studies marks and the SSHA scores

in the boys' and girls' sections. It is possible, in view of the absence of significant correlations between Social Studies marks and the SSHA scores, that there is inherent in the study or presentation of this subject a factor which distinguishes Social Studies from the other subjects. This is another area of possible research.

The students, prior to answering the SSHA test, were told that the results of the test would not affect their academic standing. Indeed, the authors of the test incorporated such a statement in the directions. It might be worthwhile, in light of the significant correlations obtained in this study, to investigate the effect on the validity and reliability of the SSHA of altering the directions. For example, the directions could be altered to state that the class-placement of the students would be determined by their SSHA scores: students with high SSHA scores would form one class and students with low SSHA scores would constitute another class. If the results of such a study proved significant then class-placement could be made on the basis of the predicted final marks. For example, regression equations using I.Q.'s and SSHA scores as prediction variables could predict the marks of the final examination. One class could consist of the students whose predicted marks were in the top quartile, a second class could consist of the students whose predicted final marks were in the third quartile, and so on. These results of these classes could be compared with the results of classes

selected by traditional methods. In this way the superiority of one method could be determined.

The regression equation could be used practically, such as in a counseling session with a student. Generally, the teacher in any co-operative discussion is limited to an examination and an evaluation of the student's mastery of a subject. If the teacher attempts to investigate or discuss other areas the conference, in the eyes of many students, becomes quite subjective and often useless. However, a knowledge of the student's SSHA score, the predictive qualities of the regression equation, and the SSHA answers might allow the teacher and student to explore other areas with more insight and greater objectivity.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Ahman, J. Stanley, William L. Smith, and Marvin D. Glock. "Predicting Academic Success in College by Means of a Study Habits and Attitude Inventory," Educational and Psychological Measurements, 18: 853-857, 1958.
- Anastasi, Anne. Psychological Testing. New York: The Macmillan Company, 1957. 682 pp.
- Baker, Harry J. Introduction to Exceptional Children. Revised Edition. New York: The Macmillan Company, 1953. 500 pp.
- Brown, William F. and Wayne H. Holtzman. Brown-Holtzman SSHA Survey of Study Habits and Attitudes. Manual. Revised edition. New York: The Psychological Corporation, 1956. 11 pp.
- Cole, Luella. Psychology of Adolescence. Fourth Edition. New York: Rinehart and Company Inc., 1956. 712 pp.
- Cronbach, Lee J. Educational Psychology. New York: Harcourt, Brace and Company. 1953. 628 pp.
- Cuff, Noel B. "Study Habits in Grades Four to Twelve," Journal of Educational Psychology. 28: 295-301, 1937.
- Dutton, Wilbur H. "Attitudes of Junior High School Pupils to Arithmetic," School Review. 18-22, 1956.
- Dye, Myrtle G. "Attitudes of Gifted Children towards School," Educational Administration and Supervision, 42: 301-308, 1956.
- Fitt, A. B. "An Experimental Study of Children's Attitude in School in Auckland, N.Z.," British Journal of Educational Psychology, 26: 25-30, 1956.
- Garcia, Dolores and Neil Whigham. "Validity of S.S.H.A. Administered before and after College Experience," Educational and Psychological Measurements, 28: 845-850, 1958.
- Hamza, Mukhtar. "Retardation in Mathematics amongst Grammar School Pupils," British Journal of Educational Psychology, 22: 189-195, 1952.



- Holtzman, Wayne H., William F. Brown, and W.G. Farquhar. "The Survey of Study Habits and Attitudes: A New Instrument for the Prediction of Academic Success," Educational and Psychological Measurements, 14:78-732, 1954.
- Kenney, John F. Mathematics of Statistics, Part One. New York: D. Van Nostrand Company, Inc., 1939. 248 pp.
- Linguist, E. F. Design and Analysis of Experiments in Psychology and Education. Boston: Houghton Mifflin, 1953. 393 pp.
- Peters, Charles C. and Walter R. Van Voorhis. Statistical Procedures and their Mathematical Bases. New York: McGraw-Hill Company, Inc., 1940. 516 pp.
- Poeffenberger, Thomas and Donald Norton. "Factors in the Formation of Attitudes towards Mathematics," Journal of Educational Research, 52: 171-176, January, 1959.
- Rand Corporation. A Million Random Digits with 100000 Normal Deviates. Illinois: The Free Press Publishers, 1955, 600 pp.
- Ross, C. C. and Julian C. Stanley. Measurement in Today's School. Third edition. New York: Prentice-Hall, Inc., 1954. 485 pp.
- Sherif, Muzafer and Hadley Cantril. "The Psychology of Attitudes," Psychological Review, 52: 295-319, 1945.
- Sims, Verner M. and James R. Patrick, "Attitudes toward the Negro of Northern and Southern College Students," Journal of Social Psychology, 7: 192-203, 1936.
- Skinner, Charles E. (ed.). Educational Psychology. Third Edition. New York: Prentice-Hall, Inc., 1953. 791 pp.
- Stalnaker, John M. "Attitudes towards Intercollegiate Athletics," School and Society, 32: 499-504, April, 1933.
- Treloar, Alan E. Biometric Analysis, An Introduction. Minneapolis: Burgess Publishing Co., 1951. 150 pp.
- Wert, James E., Charles G. Neidt, and J. Stanley Ahman. Statistical Methods in Educational and Psychological Research. New York: Appleton-Century-Crofts, Inc., 1954. 435 pp.

APPENDIX A

CALCULATION OF REGRESSION EQUATION

ANALYSES OF REGRESSION EQUATION

TEST OF SIGNIFICANCE OF LOSS OF SSHA SCORE

SELECTION OF SSHA ITEMS USED IN CALCULATION

OF RELIABILITY

### SOLUTION OF MULTIPLE REGRESSION EQUATION

The calculations for the solution of one regression equation are shown below. The same procedure was used with the other regression equations.

The equations used are:

$$\sum X_1 Y_1 = a \sum X_1^2 + b \sum X_1 X_2 + c \sum X_1$$

$$\sum X_2 Y_1 = a \sum X_1 X_2 + b \sum X_2^2 + c \sum X_2$$

$$\sum Y_1 = a \sum X_1 + b \sum X_2 + c N$$

where  $X_1$  is the boys' I.Q.,  $X_2$  is the S.S.H.A. score and  $Y_1$  is the boys' language score.  $N$  equals 96.

The raw scores were substituted in the above equations:

$$(1) \quad 619774 = a (1075113) + b (371610) + c (10067)$$

$$(2) \quad 217351 = a (371610) + b (143614) + c (3494)$$

$$(3) \quad 5851 = a (10067) + b (3494) + c (96)$$

Equations (1), (2), and (3) were divided by their respective coefficients of  $c$ :

$$(4) \quad 61.56491506 = a (106.7957683) + b (36.91367835) + c$$

$$(5) \quad 62.2069261 = a (106.3566113) + b (41.1030337) + c$$

$$(6) \quad 60.9479166 = a (104.864583) + b (36.3958333) + c$$

Equations (6) and (5) were subtracted from equation (4):

$$(7) \quad .61699846 = a (1.9311853) + b (.51784505)$$

$$(8) \quad 1.25900950 = a (1.4920283) + b (4.70720040)$$

Equations (7) and (8) were divided by their respective coefficients of  $b$  :

$$(9) \quad 1.191473125 = a (3.72927249) + b$$

$$(10) \quad .267464605 = a (.316967235) + b$$

Equation (10) was subtracted from equation (9):

$$(11) \quad .92400852 = a (3.41230526)$$

Equation (11) was divided by the coefficient of a:

$$(12) \quad a = .2707871$$

The value obtained for a was substituted into equation (10) and this equation was solved for b. The value obtained was:

$$b = .18163393$$

The values obtained for a and b were substituted into equation (6) and this equation was solved for c. The value obtained was:

$$c = 25.9412231$$

The calculations were checked by putting the obtained values for a, b, and c, into equation (1). The right-hand side of equation (1) was solved and the obtained value was compared with the left-hand side. The right-hand side value was 619773.997969, while the left hand side equalled 619774.

### ANALYSES OF A MULTIPLE REGRESSION EQUATION

The analyses of one multiple regression equation is shown below. The same procedure was used with the other regression equations.

The regression equation is:

$$Y = a X_1 + b X_2 + c$$

where Y is the boys' language score,  $X_1$  is the I.Q.,  $X_2$  is the SSHA score and a, b, and c are constants. N equals the number of students.

The sum of squares of the regression is given by the expression:

$$a \sum X_1 Y + b \sum X_2 Y + c \sum Y - \frac{(\sum Y)^2}{N}$$

The sum of squares of the residuals is given by the expression:

$$\sum Y - a \sum X_1 Y - b \sum X_2 Y - c \sum Y$$

The sum of squares for total is given by the expression:

$$\sum Y - \frac{(\sum Y)^2}{N}$$

The F-value is:

$$F_{m, N-m-1} = \frac{\frac{\text{sum of squares of regression}}{m}}{\frac{\text{sum of squares of residuals}}{N-m-1}}$$

where m is the number of prediction variables. The formula for the multiple correlation coefficient is:

$$R = \sqrt{\frac{\text{sum of squares of regression}}{\text{sum of squares of total}}}$$

The standard deviation is given by:

$$s = \sqrt{\frac{\text{sum of squares of total}}{N-1}}$$

The standard error of estimate is:

$$s_{\text{est}} = \sqrt{\frac{\text{sum of squares of residuals}}{N-m-1}}$$

The value obtained for the sum of squares for regression was 2480.950 with 2 degrees of freedom. The sum of squares for residuals was 7213.790 with 93 degrees of freedom. The sum of squares for total was 9694.740 with 95 degrees of freedom. The F-value with 2 and 93 degrees of freedom was 15.992. The multiple correlation coefficient, R, was .5050, the standard deviation was 10.10, and the standard error of estimate was 8.807.

ANALYSIS OF THE SIGNIFICANCE OF THE LOSS OF THE SSHA SCORE

The analysis of the significance of the loss of the SSHA scores from the regression equations was done as shown below. The same procedure was followed with all the regression equations.

The regression equations are:

$$Y = aX_1 + bX_2 + c$$

$$Y = dX_2 + e$$

where Y is the boys' Language score;  $X_1$  and  $X_2$  are the I.Q.'s and SSHA scores respectively; a, b, c, d, and e are constants associated with a particular regression equation. N is the number of students.

The expression for the sum of squares of the one-prediction variable regression is:

$$d \sum X_2 Y + e \sum Y - \frac{(\sum Y)^2}{N}$$

The expression for the sum of squares for the two-prediction variable regression is given on the preceding page. The sum of squares of the loss due to the elimination can be calculated by finding the difference between the sum of squares of the one-prediction variable regression and the sum of squares of the two-prediction variable regression.

The sum of squares of the two-variable residuals is given by the expression:

$$\sum Y - a \sum X_1 Y - b \sum X_2 Y - c \sum Y$$

The degrees of freedom associated with this expression is

$N-m-1$  where  $N$  is the number of students and  $m$  is the number of prediction variables in the two-prediction variable regression equation.

The F-test is given by the expression:

$$F = \frac{\frac{\text{sum of squares of loss due to elimination of SSHA}}{1}}{\frac{\text{sum of squares of two-variable residuals}}{N-m-1}}$$

The actual values are:

$$F = \frac{\frac{496.486}{1}}{\frac{7213.790}{93}}$$

$$F = 6.40$$

with 1 and 93 degrees of freedom. An examination of a table with values of  $F$  indicates that the value is significant. That is, there is a significant loss in ability to predict Language marks when the SSHA scores are dropped from the regression equation.



SELECTION OF SCORES USED IN THE  
CALCULATION OF THE RELIABILITY COEFFICIENT OF SSHA

The calculation of the coefficient of reliability of the SSHA required (1) the selection of a random sample of SSHA tests, (2) the division of these tests into two equal parts, (3) the calculation of the correlation coefficient between the two parts of the test, and (4) the estimation of the coefficient of reliability of a test which is twice as long using the Spearman-Brown formula.

The selection of the random samples was done in the following manner. The names of all the boys were listed in the same order as found in the school files. Each boy's name was assigned a number from one to ninety-six. A table<sup>1</sup> of random numbers was used to select fifty numbers from the list. The selection of the random numbers began with page three, column three, line six and only the columns were used. Numbers were passed if they were too large or is already chosen. These numbers represented the SSHA tests used as the random sample. The same procedure was used to select the girl's SSHA tests. However, the selection began with page two hundred and seventy-nine, line seven, column four. The scores of these students are listed in Appendix B, Table XX.

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<sup>1</sup>Rand Corporation, A Million Random Digits With 100,000 Normal Deviates (Illinois: The Free Press, 1955), p. 3.

