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**THE SIZE OF HIGH SCHOOLS IN SOUTH DAKOTA  
AS A VARIABLE IN DEVELOPMENTAL  
ABILITY**

**BY**

**BARBARA DENBOW SINCLAIR**

**A thesis submitted  
in partial fulfillment of the requirements for the  
degree Master of Science, Department of  
Education, South Dakota State  
College of Agriculture  
and Mechanic Arts**

**August, 1959**

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THE SIZE OF HIGH SCHOOLS IN SOUTH DAKOTA  
AS A VARIABLE IN DEVELOPMENTAL  
ABILITY

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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Thesis Adviser

Head of the Major Department

## ACKNOWLEDGEMENTS

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B. A. S.



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## CHAPTER I

### THE PROBLEM AND DEFINITION OF TERMS

In recent years an increasing concern about the quality of the secondary school systems has led educators to consider the advantages and disadvantages of reorganization. Attempts to determine the optimum size for a high school have prompted investigation of various aspects of the problem such as cost, curriculum, participation in extra-curricular activities, and student, teacher, and community attitudes.<sup>1</sup> Although several of these areas have been investigated quite thoroughly, in only a few instances has experimental evidence relating to student performance in different size high schools been presented.<sup>2</sup>

This study attempts to show the relationship of developed ability and achievement to size of high school. The investigator feels that too much value has been given to factors like cost, the desire of the community to have a local athletic team, or proximity of the school plant. Over emphasis on these factors has resulted in neglect of student performance.

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<sup>1</sup>M. L. Hartung, "Is There an Optimum Size for a High School?", School Review, vol. 50, 68-70, The University of Chicago: Chicago, Illinois, 1953.

<sup>2</sup>Information on similar studies can be found in Chapter II, "Review of Literature".

### The Problem

The feeling that an ultimate criteria for determining optimum school size should be student achievement, not factors like those mentioned above, prompted an investigation based on the following purposes:

1. To compare the ability and developed ability of student groups from high schools differing in enrollments, using the variable size of high school;
2. To determine whether a relationship exists between first year college grade point average and size of high school;
3. Using the same variable as above, to contrast college freshmen English grades.

To facilitate the analysis of this study certain null hypotheses have been formulated. The use of these hypotheses assumes that any observable differences may be attributed to chance factors. The hypotheses will be rejected if the data found indicates results are significant at the one percent level of confidence.

The first three hypotheses were designed to compare ability levels of ninth graders. Acceptance of these statements will mean that no mean difference in mental ability exists among South Dakota high school freshmen from high schools of differing sizes.

1. No significant difference in verbal ability exists among students from various size high schools as measured by the "language factors" score on the "California Short Form Test of Mental Maturity".
2. No significant difference in quantitative ability exists among students from various size high schools as measured by the "non-language factors" score on the "California Short Form Test of Mental Maturity".
3. No significant difference in total ability exists among students from various size high schools as measured by the "total mental factors" score on the "California Short Form

### **Test of Mental Maturity".**

Hypotheses four, five, and six were established to contrast the developed ability levels of students from different size secondary schools. Acceptance of these hypotheses will show that no mean difference is found among South Dakota twelfth graders in developed ability, regardless of the size of the high school.

4. No significant difference in linguistic developed ability exists among students from various size high schools as measured by the "verbal" score on the "Cooperative School and College Ability Test".
5. No significant difference in quantitative developed ability exists among students from various size high schools as measured by the "quantitative" score on the "Cooperative School and College Ability Tests".
6. No significant difference in total developed ability exists among students from various size high schools as measured by the "total" score on the "Cooperative School and College Ability Test".

The last two hypotheses relate college achievement to size of secondary school. Affirmation of their validity will indicate that size of high school is not a variable in determining first year college grade point average and first year college English grades.

7. No significant difference in college achievement exists among students from various size high schools as determined by first year college grade point average.
8. No significant difference in English achievement exists among students from various size high schools as determined by first year college English grades.

### **Scope of the Study**

The study included an examination of the purposes mentioned above. The student sample used for comparing ability and developed

ability encompassed all South Dakota high school seniors during the 1956-57 school year, who had remained in the same school system for four years and participated in both the "California Short Form Test of Mental Maturity"<sup>3</sup> at the ninth grade level and the "Cooperative School and College Ability Test"<sup>4</sup> when they were seniors. This was 5068 of the twelfth graders from 241 of the 296 secondary schools in the state that year. Comparison of college freshmen grade point averages and English scores included the students from this group who entered South Dakota colleges in the fall of 1957 and completed the first year of college.

Although the sample used for this study was based on students in South Dakota high schools, it may be of predictive value in states with similar educational conditions.

Definition of terms

Because there is some difference of opinion as to the meaning of certain terms in the counseling and guidance field, an interpretation of several words and phrases is included here. These definitions are to be used with reference to the terms in this paper.

"Developed ability" is an "estimate of the capacity of each

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<sup>3</sup>E. T. Sullivan, W. W. Clark and E. W. Tieg, "California Short Form Test of Mental Maturity", California Test Bureau: Los Angeles, California, 1950.

<sup>4</sup>"Cooperative School and College Ability Tests", Form IA, Educational Testing Service; Princeton, New Jersey, 1955.



individual student to undertake the academic work of the next high level of school".<sup>5</sup>

"Mental ability" may be defined as "the person's performance on a task at present, with maximum motivation but without further training".<sup>6</sup>

"Grade point average" is the arithmetic mean of the grades an individual has attained (in this case while in college). Grade point average is determined by attaching numerical values to grades: A - 4, B - 3, C - 2, D - 1, F - 0.

#### Limitations of the Study

Although much information can be found on various phases of the reorganization issue, little research has been done relating size of school to developmental ability. Some is limited in scope; while other information is not applicable to this problem. This situation made it difficult to compare the results of other investigations with the information presented here.

One unavoidable limitation relating to test administration must be realized. The general procedure of the Statewide Testing Program<sup>7</sup> is to send uniform materials and instructions to each high school,

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<sup>5</sup>"Examiner's Manual: Cooperative School and College Ability Test", p. 3, Educational Testing Service: Princeton, New Jersey, 1955.

<sup>6</sup>L. J. Cronbach, Essentials of Psychological Testing, p. 13, Harper and Brothers: New York, New York, 1949.

<sup>7</sup>Statistical data used in this study was taken from the records of the Statewide Testing Program sponsored by South Dakota Department of Public Instruction.



requesting it, during the fall semester. The tests are administered by someone designated by the school. The testing skill of these administrators is difficult to determine and control. The possibility of some variation in test administration, physical conditions, and mental attitude should not be overlooked.

This researcher does not wish to imply that the variables considered in this thesis are the only ones nor the most important ones involved with this problem. Many factors might have been considered, but it was felt that three variables--size of school, developed ability, and achievement best served the purpose established here.

#### Organisation of the Remainder of the Study

Following the review of literature and the description of the procedures used in this study, a chapter each is designated to the presentation and interpretation of data, and the summary and conclusions.

## CHAPTER II

### REVIEW OF LITERATURE

A survey of past studies and reports was made to provide a better understanding of the problem. Information pertaining to the size of school related to ability and achievement is lacking. General studies, however, concerning size of school are more frequent.

Those studies found that were considered to have any bearing on on the present problem will be presented here in brief form.

In a 1953 School Review article, Hartung<sup>8</sup>, discussing the factors which he felt should be considered in deciding the optimum size for a high school, pointed out:

No definite answer seems to be available in the literature. If an answer is eventually secured, it will probably not be found in a single figure. Instead, a formula may be evolved which will yield an optimum figure for a given community in terms of certain specified assumptions and local conditions.<sup>9</sup>

His statement supports the importance of investigating every influencing criteria, including such factors as developed ability and achievement.

Some of the other areas which Hartung felt should be considered were cost of operation, evaluation of curriculums, services provided (like guidance, libraries, cafeterias, and health), student attitudes, social activities, services the school can provide for the community, and facilities for the faculty.

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<sup>8</sup>M. L. Hartung, "Is There an Optimum Size for a High School", School Review, vol. 61, 68-72, The University of Chicago: Chicago, Illinois, 1953.

<sup>9</sup>Ibid., p. 68.

The article was concluded with the following suggestion: "The solution of the problem under discussion here, optimum size of school, could be helped materially if the designers of such studies would plan in advance to study and report upon relevant variables as a function of school size".<sup>10</sup>

Five years previous to Hartung's article a bulletin appeared analyzing the Illinois secondary school curriculum program. An investigation of "drop-out rate" in 22 schools outside the city of Chicago during 1947-48 revealed that "the wide variation in holding power of the schools must be accounted for on the basis of factors other than school size".<sup>11</sup> The holding power of the five largest and five smallest schools in the study was very closely the same for both sexes. The report concluded that persistence in high school was one factor which could not be correlated with size of school.

Extracurricular activities, as related to size of high school in Indiana, was investigated by Jung and Fox and published in a 1952 bulletin by the University of Indiana. A sample of 442 schools was divided into six groups, the largest including schools with 750 students or more and the smallest having schools with fewer than 100 pupils. Although many of the 37 factors investigated showed no extreme variations among schools of different size, on a number of important issues "the larger schools are more likely to be in the position favored by modern

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<sup>10</sup>Ibid., p. 70

<sup>11</sup>Ibid., p. 70

educational theory".<sup>12</sup> In general the larger schools appeared to be better established and organized. More of this group had written objectives and aims for their activities, than did the smaller schools.

A second bulletin<sup>13</sup> by the above authors using the same sample presented data favoring the larger schools also. A questionnaire was used to survey the club program of the Indiana high schools. Analysis of the data showed that the larger schools had a superior system.

In 1924 Odell<sup>14</sup> compared size of high school with first year college average and persistence in college. Illinois high schools were classified into five groups based on number of pupils at the time the students in the sample were seniors (1923-24). Results revealed a tendency for students from the smallest high schools (those having less than 100) to be slightly below average. The mean college score was 82, as compared with 83 for all students, and their average length of attendance was three semesters, one less than the whole sample. Students coming from high schools of 500-999 maintained average marks of 84 and average attendance of six semesters. The three middle groups were very similar to each other. Odell concluded that "on the whole there is little relationship between size of high school attended and college success as measured either by marks or length of attendance".<sup>15</sup>

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<sup>12</sup>Ibid., p. 72.

<sup>13</sup>Ibid., p. 71.

<sup>14</sup>C. W. Odell, "Predicting the Scholastic Success of College Students, Appendix A", University of Illinois Bulletin, vol. 28, 39, University of Illinois: Champaign, Illinois, 1930.

<sup>15</sup>Ibid., p. 39.

Students from the smallest high schools appear to be at a slight disadvantage, while those from the schools having 500-999 students possess a small advantage.

Testing the hypothesis (stated in the null form) that size of high school graduating class bears no significant relationship to marks received during the first year of college, Bledsoe<sup>16</sup> determined that the chances are slightly favorable that the student from the larger graduating class will achieve a better average mark in college. The data used included information on all students who graduated from accredited secondary schools for white pupils in Georgia from 1924 to 1951, who attended Georgia universities and colleges for one year. Three sample groups were established for comparison. The groups contained schools with less than 40 graduates, from 40 to 99 graduates, and with 100 or more graduates. Comparisons between the large and small, and large and medium groups as shown in Table I resulted in a significant difference between mean grades at the one percent level. Difference in performance among small and medium size schools was negligible.

