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A study of the comparative validity of a scholastic aptitude test and an achievement test in predicting school success

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A STUDY OF THE COMPARATIVE VALIDITY OF A

SCHOLASTIC APTITUDE TEST & AN ACHIEVEMENT

TEST IN PREDICTING SCHOOL SUCCESS

MORIARTY - 1933

A STUDY OF THE COMPARATIVE VALIDITY OF A SCHOLASTIC APTITUDE TEST AND AN ACHIEVEMENT TEST IN PREDICTING SCHOOL SUCCESS

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I INTRODUCTION

INTRODUCTION

It is generally admitted today that the intelligence test and the achievement test fail to measure some essential requisites for success in school. Practically every type of school has examples of pupils who, in spite of a high score on these tests, show a poor record at the end of the school year. On the other hand, we see pupils who have achieved success in their school work, although they received a low score on these same tests.

The purpose of this study is to investigate the comparative validity of a scholastic aptitude test, which is based essentially upon ability to learn academic subject matter, and the Sones-Harry High School Achievement Test (Form B) which is based primarily on previously acquired knowledge.

Most intelligence and achievement tests such as the Sones-Harry Test are based primarily upon past experience. The scholastic aptitude test which is used in this study and which is known as the West Springfield High School Scholastic Aptitude Test is based essentially upon ability to learn academic subject matter. This study is an attempt to discover whether the use of a test based upon ability to learn academic subject matter will show a closer relationship with school marks than tests based upon past experience.

Therefore, since our present methods of predicting school success are not entirely satisfactory, it seems of practical value to make a study of this new type of scholastic aptitude test with the hope that it may prove to be a more valid and reliable instrument of measurement than the intelligence and achievement tests now in use.

A brief history of educational measurement in the United States would furnish background for this study. Educational measurements have been made in some form since schools were organized. It is possible to go back as far as 1864 to a plan for measuring the work of pupils which was used by an English schoolmaster, Reverend George Fisher. This plan was based on "scale books" which contained sample performances of various degrees of excellence. In 1875 a number of school superintendents in Norfolk County, Massachusetts, devised an arithmetic examination which was then used considerably. However, there is no record of the nature of the tests nor of the results.

The construction of standardized objective tests for the purpose of measuring achievement began about forty years ago. These tests have two important characteristics which should be noted. First, they are objective, which means that the measures obtained from them are relatively independent of the person using them. Second, they are standardized which means that norms are available for interpreting the measures obtained. Contri-

butions to the early development of these standardized objective achievement tests were made by workers in two fields, psychology and school administration. Psychologists, in studying the workings of the human mind, constructed tests in school subjects. These tests were for the most part objective, but were seldom standardized. School administrators attempted to settle questions of courses of study, school organization, methods of instruction, etc. in a scientific manner by the use of objective tests.

One of the first important steps in the testing movement in this country was taken by Dr. J. M. Rice, a superintendent of schools,who in 1894 chose a list of fifty words to compose a spelling test and established norms or standards of accomplishment in connection with this same list. Thus, for the first time the same test was applied to many groups, so that the accomplishment of one school system could be compared with that of another. This test also made possible the study of the relative efficiency of methods of teaching spelling. Dr. Rice met with considerable opposition from the educators of his day, who claimed that he was trying to measure things in human nature to which no objective yard stick could be applied. Dr. Rice constructed a second test which was longer and more reliable. The reliability of test results was further improved at this time by the standardization of instructions for giving tests.

Professor E. L. Thorndike, "the father of educational measurement" has made many contributions to the development of standardized objective tests. In 1904 he published the first edition of his "Mental and Social Measurements". In December 1909 he presented his handwriting scale before the meeting of Section L of the American Association for the Advancement of Science. This scale made it possible to judge a child's handwriting by comparing a sample of his work with specimens on a scale.

Hilligas in 1912 applied to the field of English composition the principles underlying the construction of Thorndike's Handwriting Scale. Since that time others have used these same principles with some modification and elaboration.

C. W. Stone in 1908 devised two tests in the field of arithmetic, one on fundamentals and the other on reasoning, to be administered to the first six grades. These tests were objective, but were not standardized. However, since the completion of the original study the reasoning test has been standardized and used extensively in school surveys and by teachers.

S. A. Courtis in 1907-1908 conceived the idea of giving arithmetic tests in all grades, including the high school. His interest lay in measuring the growth of pupils in arithmetic and in establishing norms of attainment for the various grades. He devised a group of arithmetic tests which he called

Series A and which were available for use in September 1909.
The scoring was made objective and the tests were standardized.
After these tests had been used extensively, Courtis was con-
vinced that they were unsatisfactory in a number of respects,
and so in 1913-14 he devised and made available a new group of
tests called Series B. This series consists of four tests, one
on each of the fundamental operations with integers, which
measure both rate and accuracy.

L. P. Ayres in 1912-1915 contributed to the development
of educational measurements by the construction of his hand-
writing and spelling scales. His handwriting scale adopted
legibility as the criterion of quality. Samples of pupils'
handwriting were secured, under controlled conditions, and an
index of legibility was calculated from the average rate of
reading. Thorndike's method of constructing his scale is much
simpler and has been followed by other makers of handwriting
scales.

B. R. Buckingham, a student under Thorndike, in 1913
published the account of the derivation of his spelling scale,
which represented a new type of measuring instrument. Words
were selected and their difficulty was determined on the basis
of the percent of correct spellings by pupils in various school
grades. These words were then arranged in order of their dif-
ficulty, and thus was produced a measuring instrument which
began with words which practically all pupils could spell, and

increased in difficulty, until, at the other end of the scale, relatively few pupils were able to spell the words correctly. Thus, the ability of a pupil may be measured in terms of the level of difficulty which he is able to reach on the scale.

This principle of test construction has been followed by a number of workers--Woody in arithmetic, Hotz in algebra, Henmon and Brown in Latin, Trabue in language, and Van Wagenen in history.

The development of educational age scales and quotients by McCall was an important contribution. The age scale makes it possible to express a pupil's score on any test in the same units that are employed to express his chronological age. Dividing the pupil's educational age by his chronological age will give his educational quotient. This made age and quotient scores on educational scales comparable with each other.

Franzen and Monroe developed the accomplishment ratio, arithmetic ratio, reading ratio, etc. These ratios make it possible to determine what may be expected of a pupil in view of his intelligence as the accomplishment ratio shows whether he is achieving more or less than should be expected in view of his mental age.

As a result of the contributions made by the men mentioned above, there are today many types of achievement tests available for measuring accomplishment in school subjects.

Examples of tests of this type are the Kansas Silent Reading Test, the Holmes Penmanship Test, the Peet-Dearborn Arithmetic Tests, the Handschin Modern Language Tests, the Ayres Handwriting Scale, the Harvard-Newton and Hudelson English Composition Scales, the Iowa Spelling Score, the Sones-Harry Achievement Test and many others. There are separate achievement tests for nearly all the subjects of the curriculum from grades 1 to 12. The fundamental purpose back of the production of many of these tests has been to make possible a scientific analysis of the elements of educational guidance.

All of the contributions hitherto discussed have been in connection with the development of instruments for measuring the achievement of pupils in school subjects. However, because the subject of intelligence tests will be discussed later and because of the prevailing assumption that there is an intimate relation between general intelligence and achievement, it is appropriate to review very briefly the development of general intelligence tests.

In 1904 Binet, a French psychologist, in his work of organizing classes for subnormal children, faced the problem of devising some means for determining what children were subnormal. As a result, he, in collaboration with Simon, devised in 1905 a group of tests, known as the "Binet General Intelligence Test". In the United States, Goddard, Terman, Thorndike and others worked to revise and improve the

Binet tests. The Stanford Revision by Terman is, perhaps, the most widely known.

The Binet tests must be administered to the pupils individually, and consequently their use is necessarily limited. In 1917 A. S. Otis, a student under Terman, had completed a test that might be given to pupils in groups. When it was decided to introduce psychological testing into the U. S. Army, Otis offered his test to the committee in charge of the work. Since 1918 there have appeared a large number of group intelligence tests which have been used extensively.

Reference to similar studies on problems directly related to the present study would be undoubtedly advantageous. "A Statistical Analysis of the Sones-Harry High School Achievement Test" was made in 1932 by Miss Elsie Mae Hutcheon[4] of Western Reserve University. (Reference to numbers throughout this study will be found in references in Section VIII.) The following quotations are cited in order to give a brief summary of the procedure and results.

"The problem of this study is to find the interrelations among achievements in language, mathematics, natural science and social studies as measured by these four corresponding parts of the Sones-Harry High School Achievement Test."

"The original study has included seven hundred seventy-

nine records of graduating (12A) students from Collinwood
High School, a typically cosmopolitan Cleveland school.
For the major part of the statistical analysis a sampling
of the first hundred cases in alphabetical order has been
used. This sampling is equally divided as to sex".

"The traits for each pupil are: (1) scores in Language-
Literature, (2) scores in Mathematics, (3) scores in Natural
Science, (4) scores in Social Studies, (5) scores for the
total Sones-Harry Test, (6) chronological age, (7) Probable
Learning Rate, the terms used in Cleveland as equivalent to
Intelligence Quotient, secured from a group intelligence test,
(8) scores on Ohio State University Psychological Examination
and (9) average of all high school marks."

"The correlation coefficients are larger for language
and P.L.R., language and O.S.U., and social studies and
P.L.R. or O.S.U. than the relationships between either mathe-
matics or science and the two psychological measures. For
this reason it is probable that both P.L.R. and O.S.U. mea-
sure verbal intelligence, based upon paragraph reading and
vocabulary comprehension more than they measure other types
of intelligence".

"School average does not correlate highly enough with
any part of the test or the total of the test to be signifi-
cant. (r_{19} or relationship between scores in Language-Liter-
ature and average of all high school marks = .444; r_{29} or

relationship between scores in Mathematics and average of
all high school marks = .188; r_{39} or relationship between
scores in Natural Science and average of all high school
marks = .099; r_{49} or relationship between scores in Social
Studies and average of all high school marks = .237; r_{59}
or relationship between scores for the total Sones-Harry
Test and average of all high school marks = .307). How-
ever, other factors than achievement enter into school marks.
Since the highest relationship (.444) is between school aver-
age and language we may conclude that language grades have
great weight in the school average".

This conclusion can be criticized, however. It might
be said that the language section of the test correlates
more highly with school marks in any subject other than
language which may be included in the school average. There
is no reason why it can be said that the language section
correlates highly with school marks in languages, as no such
correlation has been worked out. Therefore, in order to
have the right to draw the above conclusion, it would seem
necessary to correlate school marks in languages with the
marks in the language section of the test.

"There is much indication of relationships between abil-
ity in mathematics and natural science and between ability
in language and social studies as measured by the Sones-
Harry Test".

"In general, in predicting success on each of the four

parts of the test, the most effective measures are P.L.R., O.S.U. and chronological age as shown by the multiple correlation coefficients. The school average is a negligible factor in predicting."

"There seems to be a high relationship between achievement in mathematics, as measured by this part of the Sones-Harry Test, and the number of semesters of study in that field. The same high relationship is indicated for the field of natural science. Very low relationships exist between language-literature and the number of semesters and between social studies and the number of semesters. The high relationships for mathematics and science may be due to the fact that they involve 'hierarchy of habits'."

"Although usually teachers' marks never run over .75 reliability, correlations obtained between percentile rankings of each student and the teachers' marks for these same students for the last two semesters' grades in each subject field show that the test is a fair estimate of the actual knowledge of the pupil in the subject."

Miss Hutcheon closes her study with the following general conclusions: "(1) the Sones-Harry High School Achievement Test is very reliable for individual pupil diagnosis; (2) the test is valid in the four fields covered; (3) the test has the highest correlation coefficient with freshman college success in any of the factors that could be measured

in three hours; (4) the test is generally liked by students taking it; (5) academic students are superior to technical and commercial students; (6) boys achieve more on the test than girls; (7) mathematics and science seem to have much in common; (8) language-literature and social study also seem to have a basic ability that is common; (9) relationships with intelligence scores range from .40 to .75."

A thesis, "A Comparative Study of Certain Types of Subject Matter in Scholastic Aptitude Tests", was written in 1932 by Mr. Charles P. McDonnell[7] of the West Springfield High School, one of the authors of the West Springfield High School Scholastic Aptitude Test. His problem was to investigate the comparative validity of the Scholastic Aptitude Test and the Terman Test of Mental Ability, Form A, in predicting school success. One hundred and fifteen pupils from the ninth grade and the same number from the tenth grade of the West Springfield High School were used in this study.

Mr. McDonnell determined coefficients of correlation for one hundred and fifteen pupils in the ninth grade and the same number in the tenth grade between the Scholastic Aptitude Test scores and (1) the Terman Test scores, (2) the teachers' estimated marks and (3) the school marks. The following is a summary of his correlation results. The correlation between the Terman Test and Scholastic Aptitude

Test scores was high in both grades, being .67. The co-efficient of correlation between the Terman scores and school marks in the tenth grade was .463, and between the Scholastic Aptitude Test scores and school marks was .467. In the ninth grade the coefficient of correlation between Scholastic Aptitude Test scores and school marks was .60, fourteen points higher than that between the Terman Test scores and school marks (.46). Apparently in the tenth grade one test was just as valid as the other, whereas in the ninth grade the Scholastic Aptitude test was the more valid.

The coefficient of correlation between the Terman Test scores and teachers' estimated marks in the tenth grade was .44 and in the ninth grade .54. The coefficient between Scholastic Aptitude Test scores and teachers' estimated marks in the tenth grade was only .38, whereas in the ninth grade it was .58.

The quartile placement method was also used in this study. Pupils were arranged in quartiles according to their scores in the tests to be compared, and the percentage of perfect correspondence and the total points of misplacement were determined.

The following is a summary of the results obtained by the quartile placement method. In the tenth grade the Scholastic Aptitude Test scores showed 13 more cases of perfect correspondence (47%) and 25 points less misplacement than when the Terman Test scores were compared with school marks

(34%). The Scholastic Aptitude Test scores and the teachers'
estimated marks in the same grade showed 2% more cases of
perfect correspondence (48%) and 7 points less misplacement
than when the Terman scores were compared with the teachers'
estimated marks (46%).

In the ninth grade the Scholastic Aptitude Test scores
had 1% more cases of perfect correspondence (42%) and 7
points less misplacement than the Terman Test scores when
compared with school marks (41%). The Scholastic Aptitude
Test scores compared with teachers' estimated marks showed
1% more cases of perfect correspondence (40%) and 2 points
less misplacement than the Terman Test scores compared with
the teachers' estimated marks (39%). Thus, in both grades
the Scholastic Aptitude Test seemed more valid than the
Terman Test.

The following quotation is cited in order to give a
brief summary of the conclusion of this study:[7]

"It would appear from the results of this study that
a worth while idea has been presented, namely, a test con-
structed on subject matter based on ability to learn. The
Terman A Intelligence Test has been accepted by many schools
as a suitable test by which to rate the intelligence of
their students. The Ability to Learn Test when correlated
with school marks in the tenth grade (.467 ± .049) is .004
higher than the Terman Test (.463 ± .049). In the ninth
grade the Ability to Learn Test when correlated with school

marks is .60 $\pm$ .049, a difference of fourteen points in favor of the Ability to Learn Test. From these figures it seems plausible to assume that the Ability to Learn Test has considerably greater validity than the Terman Test, at least in the ninth grade."

II   ANALYSIS OF TESTS USED IN THIS STUDY

ANALYSIS OF TESTS USED IN THIS STUDY

Before describing the Sones-Harry Achievement Test (Form B), it might be well to discuss briefly the nature and use of the achievement test in general as contrasted with the intelligence test. The achievement test is, according to W. S. Monroe[8], one devised for school use which has for its function the measurement of achievement or what the student has learned. The general intelligence test is used, on the other hand, to measure the pupil's general capacity to do the work of the school. Edward A. Lincoln[6] defines achievement tests as tests in the school subjects and also calls them accomplishment or simply subject tests. Intelligence tests he defines as "tests used for the measurement of native intelligence, brain power, or inborn ability of the individual. Because they test innate mental ability they are so constructed that formal education has little or no effect on the scores which children make."

W. W. D. Sones and David P. Harry, Jr.[11], authors of the Sones-Harry High School Achievement Test, claim that the achievement test has many valuable functions in the secondary school. In the first place, the test makes possible a better grouping of pupils in the high school by measuring the pupils' abilities in a general field. Secondly, the test may be used in educational and vocational guid-

ance of secondary school pupils or college freshmen, as
pupils ranking low in one of the subject matter fields, after
pursuing several courses in it, should be guided away from
a career requiring special ability or information in that
field. Furthermore, gaps in the training of students may
be discovered by means of this test. Certain pupils in
their freedom of election of courses fail to take a course
in one of the four subject matter fields of the core cur-
riculum, namely, (1) language-literature, (2) mathematics,
(3) natural science, (4) social science. Under ordinary
class room conditions this lack of even general information
by a student passes unnoticed. This test, according to its
authors, gives a measure of what the student has secured
outside of definite class instruction and points out the
students who should be required to take at least a general
course in a subject matter field.

This test covers the four fields usually required of
students in secondary schools; namely, Language and Liter-
ature, Mathematics, Natural Science and Social Studies.

The type of content and the number of items in each
section are as follows--

Part I   Language and Literature (140 items)

Section		Number of Items
A	Language Usage	10
B	Word Meaning	10
C	Abbreviations and Prefixes	10
D	Grammatical Principles	5
E	Foreign Phrases	10
F	Literary Forms	5
G	Reading Comprehension	8
H	International Authorship	10
I	Character Sketches	5
J	Literary Passages	5
K	Literary Themes	5
L	Technical Language Vocabulary	10
M	Grammatical & Rhetorical Forms	10
N	Literary Characters	15
O	American and English Authors	15
P	Literary Interest	7

Part II   Mathematics   (80 items)

Section		Number of Items
A	Fundamentals of Mathematics	30
B	Mathematical Concepts	10
C	Interpretation of Graphs	5
D	Functional Relationship	10
E	Geometric Figures	5
F	Geometric Formulas	5
G	Geometric Theorems	10
H	Mathematical Formulas	5

Part III   Natural Science (80 items)

A	Natural Sciences	5
B	Science Processes	10
C	Classification	5
D	Science Principles	10
E	Numerical Values	5
F	Extremes in Nature	5
G	Transformation of Energy	10
H	Science Stories	15
I	Science Instruments	5
J	Scientists	10

Part IV Social Studies (115 items)

Section		Number of items
A	Civic Information	10
B	Civic Information	20
C	Famous Americans	10
D	Background of Civilization	15
E	Events in American History	15
F	Characters of History	10
G	International Affairs	10
H	Place Geography	10
I	Economists	5
J	Economic Vocabulary	10

A copy of the Sones-Harry Achievement Test (Form B) will be found in the appendix.

The West Springfield High School Scholastic Aptitude Test was constructed in 1931 by Dr. Harry N. Glick, Professor of Psychology at Massachusetts State College, and Mr. Charles P. McDonnell of the West Springfield High School. It consists of subject matter which is supposedly entirely new to the pupils who are to be tested. The pupils are allowed to study the new material for a specified period of time, then the papers are collected and the tests are passed out. In this test there is no opportunity for past experiences to help the pupil, with the exception, of course, of his training in how to study, and consequently his ability to learn or his scholastic aptitude is displayed.

The test consists of five study sheets and a test for each study sheet with the exception of the science study sheet which has two tests. The artificial language test is both a study sheet and test combined. The test and direc-

tions for administering it will be found in the appendix.

The sections of the test are are as follows:

1. _Science._ On the study sheet appears the diagram of a grasshopper with fourteen different parts located and labelled. On the same sheet are eleven statements representative of those discussed in any first year biology class. Five minutes are allowed for study.

The test (Section I, Part A) contains a drawing of the grasshopper with the fourteen different parts numbered. The names are found below the drawing and the student is to place the correct number in the parentheses after the name.

The test (Section I, Part B) contains the list of definitions found on the study sheet with the scientific names omitted. A list of the terms defined is found below the definitions. The pupil is to copy the number of the definition in the parentheses after the term which the definition best defines as indicated in the directions.

2. _History._ The study sheet (Section II) contains a paragraph describing the character of Charles, the second, of England and stating some facts pertaining to his reign as king. The pupil is allowed three minutes to read the paragraph as many times as possible.

On the test (Section II) there are twenty single choice questions based on the paragraph on the study sheet. The pupil is to place a check after the word that best com-

pletes the statement.

3. Geography. The study sheet (Section IV, Part A) is a map of South America. All the countries, two rivers, eight cities, one island and the Panama Canal are named. The pupil is given three minutes to study the map.

The test (Section IV, Part A) contains a map with the names of the countries, rivers, cities and islands omitted and in their places numbers are substituted. At the left of the map is a list of the countries, rivers, etc., with parentheses after each name. The pupil is to place the numbers that are on the map in the parentheses after the correct name.

On the study sheet (Section IV, Part B) is a list of twenty statements dealing with subject matter covered by most industrial geography courses in the high school. The pupil is given three minutes to study these statements.

The test (Section IV, Part B) is a list of the same twenty statements with the important word omitted. Below the statements is a numbered list of the words that belong in the blank spaces. The pupil is to copy the number of the statement in the parentheses after the word that best completes the statement.

4. English or Reading Comprehension. Section V Parts A and B is a study sheet containing a paragraph taken from

the "Social Backgrounds of English Literature" and a poem.
The pupil is allowed four minutes to study Parts A and B.

The test (Section V, Part A) contains the same para-
graph as found on the study sheet with the important words
omitted. Below the paragraph is a list of the words that
have been omitted. The pupil is to copy the number of each
blank in the parentheses after the word which belongs in
the blank.

Part B consists of seven statements referring to the
poem studied on the study sheet (Section IV, Part B). The
pupil is to mark the statements, true, false or didn't say,
thus indicating his ability to interpret poetry.

5. Artificial Language. On the first sheet of Sec-
tion III are a vocabulary, some rules and some sample
sentences of an artificial language. On the second sheet
are nineteen English sentences and just beneath each English
sentence is its translation into the artificial language.
Some of these translations are correct and some are in-
correct. The pupil is to consult the vocabulary and rules
and draw a line through every word incorrectly translated.
Ten minutes are allowed for this section.

This detail of the two tests is presented to give a
rather definite idea of the nature of the two measuring
instruments which are compared in this study in regard to
their comparative predictive validity with reference to
school work.

III COLLECTION OF DATA

COLLECTION OF DATA

The Sones-Harry Achievement Test was administered May 26, 1931 to 474 pupils in the ninth grade (Junior III) of the five junior high schools of the city of Holyoke, Massachusetts. The purpose of the superintendent in having this test administered was to measure (1) the achievement of the students at the end of their ninth year and (2) their chance for success in their senior high school work the following year. The class room teachers in each junior high school had charge of the testing under the supervision of Mr. Lloyd Young, Director of Research for the Holyoke Public schools.

The writer obtained permission from the superintendent of schools to use the results of these tests and made out a card for each pupil, upon which were recorded his age, course of study, the name of the junior high school he attended, the scores received on the four sections of the test and the total score.

The West Springfield High School Scholastic Aptitude Test was administered to the same pupils on February 4, 1932, these pupils being now in the tenth grade or the sophomore year of the senior high school. The test had to be given to all the pupils in the sophomore sections in order to avoid confusion in the school schedule, so that a total of 553 tests was administered, but only 390 of the original 474

junior high school pupils took the test. Eighty-four of
those pupils who had completed their ninth year in the junior
high school either did not come to the senior high or were
absent on the day when the Scholastic Aptitude Test was ad-
ministered. However, there were 163 pupils who took the
Scholastic Aptitude Test but who had not taken the Achieve-
ment Test, because they had during the previous year at-
tended the various parochial schools of the city or had come
to Holyoke from some other city or town. The results of the
test for these 163 pupils were not used.

A question may arise regarding the fact that about
eight months elapsed between the dates of administering
these two tests. However, as has already been stated, the
Achievement Test was given in May, 1931 at the order of the
superintendent of schools before the writer had begun this
study, and the Scholastic Aptitude Test was not constructed
until December, 1931. Due to the irregularity of the pro-
gram during the mid-year examination period, it was im-
possible to arrange an earlier date than February 4, 1932
for administering the Scholastic Aptitude Test. The Achieve-
ment Test was given for the purpose of measuring what had
been accomplished by the pupils during the ninth year of
school, and the Scholastic Aptitude Test was given to mea-
sure the ability of these same pupils to learn. It does
not seem probable that the pupils' ability to learn could

undergo much change within a period of eight months. There-
fore, this lapse of time should make little or no difference
in the results obtained by comparing the scores obtained on
both of these tests with the school marks obtained during
the tenth year of school.

It was impossible to administer the test to the 553
pupils at one time, as the Holyoke High School, due to in-
crease in numbers, is run on the two session plan. Of the
sophomores, 311 pursuing the college, technical, and general
courses, attended the morning session during the school year
1931-1932, and 242 pupils of the commercial course attended
the afternoon session. However, there was no opportunity
for the morning group in any way to give information to the
afternoon group.

Under the supervision of the writer ten teachers ad-
ministered the test to 311 pupils of the morning session
and nine teachers gave the test to the 242 pupils of the
afternoon session. Each teacher had the printed directions
(see appendix) which had been carefully explained the day
before the test was administered.

Each teacher, supervising the testing, explained to
the pupils that the test would have no influence on their
school marks, as it was not a test of what they knew, but
rather a test of their ability to learn certain types of
subject matter which they would meet in high school. They

were told that they would be given an opportunity to learn
the answers to the questions, and were urged not to be dis-
couraged if they found the answers difficult to learn, as
no one was expected to make a perfect score. The pupils
were, however, urged to do their best so that it might be
possible for their teachers to judge accurately regarding
their ability to do school work. It was impossible to
determine whether every pupil did his best work. However,
the teachers reported that the pupils as a whole showed
excellent application and concentration on the test. The
fact that these pupils had had considerable experience in
taking tests was a great advantage, as they were able to
adjust themselves to the situation easily.

The study sheets were passed out face down, and the
pupils were told when to look at them. The teacher read
over the directions under Section I with the pupils and
told them they would be allowed five minutes for study.
This method was followed with Sections II, IV and V --
three minutes being allowed for the study of Section II,
three minutes each for Parts A and B of Section IV and
four minutes for Part V. After each section had been
studied, the papers were passed forward.

Then, the tests were passed out, and the pupils were
directed to write their names and ages on the line indicated

on the cover. They were told to turn first to Section III, the artificial language section, while the teacher read the directions, and they were allowed ten minutes to work on this section. This section was placed first in the series of tests because it is of an entirely different nature from the others and thus, according to Mr. McDonnell,[7] who in his thesis quotes from a lecture by McGeoch delivered at a meeting of the American Psychological Association, Toronto, Canada, 1932, by introducing a new type of material into the pupil's mind likely makes it harder for him to remember the previously studied material. Thus, it is thought possible to obtain a more accurate test of the pupil's power and ability to learn.

At the end of ten minutes the pupils were told to turn to Section I-Part A and look at the directions while the teacher read them, and they were given four minutes to work on this section. The same method was followed throughout the test - four minutes being allowed for Section I - Part B, three minutes for Section II, three minutes for Section IV - Part A, four minutes for Section IV - Part B, and five minutes for Section V.

In scoring this test, the scores for each section were placed in the spaces designated on the cover of the test itself. One point was given for everything the pupil did

correctly and there was no deduction for mistakes with the
exception of the artificial language section. In this sec-
tion of the test one point was given for every incorrectly
translated word that was crossed out or underlined, in other
words, for the discovery of an error. The pupil was penal-
ized one point for every correctly translated word which he
crossed out or underlined. For example, in the first sentence
the word the is incorrectly translated by the word lat, and
therefore the pupil who crossed out this word received one
point. If, however, he also crossed out the word ego which
correctly translates I, he would be penalized one point.
The score for one sentence might be zero or even less than
zero, if the pupil crossed out more correctly translated
words than incorrectly translated words, but in no case is
the total score of this section scored less than zero.
The scores of the different sections were added and the
total score found. Then, a record was made on the cards
mentioned above of the scores of each section of the test
and the total score.