It was also necessary to divide the questions in the SSHA test into two equal parts. The questions which are scored by the Male keys are 4, 5, 7, 8, 11, 14, 15, 16, 17, 18, 19, 21, 23, 25, 30, 32, 34, 38, 41, 42, 43, 44, 48, 49, 50, 52, 54, 55, 59, 61, 63, 67, 68, 70, 71, and 72. The questions which are scored by the Female keys are 2, 3, 5, 6, 7, 8, 9, 15, 16, 17, 18, 21, 22, 25, 30, 32, 37, 38, 43, 54, 55, 56, 61, 63, 67, 70, 72, 73, and 74. The questions which are answered by the boys were assigned code numbers: the first question namely number 4, was called number 1, the second question number 5 was called number 2 and so on. The table of random numbers which was contained in the Rand Corporation publication was used to select the two groups of numbers. The reading of the random numbers began on page nine, column one, line three. The first eighteen usable numbers found by reading down the columns represented the first group of questions and the remainder of the questions represented the second group of questions. The same procedure was used to determine the questions used in the calculation of the coefficient of reliability for the scores of the girls. The questions were found by starting on page twenty, column two, line five. The question represented by the fifteenth usable number was not included in the calculations.

The scores obtained from the selected questions were used in the calculation of two correlation coefficients. These coefficients were used in the calculation of the reliability coefficient.

APPENDIX B

TABLES OF MARKS

TABLE VIII

MARKS OBTAINED BY MALE STUDENTS, 1961-1962

Student number	I.Q. score	S.S.H.A. score	Language mark	Maths. mark	Science mark	Soc. St. mark
3	124	50	73	79	68	68
4	123	55	77	92	75	76
5	127	40	68	54	59	56
6	124	56	73	84	93	78
7	121	39	68	79	68	67
8	123	40	81	86	75	76
9	132	40	75	69	61	71
10	112	45	72	78	85	80
11	99	25	64	77	85	59
12	130	30	68	80	76	79
13	121	54	64	64	65	64
14	103	40	73	91	85	83
15	99	34	74	71	76	78
16	128	36	61	72	65	65
17	138	62	82	86	76	79
18	100	59	57	54	63	70
19	100	23	63	58	69	67
20	101	38	51	48	63	56
21	110	42	63	51	60	56
22	124	39	64	77	74	63
23	125	39	77	71	61	74
24	123	42	68	53	64	55
25	86	51	80	69	92	74
26	132	52	68	81	54	43
27	103	27	48	33	48	45
28	92	33	73	59	73	66
29	88	9	57	43	43	56
30	87	23	65	46	76	70
31	105	35	55	71	58	51
32	77	37	65	81	64	74
33	115	38	55	63	64	56
34	101	40	47	28	23	29
35	89	36	62	75	75	58
36	115	39	67	72	76	51
37	101	54	70	64	65	68

TABLE VIII (continued)

Student number	I.Q. score	S.S.H.A. score	Language mark	Maths. mark	Science mark	Soc. St. mark
38	122	56	59	66	66	62
39	122	49	68	67	70	59
40	124	24	61	41	58	61
41	84	33	68	81	74	76
42	121	57	56	44	59	58
43	114	33	58	59	59	54
44	112	46	74	68	86	66
45	118	35	60	56	64	62
46	98	17	57	71	54	39
47	88	61	62	64	65	80
48	126	29	68	84	52	39
50	105	36	66	60	55	59
51	93	35	44	56	71	75
52	101	18	58	44	52	44
53	111	61	58	65	64	47
54	88	48	46	20	47	13
55	114	40	65	79	71	56
56	116	11	53	60	72	56
57	102	61	70	68	69	72
58	87	42	58	66	55	54
59	90	54	61	43	67	54
60	104	27	60	47	56	34
61	87	38	48	51	61	68
62	103	25	48	44	61	50
63	85	27	61	51	69	44
64	95	46	61	29	57	29
65	109	19	59	46	70	53
66	84	18	54	72	69	65
67	95	37	52	66	51	41
68	83	48	56	57	68	44
69	103	15	57	70	62	45
70	103	35	53	55	73	68
71	95	25	56	50	45	21
72	110	23	76	62	70	64
73	106	40	52	43	55	51

TABLE VIII (continued)

Student number	I.Q. score	S.S.H.A. score	Language mark	Maths. mark	Science mark	Soc. St. mark
74	107	31	58	51	69	56
75	86	23	43	29	35	34
76	105	41	74	59	60	56
78	109	32	65	67	70	46
79	106	58	67	60	76	45
80	102	33	65	63	58	52
81	102	28	56	38	73	60
82	89	48	67	54	51	43
83	103	17	58	60	55	47
84	88	33	69	41	52	55
86	100	43	56	71	63	53
87	114	25	61	71	55	45
89	97	23	64	28	43	56
90	100	44	54	15	28	31
91	89	16	53	22	47	55
92	100	25	52	15	30	19
93	100	37	63	41	26	43
94	89	14	54	36	43	48
95	86	29	46	26	44	29
96	113	59	50	27	38	32
98	91	17	47	15	44	46
99	95	24	56	50	56	54
100	133	30	73	81	58	64
101	106	45	50	20	18	20
102	85	9	25	11	54	72
103	96	39	33	20	8	18

TABLE IX

MARKS OBTAINED BY FEMALE STUDENTS, 1961-1962

Student number	I.Q. score	S.S.H.A. score	Language mark	Maths. mark	Science mark	Soc. St. mark
1	160	32	71	86	84	84
2	108	34	56	57	45	48
3	119	32	71	74	72	62
4	99	20	71	62	64	68
5	93	39	79	65	67	73
6	87	34	61	43	59	31
7	108	37	66	52	57	54
8	102	35	68	62	54	61
9	100	45	74	65	68	67
10	91	34	71	69	83	81
11	112	35	63	71	88	76
12	131	52	75	95	70	76
13	115	22	67	61	59	62
14	124	31	81	82	90	84
15	95	23	76	49	72	47
16	119	24	68	59	62	65
17	103	24	58	36	48	33
18	108	36	63	70	71	75
19	95	34	63	63	68	63
20	126	28	73	66	63	81
21	96	35	64	50	55	56
22	95	30	61	50	70	74
23	96	16	68	60	64	52
24	90	28	70	61	64	65
25	119	17	52	59	42	46
26	93	10	73	60	61	60
27	94	32	64	69	53	56
28	100	25	65	63	55	56
29	108	35	74	76	81	72
30	122	22	52	71	77	66

TABLE IX (continued)

Student number	I.Q. score	S.S.H.A. score	Language mark	Maths. mark	Science mark	Soc. St. mark
31	104	34	69	75	62	54
32	100	12	63	48	66	72
33	92	36	55	28	35	46
34	108	20	62	58	75	73
35	99	43	59	59	66	53
36	90	24	53	69	76	46
37	99	34	48	57	57	46
38	99	25	62	50	38	45
39	101	15	54	61	58	57
40	113	18	56	44	55	53
41	101	26	54	58	57	46
42	99	35	68	68	78	50
43	88	37	68	59	68	42
44	103	34	69	41	71	61
45	104	15	65	73	44	56
46	80	19	35	34	36	43
47	103	26	62	48	57	32
48	107	41	63	49	61	38
49	90	39	72	51	56	53
50	92	16	51	23	39	38
51	92	22	62	39	49	45
52	112	17	72	61	48	43
53	82	35	61	35	37	40
54	107	38	69	52	67	55
55	79	19	65	52	45	38
56	83	31	55	41	58	29
57	83	28	58	59	44	37
58	75	24	59	40	68	65
59	98	35	80	59	62	56
60	97	14	62	40	52	53
61	100	21	77	54	49	57
62	92	20	72	63	68	64
63	104	30	71	51	77	40
64	95	21	66	53	42	34
65	107	32	57	46	59	44



TABLE IX (continued)

Student number	I.Q.. score	S. S.H.A. score	Language mark	Maths. mark	Science mark	Soc. St. mark
66	85	18	56	40	50	57
67	84	22	64	67	58	55
68	104	33	61	28	32	29
69	96	24	67	64	50	16
70	97	22	61	62	49	29
72	77	24	56	55	85	75
73	118	15	56	8	73	80
74	83	39	70	52	46	70
75	87	24	43	10	14	13
76	96	27	61	12	47	55
77	106	43	70	54	51	59
78	90	32	56	14	45	65
79	107	14	55	12	24	24
81	99	25	62	13	30	46
82	92	18	47	24	31	29
83	97	25	57	23	43	52
84	77	25	59	34	38	38
85	113	29	67	78	61	64

TABLE X

S.S.H.A. SCORES OF STUDENTS OVER AGE

Male Student number	S.S.H.A. score	Female student number	S.S.H.A. score
4	55	4	20
15	34	17	24
20	38	19	34
25	51	22	30
26	52	23	16
27	27	24	28
28	33	27	32
29	9	30	22
30	23	33	36
32	37	35	43
33	38	36	24
34	40	38	25
41	33	43	37
46	17	44	34
47	61	45	15
51	35	46	19
55	40	47	26
57	61	48	41
58	42	49	39
60	27	50	16
61	38	51	22
62	25	53	35
63	27	55	19
64	46	56	31
65	19	57	28
66	18	58	24
67	37	59	35
68	48	60	14
69	15	61	21
70	35	66	18

TABLE X (continued)

Male student number	S.S.H.A. score	Female student number	S.S.H.A. score
72	23	67	22
73	40	72	24
75	23	73	15
76	41	74	39
80	33	76	27
81	28	77	43
82	48	78	32
83	17	82	18
84	33	84	25
		85	29

TABLE XI

S.S.H.A. SCORES OF STUDENTS OF NORMAL AGE OR UNDER AGE

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
3	50	1	32
5	40	2	34
6	56	3	32
7	39	5	39
8	40	6	34
9	40	7	37
10	45	8	35
11	25	9	45
12	30	11	35
13	54	12	52
14	40	13	22
16	36	14	31
17	62	15	23
18	59	16	24
19	23	18	36
21	42	20	28
22	39	21	35
23	39	25	17
24	42	18	10
31	35	28	25
35	36	29	36
36	39	31	34
37	54	32	12
38	56	34	20
39	49	37	34
40	24	39	15
42	57	40	18
43	33	41	26
44	46	42	35
45	35	52	17

TABLE XI (continued)

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
48	29	54	38
50	36	62	20
52	18	63	30
53	61	64	21
54	48	65	32
56	11	68	33
59	54	69	24
71	25	70	22
74	31	75	24
78	32	79	14
79	58	81	25
85	43	83	25
86	25	10	34
89	23		
90	44		
91	16		
92	25		
93	37		
94	14		
95	29		
96	59		
98	17		
99	24		
100	30		
101	45		
102	9		
103	39		

TABLE XII

S.S.H.A. SCORES OF STUDENTS WHO FAILED ONE OR MORE JUNE EXAMINATIONS

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
5	40	19	34
34	40	46	19
48	29	53	35
55	48	54	38
59	54	57	28
60	27	60	14
62	25	63	30
64	46	64	21
65	19	68	33
69	15	76	27
70	35	79	14
71	25	81	25
73	40	83	25
74	31		
81	28		
84	33		
85	43		
89	23		
91	16		
95	29		
96	59		
101	45		

TABLE XIII

S.S.H.A. SCORES OF STUDENTS WHO DID NOT FAIL JUNE EXAMINATIONS

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
3	50	1	32
4	55	2	34
6	56	3	32
7	39	4	20
8	40	5	39
9	40	6	34
10	45	7	37
11	25	8	35
12	30	9	45
13	54	10	34
14	40	11	35
15	34	12	52
16	36	13	22
17	62	14	31
18	59	15	23
19	23	16	24
20	38	18	36
21	42	20	28
22	39	21	35
23	39	22	30
24	42	23	16
25	51	24	28
27	27	25	17
28	33	26	10
29	9	27	32
30	23	28	25
31	35	29	35
32	37	30	22
35	36	31	34
36	39	32	12

TABLE XIII (continued)

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
37	54	34	20
38	56	35	43
39	49	36	24
40	24	37	34
42	57	38	25
43	33	39	15
44	46	40	18
45	35	41	26
46	17	42	35
47	61	43	37
50	36	44	34
51	35	45	15
52	18	47	26
53	61	48	41
56	11	51	22
58	42	52	17
61	38	55	19
63	27	56	31
66	18	58	24
67	37	61	21
68	48	62	20
72	23	65	32
76	41	69	24
78	32	70	22
79	58	72	24
82	48		
86	25		
94	14		
98	17		
100	30		