Two studies have been done recently, using the SCAT, CDM, and a South Dakota student sample. The first related first year college grade point averages and English scores to SCAT scores of students who graduated from South Dakota high schools in 1957 and completed the following year of study in a South Dakota college. Using a sample of 1833,

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<sup>16</sup>J. C. Bledsoe, "Do Graduates of Large High Schools Perform Significantly Better in College?", College and University, vol. 30, 60-64, American Association of Collegiate Registrars and Admissions Officers: Menasha, Wisconsin, 1954.

TABLE I. DIFFERENCES IN ACHIEVEMENT OF SMALL,  
MEDIUM, AND LARGE SECONDARY SCHOOLS

	Difference	Standard Error of the Difference	"t" Test of Significance
Medium--Small	.004	.0206	0.194
Large--Small	.096	.0250	3.840*
Large--Medium	.092	.0272	3.382*

\*Statistically significant at the one percent level of confidence.

Mott<sup>17</sup> found correlations of (1) .438 for V, (2) .390 for Q, and (3) .478 for T scores respectively on the SCAT when related to the grade point averages. All three coefficients were significant at the one percent level of confidence. Comparison of the first year college English scores of 1752 students with their SCAT-V, Q, and T revealed correlation coefficients of (1) .520 for V, (2) .395 for Q, and (3) .534 for T, respectively, which were also significant at the one percent level of confidence. He concluded that SCAT-T was the best predictor of both grade point averages and college English scores.

The second study by Kortmeyer<sup>18</sup> analyzed the value of the CTM as a predictor of college scholastic success. Using the same sample

<sup>17</sup>D. D. Mott, An Actuarial Study of Scores Received by High School Seniors on the Cooperative School and College Ability Test and These Students' Grades Received During the First Year of Attendance in South Dakota Colleges, unpublished Master's Degree thesis, South Dakota State College: Brookings, South Dakota, 1959.

<sup>18</sup>H. A. Kortmeyer, A Statistical Study of the Relationship of the California Test of Mental Maturity Scores of South Dakota High School Freshmen to Future Academic Success, unpublished Master's Degree thesis, South Dakota State College: Brookings, South Dakota, 1959.



as the preceding study to determine the relationship of first year grade point average and scores of the CTMM, he concluded the following:

1. The correlation coefficient of TME scores on the CTMM and grade point average is significant in prediction of college grade point average.
2. The L scores from CTMM are valuable as predictive tools, but are not as consistent as DP.
3. There is comparatively little value in the NL score as far as prediction usage is concerned.
4. It is possible to predict, with greater accuracy, the first year grade than it is to predict first quarter grades in college. (This observation is based on a smaller standard error of estimate.)

Several other studies related to size of school are cited here, briefly. Ferriss, Gaumnitz, and Brannell<sup>19</sup> compared secondary schools and found a distinct improvement in conditions in schools as enrollment increased. Dawson<sup>20</sup> studying the characteristics of large and small secondary schools, concluded that "efficiency is considerably affected by size of schools". His recommendation as to minimum size was seven teachers and 210 pupils for a six-year school. Using the "Stanford Achievement Battery" to measure the variable achievement, Nelson<sup>21</sup> found little mean difference between pupils in large and small high schools.

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<sup>19</sup>E. N. Ferriss, W. H. Gaumnitz, and F. R. Brannell, "The Smaller Secondary Schools", Bulletin no. 17, United States Office of Education; Washington, D. C., 1932.

<sup>20</sup>H. A. Dawson, "Satisfactory Local School Units", unpublished Ph. D. dissertation, George Peabody College for Teachers; Nashville, Tennessee, 1934.

<sup>21</sup>T. L. Nelson, "Comparison of the Achievement of Pupils in Schools of One or Two Teachers With That of Pupils [Schools] of Eight or More Pupils [Teachers]", unpublished Doctor's thesis, University of California; Berkeley, California, 1932.

Seyfert<sup>22</sup> felt that the small school is seriously handicapped in the number of activities and subjects it may undertake satisfactorily at one time. He concluded that size of student body affects considerably, the number of different curriculums offered.

Information comparing the achievement of South Dakota high school seniors from groups of different size schools was reported by Fort<sup>23</sup> in the "South Dakota Education Association Journal". He cited the norm groups which were established in 1957 for high school use based on the results of the Batson Test given to seniors that year.

This battery, used for many years by the University of South Dakota to determine the achievement of twelfth graders, is an optional service provided for South Dakota high schools. Included in the test are fields such as English, mathematics, science, and social studies. Comparison of the raw scores in Table II indicates a difference in average achievement does exist.

Several conclusions might be drawn from the literature cited in this chapter. Below are some of the inferences which are found in the previous articles:

1. Little recent research has been done measuring developed ability and achievement levels using size of high school as a variable.
2. Size of school is not a factor in determining persistence in high school.

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<sup>22</sup>W. C. Seyfert, "School Size and School Efficiency", School Review, vol. 61, 316, Harvard University Press: Cambridge, Massachusetts, 1937.

<sup>23</sup>G. M. Fort, "Equal Ability--Unequal Development", South Dakota Education Association Journal, vol. 34, 13-14, South Dakota Education Association: Pierre, South Dakota, 1959.



**TABLE II. RAW SCORES AT DIFFERENT PERCENTILES FOR GIVEN  
NORM GROUPS ON BATSON TEST 1957**

Group	Size of High School	20th %ile	50th %ile	80th %ile
Group I	Less than 50	79	95	116
Group II	50 - 99	76	94	117
Group III	100 - 149	76	94	115
Group IV	150 - 199	81	97	120
Group V	200 - 299	78	98	125
Group VI	300 and over	87	111	142

3. Larger schools, in general, have better organized and superior extra-curricular programs.
4. On the whole there is little relationship between size of high school and college success, as determined by first year grade point averages and persistence in school.
5. Chances are slightly favorable that the student from the larger graduating class will achieve a better college average.
6. There is a significant relationship found when comparing college grade point averages and English scores to SCAT scores.
7. Little mean difference in achievement exists between students from large and small high schools.
8. A difference in average achievement among students from various size high schools is evident when raw scores on the "Batson Test" are compared.

It should be noted that there is disagreement among investigators concerning the influence size of school plays on developed ability and achievement.

## CHAPTER III

## PROCEDURES USED IN THE STUDY

Gathering of the data for this thesis began in the fall of 1953, when freshmen students in South Dakota high schools took the "California Short Form Test of Mental Maturity"<sup>24</sup>. In 1956, when those same students completed the "Cooperative School and College Ability Test"<sup>25</sup>, results were matched and prepared for statistical consideration. Preliminary analysis of the data by Professor Gerald Fort indicated that a complete analysis might produce significant results. In 1958 this writer undertook the task of comparing the data using size of school as a variable. This chapter includes a description of the source of data, tests used, method of group sampling, and processing of data.

## Source of the Data

Data used in this thesis were obtained through the facilities of the Statewide Testing Program under the direction of the Department of Public Instruction. Percentile scores for all high school students who had taken the CTMM as a freshmen in 1953 and the SCAT in twelfth grade (1957) were recorded on punched cards. This information was made available to the investigator by the Office of Student Personnel and Machine Records Service at South Dakota State College.

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<sup>24</sup>This test will also be referred to as the CTMM throughout this thesis.

<sup>25</sup>This test will also be referred to as the SCAT throughout this thesis.

Information on the first year college grade point averages and college English scores was obtained from a survey taken by South Dakota State College in conjunction with "The South Dakota College Public Relations Association". Fifteen of the 16 colleges in the state replied to the questionnaire. The sample included South Dakota high school graduates who completed one year in a South Dakota college.

#### Description of the "California Short Form Test of Mental Maturity"<sup>26</sup>

This test is a part of a larger test referred to as the "California Test of Mental Maturity". It is available at the pre-primary, primary, elementary, intermediate, and advanced levels.

The purpose of the test is "to provide information on the nature and organization of the abilities of a given individual in order that that information may be used to guide his learning activities".<sup>27</sup> Measures obtained from this form are: language, non-language, mental maturity, and the four factors of mental capacity: spatial relations, logical reasoning, numerical reasoning, and verbal concepts. Results of the test are expressed in three mental ages and three I. Q.'s (language, non-language, and total mental factors (also referred to as the L, N-L, and the MF scores in this paper)).

A study conducted to test the reliability of the "California Short Form Test of Mental Maturity Advanced" (CTM) based on 400 stu-

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<sup>26</sup>Information included here was taken from the "administrators manual" for the advanced test, "S-Form".

<sup>27</sup>Sullivan, E. T., W. W. Clark, E. W. Tiegs, "Manual-California Short Form Test of Mental Maturity, Advanced", p. 2, California Test Bureau: Los Angeles, California, 1950.

dents in grades nine to 12, 250 college freshmen, and 250 adults revealed part score reliability coefficients ranging from .86 to .95 on the seven factors.<sup>28</sup>

The California Test Bureau has established a correlation between the "American College Entrance (ACE) Psychological Examination, College Freshmen" and the CTM of (1) .75 for the total, (2) .72 for the verbal, and (3) .53 for the non-verbal scores.

Correlation of the CTM with two other intelligence tests (the "Otis Quick-Scoring Test" and the "Terman-McNemar Test") resulted in coefficients which were significant at the one percent level of confidence for the language factors in both cases and for the non-language score on the "Otis". No relationship existed between the non-language factors on the "Terman-McNemar" and the CTM.<sup>29</sup>

Further investigation of the correlation between the "ACE Psychological Examination, College Freshmen" and the CTM by Klugman<sup>30</sup> using a sample of 151 female student nurses resulted in correlation coefficients of (1) .76 for verbal scores, (2) .45 for non-verbal scores, and (3) .72 for totals. All three coefficients were significant at the one percent level of confidence.

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<sup>28</sup>Ibid., p. 4.

<sup>29</sup>"Technical Report on the 'California Test of Mental Maturity'", p. 29, California Test Bureau: Los Angeles, California, 1957.

<sup>30</sup>S. F. Klugman "Agreement Between Two Tests as Predictors of College Success", Personnel and Guidance Journal, vol. 36, 255-258, American Personnel and Guidance Association, Inc.: Washington, D. C., 1957.

**TABLE III. CORRELATION COEFFICIENTS AND RELATED DATA FOR OTHER STANDARDIZED INTELLIGENCE TESTS VS. CALIFORNIA SHORT FORM TEST OF MENTAL MATURITY, ADVANCED, LANGUAGE SECTION**

Other Test*	Grade	No. of Cases	CTM, Language		Other Test		
			r	Mean (M. A.)	S. D. (M. A.)	Mean (M. A.)	S. D. (M. A.)
Otis-Gamma	11	94	.493	187.2	24.6	203.4	28.7
Terman-McNemar	11	96	.580	192.3	18.1	212.0	27.5

\*"Otis Quick-Scoring Mental Ability Tests, Gamma, Form EM", "Terman-McNemar Test of Mental Ability, Form C".