It was necessary to obtain a record of school marks
in order to have sufficient data for carrying out this
study. Only the marks on academic subjects were used, as
this is a study of mental and not motor ability. The
subjects used in this study are English, Commercial Ge-

ography, Bookkeeping, Commercial Arithmetic, French, World
History, Algebra, Latin, German, Botany, Geometry, Physics
and Junior Business Training

The marks in the above subjects were averaged for the
year by the class teachers and recorded in the high school
office at the close of the school year. The records on
the aforementioned cards were completed by recording the
academic subjects studied by each student during his sopho-
more year in the Holyoke High School, the marks received
for the year in these subjects, and a general average of
these marks. A complete record of three sets of marks --
Sones-Harry Achievement Test Scores, West Springfield Scho-
lastic Aptitude Test Scores, and School marks was obtained
for 384 students. The cards of all those students whose
records did not show these three sets of marks were dis-
carded.

IV STATISTICAL INTERPRETATION

STATISTICAL INTERPRETATION

There are many types of statistical methods which may
be applied in order to make data more intelligible and mean-
ingful. It is impossible to make comparisons and to show
relationships existing between large groups of scores such
as those appearing in Tables I and II without employing
statistical methods. Examination of Table I shows the dis-
tribution by rank of the 384 pupils according to the total
Scholastic Aptitude Test scores received, the highest being
placed first. The first column gives the number of the in-
dividual, columns 2 - 6 give the scores for Sections I - V
of the Scholastic Aptitude Test, column 7 gives the total
scores for the Scholastic Aptitude Test, columns 8 - 11 give
the scores for Sections I - IV of the Sones-Harry Achieve-
ment Test, column 12 gives the total scores for the Sones-
Harry Achievement Test and column 13 gives the school aver-
age.

A study of Table II shows the marks received in the
various academic school subjects studied by the 384 pupils
and the school average for each pupil for the year.

In this study the following methods are used--(1)
graphical, (2) coefficient of correlation (Pearsonian
Method) and (3) quartile placement. All statistical work
was done by the writer and checked twice.

TABLE I

Distribution by Rank of 384 Pupils According to the Total Scholastic Aptitude Test Scores

Number of Student	Section I Aptitude Test	Section II Aptitude Test	Section III Aptitude Test	Section IV Aptitude Test	Section V Aptitude Test	Total Score Aptitude Test	Language-Lit. Section Achieve. Test	Math. Section Achieve. Test	Natural Science Achieve. Test	Social Studies Achieve. Test	Total Score Achieve. Test	School Average
1	19	18	30	42	18	127	81	25	26	41	173	91
2	22	18	31	35	19	125	78	23	30	36	167	87
3	17	17	28	44	19	125	59	13	27	29	128	86
4	23	18	20	44	19	124	59	27	33	34	153	79
5	23	16	28	39	18	124	61	23	31	53	148	91
6	21	15	25	43	21	123	71	32	42	79	224	87
7	23	14	20	49	19	122	64	26	17	54	161	90
8	20	13	30	45	16	122	44	21	22	30	117	78

TABLE I (Cont.)

9	20	16	30	42	13	121	65	30	21	35	151	94
10	18	17	30	43	12	120	53	24	37	41	155	81
11	21	19	22	41	17	120	94	35	44	62	235	83
12	21	14	27	40	17	119	64	24	32	48	168	74
13	15	16	25	46	16	118	51	27	29	51	158	88
14	20	14	29	36	16	118	39	27	36	40	142	79
15	23	14	28	37	14	116	69	21	22	47	159	83
16	23	18	17	44	14	116	45	41	48	61	195	90
17	17	16	25	40	17	115	55	20	28	39	142	86
18	22	15	24	41	13	115	65	28	30	50	173	83
19	19	13	24	43	16	115	82	39	51	53	225	88
20	18	14	28	45	10	115	87	28	38	42	195	83
21	15	19	18	46	17	115	87	32	48	74	241	92
22	11	17	26	44	17	115	54	18	26	29	127	92
23	16	17	29	33	19	114	96	30	24	36	186	86

TABLE I (Cont.)

24	18	16	23	41	16	114	64	17	18	22	121	76
25	18	14	21	44	17	114	60	19	23	29	131	87
26	15	18	27	37	17	114	47	8	23	32	110	79
27	12	17	22	44	19	114	44	21	16	30	111	87
28	23	13	27	41	9	113	50	28	19	61	158	80
29	17	18	24	39	15	112	77	30	28	40	175	84
30	13	15	29	36	16	111	75	36	30	73	214	87
31	18	18	26	41	8	111	81	38	43	52	214	87
32	17	15	19	38	21	110	77	32	14	28	151	87
33	18	17	24	36	15	110	63	34	30	39	166	86
34	18	15	26	37	14	110	32	20	7	18	77	85
35	14	15	25	39	17	110	49	25	11	28	113	83
36	18	17	27	30	17	109	86	32	32	34	184	82
37	17	13	20	45	14	109	45	22	34	32	133	83
38	14	13	27	40	14	108	36	22	32	30	120	75

TABLE I (Cont.)

39	14	17	26	37	14	108	84	31	29	27	171	79
40	23	16	24	35	10	108	70	14	25	33	142	82
41	13	17	31	35	12	108	57	34	29	37	157	88
42	16	12	29	36	15	108	33	27	29	30	119	83
43	13	18	17	42	17	107	49	23	39	47	158	90
44	16	17	16	41	17	107	78	29	35	36	178	82
45	18	16	29	32	12	107	47	21	31	25	124	94
46	9	16	31	35	16	107	34	18	31	32	115	91
47	18	15	30	30	14	107	47	22	31	17	117	84
48	12	14	21	44	16	107	36	9	24	28	97	87
49	16	13	32	39	7	107	45	17	15	11	88	84
50	14	15	26	39	13	107	47	15	32	40	134	71
51	10	14	26	44	12	106	31	20	20	44	115	72
52	11	16	23	41	15	106	61	35	28	40	164	83
53	19	18	19	38	12	106	38	14	16	19	87	74
54	18	14	28	40	6	106	61	19	19	25	124	83

TABLE I (Cont.)

55	20	16	16	38	16	106	61	31	28	27	147	90
56	8	19	27	37	14	105	53	24	34	47	158	88
57	19	10	27	41	8	105	42	21	24	32	119	66
58	11	18	25	38	13	105	29	14	20	21	84	82
59	9	14	29	34	18	104	59	21	30	35	145	80
60	16	14	26	38	10	104	39	16	18	15	88	80
61	18	13	26	34	13	104	40	8	16	8	72	69
62	19	13	26	36	10	104	28	18	22	20	88	78
63	18	14	18	41	13	104	39	24	20	46	129	73
64	15	13	29	40	6	103	39	15	21	20	95	78
65	18	15	28	40	1	102	35	11	26	0	72	80
66	15	16	26	39	6	102	81	29	22	45	177	86
67	18	16	15	39	14	102	54	20	27	30	131	79
68	16	14	23	40	9	102	47	21	30	37	135	83
69	15	18	30	27	12	102	48	17	31	28	124	85
70	14	13	26	38	11	102	45	18	31	42	136	79

TABLE I (Cont.)

71	13	18	16	42	12	101	86	31	39	51	207	80
72	12	17	15	41	16	101	69	31	31	45	176	89
73	9	16	27	32	17	101	84	31	29	39	183	92
74	16	18	19	31	14	101	45	21	27	36	129	87
75	21	14	24	36	5	100	74	16	30	31	151	87
76	14	12	23	41	10	100	30	19	22	33	104	85
77	13	9	27	59	12	100	41	17	17	18	93	71
78	16	19	17	37	10	99	32	4	20	15	71	81
79	10	16	28	29	15	98	70	17	41	43	171	83
80	18	15	22	38	5	98	40	14	22	31	107	69
81	16	18	21	28	14	97	64	25	18	20	127	90
82	10	15	26	37	9	97	28	16	17	20	81	75
83	12	15	27	33	10	97	25	16	11	15	67	82
84	17	17	17	33	13	97	81	32	35	30	178	83
85	4	13	31	43	6	97	42	14	22	12	90	79
86	19	16	21	33	8	97	36	10	12	22	80	75

TABLE I (Cont.)

87	15	17	20	30	15	97	73	23	37	38	171	85
88	13	11	23	38	12	97	30	20	21	24	95	88
89	14	16	23	39	5	97	32	18	21	19	90	72
90	8	16	16	42	15	97	56	20	25	23	124	85
91	15	12	26	38	6	97	47	15	16	21	99	84
92	13	14	31	34	5	97	35	16	32	30	113	83
93	16	14	28	30	8	96	41	27	33	24	125	92
94	16	18	12	38	12	96	53	16	23	37	129	81
95	15	15	21	37	8	96	62	13	13	30	118	82
96	13	14	23	34	12	96	34	33	20	36	123	86
97	11	17	22	36	10	96	30	12	18	17	77	75
98	14	16	19	29	17	95	54	25	6	20	105	83
99	11	17	31	26	9	95	38	10	25	33	106	89
100	18	17	12	33	15	95	56	12	21	31	120	77
101	20	17	0	45	13	95	40	14	39	43	136	72

TABLE I (Cont.)

102	20	17	19	25	14	95	58	22	26	32	138	73
103	14	15	26	29	11	95	49	23	34	23	129	80
104	18	14	28	30	10	94	57	14	6	13	90	80
105	19	15	16	38	6	94	25	8	27	28	88	69
106	18	16	15	35	10	94	23	8	12	27	70	81
107	13	10	29	35	7	94	31	10	13	13	67	79
108	14	13	16	37	14	94	31	15	17	13	76	86
109	11	14	28	30	11	94	27	20	33	25	105	85
110	12	14	17	37	14	94	47	24	22	33	126	70
111	16	12	20	42	3	93	42	13	21	30	106	71
112	13	9	23	38	10	93	30	16	10	26	82	77
113	7	12	29	32	13	93	47	13	12	18	90	79
114	10	12	21	33	17	93	50	12	28	29	119	86
115	17	18	10	41	6	92	76	25	45	63	209	89
116	12	16	23	33	8	92	59	13	23	14	109	70

TABLE I (Cont.)

117	9	15	22	31	15	92	39	18	21	27	105	76
118	9	13	25	37	8	92	45	17	28	26	116	84
119	10	15	24	34	9	92	34	23	21	18	96	87
120	19	13	21	29	10	92	31	16	16	15	78	75
121	9	16	15	40	12	92	64	19	27	40	150	85
122	9	13	30	33	7	92	47	18	27	14	106	79
123	8	16	30	25	14	92	34	8	8	17	67	88
124	19	10	17	39	7	92	38	12	5	17	72	73
125	14	18	19	26	15	92	58	21	34	51	164	82
126	13	16	18	37	8	92	42	17	22	36	117	75
127	14	13	17	41	6	91	30	13	21	14	78	78
128	16	12	15	40	8	91	57	10	20	41	128	83
129	23	10	13	34	11	91	38	15	30	30	113	75
130	10	15	25	34	7	91	32	16	19	18	85	80
131	18	9	27	33	4	91	42	22	15	15	94	84

TABLE I (Cont.)

132	4	16	24	32	15	91	37	19	18	15	89	69
133	3	14	31	26	17	91	31	25	28	48	132	74
134	17	17	13	36	8	91	52	16	25	30	123	77
135	14	13	27	25	11	90	49	19	29	30	127	85
136	15	15	13	45	2	90	39	25	30	22	116	87
137	12	16	30	28	4	90	43	11	19	10	83	87
138	12	17	18	39	4	90	80	23	22	41	166	83
139	15	12	22	31	10	90	40	21	27	25	113	88
140	17	15	22	28	7	89	46	9	26	25	106	65
141	11	16	19	29	14	89	47	31	39	29	146	78
142	14	13	23	29	10	89	18	8	15	17	58	71
143	12	13	22	39	3	89	38	17	20	30	105	91
144	2	13	25	43	6	89	38	25	25	42	130	74
145	13	14	24	27	11	89	55	22	27	38	142	74
146	10	12	22	35	10	89	29	17	24	28	98	87

TABLE I (Cont.)

147	13	18	16	28	14	89	50	19	59	25	133	86
148	14	13	16	40	5	88	52	20	23	55	150	78
149	4	13	24	35	12	88	42	25	17	44	128	88
150	7	16	28	28	9	88	30	17	25	22	94	85
151	14	17	19	26	11	87	50	11	19	30	110	89
152	16	13	28	25	5	87	50	25	37	37	149	83
153	14	13	19	38	3	87	14	21	22	47	104	78
154	9	19	29	24	6	87	46	7	9	25	87	78
155	9	12	31	28	7	87	37	13	16	27	91	89
156	20	16	16	21	14	87	37	20	27	24	108	67
157	12	17	20	26	12	87	50	19	28	28	125	78
158	13	12	21	33	8	87	41	8	26	24	99	74
159	12	13	24	24	10	86	37	13	22	29	101	79
160	18	15	24	30	7	86	83	23	29	38	173	80
161	5	15	25	38	3	86	27	13	26	30	96	76

TABLE I (Cont.)

162	14	16	16	39	1	86	36	8	20	23	87	73
163	12	15	19	33	7	86	51	10	28	55	144	71
164	19	10	25	25	7	86	18	5	16	15	54	73
165	14	10	22	35	5	86	50	28	28	37	143	74
166	11	13	25	32	5	86	46	22	21	24	113	81
167	14	19	13	27	12	85	52	28	43	56	179	85
168	15	19	20	19	12	85	57	13	39	37	146	82
169	14	18	13	33	7	85	48	10	26	52	136	79
170	9	15	9	44	8	85	46	25	21	47	139	85
171	11	17	24	32	1	85	29	17	19	20	85	82
172	9	14	14	38	9	84	41	17	17	34	109	74
173	11	13	20	34	6	84	35	15	31	27	108	89
174	11	16	21	27	9	84	35	8	14	27	84	75
175	9	15	21	32	7	84	34	20	15	19	88	75

TABLE I (Cont.)

176	13	17	23	19	12	84	67	36	16	28	147	94
177	14	16	24	25	6	84	19	12	14	13	58	68
178	8	13	26	29	8	84	37	16	15	20	88	80
179	7	16	17	35	8	83	17	12	35	20	84	87
180	9	10	23	35	6	83	49	19	10	10	88	72
181	17	14	20	24	8	83	49	10	14	31	104	73
182	16	14	12	33	8	83	39	9	29	21	98	78
183	10	13	27	28	5	83	32	15	22	15	84	84
184	6	17	16	32	12	83	28	16	16	22	82	74
185	13	17	19	26	8	83	42	12	18	28	100	75
186	14	16	11	36	6	83	36	18	21	40	115	73
187	7	17	23	21	4	82	57	9	26	31	123	81
188	12	14	12	44	0	82	13	10	16	32	71	85
189	13	13	18	33	5	82	21	24	31	36	112	77
190	11	15	19	27	10	82	44	13	21	33	111	80

TABLE I (Cont.)

191	10	14	19	26	13	82	32	16	19	30	97	84
192	9	13	22	34	3	81	55	23	27	47	152	78
193	13	13	19	31	5	81	41	18	11	19	89	72
194	6	12	15	38	10	81	42	7	20	16	85	74
195	8	13	23	29	8	81	42	16	22	29	109	85
196	13	12	23	21	12	81	13	12	23	21	12	73
197	8	11	22	32	7	80	34	5	13	13	65	78
198	15	14	14	32	5	80	16	15	25	15	71	73
199	10	10	15	39	6	80	25	1	8	15	59	75
200	5	17	19	33	6	80	36	10	27	16	89	83
201	13	13	17	31	6	80	26	10	25	31	92	82
202	4	16	24	30	5	79	31	21	24	24	100	71
203	7	13	27	30	2	79	35	12	16	17	80	75
204	13	14	16	29	7	79	26	14	21	13	74	71
205	5	16	14	35	9	79	34	16	29	23	102	75

TABLE I (Cont.)

206	16	9	14	35	5	79	35	16	28	21	100	68
207	8	13	17	29	12	79	44	22	24	43	133	77
208	8	10	29	27	4	78	36	9	19	18	79	80
209	15	10	14	24	9	78	66	18	51	30	145	80
210	10	15	15	31	7	78	51	14	15	7	67	79
211	14	11	15	30	8	78	43	19	16	48	126	77
212	7	13	26	27	5	78	42	12	16	30	100	79
213	9	13	15	34	7	78	29	8	20	38	95	67
214	15	14	12	27	10	78	19	19	27	27	92	70
215	14	15	10	30	9	78	19	13	19	27	78	75
216	14	18	0	36	9	77	51	13	22	47	133	71
217	4	13	17	29	14	77	86	21	15	36	158	83
218	20	11	11	30	5	77	34	13	6	17	70	74
219	9	14	20	29	5	77	31	16	25	25	97	88
220	9	9	22	30	6	76	18	2	16	10	46	75

TABLE I (Cont.)

221	9	13	18	26	10	76	16	6	15	13	50	76
222	11	15	19	26	4	75	21	13	8	16	58	75
223	11	9	26	21	8	75	25	4	18	25	72	74
224	12	19	11	26	7	75	46	10	13	22	91	86
225	7	12	20	28	8	75	37	12	18	33	100	79
226	8	12	30	25	10	75	41	12	14	17	84	80
227	12	15	17	26	5	75	79	33	31	38	181	81
228	8	11	25	18	13	75	27	13	13	16	69	75
229	14	18	16	20	7	75	46	19	15	23	103	85
230	4	13	17	33	7	74	27	6	7	15	55	81
231	18	15	12	29	0	74	29	9	16	13	67	79
232	5	14	11	39	5	74	50	11	29	64	154	86
233	12	10	18	24	10	74	38	19	26	38	121	79
234	17	5	24	23	5	74	34	8	12	0	54	72
235	7	12	24	26	5	74	29	12	17	13	71	77
236	8	8	21	29	8	74	41	7	24	21	93	86

TABLE I (Cont.)

237	10	17	19	25	3	74	40	18	22	35	113	77
238	17	17	10	30	6	74	41	13	30	37	121	84
239	8	13	23	23	6	75	48	13	30	32	123	77
240	10	17	12	28	6	73	61	20	0	0	81	79
241	5	12	24	27	5	75	32	19	15	18	82	70
242	10	10	14	34	5	73	27	17	28	12	84	79
243	3	15	22	28	5	75	29	9	11	15	64	68
244	2	10	29	21	11	73	44	22	23	19	108	82
245	6	15	23	20	8	72	27	11	7	9	54	72
246	11	10	13	33	5	72	41	5	11	7	64	72
247	15	10	25	19	3	72	22	4	2	10	38	73
248	8	10	22	28	4	72	30	15	14	24	83	75
249	13	12	19	21	7	72	45	18	19	26	108	88
250	12	10	20	26	3	71	23	9	15	22	69	81
251	12	11	15	24	9	71	57	14	20	17	88	73

TABLE I (Cont.)

252	15	16	10	27	3	71	31	8	26	32	97	87
253	5	14	22	26	4	71	44	15	27	39	125	88
254	13	12	13	25	8	71	10	13	13	7	43	77
255	8	18	18	15	11	70	67	24	17	33	141	80
256	7	14	13	26	10	70	69	23	27	20	139	77
257	10	9	23	24	4	70	24	7	12	12	55	77
258	11	10	17	23	9	70	15	5	12	4	36	67
259	9	9	23	26	3	70	29	13	17	24	85	75
260	10	18	21	13	8	70	47	17	33	28	125	79
261	6	17	18	24	5	70	46	14	20	34	114	71
262	4	9	23	24	10	70	30	16	16	36	98	76
263	9	11	10	28	11	69	38	15	51	29	113	73
264	9	14	11	51	4	69	45	24	37	39	145	74
265	3	13	18	30	5	69	43	17	26	24	110	68
266	4	12	21	31	11	69	27	6	18	7	58	64

TABLE I (Cont.)

267	10	15	17	22	5	69	46	3	29	25	103	74
268	14	13	13	20	9	69	36	22	29	29	116	63
269	6	12	15	23	13	69	37	9	25	25	96	71
270	8	10	21	26	3	68	31	5	10	12	58	71
271	4	14	23	16	11	68	28	13	11	10	62	78
272	6	15	12	34	1	68	30	20	20	27	97	90
273	10	14	5	33	6	68	21	7	11	33	72	73
274	15	12	11	26	4	68	33	20	22	15	90	72
275	10	12	13	28	4	67	29	13	20	12	74	70
276	13	15	15	20	4	67	40	8	21	21	90	79
277	9	10	13	33	2	67	28	20	34	36	118	72
278	7	6	19	25	10	67	20	8	5	11	44	78
279	4	14	11	31	7	67	37	15	18	22	92	76
280	4	10	25	23	4	66	16	10	11	8	45	76
281	12	4	20	22	8	66	29	13	14	15	71	74

TABLE I (Cont.)

282	9	17	10	25	5	66	35	17	17	30	99	79
283	9	18	15	20	4	66	36	18	33	52	119	76
284	12	5	16	26	7	66	42	13	15	27	97	68
285	6	10	13	26	10	65	39	24	23	0	86	70
286	5	15	15	25	5	65	16	8	18	17	59	75
287	6	8	19	20	11	64	39	18	31	32	120	92
288	14	15	8	24	3	64	52	17	25	17	111	80
289	5	15	5	37	2	64	40	20	20	30	110	70
290	11	7	14	25	7	64	36	22	15	12	85	73
291	4	13	18	23	6	64	25	2	5	7	39	72
292	2	16	15	29	2	64	21	7	13	30	71	65
293	5	11	16	20	11	63	28	14	10	12	64	79
294	11	14	16	16	6	63	22	10	25	19	76	64
295	10	16	13	16	8	63	57	11	34	11	115	73
296	11	15	11	17	9	65	22	12	23	16	73	74

TABLE I (Cont.)

297	7	11	14	25	6	63	34	12	35	37	118	71
298	14	9	2	31	6	62	29	10	17	23	79	72
299	6	8	23	18	7	62	18	10	5	13	46	86
300	11	8	7	30	6	62	19	10	15	12	56	79
301	6	13	20	17	6	62	29	11	13	8	61	75
302	5	14	16	20	8	63	23	17	21	11	72	68
303	12	15	10	16	9	62	30	11	7	21	69	70
304	9	8	20	19	6	62	22	13	12	12	59	75
305	7	13	18	14	9	61	40	12	10	7	69	72
306	8	13	15	25	0	61	51	23	17	15	106	75
307	16	13	1	25	6	61	27	11	11	22	71	72
308	9	12	17	20	3	61	24	7	14	12	57	69
309	11	16	7	23	4	61	16	6	17	8	47	69
310	13	12	11	22	3	61	25	13	15	7	60	70
311	4	9	20	25	3	61	29	9	13	9	60	85

TABLE I (Cont.)

312	5	17	7	27	4	60	18	8	7	22	55	80
313	9	8	9	23	11	60	29	15	18	21	83	81
314	9	6	16	24	5	60	20	12	10	8	50	80
315	7	13	13	20	7	60	32	11	14	15	72	69
316	8	13	15	19	5	60	25	11	12	22	70	77
317	6	14	15	20	5	60	28	18	27	23	96	71
318	4	10	20	20	5	59	33	15	14	8	68	75
319	8	12	5	28	6	59	34	20	17	16	87	69
320	5	11	10	26	7	59	30	8	19	25	82	80
321	2	7	24	21	4	58	39	12	21	32	104	74
322	10	8	13	22	5	58	26	12	8	24	70	75
323	11	4	1	27	5	58	39	14	19	31	103	69
324	8	9	13	27	1	58	21	14	19	18	72	79
325	11	10	14	23	0	58	51	18	32	26	127	74
326	6	10	4	33	4	57	21	9	17	13	60	68
327	4	13	18	14	8	57	53	17	13	21	104	86

TABLE I (Cont.)

328	4	13	18	16	6	57	22	12	15	13	62	75
329	14	9	8	17	8	56	24	15	18	12	69	73
330	5	18	18	9	6	56	23	11	14	14	62	75
331	3	7	20	20	6	56	29	9	12	8	58	68
332	8	8	21	14	5	56	33	11	17	8	69	72
333	7	15	16	14	4	56	31	22	17	25	95	82
334	8	14	11	19	4	56	35	10	15	26	80	77
335	3	13	8	29	2	55	38	29	12	28	107	78
336	6	7	12	22	7	54	15	4	8	8	55	70
337	14	9	6	19	6	54	11	5	6	2	24	71
338	9	12	8	22	3	54	25	9	13	23	70	70
339	3	11	11	21	8	54	27	6	19	7	59	75
340	5	6	22	17	3	53	33	9	14	14	70	78
341	8	10	8	20	6	52	15	14	11	16	56	72
342	11	15	0	22	4	52	41	7	4	14	66	80
343	5	10	19	15	3	52	25	13	21	13	72	75

TABLE I (Cont.)

344	5	11	11	20	4	51	28	8	16	6	58	75
345	5	8	16	19	2	50	21	4	17	19	61	73
346	8	10	0	32	0	50	15	11	11	12	49	69
347	5	7	0	34	4	50	26	4	13	11	54	68
348	4	9	13	20	3	49	39	15	13	17	84	72
349	7	11	15	14	2	49	18	14	24	24	80	74
350	0	10	0	56	2	48	15	6	12	16	49	65
351	4	10	10	21	3	48	28	2	10	12	52	70
352	9	12	8	14	5	48	32	7	11	17	67	65
353	3	11	20	10	4	48	23	11	12	19	65	72
354	9	10	7	18	3	47	17	8	26	21	72	71
355	4	12	11	13	7	47	15	16	14	8	55	78
356	4	5	13	20	4	46	16	15	17	10	58	69
357	27	8	14	16	65	5	14	6	19	1	45	65
358	3	6	10	21	5	45	18	15	12	9	54	74

TABLE I (Cont.)

359	3	14	8	16	4	45	12	12	13	19	56	70
360	2	10	11	16	5	44	15	5	9	13	42	75
361	2	7	21	11	3	44	15	6	8	6	35	68
362	2	7	19	9	7	44	15	11	10	11	47	71
363	6	8	12	17	0	43	29	14	12	9	64	75
364	4	12	14	12	1	43	23	13	14	26	76	66
365	8	5	0	21	8	42	20	9	9	9	47	82
366	5	7	20	6	4	42	18	12	10	6	46	66
367	0	12	0	28	1	41	24	9	16	19	68	72
368	2	9	0	18	11	40	29	7	6	2	44	63
369	5	11	13	7	4	40	40	7	19	12	78	82
370	1	9	0	13	17	40	18	11	14	7	50	70
371	0	11	0	18	3	39	28	11	7	20	66	67
372	1	2	21	12	5	39	12	5	10	9	36	63
373	5	5	11	14	3	38	16	12	17	4	49	70
374	2	11	2	17	6	38	17	11	13	10	51	70

TABLE I (Cont.)