TABLE XIV

S.S.H.A. SCORES OF STUDENTS WHO DID NOT FAIL ANY JUNIOR  
HIGH SCHOOL GRADES

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
3	50	1	32
4	55	2	34
5	40	3	32
6	56	4	20
7	39	5	39
8	40	6	34
9	40	7	37
10	45	8	35
11	25	9	45
12	30	10	34
13	54	11	35
14	40	12	52
15	34	13	22
16	36	14	31
17	62	15	23
18	59	16	24
19	23	18	36
20	38	19	34
21	42	20	28
22	39	21	35
23	39	22	30
24	42	23	16
25	51	24	28
27	27	25	17
28	33	26	10
29	9	27	32
30	23	28	25
31	35	29	35
32	37	30	22
34	40	31	34

TABLE XIV (continued)

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
35	36	32	12
36	39	34	20
37	54	35	43
38	56	36	24
39	49	37	34
40	24	38	25
42	57	39	15
43	33	40	18
44	46	41	26
45	35	42	35
46	17	43	37
47	61	44	34
48	29	45	15
50	36	46	19
51	35	47	26
52	18	48	41
53	61	51	22
54	48	52	17
56	11	53	35
58	42	54	38
59	54	55	19
60	27	56	31
61	38	57	28
62	25	58	24
63	27	60	14
64	46	61	21
65	19	62	20
66	18	63	30
67	37	64	21
68	48	65	32
69	15	68	33
70	35	69	24
71	25	70	22
72	23	72	24
73	40	76	27

TABLE XIV (continued)

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
74	31	79	14
76	41	81	25
78	32	83	25
79	58		
81	28		
82	48		
84	33		
85	43		
86	25		
89	23		
91	16		
93	37		
95	29		
96	59		
98	17		
100	30		
101	45		

TABLE XV

S.S.H.A. SCORES OF STUDENTS WHO DID FAIL A GRADE IN  
JUNIOR HIGH SCHOOL

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
26	52	17	24
33	38	33	36
41	33	49	39
55	40	50	16
57	61	59	35
75	23	66	18
80	33	67	22
83	17	73	15
90	44	74	39
92	25	75	24
93	14	77	43
99	24	78	32
102	9	82	18
103	39	84	25
		85	29

TABLE XVI

S.S.H.A. SCORES OF STUDENTS IN UNMIXED CLASSES

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
19	23	17	24
20	38	18	36
21	42	19	34
22	39	20	28
23	39	21	35
24	42	22	30
25	51	23	16
26	52	24	28
27	27	25	17
28	33	26	10
29	9	27	32
30	23	28	25
31	35	29	35
32	37	30	22
33	38	31	34
34	40	32	12
35	36	33	36
36	39	34	20
37	54	35	43
38	56	36	24
39	49	37	34
40	24	38	25
41	33	39	15
42	57	40	18
43	33	41	26
44	46	42	35
45	35	43	37
46	17	44	34
47	61	45	15
48	29	46	19
50	36	47	26
51	35	48	41
52	18	49	39
53	61	50	16
54	48	51	22

TABLE XVI (continued)

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
55	40	52	17
56	11	53	35
57	61	54	38
58	42	55	19
59	54	56	31
60	27	57	28
61	38	58	24
62	25	59	35
63	27	60	14
64	46	61	21
65	19	62	20
66	18	63	30
67	37	64	21
68	48	65	32
69	15	66	18
70	35	67	22
71	25	68	33
72	23	69	24
73	40	70	22
74	31	72	24
75	23		
76	41		
78	32		
79	58		
80	33		
81	28		
82	48		
83	17		
84	33		
85	43		
86	25		

TABLE XVII

S.S.H.A. SCORES OF STUDENTS IN MIXED CLASSES

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
3	50	1	32
4	55	2	34
5	40	3	32
6	56	4	20
7	39	5	39
8	40	6	34
9	40	7	37
10	45	8	35
11	25	9	45
12	30	10	34
13	54	11	35
14	40	12	52
15	34	13	22
16	36	14	31
17	62	15	23
18	59	16	24
89	23	73	15
90	44	74	39
91	16	75	24
92	25	76	27
93	37	77	43
94	14	78	32
95	29	79	14
96	59	81	25
98	17	82	18
99	24	83	25
100	30	84	25
101	45	85	29
102	9		
103	39		

TABLE XVIII

S.S.H.A. SCORES OF STUDENTS WHO REQUESTED AN  
INTERPRETATION OF THEIR S.S.H.A. SCORE

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
3	50	1	32
4	55	2	34
5	40	3	32
6	56	4	20
7	39	5	39
8	40	6	34
9	40	7	37
10	45	8	35
11	25	9	45
12	30	10	34
13	54	11	35
14	40	12	52
15	34	13	22
16	36	14	31
17	62	15	23
18	59	16	24
19	23	17	24
21	42	18	36
23	39	19	34
24	42	20	28
25	51	21	35
26	52	22	30
28	33	23	16
30	23	25	17
31	35	26	10
32	37	27	32
34	40	28	25
35	36	29	35
36	39	30	22
37	54	31	34
38	56	32	12
39	49	33	36
40	24	34	20
42	57	35	43
44	46	36	24



TABLE XVIII (continued)

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
45	35	37	34
46	17	38	25
48	29	39	15
50	36	40	18
51	35	41	26
52	18	42	35
55	40	43	37
57	61	44	34
58	42	45	15
59	54	46	19
60	27	47	26
61	38	51	22
62	25	56	31
64	46	62	20
65	19	64	21
66	18	67	22
67	37	70	22
68	48		
69	15		
70	35		
72	23		
73	40		
76	41		
78	32		
79	58		
80	33		
81	28		
82	48		
84	33		
85	43		
86	25		

TABLE XIX

S.S.H.A. SCORES OF STUDENTS WHO DID NOT REQUEST AN  
INTERPRETATION OF THEIR S.S.H.A. SCORE

Male Student number	S.S.H.A. score	Female Student number	S.S.H.A. score
20	38	24	28
22	39	48	41
27	27	49	39
29	9	50	16
33	38	52	17
41	33	53	35
43	33	54	38
47	61	55	19
53	61	57	28
54	48	58	24
56	11	59	35
63	27	60	14
71	25	61	21
74	31	63	30
75	23	65	32
83	17	66	18
89	23	68	33
90	44	69	24
91	16	72	24
92	25	73	15
93	37	74	39
94	14	75	24
95	29	76	27
96	59	77	43
98	17	78	32
99	24	79	14
100	30	81	25
101	45	82	18
102	9	83	25
103	39	84	25
		85	29

TABLE XXX

S.S.H.A. SCORES OF FIFTY STUDENTS SELECTED AT RANDOM

Male Student number	Random sample A	Random sample B	Female Student number	Random sample A	Random sample B
3	30	20	33	17	18
4	29	26	34	12	8
5	22	18	36	13	11
8	19	21	37	19	14
9	18	22	38	11	13
10	21	24	40	10	8
11	10	15	44	15	18
12	13	17	50	8	8
17	29	33	51	11	10
18	29	30	52	12	5
19	13	10	53	18	16
21	22	20	54	22	16
22	20	19	55	10	9
29	6	3	56	16	14
31	14	21	59	15	20
33	22	16	62	8	11
35	15	21	64	7	14
40	11	13	65	17	15
41	22	11	66	10	8
42	26	31	67	10	12
45	16	19	69	11	13
47	30	31	76	9	17
50	18	18	77	24	18
53	30	31	78	17	14
55	21	20	79	6	8
56	4	7	81	12	13
58	18	24	82	9	9
61	17	21	83	11	13
62	11	14	84	12	13
63	12	15	85	15	13

TABLE XX (continued)

Male Student number	Random sample A	Random sample B	Female Student number	Random sample A	Random sample B
64	19	27	3	19	12
65	9	10	4	11	9
66	7	11	5	20	18
68	23	25	7	17	19
71	14	11	12	26	25
73	21	19	14	17	13
74	14	17	15	10	12
75	15	8	16	14	10
76	21	20	18	15	20
78	20	12	19	21	13
79	27	31	20	15	13
81	8	20	21	19	15
82	25	23	22	14	15
83	10	7	25	8	8
90	13	31	27	18	13
92	8	17	28	13	11
95	14	15	29	19	16
99	13	11	30	9	13
100	13	17	31	18	16
102	5	4	32	5	7

APPENDIX C

TESTS

Name of Inspector.....

Name of Student.....  
(Surname) (First name) (Middle name)

School.....  
(Name of School) (P.O. Address of School)

Room Number.....

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**DEPARTMENT OF EDUCATION**  
**MANITOBA**

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**EXAMINATIONS, JUNE, 1962**

**GRADE IX LANGUAGE**

Wednesday, June 20th, 9.00 to 11.00 a.m.

Examiners: Sister Emélie des Anges, D. Duerksen









10 × ½

6. In the space provided write the appropriate letter opposite the corresponding sentence.

- a. Simple sentence.
- b. Simple sentence with compound subject.
- c. Simple sentence with compound predicate.
- d. Simple sentence with compound subject and compound predicate.
- e. Compound sentence.
- f. Complex sentence.
- g. Compound complex sentence.

Example:     *f*     He was a man whom we all trusted.

- ..... (1) I came, I saw, and I conquered.
- ..... (2) The sun in the heavens gleamed and burned into the valley.
- ..... (3) Columbus had a discouraging time, but he reached America before his mutinous crew gained the upper hand.
- ..... (4) Have Joan and Karen swept and dusted the rooms?
- ..... (5) Strength, skill, and ingenuity are the requirements for the difficult task.
- ..... (6) Will you be able to do the work or shall I delegate another?
- ..... (7) Why Tom did not come is unknown.
- ..... (8) When Richard returned, his first remark was that he had completed the assigned task.
- ..... (9) Peering out into the darkness, the tall captain of the schooner observed the fury of the North Atlantic gale threatening to bring death and destruction to the mariners.
- ..... (10) While we were struggling down the mountainside, a rescue plane flew over our heads and the pilot dropped a package of food.

5 × 1

7. Write a sentence illustrating each of the following verbal forms. Use the space provided and underline your example.

- (1) An infinitive as subject of a sentence.....  
.....
- (2) A present participle.....  
.....
- (3) A perfect participle.....  
.....
- (4) A gerund as predicate nominative.....  
.....
- (5) An infinitive as adverb.....  
.....

SECTION D—Sentence Correction

8×1½ 8. Rewrite the following and correct where necessary. Give a reason for each correction you make.

- (1) You were generous with your time and money, no stone was left unturned to bring us help in the emergency.

.....  
.....  
.....  
Reason.....  
.....

- (2) Standing on a hill, the ship came into view.

.....  
.....  
Reason.....  
.....

- (3) Who did you say gave you this picture?

.....  
Reason.....  
.....

- (4) Fanny told me that she was going to school over the telephone.

.....  
Reason.....  
.....

- (5) That I can lead you to safety.

.....  
Reason.....  
.....

- (6) We were requested to immediately take our position.

.....  
Reason.....  
.....

- (7) At the camp every one had to cook their own meals.

.....  
Reason.....  
.....

- (8) The trouble came from us leaving the back door open.

.....  
Reason.....  
.....



Blank lined paper with horizontal ruling lines.













Name of Inspector.....

Name of Student.....  
(Surname) (First name) (Middle name)

School.....  
(Name of School) (P.O. Address of School)

Room Number.....

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**DEPARTMENT OF EDUCATION**  
**MANITOBA**

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EXAMINATIONS, JUNE, 1962

GRADE IX

**MATHEMATICS**

Tuesday, June 19th, 9.00 to 11.00 a.m.

Examiners: A. S. Gwynne, Miss A. A. Wiechman



## SECTION A

Values

$20 \times 1$  Perform the operations indicated. Reduce fractional answers to lowest terms. Put your answers in the block spaces provided. Additional rough work may be done on blank paper supplied by the school.

1. Add:

$$\begin{array}{r} 99.75 \\ 547.69 \\ 8.50 \\ 446.97 \\ 8.76 \end{array}$$

2. Add:

$$\begin{array}{r} 7\frac{5}{6} \\ 11\frac{11}{16} \\ 13\frac{3}{4} \\ \hline \end{array}$$

3. Subtract:

$$\begin{array}{r} 700.3 \\ 67.45 \end{array}$$

4. Subtract:

$$\begin{array}{r} 10\frac{5}{8} \\ 5\frac{2}{3} \\ \hline \end{array}$$

5. Multiply:

$$\begin{array}{r} .0469 \\ 85.7 \\ \hline \end{array}$$

6. Multiply:

$$1\frac{1}{7} \times 4\frac{5}{8} \times 28 =$$

7. Divide:

$$\begin{array}{r} 70.5 \overline{) 2.0727} \end{array}$$

8. Divide:

$$12\frac{3}{4} \div 17 =$$

9. Express as a decimal:  $173\%$ 

10. Simplify:  $\frac{3}{4} \times \frac{2}{3} - \frac{1}{2} \div 4 =$ 

11. What number is  $20\%$  more than 60?
12. Simplify:  $(17\frac{2}{3} - 9\frac{5}{8}) \div (\frac{3}{8} \times 4\frac{2}{3}) =$

13. Express  $\frac{5}{11}$  as a decimal and round it off to the nearest hundredth.

14. 24 is ..... % of 64

15. Change 6.2 metres to centimetres.

16. Find the value of  $\sqrt{5041}$ .

17.  $\frac{3}{8}\%$  of 64 =

18. Express seven one-thousandths as a decimal fraction.

19. Find the perimeter of an equilateral triangle having a side of 5 inches.

20. Write  $6\frac{1}{2}\%$  as a decimal fraction.

### SECTION B—PROBLEMS

Solutions to problems must be shown in space provided.