**TABLE IV. CORRELATION COEFFICIENTS AND RELATED DATA FOR OTHER STANDARDIZED INTELLIGENCE TESTS VS. CALIFORNIA SHORT FORM TEST OF MENTAL MATURITY, ADVANCED, NON-LANGUAGE SECTION**

Other Test	Grade	No. of Cases	CTM, Non-Language		Other Test		
			r	Mean (M. A.)	S. D. (M. A.)	Mean (M. A.)	S. D. (M. A.)
Otis-Gamma	11	94	.370	195.0	22.2	203.4	28.7
Terman-McNemar	11	96	.053	203.2	25.0	212.0	27.5

## Description of the "Cooperative School and College Ability Test"<sup>31</sup>

This test was developed by the Educational Testing Service as a replacement for the "ACE Psychological Examination". The purpose is "to estimate the capacity of the individual high school student to undertake the academic work of college".<sup>32</sup>

The manual for the test lists these items as some of the specific purposes and uses for the SCAT:

1. Comparing the measured academic abilities of students in different class, grade, and school groups.
2. Comparing averages and ranges of scores earned locally with scores earned by students in the schools on which the tests have been normed.
3. Accumulating school and system data which will permit him [the administrator] to observe educationally important change in the average ability levels of students in his schools.

Four subtests are used to measure developmental ability which will indicate the relative academic success the student is likely to achieve in college. Sentence completion and vocabulary compose the verbal score, while computation and problem solving are concerned with numerical tasks. The complete test includes 60 verbal items plus 50 numerical items and yields three scores, the verbal (V) score, the quantitative (Q) score, and the total (T) score.

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<sup>31</sup>Information in this section is taken from the "Examiner's Manual, Cooperative School and College Ability Tests", Educational Testing Service: Princeton, New Jersey, unless otherwise specified.

<sup>32</sup>Ibid., p. 3.

While long range studies of reliability and validity have not been completed as yet, due to the newness of the test, early studies indicate that the test has definite predictive value for school work (according to the publishers).

Inferences that appear to have good support by the data available:

1. That the test measures certain limited verbal and quantitative abilities which are developed in school and are in themselves educationally important;
2. That the abilities measured have a considerable and positive relationship to the grade averages students earn in school;
3. That the scores earned by an individual on this test provide at least a partial estimate of that student's relative present capacity to succeed in his academic school work.

Traxler<sup>33</sup> has published a study which provides some information on the value of the SCAT and the "ACE Psychological Examination" for predicting success in school. The scores of these two tests were correlated with the marks of pupils in five independent school districts which administered both tests during September and October, 1955. One school for girls, one coeducational school, and three schools for boys were included in the study.

Correlation coefficients were obtained between linguistic or verbal scores and English marks, quantitative scores and marks in mathematics, and total scores and average marks. Only the scores for

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<sup>33</sup>A. E. Traxler, "Should SCAT Scat ACE?", 1955 Fall Testing Program in Independent Schools and Supplementary Studies, p. 61, Educational Records Bulletin, No. 67, Educational Records Bureau: New York 32, New York, 1956.



eleventh and twelfth grades are listed in Table V, since they are the most closely related to this thesis. The first, second and fifth school listed are boys' schools; the third is a girls' school; and the fourth is a coeducational school.

The general conclusion indicated by these data was that the SCAT and the ACE are equally effective in predicting English marks of pupils in independent secondary schools and that the SCAT tends to predict mathematics marks and average marks slightly better than the ACE. Traxler states that:

It is probably to be expected that the SCAT quantitative score would be a little more closely correlated than the ACE score with the mathematics marks, since the items in this part of the SCAT are more nearly samples of school work than most of the quantitative items in the ACE. The medians of the correlations of the total scores on both tests with average marks center around .5 (SCAT, .52; ACE, .48). Hence, these tests seem about as effective in predicting school success, as indicated by marks, as intelligence or scholastic aptitude tests usually are.<sup>34</sup>

#### Method of Group Sampling

In Fort's<sup>35</sup> preliminary survey of this data, grouping was determined only by number of students in the schools. He concluded that further study of the problem should consider number of teachers, as well as number of students, because this factor seemed to be of considerable importance in determining the quality of a school. Since

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<sup>34</sup>Ibid., p. 62-3.

<sup>35</sup>G. M. Fort, "Study of Developed Ability of High School Students Using size of School as a Variable", unpublished study, South Dakota State College: Brookings, South Dakota, 1957.



TABLE V. CORRELATIONS OF SCORES ON COOPERATIVE SCHOOL AND COLLEGE ABILITY TESTS, FORM 1A, AND AMERICAN COUNCIL ON EDUCATION PSYCHOLOGICAL EXAMINATION, 1948 COLLEGE EDITION, WITH MARKS OF PUPILS IN FIVE INDEPENDENT SCHOOLS

School	Grade	N	English Marks		Mathematics Marks		Average Marks	
			Scat	Ace	Scat	Ace	Scat	Ace
			V-Score r P.E.	L-Score r P.E.	Q-Score r P.E.	Q-Score r P.E.	T-Score r P.E.	T-Score r P.E.
1	11	65	.38±.07	.45±.07	.30±.08	.33±.07	.46±.07	.42±.07
	12	0						
2	11	45	.43±.08	.61±.06	.44±.08	.28±.09	.60±.06	.63±.06
	12	15	.42±.14	.37±.15	.55±.12	.41±.15	.56±.12	.48±.13
3	11	29	.49±.10	.45±.10	-.01±.13	.12±.12	.34±.11	.24±.12
	12	12	.66±.11	.58±.13	.27±.05	.50±.15	.22±.18	.23±.18
4	11	20	.90±.03	.77±.06	.22±.14	.27±.14	.60±.10	.53±.11
	12	*	.73±.09	.81±.06	-.36±.18	-.11±.29	.45±.16	.48±.16
5	11	27	.62±.08	.61±.08	.40±.11	.20±.13	.48±.10	.23±.12
	12	**	.50±.09	.53±.08	.70±.07	.60±.09	.37±.13	.45±.12
Median			.535	.530	.455	.355	.520	.480
Range			.08 to .90	.20-.81	-.36-.77	-.11-.68	.22-.80	.23 to .72

Source: 1955 Fall Testing Program in Independent Schools and Supplementary Studies, p. 61, Educational Records Bulletin No. 67, Educational Records Bureau: New York 32, New York, 1956.

\* V, 34; Q & T, 11.

\*\*V, 34; Q & T, 22.

data on both number of students and teachers were readily available<sup>36</sup>

both factors were used in establishing five groups.

<sup>36</sup>Number of teachers and school enrollment statistics were taken from the Educational Directory of South Dakota Schools, 1955-56, State Superintendent of Public Instruction: Pierre, South Dakota, 1956.

The divisions which resulted from an arbitrary selection are listed below in Table VI.

**TABLE VI. PRELIMINARY DIVISIONS ESTABLISHED  
TO DETERMINE GROUP SAMPLES**

Group	No. of Students	No. of Teachers
I	1- 40	3
II	41- 75	4
III	76-100	5-6
IV	101-150	7-8
V	151- f	9-f

Those schools which did not fit in one of the established groups were placed first, according to the number of students, and then moved one group up or down depending on the number of teachers in the school.<sup>37</sup> This method seemed justifiable, since a school with a larger number of teachers per student should be able to provide more advantages; and likewise, a school with fewer teachers should provide fewer advantages.

Final arrangement of the data resulted in the distribution of students and teachers shown in Table VII.

This investigator realized that this was not the only nor the absolute best method of grouping data, but it seemed to possess logic and appeared to be the most valuable of those groupings tried by the author.

<sup>37</sup>For example, student test results from a school with 66 students and four teachers would be placed in Group II, while a school with 66 students and six teachers would go in Group III.

**TABLE VII. DISTRIBUTION OF STUDENTS  
AND TEACHERS IN GROUP SAMPLES**

Group	Average Number of Students in Schools	Average Number of Teachers in Schools	Total Number of Schools	Total Number of Pupils
I	34.21	3.00	43	272
II	45.04	4.00	40	330
III	72.29	5.42	66	880
IV	113.67	7.43	37	798
V	276.14	16.77	64	2786

Data on students who completed one year of college and freshmen English were also grouped by the method outlined above. The process was very similar although the sample was considerably smaller. The number of cases in each group for English scores and grade point averages is found in Table VIII.

**TABLE VIII. SIZE OF SAMPLES FOR ENGLISH  
SCORES AND GRADE POINT AVERAGES**

Group	English Scores Number of Pupils	G. P. A.* Number of Pupils
I	47	47
II	74	76
III	195	205
IV	186	194
V	606	636

\*Grade point averages.

### Method of Processing the Data

After the groups were established, sums and sums of squares were computed for the V, Q, T, (on the SCAT) L, N-L, DIF (on the CDM), grade point averages, and English scores, using a punched card calculator and accounting machine. The data was then treated to find the mean scores, standard deviations, and significant difference between means of the five groups for each score. To determine the "t" score value for each comparison, the following formula<sup>38</sup> was used:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s_p \sqrt{(1/N_1) + (1/N_2)}}$$

where  $s_p^2$  is the pooled mean-square estimate of  $\sigma^2$  given by

$$s_p^2 = \frac{\sum x_1^2 - \frac{(\sum X_1)^2}{N_1} + \sum x_2^2 - \frac{(\sum X_2)^2}{N_2}}{N_1 + N_2 - 2}$$

where  $\sum x_1^2$  = sum of squares in first sample.

$\sum x_2^2$  = sum of squares in second sample.

$\sum X_1$  = sum of observations in first sample.

$\sum X_2$  = sum of observations in second sample.

Examination of the completed analysis indicated that one further comparison of groups might be of value. The experimenter decided to select random samples of equal size from each of the five groups, make combinations of the groups, and then compare them to discover if a

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<sup>38</sup>E. F. Lindquist, A First Course in Statistics, p. 138, Houghton-Mifflin Company: New York, New York, 1942.

definite pattern or point of optimum significance could be established.

The following combinations were used: (1) I - II, III, IV, V, (2) I, II - III, IV, V, (3) I, II, III - IV, V, and (4) I, II, III, IV - V.

The same method for determining the significant difference between means as described above was used.

## CHAPTER IV

## PRESENTATION AND INTERPRETATION OF DATA

Analysis of the eight hypotheses established in Chapter I was made to obtain a picture of the effect of the variable, size of school, on student ability in the ninth grade, developed ability in the twelfth grade, achievement during the first year of college, and, more specifically, achievement in one college subject--freshmen English. It was felt that the results of these computations would contribute information concerning the effectiveness of different size secondary school systems in developing student ability.

Analysis of the hypotheses provided the statistical information in this chapter. Computations of "t" for mean differences were made in each case. Reference was then made to Table IX, the table for significant values of "t" at the five percent and one percent level, for different degrees of freedom, to determine whether computed values of "t" were significant.

The "t" scores were tested at the one percent level because the author felt the data should pass the most critical test to be of maximum value. The five percent values were included in the table for the reader's convenience.