375	4	9	2	16	5	36	15	8	13	9	45	71
376	3	7	11	9	6	36	22	8	5	21	56	72
377	2	10	1	20	5	36	26	11	12	22	71	70
378	6	12	0	12	5	35	24	4	11	10	49	69
379	4	13	0	13	4	34	31	12	26	21	90	72
380	6	10	4	9	3	32	21	9	25	17	70	66
381	2	11	0	9	10	32	32	7	15	16	70	66
382	2	8	6	10	3	29	19	11	7	8	45	67
383	5	9	0	6	5	25	22	6	10	6	44	60
384	1	0	12	7	5	25	20	11	13	7	51	73

TABLE II

Distribution of Marks of 384 Pupils in Various Academic
School Subjects and the Yearly Averages

Number of Student	English	Latin	German	French	Algebra	Geometry	Botany	Physics	World History	Commercial Arithmetic	Commercial Geography	Bookkeeping	Jr. Business Training	School Average
1	90	88		90	94									91
2	80	88		90	88									87
3	90										80	83		86
4	86	76		92				72						79
5	92	84		90	80						90	88		91
6	82	90		96	92									87
7	92			90	80									90
8	70										84	76		78

TABLE II (Cont.)

	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
• 9 •	92	96		94	92										94
10	84	80		80	80										81
11	84	84		86	80										83
12	80	70		70	74										74
13	84	84		96	78										88
14	76			80	82			76							79
15	86	78		90	76										83
16	86	86		94	94										90
17	84	80		86	94										86
18	82			94	80			76							83
19	82			92		94		82							88
20	80	84		96	72										83
21	90	88		94	96										92
22	86										88				92
23	90	80		92	80							96			86
24	80	80		72	70							96			76

TABLE II (Cont.)

No.										
25	88	84		88	88					87
26	84		80	80				80	70	79
27	90			78	78			92	86	87
28	78	90		72	94		76			80
29	94	82		80	72					84
30	86	84		88	90					87
31	92	84		94	76					87
32	88	80		94	84					87
33	84		88		92		82			86
34	88							92	75	85
35	70			90	74				90	85
36	84	80		80						82
37	74				72	72		92	82	85
38	74	80		80						75
39	80	80		92	65					79
40	84	82		76	76	30				82

TABLE II (Cont.)

No.												
'41	85	85			90							88
42	80	70	90	90								85
43	86	90		96	86							90
44	82	80		88	76							82
45	90	96		94	94							94
46	86	90		94	92							91
47	86						80	88	82			84
48	88						84	88	86			87
49	88			94				80	74			84
50	80	60		74	70							71
51	72			55	88	72						72
52	80			86	94	72						85
53	70			70					75	80		74
54	88	84		86	72							83
55	86	86		94	92							90
56	86	90		92		82						88

TABLE II (Cont.)

57	70	55			74						66
58	82							36		88	70	82
59	84	70		94	70							80
60	84									80	76	80
61	78									75	55	69
62	78	70			84		80					78
63	80			70	85			76				73
64	72									82	80	78
65	80					70		88	70	80		80
66	86			94						84	80	86
67	74				76		75	90				79
68	84							84	84	80		83
69	85	85	85		85		76	80				85
70	82											79
71	80	82		84	72							80
72	80	88		96	92							89

TABLE II (Cont.)

'73	86	94					92
74	82	90	90	84			87
75	85	90	85	88			87
76	80		78	70	84	90	85
77	72	65	74		86	82	71
78	80		90	76			81
79	90		65	76	76		83
80	80	55	96	72			63
81	90	94	80				90
82	80		74	86	72		75
83	76	84	88		86	80	82
84	80	84	88	80			33
85	84		78		82	70	79
86	70	90	92		74	76	75
87	90	80	92		92	88	85
88	80		92				88

TABLE II (Cont.)

No.	'74		'76		'65		'74	'72
'89	'74		'76		'65			'72
90	72			90				85
91	80			88		86	90	84
92	80			90		86	80	83
93	88	90		96	92	80	82	92
94	92	78		80	72			81
95	80	84	86		76			82
96	86	76		88	92			96
97	74							75
98	80	86		90	76	80	70	83
99	86	90		92	78			89
100	84	72		86	65			77
101	80			65				72
102	84		65	72	70	72		73
103	80	74		86	80			80
104	82	86		88	65			80

TABLE II (Cont.)

	70		65	72	70				69
105	70								69
106	82						92	70	81
107	78		88				74	76	79
108	92		92				80	80	86
109	83		78				78		81
110	86						84	86	85
111	70	70			70				70
112	70			70	74				71
113	70		74	88					77
114	74		88				75	80	79
115	84						90	84	86
116	88		90	82		94			89
117	72		74	65					70
118	72		88				74	70	76
119	76		92				76	90	84
120	80		94				90	84	87

TABLE II (Cont.)

No.	76	76							80	70	75
121	76										75
122	80	86	78	78							83
123	70	85	82	80							79
124	90				90			88	82		88
125	80	70	70	72							73
126	84	82	80	80							82
127	76	74		76		74	74				75
128	84							80	70		78
129	84							88	76		83
130	80					70	76	74			75
131	86		74	78				80			80
132	80	84	90	80							84
133	72		65					70			69
134	80		70	74			72				74
135	76	70	80	82							77
136	90	80	94	74							85

TABLE II (Cont.)

	'89 '	'	'	'	'	'88 '	'	'92 '	'80 '	'87 '
'137 '	89									87
138	84	78	92	80				84		87
139	86		88	80						83
140	84	90	90	86						88
141	73					55	72	55		65
142	86	70	76	80						78
143	70		72		70					71
144	88	90	96	88						91
145	80		65	80			70			74
146	70	70	76	80						74
147	88					94	80			87
148	83	84	90	80						86
149	85		75	78	75					78
150	84		88	86	82					88
151	88		80				90	82		85

TABLE II (Cont.)

No.										
152	88	86	94	86						89
153	84		90					84	74	83
154	70		72				82	86	80	78
155	84		90					80	70	78
156	76		90					90	90	89
157	72	55	70	70						67
158	76	80	80	74						78
159	80		72	70						74
160	80	76	86	72						79
161	84		84					84	72	80
162	70		84		70			80		76
163	72					74		72		73
164	78		88			80		55		71
165	70							65	70	73
166	82		72	70	74					74
167	84	86	84	70						81

TABLE II (Cont.)

'168	'85		'85					'85	'85	'85	
169	80	86	90	70							82
170	80			88	70						79
171	80	90	86	84					70		85
172	80			80	82	84		80	82		82
173	80		70	70	74						74
174	90			96	80			96	80		89
175	75		75		85			85	65		75
176	74			82	70			70			75
177	90	94	94	96							94
178	74		74	55							68
179	80			84			84	84	76		80
180	86			90	64		84	90	88		87
181	70			70	76			70	76		72
182	74		85	70	64	76 80		84			73
183	72					76 80		84			78

TABLE II (Cont.)

'184	84	82		94				84
185	72	70	72	80	74			74
186	82	70	74	74				75
187	76			70	74			73
188	90			88		74	80	81
189	84			88		86	80	85
190	76					84	70	77
191	82	74		90	72			80
192	82	74		90	88			84
193	80	72		72	86			78
194	65			78		72	72	72
195	72			74		80	70	74
196	86		88			80		85
197	72			78		70	72	73
198	82			70		82	76	78
199	74		74	72	72			73

TABLE II (Cont.)

#										
'200	70							80	76	75
201	86		84					82	80	83
202	82							88	76	82
203	70	70		72		70				71
204	80			70			65		86	75
205	76			74			70		65	71
206	82			71			74		70	75
207	70			72	55	75				68
208	74	76		82	80	76				77
209	86	74		82			76			80
210	84			80		74	84		72	79
211	70			88	80				72	77
212	76			65				82	70	79
213	70	65		65	70			65		67
214	70			70		75				70
215	70			72	80					73

TABLE II (Cont.)

216	72	75	65	70						71
217	86	80	80	80						83
218	74		72	78	72					74
219	84							90	80	88
220	76							80	70	75
221	78						78	76	70	76
222	76		76	72		76				75
223	65		94					65	70	74
224	84	84	88	88						86
225	74		78					84		79
226	74		80	80				80	84	80
227	84	80	80							81
228	82		70					74	74	75
229	82	85	90	74				74	84	83
230	86							74	84	81

TABLE II (Cont.)

231	72				86				79
232	80					94	90	80	86
233	80	70	86	80					79
234	74		86	72					77
235	84		94				84	80	86
236	90						70	70	77
237	70						74	72	72
238	86		80	90		78			84
239	65	76	78	90					77
240	80	84	88	65					79
241	70		70				70	68	70
242	78					78	80		79
243	72	55			70	74			68
244	85		80	70			86	78	82
245	84	55	78						72
246	82		80				70	55	72
247	70		72				74	74	73

TABLE II (Cont.)

No.	'	'	'	'	'	'	'	'	'	'
'248	70						76		76	'75 '
249	88		80			88	86		90	88
250	74	86	80	90	80					81
251	78									73
252	76					94	72	72	70	87
253	88					92	90	92	80	88
254	78						82	90	70	77
255	70	86	88	74		76	78	82		80
256	76	70	88	72			72	78		77
257	78		70			76		72	76	77
258	72		70							71
259	82		55	76			80	80		73
260	86	80	80	70						79
261	74	65	74	70						71
262	74	72	80	76		72				76
263	70					76				73

TABLE II (Cont.)

	'75	'70	'76			'74					'74
'264	75										74
265	76	70	55								67
266	65	70						65	55		64
267	80	74					70	70			74
268	65						55	65		65	63
269	70	70				70		72			71
270	70	70						70	74		71
271	84	79						74	76		78
272	84					94		92			90
273	70	80				70		70			73
274	70	72	70		75						72
275	76			76		76					76
276	84	70						80	70		78
277	72	70						74			72
278	74					82		84	70		78
279	72	90	70								76

TABLE II (Cont.)

No.											
'280	88			70	65					80	76
281	70								80	72	74
282	84								72	80	79
283	74					75	70	84			76
284	72					76	55				68
285	70									70	70
286	74					78				74	75
287	84	94				65	94	96			92
288	80	70					84	86			80
289	70						70	88			76
290	74	70					76	72			73
291	76				74	65				74	72
292	65				75					55	65
293	78	80							70	86	79
294	72	55								65	64
295	72								70	76	73

TABLE II (Cont.)

'296	76						72	74	74
297	86	55					74		71
298	70			70		74	74		72
299	86					88	92	76	86
300	80			84		72			79
301	72		74				74	70	73
302	65						70		68
303	70			70		70			70
304	72						72	74	73
305	75						65	75	72
306	74	70	80	76					75
307	70		74	70		72			72
308	70					70	72	65	69
309	60					72	76		69
310	70					70	70		70
311	76		88				92	84	85

TABLE II (Cont.)

'312	80	80						76	82	80	80
313	80	80	84			80		80	80		81
314	78								80		79
315	70	65		80			70	65			68
316	86	70	80			70		70			77
317	72		70		70						71
318	70	76	76				76	76			75
319	72	65	60	80							69
320	84							70			80
321	80	72	74	70	70						74
322	74				70						75
323	75			75	70		80	55			69
324	72		74				84	84			79
325	70		72	76	76						74
326	70	65	55				82				68
327	86		86				88	84	86		86

TABLE II (Cont.)

	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'
'328	76				72									72	78	75
329	78	72						72			70					73
330	78				76							70				75
331	70				65						68	68	70		70	68
332	70				70						76	76	70		70	72
333	76	80	80	90												82
334	80		80			70										77
335	72			90		72										78
336	70				76		65							76		70
337	76				72		65	70						72		71
338	74				70		65	70						70		70
339	70		74		80			76						80		75
340	80				80							74		80		78
341	72				72									72		72
342	84	72	84													80
343	74				80			70						80		75

TABLE II (Cont.)

344	70						80	70	73
345	72	72					70	76	73
346	70	65					72		69
347	70	70			74		72	55	68
348	70			72	72		76	70	72
349	70						80		74
350	75						55	65	65
351	72			70	70		72	65	70
352	72						76	55	68
353	72	72	72						72
354	72				70	74	70		71
355	80						80		78
356	60	65		76			74		69
357	75	65	70						70
358	76	70	70		76				74
359	70	70	70		70				70

TABLE II (Cont.)

Row										
'360	76							70	78	75
361	70							65	70	68
362	70		70					72		71
363	76		74	55				74		75
364	70		70		70					66
365	86		80					76	84	82
366	55						72	65	70	66
367	70							76	70	72
368	70							65		68
369	88							82	76	82
370	70					70		70		70
371	70						74	70	55	67
372	70						55	70	55	63
373	70					70		70		70
374	74			65		72		70		70
375	70		70	72	70					71
376	70	65	72	80						72

TABLE II (Cont.)

'377	' 76	'	' 60	' 70	'	'	'	' 72	' ' 70 '
378	70			70	74	72		74	65	69
379	70				74		74	74	72
380	70						74	55	66
381	65					74	60		66
382	65						70	65	67
383	70						55	55	60
384	70						74	74	73

According to the Graphical Method, the distributions
of the Sones-Harry Achievement Test scores, the Scholastic
Aptitude Test scores and the school marks are represented by
the frequency polygon or line graph. The horizontal axis
represents the scale along which the intervals of the fre-
quency distribution are laid off. The vertical axis repre-
sents the number of cases. The number of cases is plotted
by locating points above the appropriate mid points of the
intervals on the base line, until all scores have been
located and the points are then connected.

The frequency polygons obtained do not follow exactly
the normal probability curve. The normal probability curve
is a bell-shaped curve of almost perfect bilateral symmetry
with the greatest concentration in the center, and the
scores falling away by corresponding decrements above and
below the central point. Such a curve may be said to repre-
sent the relative frequency of occurrence of various com-
binations of a very large number of equal, similar and in-
dependent factors, when the chances of the occurrence or
non-occurrence of each factor is the same. The normal curve
is often called the normal probability curve because it
gives the theoretical probabilities of the occurrence of
chance phenomena. It is also called the normal frequency
curve, because frequency distributions of actual data obtained

from the measurement of many variable facts are normal.

Figures 1 - 4 have undergone the process of "smoothing". Usually a frequency polygon, plotted with a limited number of cases is somewhat irregular. The smoothness of the polygon increases with an increase in the number of cases and the size of the interval, other things being equal. After a frequency polygon has been plotted, it may be "smoothed" in order to show what it would be like with a larger number of cases. The method of "smoothing" employed in this study is used by L. L. Thurstone.[12] In Figure 1 the frequency of 1 at point A is smoothed by adding twice the frequency at A (2 x 1 = 2) and the adjacent frequencies (2 + 4). This gives a total of 8 which is divided by 4 to get the balanced frequency of 2. In Figures 1 - 3, the observed frequencies of the original data are indicated by small circles connected by dotted lines in red ink so that the reader may use his own judgment as to the extent to which the original data have been smoothed.

Figure 1 shows the distribution of the Scholastic Aptitude Test scores of 384 pupils. This curve approximates the normal distribution curve fairly well. The measures are concentrated rather closely around the center and taper off from the center fairly evenly to the right and left, al-

FIGURE 1

DISTRIBUTION OF SCHOLASTIC APTITUDE TEST SCORES
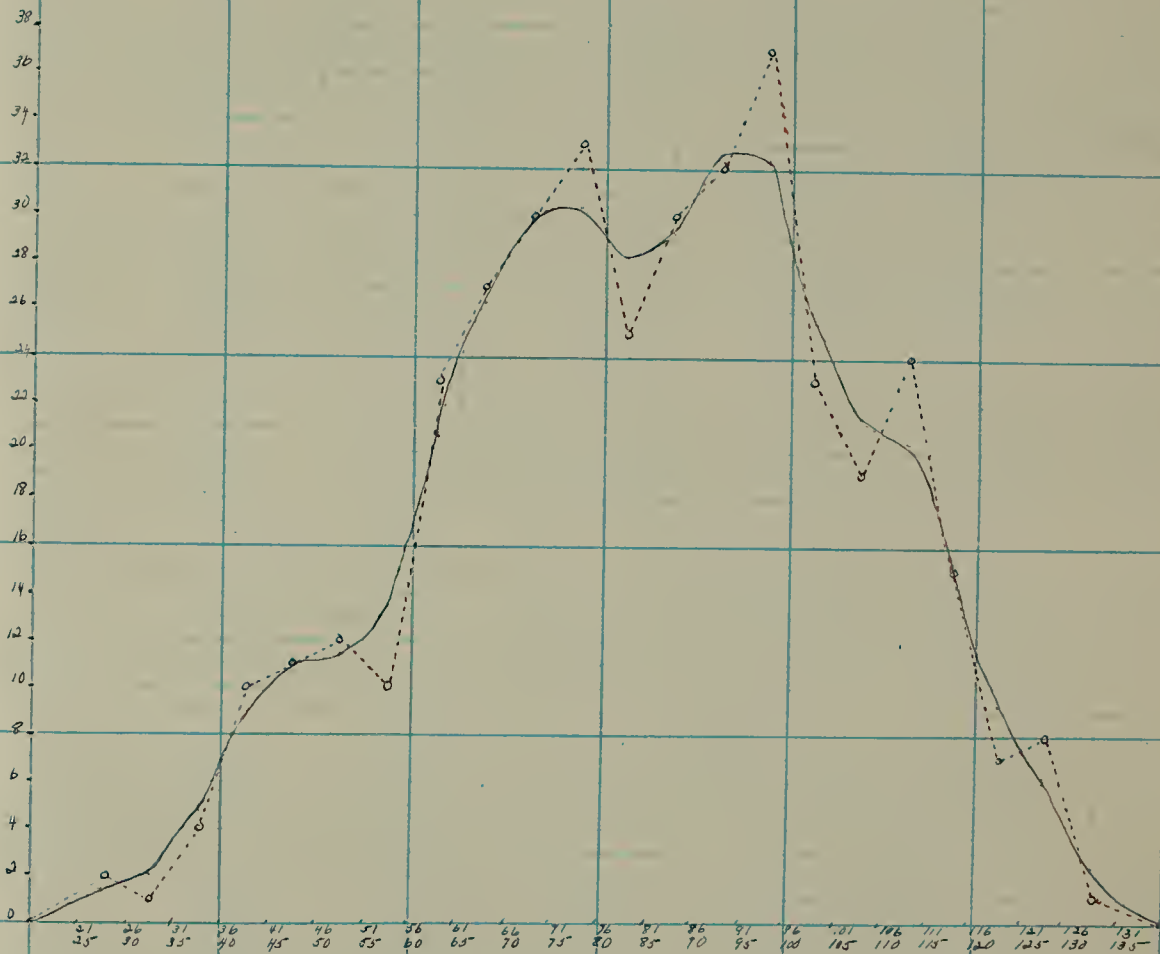
o----o----o — OBSERVED FREQUENCIES OF ORIGINAL DATA

(FREQUENCY POLYGON HAS BEEN SMOOTHED ACCORDING TO THURSTONE)

FIGURE 2

DISTRIBUTION OF SONES HARRY ACHIEVEMENT TEST SCORES
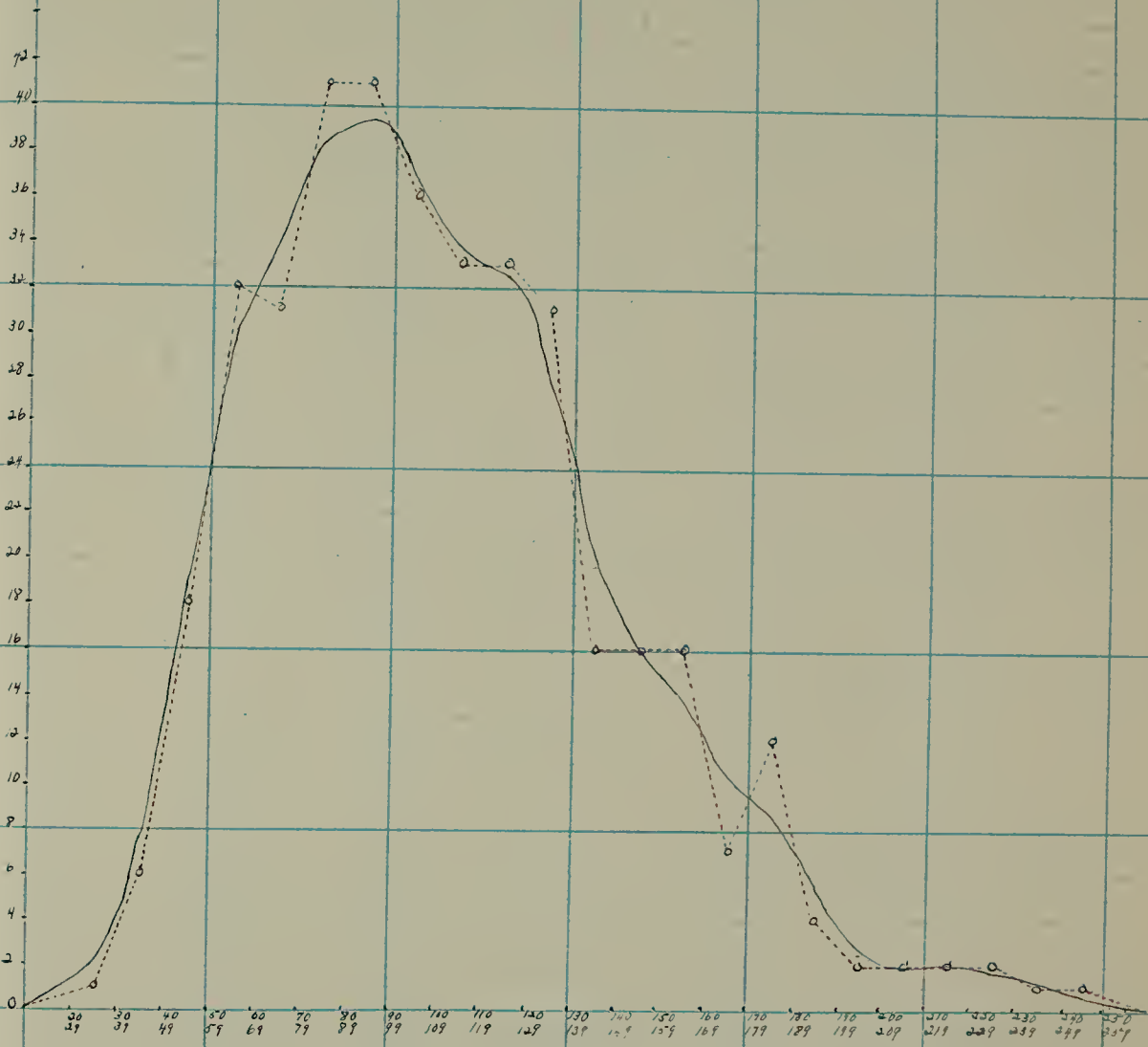
o---o---o- OBSERVED FREQUENCIES OF ORIGINAL DATA

(FREQUENCY POLYGON HAS BEEN SMOOTHED ACCORDING TO THURSTONE)

FIGURE 3

DISTRIBUTION OF SCHOOL MARKS
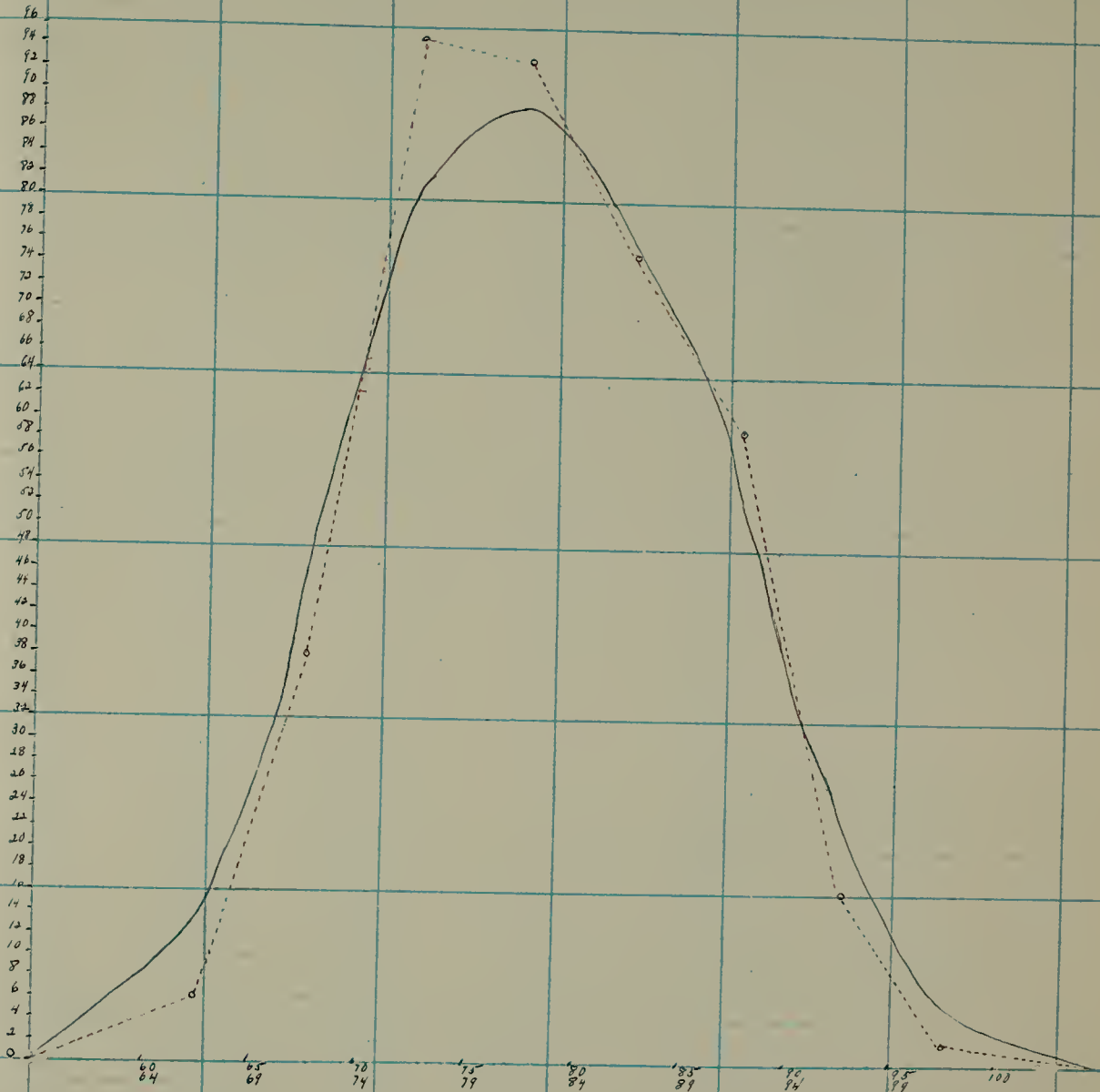
o----o----o- OBSERVED FREQUENCIES OF ORIGINAL DATA

(FREQUENCY POLYGON HAS BEEN SMOOTHED ACCORDING TO THURSTONE)

FIGURE 4

COMPOSITE OF FIGURES 1-3
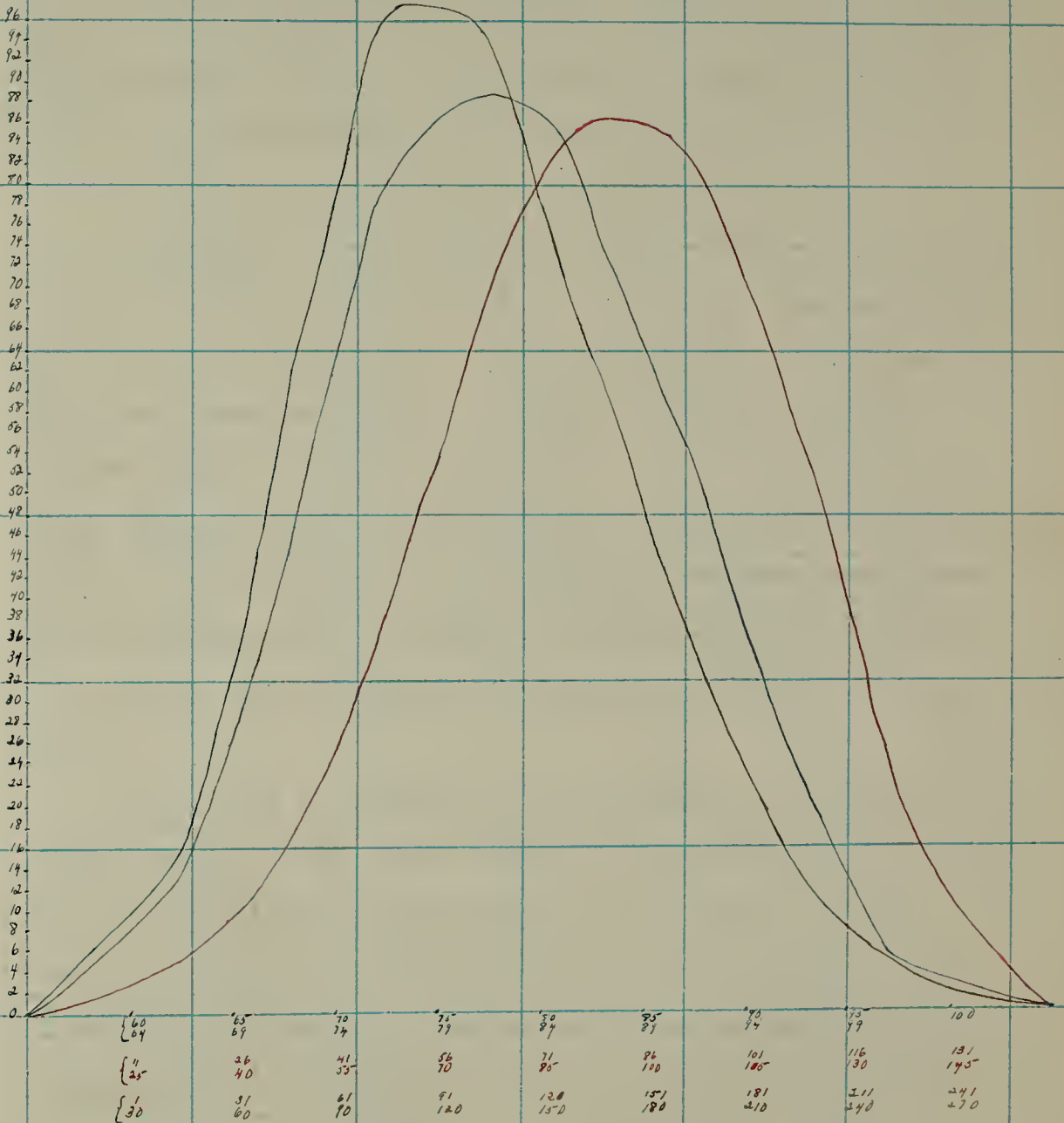
DISTRIBUTION OF SCHOLASTIC APTITUDE TEST SCORES

DISTRIBUTION OF SCHOOL MARKS

DISTRIBUTION OF SONES HARRY ACHIEVEMENT TEST SCORES

though there is a slight degree of negative "skewness",
which indicates a piling up of scores toward the right side
of the scale. This does not necessarily mean that the test
is valid, but simply that it conforms to the law of nature.
Any unselected group, if large enough, (Rugg[9] places the
minimum at 500) should give a normal distribution curve,
unless there is a weakness at some point.