Values

5

1. A field in the form of a trapezium has two parallel sides 50 rods apart. One of these sides is 85 rods long and the other is 75 rods long. Find the area of the field in acres.

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5

2. A cement walk  $3\frac{1}{2}$  feet wide is to be constructed around a wading pool 21 feet in diameter. Find the surface area of the walk.

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- 5 3. A dealer buys desks at \$175 less discounts of 20% and 5%. He also takes advantage of a cash discount of 2%. What price does he pay for each desk?

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- 5 4. A man left  $\frac{2}{3}$  of his estate to his son,  $\frac{1}{4}$  of it to his daughter, and the rest to his wife. If the wife received \$13,300, what was the value of the estate?

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### SECTION C—ALGEBRA

Perform the operations indicated. Place answers in the spaces provided.

- $20 \times \frac{1}{2}$  1. Indicate by brackets that three times the sum of  $y$  and  $z$  is to be subtracted from  $x$ .

.....

2. If  $a = 5$ ,  $2a^2 =$  .....

3. Add:  $-2x^2$  and  $x^2$ .....

4. From  $-6a$  subtract  $3a$ .....

5. What number must be added to  $3a^2 - b$  to give zero?

.....

6. Simplify:  $x - 3y - (5y - x) =$  .....

7. Multiply:  $a^3b \times b^2 =$  .....

8.  $(2pq^2)^4 =$  .....

9.  $(-x)^5 =$  .....

10.  $-a(9a^2 - 1) =$  .....

11.  $\frac{(3m)^3}{3m} =$  .....

$$12. \frac{5a^2b^3c^2}{ab^2c^2} = \dots\dots\dots$$

$$13. \frac{x^3y}{-xy} = \dots\dots\dots$$

$$14. \frac{x^3}{x^4} = \dots\dots\dots$$

In the following equations, solve for the unknown.

$$15. \frac{3}{8}a = 30 \dots\dots\dots$$

$$16. 2x + 5 = 11 \dots\dots\dots$$

$$17. 14x = 32 + 12x \dots\dots\dots$$

$$18. 3x + 12 = 0 \dots\dots\dots$$

$$19. 8 + y = 0 \dots\dots\dots$$

$$20. \text{Find the average of these expressions: } x - 8 \text{ and } 3x + 2 \dots\dots\dots$$

#### SECTION D—ALGEBRA

5×1 1. Write each statement as an algebraic equation. DO NOT SOLVE.

(a) If 5 is subtracted from a certain number, the result is 7.

.....

(b) One half of a number is 15.

.....

(c) If 2 is added to three times a certain number the result is 11.

.....

(d) Two times a certain number increased by 7 is 32.

.....

(e) The sum of a number and two times itself is 39.

.....

In the following questions, perform the operations indicated. Show all necessary work.

$$3 \quad 2. \text{Simplify: } (x^3 - 5x^2 - 6x) - (2x^3 - 5x^2 - 6x) - (4x^3 - 8x^2 + x)$$

.....

.....

2 3. Subtract:

$$\begin{array}{r} x^2 - 2xy - y \\ x^2 - 5xy - 6y \\ \hline \end{array}$$

.....

$$\begin{array}{r}
 2 \quad 4. \text{ Add: } \quad 7a - 2ab + 3b + 2 \\
 \quad \quad \quad -4a \quad + 2b + 1 \\
 \quad \quad \quad \hline
 \quad \quad \quad 5a - 6ab - 7b - 2 \\
 \quad \quad \quad \hline
 \quad \quad \quad \hline
 \end{array}$$

$$2 \quad 5. \text{ Divide: } \underline{a-2} \overline{2a^2 - 5a + 2}$$

$$\begin{array}{r}
 2 \quad 6. \text{ Multiply: } \quad 2x^2 - 2x + 3 \\
 \quad \quad \quad \quad \quad \quad x + 4 \\
 \quad \quad \quad \quad \quad \quad \hline
 \end{array}$$

.....

$$3 \quad 7. \text{ If } a=5, b=3, c=1, \text{ find the value of: } (a^2 - 3b^2 + c^2) - (2a^2 + b^2 - c^2) + (5a^2 - b^2 + 3c^2)$$

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$$3 \quad 8. \text{ Solve: } 3(x+2) + 5(x-3) = 2(x-4) + 4(x-1) + 13$$

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$$3 \quad 9. \text{ Solve: } (x+5)(x-7) = (x-5)(x+2)$$

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### SECTION E—ALGEBRA

Form equations and solve. Show all necessary work.

$$3 \quad 1. \text{ One of two numbers is 4 times another number. The sum of the numbers is 125. Find the numbers.}$$

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- 3      2. Bruce has twice as many marbles as Fred, and Harry has 5 more than Bruce. All together they have 115 marbles. How many marbles does each have?

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- 4      3. Find three consecutive even numbers so that the sum of the first, and twice the second, and five less than the third is 27.

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#### SECTION F—GEOMETRY

- $8 \times \frac{1}{2}$       1. (a) Illustrate and label each of the following by means of a diagram:

(1) transversal

(2) diagonal

(3) supplementary angles

(4) vertically opposite angles

(5) sector

(6) chord

(7) exterior angle

(8) hypotenuse



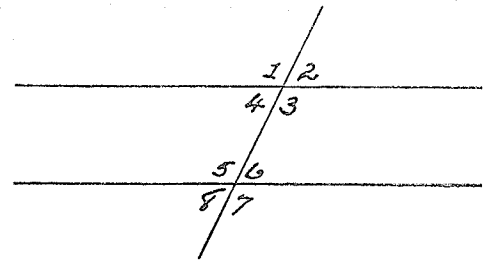
2 ×  $\frac{1}{2}$  (b) In the accompanying diagram:

(1) Angles 4 and 6 are called

.....

(2) Angles 1 and 5 are called

.....



3+3 2. Construct an acute angle and bisect it. (Use ruler and compass only). Label it. WRITE OUT THIS CONSTRUCTION.

4 3. Given a line AB  $2\frac{3}{4}$  inches long. At a point E on AB,  $1\frac{1}{2}$  inches from A, draw a line at right angles to AB. DO NOT WRITE OUT THIS CONSTRUCTION. (Use ruler and compass only.)



DEPARTMENT OF EDUCATION  
MANITOBA

EXAMINATIONS, JUNE, 1962

GRADE IX SCIENCE

Thursday, June 21st, 9.00 to 11.00 a.m.

Examiners: W. Ferens, D. H. Friesen

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

This is a test to measure your knowledge of Science. It is made up of 100 questions. For each question five different answers are suggested. In each question you must decide which is the right answer among the five answers suggested.

**DIRECTIONS**—Read each question and its numbered answers. When you have decided which answer is correct, blacken the corresponding space on this sheet with the special pencil. Make your mark as long as the pair of lines, and move the pencil point up and down firmly to make a heavy black line. If you change your mind, erase your first mark *completely*. Make no stray marks; they may count against you.

SAMPLES

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. Chicago is  | 1 | 2 | 3 | 4 | 5 |
| (1) a country (2) a mountain (3) an island (4) a city (5) a state.....   |   |   |   | ■ |   |
| 2. Which of the following is <i>not</i> part of most cells?              | 1 | 2 | 3 | 4 | 5 |
| (1) cell wall (2) nucleus (3) stomata (4) living protoplasm (5) cell sap |   |   |   |   |   |
| 3. Cells take in oxygen and give off:                                    | 1 | 2 | 3 | 4 | 5 |
| (1) nitrous oxide (2) carbon dioxide (3) oxygen (4) nitrogen (5) argon   |   |   |   |   |   |

**NOTE**

Be sure to make good heavy black marks. Erase completely any answers which you wish to change, and, except for recording your answers, do not make any marks either on the answer sheet or on the test itself. Do any necessary figuring on a separate sheet of paper.

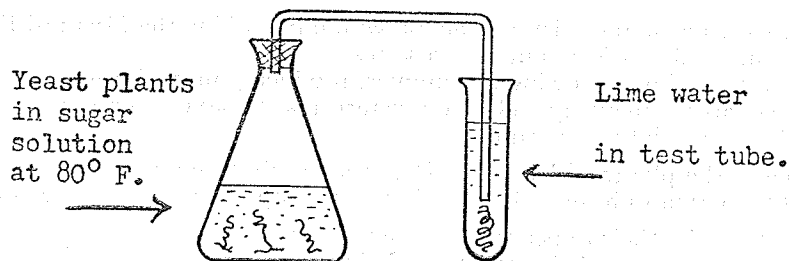
## INSPECTOR'S TEST

1. The calyx of a flower consists of: (1) petals (2) anthers (3) sepals (4) leaves (5) ovules..... 1
2. The main purpose of the leaves of a flower is: (1) to provide shade for the plant  
(2) to manufacture food for the plant (3) to take in carbon dioxide from the air  
(4) to produce the seeds (5) to produce pollen grains..... 2
3. The fruit of the mustard plant is called:  
(1) a legume (2) a pod (3) an achene (4) a silique (5) a grain..... 3
4. The scientific name of the Grass Family is:  
(1) Gramineae (2) Leguminosae (3) Cruciferae (4) Compositae (5) Brassicaceae..... 4
5. Which of the following plants does *not* belong to the Mustard Family?  
(1) cabbage (2) radish (3) turnip (4) lettuce (5) cauliflower..... 5
6. Vaccination is used to make a person immune to (1) tuberculosis (2) diphtheria  
(3) infantile paralysis (4) smallpox (5) typhoid fever..... 6
7. The souring of milk is due to (1) lack of pasteurization (2) the action of bacteria  
(3) warm temperatures (4) lactic acid (5) yeast plants..... 7
8. Foods are preserved by freezing because  
(1) moisture is removed by freezing (2) bacteria are killed by freezing  
(3) at the freezing point bacteria become inactive and stop digesting the food  
(4) frozen foods remain fresher longer  
(5) it is easier to freeze foods than preserving them in air-tight containers..... 8
9. An example of a microscopic alga enclosed in silica, glass skeletons is the:  
(1) protococcus (2) desmid (3) diatom (4) cilia (5) bacillus..... 9
10. Spirogyra differs from the common field mushroom in that spirogyra (1) contains chlorophyll  
(2) cannot manufacture its own food (3) can be used as food (4) reproduces by means of seeds  
(5) reproduces by means of spores..... 10
11. The enlarged, flattened end of the stem upon which the flower stands is called the:  
(1) calyx (2) involucre (3) ovary (4) peduncle (5) receptacle..... 11
12. The floral formula of the Mustard plant is: (1)  $Ca^4Co^4S^5P^2$  (2)  $Ca^4Co^4S^{2+4}P^2$   
(3)  $Ca^5Co^5S^{10}P^1$  (4)  $Ca^2Co^4S^{2+4}P^1$  (5)  $Ca^4Co^4S^4P^2$ ..... 12
13. The science that deals with the study of plants is:  
(1) chemistry (2) zoology (3) physiology (4) anatomy (5) none of these..... 13
14. The largest of the Plant families is the: (1) Mustard Family (2) Grass Family  
(3) Pea Family (4) Willow Family (5) Sunflower Family..... 14
15. The great grass lands of South America are called:  
(1) plains (2) pampas (3) prairies (4) veldt (5) steppes..... 15
16. Which animal is not a vertebrate? (1) snake (2) earthworm (3) fish (4) frog (5) bird..... 16
17. A whale is classified as a mammal because (1) it has a thick layer of blubber (2) it has milk glands  
(3) it has lungs (4) it has nostrils on top of its head (5) it does not care for its young..... 17
18. The person who discovered the nucleus of a cell in 1831 was (1) Robert Brown (2) Robert Hooke  
(3) Antony Leeuwenhoek (4) Robert Koch (5) Louis Pasteur..... 18
19. Milk is pasteurized by: (1) removing the cream with a cream separator (2) adding a chemical  
(3) mixing the cream so that it cannot be separated  
(4) boiling the milk to kill all bacteria and then quickly cooling it  
(5) heating the milk at a definite temperature for a definite period of time and then cooling it..... 19
20. Amphibians in the larval stage breathe by means of:  
(1) stomata (2) air sacs (3) gills (4) lungs (5) muscular diaphragm..... 20
21. Which of the following is *not* part of the leaf of a grass plant?  
(1) the blade (2) the veins (3) the petiole (4) the sheath (5) the ligule..... 21
22. The roots of the wheat plant: (1) are classified as tap roots (2) have swellings called nodules  
(3) are supported by special props (4) are classified as fibrous roots (5) are classified as fleshy roots..... 22
23. Which of the following is not a member of the Grass Family?  
(1) rice (2) alfalfa (3) sugar cane (4) corn (5) bamboo..... 23
24. Members of the Grass Family are not used in the production of:  
(1) flour (2) beer (3) brooms (4) molasses (5) linen..... 24