The mean scores for the various factors of the CDM are presented in Table X for comparison.

The first three hypotheses tested were concerned with the mental ability levels of students in the ninth grade, as measured by the CDM. The L, N-L, and TMF scores were analyzed individually.

TABLE IX. VALUES OF "t" AT THE ONE PERCENT  
AND FIVE PERCENT LEVELS OF SIGNIFICANCE\*

Degrees of Freedom	5%	1%	Degrees of Freedom	5%	1%
1	12.706	63.657	32	2.037	2.739
2	4.303	9.925	34	2.032	2.728
3	3.182	5.841	36	2.027	2.718
4	2.776	4.604	38	2.025	2.711
5	2.571	4.032	40	2.021	2.704
6	2.447	3.707	42	2.017	2.696
7	2.365	3.499	44	2.015	2.691
8	2.306	3.355	46	2.012	2.685
9	2.262	3.250	48	2.010	2.681
10	2.228	3.169	50	2.008	2.678
11	2.201	3.106	55	2.005	2.668
12	2.179	3.055	60	2.000	2.660
13	2.160	3.012	65	1.998	2.653
14	2.145	2.977	70	1.994	2.648
15	2.131	2.947	80	1.990	2.638
16	2.120	2.921	90	1.987	2.632
17	2.110	2.898	100	1.984	2.626
18	2.101	2.878	125	1.979	2.616
19	2.093	2.861	150	1.976	2.609
20	2.086	2.845	200	1.972	2.601
21	2.080	2.831	300	1.968	2.592
22	2.074	2.819	400	1.966	2.588
23	2.069	2.807	500	1.965	2.586
24	2.064	2.797	1000	1.962	2.581
25	2.060	2.787	$\infty$	1.960	2.576
26	2.056	2.779			
27	2.052	2.771			
28	2.048	2.763			
29	2.045	2.756			
30	2.042	2.750			

\*A. L. Edwards, Statistical Analysis, p. 330, Rinehart and Company, Inc.: New York, New York, 1946.

**TABLE X. MEAN SCORES FOR STUDENTS ON THE CDM,  
USING SIZE OF SCHOOL AS THE VARIABLE**

Group	L	CTDM N-L	TMF
I	26.952	33.107	60.059
II	26.527	33.479	60.006
III	27.380	33.692	61.072
IV	26.960	33.514	60.474
V	27.841	33.904	61.745

First consideration was made of Hypothesis 1, as stated in Chapter

I:

No significant difference in verbal ability exists among students from various size high schools as measured by the "language factors" score on the "California Short Form Test of Mental Maturity.

Table XI which follows, shows the mean differences used to determine the significance of difference between L scores and indicates those comparisons which were significant at the one percent level of confidence.

**TABLE XI. MEAN DIFFERENCES BETWEEN VARIOUS SIZE HIGH SCHOOLS  
ACCORDING TO THE LINGUISTIC SCORES ON THE CALIFORNIA  
SHORT FORM TEST OF MENTAL MATURITY**

	I	II	III	IV
II	-.425			
III	.428	.853		
IV	.008	.433	-.420	
V	.889**	1.314*	.461	.881*

\* significant at the one percent level of confidence.

\*\*significant at the five percent level of confidence.



Mean differences for the linguistic scores on the CTM range from -.425 to 1.314. Significant differences in means at the one percent level of confidence between Groups II - V and IV - V were found. Although the general hypothesis must be rejected because of the two instances in 10 where meaningful differences were found, in the majority of cases, differences in linguistic ability were negligible.

Hypothesis 2 was stated in Chapter I:

No significant difference in quantitative ability exists among students from various size high schools as measured by the "non-language factors" score on the "California Short Form Test of Mental Maturity".

Table XII presents the mean differences of the non-language scores on the CTM and indicates those cases where the difference was more than a matter of chance.

TABLE XII. MEAN DIFFERENCES BETWEEN VARIOUS SIZE HIGH SCHOOLS ACCORDING TO THE NON-LINGUISTIC SCORES ON THE CALIFORNIA SHORT FORM TEST OF MENTAL MATURITY

	I	II	III	IV
II	.372			
III	.585	.213		
IV	.407	.035	-.178	
V	.797**	.617	.212	.390

\* Significant at the one percent level of confidence.

\*\* Significant at the five percent level of confidence.

The results showed mean differences ranging from  $-.178$  to  $.797$ . No differences between the N-L mean scores were great enough to be attributed to any factor other than chance. Therefore, Hypothesis 2 was accepted; since differences found in N-L scores were not significant.

Next, Hypothesis 3, as stated in Chapter I, was considered:

No significant difference in total ability exists among students from various size high schools as measured by the "total mental factors" score on the "California Short Form Test of Mental Maturity".

Mean differences for the total mental factors score mentioned in the above hypothesis are found in Table XIII.

TABLE XIII. MEAN DIFFERENCES BETWEEN VARIOUS SIZE HIGH SCHOOLS ACCORDING TO THE TOTAL MENTAL FACTORS SCORES ON THE CALIFORNIA SHORT FORM TEST OF MENTAL MATURITY

	I	II	III	IV
II	-.053			
III	1.013	1.066		
IV	.415	.468	-.598	
V	1.686**	1.739*	1.271*	

\* Significant at the one percent level of confidence.

\*\*Significant at the five percent level of confidence.

"T" values for average TMF scores indicated that the only group comparisons showing a significant difference in means were those also mentioned when considering Hypothesis 1: Groups II - V and IV - V. This seemed logical since the total mental factors score is the sum of the L and N-L and would be influenced by differences in the part scores. Although it was necessary to reject the hypothesis, it should be again noted that the general pattern indicates little difference in mean

total ability.

The general conclusion drawn from the analysis of mean differences in ability for students from various size high schools was that most students in South Dakota who enter high schools of varying sizes have equal mean ability. In only two instances were any evidences shown that ability levels varied to a meaningful degree.

The next step was to compare the ability development of these same students after completing three years in the same school. Hypotheses 4, 5, and 6 compared the developed ability levels of high school seniors using size of school as the variable. The three measures for the SCAT were considered separately. Table XIV shows the mean scores for the five groups.

TABLE XIV. MEANS FOR THE V, Q, AND T SCORES ON THE SCAT, USING SIZE OF HIGH SCHOOL AS THE VARIABLE

Group	V	Q	T
I	31.860	27.673	59.533
II	32.603	28.891	61.494
III	33.033	28.972	62.035
IV	33.942	28.481	62.424
V	36.148	29.979	66.127

Hypothesis 4 was stated in Chapter I:

No significant difference in linguistic developed ability exists among students from various size high schools as measured by the "verbal" score on the "Cooperative School and College Ability Test".

Results of the V score analysis are found in Table XV below.

**TABLE XV. MEAN DIFFERENCES BETWEEN VARIOUS SIZE HIGH SCHOOLS  
ACCORDING TO THE VERBAL SCORES ON THE COOPERATIVE  
SCHOOL AND COLLEGE ABILITY TEST**

	I	II	III	IV
II	.743			
III	1.173	.430		
IV	2.208*	1.909*	.909	
V	4.288*	3.545*	3.115*	2.206*

\* Significant at the one percent level of confidence.

\*\* Significant at the five percent level of confidence.

Analysis of mean difference ranging from .430 to 4.288 indicated that the following group comparisons were significant at the one percent level of confidence: I - IV, I - V, II - IV, II - V, III - V, and IV - V. On the basis of these findings, it was necessary to reject the null hypothesis and conclude that significant differences did exist among the various size high schools as measured by the mean V score on the SCAT.

In Chapter I, Hypothesis 5 reads:

No significant difference in quantitative developed ability exists among students from various size high schools as measured by the "quantitative" score on the "Cooperative School and College Ability Test".

Table XVI shows the mean differences for the Q scores and indicates which comparisons were significantly different at the one percent level of confidence.

Comparisons of the Q score produced significant mean differences when using Groups: I - III, I - V, III - V, and IV - V. On this

**TABLE XVI. MEAN DIFFERENCES BETWEEN VARIOUS SIZE HIGH SCHOOLS  
ACCORDING TO THE QUANTITATIVE SCORES ON THE  
COOPERATIVE SCHOOL AND COLLEGE  
ABILITY TEST**

	I	II	III	IV
II	1.218			
III	1.299*	.081		
IV	.808	-.410	-.491	
V	2.306*	1.088**	1.007*	1.498*

\* Significant at the one percent level of confidence.

\*\* Significant at the five percent level of confidence.

basis, the hypothesis was rejected and the fact that a significant difference does exist between quantitative scores for the SCAT was accepted, although not to quite the extent of the verbal score.

The sixth hypothesis, as quoted from Chapter I, reads:

No significant difference in total developed ability exists among students from various size high schools as measured by the "total" score on the "Cooperative School and College Ability Test".

Results of these tests of significance, run to determine the accuracy of the above statement are noted in Table XVII.

The data indicated that a significant difference between mean total scores on the SCAT existed when the following groups were compared: I - V, II - III, II - V, III - V, and IV - V. The hypothesis was rejected, since there was a meaningful difference between total scores (which are the sum of the V and Q scores) on the SCAT, using school size as the variable.

**TABLE XVII. MEAN DIFFERENCES BETWEEN VARIOUS SIZE HIGH SCHOOLS  
ACCORDING TO THE TOTAL SCORES ON THE COOPERATIVE  
SCHOOL AND COLLEGE ABILITY TEST**

	I	II	III	IV
II	1.961			
III	2.502**	.541*		
IV	2.891**	.930	.389	
V	6.594*	4.636*	4.092*	3.703*

\* Significant at the one percent level of confidence.

\*\*Significant at the five percent level of confidence.

The general conclusion established from the analysis of the developed ability of twelfth graders was that the students from smaller high schools had not developed their ability to the degree that those from the larger schools had, although they were basically equal in ability at the ninth grade level. The table of mean scores for the SCAT shows that the trend is toward progressively higher average scores on the test as the size of the school increases.

The realization that there was a variance in development of ability led to an investigation of the achievement of some of these same students who attended a year of college in South Dakota. The purpose, here, was to determine if the size of high school had influenced the achievement of these students in college. The last two hypotheses (7 and 8) compared first year grade point averages and freshmen English scores using size of high school as the variable. Table XVIII shows the mean grade point averages and English grades for the five groups.

**TABLE XVIII. MEAN GRADE POINT AVERAGES AND ENGLISH SCORES FOR THE FIRST YEAR OF COLLEGE, USING SIZE OF HIGH SCHOOL AS THE VARIABLE**

Group	G. P. A.	English
I	2.130	1.955
II	2.193	2.112
III	2.340	2.215
IV	2.330	2.267
V	2.312	2.292

Hypothesis 7, as stated in Chapter 1, reads:

No significant difference in college achievement exists among students from various size high schools as determined by first year college grade point average.

The mean differences which resulted from "t" test comparisons are shown in Table XIX.

**TABLE XIX. MEAN DIFFERENCES FOUND BY COMPARING GRADE POINT AVERAGES OF STUDENTS FROM VARIOUS SIZE HIGH SCHOOLS**

	I	II	III	IV
II	.064			
III	.210	.147		
IV	.201	.137	.010	
V	.182	.118	.028	.019

\* significant at the one percent level of confidence.