The distribution of the Achievement scores of 384
pupils is indicated by Figure 2. This curve is asymmetrical
or "skewed" considerably to the right--i.e., it possesses
positive "skewness", which indicates a piling up of the
scores toward the left side of the scale. This may indi-
cate that the test is too difficult for the group, as too
hard a test excludes from the operation factors which make
for the extension of the curve at the upper end. It must
be admitted that "skewness" indicates some type of weak-
ness.

By a study of Figure 3 it is possible to note the
distribution of the school marks of the 384 pupils. This
curve is slightly asymmetrical, and possesses a slight
amount of positive "skewness", or piling up of the scores
toward the left side of the scale. This condition may be
explained by the fact that there is a tendency today for
a large majority of pupils in the public high school to
strive to obtain a passing mark only. The passing mark

in the Holyoke High School is 70. Consequently, there
should naturally be a piling up of scores between 70 and
79, which results in positive "skewness". Table III shows
that 48.96% of the group received C (70-79) and 11.46%
received a failing grade (below 70), making a total of
60.42% who received a grade below 80.

Figure 4 represents the distribution of the school
marks, the Scholastic Aptitude Test scores and the Achieve-
ment Test scores at the same time. Intervals of fifteen
points were taken for the Scholastic Aptitude Test scores
and intervals of thirty points for the Achievement Test
scores so that these scores and the school marks spread
over comparatively the same limits.

Tables III-V show the frequency distribution of the
Scholastic Aptitude Test scores, the Achievement Test
scores and the school marks of the 384 students. Figures
1-4 by representing this material graphically make it more
comprehensible.

By an examination of Table III it can be seen that
more pupils received Scholastic Aptitude Test scores between
91-95 than between any other five point interval. In the
West Springfield High School more pupils received Scholas-
tic Aptitude Test scores between 66-70 in the tenth grade
and 46-50 in the ninth grade than between any other five

TABLE III

Distribution of Scholastic Aptitude Test Scores
of 384 Pupils in the Holyoke Senior High School
(Sophomore Year or 10th Grade). These scores
are grouped in five-point divisions.

Test Scores	Number of Students
126 - 130	1
121 - 125	8
116 - 120	7
111 - 115	15
106 - 110	24
101 - 105	19
96 - 100	23
91 - 95	37
86 - 90	32
81 - 85	30
76 - 80	25
71 - 75	33
66 - 70	30
61 - 65	27
56 - 60	23
51 - 55	10
46 - 50	12
41 - 45	11
36 - 40	10

TABLE III (Cont.)

31 - 35	4
26 - 30	1
21 - 25	2
	384
Median Score	81.67

TABLE IV

Distributions of Sones-Harry Achievement Test
Scores of 384 Pupils in the Holyoke Junior
High School (Junior III or 9th Grade). The
test scores are grouped in ten-point divisions.

Test Scores	Number of Students
240 - 249	1
230 - 239	1
220 - 229	2
210 - 219	2
200 - 209	2
190 - 199	2
180 - 189	4
170 - 179	12
160 - 169	7
150 - 159	16
140 - 149	16
130 - 139	16
120 - 129	31
110 - 119	33
100 - 109	33
90 - 99	36
80 - 89	41
70 - 79	41
60 - 69	31
50 - 59	32

TABLE IV (Cont.)

40 - 49	18
30 - 39	6
20 - 29	1
	384
Median Score	96.11

TABLE V

Distribution of School Marks of 384 Pupils at the End of the Sophomore Year (10th Grade). These scores are grouped in five-point division.

School Marks	Number of Students
100	
95 - 99	2
90 - 94	16
85 - 89	59
80 - 84	75
75 - 79	93
70 - 74	95
65 - 69	38
60 - 64	6
	384
Median Score	77.84

point interval.

Table III also shows that the median score is 81.67.
It is interesting to note that in the West Springfield
High School the median score in the tenth grade is 70.8
and in the ninth grade 56.5, both scores being consider-
ably lower than the median for the Holyoke High School.
The fact that the median for the Holyoke High School
group is higher than that for both the ninth grade and
the tenth grade of the West Springfield High School does
not necessarily mean that the Holyoke High School group
is superior to the other groups. However, the Holyoke
High School group seems to be superior to the West Spring-
field High School groups, as the range for the Holyoke
group extends from 21-126 with the mode (the score occur-
ring the greatest number of times) lying between 91-95,
whereas the range for the West Springfield group extends
from 21-120 with the mode for the ninth grade lying be-
tween 46-50 and for the tenth grade between 66-70.

A study of Table IV shows that more pupils received
Sones-Harry Achievement Test Scores between 70-79 and
80-89 than between any other ten point interval.

Table V indicates that eighteen pupils received A
(90-99) and one hundred thirty-four received B (80-89),
while one hundred eighty-eight or 48.96% of the group

received C (70-79). Forty-four pupils or 11.46% of the group received a failing grade (below 70).

It is interesting to note that in the West Springfield High School the median score for the tenth grade is 74.9 and that of the ninth grade 76.8, both medians being lower than that of the Holyoke High School students (77.84).

The outstanding point to be noted in a general survey of this graphical method is that Figures 1-4 and Tables III-V indicate that the Scholastic Aptitude Test scores approximate the normal distribution curve more closely than the Achievement Test scores.

It must be noted, however, that graphs indicate only a very general relationship between two sets of data and that other statistical methods must be employed in order to show more specific relationships.

Incidentally, Mr. McDonnell, in his study, did not find by the graphical method enough evidence to say that the Scholastic Aptitude Test is significantly better than the Terman A Intelligence Test. However, in this study, it seems possible to state that the graphical method indicates that the Scholastic Aptitude scores show a more normal distribution than the Sones-Harry Achievement Test scores.

The coefficient of correlation method is used to

further clarify this study. In calculating the coefficient of correlation the Pearsonian Product-Moment formula is used as follows:

$$r = \frac{\frac{\Sigma x'y'}{N} - Cx\,Cy}{\sigma_x\,\sigma_y}$$

where Σ is equal to "the sum of", x is the deviation of any score from the mean of one group, while y is the deviation from the mean in the other group, C_x is the correction on the x axis, C_y is the correction on the y axis, N is the number of cases, σ_x is the standard deviation of one group and σ_y is the standard deviation in the other group. The formula is named after Professor Karl Pearson who devised it. The method of using it is taken from H.E.Garrett[1]. The coefficient of correlation or "r" is an index denoting the relationship existing between two paired arrays.

Perfect relationship may be expressed by the coefficient of 1.00. For example, if one hundred men take exactly the same arrangement in two tests so that the man who ranks first in one test ranks first in the other, and the man who ranks second in the first test ranks second in the other, and this type of correspondence continues through the list, the correlation is perfect, because the relative position of each man is exactly the same in one test as in the other.

Chance relationship may be expressed by the coefficient, 0. H. E. Garrett[2] gives an example of this when he compares the scores of one hundred college seniors on the Army Alpha Test with the scores of the same individuals on a tapping test. If the group is divided into three equal parts, the average Alpha score of the upper one-third is 190, and the average tapping rate, 184; the average Alpha score of the middle third is 175 with an average tapping rate of 186; and the average Alpha score of the lowest one-third is 160 with an average tapping rate of 185. Since the tapping rate is almost identical in all three groups, it is impossible to draw any conclusion from a man's tapping rate alone as regards his probable score on the Alpha test. There is theoretically little or no correspondence in the degree or amount of capacity possessed by a given individual in the traits measured by the two tests, and so the coefficient of correlation is zero, which indicates that chance correlation is present.

Relationship may also be negative as well as positive. Such a relation exists when a large degree of one ability is associated with a small degree of another. When this inverse relationship is perfect, r equals -1.00. Garrett illustrates this relationship with the following example. If, in a group of twenty-five boys, the boy standing highest

in Latin ranks lowest in Shop Work; the boy standing
second in Latin stands next to the bottom in Shop Work;
and any boy is found to stand exactly the same distance
from the top of the group in Latin as he stands from the
bottom of the group in Shop Work, the correspondence is
perfect, but the relation is inverse, and r equals -1.00.

Harold O. Rugg[10] states that a "high" correlation is
one in which r is about .60 to .70. A "very high" corre-
lation is one in which r is in the neighborhood of .80 or
.90. An r of .40 to .55 indicates a "marked" correlation.
A "low" correlation is one in which r equals about .20 to
.35. When r is below .15 or .20, there is no significant
degree of relationship.

The reliability of the coefficient of correlation is
impaired by the fact that a general relationship is being
determined on the basis of a sample. It is necessary to
make allowance for the possibility of the sample not being
completely representative of the total, even though it was
chosen in a random manner. According to Jordan[5], the
reliability of the coefficient depends upon (1) the size
of the coefficient and (2) the number of cases. The formula
for the probable error of the coefficient of correlation is

$$P.E._r = \frac{.6745 \ (1-r^2)}{\sqrt{N}} \ .$$

The probable error gives the limits within which the subsequent coefficients are likely to fall. If r is large, the probable error decreases; if small, it increases; if r is 1.00, the P.E. is 0. The interpretation of the probable error may be illustrated by the following example. If r equals. 758 with P.E. of ± .054, the chances are even that on computing the coefficient with another group of individuals that the coefficient would fall within the range of .704 to .812. The chances are 4.5 to 1 that subsequent coefficients would fall within 2 P.E.'s; the chances are 21 to 1 that these coefficients would fall within a range of 3 P.E.'s and 121 to 1 that they would fall within 4 P.E.'s. This example is taken from Jordan[5]. The coefficient of correlation should be at least three times and preferably four times the size of the probable error in order to be accepted as reliable.

The method of correlation is one of the most widely used statistical devices. In education it has been used considerably for the purpose of prognosis, i.e., to determine whether certain tests are capable of predicting success in various fields. It has also been used to determine the reliability of a test by showing to what extent a test gives the same results on two successive applications to the same

group of children.

Table VI shows the Pearsonian method of calculating coefficients of correlation used in this study.

A study of Table VII shows that the coefficient of correlation between the Scholastic Aptitude Test scores and school marks (.58 ± .023) is six points higher than the coefficient of correlation between the Achievement Test scores and school marks (.52 ± .03). Both of these coefficients show a "marked" correlation according to Rugg[10], and are far greater than four times the probable error, which is the standard set by Jordan[5] in order that the coefficient may be accepted as reliable. This seems to indicate that the Scholastic Aptitude Test is more valid than the Achievement Test for predicting school success. The coefficient of correlation between the Scholastic Aptitude Test and the Achievement Test scores (.66 ± .02) indicates that there is a high degree of correlation between the two tests. According to Rugg a "high correlation" is one in which r is about .60 to .70. This coefficient is also far greater than four times its probable error. This result suggests that there is a certain amount of similarity between the two tests, i.e., that they both measure the same factors to a certain extent. However, the problem of this study is to determine which test measures the more accurately those factors, a

TABLE VI

Correlation Between Scholastic Aptitude Test Scores and School Marks of 384 Pupils (Pearsonian Product-Moment Method)[2]

School Marks - x

Scholastic Aptitude Test Scores - y

y	60–62	63–65	66–68	69–71	72–74	75–77	78–80	81–83	84–86	87–89	90–92	93–95	f	d	fd	fd²	Σx
120–129													11	5	55	275	13
110–119													23	4	92	368	16
100–109													43	3	129	387	12
90–99													62	2	124	248	5
80–89													62	1	62	62	
70–79													61		(462)		
60–69													55	−1	−55	55	8
50–59													30	−2	−60	120	9
40–49													23	−3	−69	207	18
30–39													11	−4	−44	176	14
20–29													3	−5	−15	75	6
f	1	10	20	44	63	50	61	48	36	33	15	5	(384)	(−243)	(1973)	(104)	
d	−6	−5	−4	−3	−2	−1		1	2	3	4	5					
fd	−6	−50	−80	−132	−126	−50	(444)	48	72	99	60	15	(294)				
fd²	36	250	320	396	252	50			48	144	297	240	75	(2108)			

TABLE VI (Cont.)

$$Cx = \frac{264-444}{384} = -.39$$

$$Cx^2 = .1521$$

$$Cy = \frac{462-243}{384} = .57$$

$$Cy^2 = .3249$$

$$CxCy = -.2223$$

$$\sigma x = \sqrt{\frac{2168}{384}-.1521} = 2.31$$

$$\sigma y = \sqrt{\frac{1975}{384}-.3249} = 2.19$$

$$r = \frac{\frac{1043}{384} - (-.2223)}{2.31 \times 2.19} = .58$$

$$P.E. = \frac{.6745\ (1-58^2)}{\sqrt{384}} = .023$$

$$r = .58 \pm .023$$

TABLE VII

Comparison of Correlations of Scores of
Scholastic Aptitude Test and Sones-Harry
Achievement Test and Comparison of These
With School Marks of 584 Pupils

Achievement Test Scores
vs. School Marks   .52 ± .03

Scholastic Aptitude Test Scores
vs. School Marks   .58 ± .023

Scholastic Aptitude Test Scores
vs. Achievement Test Scores   .66 ± .02

knowledge of which is necessary for predicting school success.

It can be seen from Table VIII that the coefficients between the Scholastic Aptitude Test total scores and each section of the test are fairly constant, there being a difference of only twelve points between the lowest and the highest coefficient. These coefficients are all high, as they also exceed .60, and they are all far greater than four times their probable errors. This would seem to indicate that no section of the test shows any great weakness as compared with the other sections, and that the test is of uniform difficulty throughout.

An examination of Table IX shows coefficients of correlation much lower than those in Table VII (see page 104). This difference is due to the fact that in Table IX parts of each test are being compared with parts of the total school average, and consequently the relationship would have to be lower. Furthermore, in the science comparison only 70 students are considered out of the total of 384, as only 70 students in this group were studying science during 1931-1932 in the Holyoke High School. The coefficient of correlation between school marks in science and the Science Section of the Achievement Test (.43 ± .07) which is marked is seventeen points higher than that between school marks in science and the Science Section of the Aptitude Test (26 ±

TABLE VIII

Comparison of Correlations Between the
Scholastic Aptitude Test Total Scores
and Scores of Sections of the Scholastic
Aptitude Test of 384 Pupils

Scholastic Aptitude Test Scores
   vs. Section I (Science)   .74 $\pm$ .02

Scholastic Aptitude Test Scores
   vs. Section II (History)   .68 $\pm$ .02

Scholastic Aptitude Test Scores
   vs. Section III (Artificial
   Language)   .67 $\pm$ .019

Scholastic Aptitude Test Scores
   vs. Section IV (Geography)   .62 $\pm$ .021

Scholastic Aptitude Test Scores
   vs. Section V (Reading Compre-
   hension)   .68 $\pm$ .019

TABLE IX

Comparison of Correlations Between (1) Science
Section of Aptitude Test and School Marks in
Science and Science Section of Achievement Test
and School Marks in Science of 70 Pupils and
(2) Reading Comprehension Section of Aptitude
Test and School Marks in English and English
Section of Achievement Test and School Marks in
English of 384 Pupils.

Science Section of Aptitude Test
   vs. School Marks in Science   .26 ± .005

Science Section of Achievement Test
   vs. School Marks in Science   .43 ± .07

Reading Comprehension Section of
Aptitude Test
   vs. School Marks in English   .37 ± .03

English Section of Achievement Test
   vs. School Marks in English   .53 ± .024

.005) which is low, but significant. However, this may be explained by the fact that the Science Section of the Scholastic Aptitude Test is limited to one branch of science-- Biology, whereas the Science Sections of the Achievement Test consists of material taken from Chemistry, Physics, Biology and the history of science in general. Thus the student is given an opportunity to display his ability over a wider range in the Achievement Test than in the Aptitude Test, and it is upon this wider range that his school marks in science are based.

The coefficient of correlation between school marks in English and the English Section of the Achievement Test (.53 ± .024) which is marked is sixteen points higher than that between school marks in English and the Reading Comprehension Section of the Aptitude Test (.37 ± .03) which is low, but significant. This may be explained by the fact that the English Section of the Achievement Test is composed of several sections, such as Correct and Faulty Use of English, Word Meaning, Abbreviations and Prefixes, etc. in addition to a Reading Comprehension Section. Again, the student is given an opportunity to display his ability over a wider range in the Achievement Test than in the Aptitude Test. School marks in English are based upon this wider range of subject matter and consequently a higher correlation should exist between school marks in English and the English

Section of the Achievement Test than between school marks in English and the Reading Comprehension Section of the Aptitude Test.

The coefficient of correlation between (1) the language section of the Scholastic Aptitude Test and school marks in languages of 246 students and (2) the geography section of the Scholastic Aptitude Test and the school marks in Commercial Geography of 203 students is indicated as follows:

1. Language Section of Aptitude Test
    vs. School Marks in Languages   .35 $\pm$ .04

2. Geography Section of Aptitude Test
    vs. School Marks in Commercial
    Geography   .40 $\pm$ .04

A correlation of (.35 $\pm$ .04) between the language section of the Scholastic Aptitude Test and school marks in languages is significant according to Rugg. The correlation between the geography section of the Aptitude Test and School Marks in Commercial Geography (.40 $\pm$ .04) is marked. It was impossible to make this same type of comparison with the Achievement Test because the Achievement Test contains no language section and no separate geography section.

It is indicated by Table X that practically the same correlation exists between the Achievement Test scores and the Scholastic Aptitude Test scores of the Holyoke High

TABLE X

Comparison of Correlations of (1) Sones-Harry
Achievement Test Scores, Scholastic Aptitude
Test Scores, and School Marks of 384 Pupils in
the Holyoke High School and (2) Terman Intelli-
gence Test Scores, Scholastic Aptitude Test Scores
and School Marks of 115 Pupils in the Ninth and
Tenth Grades of the West Springfield High School

Holyoke High School

Achievement Test Scores
  vs. Scholastic Aptitude Test Scores $.66 \pm .02$

Achievement Test Scores
  vs. School Marks $.52 \pm .03$

Scholastic Aptitude Test Scores
  vs. School Marks $.58 \pm .023$

West Springfield High School

	Ninth Grade	Tenth Grade
Intelligence Test Scores vs. Scholastic Aptitude Test Scores	$.67 \pm .034$	$.67 \pm .034$
Intelligence Test Scores vs. School Marks	$.46 \pm .049$	$.463 \pm .049$
Scholastic Aptitude Test Scores vs. School Marks	$.60 \pm .04$	$.467 \pm .049$

School students (.66 ± .02) as between the Intelligence
Test scores and Scholastic Aptitude Test scores of the
West Springfield High School students (.67 ± .034). The
correlation of the Achievement Test scores and the school
marks of the Holyoke High School students (.52 ± .03) is
six points higher than that of the Intelligence Test Scores
and school marks (.46 ± .049) of the ninth grade students
and five and seven-tenths higher than that of the Intelli-
gence Test scores and school marks (.463 ± .049) of the
tenth grade students of the West Springfield High School.
The correlation of the Scholastic Aptitude Test scores of
the Holyoke High School students with school marks (.58 ±
.023) is two points lower than that of the Scholastic Apti-
tude Test scores with the school marks of the ninth grade
students and eleven and three-tenths points higher than
that of the tenth grade students of the West Springfield
High School.

A study of Table XI shows that there is a high corre-
lation between science and geography (.61); a marked corre-
lation between science and history (.44), science and read-
ing comprehension (.46), history and geography (.43), histo-
ry and reading comprehension (.41), geography and reading
comprehension (.41); and a low correlation between science
and artificial language (.32), history and artificial

TABLE XI

Intercorrelations of the Five Parts of the Scholastic Aptitude Test for 384 Pupils

Science Section vs. History Section	$.44 \pm .027$
Science Section vs. Artificial Language Section	$.32 \pm .038$
Science Section vs. Geography Section	$.61 \pm .021$
Science Section vs. Reading Comprehension Section	$.46 \pm .027$
History Section vs. Artificial Language Section	$.22 \pm .032$
History Section vs. Geography Section	$.43 \pm .028$
History Section vs. Reading Comprehension Section	$.41 \pm .028$
Artificial Language Section vs. Geography Section	$.35 \pm .031$
Artificial Language Section vs. Reading Comprehension Section	$.38 \pm .029$
Geography Section vs. Reading Comprehension Section	$.41 \pm .029$

language (.22), artificial language and geography (.35), artificial language and reading comprehension (.38).

An important consideration which C. L. Hull[3] states should be observed in choosing tests to make up a battery is that they should correlate as low with each other as possible. A high correlation between two tests in a battery indicates that the same trait is being measured by both tests, and a low correlation between two tests indicates that each test is measuring a different trait.

The results in Table XI show that the science and geography sections of the Scholastic Aptitude Test measure the same trait to a high degree. There is a measuring of the same trait to a marked degree by the following sections-- science and history, science and reading comprehension, history and geography, history and reading comprehension, and geography and reading comprehension. The following sections show a measuring of different traits--science and artificial language, artificial language and geography, and artificial language and reading comprehension.

Table XII shows that in the Sones-Harry Achievement Test there is a high correlation between language-literature and social studies (.659), between mathematics and science (.684); a marked correlation between language-literature and mathematics (.458), language-literature and science (.443), mathematics and social studies (.526), science and social studies (.583). There are no two sec-

TABLE XII

Intercorrelations of the Four Parts of the Sones-Harry
High School Achievement Test for 779 Graduating Seniors
of the Collinwood High School, Cleveland, Ohio[4]

Language-Literature vs. Mathematics	.458
Language-Literature vs. Science	.443
Language-Literature vs. Social Studies	.659
Mathematics vs. Science	.684
Mathematics vs. Social Studies	.526
Science vs. Social Studies	.583

Note: PE_r ranges from .013 to .019

tions which show a low correlation.

If Tables XI and XII are compared, it will be seen that the Scholastic Aptitude Test is superior to the Sones-Harry Achievement Test in that there is less measuring of the same trait by the various parts of the test.

Miss Hutcheon in her thesis does not seem to take into consideration the fact that a low correlation between the parts of a test is a requisite of a good test when she makes the following statement regarding her findings. "There is much indication of relationships between ability in mathematics and natural science and between ability in language and social studies as measured by the Sones-Harry Test. The relationships between mathematics and social studies and science and social studies are both higher than either with language-literature. Little or no relationship exists between language-literature and mathematics."

In the first place, according to Rugg[10], the correlation between language-literature and mathematics is marked (.458). Furthermore, granted that the correlations in Table XII justify the statement that "there is much indication of relationship between ability in mathematics and natural science and between ability in language and social studies as measured by the Sones-Harry Test", nevertheless it is not to the credit of the test that such relationships are indicated by the scores on its various parts.

The following quotation from C. L. Hull[3] shows clearly the views of trained psychologists on this subject. "The folly of choosing for a battery two tests which correlate highly with each other is evident upon reflection. It appears obvious that in so far as tests correlate with each other they are testing the same functions. When this corre-lation approaches the maximum, the two tests are apparently measuring the same thing, in which case to give both tests would be equivalent to giving the same test twice. If we assume that the test measured its function with reasonable accuracy the first time, it would be a simple waste of labor to measure it again by giving a second test almost identical in nature."

Table XIII shows the results obtained by dividing the 384 students into two groups--one of 218 students and the other of 166 students. The first group (218) is composed of those pupils who were graduated from the Joseph Metcalf and Highland Junior High Schools, both of which are located in the upper part of the city of Holyoke. The second group (166) is composed of those pupils who were graduated from the Morgan, West Street and Lawrence Junior High Schools which are located in the lower part of the city. The pupils of the first group come from homes which offer a type of environment far superior to that presented in the homes of the students of the second group. Naturally, there are

TABLE XIII

The Correlations of Scholastic Aptitude Test Scores
and Sones-Harry Achievement Test Scores With School
Marks (1) of 218 Graduates of the Joseph Metcalf
and Highland Junior High Schools of Holyoke, Massa-
chusetts, as Compared with the Same Correlations
(2) for 166 Graduates of the Morgan, West Street and
Lawrence Junior High Schools

Joseph Metcalf and Highland Junior High Schools

Achievement Test Scores
vs. School Marks $.53 \pm .032$

Aptitude Test Scores
vs. School Marks $.64 \pm .027$

Morgan, West Street and Lawrence Junior High Schools

Achievement Test Scores
vs. School Marks $.50 \pm .039$

Aptitude Test Scores
vs. School Marks $.60 \pm .033$

exceptional cases in both groups. The division into these two groups was made with the hope that some interesting results might follow.

It will be noted that Group I shows a correlation between the Achievement Test scores and school marks (.53 $\pm$ .032), that is, three points higher than that between the Achievement Test scores and school marks for Group II (.50 $\pm$ .039). The correlation between the Scholastic Aptitude Test scores and school marks for Group I (.64 $\pm$ .027) is four points higher than the correlation between the Scholastic Aptitude Test scores and school marks for Group II (.60 $\pm$ .033). These results might indicate that the pupils who have had the advantage of a superior environment use to better advantage what ability they possess than do those pupils who have come from the poorer type of home.