25. Which of the following plants is a member of the Pea Family?  
 (1) veiny vetch (2) flixweed (3) Frenchweed (4) yarrow (5) goldenrod..... 25
26. Which of the following is not a mammal?  
 (1) rat (2) sloth (3) salmon (4) vole (5) spiny ant-cater..... 26
27. A bear is best classified as:  
 (1) a carnivore (2) an herbivore (3) an omnivore (4) a rodent (5) an insectivore..... 27
28. Fungus plants reproduce by means of:  
 (1) seeds (2) photosynthesis (3) fertilization (4) spores (5) stems..... 28
29. A plant partnership made up of algae and fungi is (1) laminaria (2) reindeer moss (3) hypholoma  
 (4) mermaid's tresses (5) club moss..... 29
30. Mammals that have sharp incisors which are used for gnawing hard objects such as wood are:  
 (1) rodents (2) termites (3) herbivores (4) carnivores (5) omnivores..... 30
31. One of the following is *not* associated with the Pea Family:  
 (1) nodule (2) stipule (3) leaflet (4) keel (5) ligule..... 31
32. Clover is planted chiefly:  
 (1) to provide a home for bacteria (2) to remove excess carbon-dioxide from the air  
 (3) to provide nectar for insects (4) to enrich the land with nitrates  
 (5) to provide people with carbohydrates..... 32
33. The floral formula of the sunflower is:  
 (1)  $Ca^2Co^3S^3P^2$  (2)  $Ca^2Co^5S^5P^2$  (3)  $Ca^5Co^5S^{9+1}P^1$  (4)  $Ca^2Co^4S^5P^1$  (5)  $Ca^2Co^5S^5P^1$ ..... 33
34. A seed and a spore fall at the same time in one location. The seed germinates but the spore remains inactive because:  
 (1) the seed has a young plant within itself and the spore does not  
 (2) the seed has its own store of food and there is no food available for the spore  
 (3) there is no moisture present (4) the temperature is too low for germination  
 (5) the seed has two parents and the spore has only one..... 34
35. The disc florets of the sunflower: (1) possess large yellow corollas (2) do not possess stamens  
 (3) produce the seeds (4) possess only imperfect pistils (5) form the involucre..... 35
36. A baby kangaroo makes its way to a pouch on its mother's abdomen immediately after it is born. This is necessary for the survival of the baby chiefly because a kangaroo:  
 (1) travels long distances in search of food (2) is very active when born  
 (3) is very immature when born (4) is very impatient with its young  
 (5) does not want anyone to see its baby..... 36
37. The dental formula of a beaver is:  
 (1)  $\frac{0013}{3133}$  (2)  $\frac{3133}{3133}$  (3)  $\frac{3142}{3143}$  (4)  $\frac{1013}{1013}$  (5)  $\frac{1123}{1123}$ ..... 37
38. An example of a pouched mammal is the:  
 (1) armadillo (2) bat (3) shrew (4) meadow mouse (5) wallaby..... 38
39. Which one of the following is not warm-blooded?  
 (1) mole (2) opossum (3) lemming (4) toad (5) gibbon..... 39
40. A cold blooded animal may be defined as one:  
 (1) whose body temperature remains constant  
 (2) whose body temperature is approximately the same as that of its surroundings  
 (3) whose body temperature is 98.6° F. (4) whose body temperature is 77° F.  
 (5) whose blood is always cold..... 40
41. Which of the following flowers is a member of the Composites?  
 (1) sweet pea (2) dahlia (3) lily (4) nasturtium (5) geranium..... 41
42. The characteristic that identifies a plant as belonging to the Mustard Family is:  
 (1) the presence of a fibrous root (2) a cluster of flowers on a single head  
 (3) a flower with a cross-shaped corolla (4) a butterfly-shaped corolla  
 (5) a compound leaf with small leaflets..... 42
43. The number of members of the Mustard Family found growing in Manitoba is approximately:  
 (1) 65 (2) 160 (3) 35 (4) 135 (5) 116..... 43

- 25 44. Which one of the following characteristics is *not important* in making the Mustard Family troublesome?  
 26 (1) some young mustard plants form autumn rosettes  
 27 (2) the mustard plant continues growing all summer, producing more flowers  
 28 (3) the mustard seed ripens unevenly (4) the mustard plants have tap roots  
 29 (5) the mustard plants multiply very rapidly..... 4
- 30 45. The scientific name of the plants of Division III of the family tree is:  
 31 (1) thallophyte (2) spermatophyte (3) bryophyte (4) saprophyte (5) pteridophyte..... 4
- 32 46. The earliest plants to make their appearance on earth were the:  
 33 (1) algae (2) fungi (3) roses (4) liverworts (5) bacteria..... 4
- 34 47. Saprophytes are: (1) disease producing bacteria (2) independent plants  
 35 (3) plants which live upon dead or decaying plants or animals  
 (4) plants which live upon living plants or animals (5) tiny plants that devour germs..... 4
- 36 48. An example of a pore-bearing fungus is the:  
 (1) morel (2) coral fungus (3) amanita (4) bracket fungus (5) puffball..... 4
- 37 49. Mutations are brought about by changes in the:  
 (1) pollination (2) nutrition (3) determiners (4) protoplasm (5) chlorophyll..... 4
- 38 50. The process by which a branch or a bud of a living tree or shrub is attached to a stem or branch of  
 another living plant in such a way that it continues to grow and reproduce is:  
 (1) grafting (2) cutting (3) pruning (4) bracing (5) cross-breeding..... 50
- 39 51. The thallus plants do *not* include the:  
 (1) algae (2) fungi (3) moulds (4) bacteria (5) mosses..... 51
- 40 52. The oldest and simplest of the flowering plants are the:  
 (1) buttercups (2) geraniums (3) roses (4) daisies (5) lilies..... 52
- 41 53. The first plants whose leaves had stomata were the:  
 (1) algae (2) liverworts (3) mosses (4) fungi (5) horsetails..... 53
- 42 54. The ferns are considered more highly developed than the mosses because the ferns:  
 (1) reproduce by means of spores (2) possess chlorophyll (3) have small leaves  
 (4) have well-developed sap tubes (5) have creeping stems in our climate..... 54
- 43 55. Plant fossils are commonly found in rock such as:  
 (1) granite (2) limestone (3) feldspar (4) quartz (5) slate..... 55
- 44 56. One animal does not belong in this group. Which one?  
 (1) shrew (2) pig (3) whale (4) duck-bill (5) snake..... 56
- 45 57. An animal which swallows its food whole and later chews its cud is best referred to as:  
 (1) a grazing animal (2) an ungulate (3) a ruminant (4) even-toed (5) an herbivore..... 57
- 46 58. In late spring or early summer tiny colourless rust spores infect:  
 (1) oats (2) currant bushes (3) wheat (4) barberry (5) rye..... 58
- 47 59. The most desirable method to improve domesticated animals and cultivated plants is:  
 (1) scientific cross-breeding (2) by selecting superior individuals to be parents of future offspring  
 (3) selecting the best in each generation (4) by getting rid of all diseased plants and animals  
 (5) by importing plants and animals from other countries..... 59
- 48 60. Which one of the following does more harm than good?  
 (1) coyote (2) Cooper's hawk (3) robin (4) snowy owl (5) beaver..... 60
- 49 61. The simplest of all animals is:  
 (1) the opossum (2) the pygmy shrew (3) the mole (4) the volvox (5) the amoeba..... 61
- 50 62. The man who invented the compound microscope was:  
 (1) Robert Koch (2) Dr. Jenner (3) Robert Hooke (4) Robert Brown (5) Antony Leeuwenhoek..... 62
- 51 63. The bean seed is a(n): (1) dicotyledon (2) plumule (3) monocotyledon (4) silique (5) achene..... 63
- 52 64. The process of changing non-living food into living protoplasm is called:  
 (1) absorption (2) assimilation (3) osmosis (4) respiration (5) excretion..... 64
- 53 65. An example of a protozoan that can live either as a plant or as an animal is the  
 (1) euglena (2) vorticella (3) stentor (4) paramoecium (5) mona..... 65
- 54 66. Which animal does not belong in this group?  
 (1) newt (2) salamander (3) mud puppy (4) frog (5) marmoset..... 66

Questions 67, 68 and 69 pertain to this diagram:



The diagram illustrates apparatus used in an experiment described in the text.

67. The gas that is produced in the process is:  
 (1) nitrogen (2) sulphur dioxide (3) hydrogen sulphide (4) carbon dioxide (5) ammonia
68. The limewater at first turns: (1) colourless (2) brown (3) pink (4) milky (5) blue
69. The process of the reaction is called:  
 (1) digestion (2) fermentation (3) distillation (4) assimilation (5) transportation
70. Of the birds of prey, one of the following is not too common in Western Canada:  
 (1) Cooper's hawk (2) night hawk (3) sharp-shinned hawk (4) goshawk (5) sparrow hawk
71. All of the following except one are true of a sphere type body:  
 (1) The inner cells do not receive sufficient oxygen  
 (2) the inner cells are unable to rid themselves properly of carbon dioxide  
 (3) the inner cells do not receive sufficient food  
 (4) the inner cells do not contain sufficient genes (5) the inner cells tend to become unhealthy
72. An example of a sphere type body is the:  
 (1) volvox (2) mona (3) amoeba (4) paramoecium (5) euglena
73. Which of the following characteristics is *not true* of both the cup-shaped body and the food tube type of body: (1) food enters the body through one opening (2) the outer cells serve as protection (3) some cells serve to absorb digested food (4) removal of waste products is difficult (5) some cells serve to produce digestive chemicals
74. Which of the following is a flagellate?  
 (1) vorticella (2) stentor (3) mona (4) volvox (5) paramoecium
75. The union of the sperm cell with an egg cell is called:  
 (1) conjugation (2) fertilization (3) incubation (4) reproduction (5) budding
76. The Larch Sawfly is an insect that destroys some of our forest trees. It chiefly feeds on the:  
 (1) cherry tree (2) tamaracks (3) balsam (4) pine trees (5) currant bushes
77. One of these is *not* a parasite. Which one?  
 (1) smut (2) potato blight (3) athlete's foot (4) ringworm (5) bread mould
78. A cow that is noted for the high butterfat content of its milk is:  
 (1) Jersey (2) Aberdeen Angus (3) Holstein (4) Guernsey (5) Hereford
79. Alcohol is not a good food because: (1) it gives one a false warming effect (2) it gives one too much energy (3) generally it acts as a depressant (4) it cannot be stored in the body for future use (5) it acts as a stimulant
80. The part of the body that alcohol first anaesthetizes is: (1) the motor areas of the brain (2) the frontal lobes of the brain (3) the spinal cord (4) the blood vessels (5) the involuntary muscles
81. Which one of the following adaptations does not pertain to the earthworm?  
 (1) a smooth, slippery skin (2) a keen sense of smell (3) the ability to digest humus (4) the ability to breathe air through the skin (5) four rows of bristles on the underside of the body
82. One of the following protective adaptations does not pertain to the crayfish. Which one?  
 (1) an exoskeleton (2) a pair of pincer claws (3) a tail fin (4) a poisonous sting (5) a camouflage colour
83. One of the following enabling adaptations does not pertain to the crayfish. Which one?  
 (1) stalked eyes (2) two pair of antennae (3) tentacles (4) feathery gills (5) gill bailers