\*\*Significant at the five percent level of confidence.

No significant differences were found. Some trends pointed to the tendency for extremely differing groups to show mean grade averages favoring the larger high schools, but noted differences were not significant.

As established in Chapter I, Hypothesis 8 states:

No significant difference in English achievement exists among students from various size high schools as determined by first year college English grades.

Mean differences between groups and significant comparisons are indicated in Table XX, below:

**TABLE XX. MEAN DIFFERENCES FOUND BY COMPARING COLLEGE FRESHMEN ENGLISH SCORES OF STUDENTS FROM VARIOUS SIZE HIGH SCHOOLS**

	I	II	III	IV
II	.157			
III	.260	.103		
IV	.312**	.155	.052	
V	.337*	.180	.077	.025

\* Significant at the one percent level of confidence.

\*\* Significant at the five percent level of confidence.

Although results of the "t" tests showed that only one comparison (Groups I - V) was significant at the one percent level of confidence, the trend shown by the mean differences indicates that mean averages for the five groups increased steadily as the contrast in size of school increased.

The last two investigations were preliminary in nature and not a major part of the experimental design of this project. Further study of college achievement and size of school should probably consider the following factors:

1. The mean grade point averages of South Dakota high school graduates attending South Dakota colleges the first year



differ, as pointed out by Kortmeyer<sup>39</sup> and Mott<sup>40</sup>. Conversion of grades to standard scores among colleges would add much to the validity of this type of study.

2. A wide disparity in numbers and ability levels of students in South Dakota colleges from differing sized high schools creates some unusual statistical problems which could better be controlled by more complex analyses, such as analysis of variance and covariance. The author is not prepared to conduct such analyses.

The data obtained indicates that, although student groups were equal in ability at the time they entered the ninth grade in high school, during the three subsequent years of school, students from the larger schools developed their ability to a significantly greater degree than those from the smaller high schools. Analysis further revealed that size of school did not affect achievement in college. The author is reluctant, however, to draw any conclusions until further investigation is conducted on the subject.

Further analysis of the "t" scores on the SCAT, to determine if there was an optimum point in size of high school at which the significance was greatest, indicated that as the size of school increases, the developed ability level of students increases. The results of the study are shown in Tables XXI and XXII.

Progressing school sizes reveal increasing mean differences in developed ability. Greatest disparity, if a single optimum size of school separation is required, is found between Group V and the remaining smaller groups. The second most reasonable separation involves

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<sup>39</sup>Kortmeyer, op. cit.

<sup>40</sup>Mott, op. cit.

**TABLE XXI. MEAN AVERAGES OF RANDOM SAMPLE USED TO DETERMINE  
THE MAXIMUM POINT OF SIGNIFICANT DIFFERENCE**

Group	Number	Mean
I	200	59.785
II	200	62.210
III	200	61.375
IV	200	64.825
V	200	68.560

(Random sample means were compared with total group means, as shown in Table XIV, and all mean differences found were insignificant, using the "t" test)

**TABLE XXII. MEAN DIFFERENCES BETWEEN VARIOUS SIZE HIGH  
SCHOOLS (GROUPED) ACCORDING TO THE TOTAL SCORES  
ON THE COOPERATIVE SCHOOL AND COLLEGE  
ABILITY TEST**

Group <sup>1</sup>	Group <sup>2</sup>	Mean Difference
I	II, III, IV, V	4.458*
I, II	III, IV, V	3.922*
I, II, III	IV, V	5.570*
I, II, III, IV	V	6.511*

\*Significant at the one percent level of confidence.

Groups I, II, and III as against Groups IV and V. It would appear that the latter separation would be a more practicable classification, in terms of mean differences in Total SCAT scores. In other words, it would appear that schools with fewer than seven teachers and less than 101 students would be detrimental to those students in terms of developing ability to the fullest extent during the high schools.

## CHAPTER V

## SUMMARY AND CONCLUSIONS

The purposes of this study were:

1. To compare the ability and developed ability of student groups from high schools differing in enrollments, using size of school as a variable;
2. To determine whether the size of high school is an influencing factor in determining first year college grade point average;
3. To examine college freshmen English grades, using the same variable as above.

In reference to the first purpose the following conclusions can be drawn:

1. Ability levels of ninth grade students from different size high schools are relatively the same. A difference in mean ability favoring the largest school group (nine teachers and more than 150 students) was found when compared with Group II (four teachers and 41 to 75 students) and Group IV (seven or eight teachers and 101 to 150 students).
2. Developed ability of twelfth grade students from different size high schools is significantly different, with a clear and significant difference favoring the larger school groups over the smaller school groups.

Considering the second purpose, the following conclusion can be made:

Results of this investigation indicated that size of high school has little influence on the achievement of students during their first year of college. The writer is reluctant to draw any definite conclusions in this area, as a result of this study, however, because of the methodology employed, as discussed in Chapter IV.

**Examination of the third purpose led to the following conclusion:**

**Students from different size high schools attain relatively the same English scores during their freshmen year of college. An exception noted was that students from schools with more than eight teachers and over 150 students attain significantly higher grades in English than students from schools with three teachers and less than 41 pupils. Again, the writer points out that English mean scores vary in South Dakota colleges and results would be more valid, if these scores were equated by using a standard scale. The noted differences favoring the largest high schools over the smallest high schools in this achievement area provide interesting data for future exploration concerning environmental factors as indicated in 3 below.**

**Several suggestions are presented here, regarding further study of this nature:**

- 1. This study considers two variables--number of pupils and number of teachers, in determining the quality of the schools. It would be of value to include other factors which might also influence quality (such as training, experience, and degrees of teachers, library facilities, special school services, varied curriculums, community resources, financial support, and the school plant).**
- 2. Careful exploration of size and type of school as it affects achievement might provide valuable information. This could include:**
  - a. Ninth grade achievement evaluation based on past experience--rural vs. urban schools,**
  - b. Compare achievement in the twelfth grade in different schools by using matched groups equal in achievement and ability,**
  - c. Utilizing a more complete sample to analyze college grade point averages with a well-defined methodology,**
  - d. A cross-sectional study at the different grade levels indicated in c; since the Statewide Testing Program results over the past few years have indicated that ability**

levels have remained relatively constant for ninth graders and seniors.

3. Investigate the differences in ability levels found when measuring linguistic ability on the CTOM to see if some rationale may be determined. Several possibilities could be considered. The inconsistent results are perplexing and certainly, an exploration should include the availability of library facilities and reading material in the home. The lack of these materials could have an effect on test results for these students. Yet, if this is true, why were the mean scores of students in Group I not affected to the same degree? Secondly, it would be interesting to investigate the educational backgrounds of these students to determine how much test experience they had previously encountered, and if transferring schools upon entering the ninth grade had an effect on test results or student achievement.

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**APPENDICES**





46

**APPENDIX A**  
**THE SOUTH DAKOTA COLLEGE PUBLIC RELATIONS ASSOCIATION**  
A SERVICE OF

AUGUSTANA COLLEGE • BLACK HILLS TEACHERS COLLEGE • DAKOTA WESLEYAN UNIVERSITY  
GENERAL BEADLE STATE TEACHERS COLLEGE • HURON COLLEGE • MOUNT MARTY COLLEGE  
NORTHERN STATE TEACHERS COLLEGE • SIOUX FALLS COLLEGE • SOUTH DAKOTA SCHOOL OF  
MINES AND TECHNOLOGY • SOUTH DAKOTA STATE COLLEGE • SOUTHERN STATE TEACHERS COLLEGE  
STATE UNIVERSITY OF SOUTH DAKOTA • YANKTON COLLEGE

October 13, 1958

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Dear \_\_\_\_\_,

The South Dakota Guidance and Personnel Association and the South Dakota College Public Relations Association is sponsoring a study of achievement of the 1957 high school graduates from South Dakota. The study involves all South Dakota high schools and we are attempting to evaluate the Ninth Grade State-Wide Testing Program, the Twelfth Grade State-Wide Testing Program, and the variable of size of high school as it affects success in college. Material relative to this study has been requested from all colleges in South Dakota and it was our understanding that we would work through the College Public Relations person, who could see that the material got into the proper hands at the individual college. Since Forrest Jones is the one assigned the responsibility, I had sent material to him on July 21 and followed it up with letters on September 12 and October 6. He now writes to me telling me that I should contact you for this information.

I am enclosing a sample copy of the kind of material that we need for the report. We are interested only in students from South Dakota high schools who graduated from high school in the spring of 1957 and who entered your college in the fall of 1957. Thus far we have received this data back from all of the four-year colleges but your school, and we are hoping for 100% participation.

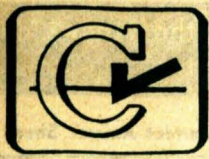
If there are any questions, please do not hesitate to write or call me. We are hopeful that we can make a preliminary report at SDEA.

Sincerely yours,

Gerald M. Fort  
Associate Professor

Enc. 1





APPENDIX B

47

Advanced • GRADES 9 to Adult • 1950 S-Form

# California Short-Form Test of Mental Maturity

Devised by

ELIZABETH T. SULLIVAN, WILLIS W. CLARK, AND ERNEST W. TIEGS

## INSTRUCTIONS TO EXAMINEES:

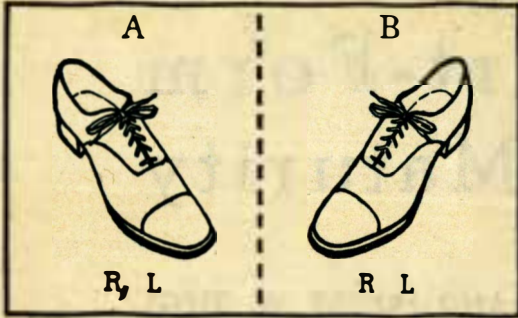
This is a test of mental maturity. In taking it you will show how well you understand relationships and what you do when you face new problems. No one is expected to do the whole test correctly, but you should answer as many items as you can. Work as fast as you can without making mistakes.

DO NOT WRITE OR MARK ON THIS TEST BOOKLET UNLESS TOLD TO DO SO BY THE EXAMINER.

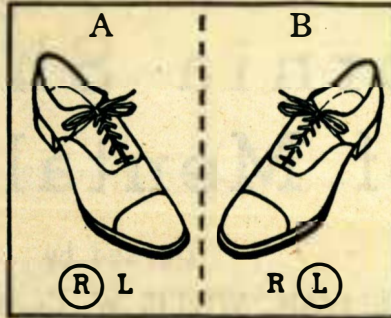


**DIRECTIONS:** Mark as you are told the letter, R, for each picture that shows a right, mark the letter, L, for each picture that shows a left

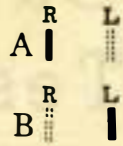
Samples A and B




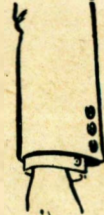








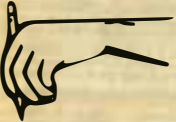







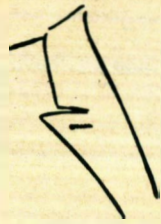

Correct Test Booklet Marks



Correct Answer Sheet Marks



**TEST 1**

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

**STOP**

NOW WAIT FOR FURTHER INSTRUCTIONS

Test 1 Score (number right) .....