Table XIII shows that for Group I the coefficient of correlation between the Scholastic Aptitude Test scores and school marks (.64 $\pm$ .027) is nine points higher than the coefficient of correlation between the Achievement Test scores and school marks (.53 $\pm$ .032). Group II shows the same type of difference between the two correlations, that is, the coefficient of correlation between the Scholastic Aptitude Test scores and school marks (.60 $\pm$ .033) is ten points higher than the coefficient of correlation between

the Achievement Test scores and school marks (.50 ± .039).
It will be noted that according to Rugg[10] both coefficients
of correlation between the Scholastic Aptitude Test scores
and school marks are high, whereas both coefficients of corre-
lation between the Achievement Test scores and school marks
are marked. In all cases, the coefficient is much more than
four times the probable error.

These results seem to indicate that the Scholastic Apti-
tude Test is more valid than the Achievement Test for pre-
dicting school success.

Table XIV shows that the composite correlation of the
Scholastic Aptitude Test total scores and the Achievement
Test total scores with school marks (.55 ± .024) is three
points higher than the correlation between the Achievement
Test total scores and school marks (.52 ± .03) and three
points lower than the correlation between the Scholastic
Aptitude Test total scores and school marks (.58 ± .023).
The composite correlation was worked out by correlating the
average of the Scholastic Aptitude Test score and the Achieve-
ment Test score for each pupil with the school marks. The
fact that the composite correlation is higher than that
between the Achievement Test scores and school marks and
lower than that between the Scholastic Aptitude Test scores
and school marks seems to indicate that it would be advisable
to eliminate the Achievement Test when administering tests

TABLE XIV

Comparison of (1) Composite Correlation of
Scholastic Aptitude Test Total Scores and
Achievement Test Total Scores with School
Marks, (2) Correlation Between Scholastic
Aptitude Test Total Scores and School Marks
and (3) Correlation Between Achievement Test
Scores and School Marks

Scholastic Aptitude and Achievement Test Scores
  vs. School Marks

$.55 \pm .024$

Scholastic Aptitude Test Scores
  vs. School Marks

$.58 \pm .023$

Achievement Test Scores
  vs. School Marks

$.52 \pm .03$

for the purpose of predicting school success.

The following seem to be the outstanding points of summary in the discussion of the correlation method:

1. The correlation between the Achievement Test scores and the Scholastic Aptitude Test scores is high (.66 ± .02).

2. The correlation between the Scholastic Aptitude Test scores and school marks (.58 ± .023) is six points higher than that between the Achievement Test scores and school marks (.52 ± .03). This would seem to indicate that the Scholastic Aptitude Test is more valid than the Achievement Test.

3. In the West Springfield High School study a correlation of .67 was found between the Terman Intelligence Test scores and the Scholastic Aptitude Test scores for both the ninth and tenth grades, only one point higher than that found between the Sones-Harry Achievement Test scores and the Scholastic Aptitude Test scores of the Holyoke High School pupils.

4. In the tenth grade of the West Springfield High School the correlation between the Terman Intelligence Test scores and the school marks is .463 ± .049 and between the Scholastic Aptitude Test scores and school marks .467 ±.049. In the ninth grade, however, the coefficient of correlation between the Scholastic Aptitude Test scores and school marks (.60 ± .04) is fourteen points higher than that between the

Terman Intelligence Test scores and school marks (.46 ± .049).
The conclusion drawn in the tenth grade is that one test is
just as reliable as the other, but in the ninth grade the
Scholastic Aptitude Test is more reliable than the Terman
Intelligence Test.

5. The study of the intercorrelations of the five parts
of the Scholastic Aptitude Test as compared with the study
of the intercorrelations of the four parts of the Achieve-
ment Test show that the Scholastic Aptitude Test is superior
to the Achievement Test in that there is less measuring of
the same trait by the various parts of the test; i.e., less
"over-lapping".

6. The division of the 384 pupils into two groups based
upon home environment shows interesting results. Group I,
composed of 218 pupils who were graduated from the Joseph
Metcalf and Highland Junior High Schools of Holyoke, Massa-
chusetts, have had for the most part the advantages of a
home environment far superior to that afforded to Group II,
composed of 166 pupils, who graduated from the Morgan, West
Street and Lawrence Junior High Schools. The pupils of
Group I show that they use to better advantage what ability
they possess than do the pupils of Group II. The coef-
ficients of correlation between the Scholastic Aptitude Test
scores and school marks (Group I .64 and Group II .60) are
higher than the coefficients of correlation between the

Achievement Test scores and school marks (Group I .53 and
Group II .50).

7. The composite correlation of the Scholastic Apti-
tude Test total scores and the Achievement Test total scores
with school marks (.55 ± .024) is three points higher than
the correlation between the Achievement Test total scores
and school marks (.52 ± .03) and three points lower than
the correlation between the Scholastic Aptitude Test total
scores and school marks (.58 ± .023). This result might
indicate that it would be advisable to eliminate the Achieve-
ment Test when administering tests for the purpose of pre-
dicting school success.

8. In the Holyoke High School study the Scholastic
Aptitude Test is more valid than the Sones-Harry Achieve-
ment Test.

The quartile placement method is the final type used in
this study. The pupils are arranged in quartiles in accord-
ance with their scores on the test to be considered. Table
XV shows the range of quartiles for (1) the Scholastic Apti-
tude Test Scores (2) the Sones-Harry Achievement Test Scores
and (3) the School Marks. The first quartile is composed of
the best students and the fourth quartile is composed of the
poorest students.

The percentage of perfect correspondence, known as the

TABLE XV

Range of Quartiles Used in the Scholastic
Aptitude Test Scores, Sones-Harry Achieve-
ment Test Scores and School Marks of 384
Pupils

Scholastic Aptitude Test Scores

First quartile (above 96.22)
Second quartile (82 - 96.22)
Third quartile (66 - 81.67)
Fourth quartile (up thru 65.26)

Sones-Harry Achievement Test Scores

First quartile (above 125.16)
Second quartile (97 - 125.16)
Third quartile (72 - 96.11)
Fourth quartile (up thru 71.95)

School Marks

First quartile (above 83.73)
Second quartile (78 - 83.73)
Third quartile (73 - 77.85)
Fourth quartile (up thru 72.74)

coefficient of correspondence, and the total points of mis-
placement are determined in order to find how the two groups
of scores compare and to check the coefficient of correlation
method. Perfect correspondence means that a pupil's scores
remain in the same quartile for the two tests that are being
compared. Misplacement means that the pupil's score in
one test is in a certain quartile and that in another test
his score is in a different quartile. For example, a pupil
may be in Quartile 1 in the Achievement Test and in Quartile
3 in the Scholastic Aptitude Test.

An examination of Table XVI shows that there are thirty-
eight pupils in Quartile 1 of the Achievement Test scores
who are also in Quartile 1 of the school marks. There are
forty pupils in Quartile 1 of one test and Quartile 2 of
the other, eleven pupils, who are misplaced two quartiles,
and five pupils who are misplaced three quartiles. This
gives a total misplacement of fifty-six and a point mis-
placement of seventy-seven. Point misplacement is obtained
by finding the sum of the total misplacement in each quartile.
For example, if a pupil is in Quartile 1 in one test and
moves to Quartile 2 in another, the point misplacement is
one; if he moves to Quartile 3, the point misplacement is
two.

Tables XVI - XVIII show the number of cases of perfect
correspondence and the point misplacement of three pairs of

TABLE XVI

Quartile Placement of Sones-Harry Achievement Test Scores
and School Marks of 384 Pupils

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	38	40	11	5	56	77
2	27	49	20		69	89
3	27	50	12		62	74
4	51	31	19	4	54	81
	143	170	62	9	241	321

37.24% Perfect Correspondence   321 Point Misplacement

TABLE XVII

Quartile Placement of Scholastic Aptitude Test Scores and School Marks of 384 Pupils

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	42	36	7	7	50	71
2	31	55	13		68	81
3	36	47	10		57	67
4	35	27	14	4	45	6
	164	165	44	11	220	286

42.71% Perfect Correspondence   286 Point Misplacement

TABLE XVIII

Quartile Placement of Scholastic Aptitude Test Scores
and Sones-Harry Achievement Test Scores of 384 Pupils

Quartile	Perfect Correspondence	Quartile Misplacement 1	Quartile Misplacement 2	Quartile Misplacement 3	Total Misplacement	Point Misplacement
1	55	20	17		37	54
2	39	54	6		60	66
3	26	56	11		67	78
4	68	21	10	1	32	44
	188	151	44	1	196	242

48.96% Perfect Correspondence   242 Point Misplacement

scores. Table XVI shows a comparison between the Achievement Test quartiles and the School Marks quartiles--143 cases of perfect correspondence and 321 points of misplacement. Table XVII shows a comparison between the Scholastic Aptitude Test quartiles and the School Marks quartiles--164 cases of perfect correspondence and 286 points of misplacement. Table XVIII shows a comparison between the Scholastic Aptitude Test Quartiles and the Achievement Test quartiles--188 cases of perfect correspondence and 242 points of misplacement.

Summary of Quartile Analysis.

When the Scholastic Aptitude Test scores are compared with the school marks there are 21 more cases of perfect correspondence (42.71%) and 35 points less misplacement than when the Achievement Test scores are compared with school marks (37.24%). When the Scholastic Aptitude Test scores are compared with the Achievement Test scores there is even a great degree of correspondence shown--45 more cases of perfect correspondence (48.96%) and 79 points less misplacement than when the Achievement Test scores are compared with school marks (37.24%).

These results agree with the coefficient of correlation method and make it possible to state with more certainty that there is a greater degree of correspondence between the Scho-

lastic Aptitude Test and school marks than between the
Achievement Test and school marks.

It is interesting to note that in the West Springfield
High School study the Scholastic Aptitude Test scores in the
tenth grade show 13 more cases of perfect correspondence (47%)
and 25 points less of misplacement than when the Terman In-
telligence Test scores are compared with school marks (34%).
In the ninth grade the Scholastic Aptitude Test scores com-
pared with the school marks have one percent more cases of
perfect correspondence (42%) and 7 points less misplacement
than the Terman Intelligence Test scores compared with
school marks (41%).

V SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

The problem of this study is to investigate the comparative validity of a scholastic aptitude test, which is based essentially upon ability to learn academic subject matter, and the Sones-Harry High School Achievement Test (Form B) to determine which type of test correlates the more highly with school marks, thereby making it the more valid instrument in predicting school success.

The study has included 384 records of three sets of marks each for pupils in the high school of the city of Holyoke, Massachusetts--(1) the scores received on the Sones-Harry Achievement Test which was administered in the ninth year of school, (2) the scores received on the West Springfield Scholastic Aptitude Test which was administered in the tenth year and (3) the school marks received in academic subjects studied during the tenth year.

The following statistical methods are employed for the purpose of interpreting the data--(1) graphical, (2) coefficient of correlation and (3) quartile placement.

Graphs are presented showing the distribution curve of (1) Scholastic Aptitude Test scores, (2) Achievement Test scores, (3) school marks.

The coefficients of correlation are determined for the following: (1) Achievement Test scores and school marks;

(2) Scholastic Aptitude Test scores and school marks; (3)
Scholastic Aptitude Test scores and Achievement Test scores;
(4) Scholastic Aptitude Test scores and (a) Science Section
of Aptitude Test, (b) History Section of Aptitude Test (c)
Artificial Language Section of Aptitude Test, (d) Geography
Section of Aptitude Test, (e) Reading Comprehension Section
of Aptitude Test; (5) Science Section of Aptitude Test and
school marks in science; (6) Science Section of Achievement
Test and school marks in science; (7) Reading Comprehension
Section of Aptitude Test and school marks in English; (8)
English Section of Achievement Test and school marks in
English; (9) Artificial Language Section of Aptitude Test
and school marks in language; (10) Geography Section of
Aptitude Test and school marks in Commercial Geography; (11)
intercorrelations of the five parts of the Aptitude Test;
(12) Achievement Test scores and school marks for pupils who
were graduated from the Joseph Metcalf and Highland Junior
High Schools; (13) Achievement Test scores and school marks
for pupils who were graduated from the Morgan, West Street
and Lawrence Junior High Schools; (14) Aptitude Test scores
and school marks for pupils who were graduated from the
Joseph Metcalf and Highland Junior High School; (15) Apti-
tude Test scores and school marks for pupils who were gradu-
ated from the Morgan, West Street and Lawrence Junior High

Schools; (16) Composite correlation of Scholastic Aptitude
Test total scores and Achievement Test total scores with
school marks.

In the quartile placement method the percentage of
perfect correspondence or the coefficient of correspondence
and the total points of misplacement are determined for (1)
Achievement Test scores and school marks, (2) Aptitude Test
scores and school marks, (3) Aptitude Test scores and Achieve-
ment Test scores.

Tables are presented showing (1) the rank arrangement
of the 384 students according to the total Scholastic Apti-
tude Test scores; (2) marks received in the various academic
school subjects with school average; (3) distribution of
Scholastic Aptitude Test scores; (4) distribution of Achieve-
ment Test scores; (5) distribution of school averages; (6)
an example of the Pearsonian method of correlation of the
Aptitude Test scores and school marks; (7) the fifteen corre-
lations enumerated above; (8) comparison of correlations (a)
of Achievement Test scores, Aptitude Test scores and school
marks of 384 students in the Holyoke High School and (b)
Terman Intelligence Test scores, Aptitude Test scores and
school marks of 115 students in the ninth and tenth grades
of the West Springfield High School; (9) intercorrelations
of four parts of the Achievement Test for 779 graduating

seniors of the Collinwood High School, Cleveland, Ohio,
determined by Miss Elsie M. Hutcheon in her "Statistical
Analysis of the Sones-Harry High School Achievement Test";
(10) Comparison of (a) composite correlation of Scholastic
Aptitude Test total scores and Achievement Test total scores
with school marks (b) correlation between Scholastic Apti-
tude Test total scores and school marks and (c) Correlation
between Achievement Test total scores and school marks; (11)
range of quartiles used in Aptitude Test scores, Achieve-
ment Test scores and school marks; (12) perfect correspon-
dence and point misplacement for (a) Achievement Test scores
and school marks, (b) Aptitude Test scores and school marks,
(c) Achievement Test scores and Aptitude Test scores.

The distribution curve of the 384 Scholastic Aptitude
scores shown in Figure 1 approximates the normal distribu-
tion curve fairly well. The measures are concentrated
rather closely around the center and taper off from the
center fairly evenly to the right and left although there
is a slight degree of negative "skewness", which indicates
a piling up of scores toward the right side of the scale.

The distribution curve of the 384 Achievement scores
shown in Figure 2 is asymmetrical or "skewed" considerably
to the right--i.e., it possesses positive "skewness" which

indicates a piling up of the scores toward the left end of
the scale. This may indicate that the test is too difficult
for the group. At any rate "skewness" indicates some type
of irregularity.

The distribution curve of the 384 school marks shown
in Figure 3 is slightly asymmetrical, and possesses a slight
amount of positive "skewness" or piling up of the scores
toward the left side of the scale. This condition may be
explained by the fact that there is a tendency today for
the pupils to strive for a passing mark only, and since the
passing mark in the Holyoke High School is 70, there would
naturally be a piling up of scores around that point, which
results in positive "skewness".

The distribution curves of the school marks, the Scho-
lastic Aptitude scores and the Achievement scores are shown
at the same time in Figure 4.

After an examination of Figures 1-4 it seems possible
to state that the graphical method indicates that the Scho-
lastic Aptitude Test scores show a more normal distribution
than the Sones-Harry Achievement Test scores. This would
indicate that the former is better adapted to the group.

Tables VI - XI and Tables XIII and XIV show the coef-
ficients of correlation that have been worked out in this
study. Table XII shows the intercorrelations between the

parts of the Sones-Harry Achievement Test, as worked out by Miss Elsie M. Hutcheon. Each table contains an explanation and interpretation of the results obtained.

It should be noted that the correlation between the Achievement Test scores and the Scholastic Aptitude Test scores is high (.66 ± .02), only one point lower than that obtained between the Terman Intelligence scores and Scholastic Aptitude Test scores for both the ninth and tenth grade of the West Springfield High School (.67 ± .034). These results indicate that the same traits are being measured by the Achievement and Aptitude Tests and also by the Intelligence and Aptitude Test.

It is interesting to note that the correlation between the Scholastic Aptitude Test scores and school marks (.58 ± .023) is six points higher than that between the Achievement Test scores and school marks (.52 ± .03). This result indicates the Scholastic Aptitude Test possesses greater reliability than the Achievement Test for predicting school success.

In the tenth grade of the West Springfield High School the correlation between the Terman Intelligence Test scores and school marks (.463 ± .049) is practically the same as that between the Scholastic Aptitude Test scores and school marks (.467 ± .049). In the ninth grade, however, the corre-

lation between the Scholastic Aptitude Test scores and school marks (.60 ± .04) is fourteen points higher than that between the Terman Intelligence Test scores and school marks (.46 ± .049). These results indicate that in the tenth grade one test is just as reliable as the other, but in the ninth grade the Scholastic Aptitude Test is more reliable than the Terman Intelligence Test for predicting school success.

The study of the intercorrelations of the five parts of the Scholastic Aptitude Test found in Table XI as compared with the study of the intercorrelations of the four parts of the Achievement Test found in Table XII show the following results:

Scholastic Aptitude Test

(1) <u>High</u> correlation between science and geography (.61)

(2) <u>Marked</u> correlation between

        a. science and history (.44)

        b. science and reading comprehension (.46)

        c. history and geography (.43)

        d. history and reading comprehension (.41)

        e. geography and reading comprehension (.41)

(3) <u>Low</u> correlation between

        a. science and artificial language (.32)

        b. history and artificial language (.22)

        c. geography and artificial language (.35)

    d. reading comprehension and artificial
      language (.38)

Sones-Harry Achievement Test

(1) <u>High</u> correlation between

    a. language-literature and social studies (.659)

    b. mathematics and science (.684)

(2) <u>Marked</u> correlation between

    a. language-literature and mathematics (.458)

    b. language-literature and science (.443)

    c. mathematics and social studies (.526)

    d. science and social studies (.583)

According to C. L. Hull[3], in so far as tests correlate with each other, they are testing the same functions. When this correlation approaches the maximum, the two tests become nearly identical, so that if both tests are given, it is equivalent to giving the same test twice. The measuring of the same function twice by giving two tests almost identical in nature would be a simple waste of labor. It can be seen by an examination of the intercorrelations of the parts of the Scholastic Aptitude Test and of the Achievement Test that the Aptitude Test is superior to the Achievement Test in that its parts have a lower intercorrelation than do the parts of the Achievement Test.

The division of the 384 pupils into two groups based

upon home environment shows interesting results. Group I,
composed of 218 students who were graduated from the Joseph
Metcalf and Highland Junior High School of Holyoke, Massa-
chusetts, have had, for the most part, advantages of a home
environment far superior to that afforded to Group II, com-
posed of 166 pupils, who graduated from the Morgan, West
Street and Lawrence Junior High Schools. In Group I the
correlation between Achievement Test scores and school
marks (.53 ± .032) is three points higher than the corre-
lation between Achievement Test scores and school marks
(.50 ± .039) for Group II, thus indicating that Group I
shows greater achievement than Group II. In Group I the
correlation between Aptitude Test scores and school marks
(.64 ± .027) is four points higher than that for Group II
(.60 ± .033), thus indicating that the pupils in Group I
use to better advantage the ability they possess than do
the pupils of Group II. It is interesting to note that
for Group I the coefficient of correlation between the
Aptitude Test scores and school marks (.64 ± .027) is nine
points higher than that between the Achievement Test scores
and school marks (.53 ± .032). Group II shows the same
type of difference, that is, the coefficient of correlation
between the Aptitude Test scores and school marks (.60 ±
.033) is ten points higher than that between the Achieve-
ment Test scores and school marks (.50 ± .039). These

results correspond with the previously determined correlations showing superiority of the Aptitude Test over the Achievement Test for predicting school success.

The composite correlation of the Scholastic Aptitude Test total scores and the Achievement Test total scores with school marks (.55 ± .024) is three points higher than the correlation between the Achievement Test total scores and school marks (.52 ± .03) and three points lower than the correlation between the Scholastic Aptitude total scores and school marks (.58 ± .023). These results seem to indicate that it would be advisable to eliminate the Achievement Test when administering tests for the purpose of predicting school success.

All results obtained by the correlation method indicate that the Scholastic Aptitude Test possess a greater degree of validity for predicting school success than does the Sones-Harry Achievement Test.

When the Achievement Test scores and school marks of 384 pupils are placed in quartiles there is 37.24% perfect correspondence and 321 points misplacement. When the Scholastic Aptitude Test scores and school marks are placed in quartiles there is 42.71% perfect correspondence and 286 points misplacement. In the West Springfield High School study when the Intelligence Test scores and school marks

of 115 students are placed in quartiles there is 34% perfect
correspondence and 108 points misplacement. When the same
is done to the Scholastic Aptitude scores and school marks
the perfect correspondence is 47% and the points misplace-
ment 83. In the ninth grade the Intelligence Test scores
and school marks have 41% perfect correspondence and 97
points misplacement while the Scholastic Aptitude Test scores
and school marks have 42% perfect correspondence and 90
points misplacement.

The results obtained in the Holyoke High School study
agree with the coefficient of correlation method and make
it possible to state with more certainty that the Scho-
lastic Aptitude Test possesses a greater degree of validity
than the Achievement Test for predicting school success.

TABLE XIX

Summary of Data in Comparison of Sones-Harry
High School Achievement Test (Form B) and the
West Springfield High School Scholastic Apti-
tude Test with School Marks.

Graphical Method

Figures 1-4 indicate that the Scholastic Aptitude

Test scores show a more normal distribution than the Sones-

Harry Achievement Test scores.

Correlation Method

(1) Scholastic Aptitude Test scores and school
marks for 384 pupils   .58 ± .023

(2) Sones-Harry Achievement Test scores and
school marks for 384 pupils   .52 ± .03

                                                        .06

(3) Composite of Scholastic Aptitude scores
and Achievement scores with school marks   .55 ± .024

(1) Scholastic Aptitude Test scores and school
marks for 218 graduates of Joseph Metcalf
and Highland Junior High Schools   .64 ± .027

(2) Sones-Harry Achievement Test scores and
school marks for 218 graduates of Joseph
Metcalf and Highland Junior High Schools   .55 ± .032

                                                        .09

TABLE XIX (Cont.)

(1) Scholastic Aptitude Test scores and school
marks for 166 graduates of Morgan, West
Street and Lawrence Junior High Schools   .60 ± .033

(2) Sones-Harry Achievement Test scores and
school marks for 166 graduates of Morgan,
West Street and Lawrence Junior High Schools .50 ± .039

.10

These correlations seem to indicate that the

Scholastic Aptitude Test is more valid than the Sones-

Harry Achievement Test.

Quartile Method	Perfect Correspondence
(1) Scholastic Aptitude Test scores and school marks	42.71%
(2) Sones-Harry Achievement Test scores and school marks	37.24%
	5.47%

These results correspond with those obtained by

the correlation method.

The results of the three statistical methods em-

ployed seem to indicate that the West Springfield Scho-

lastic Aptitude Test is more valid than the Sones-Harry

Achievement Test for use in predicting school success.

Conclusions and Recommendations

It has been stated in Chapter I that the intelligence test and the achievement test fail to measure some requisite for success in school. In this study an attempt has been made to determine whether or not a new type of test, a Scholastic Aptitude Test based upon ability to learn, may be a more valid measuring instrument for predicting school success than either the intelligence or achievement test.

The results of this study appear to verify the statement made by Mr. C. P. McDonnell[7] in his thesis of 1932 that "a worth while idea has been presented, namely, a test consisting of subject matter based on ability to learn". The Sones-Harry Achievement Test has been used considerably by many schools for measuring the achievement of students and thus their chance for future school success. The Scholastic Aptitude Test when compared with the Sones-Harry Achievement Test by the use of three different statistical methods, namely, graphical, correlation, and quartile placement is shown to be superior to the Achievement Test. Therefore, it seems logical to assume that the Scholastic Aptitude Test possesses considerably greater validity for predicting school success than the Sones-Harry Achievement Test.

Recommendations for further research in the field of

Scholastic Aptitude Tests are (1) construction and study of the validity of a mathematics section in the test; (2) study of the relationship between this test and other types of achievement tests such as silent reading tests, arithmetic tests, modern language tests, English composition tests, etc.; (3) study of the relationship between this test and other types of intelligence tests than the Terman Test.

A considerable amount of improvement might be made on the present scholastic aptitude tests by introducing a new type of subject matter, that is, "nonsense" material. The purpose of using "nonsense" material is to avoid the possibility of any student's being familiar with the subject matter of the test. It seems logical to assume that "nonsense" material can test the ability of the student to learn just as accurately as actual facts. A test with science and mathematics sections consisting of "nonsense" material has been constructed and administered to the first year students of the Massachusetts State College by Dr. Harry N. Glick, but the correlations with college marks have not yet been determined. Other tests of this type are in the process of construction, and will, no doubt, show very interesting results when completed.

VI INDEX TO TABLES AND FIGURES

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INDEX TO TABLES (Cont.)

INDEX TO TABLES (Cont.)

INDEX TO TABLES (Cont.)

INDEX TO FIGURES

VII LITERATURE CITED

LITERATURE CITED

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VIII   APPENDIX

SONES–HARRY
HIGH SCHOOL ACHIEVEMENT TEST

By W. W. D. Sones
Professor of Education and Director of Erie Center, University of Pittsburgh

and David P. Harry, Jr.
Associate Professor of Education, Graduate School, Western Reserve University

B

TEST: FORM B
For Secondary Schools and College Entrance

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

Name...Date.........19.......
(First name,   initial,   last name)

Age.......years......months   Teacher..............................

Class...................School or college.................City...........

What course are you taking in high school?...............................
(Academic, commercial, general, scientific, etc.)

What is your major field in college? ....
(English, math., social studies, science, etc.)

How many half years have you had in the following subjects? (Include the present semester.)

English.............( ) ( )   Mathematics.........( ) ( )

Natural Science (Gen. Sci., Biology, Chemistry, Physics) . ( ) ·( )   Social Studies (History, Economics, Civics, etc.) ....( ) ( )

GENERAL DIRECTIONS.   This test has four parts: Language and Literature, Mathematics, Natural Science, Social Studies.   You will take one part at a time.   Each part has several sections.   The directions are printed at the beginning of each section. Read them carefully and proceed at once to answer the questions.   You are not expected to answer all the questions in any section. Do your best, but do not stay long on any single section or question.   If you have finished any part before the time is up, do not go ahead to the next part but go back and make sure your answers are correct.   If the time is up before you finish a part, stop work on it and proceed at once to the next. *Ask no questions* after the examination has begun.

The First Part is Language and Literature.   The time is 40 minutes.   Begin.

| | SCORE | | | |
SECTIONS	I LANG.-LIT.	II MATH.	III NAT. SCI.	IV SOC. STUD.
A				
B				
C				
D				
E				
F				
G				
H				
I		×		
J		×		
K		×	×	×
L		×	×	×
M		×	×	×
N		×	×	×
O		×	×	×
P		×	×	×
Totals				

SONES-HARRY HIGH SCHOOL ACHIEVEMENT TEST

Educational Profile of. . . . .

Age . . . .

Grade . . . .

Course. . . . .

Date . . . .