84. Most of the fossils that man has found are those of animals: (1) that lived in the sea (2) that were preserved in wind-blown sands (3) that were preserved in volcanic ash (4) that were preserved in ice (5) that were trapped in the tar pits.....
85. The brachiopod is a fossil more commonly called a (1) sunflower "coral" (2) sponge (3) crinoid (4) "lamp shell" (5) trilobite.....
86. Stronger alcoholic beverages such as gin may be produced by: (1) brewing (2) fermenting (3) distilling (4) evaporating (5) condensing.....
87. Smoking is harmful to the human body because: (1) everyone that smokes develops mouth and lung cancer (2) smoking is an expensive habit (3) tobacco contains a poisonous drug (4) it is impossible to stop smoking once the habit is formed (5) it takes away one's appetite.....
88. The smallest mammal in North America is the: (1) mole (2) amoeba (3) pygmy shrew (4) vole (5) field mouse.....
89. Which one of the following does not belong in this group? (1) morel (2) common field mushroom (3) white puffball (4) amanita (5) coral fungus.....
90. Which one of the following is not a fungus plant? (1) coccus (2) protococcus (3) bacillus (4) spirillum (5) decay bacterium.....
91. The Cenozoic Era is closely associated with the: (1) age of the invertebrates (2) age of the seaweeds (3) age of amphibians (4) age of mammals (5) age of fishes.....
92. Lack of conservation in the past led to the complete extermination of one of the following: (1) pinnated grouse (2) carrier pigeon (3) buffalo (4) ring-necked pheasant (5) passenger pigeon.....
93. Hair-like projections which aid typhoid fever bacteria to swim in the intestines are called: (1) mermaid's tresses (2) filaments (3) cilia (4) spirals (5) root hairs.....
94. A disease caused by the eating of spoiled food is: (1) botulism (2) indigestion (3) scurvy (4) tetanus (5) ulcers.....
95. Lamanaria belongs to a group of plants known as: (1) fungi (2) algae (3) gymnosperms (4) flowering (5) dependent.....
96. A plant that has two kinds of branches, a spore-bearing branch and a food-making branch is the: (1) club moss (2) horsetail (3) fern (4) corn (5) liverwort.....
97. A carnivore is aided chiefly in the digestion of the type of food that it eats: (1) by chewing it carefully and thus mixing it thoroughly with saliva (2) by eating food that is very easily digested (3) by its very strong digestive juices (4) by not over-eating (5) by swallowing chunks of flesh and bone.....
98. It can be shown that there are different kinds of bacteria and moulds by using (1) distilling apparatus (2) the Jamieson kit (3) the first aid kit (4) the tuberculin test (5) the X-rays machine.....
99. Which one is the dental formula of a ruminant?  
 (1)  $\frac{3133}{3133}$  (2)  $\frac{0033}{3133}$  (3)  $\frac{1023}{1013}$  (4)  $\frac{2033}{1023}$  (5)  $\frac{2113}{3113}$ .....
100. Bacteria may be best classified as: (1) parasites (2) saprophytes (3) independent plants (4) parasites and saprophytes (5) tiny dependent animals.....

Name of Inspector.....

Name of Student.....  
(Surname) (First name) (Middle name)

School.....  
(Name of School) (P.O. Address of School)

Room Number.....

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DEPARTMENT OF EDUCATION  
MANITOBA

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EXAMINATIONS, JUNE, 1962

GRADE IX

SOCIAL STUDIES

Friday, June 22nd, 9.00 to 11.00 a.m.

Examiners: P. Bugera, D. Smith





## PART A

Values

 $20 \times \frac{1}{2}$   
 = 10

1. Opposite the numbers listed below write the name of the geographical feature indicated by each number on the accompanying map of Europe:

(1) body of water..... (11) country.....

(2) body of water..... (12) country.....

(3) body of water..... (13) city.....

(4) river..... (14) city.....

(5) river..... (15) city.....

(6) river..... (16) city.....

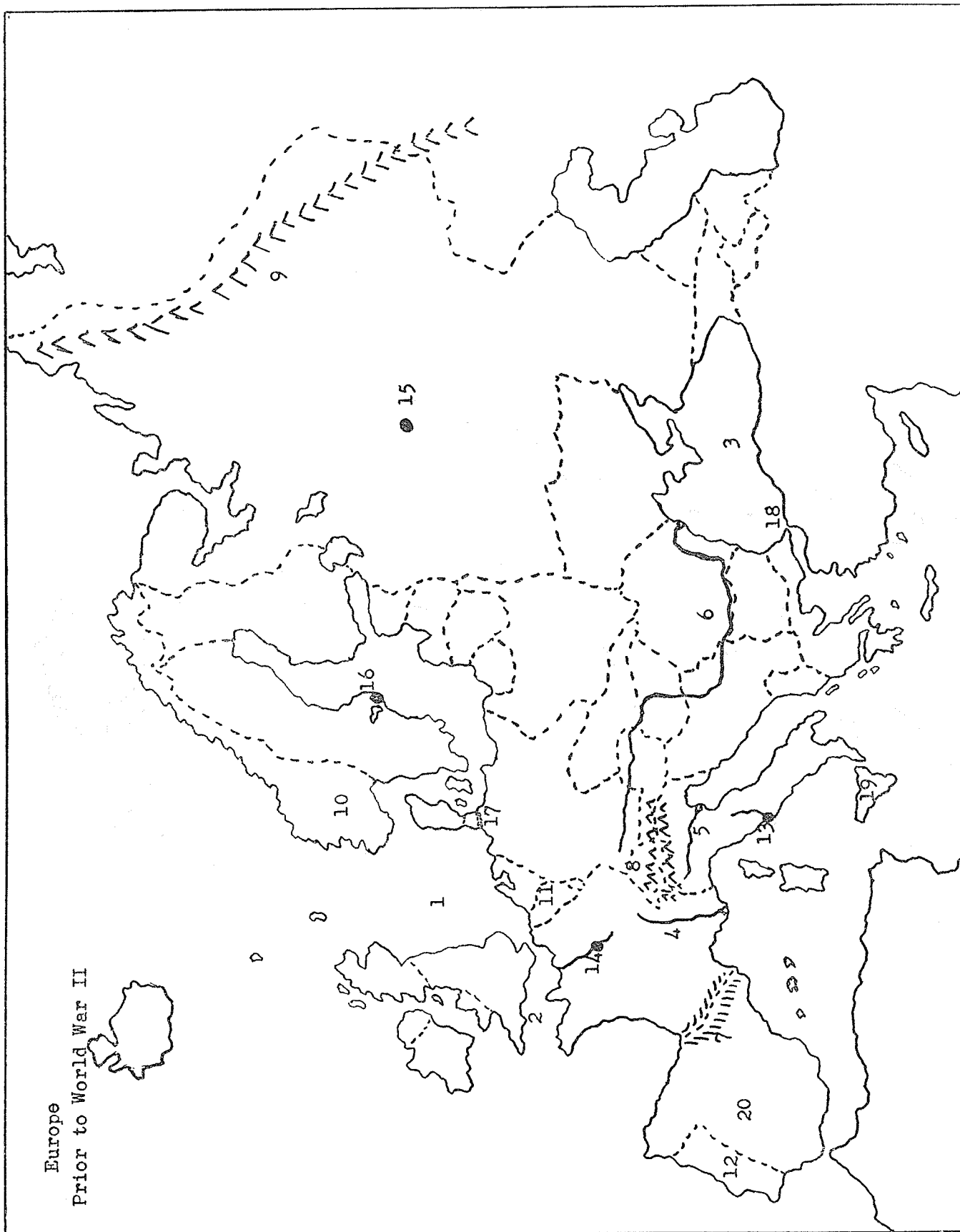
(7) mountains..... (17) canal.....

(8) mountains..... (18) strait.....

(9) mountains..... (19) island.....

(10) country..... (20) peninsula.....

Europe  
Prior to World War II



$10 \times \frac{1}{5}$   
=5

2. Opposite the numbers listed below write the name of the geographical feature indicated by each number on the accompanying map of Asia:

- |                        |                        |
|------------------------|------------------------|
| (1) body of water..... | (6) city.....          |
| (2) body of water..... | (7) city.....          |
| (3) river.....         | (8) city.....          |
| (4) island.....        | (9) mountains.....     |
| (5) desert.....        | (10) railway line..... |



$10 \times \frac{1}{2}$   
= 5

3. Choose the correct dates from Column B to match any TEN events listed in Column A, and write them in the spaces provided.

A	B
(1) End of World War II	732
(2) China becomes a republic	1492
(3) Moors surrender at Granada	1588
(4) Russian Revolution	1648
(5) The Dutch gain independence from Spain	1789
(6) Commodore Perry visits Japan	1815
(7) Spain becomes a republic	1854
(8) Spanish Armada defeated by the English	1861
(9) China's Box Rebellion	1871
(10) Alexander II frees the serfs	1900
(11) Congress of Vienna	1911
(11) The fall of Bastille	1917
	1931
	1945

$10 \times \frac{1}{2}$   
= 5

4. In the space provided name the person connected with the following. Do any TEN.

- (1) "The Messiah" .....
- (2) Invention of the printing press .....
- (3) Author of "War and Peace" .....
- (4) The "Laughing Cavalier" .....
- (5) Author of the "Three Musketeers" .....
- (6) Invention of the "wireless" .....
- (7) Theory of Relativity .....
- (8) Invention of the X-ray machine .....
- (9) Author of "The Prince" .....
- (10) Discoverer of radium .....
- (11) Painted "The Gleaners" .....
- (12) Discovered the cure for rabies .....

$20 \times \frac{1}{2}$   
= 10

5. Complete the following statements by writing the correct answers in the spaces provided.

- (1) The idea of kingship believed by Louis XIV is known as.....
- (2) The city often referred to as the "Eternal City" is.....
- (3) The country that invaded Ethiopia in 1935 was.....
- (4) The first Russian ruler to gain the title of "Czar" was.....
- (5) The hero of the Dutch at the siege of Leyden was.....
- (6) Japanese religious patriotism is called.....
- (7) The immediate cause of World War I was.....
- (8) The greatest inland waterway in China is.....

- (9) The country that proposed the "Open-door Policy" for China, and insisted that it be carried out was.....
- (10) The "Golden Horde" refers to the.....
- (11) The most important industrial region in Italy is the.....valley.
- (12) Substitutes made by the German scientists are called.....
- (13) The last Moorish stronghold in Spain was.....
- (14) The modern name for Gaul is.....
- (15) The city states were located in the country now known as.....
- (16) The country noted for the export of flower bulbs is.....
- (17) The great military figure whose march on Moscow ended in disaster was.....
- (18) The French heroine of the "Hundred Years' War" was.....
- (19) The man responsible for setting up the "Council of Blood" to persecute the Dutch Protestants was.....
- (20) The leader and the present strong man in the U.S.S.R. is.....

$20 \times \frac{1}{2}$   
= 10

6. Place the correct answer in the space to the right.

*Example:* The capital city of Manitoba is A. Roblin,  
B. Toronto, C. Winnipeg, D. Washington.

.....Winnipeg.....

- (1) The person responsible for the first "Five-Year Plan" was A. Lenin, B. Stalin, C. Trotsky, D. Machiavelli. ....
- (2) About 70% of the world's supply of coffee comes from A. Brazil, B. Argentina, C. Peru, D. Mexico. ....
- (3) The climate of the west coast of Scandinavia is influenced by the A. Alaskan Current, B. Humboldt Current, C. Gulf Stream, D. Labrador Current. ....
- (4) The first president of the Weimar Republic was A. Ebert, B. Hindenburg, C. Bismarck, D. Hitler. ....
- (5) The French ruler forced to abdicate after the Franco-Prussian War was A. Napoleon Bonaparte, B. Louis XIV, C. Louis XVIII, D. Napoleon III (Louis Napoleon). ....
- (6) What country was given control of Belgium at the Congress of Vienna? A. Britain, B. Spain, C. Russia, D. Holland. ....
- (7) The famous "Fourteen Points" were proposed as a basis of peace during World War I by A. Clemenceau, B. Wilson, C. Lloyd George, D. Orlando. ....
- (8) The Moors were defeated at Tours by A. Clovis, B. Alaric, C. Charlemagne, D. Charles Martel. ....
- (9) Which of the following is not Chinese? A. Yamato Dake, B. Chiang-Kai-shek, C. Sun Yat-sen, D. Confucius. ....
- (10) Montezuma was the leader of the A. Mestizos, B. Mayas, C. Aztecs, D. Incas. ....
- (11) The Spanish Armada was organized by A. Charles V, B. Philip II, C. Duke of Alva, D. Alfonso Enriques. ....
- (12) The Russian ruler who attempted to westernize his country in the 18th century was A. Alexander II, B. Ivan III, C. Peter the Great, D. Alexander III. ....
- (13) The last king of Spain was A. Nicholas II, B. Alfonso XIII, C. Franco, D. Manuel II. ....