**DIRECTIONS:** In each row find the drawing that is a different view of the first drawing. Mark its number as you are told.

**TEST 2**

**C**

1 2 3 4 \_\_\_\_\_C

**21**

1 2 3 4 \_\_\_\_\_21

**22**

1 2 3 4 \_\_\_\_\_22

**23**

1 2 3 4 \_\_\_\_\_23

**24**

1 2 3 4 \_\_\_\_\_24

**25**

1 2 3 4 \_\_\_\_\_25

**26**

1 2 3 4 \_\_\_\_\_26

**27**

1 2 3 4 \_\_\_\_\_27

**28**

1 2 3 4 \_\_\_\_\_28

**29**

1 2 3 4 \_\_\_\_\_29

**30**

1 2 3 4 \_\_\_\_\_30

**31**

1 2 3 4 \_\_\_\_\_31

**32**

1 2 3 4 \_\_\_\_\_32

**33**

1 2 3 4 \_\_\_\_\_33

**34**

1 2 3 4 \_\_\_\_\_34

**35**

1 2 3 4 \_\_\_\_\_35

**STOP** NOW WAIT FOR FURTHER INSTRUCTIONS

Test 2 Score (number right) .....



**DIRECTIONS:** The first three pictures in each row are alike in some way. Decide how they are alike, and then find the one picture among the four to the right of the dotted line that is most like them and mark its number.

**TEST 3**

<p><b>D</b></p> <p>1 2 3 4 ___</p>	<p><b>43</b></p> <p>1 2 3 4 ___</p>
<p><b>36</b></p> <p>1 2 3 4 ___</p>	<p><b>44</b></p> <p>1 2 3 4 ___</p>
<p><b>37</b></p> <p>1 2 3 4 ___</p>	<p><b>45</b></p> <p>1 2 3 4 ___</p>
<p><b>38</b></p> <p>1 2 3 4 ___</p>	<p><b>46</b></p> <p>1 2 3 4 ___</p>
<p><b>39</b></p> <p>1 2 3 4 ___</p>	<p><b>47</b></p> <p>1 2 3 4 ___</p>
<p><b>40</b></p> <p>1 2 3 4 ___</p>	<p><b>48</b></p> <p>1 2 3 4 ___</p>
<p><b>41</b></p> <p>OSC TEUZ</p> <p>1 2 3 4 ___</p>	<p><b>49</b></p> <p>1 2 3 4 ___</p>
<p><b>42</b></p> <p>1 2 3 4 ___</p>	<p><b>50</b></p> <p>1 2 3 4 ___</p>

**STOP**

Test 3 Score  
(number right).....



**DIRECTIONS:** Read each group of statements below and the conclusions which follow. Then mark as you are told the number of each answer you have decided is correct.

**TEST 4**

E. All four-footed creatures are animals.  
All horses are four-footed.  
Therefore

- <sup>1</sup> Creatures other than horses can walk
- <sup>2</sup> All horses can walk
- <sup>3</sup> All horses are animals \_\_\_\_\_E

51. Elm Street is parallel to Oak Street.  
Oak Street is parallel to Palm Avenue.  
Therefore

- <sup>1</sup> Elm Street crosses Palm Avenue
- <sup>2</sup> Palm Avenue is longer than Elm Street
- <sup>3</sup> Elm Street is parallel to Palm Avenue \_\_\_\_\_51

52. George Washington was a skillful general.

George Washington was President of the United States.

Therefore

- <sup>1</sup> Skillful generals make good presidents
- <sup>2</sup> A President of the United States was a skillful general
- <sup>3</sup> Good presidents make skillful generals \_\_\_\_\_52

53. If he steers toward the land he will be wrecked, and if he steers toward the open sea he will be wrecked.

But, he must steer either toward the land or toward the open sea.

Therefore

- <sup>1</sup> He should head for the open sea
- <sup>2</sup> The coast is dangerous for ships
- <sup>3</sup> He will be wrecked \_\_\_\_\_53

54. If the wind changes it will either grow warmer or it will storm.

The wind does not change.

Therefore

- <sup>1</sup> It will probably grow warmer
- <sup>2</sup> The conclusion is uncertain
- <sup>3</sup> It will not grow warmer nor will it storm \_\_\_\_\_54

55. X is younger than Y.

Y is younger than Z.

Therefore

- <sup>1</sup> Y is younger than X
- <sup>2</sup> X is younger than Z
- <sup>3</sup> Y has lived longer than Z \_\_\_\_\_55

56. All circles are round figures.

A certain figure is not round.

Therefore

- <sup>1</sup> It is oval
- <sup>2</sup> It is either a square or a triangle
- <sup>3</sup> It is not a circle \_\_\_\_\_56

57. A is situated to the east of B.

B is situated to the east of C.

Therefore

- <sup>1</sup> C is situated close to A
- <sup>2</sup> A is situated to the east of C
- <sup>3</sup> C is nearer to A than to B \_\_\_\_\_57

**TEST 4 (Continued)**

58. If he is to complete his high school course, he must avoid wasting his energy and his money.

But, he will not avoid wasting his energy, nor will he avoid wasting his money.

Therefore

**1 He will not complete his high school course**

**2 He will be sorry some day**

**3 He should be criticized for not doing better** —58

59. If the students are in error, your refusal to listen to their side is unreasonable.

If they are not in error, your refusal is unjust.

But, the students are in error or they are not.

Therefore

**1 Your refusal is justifiable**

**2 Your refusal is either unreasonable or it is unjust**

**3 Your refusal may be reconsidered later** —59

60. Three boys are up on a ladder. Tom is farther up the ladder than Paul.

Jim is farther up than Tom.

Which boy is in the middle position on the ladder?

**1 Tom**

**2 Paul**

**3 Jim** —60

61. A is either B or C or D.

A is not B.

Therefore

**1 A is C**

**2 A is either C or D**

**3 The conclusion is uncertain** —61

62. If he were loyal he would not speak unkindly of his family in earnest.

If he were wise he would not speak unkindly of them in jest.

He speaks unkindly either in earnest or in jest.

Therefore

**1 He is either not loyal or not wise**

**2 He is unkind**

**3 The conclusion is uncertain** —62

63. If A is B, E is F; if C is D, G is H.

Either A is B or C is D.

Therefore

**1 Either A is F or C is H**

**2 Either E is F or G is H**

**3 The conclusion is uncertain** —63

64. A is between B and C.

B is between C and D.

Therefore

**1 A is not between C and D**

**2 A is between B and D**

**3 A is nearer to B than to D** —64

65. Five cities (P, Q, R, S, and T) are in the same state.

S is between P and Q. T is between P and S.

R is the same distance from P and T, and S is the same distance from P and Q.

Therefore

**1 Q is nearer to T than to S**

**2 R is nearer to Q than to P**

**3 T is nearer to P than to Q** —65

**STOP**

NOW WAIT FOR  
FURTHER INSTRUCTIONS



**DIRECTIONS:** In each row of numbers below, there is one that does not belong. Find the number that should be omitted from each row among the answer numbers on the right, and mark its letter as you are told. When you have finished as many as you can from 66 to 75, read the Directions in the middle of the page and proceed with rows 76 to 80.

**TEST 5**

- |       |    |    |    |    |    |    |    |    |    |      |      |      |      |      |      |
|-------|----|----|----|----|----|----|----|----|----|------|------|------|------|------|------|
| F.    | 2  | 4  | 6  | 8  | 9  | 10 | 12 | 14 |    | a 6  | b 9  | c 10 | d 12 | e 14 | — F  |
| (66). | 18 | 15 | 13 | 12 | 9  | 6  | 3  |    |    | a 13 | b 12 | c 9  | d 6  | e 3  | — 66 |
| (67). | ½  | 0  | 1  | 2  | 4  | 8  | 16 |    |    | a 1  | b ½  | c 0  | d 8  | e 16 | — 67 |
| (68). | 4  | 5  | 7  | 10 | 11 | 13 | 14 | 16 | 17 | 19   |      |      |      |      | — 68 |
| (69). | 56 | 49 | 43 | 38 | 35 | 34 | 31 | 29 |    |      |      |      |      |      | — 69 |
| (70). | 7  | 9  | 10 | 13 | 16 | 19 |    |    |    |      |      |      |      |      | — 70 |
| (71). | 27 | 25 | 22 | 17 | 12 | 7  |    |    |    |      |      |      |      |      | — 71 |
| (72). | 3  | 5  | 6  | 11 | 12 | 14 | 15 | 19 | 20 | 21   |      |      |      |      | — 72 |
| (73). | 37 | 34 | 31 | 29 | 27 | 24 | 22 | 21 | 19 |      |      |      |      |      | — 73 |
| (74). | 1  | 2  | 4  | 7  | 11 | 15 | 16 | 22 |    |      |      |      |      |      | — 74 |
| (75). | 18 | 21 | 19 | 22 | 20 | 22 | 23 | 21 | 24 |      |      |      |      |      | — 75 |

**DIRECTIONS:** Go right on with the following until told to stop. In each row of numbers below, the numbers grow larger or smaller in a regular series of whole numbers. Decide what numbers are missing, find them among the answers on the right, and mark the letter of your choice for the correct answer.

- |       |  |       |       |       |       |       |       |       |              |              |              |              |  |  |            |
|-------|--|-------|-------|-------|-------|-------|-------|-------|--------------|--------------|--------------|--------------|--|--|------------|
| X.    | 12   | ..... | 14    | 15    | ..... | ..... | 18    |       |              |              |              |              |  |  |            |
|       | (In Sample X the correct answer is C, meaning 13, 16, 17.) |       |       |       |       |       |       |       | a 13, 15, 16 | b 13, 15, 17 | c 13, 16, 17 |              |  |  | <u>C</u> X |
|       |  |       |       |       |       |       |       |       | d 14, 16, 17 | e 15, 16, 18 |              |              |  |  |            |
| (76). | 15   | 16    | 18    | ..... | 21    | ..... | 24    | 25    | .....        |              |              |              |  |  |            |
|       |  |       |       |       |       |       |       |       |              | a 20, 23, 27 | b 19, 22, 27 | c 19, 23, 29 |  |  | — 76       |
|       |  |       |       |       |       |       |       |       |              | d 20, 22, 26 | e 19, 23, 27 |              |  |  |            |
| (77). | 17   | 19    | ..... | ..... | 23    | ..... | 26    | 28    | 29           |              |              |              |  |  |            |
|       |  |       |       |       |       |       |       |       |              | a 21, 22, 24 | b 20, 21, 25 | c 20, 21, 24 |  |  | — 77       |
|       |  |       |       |       |       |       |       |       |              | d 20, 22, 25 | e 21, 22, 25 |              |  |  |            |
| (78). | 27   | 29    | ..... | 28    | ..... | 27    | 24    | ..... | 23           |              |              |              |  |  |            |
|       |  |       |       |       |       |       |       |       |              | a 22, 24, 26 | b 21, 25, 27 | c 22, 25, 26 |  |  | — 78       |
|       |  |       |       |       |       |       |       |       |              | d 25, 26, 25 | e 26, 25, 26 |              |  |  |            |
| (79). | 60   | ..... | 55    | 51    | 49    | ..... | ..... | 40    | 37           |              |              |              |  |  |            |
|       |  |       |       |       |       |       |       |       |              | a 57, 45, 43 | b 59, 45, 42 | c 58, 46, 42 |  |  | — 79       |
|       |  |       |       |       |       |       |       |       |              | d 58, 45, 42 | e 56, 46, 41 |              |  |  |            |
| (80). | 48   | ..... | 44    | 41    | ..... | 36    | 34    | ..... | 28           |              |              |              |  |  |            |
|       |  |       |       |       |       |       |       |       |              | a 46, 38, 31 | b 45, 39, 30 | c 46, 39, 31 |  |  | — 80       |
|       |  |       |       |       |       |       |       |       |              | d 47, 38, 42 | e 47, 39, 30 |              |  |  |            |

**STOP** NOW WAIT FOR FURTHER INSTRUCTIONS

Test 5 Score (number right).....