	Lang. and Lit.	Math.	Nat. Sci.	Soc. Stud.	Total
TEST SCORE					
HALF YEARS OF SUBJECT					

STANDARD OF COM-PARISON*	TEST	PERCENTILE POSITION†										
		5 10	20 25	30	40	50	60	70	75	80	90	95
Grade	Lang.-Lit.											
	Math.											
	Nat. Sci.											
	Soc. Stud.											
Number of Half Years of the Subject	Lang.-Lit.											
	Math.											
	Nat. Sci.											
	Soc. Stud.											
All Students in High School	Lang.-Lit.											
	Math.											
	Nat. Sci.											
	Soc. Stud.											
	Lang.-Lit.											
	Math.											
	Nat. Sci.											
	Soc. Stud.											
	Lang.-Lit.											
	Math.											
	Nat. Sci.											
	Soc. Stud.											

* The profile for a student may be made for one or more of the standards of comparison listed in this column. Space is allowed in the lower part of the chart for other standards than those mentioned; for example, age or type of course in high school.

† See Table 1 in the Manual of Directions for percentile rankings by grade and for all high school students, and Table 2 for percentile rankings by number of half years of the subject.

DIRECTIONS. If the profile is made on the basis of the test norms, reference to the appropriate table in the Manual will indicate the percentile rank corresponding to each score. Make a small cross on the chart to indicate the student's percentile position for each test and join the crosses. The first part of the chart will show the student's percentile position on each test in relation to other students of his year in high school, etc.

If the percentile positions are to be determined in relation to the local distribution of the scores, the procedure for determining the percentile scores can be learned from the *Universal Percentile Graph*, published by World Book Company.

PART I. LANGUAGE AND LITERATURE

SECTION A. CORRECT AND FAULTY USE OF ENGLISH   *Score I, A (_____)*

DIRECTIONS. Some of the following sentences are correct, and some are faulty. In the parentheses after each sentence write a plus (+) if it is correct or a zero (0) if it is faulty. The samples are correctly marked.

SAMPLES: Stop that and leave me alone!...............................(**0**)
Every one of us girls thinks she is mean.........................(**+**)

1. Doesn't he know how to ride? ....(   ) 1
2. He says that us high school students are not serious ....(   ) 2
3. It is kind of cold for May ....(   ) 3
4. John and I went alone ....(   ) 4
5. Following a hasty breakfast I hurried up the hill ....(   ) 5
6. Pittsburgh manufactures most anything from canned food to steel ships ....(   ) 6
7. They sent for a physician and lawyer ....(   ) 7
8. I do not recollect of having read the book ....(   ) 8
9. Mary asked: "Who did you say was tardy?" ....(   ) 9
10. Arriving in the city, we visited the zoo ....(   ) 10

SECTION B. WORD MEANING   *Score I, B (_____)*

DIRECTIONS. Think of the meaning of each word at the left. Select the word in each line that means the same as the word at the left and write its number in the parentheses.

11. *disinterested* 1 uninteresting   2 smitten   3 impartial   4 serious ....(   ) 11
12. *synonymous* 1 abbreviation   2 sinful   3 equivalent   4 opposite ....(   ) 12
13. *prediction* 1 idea   2 prophecy   3 theory   4 statement ....(   ) 13
14. *itinerary* 1 sailor   2 explorer   3 itemized list   4 route ....(   ) 14
15. *squalor* 1 filth   2 untidiness   3 low placed   4 hidden ....(   ) 15
16. *agnostic* 1 pagan   2 backslider   3 unmoral   4 unbeliever ....(   ) 16
17. *hoar* 1 long   2 black   3 thin   4 white ....(   ) 17
18. *inhibit* 1 dwell in   2 restrain   3 rescue   4 exercise ....(   ) 18
19. *paradox* 1 heaven   2 seeming contradiction   3 disagreement   4 parallel(   ) 19
20. *temporary* 1 transitory   2 temporal   3 permanent   4 timely ....(   ) 20

SECTION C. ABBREVIATIONS AND PREFIXES   *Score I, C (_____)*

DIRECTIONS. Think of the meaning of each expression in Column 2. Select the abbreviation or prefix (in Column 1) which gives the meaning and write its number in the parentheses. The sample is correctly marked.

COLUMN 1 (ABBREVIATIONS AND PREFIXES)

1. ab	9. i.e.
2. A.D.	10. post
3. ad	11. R.S.V.P.
4. A.M.	12. sub
5. ante	13. super
6. anti	14. ult.
7. cf.	15. viz.
8. et al.	

COLUMN 2 (EXPRESSIONS)

SAMPLE. After ....(*10*)
21. Answer, please............(   ) 21
22. Before noon ....(   ) 22
23. Under...................(   ) 23
24. To......................(   ) 24
25. Over, above.............(   ) 25
26. Before..................(   ) 26
27. Away (off, from)..........(   ) 27
28. Against..................(   ) 28
29. Namely..................(   ) 29
30. Last month..............(   ) 30

SECTION D. WHY CERTAIN COMMON EXPRESSIONS ARE FAULTY

Score I, D (_____)

DIRECTIONS. Read each correct and faulty expression in Column 2. Then select the rule from Column 1 that governs the correct usage, and write its number in the parentheses.

COLUMN 1 (RULES OF GRAMMAR)

1. The subject of an infinitive is always in the objective case.
2. The object (direct) of a verb is always in the objective case.
3. Every pronoun must agree with its antecedent in person and number.
4. Every complete sentence must have a subject and a predicate.
5. When comparing one of two objects with the other the comparative degree of the adjective is used.
6. An adverb modifies a verb, an adjective, or another adverb.
7. An adjective modifies a noun or pronoun.
8. A coördinate conjunction connects equal or balanced parts of a sentence.

COLUMN 2 (EXPRESSIONS COMMONLY MISUSED)

31. Your letter of the fifth is at hand, *rather than* Yours of the fifth at hand..........(   ) 31
32. Mary often dictates to Jean although Jean is the older, *rather than* Mary often dictates to Jean although Jean is the oldest...............(   ) 32
33. Has everybody his program? *rather than* Has everybody their program?............(   ) 33
34. I shall ask whomever you name, *rather than* I shall ask whoever you name.........(   ) 34
35. She looks charming tonight, *rather than* She looks charmingly tonight..............(   ) 35

SECTION E. FOREIGN PHRASES USED IN ENGLISH

Score I, E (_____)

DIRECTIONS. In the parentheses after each foreign expression in Column 2 write the number of the English expression in Column 1 that tells its meaning.

COLUMN 1 (ENGLISH EXPRESSIONS)

1. farewell
2. folksong
3. hands off
4. group spirit
5. one out of many
6. of its own nature
7. till we meet again
8. without definite date
9. as appears on the surface
10. according to value
11. a bold piece of statesmanship
12. desire to be on the move
13. By this symbol thou shalt conquer.
14. menu with prices for individual dishes
15. existing condition of affairs

COLUMN 2 (FOREIGN EXPRESSIONS)

36. Adios.....................(   ) 36
37. A la carte...................(   ) 37
38. Wanderlust.................(   ) 38
39. In hoc signo vinces..........(   ) 39
40. Esprit de corps..............(   ) 40
41. Sine die....................(   ) 41
42. Coup d'état.................(   ) 42
43. Auf wiedersehen.............(   ) 43
44. Laissez faire................(   ) 44
45. Status quo..................(   ) 45

SECTION F. LITERARY FORMS

Score I, F (_____)

DIRECTIONS. In the parentheses after each literary product in Column 2 write the number of the form in Column 1 that tells what type it is.

COLUMN 1 (LITERARY FORMS)

1. ballad
2. biographical novel
3. comedy
4. elegy
5. epic poetry
6. essay
7. historical novel
8. short story
9. sonnet
10. tragedy

COLUMN 2 (LITERARY PRODUCTS)

46. Macbeth....................(   ) 46
47. A Tale of Two Cities.........(   ) 47
48. Silas Marner...............(   ) 48
49. Paradise Lost...............(   ) 49
50. The Ancient Mariner.........(   ) 50

[4]

SECTION G. READING COMPREHENSION

DIRECTIONS. Read this paragraph carefully. Then read the questions below it. Each question refers to the italicized expression in the paragraph that has the same number as the question. In the parentheses after each question in Column 2 below write the number of the answer to it (from the Answer List in Column 1 below).

MAN ON HORSEBACK

Every time the President, the Secretary of War, or the Secretary of the Navy clamps *the gag rule* (51) on a high-ranking national defense officer who *shoots over the Administration's head* (52) in an effort to sway the political judgment of the people, there is a small but vigorous protest, with many allusions to free speech. Then the admirals and generals subside and the government goes serenely on its way.

Lately Marshal Foch enlivened his speeches upon public occasions with bursts of verbal machine-gun fire aimed at Communists and *all other left-wing politicians.* (53)

Paul Painlevé came back with a gag order forbidding all army officers from expressing any political views whatever.

Is this wise? Let us see.

Deep in the heart of *every free man* (54) is joy in the fact that through his chosen governors *he orders the soldiery around* (55) as he pleases.

He's safe from the blandishments and cruelty of professional war makers looking for business.

His ancestors bore military tyranny until they preferred death.

They died by millions to rule the military (56) and today's men do not like to be reminded of how easily their forefathers were bluffed.

(Editorial in *Collier's*, April, 1928)

COLUMN 1 (ANSWER LIST)

1. citizens with right to vote
2. generals and admirals
3. government by the people
4. silencing official opinion
5. infringement of constitutional right
6. revolution to gain democratic government
7. criticism of government policy
8. non-interference of military officials in political affairs
9. symbol of militarism
10. radicals
11. independent thinkers

COLUMN 2 (QUESTIONS)

51. What is gag rule?............( ) 51
52. What does this mean?........( ) 52
53. Who are they?..............( ) 53
54. To whom does this refer?.....( ) 54
55. What constitutional right is implied?..................( ) 55
56. What does this mean?........( ) 56
57. What is the main theme of the editorial?.................( ) 57
58. (Answer *Yes* or *No*.) Does the writer advocate unlimited freedom of speech?........( ) 58

SECTION H. INTERNATIONAL AUTHORSHIP

DIRECTIONS. In the first parentheses after the name of each book in Column 3 write the number of its author from Column 1. In the second parentheses after each book in Column 3 write the number of its author's nationality from Column 2.

COLUMN 1 (AUTHORS)

1. Cervantes
2. Dante
3. David
4. Emerson
5. Goethe
6. Homer
7. Hugo
8. Ibsen
9. Milton
10. Tolstoi

COLUMN 2 (NATIONALITIES)

1. American
2. English
3. French
4. German
5. Greek
6. Hebrew
7. Italian
8. Norwegian
9. Russian
10. Spanish

COLUMN 3 (BOOKS)

59–60. Les Misérables .....Author ( ) 59
Nationality ( ) 60

61–62. Don Quixote.......Author ( ) 61
Nationality ( ) 62

63–64. The Divine Comedy.Author (.) 63
Nationality ( ) 64

65–66. Essays............Author ( ) 65
Nationality ( ) 66

67–68. Anna Karenina.....Author ( ) 67
Nationality ( ) 68

SECTION I. FAMILIAR CHARACTERS OF LITERATURE   *Score I, I (_____)*

DIRECTIONS. In the parentheses after each description in Column 2 write the number of the character in Column 1 that it describes.

COLUMN 1 (CHARACTERS)   COLUMN 2 (DESCRIPTIONS)

1. Ancient Mariner
2. Hamlet
3. Hawkeye
4. Ichabod Crane
5. Lady Macbeth
6. Philip Nolan
7. Mr. Pickwick
8. Rip Van Winkle
9. Robinson Crusoe
10. Silas Marner

69. The lazy person who through idleness forfeited the respect of kin and friends and eventually lost all contact with human progress........( ) 69

70. The person who learned too late the real penalty for disloyalty to country.................( ) 70

71. The recluse who discovered for himself the joy that comes from human companionship and was reborn as a social being...............( ) 71

72. One who represents the pioneer making first contact between wilderness and savage and civilization.............................( ) 72

73. A genial soul with a simple but wholesome philosophy of life who had most fascinating adventures in the commonplace...........( ) 73

SECTION J. FAMILIAR PASSAGES IN LITERATURE   *Score I, J (_____)*

DIRECTIONS. In the parentheses after each passage in Column 2 write the number of the line in Column 1 that is omitted from it.

COLUMN 1 (OMITTED LINES)

1. Here I and sorrows sit.
2. We can make our lives sublime,
3. And waste its sweetness on the desert air.
4. The eternal years of God are hers.
5. Uneasy lies the head that wears a crown.
6. Then, if ever, come perfect days;
7. Which taken at the flood, leads on to fortune;
8. All's right with the world.
9. It might have been!
10. The better part of valor is discretion.

COLUMN 2 (PASSAGES)

74. Full many a gem of purest ray serene
   The dark unfathom'd caves of ocean bear;
Full many a flower is born to blush unseen,

   (...) ....( ) 74

75. For of all sad words of tongue or pen,
   The saddest are these:

   (...) ....( ) 75

76. There is a tide in the affairs of men

   (...) ....( ) 76

Omitted, all the voyage of their life
   Is bound in shallows and in miseries.

77. And what is so rare as a day in June?

   (...) ....( ) 77

78. Lives of great men all remind us

   (...) ....( ) 78

[6]

SECTION K. LITERARY THEMES

DIRECTIONS. In the parentheses after each theme in Column 2 write the number of the literary product in Column 1 to which the theme refers.

COLUMN 1 (LITERARY PRODUCTS)

1. A Tale of Two Cities
2. David Copperfield
3. Evangeline
4. Ivanhoe
5. The Ancient Mariner
6. The Last of the Mohicans
7. The Outcasts of Poker Flat
8. The Scarlet Letter
9. The Sir Roger de Coverley Papers
10. Treasure Island

COLUMN 2 (LITERARY THEMES)

79. A portrayal of early American frontier civilization . . . . ( ) 79
80. A portrayal of life in England after the Norman conquest . . . . ( ) 80
81. A portrayal of life in the Far West . . ( ) 81
82. A portrayal of the supernatural and the mystical . . . . ( ) 82
83. A portrayal of the life of an English squire . . . . ( ) 83

SECTION L. TECHNICAL VOCABULARY OF LANGUAGE

DIRECTIONS. In the parentheses after each definition in Column 2 write the number of the term in Column 1 of which it is the definition.

COLUMN 1 (ANSWERS)

1. clause
2. conjugation
3. declension
4. diction
5. exposition
6. gender
7. idiom
8. narration
9. paragraph
10. person
11. phrase
12. predicate
13. punctuation
14. quotation
15. sentence
16. subject
17. tense
18. voice

COLUMN 2 (DEFINITIONS)

84. A unit of writing, consisting of one or more sentences developing a single topic or idea . . . . ( ) 84
85. Distinction of a word according to the (actual or imputed) sex denoted or referred to . . . . ( ) 85
86. A subdivision of a sentence containing a subject and a predicate . . . . ( ) 86
87. The division of literary composition into sentences and members of a sentence by points, marks, or stops, so as to make clear the author's meaning by indicating their structure to the eye . . . . ( ) 87
88. An ordered arrangement of the inflectional forms of a verb . . . . ( ) 88
89. The word or words in a sentence that express what is said of the subject . . . . ( ) 89
90. The choice of words for the expression of ideas . . . . ( ) 90
91. An expression that is peculiar to itself in grammatical construction, and whose total meaning cannot be derived from its parts . . . . ( ) 91
92. The statement and discussion of an abstract or general theme . . . . ( ) 92
93. Distinction of forms to indicate the relation of the subject of the verb to the action which the verb expresses . . . . ( ) 93

SECTION M. IDENTIFICATION OF GRAMMATICAL AND RHETORICAL FORMS

Score I, M (_____)

DIRECTIONS. In the parentheses after each sentence in Column 2 write the number of the form in Column 1 that identifies the italicized part of the sentence or tells what figure of speech it is.

COLUMN 1 (ANSWERS)	COLUMN 2 (ILLUSTRATIONS)
1. adverb	94. Our *class* has forty members............( ) 94
2. alliteration	95. The sun *rises* in the east and *sets* in the west ( ) 95
3. collective noun	96. *To see* her is *to love* her..............( ) 96
4. colloquialism	97. What pleasure in playing baseball could a
5. conditional clause	boy possibly have *who* always strikes out?( ) 97
6. hyperbole	98. He ran *forward quickly*................( ) 98
7. infinitive	99. I heard the young girl *singing at her work*..( ) 99
8. interjection	100. *See Saw Seen*.......................( ) 100
9. intransitive verb	101. As the bees come forth continually in fresh
10. irony	numbers, so fresh bands of Greeks keep
11. metaphor	continually pouring forth from the ships
12. parenthetical expression	and tents. *What figure of speech?*......( ) 101
13. participial phrase	102. For Brutus is an honorable man;
14. past participle	So are they all, all honorable men.
15. preposition	*What figure of speech?*..................( ) 102
16. principal parts	103. What a tale of terror, now, their turbulency
17. relative pronoun	tells. *What figure of speech?*..........( ) 103
18. simile	

SECTION N. CHARACTERS FAMOUS IN LITERATURE

Score I, N (_____)

DIRECTIONS. In the parentheses after each character in Column 2 write the number of the literary product in Column 1 in which it plays a prominent part.

COLUMN 1 (LITERARY PRODUCTS)	COLUMN 2 (CHARACTERS)
1. A Christmas Carol	104. Scrooge ....( ) 104
2. As You Like It	105. Lucie Manette ....( ) 105
3. A Tale of Two Cities	106. Roderick Dhu ....( ) 106
4. David Copperfield	107. Priscilla ....( ) 107
5. Evangeline	108. Brutus ....( ) 108
6. Idylls of the King	109. Penelope ....( ) 109
7. Ivanhoe	110. Banquo ....( ) 110
8. Julius Cæsar	111. Rip Van Winkle ....( ) 111
9. Lorna Doone	112. Hester Prynne ....( ) 112
10. Macbeth	113. Matthew Maule ....( ) 113
11. Silas Marner	114. Guinevere ....( ) 114
12. The Courtship of Miles Standish	115. Long John Silver ....( ) 115
13. The House of the Seven Gables	116. Richard-the-Lion-Hearted .....( ) 116
14. The Lady of the Lake	117. Micawber ....( ) 117
15. The Merchant of Venice	118. Orlando de Boys ....( ) 118
16. The Odyssey	
17. The Pilgrim's Progress	
18. The Scarlet Letter	
19. The Sketch Book	
20. Treasure Island	

SECTION O. AMERICAN AND ENGLISH AUTHORS

Score I, O (_____)

DIRECTIONS. In the parentheses after the name of each book or poem in Column 2 write the number of the author in Column 1 who wrote it.

COLUMN 1 (AUTHORS)

COLUMN 2 (BOOKS AND POEMS)

1. Bacon	119. The House of the Seven Gables.................( ) 119
2. Bryant	120. Julius Cæsar.........................( ) 120
3. Bunyan	121. A Christmas Carol.........................( ) 121
4. Burns	122. Idylls of the King.........................( ) 122
5. Carlyle	123. Silas Marner.........................( ) 123
6. Chaucer	124. The Lady of the Lake.........................(·) 124
7. Dickens	125. The Raven.........................( ) 125
8. Eliot	126. The Pilgrim's Progress.........................( ) 126
9. Gray	127. Essays of Elia.........................( ) 127
10. Hawthorne	128. Canterbury Tales.........................( ) 128
11. Irving	129. An Elegy Written in a Country Churchyard.......( ) 129
12. Lamb	130. L'Allegro.........................( ) 130
13. Longfellow	131. The French Revolution.........................( ) 131
14. Milton	132. Novum Organum.........................( ) 132
15. Poe	133. Leaves of Grass.........................( ) 133
16. Scott	
17. Shakespeare	
18. Tennyson	
19. Whitman	
20. Wordsworth	

SECTION P. LITERARY INTERESTS

Score I, P (_____)

DIRECTIONS. In the parentheses after each description of an interest or mood in Column 2 write the number of the author in Column 1 who can best help to satisfy it.

COLUMN 1 (AUTHORS)

COLUMN 2 (INTERESTS AND MOODS)

1. Burns	134. Tragic drama.........................( ) 134
2. Carlyle	135. Historical novels.........................( ) 135
3. Dickens	136. Philosophy in the form of humorous fiction.......( ) 136
4. Keats	137. Novels involving behavior of people in the commonplace aspects of life.........................( ) 137
5. Kipling	
6. Mark Twain	138. Short stories of vigorous outdoor life............( ) 138
7. Poe	139. Sentimental poetry.........................( ) 139
8. Ruskin	140. Philosophy of the serious aspects of life in poetic form.........................( ) 140
9. Scott	
10. Shakespeare	
11. Shaw	
12. Stevenson	
13. Tennyson	
14. Wordsworth	

PART II. MATHEMATICS

SECTION A. ABILITY TO DO, USE, OR APPLY THE FUNDAMENTAL PROCESSES OF MATHEMATICS

Score II, A (_____)

DIRECTIONS. Do what each question asks. Put your answers on the lines at the right. Do any figuring you wish in the margins. The sample is correctly done.

SAMPLE. Write $\frac{1}{2}$ as a decimal . . . .(_____.5_____)

1. What instrument was designed to draw a circle? . . . : . . . .(_____)₁

2. Write "25% of" as "a decimal times" . . . .(_____)₂

3. Write in figures: one thousand seven and four hundredths . . . .(_____)₃

4. What is 4 per cent of $300? . . . .(_____)₄

5. What does xy mean? . . . .(_____)₅

6. One square foot equals how many square inches? . . . .(_____)₆

7. The ratio of 3 to 4 is equal to the ratio of $4\frac{1}{2}$ to . . . . : . . . .(_____)₇

8. Write "175% of" as "a decimal times" . . . .(_____)₈

9. Make an equation of the numbers 4, 5, and 9 . . . .(_____)₉

10. What is the cube of 4? . . . .(_____)₁₀

11. What geometric figure would you use to help you in the construction of a regular hexagon? . . . .(_____)₁₁

12. Write "$4\frac{1}{2}$ per cent of" as "a decimal times" . . . .(_____)₁₂

13. Write "$\frac{1}{2}$% of" as "a decimal times" . . . .(_____)₁₃

14. In the formula $A = \pi r^2$, what is the approximate value of A when r equals 7? . . . .(_____)₁₄

15. Solve for x: $x - 5(2 - 3x) = 6$ . . . .(_____)₁₅

16. Perform the operation: $5x - (-4 + x) =$ . . . .(_____)₁₆

17. Perform the operation: $\frac{a}{b} + \frac{c}{d} =$ . . . .(_____)₁₇

18. Factor $x^2 - 7x + 12$ . . . .(_____)₁₈

19. About how many quarts are in a liter? (to the nearest quart) . .(_____)₁₉

20. If the temperature is 68° F., what is the centigrade reading? (F $= \frac{9}{5}$ C $+ 32$) . . . .(_____)₂₀

21. Lindbergh left New York at 7:52 A.M. Friday and reached Le Bourget Field, Paris, at 5:21 P.M. Saturday (New York time). How long did it take him? . . . .(_____)₂₁

22. About how many inches are in a meter? (to the nearest inch) . .(_____)₂₂

23. What does $a^6 \div a^2$ equal? . . . .(_____)₂₃

24. What is the shortest cut in multiplying a number by 100? . . . . .(_____)₂₄

25. Solve for a: $\frac{a+3}{a-3} = \frac{a+4}{a-6}$ . . . .(_____)₂₅

26. Perform the operation: $\frac{a-b}{a^2+b^2} \cdot \frac{a^4-b^4}{(a-b)^2}$ . . . .(_____)₂₆

27. What is the formula $s = \frac{1}{2}gt^2$ in terms of t? . . . .(_____)₂₇

[10]

28. Solve for x and y: $\begin{cases} x + y = 5 \\ 3x + y = 3 \end{cases}$ ·············(_____) 28

29. With x and y as variables and k as a constant, write the equation which shows that x varies directly as y.....................(_____) 29

30. What does $\log a + \log b$ equal?...........................(_____) 30

SECTION B. MATHEMATICAL CONCEPTS

Score II, B (_____)

DIRECTIONS. In the parentheses after each statement in Column 2 write the number of the answer in Column 1 that best fits it. The sample is correctly marked.

COLUMN 1   (ANSWERS)

COLUMN 2   (STATEMENTS)

1. acute
2. angle
3. axiom
4. congruent
5. diameter
6. exponent
7. formula
8. hypothesis
9. isosceles
10. pi
11. polygon
12. radius
13. rectangle
14. root
15. square
16. supplementary

SAMPLE.   A line equal to half a diameter of a circle....(*12*)

31. The longest straight line that can be drawn in a circle.(____) 31

32. A triangle with only two sides equal...............(____) 32

33. An angle less than a right angle...................(____) 33

34. When $\angle A + \angle B = 180°$, the angles are..........(____) 34

35. A parallelogram with adjacent sides unequal and angles right angles...........................(____) 35

36. A short method of expressing or a symbolic representation of a rule...........................(____) 36

37. A statement of a condition assumed to be true.......(____) 37

38. The ratio between the circumference and the diameter of any circle.................................(____) 38

39. A general fact that is accepted as true without proof.(____) 39

40. A rotation of a line in a plane is, or forms,.........(____) 40

SECTION C. INTERPRETATION OF GRAPHS

Score II, C (_____)

DIRECTIONS.   Find in the graph the answer to each question and answer briefly.

INCREASE OF POPULATION 1800 – 1910

After Plate 16 of the Statistical Atlas of 1914

POPULATION IN MILLIONS

YEARS
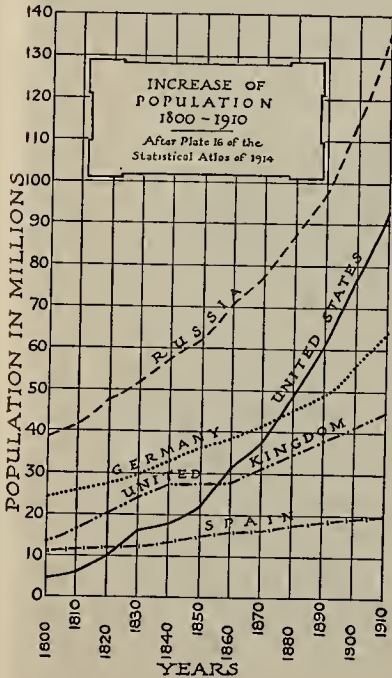
41. At what date did the United States pass Spain in population?........(_____) 41

42. What is the size of each step of the scale on the vertical axis?.........(_____) 42

43. What was the approximate population of Russia in 1905?..........(_____) 43

44. What happened at point (1874, 43)?..........(_____) 44

45. Which axis is the horizontal axis?..........(_____) 45

[11]

SECTION D. FUNCTIONAL RELATIONSHIPS   *Score II, D* (_____)

DIRECTIONS.   In the parentheses after each situation in Column 2 write the number of the answer in Column 1 which tells what process or processes you would have to use in solving the situation.   The sample is correctly marked.