- (14) The European agricultural country famous for its co-operative organizations is A. Denmark, B. Belgium, C. Italy, D. Austria.
- (15) The political party that believes in state ownership of industry is A. Liberal, B. Capitalist, C. Conservative, D. Communist.
- (16) The world organization dedicated to the preservation of peace today is A. League of Nations, B. Holy Alliance, C. United Nations, D. People's Party.
- (17) The last country to end serfdom in Europe was A. France, B. Russia, C. Prussia, D. Holland.
- (18) A country which fought against the Allies in World War II is A. Japan, B. China, C. France, D. Greece.
- (19) The Spanish conqueror of Mexico was A. Pizzaro, B. Dumont, C. Cortez, D. Magellan.
- (20) The present ruler of mainland of China is A. Tojo, B. Chiang Kai-shek, C. Pu Yi, D. Mao Tse-tung.

PART B

Values

5 × 2  
= 10

1. Define clearly and indicate briefly the historical significance of any FIVE of the following:  
 Example: "Dream of Hideyoshi" was a belief, originally held by Hideyoshi, that Japan would conquer and rule the world. It was one of the underlying causes of Japan's aggressive military policy.

"Open-Door" Policy	Privileged Class
"Master-Race" Doctrine	"The Cry from Dolores"
"Buffer State"	Enlightened Despot
Walloons	

- (1) .....
- (2) .....
- (3) .....
- (4) .....
- (5) .....

- 5 2. Answer (a) or (b) in a well-written paragraph.  
 (a) describe the military, feudal society established under the shoguns of Japan between the 8th and 12th centuries.

OR

- (b) Describe the Golden Age of the Dutch.
- .....
- .....
- .....

- 5 3. Answer (a) or (b) in a well-written paragraph.  
 (a) Discuss the work of Sarmiento, the greatest of all Argentine presidents between 1868 and 1874.

OR

- (b) "Brazil stands on the threshold of a great future."  
Comment on five factors that support the statement above.
- .....
- .....
- .....
- .....

- 5 4. Answer (a) or (b) in a well-written paragraph.
- (a) Describe the steps taken by Peter the Great to strengthen Russia.
- OR
- (b) Discuss three important results of the Mexican Revolution of 1810.
- .....
- .....
- .....
- .....

### PART C

ESSAY QUESTIONS. Students will write on ONE topic from Section A, and ONE topic from Section B.

#### Section A (Do only ONE question from this section.)

- 15 1. Discuss China from 1900 by using the following headings:
- (a) The Boxer Rebellion
  - (b) The First Republic
  - (c) The People's Party or Kuomintang
  - (d) Conflict between Nationalists and Communists
2. In a paragraph for each heading, explain how the following either changed or affected the course of Spanish history:
- (a) The large land-owners, the clergy, and the army
  - (b) Conditions under Alfonso XIII
  - (c) The Bloodless Revolution
  - (d) The Civil War
3. Write an essay on the French Revolution, using the following outline:
- (a) The causes of the Revolution
  - (b) The events of the Revolution
  - (c) The results of the Revolution

#### Section B (Do only ONE question from this section.)

- 15 1. Describe the rise of the Nazis in Germany, using the following headings as guides:
- (a) The effects of World War I on Germany
  - (b) Conditions in Germany as a result of the world depression
  - (c) Hitler's promises and methods
2. Discuss Russia under the Communists today, using the following headings:
- (a) Education
  - (b) Speech, press, and religion
  - (c) Factories and farms
  - (d) Political system
3. Write the story of Italian unification, using the following headings:
- (a) How Italy was divided in 1859
  - (b) The part played by Mazzini, Cavour, and Garibaldi
  - (c) Final events of the unification.

## QUICK-SCORING GROUP TEST OF LEARNING CAPACITY

Cat. No. 177

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

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This is a test to measure how readily and accurately you can think. It is made up of questions of different sorts. For each question five different answers are suggested. In each question you must decide which is the right answer among the five answers suggested.

You will now place this test so that it overlaps the left side of the answer sheet, and so that the three triangles on the right-hand edge of the test line up evenly with the left-hand set of triangles on the answer sheet, with the points of the triangles almost touching. When you have done this, wait for further instructions from your examiner.

Further Instructions

Here are some sample questions to make clear to you how you are to record your answers.

1. Which word does not belong in this list ?

(1) green (2) red (3) blue (4) sweet (5) yellow .....

"Sweet" does not belong, of course, since the other four answers are all colours, so the 4th answer is the right one. Now look at the spaces to the right of the above sample on the answer sheet. You will see that the right answer is indicated by the fact that the 4th space has been blackened.

2. 2, 4, 6, 8, 10, 12, . . . The next number in this series would be

(1) 11 (2) 14 (3) 16 (4) 13 (5) 15 .....

The right answer is 14, which is answer number 2. Indicate this by taking your pencil and blackening the space under 2 on the answer sheet. Make a good heavy mark by moving your pencil up and down in the space two or three times.

3. Bird is to air as fish is to

(1) water (2) swim (3) bait (4) net (5) catch .....

As a bird lives in the air so a fish lives in water. Answer number 1 is the right one. Indicate this by blackening space number 1 on the answer sheet.

4. The sum of 11 and 17 is

(1) 18 (2) 31 (3) 26 (4) 38 (5) none of these .....

Here none of the four sums suggested is correct, so the right answer is answer number 5. Indicate this on your answer sheet.

You now know how to record your answers. In doing this test, make sure that the triangles on the page on which you are working line up accurately with the triangles on the answer sheet, and be sure to keep them lined up, or you will lose your place and record your answers wrongly.

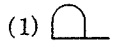




Be sure to make good heavy black marks. Erase completely any answer which you wish to change, and, except for recording your answers, do not make any marks either on the answer sheet or on the test itself. Do any necessary figuring on a separate sheet of paper.

























When you finish one page go on to the next. Work as quickly and as accurately as possible. Do not spend too much time on any one question: skip any questions which seem to be too difficult and return to them later if you have any time left.

















The test contains 75 items, and you will have 30 minutes working time for them. You will not likely be able to do them all, but do the best you can. Do not open the test booklet until you are told to do so. Put your pencils down and wait for the signal to begin.



GROUP TEST OF LEARNING CAPACITY

1. "Larceny" is a term used in  
(1) printing (2) medicine (3) religion (4) horticulture (5) law .....
2. Which word does not belong in this list?  
(1) day (2) noon (3) minute (4) century (5) year .....
3. Precipitous means the same as  
(1) slow (2) bold (3) sharp (4) steep (5) brief .....
4. Quell is to revolt as cure is to  
(1) riot (2) health (3) disease (4) medicine (5) doctor .....
5. Which word does not belong in this list?  
(1) stream (2) pond (3) river (4) brook (5) creek .....
6. A whimsical idea is  
(1) fanciful (2) sensible (3) sacred (4) precise (5) mournful .....
7. Walking is to golf as skating is to  
(1) hockey (2) skates (3) exercise (4) winter (5) ice .....
8. To ape is to  
(1) condemn (2) advise (3) oppose (4) criticize (5) imitate .....
9. 3, 4, 3, 8, 3, 16, 3, . . . The next number in this series would be  
(1) 24 (2) 48 (3) 20 (4) 32 (5) none of these .....
10. His is to their as mine is to  
(1) us (2) my (3) we (4) me (5) our .....
11. Which word does not belong in this list?  
(1) in (2) by (3) and (4) of (5) to .....
12. We are usually recumbent while we are  
(1) running (2) eating (3) angry (4) sleeping (5) talking .....
13. If Jack can run 40 yards while Bill runs 35 yards, by how many yards will Bill be beaten in a 200-yard race?  
(1) 25 (2) 5 (3) 20 (4) 30 (5) none of these .....
14. Immaculate clothing is  
(1) expensive (2) spotless (3) new (4) tawdry (5) shabby .....
15. Which word does not belong in this list?  
(1) colt (2) cow (3) pup (4) lamb (5) kitten .....
16. A morose man is  
(1) sullen (2) dumb (3) despicable (4) audacious (5) wicked.....
17. Hotter is to coldest as better is to  
(1) best (2) bad (3) worst (4) good (5) worse.....
18. 31, 30, 28, 27, 25, 24, ... The next number in this series would be  
(1) 20 (2) 26 (3) 23 (4) 21 (5) none of these .....
19. The opposite of amicable is  
(1) despised (2) voracious (3) dubious (4) destitute (5) hostile.....
20. J is to C as P is to (1)  (2)  (3)  (4)  (5)  .....
21. Finger is to elbow as toe is to (1) hand (2) foot (3) knee (4) leg (5) ankle.....
22. 4, 5, 7, 10, 14, ... The next number in this series would be  
(1) 19 (2) 18 (3) 17 (4) 16 (5) none of these .....
23. 14, 28, 18, 36, 26, ... The next number in this series would be  
(1) 62 (2) 16 (3) 52 (4) 46 (5) none of these .....
24. Ocean is to island as continent is to  
(1) river (2) land (3) mountain (4) Asia (5) lake .....
25. The term "cede" is usually used in connection with  
(1) money (2) territory (3) music (4) royalty (5) farming .....
26. 486, 162, 54, 18, ... The next number in this series would be  
(1) 8 (2) 12 (3) 6 (4) 4 (5) none of these .....
27. Three boys sit in a row between Tom and Bill. Joe sits to the right of Harry, and Fred sits to the right of Joe. The middle boy is (1) Fred (2) Tom (3) Bill (4) Harry (5) Joe .....
28. A train travels 270 miles in 9 hours. How many times as fast must it travel to go 240 miles in 4 hours?  
(1) 1 (2) 2 (3) 3 (4) 4 (5) none of these .....

29. 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 before L in the alphabet as T comes after X in the word "EXAMINATION"? (1) G (2) D (3) E (4) H (5) none of these.....
30.  is to  as  is to (1)  (2)  (3)  (4)  (5) 
31. A ketch is used for (1) throwing (2) cutting (3) fastening (4) gardening (5) sailing .....
32. Link is to lank as till is to  
(1) farmer (2) chain (3) soil (4) tall (5) bank .....
33. 64, 55, 47, 40, 34, 29, ... The next number in this series would be  
(1) 25 (2) 26 (3) 21 (4) 24 (5) none of these .....
34. A merchant blends tea by using 1 pound of green tea for every 2 pounds of black. How many pounds of black tea will there be in 24 pounds of the mixture? (1) 8 (2) 12 (3) 16 (4) 6 (5) none of these .....
35. 24, 17, 20, 13, 16, 9, ... The next number in this series would be  
(1) 6 (2) 14 (3) 2 (4) 12 (5) none of these .....
36. Which letter of the word "PROCRASTINATION" is as far from the beginning of the word as it is from the beginning of the alphabet? (1) A (2) R (3) I (4) T (5) none of these .....
37.  is to  as  is to (1)  (2)  (3)  (4)  (5) 
38. 2, 3, 6, 7, 14, 15, ... The next number in this series would be  
(1) 30 (2) 16 (3) 29 (4) 22 (5) none of these .....
39.  is to  as  is to (1)  (2)  (3)  (4)  (5) 
40. 13, 2, 11, 4, 9, 6, ... The next number in this series would be  
(1) 5 (2) 7 (3) 3 (4) 8 (5) none of these .....
41. Tommy weighs three-fourths of his weight plus 24 pounds. How many pounds does he weigh?  
(1) 32 (2) 42 (3) 72 (4) 92 (5) none of these .....
42. If  $2\frac{1}{2}$  pounds of meat cost 40¢, how many pounds may be bought with 96¢?  
(1) 8 (2) 6 (3)  $4\frac{1}{2}$  (4) 4 (5) none of these .....
43. At the start of the baseball game a rainstorm 9 miles away is approaching at the rate of 15 miles per hour. How many innings will be completed before it rains if it takes 6 minutes to play one inning?  
(1) 4 (2) 6 (3) 8 (4) 5 (5) none of these .....
44. 11, 21, 30, 38, 45, 51, ... The next number in this series would be  
(1) 61 (2) 57 (3) 58 (4) 56 (5) none of these.....
45. The opposite of dextrous is  
(1) clumsy (2) stupid (3) stubborn (4) malicious (5) selfish.....
46. Except for one letter, the letters of the word "SPIRED" follow one another in the word in the opposite order to that in which they occur in the alphabet. The letter is  
(1) E (2) D (3) I (4) P (5) none of these .....
47. A family uses  $\frac{4}{5}$  of a sack of flour in 60 days. How many days will  $\frac{2}{3}$  of a sack last?  
(1) 72 (2) 50 (3)  $112\frac{1}{2}$  (4) 32 (5) none of these .....
48. Adroit means the same as  
(1) appropriate (2) abrupt (3) deceitful (4) plentiful (5) skilful .....
49. Short is to length as light is to  
(1) heavy (2) lamp (3) scales (4) weight (5) sound .....
50. If Mary had 12 more beads than Jane, she would have 3 more than half enough to make a string of 70 beads. How many beads has Jane? (1) 26 (2) 50 (3) 44 (4) 20 (5) none of these .....
51. Which word does not belong in this list?  
(1) him (2) they (3) I (4) we (5) she .....
52. A sagacious person is  
(1) suspicious (2) mediocre (3) honourable (4) shrewd (5) tenacious .....
53. 100, 50, 60, 30, 40, 20, ... The next number in this series would be  
(1) 10 (2) 50 (3) 30 (4) 0 (5) none of these .....
54. If 2 boys can hoe 6 rows of corn in 3 hours, how many hours will it take one boy to hoe 4 rows?  
(1) 1 (2) 2 (3) 8 (4) 4 (5) none of these .....
55. 3, 5, 9, 17, 33, ... The next number in this series would be  
(1) 49 (2) 65 (3) 50 (4) 67 (5) none of these .....