**DIRECTIONS:** Work these problems on a sheet of scratch paper. Mark as you are told the letter of each correct answer.

**TEST 6**

- G. If a man earned \$25.00 and spent \$10.00, how much money would he have left?      a \$5.00  
b \$15.00  
c \$20.00  
d \$10.00      —G
- 
81. How many picture post cards can you buy for 15 cents at the rate of 3 for 5 cents?      a 9  
b 3  
c 15  
d 34      —81
- 
82. How many feet of railroad track can be laid with 750 ties if 25 ties are needed for each 50 feet?      a 1250  
b 1500  
c 325  
d 30      —82
- 
83. What number if multiplied by 3 is equal to 2 times 9?      a 3  
b 9  
c 18  
d 6      —83
- 
84. A sample rug is 12 inches long and 9 inches wide. How long will a larger rug of the same proportions be if it is 36 inches wide?      a 108 in.  
b 48 in.  
c 15 in.  
d 36 in.      —84
- 
85. What is the number which if divided by 4 is equal to  $\frac{1}{8}$  of 72?      a 12  
b 18  
c 48  
d 3      —85
- 
86. A high school student borrowed \$75.00 for one year at 6% to start a chicken ranch. How many little chickens must he sell at 10 cents each to pay back the money he borrowed with interest?      a 45  
b 450  
c 750  
d 795      —86
- 
87. A dealer allowed an old customer a discount of 10% on the marked price of bookcases. What is the marked price of a bookcase for which this customer paid him \$36.00?      a \$40.00  
b \$32.40  
c \$3.60  
d \$39.60      —87



TEST 6 (Continued)

88. A circular flower bed 7 feet in diameter is to be bordered by plants set one foot apart. What will be the cost of the plants at the rate of 2 for 15 cents? (Circumference of a circle is about  $3\frac{1}{7}$  times the diameter.)
- a 52¢  
b \$1.65  
c 70¢  
d \$1.57½ — 88
- 
89. A man placed four stepping stones one foot square in a row in a section of his garden so that there were equal spaces on all four sides of each of the stones. If the section was 3 feet wide, how long was it?
- a 12 ft.  
b 3 ft.  
c 9 ft.  
d 8 ft. — 89
- 
90. Ben lives 1.5 miles east of the library. James lives 2.5 miles directly west of the library. On a scale of  $\frac{1}{2}$  inch = 1 quarter mile, how many inches will represent the distance between the boys' houses?
- a 8  
b 16  
c 6  
d 2 — 90
- 
91. What is the number which if added to 5 is 3 less than  $\frac{1}{3}$  of  $\frac{3}{5}$  of 60?
- a  $\frac{1}{2}$   
b 9  
c 4  
d 12 — 91
- 
92. A gallon of water weighs 8.4 pounds. A gallon of gasoline weighs 68 per cent as much as a gallon of water. A pilot flying the air mail carried 50 gallons. How many pounds did this gasoline weigh?
- a 285  
b 285.6  
c 278.6  
d 380 — 92
- 
93. A coffee shop buys a blend of coffee composed of  $\frac{2}{3}$  of Grade A at 60 cents a pound and  $\frac{1}{3}$  of Grade B at 30 cents a pound. If they change the mixture, using  $\frac{1}{3}$  of Grade A and  $\frac{2}{3}$  of Grade B, how much will they save on every 10 pounds of coffee?
- a 3¢  
b 10¢  
c 30¢  
d \$1.00 — 93
- 
94. A man's will provided that his estate of \$15,000.00 should be divided as follows:  $\frac{2}{5}$  to his wife and  $\frac{1}{5}$  each to three children, except that in the event any of the children were deceased, their share should be divided equally between the remaining children and the wife. Two children were killed in an automobile accident. How much did the remaining child receive from the estate?
- a  $\frac{1}{5}$   
b \$6000.00  
c \$4500.00  
d \$5000.00 — 94
- 
95. If a set of tires for one automobile costs one-half of what a set costs for another automobile; and if three sets of the cheaper tires last only as long as two sets of the more expensive kind, the total cost of the cheaper tires during a given period will average what fraction or per cent of the cost of the more expensive kind?
- a  $\frac{1}{3}$  or 33 $\frac{1}{3}$ %  
b  $\frac{1}{2}$  or 50%  
c  $\frac{3}{4}$  or 75%  
d  $\frac{3}{8}$  or 37 $\frac{1}{2}$ % — 95



**DIRECTIONS:** Mark as you are told the number of the word that means the same or about the same as the first word.

**TEST 7**

- H. blossom <sup>1</sup> tree <sup>2</sup> vine  
<sup>3</sup> flower <sup>4</sup> garden \_\_\_\_\_ H
96. inefficient <sup>1</sup> avoidable <sup>2</sup> able  
<sup>3</sup> incompetent <sup>4</sup> unruly \_\_\_\_\_ 96
97. confiscate <sup>1</sup> assert <sup>2</sup> seize  
<sup>3</sup> compile <sup>4</sup> comfort \_\_\_\_\_ 97
98. malign <sup>1</sup> insure <sup>2</sup> muffle  
<sup>3</sup> slander <sup>4</sup> invade \_\_\_\_\_ 98
99. whimsical <sup>1</sup> accurate <sup>2</sup> weighty  
<sup>3</sup> fashionable <sup>4</sup> fanciful \_\_\_\_\_ 99
100. avarice <sup>1</sup> virtue <sup>2</sup> prominence  
<sup>3</sup> greed <sup>4</sup> honor \_\_\_\_\_ 100
101. eradicate <sup>1</sup> destroy <sup>2</sup> vacate  
<sup>3</sup> use <sup>4</sup> solve \_\_\_\_\_ 101
102. impeachment <sup>1</sup> prayer <sup>2</sup> burial  
<sup>3</sup> resignation <sup>4</sup> accusation \_\_\_\_\_ 102
103. discordant <sup>1</sup> clashing <sup>2</sup> sad  
<sup>3</sup> unsteady <sup>4</sup> distinctive \_\_\_\_\_ 103
104. titanic <sup>1</sup> reddish <sup>2</sup> acid  
<sup>3</sup> large <sup>4</sup> ancient \_\_\_\_\_ 104
105. edict <sup>1</sup> decree <sup>2</sup> diction  
<sup>3</sup> sovereign <sup>4</sup> edition \_\_\_\_\_ 105
106. recumbent <sup>1</sup> saving <sup>2</sup> curved  
<sup>3</sup> reclining <sup>4</sup> cumbersome \_\_\_\_\_ 106
107. caprice <sup>1</sup> action <sup>2</sup> whim  
<sup>3</sup> capture <sup>4</sup> tact \_\_\_\_\_ 107
108. expedite <sup>1</sup> expel <sup>2</sup> dictate  
<sup>3</sup> delay <sup>4</sup> hasten \_\_\_\_\_ 108
109. loquacious <sup>1</sup> talkative <sup>2</sup> logical  
<sup>3</sup> legal <sup>4</sup> delicious \_\_\_\_\_ 109
110. idiosyncrasy <sup>1</sup> ode <sup>2</sup> peculiarity  
<sup>3</sup> office <sup>4</sup> imbecility \_\_\_\_\_ 110
111. perfidious <sup>1</sup> treacherous <sup>2</sup> glad  
<sup>3</sup> studious <sup>4</sup> responsible \_\_\_\_\_ 111
112. artifice <sup>1</sup> artless <sup>2</sup> hate  
<sup>3</sup> definition <sup>4</sup> device \_\_\_\_\_ 112
113. anomaly <sup>1</sup> ceremony <sup>2</sup> illness  
<sup>3</sup> irregularity <sup>4</sup> normal \_\_\_\_\_ 113
114. reciprocal <sup>1</sup> charming <sup>2</sup> mutual  
<sup>3</sup> agreeable <sup>4</sup> meditative \_\_\_\_\_ 114
115. travesty <sup>1</sup> burlesque <sup>2</sup> tragedy  
<sup>3</sup> meeting <sup>4</sup> hotel \_\_\_\_\_ 115
116. obtuse <sup>1</sup> pointed <sup>2</sup> reversible  
<sup>3</sup> blunt <sup>4</sup> objectionable \_\_\_\_\_ 116
117. abstemious <sup>1</sup> stormy <sup>2</sup> bright  
<sup>3</sup> mournful <sup>4</sup> temperate \_\_\_\_\_ 117
118. tangent <sup>1</sup> blend <sup>2</sup> agent  
<sup>3</sup> touching <sup>4</sup> sensing \_\_\_\_\_ 118
119. extraneous <sup>1</sup> extra <sup>2</sup> foreign  
<sup>3</sup> transparent <sup>4</sup> noisy \_\_\_\_\_ 119
120. erudite <sup>1</sup> crude <sup>2</sup> learned  
<sup>3</sup> rugged <sup>4</sup> polite \_\_\_\_\_ 120
121. ameliorate <sup>1</sup> improve <sup>2</sup> harden  
<sup>3</sup> dilute <sup>4</sup> decorate \_\_\_\_\_ 121
122. malapert <sup>1</sup> sick <sup>2</sup> lazy  
<sup>3</sup> slow <sup>4</sup> saucy \_\_\_\_\_ 122
123. opulence <sup>1</sup> jewel <sup>2</sup> generosity  
<sup>3</sup> wealth <sup>4</sup> honor \_\_\_\_\_ 123
124. urbanity <sup>1</sup> loyalty <sup>2</sup> refinement  
<sup>3</sup> weakness <sup>4</sup> barbarism \_\_\_\_\_ 124
125. propinquity <sup>1</sup> nearness <sup>2</sup> speed  
<sup>3</sup> diligence <sup>4</sup> propriety \_\_\_\_\_ 125
126. trajectory <sup>1</sup> court <sup>2</sup> project  
<sup>3</sup> area <sup>4</sup> curve \_\_\_\_\_ 126
127. corollary <sup>1</sup> crown <sup>2</sup> inference  
<sup>3</sup> enclosure <sup>4</sup> supersede \_\_\_\_\_ 127
128. ostensible <sup>1</sup> actual <sup>2</sup> available  
<sup>3</sup> genuine <sup>4</sup> pretended \_\_\_\_\_ 128
129. salient <sup>1</sup> salty <sup>2</sup> outstanding  
<sup>3</sup> merciful <sup>4</sup> agreeable \_\_\_\_\_ 129
130. probity <sup>1</sup> uprightness <sup>2</sup> weight  
<sup>3</sup> suspicion <sup>4</sup> interference \_\_\_\_\_ 130
131. acephalous <sup>1</sup> false <sup>2</sup> warlike  
<sup>3</sup> headless <sup>4</sup> sensible \_\_\_\_\_ 131
132. porphyry <sup>1</sup> papyrus <sup>2</sup> rock  
<sup>3</sup> cave <sup>4</sup> manuscript \_\_\_\_\_ 132
133. strident <sup>1</sup> muscular <sup>2</sup> shrill  
<sup>3</sup> battered <sup>4</sup> strong \_\_\_\_\_ 133
134. effete <sup>1</sup> exhausted <sup>2</sup> festive  
<sup>3</sup> fragile <sup>4</sup> plentiful \_\_\_\_\_ 134
135. tyro <sup>1</sup> scold <sup>2</sup> village  
<sup>3</sup> law <sup>4</sup> beginner \_\_\_\_\_ 135
136. perimeter <sup>1</sup> measure <sup>2</sup> sound  
<sup>3</sup> boundary <sup>4</sup> difficulty \_\_\_\_\_ 136
137. diurnal <sup>1</sup> seasonable <sup>2</sup> timely  
<sup>3</sup> occasional <sup>4</sup> daily \_\_\_\_\_ 137
138. obloquy <sup>1</sup> disaster <sup>2</sup> blame  
<sup>3</sup> pride <sup>4</sup> obligation \_\_\_\_\_ 138
139. eyot <sup>1</sup> island <sup>2</sup> lake  
<sup>3</sup> river <sup>4</sup> insect \_\_\_\_\_ 139
140. detritus <sup>1</sup> fossil <sup>2</sup> dextrous  
<sup>3</sup> fragment <sup>4</sup> poem \_\_\_\_\_ 140
141. palladium <sup>1</sup> burden <sup>2</sup> safeguard  
<sup>3</sup> title <sup>4</sup> residence \_\_\_\_\_ 141
142. quiddity <sup>1</sup> oddity <sup>2</sup> doubt  
<sup>3</sup> essence <sup>4</sup> presence \_\_\_\_\_ 142
143. ambient <sup>1</sup> slow <sup>2</sup> surrounding  
<sup>3</sup> surprising <sup>4</sup> well-wishing \_\_\_\_\_ 143
144. orrery <sup>1</sup> book <sup>2</sup> prophecy  
<sup>3</sup> apparatus <sup>4</sup> error \_\_\_\_\_ 144
145. syzygy <sup>1</sup> separation <sup>2</sup> choice  
<sup>3</sup> conjunction <sup>4</sup> nonsense \_\_\_\_\_ 145