COLUMN 1   (ANSWERS)   COLUMN 2   (SITUATIONS)

1. add

2. subtract

3. multiply

4. divide

5. add — subtract

6. add — multiply

7. add — divide

8. multiply —
   subtract

9. subtract — divide

10. multiply — add

11. multiply — divide

12. multiply — add —
    multiply — sub-
    tract

SAMPLE.   To find the difference ; given two items. . (*2*)

46. To find the total of a bill or invoice ; given a series of items, the number of each, price of each, and rate of discount. . . . . (_____) 46

47. To find the net profit or loss ; given the total costs and total receipts. . . . . (_____) 47

48. To find the distance ; given the time and the rate (_____) 48

49. To find the per capita expense of a community activity ; given total cost and population. . . (_____) 49

50. To find the amount received for several items ; given the price of each. . . . . (_____) 50

51. To find the area of a triangle ; given the base and the altitude of the triangle. . . . . (_____) 51

52. To find the ratio of an item to the total ; given a series of items. . . . . (_____) 52

53. To find the rate of margin, loss, discount, commission ; given the total cost and the amount of margin, loss, discount, commission. . . . . (_____) 53

54. To find the discount ; given the price of each of several items and the rate of discount. . . . . . (_____) 54

55. To find the amount of rent necessary to make a certain rate on an investment ; given the amount of the investment and the expense. . (_____) 55

SECTION E. GEOMETRIC FIGURES   *Score II, E* (_____)

DIRECTIONS.   Answer each question briefly and clearly.   Write your answers to each question on the line after the question.
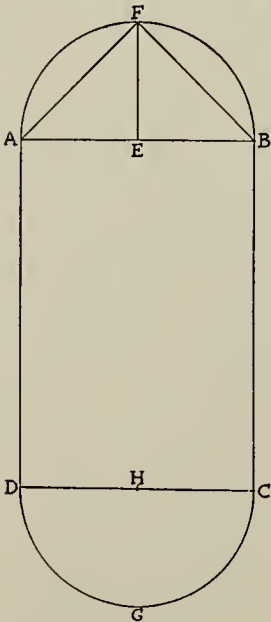
Given:

Distance A to D is 100 yards.
Distances A to E, B to E, and F to E are each 35 yards.
FE is perpendicular to AB. π is 22/7.
AB and CD are perpendicular to AD and BC.
The ends of the field are semicircles.

Problems

56. What kind of triangle is AFB?
    (1) scalene   (2) equilateral
    (3) isosceles   (4) equiangular (_____) 56

57. How do you know that line AB is shorter than BF + FA? . . . . . (_____) 57

58. How many degrees has ∠ AFE? (_____) 58

59. What is the area of the entire field? (Indicate ; do not compute.). . (_____) 59

60. What is the formula for finding the shortest distance between A and C? . . . . (_____) 60

SECTION F. FORMULAS FOR GEOMETRIC FIGURES　　　*Score II, F (＿＿＿)*

DIRECTIONS. In the parentheses after each statement in Column 2 write the number of the formula in Column 1 which you would use for it.

COLUMN 1　(FORMULAS)

1. $\frac{1}{2} rh$
2. $r\sqrt{2}$
3. $2\pi r$
4. r^3
5. $\frac{4}{3}\pi r^3$
6. πr^2
7. $2\pi rh$
8. $\sqrt[3]{r}$
9. $\pi r^2 h$
10. $4r$
11. r^2

COLUMN 2　(STATEMENTS)

SAMPLE. To find the area of a square whose side is r . . . . (//)

61. The length of the diagonal of a square whose side is r . . . .(　) 61

62. The perimeter of a square whose side is r . . . . . .(　) 62

63. The volume of a cube whose side is r . . . .(　) 63

64. The area of the base of a cylinder whose radius is r (　) 64

65. The lateral or curved surface of a cylinder whose altitude is h and the radius of whose base is r . . . .(　) 65

SECTION G. IMPORTANT THEOREMS IN GEOMETRY　　*Score II, G (＿＿＿)*

DIRECTIONS. In the parentheses after each geometric condition given below in Column 2 write the number of the result in Column 1 that could be proved by it.

COLUMN 1　(RESULTS)

1. angles equal
2. triangles congruent
3. triangles similar
4. sides perpendicular
5. lines parallel
6. quadrilateral is a parallelogram
7. parallelogram is a rectangle
8. two arcs equal (in same or equal circles)
9. two chords equal (in same or equal circles)
10. areas equivalent

COLUMN 2　(CONDITIONS)

66. If both pairs of opposite sides are parallel . . . .(　) 66

67. If the alternate interior angles are equal (　) 67

68. If the sides are respectively parallel . .(　) 68

69. If the diagonals are equal . . . .(　) 69

70. If three sides equal three sides respectively . . . .(　) 70

71. If they are triangles with equal bases and altitudes . . . .(　) 71

72. If the angles which measure them are equal . . . .(　) 72

73. If an angle is inscribed in a semicircle .(　) 73

74. If they are opposite equal sides of an isosceles triangle . . . .(　) 74

75. If equally distant from the center . . . .(　) 75
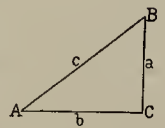
SECTION H. MATHEMATICAL FORMULAS　　　*Score II, H (＿＿＿)*

DIRECTIONS. In the parentheses after each formula in Column 2 write the number of the mathematical process in Column 1 that illustrates the formula or in which you would use the formula.

COLUMN 1　(PROCESSES)

1. arithmetical progression
2. binomial theorem
3. cosine of angle
4. geometrical progression
5. laws of exponents
6. logarithms
7. quadratic equations
8. simultaneous linear equations
9. sine of angle
10. tangent of angle

COLUMN 2　(FORMULAS)

76. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ . . . . . .(　) 76

77. $S = \dfrac{a(1 - r^n)}{1 - r}$ . . . .(　) 77

78. $l = a + (n - 1)d$ 　　(　) 78

79. (＿＿＿)$A = \dfrac{a}{c}$ 　(　) 79

80. (＿＿＿)$B = \dfrac{b}{a}$ 　(　) 80

PART III. NATURAL SCIENCE

SECTION A. WHAT IS NATURAL SCIENCE?   Score III, A (_____)

DIRECTIONS.   In the parentheses after each fact or problem in Column 2 write the number of the natural science in Column 1 under which you would classify it. The sample is correctly marked.

COLUMN 1 (SCIENCES)   COLUMN 2 (FACTS OR PROBLEMS)

1. anthropology
2. astronomy   SAMPLE.   What is the composition of air? ....(5)
3. bacteriology
4. botany   1. Days and nights are about equal length about
5. chemistry   March 21 . . . .(   ) 1
6. dietetics   2. Why are most plants green? . . . .(   ) 2
7. geology
8. meteorology   3. Why are green-leafed vegetables wholesome? . .(   ) 3
9. physics   4. How was coal formed? . . . .(   ) 4
10. zoölogy   5. Wood is a poor conductor of electricity . . . .(   ) 5

SECTION B. IMPORTANT PROCESSES IN NATURAL SCIENCE

Score III, B (_____)

DIRECTIONS.   In the parentheses after each application or illustration of a process in Column 2 write the number of the process in Column 1 that it applies to or explains.

COLUMN 1 (PROCESSES)   COLUMN 2 (APPLICATIONS AND ILLUSTRATIONS)

1. catalysis   6. The life habit of the snake in winter . . . .(   ) 6
2. conduction   7. The extraction of iron from iron ore . . . .(   ) 7
3. convection
4. diffusion   8. Fats changed to soapy substances in the intes-
5. digestion   tines . . . .(   ) 8
6. distillation   9. The union of two sex cells in the egg . . . .(   ) 9
7. fertilization   10. The turning of the leaves of window plants
8. hibernation   toward the light . . . .(   ) 10
9. migration   11. The movement of hot water from heater to faucet(   ) 11
10. neutralization   12. The southward journey of many species of birds
11. oxidation   in autumn . . . .(   ) 12
12. photosynthesis   13. The magnifying glass . . . .(   ) 13
13. pollination   14. The rusting of iron . . . .(   ) 14
14. reduction
15. refraction   15. The presence of manganese dioxide speeds up the
                            liberation of oxygen from potassium chlorate (   ) 15

SECTION C. CLASSIFICATION   Score III, C (_____)

DIRECTIONS.   In the parentheses after each item in Column 2 write the number of the classification in Column 1 to which it belongs.

COLUMN 1 (CLASSES)   COLUMN 2 (ITEMS)

1. algæ
2. chemical changes   16. Oxygen . . . .(   ) 16
3. chemical compounds
4. chemical elements   17. The earth . . . .(   ) 17
5. energy
6. fungi   18. Light . . . .(   ) 18
7. physical changes
8. planets   19. Water . . . .(   ) 19
9. protozoa
10. suns   20. The North Star . . . .(   ) 20

21.
22.
23.
24.
25.
26. 27.
28.
29.
30.

SECTION D. GENERAL PRINCIPLES THAT EXPLAIN THE PHENOMENA OF NATURE

Score III, D (_____)

DIRECTIONS. Read the following principles in Column 1. Then, in the parentheses after each fact or phenomenon in Column 2 below, put the number of the principle in Column 1 that explains it.

COLUMN 1 (PRINCIPLES)

1. *Biogenesis:* All living matter is derived from preëxisting living matter. In general it resembles in nature and form that from which it was derived.
2. *Biological adaptation of form to function:* The body parts of organic forms are structurally adapted to the function each performs.
3. *Biological balance:* In a natural environment the kind and quantity of living forms is self-limited.
4. *Biological variation:* Variation is the deviation of offspring from parent form, or the deviation from each other in the similar parts of the same organism.
5. *Boyle's Law:* The volume of a confined gas at constant temperature is inversely proportional to the pressure.
6. *Constant composition:* Every pure substance has a constant qualitative-quantitative chemical composition.
7. *Environmental adaptation:* There is a definite structural and functional relationship between living organisms and their natural habitat.
8. *First Law of Motion:* A body at rest remains at rest, and a body in motion remains in motion in a straight line with undiminished speed, unless acted upon by an external force.
9. *Law of Conservation of Mass:* There is no change in the total mass of matter taking part in a chemical change.
10. *Law of Machines:* Work input equals work output plus frictional losses.
11. *Mendel's Law:* Characters of parents are represented in the germ cells by units which tend to segregate or combine in definite proportion.
12. *Newton's Third Law:* Action and reaction are equal and in opposite directions.
13. *Ohm's Law:* The intensity of current in any circuit is directly proportional to the electromotive force and inversely proportional to the resistance of the circuit.
14. *Pascal's Principle:* Pressure applied from without to an enclosed fluid is transmitted equally in all directions without loss, and acts with equal force on equal surfaces.
15. *Periodic Law:* The properties of the chemical elements are a periodic function of their atomic weights.

COLUMN 2 (FACTS AND PHENOMENA)

21. The path of the earth is oval in shape.............................(   ) 21
22. Why can we be sure that young coming from hens' eggs will be young chicks?(   ) 22
23. No two leaves on a tree are identical in form or in structure..............(   ) 23
24. In a litter of pups having pure-bred parents, in general, one fourth will resemble the male parent, one fourth will resemble the female parent, and one half will have mixed characteristics.............................(   ) 24
25. The polar bear is white while the grizzly bear is brown..................(   ) 25
26. A discharging gun may "kick" (recoil)................................(   ) 26
27. Regardless of its source, distilled water is the same in any part of the world..(   ) 27
28. Two dry cells (connected in series) cause a bell to ring with more vigor than it would with only one ....(   ) 28
29. The chemical elements chlorine, fluorine, bromine, iodine, as well as other so-called family groups, have many points of resemblance ....(   ) 29
30. A man can lift objects many times his own weight by means of devices such as the pulley or the screw.......................................(   ) 30

[15]

SECTION E. SIGNIFICANT FIGURES IN NATURAL SCIENCE

Score III, E (＿＿＿)

DIRECTIONS. In the parentheses after each statement in Column 2 write the identifying number of the numerical value in Column 1 that applies to the statement.

COLUMN 1 (NUMERICAL VALUES)

1. −273
2. 0
3. 30
4. 32
5. 1,080
6. 1,800
7. 186,000
8. 240,000
9. 300,000
10. 93,000,000

COLUMN 2 (STATEMENTS)

31. *Degrees Centigrade:* The temperature representing total absence of heat.............( ) 31

32. *Miles per second:* The speed of light and electricity.......................( ) 32

33. *Feet per second:* The acceleration of a body falling freely under the influence of gravity....( ) 33

34. *Miles:* The distance of the moon from the earth ( ) 34

35. *Years:* The computed age of man on the earth.( ) 35

SECTION F. THE EXTREMES IN NATURE

Score III, F (＿＿＿)

DIRECTIONS. In the parentheses after each description in Column 2 write the number of the item in Column 1 that it describes.

COLUMN 1 (ITEMS)

1. Adam
2. atoms
3. bacteria
4. cells
5. chemical elements
6. electrons
7. insects
8. molecules
9. pithecanthropus erectus
10. tissues

COLUMN ·2 (DESCRIPTIONS)

36. The smallest unit of living matter.......( ) 36

37. The smallest particle of chemical compound....................( ) 37

38. The smallest particle of chemical element.( ) 38

39. The simplest substances known to man..( ) 39

40. The oldest known man...............( ) 40

SECTION G. HOW ENERGY IS TRANSFORMED IN NATURE AND IN HUMAN ACTIVITIES

Score III, G (＿＿＿)

DIRECTIONS. Column 1 gives various forms of force and energy. Column 2 gives a number of activities which bring about transformations of force and energy. In the parentheses after each activity in Column 2 write the number of the form of force or energy in Column 1 that the activity involves.

COLUMN 1 (FORMS OF FORCE AND ENERGY)

1. chemical energy
2. electrical energy
3. force of gravity
4. heat energy
5. light energy
6. magnetic force
7. mechanical energy
8. sound

COLUMN 2 (ACTIVITIES)

SAMPLE. A mazda lamp changes.............(*2*)
(That is, it changes electric energy to (*4*)
to heat energy to light energy.) to (*5*)

41–42. The phonograph operated by a spring changes.........................( ) 41
to ( ) 42

43–45. An auto engine in operation changes....( ) 43
to ( ) 44
to ( ) 45

46–47. An ascending balloon rises because of...( ) 46
derived from ( ) 47

48–50. The green leaf when active changes....( ) 48
and ( ) 49
to ( ) 50

SECTION H. SCIENCE STORIES

Score III, H (_____)

DIRECTIONS. In the following two science stories, on the line after each statement write the word that is omitted from the statement.

I. PART OF THE STORY OF THE FLOWER

51. The male sex cell in the flower is called the . . . . (_____) 51

52. The female sex cell in the flower is called the . . . . (_____) 52

53. The process by which the male cell is carried to the female organ is called . . . . (_____) 53

54. Living things which aid in the work of the flower are visually attracted by the flowers' . . . . (_____) 54

55. The combined sex cells when developed together with stored food form the . . . . (_____) 55

II. PART OF THE STORY OF THE GREEN LEAF OF A PLANT

56. The raw material taken from the atmosphere in the manufacture of a plant food is . . . . (_____) 56

57. The process requires as energy . . . . (_____) 57

58. As the process proceeds, there is given back to the atmosphere the gas . . . . (_____) 58

59. The bodies containing the green coloring materials which somehow control the process are called . . . . (_____) 59

III. PART OF THE STORY OF THE CHEMICAL MAKE-UP OF MATTER

DIRECTIONS. Each statement in the following story is followed by several alternative answers. In the parentheses after each statement write the number of the correct answer or answers.

60–61. Atoms are supposed to be composed of smaller particles called
1 molecules   2 electrons   3 ions   4 protons . . . . ( ) 60
( ) 61

62. In the center of the atom are found all of the
1 molecules   2 ions   3 electrons   4 protons . . . . ( ) 62

63. The particles in the outer part of the atom, electrically, are
1 all positive   2 all negative   3 not charged   4 some positive and some negative . . . . ( ) 63

64. Atoms are held together because of
1 electrical attraction   2 their solidity   3 cohesion   4 diffusion . ( ) 64

65. This hypothesis concerning the atom leads to the further assumption that
1 elements are unchangeable   2 chemical elements do exist   3 molecules are unchangeable   4 elements are possible of change . . . . ( ) 65

SECTION I. INSTRUMENTS USED FOR MEASURING PHENOMENA OF NATURE

Score III, I (_____)

DIRECTIONS. In the parentheses after each use in Column 2 write the number of the instrument in Column 1 that applies to it.

COLUMN 1 (INSTRUMENTS)   COLUMN 2 (USES)

1. ammeter
2. barometer
3. compass
4. hydrometer
5. hygrometer
6. photometer
7. pyrometer
8. spring balance
9. thermometer
10. voltmeter

66. Measures atmospheric pressure . . . . (   ) 66

67. Measures pull of gravity . . . . (   ) 67

68. Determines the electrical pressure of an electrical current . . . . (   ) 68

69. Measures relative amount of moisture in the atmosphere . . . . (   ) 69

70. Measures high temperatures . . . . (   ) 70

SECTION J. MEN AND WOMEN OF SCIENCE   *Score III, J (_____)*

DIRECTIONS. In the parentheses after each achievement in Column 2 put the number of the person in Column 1 who made it.

COLUMN 1 (SCIENTISTS)   COLUMN 2 (ACHIEVEMENTS)

1. Archimedes
2. Bessemer
3. Burbank
4. Madame Curie
5. Dalton
6. Darwin
7. Davy
8. Faraday
9. Franklin
10. Galileo
11. Harvey
12. Jenner
13. Kelvin
14. Lavoisier
15. Linnæus
16. Lister
17. Mendelejeff
18. Newton
19. Pasteur
20. Volta

71. Explained the nature of lightning and for this and other reasons must be considered the earliest really great American scientist . . . . . . (   ) 71

72. Discovered (jointly) the element radium which started a new train of ideas regarding the nature of matter and energy . . . . (   ) 72

73. Perhaps the earliest real experimental scientist who made the first steps toward explaining the principles of machines . . . . (   ) 73

74. Showed how all bodies in the universe were held together . . . . (   ) 74

75. Discovered that the blood circulated through the bodies of animals . . . . (   ) 75

76. Invented the first device for producing electric current . . . . (   ) 76

77. Provided the means for conquering the human scourge smallpox through his discovery of anti-smallpox vaccine . . . . (   ) 77

78. Laid the foundation for the electron theory by showing the complex nature of the atom . . . . (   ) 78

79. Gave the first scientific explanation of fire . . . . (   ) 79

80. Discovered the chemical nature and composition of water . . . . (   ) 80

PART IV. SOCIAL STUDIES

SECTION A. CIVIC INFORMATION   *Score IV, A* (_____)

DIRECTIONS.   In the parentheses after each description in Column 2 put the number of the item in Column 1 that it describes.

COLUMN 1   (ANSWERS)   COLUMN 2   (DESCRIPTIONS)

1. Attorney-general
2. Cabinet
3. Committees
4. Electoral College
5. Federal
6. Government
7. Governor
8. House of Representatives
9. Mayor
10. People
11. President
12. Secretary of State
13. Senate
14. States
15. United States Supreme Court
16. Vice President

SAMPLE.   The most important public officer in the United States....................(*11*)

1. The commander in chief of the army and navy.(   ) 1
2. The body whose tenure of office depends upon its ability to retain the confidence of the President.............................(   ) 2
3. The body whose appointment by the President is for life...............................(   ) 3
4. The body which has two members elected from each state................................(   ) 4
5. The body, a majority vote of which elects the President of the United States.............(   ) 5
6. The Cabinet officer who advises the President on legal matters........................(   ) 6
7. The man who takes the place of the chief executive of the United States when the latter cannot serve...............................(   ) 7
8. The body whose membership depends solely upon population.........................(   ) 8
9. Congress has more time for deliberation and discussion of important bills because of.....(   ) 9
10. The body which has the right to try impeachment cases...............................(   ) 10

SECTION B. CIVIC INFORMATION   *Score IV, B* (_____)

DIRECTIONS.   The following statements and questions are about recent events and facts in politics and national civic affairs.   On the line after each statement write the word or phrase that correctly completes it.   On the line after each question write the correct answer to it.

11. "Oh, beautiful for spacious skies,
   For amber waves of grain,
   For purple mountains' majesties
   Above the fruited plain!" is part of...............(_____) 11

12. What is the most common way in the United States of selecting the most important county officers?.........(_____) 12

13. With what did the last Constitutional Amendment deal?.(_____) 13

14. "When, in the course of human events, it becomes necessary for one people to dissolve the political bonds which have connected them with another," etc., is part of.........(_____) 14

15. The "Two Per Cent Law" passed by Congress in 1924 concerned..(_____) 15

16. About how large is the population of the United States? (to the nearest ten millions)......................(_____) 16

17. About how many members are in the United States House
of Representatives?...................................(_____) 17

18–20. Amendments to the Constitution of the United States
must be approved by a __(18)__ vote in each house of Con-(_____) 18
gress and then ratified by the __(19)__ of __(20)__ of the states.(_____) 19
(_____) 20

21. The state system of payment of a part of wages to
employees injured in the course of employment is called(_____) 21

22. The name of the radical organization of labor which hoped
to bring about a social revolution is.................(_____) 22

23. The economic system operative in the United States is...(_____) 23

24. Indirect taxation in the United States is illustrated by
our system of....................................(_____) 24

25. The Federal body investigating business practices in the
United States is called...........................(_____) 25

26. Who is the Prime Minister of France?................(_____) 26

27. Who is the active head of the Soviet government of Russia?(_____) 27

28. Who is the President of Mexico?.....................(_____) 28

29. Who is the United States Ambassador to England?......(_____) 29

30. Who is the United States Secretary of the Treasury?....(_____) 30

SECTION C. FAMOUS AMERICANS   *Score IV, C* (_____)

DIRECTIONS. In the parentheses after each achievement in Column 2 put the
number of the famous American in Column 1 who made it.

COLUMN 1   (NAMES)

1. Brown, John
2. Calhoun
3. Clay
4. Cleveland
5. Davis, Jefferson
6. Douglas
7. Franklin
8. Hamilton
9. Jackson, Andrew
10. Jefferson
11. Lee, Robert E.
12. Lincoln
13. Madison
14. Mann, Horace
15. Monroe
16. Roosevelt
17. Washington
18. Webster
19. Whitney, Eli
20. Wilson, Woodrow

COLUMN 2   (DESCRIPTIONS AND ACHIEVEMENTS)

31. A leader in the establishment of the League of
Nations...................................(_____) 31

32. The first Secretary of the United States Treas-
ury Department, whose policy placed the
United States on a sane financial basis......(_____) 32

33. The President of the Confederacy...........(_____) 33

34. He fastened the "spoils system" on American
life ....(_____) 34

35. He was called the "Great Compromiser"....(_____) 35

36. He upheld the Monroe Doctrine in the first
dispute concerning Venezuela ....(_____) 36

37. He would have been executed in many countries,
but in the United States he has become a
national hero...........................(_____) 37

38. He advocated "popular" or "squatter"
sovereignty.............................(_____) 38

39. His influence held the constitutional con-
vention together........................(_____) 39

40. His name is attached to the treaty which
settled the Maine boundary..............(_____) 40

SECTION D. THE BACKGROUND OF AMERICAN CIVILIZATION

Score IV, D (_____)

DIRECTIONS. Column 1 is a list of persons. Column 2 is a list of dates. Column 3 is a list of influences on civilization. Column 4 is a list of events. Read the name of each event in Column 4. Then select from Column 1 the personage concerned with the event. Select from Column 2 the date of each event. Select from Column 3 the influence of each event on civilization. Write in the appropriate parentheses the numbers of the answers selected from each column.

COLUMN 1 (PERSONAGES)
1. Muhammad
2. William of Normandy
3. Pericles
4. Coster of Haarlem and Gutenberg
5. Luther and Calvin
6. Jesus of Nazareth
7. Copernicus, Galileo, and Roger Bacon
8. Cartwright and Stephenson
9. John Locke and the Whigs
10. Columbus and Magellan

COLUMN 2 (DATES)
1. 466 B.C.
2. 4 B.C.
3. 622
4. 1066
5. about 1466
6. after the 13th century
7. 1492–1519
8. 1517–1545
9. 1689
10. after 1765

COLUMN 3 (INFLUENCES ON CIVILIZATION)
1. established civil rights of man and gave impulse to the modern democratic movement
2. reawakened the spirit of adventure and led to the Europeanization of much of the world
3. promoted the idea of individual judgment in religion
4. expressed the idea of one God for a large group of Oriental people
5. changed the manner of living of people through new ways of doing work
6. formulated the code of ethics nominally accepted by most Western people
7. began the method of discovery of true knowledge through exact observation and experiment
8. established ideals of beauty in art and literature
9. began the national development of English-speaking people
10. released man from ignorance through dissemination of knowledge

COLUMN 4 (EVENTS)

41–43. Norman conquest of England...........................Personage (   ) 41
Date (   ) 42
Influence (   ) 43

44–46. Industrial Revolution...........................Personage (   ) 44
Date (   ) 45
Influence (   ) 46

47–49. Birth of Christ...........................Personage (   ) 47
Date (   ) 48
Influence (   ) 49

50–52. Reformation...........................Personage (   ) 50
Date (   ) 51
Influence (   ) 52

53–55. The flight from Mecca...........................Personage (   ) 53
Date (   ) 54
Influence (   ) 55

SECTION E. EVENTS IN AMERICAN HISTORY   *Score IV, E (_____)*

DIRECTIONS.   On the line after each event in Column 2 write the number of the period in Column 1 during which it occurred.

COLUMN 1 (PERIODS OF AMERICAN HISTORY)

1. Discovery Period
2. Colonization Period
3. Revolution and Constitution Period
4. Early Federal Period (1789–1814)
5. Period of 1815–1831
6. Period of Slavery Controversy (1832–1861)
7. Civil War and Reconstruction Period (1861–1876)
8. Period of Economic Development (1877–1896)
9. Period of Beginning World Power (1896–1914)
10. Period of World War and Present

COLUMN 2   (EVENTS)

56. Prohibition Amendment.......(   ) 56
57. First practical use of automobile. (   ) 57
58. Louis XIV and England struggle for world supremacy.........(   ) 58
59. First locomotive used in America. (   ) 59
60. Bacon's Rebellion.............(   ) 60
61. The First Hague Conference...(   ) 61
62. Sherman Anti-Trust Act.......(   ) 62
63. Kentucky and Virginia Resolutions.....................(   ) 63
64. Migration of Mormons.........(   ) 64
65. Lewis and Clark Expedition....(   ) 65
66. Military Expedition against Villa(   ) 66
67. "Bulls of Demarcation".......(   ) 67
68. Morse invents magnetic telegraph(   ) 68
69. Atlantic Cable opened.........(   ) 69
70. Slavery prohibited in Northwest Territory.............(   ) 70

SECTION F. FAMOUS CHARACTERS OF WORLD HISTORY   *Score IV, F (_____)*

DIRECTIONS.   In the parentheses after each achievement in Column 2 write the number of the person in Column 1 who made it.

COLUMN 1   (CHARACTERS)

1. Alexander the Great
2. Aristotle
3. Augustus Octavius
4. Bismarck
5. Cavour
6. Confucius
7. Constantine
8. Darius
9. Gladstone
10. Guatama Buddha
11. Hammurabi
12. Justinian
13. Loyola
14. Napoleon
15. Peter the Great
16. Pitt
17. Plato
18. Rousseau
19. Voltaire
20. Wycliffe

COLUMN 2   (ACHIEVEMENTS)

71. The ruler of the greatest empire in the world before the time of Alexander the Great........(   ) 71
72. Often called the Father of Natural History, the founder of political science, earliest great "free, modern thinker"...................(   ) 72
73. The teacher whose practical teachings concerning the regulation of conduct still influence millions of people.......................(   ) 73
74. The Roman Emperor who codified Roman law, thus influencing greatly the legal development of later Europe.........................(   ) 74
75. The first to translate the Bible into English....(   ) 75
76. The ruler who started the Europeanization of Russia.................................(   ) 76
77. The first of the Roman Emperors.............(   ) 77
78. The man whose policies were responsible for the rapid development of the German Empire....(   ) 78
79. The prime minister whose policies enabled England to conquer France in America and India..(   ) 79
80. A voluminous author and letter writer who criticized the social, political, and religious institutions of Europe.........................(   ) 80

SECTION G.   INTERNATIONAL AFFAIRS
Score IV, G (_____)

DIRECTIONS.   In the parentheses after each question in Column 2 write the number of the reason in Column 1 that answers it.