56. The proverb "The empty vessel makes the most noise" means (1) We sing best on an empty stomach. (2) A barking dog never bites. (3) The least competent are the most boastful. (4) Those in the greatest need beg most loudly. (5) The less we have the more we crave .....
57.  is to  as  is to (1)  (2)  (3)  (4)  (5)  .....
58. MUST ROADS SOMETIMES REPAIR CONTENT ROUGH YOU BE WITH. If one word were omitted from the foregoing, the other words could be rearranged to form a sentence. The word to be omitted is (1) REPAIR (2) CONTENT (3) SOMETIMES (4) ROUGH (5) none of these.....
59. A pie is cut so that one piece, which is one-fifth of the pie, is twice as large as each of the other pieces. How many pieces is the pie cut? (1) fewer than 7 (2) 9 (3) 10 (4) more than 12 (5) none of these .....
60. Which proverb best states the fact that "We should not expect to get good from evil"? (1) Many a good cow hath a bad calf. (2) Every rose has its thorn. (3) Figs do not grow on thistles. (4) A tree is known by its fruits. (5) Every tub smells of the wine it holds .....
61.  is to  as  is to (1)  (2)  (3)  (4)  (5)  .....
62. 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. If all the odd-numbered letters were omitted from the alphabet, what would be the middle letter of those remaining? (1) M (2) O (3) N (4) P (5) none of these .....
63. Animosity is (1) friendship (2) fear (3) hope (4) tenacity (5) enmity .....
64. 82, 50, 34, 26, 22, 20, ... The next number in this series would be (1) 19 (2) 16 (3) 18 (4) 21 (5) none of these .....
65. Surreptitious actions are (1) bold (2) harmful (3) stealthy (4) plausible (5) impartial .....
66. OF RUINOUS LOSS TO PERSON HEALTH SLEEP IS MUCH. If one word were omitted from the foregoing, the other words could be rearranged to form a sentence. The word to be omitted is (1) HEALTH (2) SLEEP (3) TO (4) PERSON (5) none of these.....
67. What number is 1 more than what 9 is 1 more than half of? (1) 21 (2) 17 (3) 5 (4) 19 (5) none of these .....
68. Triangle is to triangular prism as circle is to (1) circumference (2) sphere (3) radius (4) cylinder (5) sector .....
69. OFTEN PROPHETS EVEN PREACH FOLLOWERS MANY FALSE GAIN. If one word were omitted from the foregoing, the other words could be rearranged to form a sentence. The word to be omitted is (1) MANY (2) OFTEN (3) FALSE (4) FOLLOWERS (5) none of these.....
70. R 3 W 2 B 5 H 7 E 4 N 9 P 5 M. How many odd numbers in the foregoing are neither immediately preceded by any letter in the word "GROUP" nor immediately followed by any letter in the word "LAPSE"? (1) 1 (2) 2 (3) 3 (4) 4 (5) none of these .....
71. An adage is a (1) custom (2) maxim (3) myth (4) song (5) tool .....
72. An 8-mile race starts at 3.42 p.m. and the second man finishes at 4.34 p.m., 7 minutes behind the winner. How many minutes did the winner take to run the race? (1) 85 (2) 59 (3) 99 (4) 45 (5) none of these .....
73. LEAST TALKERS GREATEST THE NOISE ALWAYS DO. If one word were omitted from the foregoing, the other words could be rearranged to form a sentence. The word to be omitted is (1) TALKERS (2) LEAST (3) NOISE (4) GREATEST (5) none of these.....
74. A clock which gains four minutes a day shows the correct time at 10 a.m. How many seconds fast will it be at 3.30 p.m. of the same day? (1) fewer than 45 (2) 55 (3) 85 (4) more than 100 (5) none of these .....
75. How many boys are there in a class of 30 pupils if there are 2/3 as many boys as girls? (1) 10 (2) 18 (3) 20 (4) 12 (5) none of these .....

END OF TEST

# Survey of Study Habits and Attitudes

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## DIRECTIONS

The purpose of this survey is to furnish an inventory of study habits and attitudes to serve as a foundation for self-improvement. If taken seriously, this inventory can help you obtain a better understanding of how to study properly. If you will honestly and thoughtfully mark all of the statements on the pages that follow, you will be able to learn many of your study faults. The value of this survey to you will be in direct proportion to the care with which you mark each statement. Since your answers will be treated with the strictest confidence, feel free to answer all questions frankly.

You will mark your answers on a separate answer sheet. Make no marks on this booklet. There are 75 statements in this questionnaire. For each statement a five-point scale is provided for indicating whether you rarely, sometimes, frequently, generally, or almost always do or feel as the statement suggests. You are to rate yourself on each statement by marking the space on your answer sheet that represents your answer choice. Thus, for example, you would mark space R on your answer sheet if you *rarely* follow the procedure described or if you feel that the statement is *rarely* true for you. In marking your answers, be sure that the number of the statement agrees with the number on the answer sheet. Make sure that your marks are heavy and black. Make no stray marks on the answer sheet and erase completely any mark that you wish to change.

To aid you in answering this questionnaire, the terms have been defined on a percentage basis as follows:

R—RARELY means from 0 to 15 per cent of the time.

S—SOMETIMES means from 16 to 35 per cent of the time.

F—FREQUENTLY means from 36 to 65 per cent of the time.

G—GENERALLY means from 66 to 85 per cent of the time.

A—ALMOST ALWAYS means from 86 to 100 per cent of the time.

Remember, you are asked to rate yourself, not in accordance with what you think you *should* do or feel, or as you think *others* might do or feel, but as you yourself are in the habit of doing and feeling. When you cannot answer a statement on the basis of actual experience, mark the statement according to what you would be most likely to do if the situation should arise.

There are no "right" or "wrong" answers to these statements, and there is no time limit for this questionnaire. Work as rapidly as you can without being careless, and do not spend too much time on any one statement. Please do not omit any of the statements.

R—RARELY

S—SOMETIMES

F—FREQUENTLY

G—GENERALLY

A—ALMOST ALWAYS

1. I feel that teachers do not understand the student's problems.
2. My dislike for a certain teacher causes me to neglect my school work.
3. I feel that I would study harder if I were given more freedom to choose courses that I like.
4. Whether I like a course or not, I still work hard to make a good grade.
5. When my assigned homework is extra long or unusually difficult, I become discouraged and either quit in disgust or skip hurriedly through the assignment, studying only the easier parts of the lesson.
- ✓ 6. In preparing reports, themes, term papers, etc., I make certain that I clearly understand what is wanted before I begin work.
- ✓ 7. Difficulty in expressing myself in writing slows me down on reports, themes, examinations, and other work to be turned in.
8. My teachers criticize my written reports as being hastily written or poorly organized.
9. I feel that teachers allow their personal like or dislike for a student to influence their grading unduly.
10. I lose interest in my studies after the first few days or weeks.
11. I memorize grammatical rules, definitions of technical terms, formulas, etc., without really understanding them.
12. I give special attention to neatness on themes, reports, and other work to be turned in.
13. I take it easy and let my assignments collect for the first two or three weeks of a new semester.
14. I hesitate to ask the teacher for further explanation of an assignment that is not clear to me.
15. Lack of interest in my school work makes it difficult for me to keep my attention focused on assigned reading.
16. Unless I really like a course, I believe in doing only enough to get a passing grade.
17. I get nervous and confused when taking an examination and fail to answer questions to the best of my ability.
18. I have trouble with the mechanics of English composition.
19. When I get behind in my school work for some unavoidable reason, I make up back assignments without prompting from the teacher.
20. I feel confused and undecided as to what my goal in life should be.
21. Some of my courses are so uninteresting that I have to "force" myself to do the assignments.
22. When I am under pressure, my work is inferior in quality.
23. Daydreaming about dates, future plans, etc., distracts my attention from my lesson while I am studying.
24. I believe that having a good time and getting one's full share of fun out of life is just as important as studying.
25. Even though an assignment is dull and boring, I stick to it until it is completed.
- ✗ 26. In taking reading notes, I tend to take down material which later turns out to be unimportant.
- ✗ 27. In taking class notes, I try to copy down the teacher's exact words as closely as possible.
28. I keep all the notes for each subject together, carefully arranging them in some logical order.
29. When I am having difficulty with my school work, I try to talk over the trouble with the teacher.
30. I feel that my grades are a fairly accurate reflection of my ability.
- ✗ 31. I feel that it is not worth the time, money, and effort one must expend to get a college education.
32. Difficulty in assembling ideas with order and clearness within a brief amount of time results in my doing poorly on examinations.
33. Some of my classes are so boring that I spend the class period drawing pictures, writing letters, or daydreaming instead of listening to the teacher.
34. I lay aside returned examinations, reports, and homework assignments without bothering to correct errors noted by the instructor.
35. I keep my place of study business-like and cleared of unnecessary or distracting items such as pictures, letters, mementos, etc.
36. Telephone calls, people coming in and out of my room, "bull-sessions" with my roommate, etc., interrupt me while I am trying to study.
37. It takes a long time for me to get warmed up to the task of studying.

R—RARELY

S—SOMETIMES

F—FREQUENTLY

G—GENERALLY

A—ALMOST ALWAYS

38. I am unable to concentrate well because of periods of restlessness, moodiness, or "having the blues."
39. I put off writing themes, reports, term papers, etc., until the last minute.
40. I feel that I am taking courses that are of little practical value to me.
41. When I sit down to study I find myself too tired, bored, or sleepy to study efficiently.
42. I strive to develop a sincere interest in every course I take.
43. The prestige of having a college education provides my main motive for going to college.
44. I think that maybe I should drop out of school and get a job.
45. I carefully study the figures, graphs, and tables in a reading assignment.
46. Prolonged reading or study gives me a headache.
47. After reading several pages of an assignment, I am unable to recall what I have just read.
48. I cut classes whenever there is something I'd rather do or whenever I need to cram for a test.
49. I waste too much time "chewing the fat," reading magazines, listening to the radio, going to the movies, etc., for the good of my studies.
50. My studying is done in a random, unplanned manner and is impelled mostly by the demands of approaching classes.
51. "Extracurricular activities" — dating, clubs, athletics, fraternity and sorority activities, etc. — cause me to get behind in my school work.
52. I utilize the vacant hours between classes for studying so as to reduce the evening's work.
53. Problems outside of school — financial difficulties, being in love, conflict with parents, etc. — cause me to neglect my school work.
54. I am on time with written assignments.
55. I have difficulty in picking out the important points of a reading assignment — points that are later asked on examinations.
56. When in doubt about the proper form for a written report, I refer to an approved model to provide a pattern to follow.
57. I like to have the radio playing while I'm preparing my homework.
58. When reading a long assignment, I stop periodically and mentally review the main facts and theories that have been presented.
59. I seem to accomplish very little in relation to the amount of time I spend studying.
60. I prefer to sit in the back of the classroom.
61. With me, studying is a hit-or-miss proposition depending on the mood I'm in.
62. I study three or more hours per day outside of class.
63. Before each study period I set up a goal as to how much material I will cover.
64. I can concentrate on a reading assignment for only a short while before the words become a meaningless jumble.
65. I am interrupted by distracting noises while I am studying.
66. I copy the diagrams, drawings, tables, and other illustrations that the instructor puts on the blackboard.
67. I keep my assignments up to date by doing my work regularly from day to day.
68. I prefer to study my lessons alone rather than with others.
69. I lose points on true-false or multiple-choice examinations because I change my original answer only to discover later that I was right the first time.
70. When preparing for an examination I arrange facts to be learned in some logical order — order of importance, order of presentation in class or textbook, order of time in history, etc.
71. I am careless of spelling and in the mechanics of English composition when answering examination questions.
72. Although I work until the last possible minute, I am unable to finish examinations within the allotted time.
73. If time is available, I take a few minutes to check over my answers before turning in my examination paper.
74. When test papers or written assignments are returned, I find that my grade was lowered by careless mistakes.
75. I think that questionnaires such as this are foolish and are of little or no help to anyone.