COLUMN 1 (GEOGRAPHICAL REASONS)

1. It has more imports and exports than any other nation.
2. It has many short mountain ranges which make natural barriers.
3. The use of the Panama Canal greatly increases the trade.
4. It controls one of the world's greatest commercial routes.
5. It is open to all nations to use on equal terms.
6. It would be a great help in time of war.
7. It has the best harbor in the district.
8. It has coal and iron, and therefore the most manufacturing.
9. Others are better situated for trade and transportation.
10. It is less dependent on other countries for food and products.
11. It has varied resources and much land awaiting settlement.
12. It offers a good market for manufactures.
13. Location and climate were not so favorable.
14. Diseases are being conquered.
15. The benefit of trade was recognized.
16. It is a question of lower standards of living.
17. Isolation is caused by mountain and ocean barriers.
18. Natural resources are very great and the people are progressive.

COLUMN 2   (QUESTIONS)

81. Why are there so many countries in Europe?.........................(   ) 81
82. Why is the population of South America only half that of the United States?(   ) 82
83. What is the meaning of "the Danube is internationalized"?..............(   ) 83
84. Why are many nations interested in Constantinople?....................(   ) 84
85. Why was the purchase of Alaska not a foolish waste of money?...........(   ) 85
86. Why has France much less foreign trade than Great Britain?.............(   ) 86
87. Why does Great Britain value Gibraltar?.............................(   ) 87
88. Why is Chinese civilization so different from that of other nations?.........(   ) 88
89. Why does New Orleans now handle more foreign trade than any other American city except New York?.................................(   ) 89
90. Why are the people of the United States becoming more and more interested in South America?..(   ) 90

SECTION H.   PLACE GEOGRAPHY
Score IV, H (_____)

DIRECTIONS.   On the line after each city write the name of the country or political division in which it is.

91. Buenos Aires ....(_____) 91
92. Geneva.......................................(_____) 92
93. Canton......................................(_____) 93
94. Suez Canal ....(_____) 94
95. Fiume ....(_____) 95
96. Vladivostok..................................(_____) 96
97. Prague.......................................(_____) 97
98. Vera Cruz....................................(_____) 98
99. Antwerp ....(_____) 99
100. Canberra....................................(_____) 100

SECTION I. NAMES ASSOCIATED WITH ECONOMICS   *Score IV, I (_____)*

DIRECTIONS. In the parentheses after each description in Column 2 write the number of the man in Column 1 to whom it refers.

COLUMN 1 (MEN)

1. Clayton
2. Dawes
3. George, Henry
4. Gompers, Samuel
5. Lewis, J. L.
6. Malthus
7. Mercantilist
8. Physiocrat
9. Shaw, G. B.
10. Smith, Adam

COLUMN 2 (DESCRIPTIONS)

101. One school of economists who believed in the government regulation of business.........( ) 101

102. An outstanding president of the United Mine Workers of America....................( ) 102

103. The co-author of the plan which arranged the present settlement of the German indemnity payments.............................( ) 103

104. The author of the theory which stated that the population would tend to outrun the means of subsistence.........................( ) 104

105. A leader of the Fabian Socialists who believes in education rather than in political action.( ) 105

SECTION J. ECONOMIC VOCABULARY AND ARGUMENTS   *Score IV, J (_____)*

DIRECTIONS. In the parentheses after each fact or description in Column 2 put the number of the economic term in Column 1 that it describes or refers to.

COLUMN 1 (ECONOMIC TERMS)

1. agriculture
2. boycott
3. budget
4. business cycles
5. corporations
6. dividends
7. entrepreneur
8. Federal Reserve System
9. good money
10. immigration
11. laissez-faire
12. large-scale production
13. monopoly
14. organized labor
15. production
16. protection
17. sabotage
18. standard of living
19. unearned increment

COLUMN 2 (FACTS AND DESCRIPTIONS)

106. That part of the profits of a corporation which is paid to the stockholders.............( ) 106

107. A statement of expected income and intended expenditure for the coming year..........( ) 107

108. The creation of utilities....................( ) 108

109. That control over supply which gives the power to fix the price...................( ) 109

110. Increase in the value of real estate due to social progress is often called...................( ) 110

111. The saving of time, the development of skill, and the adaptation of ability and natural resources are advantages of.............( ) 111

112. Much greater capital, continuation after death of present owners, greater efficiency of management, limited liability, and transferability of stock are advantages claimed for( ) 112

113. Lack of credit facilities, unfavorable climatic conditions, and inadequate market facilities have been advanced as obstacles of......( ) 113

114. Durability, portability, homogeneity, divisibility, and cognizability are physical characteristics of.......................( ) 114

115. That it promotes nationalism, fosters infant industries, and makes home markets surer are arguments given for.................( ) 115

Name...

Directions for West Springfield High School Scholastic
Aptitude Test.

This is not a test of what you have learned. In fact
before you begin the test you are not supposed to know the
answers to any of the questions in it. It is intended to
be a test of your ability to <u>learn</u> certain things which
you will meet in high school. In every part of the test,
you will be given an opportunity to learn the answers to
the questions. Some of the answers you may find difficult
to learn but do not feel discouraged because no one is
supposed to make a perfect score. Do the best you can in
the time allowed.

The first papers to be passed out are study sheets and
they will be handed to you face down. Do not look at them
until told to do so. After these are studied, they will
be collected and the test will be given to you.

(Study sheets are passed out and handed to pupils
face down).

Now look at the study sheets and read the directions
under Section I while I read them over with you. (Read
directions) The printed material under part B has nothing
to do with the drawing.

You will be allowed 5 minutes to study. Begin .

Now turn to the next sheet Section II and look at the
directions while I read them. (Read Directions)

You will be allowed 3 minutes to study. Begin.

Now turn to next sheet Section IV part A and look at directions while I read them. (Read directions)

You will be allowed 3 minutes to study. Begin.

Now turn to next sheet Section IV part B and look at directions while I read them. (Read directions)

You will be allowed 3 minutes to study. Begin.

Now turn to next sheet, Section V and look at directions while I read them. (Read directions)

You will be allowed 4 minutes. Begin.

If you get through before time is up, you may turn back and study any of the other sheets.

Now turn your papers over and pass them forward. (Study sheets are collected and tests are given out.)

Write your name on the line indicated and your age.

Now turn to first sheet Section III and look at the directions while I read them. (Read directions)

You will be allowed 10 minutes. Begin.

Turn to next sheet Section I part A and look at directions while I read them. (Read directions.)

You will be allowed 4 minutes. Begin.

Now turn to next sheet Section I part B and look at directions while I read them (Read directions)

You will be allowed about 4 minutes. Begin.

Now turn to next sheet Section II and look at directions while I read them. (Read directions)

You will be allowed about 3 minutes. Begin.

Turn to next sheet section IV part A and look at directions while I read them. (Read directions)

Now turn to next sheet section IV part B and look at directions while I read them. (Read Directions)

You will be allowed about 4 minutes. Begin.

Now turn to next sheet, Section V part A and part B. Look at directions while I read them. (Read directions)

You will be allowed about 5 minutes.

Directions:-

Study thoroughly the drawing and the printed material on this
sheet. You will be asked questions about it later. You will not
be asked to reproduce the drawing.

PART I

GRASS-HOPPER
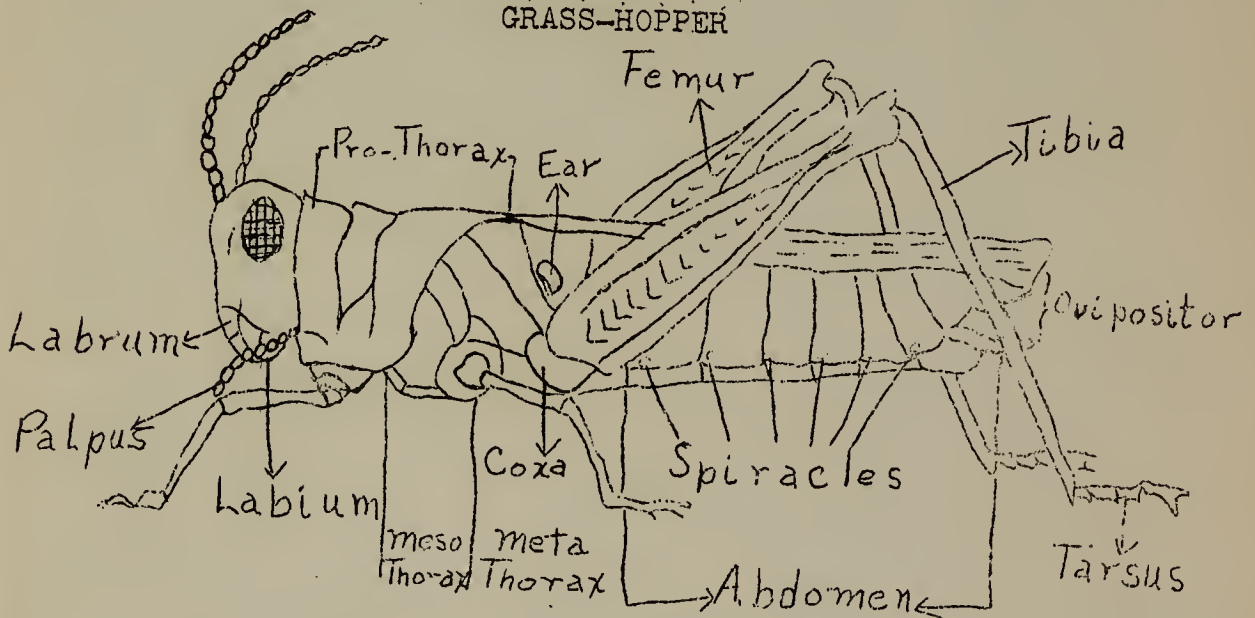
Part B

1. Metamorphosis is the change of form undergone from egg to adult,
   as in insects.

2. Operculum is a lid or flap in fishes, covering the gills.

3. Pharynx is an irregular cavity at the back of the mouth.

4. Proglottids are reproductive body segments of a tapeworm.

5. Diastase is an enzyme in plants which changes starch to sugar.

6. Cerebrum is the front part of the brain.

7. Chlorophyll is the green coloring matter of plants.

8. Ganglion is a mass of nerve tissue.

9. Pseudopodia are projections of protoplasm used for locomotion
   in the amoeba.

10. Pylorus is the valve between the stomach and the small
    intestines.

11. Diaphragm is the muscular wall at the base of the lungs.

Study carefully the paragraph below. Read it over as many times as you can until you are asked to stop. You will be asked questions on it later.

Charles the second was thirty years old on the day that he entered London, May 29, 1660. He had received little systematic instruction from books; but his life had been a stirring one, full of harsh and varied lessons in the great school of experience. As a boy of twelve he had narrowly escaped capture at Edgehill; when only fifteen, he had put in nominal command of the royal army of the West, and early in 1646, by the order of his father, he fled from England. Then followed long years of exile. Often out at the elbows; the recipient of grudging advances from those who found him a burden; disappointed, time and again, in his efforts to come to his own, he displayed through all his adversity the single virtue of cheerfulness. Once, and once only, he manifested an unselfishness that was truly praiseworthy. In order to "save his father's head" he forwarded to Parliament a sheet of paper with his signature attached, offering to observe whatever conditions they might choose to insert. At all times he appears simply as a "needy and frivolous but agreeable prince." "Who continually vexed his grave and learned councilor, Hyde, by his unwillingness to work and his loose habits". His brief experience in Scotland under the "sour tyrannies of the Kirk" led him to declare that Presbyterisnism "was not a religion for a gentleman," and emphasized by contrast the "gorgeous cermonies and easy morals," of Roman Catholicism as he found it in France. That became his faith, so far as he can be said to have had any, though he was not received into the fold of the Church until he lay on his deathbed. Although he hated the details of business and was too sensible to believe in the Divine Right of Kings, he aimed to keep as free from parliamentary controls as possible; to that end he set up a standing army, he sought to re-introduce Roman Catholicism, to secure toleration for dissenters, and futhermore allied himself with France. He bribed, flattered, and managed, but fully alive to his royal limitations he yielded when popular opposition proved too strong. Thus, before the close of his reign he gave up all his projects except the Frehch alliance to which he clung tenaciously with a political cunning rare in history he shifted to the Anglicanside and by playing the Anglicans and the French against one another he managed to spend his last years free from parliamentary restraint.

Part A

Directions:- You are to study this map carefully. Later you will be asked questions on it. You <u>will</u> <u>not</u> be asked to reproduce the map.

SECTION IV
PART B

Directions:- You are to study the statements below. You will be
asked questions about them later.

1. The Roosevelt Dam is seventy miles from Phoenix, Arizona,
   and is used to store water for irrigation.

2. The official language of the people of Mexico is Spanish.

3. The mines of Sudbury, Canada, produce about 2/3 of the
   nickel of the world.

4. Coffee is the only crop of importance on the Pacific coast
   of Central America.

5. Platinum is found in Russia and in Columbia.

6. The climate of England is modified by the Gulf Stream.

7. An arm of the sea extending into the land is called a fiord.
   And there are many of these in Norway.

8. Singapore is the great commercial city of the East Indies.

9. India and Japan have the best railroads of all the Asiatic
   countries.

10. The most valuable tree within the tropics is the coconut tree.

11. Buenos Aires in Argentina is an important and modern city.

12. Denmark is known all over the world for its bacon.

13. The Rhine River in Germany is famous for its scenic beauty.

14. Hawaii sends a great deal of sugar and pineapples to the
    United States.

15. Cork is the bark of a species of oak tree that grows in
    Portugal.

16. Switzerland has the most democratic government in the world.

17. The largest line of manufacturing in Japan is cotton goods.

18. The three great sugar beet countries of Europe are Poland,
    Germany, and France.

19. Cinchona or Peruvian bark supplies quinine, one of the most
    important drugs of commerce.

20. Rabbits do an enormous amount of damage to the crops in
    Australia.

SECTION V

Part A

As we look back upon the age of Elizabeth, we are conscious of certain outstanding features. It was, first of all, an age of change and expansion. Within the lifetime of Shakespeare the religion of England changed from something close to Catholicism to something close to Puritanism. Within his lifetime England changed from a position of comparative isolation and international insignificance to a position of proud national strength, capable of resisting on the sea the full strength of Spain, then the dominant European power.

(Social Backgrounds of Eng. Lit.)

Part B.

The world stands out on either side

No wider than the heart is wide;

Above the world is stretched the sky,

No higher than the soul is high.

The heart can push the sea and land

Farther away on either hand;

The soul can split the sky in two

And let the face of God shine through.

But East and West will pinch the heart

That cannot keep them pushed apart;

And he whose soul is flat--the sky

Will cave in on him by and by.

Edna St. Vincent Millay

WEST SPRINGFIELD

HIGH SCHOOL

SCHOLASTIC APTITUDE TEST

FOR SENIOR HIGH FRESHMEN

Prepared by H. N. Glick and Chas. P. McDonnell

Name. . . . .
(Last name)   (Given names or initials)

Age . . . . . .

	Score
Section I.	. . . .
Section II	. . . .
Section III.	. . . .
Section IV	. . . .
Section V.	. . . .
Gross Score.	. . . .

/

PART A

Directions:-

This is the drawing you studied; the parts are numbered and the names of the parts are below the drawing. You are to copy the number of each part in the parenthesis after the name of that part. Example:- Number 1 is the Labrum, so 1 is placed in the parenthesis after Labrum. Do nothing with the names of parts which do not belong to this drawing.
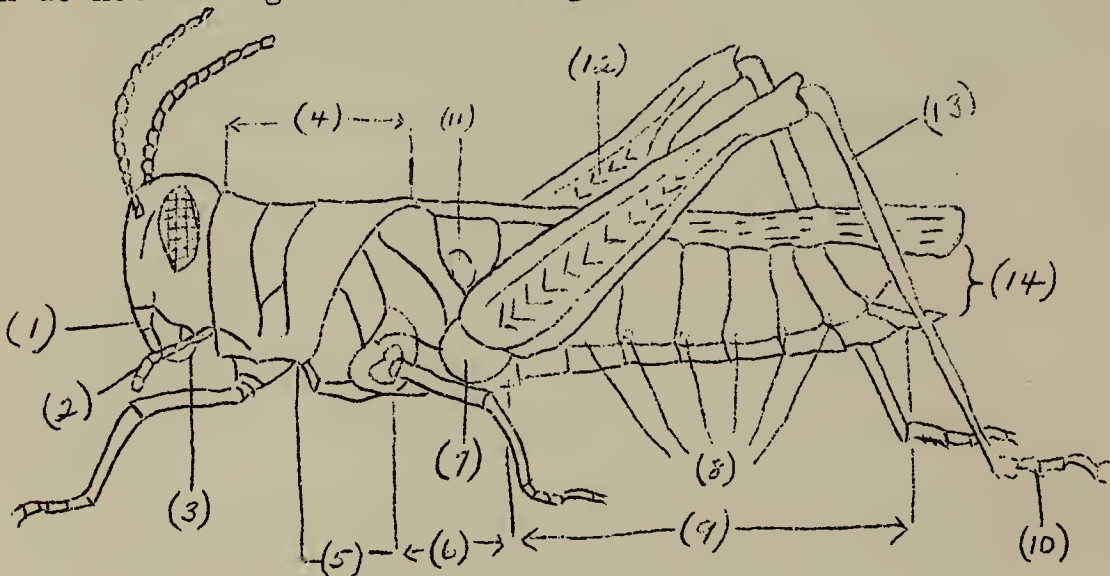
Part B

Labrum.................(1)

Abdomen...............( )

Meta-Thorax...........( )

Ovipositor............( )

Pro-Thorax............( )

Meso-Thorax...........( )

Femur.................( )

Tibia.................( )

Mandibles.................( )

Spiracles.................( )

Tarsus....................( )

Ear.......................( )

Labium....................( )

Palpus....................( )

Coka......................( )

Maxillipeds...............( )

Directions: (Part B)

Below are the definitions which you studied with the terms defined left out. The terms defined are in the list of terms below. What you are to do is to copy the number of the definition in the parenthesis after the term which the definition best defines. Example: Definition number 1 defines Metamorphosis, so 1 is placed in the parenthesis after Metamorphosis. Do nothing with the terms in the list which are not defined by any of the definitions.

1. ---------is the change of form undergone from egg to adult, as in insects.

2. ---------is a lid or flap in fishes, covering the gills.

3. ---------is an irregular cavity at the back of the mouth.

4. ---------are reproductive body segments of a tapeworm.

5.---------is an enzyme in plants which changes starch to sugar.

6. ---------is the front part of the brain.

7. ---------is the green coloring matter in plants.

8. ---------is a mass of nerve tissue.

9. ---------are projections of protoplasm used for locomotion in the amoeba.

10. ---------is the valve between the stomach and small intestines.

11. ---------is the muscular wall at the base of the lungs.

_____

metamorphosis................(1)	operculum.................( )
pharynx.....................( )	proglottids..............( )
chlorophyll.................( )	diastase.................( )
ganglion....................( )	cerebrum.................( )
pylorus.....................( )	pseudopodia..............( )
diaphram....................( )	pancreas.................( )

SECTION II

Directions:

Below are some statements taken from the paragraph you studied in Section II. You are to place a check after the expression which you think best completes the statement. Example: In the first statement a check is placed after the date 1660. Check only one expression in each statement.

1. Charles II entered London in the year

1660	✓
1672	
1650	

2. When he entered London he was

20	
40	
30	

years old.

3. He gained most of his education in the great school of

Cambridge	
Oxford	
Experience	

4. On his father's orders he fled from England in the year of

1630	
1646	
1655	

5. During his exile he was

| never | |
| always | |

in need of money.

6. Charles was usually

| sad | |
| happy | |

7. His councilor's name was

Hyde	
Cromwell	
Peel	

8. The religion which he said was not for a gentleman was the

Presbyterian	
Baptist	
Catholic	

religion.

9. The religion he preferred was the

Methodist	
Presbyterian	
Catholic	

religion.

10. As a worker he was

| lazy | |
| industrious | |

11. His habits were

| strong | |
| loose | |

12. He escaped capture at Edgehill when he was

12	
18	
20	

years old.

13. He was received into the Catholic Church

| on his death bed | |
| at his coronation | |

14. Most of the time Charles was

| selfish | |
| unselfish | |

15. In this paragraph

France	
Italy	
Spain	
Germany	

was mentioned.

16. Charles would probably have made a

| good | |
| poor | |

business man.

17. He allied himself with

France	
Sweden	
Holland	

18. He tried to re-introduce the

Methodist	
Catholic	
Baptist	

religion.

19. As a politician he was considered

cunning	
good	
fair	

20. At the close of his reign he shifted to the

Anglican	
Catholic	
Presbyterian	

religion.

SECTION III

Directions: On this sheet you will find a vocabulary, some rules and some sample sentences of an artificial language. On the oppo- site sheet are some English sentences and just beneath each English sentence is its translation into the artificial language. Some of these translations are correct and some are incorrect. You are to study the language on this sheet and draw a line through every word which is ~~incorrectly~~ translated on the opposite sheet. Do not try to memorize the vocabulary and forms on this sheet but you may consult them freely while checking the translation. If you mark through correctly translated words, it will count against you.

Vocabulary

I--ego	difficult--ne
see--set	at--mo
the--le	to--fo
cat--moh	lesson--esson
dog--can	study--etud
and--et	she--fe
run--unray	he--fu
away--ay	house--chi
that--lat	that--lat
boy--gar	away--ay
good--ber	run--unray
school--lol	and--et
like--mek	dog--can
girl--far	cat--moh
for--or	the--le
large--gat	see--set
home--chien	I--ego
is--as	
book--ko	

Rules

1. Plurals of nouns and pronouns are formed by adding "w"
   Example: we--egow
   they--luw

2. Past time is indicated by placing "ez" before the verb.
   Example: see--set
   saw--ezset

3. Opposites are formed by adding "en"
   Example: difficult--ne
   easy--neen

4. The objective case is indi- cated by placing "om" before the noun or pronoun
   Example: him--omtu
   them--omtuw

Samples: (The incorrect trans- lations are marked.)

A. I see the dog.
   ego ~~unray~~ le ~~meh~~

B. The house is large.
   le ~~chien~~ as ~~gaten~~.

1. I see the cat.
    ego set lat moh.

2. The cat sees me.
    le moh set omego.

3, The dog runs away.
    fo can unray chi.

4. He ran to the cat.
    fe etud et le ko.

5. He saw that dog.
    fu ezset lat can.

6. The house is large.
    le chien ezas gat.

7. She studies the lessons.
    fe   etud   le essonw.

8. He studied at home.
    fu ezetud fo chien.

9. He runs to that house.
    or unray fo le   lol.

10. The lesson was difficult.
    le esson as   ne.

11. The good boy studied the lessons at school.
    ko   ber far   ezetud les essonw mo   lol.

12. The cat and the boy were at home.
    le moh   et lat gar ezas mo chien.

13. The lesson was easy for her.
    le gat   as   neen fo omfe.

14. The dog ran to the girl.
    le can ezunray fo le far.

15. They saw the dog and cat.
    fu set le can et moh.

16. That boy likes the girl and she likes him.
    lat gar mek   le far le fe gat omfu.

17. We saw a large boy and small girl.
    ego set   gat gar et gar far.

18. The boy ran to the house for that book.
    le gar unray fo le chi or lat ko.

19. The girl is studying the difficult lessons.
    le gar as   le   neen   esson.

Directions: This is the map you studied with the names left out.
The names are given in the column at the left of the sheet. You
are to place the numbers that are on the map in the parentheses
after the names on the left. Example: The section of the map
where you see a number 1 is Brazil; so you place a 1 in the
parenthesis after the name Brazil.

Brazil   (   )
Buenos Aires   (   )
Columbia   (   )
Bolivia   (   )
Guiana   (   )
Uruguay   (   )
Peru   (   )
Venezula   (   )
Chile   (   )
Amazon River   (   )
Rio Janeiro   (   )
Santiago   (   )
Ecuador   (   )
Parana River   (   )
Paraguay   (   )
Caracas   (   )
Panama Canal   (   )
San Francisco River (   )
Argentina   (   )
Trinidad Island (   )
Para   (   )
Santos   (   )
Lima   (   )
Quito   (   )

Section IV
Part B

Directions:- Below are the statements you studied with the answers
left out. You are to copy the number of the statement in the paren-
thesis after the word that best completes the statement. Example:
The word that best completes the first statement is Roosevelt Dam,
so a 1 is placed in the parenthesis after the word Roosevelt Dam.

1. The _____ is seventy miles from Phoenix, Arizona and is
   used to store water for irrigation.
2. The official language of the people of Mexico is _____.
3. The mines of Sudbury, Canada produce about 2/3 of the _____
   of the world.
4. _____ is the only crop of importance on the Pacific coast
   of Central America.
5. Platinum is found in _____ and _____.
6. The climate of _____ is modified by the Gulf Stream.
7. An arm of the sea extending into the land is called a _____.
8. _____ is the great commercial city of the East Indies.
9. _____ and _____ have the best railroads of all the Asiatic
   countries.
10. The most valuable tree within the tropics is the _____ tree.
11. _____ in Argentina is an important and modern city.
12. _____ is known all over the world for its bacon.
13. The _____ _____ in Germany is famous for its scenic
    beauty.
14. _____ sends a great deal of sugar and pineapples to the
    United States.
15. Cork is the bark of a species of oak tree that grows in _____.
16. _____ has the most democratic government in the world.
17. The largest line of manufacturing in Japan is _____
18. The three great sugar beet countries of Europe are _____,
    _____ and _____.
19. Cinchona or Peruvian bark supplies _____, one of the most
    important drugs of commerce.
20. Rabbits do an enormous amount of damage to the crops in _____.

Roosevelt Dam .....(1)   England.......(   )   Spanish.......(   )

Germany...........(   )   Russia........(   )   India.........(   )

Poland............(   )   Singapore.....(   )   Coffee........(   )

Columbia..........(   )   Denmark.......(   )   Hawaii........(   )

Nickel............(   )   Rhine River...(   )   Quinine.......(   )

Coconut...........(   )   France........(   )   China.........(   )

Switzerland.......(   )   Cotton goods..(   )   Fiord.........(   )

Portugal..........(   )   Buenos Aires..(   )   Norway........(   )

Australia.........(   )   Japan.........(   )

Directions: Part A.   Below is the substance of the first selection
you read with some numbered blanks indicating that some of the
words are left out.   The words left out are listed below.   You are
to copy the number of each blank in the parentheses after the word
which belongs in the blank.

As we look back upon the age of __(1)__ we are conscious of
certain outstanding features.   It was, __(2)__, of all an age of change
and __(3)__.   Within the lifetime of __(4)__ the __(5)__ of England
changed from something close to __(6)__ to something close to __(7)__.
Within his lifetime __(8)__ changed from a __(9)__ of comparative
__(10)__ and international insignificance to a position of proud
__(11)__ __(12)__, capable of resisting on the sea the full
strength of __(13)__, then the dominant __(14)__ __(15)__.
                                (Social Backgrounds of Eng. Lit.)

Elizabeth.............( )   progress.............( )
expansion............( )   Catholicism..........( )
strength.............( )   Shakespeare..........( )
Spain................( )   isolation............( )
Puritanism...........( )   national.............( )
England..............( )   religion.............( )
position.............( )   first................( )
development..........( )   power................( )
European.............( )   leadership...........( )
most.................( )

_____PART   B_____

Directions:--Answer the following questions according to the poem
which you read.   If a statement is true, check (✓) true: If it
is false check false; if the poem doesn't say whether a statement
is true or false, check didn't say.   The samples are checked
correctly.

	true	false	didn't say
Samples: 1. The world stands out on either side	✓		
2. The world is wider than the heart.		✓	
3. The world is bigger than the planets.			✓
1. The poem implies the existence of God.			
2. The world is bounded by the heart.			
3. The sky stretches higher than our souls.			
4. The world itself helps us to find God.			
5. The soul can let the face of God shine through the sky.			
6. Narrow horizons will pinch the heart that doesn't expand.			
7. Mountains help to expand our hearts.			

Approved by:

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Date _____