**STOP**

Test 7 Score  
(number right).....





# California Short-Form Test of Mental Maturity advanced GRADES 9-ADULT '50 S-form

DEvised BY E. T. SULLIVAN, W. W. CLARK, AND E. W. TIEGS

Name \_\_\_\_\_  
Last First Middle

School or Organization \_\_\_\_\_ City \_\_\_\_\_

Examiner \_\_\_\_\_ ( ) Examinee's Age \_\_\_\_\_

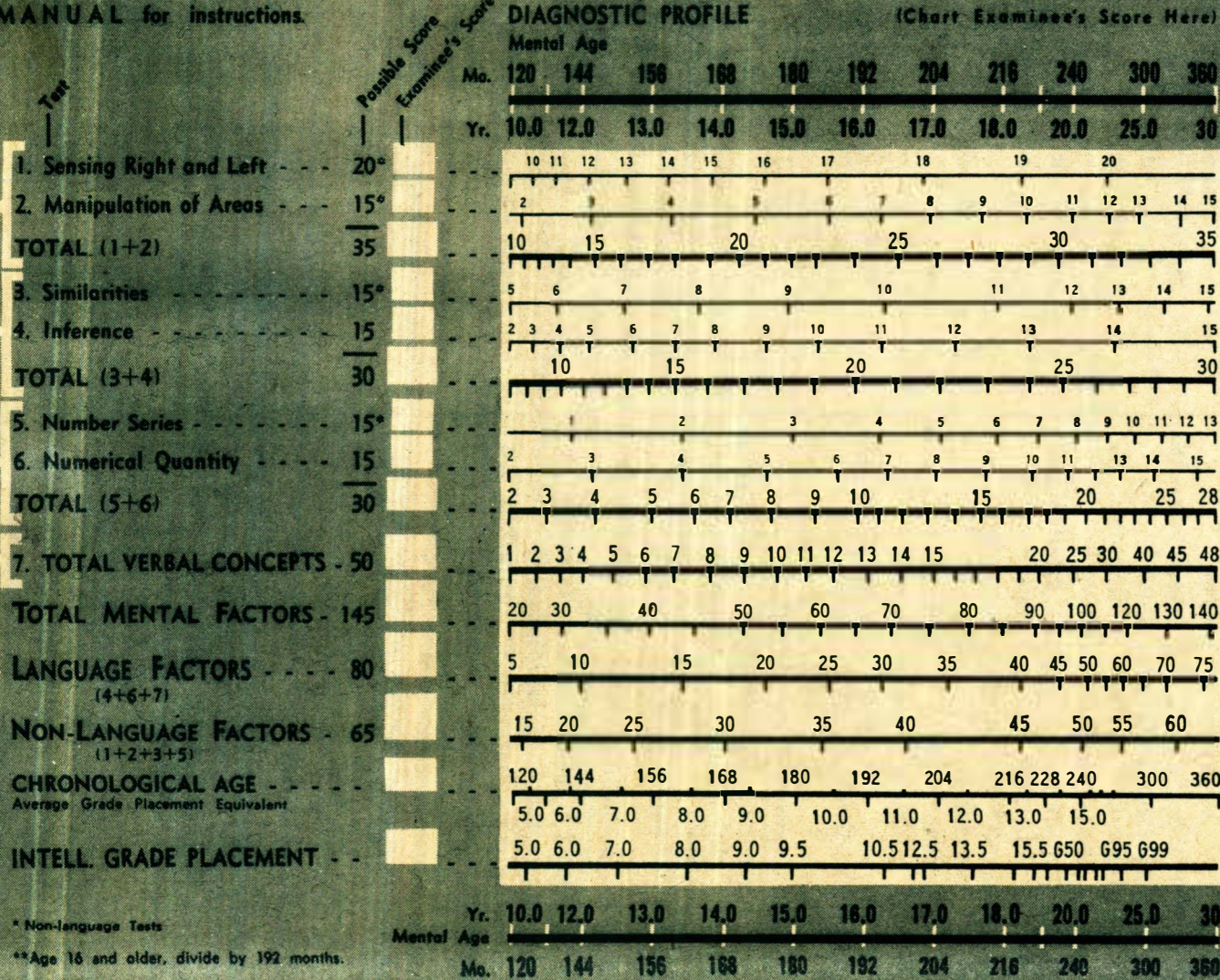
Occupation or Grade \_\_\_\_\_ Sex M-F

Date of Test \_\_\_\_\_  
Month Day Year

Date of Birth \_\_\_\_\_  
Month Day Year

See MANUAL for instructions.

Factor  
SPATIAL RELATIONSHIPS  
LOGICAL REASONING  
NUMERICAL REASONING  
VERBAL CONCEPTS



\* Non-language Tests

\*\*Age 16 and older, divide by 192 months.

## SUMMARY OF DATA

	TOTAL MENTAL FACTORS	LANG. LANGUAGE FACTORS	NON-LANG. LANGUAGE FACTORS
<b>SCORES</b>			
<b>MA</b>			
divided by			
<b>CA**</b>			
equals			
<b>I.Q.</b>			
<b>INTELLIGENCE GRADE PLACEMENTS</b>			

For comparison and prediction, use I.Q. percentile norms on page 19 of Manual.

	TMF	LANG	N-L
Normal Population			
9th Grade			
10th Grade			
11th Grade			
12th Grade			
College Freshmen			
College Sophomores			
College Graduates			
Others			



# Cooperative School and College Ability Tests

**College Ability  
Test**

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Cooperative Test Division · Educational Testing Service · Princeton, N. J. · Los Angeles 27, Calif.

**Form 1A**

Catalog No. 151-01-1



## General Directions

This is a test of some of the skills you have been learning ever since you first entered school. You should take it in the same way that you would work on any other new and interesting assignment.

The test is divided into four parts, which you will take one at a time. Give each one your close attention and do your best on every question. You probably will find some of the questions quite easy and others more difficult. You are *not* expected to answer every question correctly.

There are a few general rules for taking this test that will help you to earn your best score:

- Work carefully, but do not spend too much time on any one question. It usually is better to answer first all of the questions in the part that you know well and can answer quickly. Then go back to the questions that you want to think about.
- If you work at average speed you will have plenty of time to read and answer all of the questions. By leaving until last the questions that are most difficult, you will make best use of your time.
- You may answer questions even when you are not perfectly sure that your answers are correct. Your score will be the number of correct answers you mark.
- Put *all* of your answers on the answer sheet. This test booklet should not be marked in any way. Your examiner will give you an extra sheet of scratch paper to use when you do the number problems.
- Fill in all the information called for on the answer sheet and PRINT your name so that it can be read.
- Make sure that you understand instructions *before* you start work on any part. Ask the examiner to repeat the instructions if you do not understand exactly what you are to do.
- Make your answer marks on the answer sheet heavy and black. If you change your mind about an answer, be sure to erase your first mark completely.

If you give this test your best effort, your score will provide a good estimate of your ability in these important skills.

### DIRECTIONS FOR PART I

Each question in Part I consists of a sentence in which one word is missing; a blank indicates where the word has been removed from the sentence. Beneath each sentence are five words, one of which is the missing word. You are to select the missing word by deciding which one of the five words *best* fits in with the meaning of the sentence.

#### Sample Question

We had worked hard all day so that by evening we were quite ( ).

- A** small    **B** tired    **C** old  
**D** untrained    **E** intelligent

If you understand the sample sentence you will realize that “tired” is the missing word because none of the other words fits in with the meaning of the sentence. Next, on the answer sheet, you find the line numbered the same as the question and blacken the space which has the same letter as the missing word. Because “tired” is the correct word to use in the sample sentence, and its letter is **B**, the space marked **B** on the answer sheet is blackened. See how it has been marked on the answer sheet. Do *not* make any marks in your test booklet.

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

**PART I / TIME: 15 MINUTES**

- 1 At the great packing houses every particle of the slaughtered animal is used, and many things that would be ( ) in the small shops become a source of profit.  
**A** wasted    **B** valued    **C** sold  
**D** absorbed    **E** utilized
- 2 Since the two questions were completely ( ), it was necessary to consider them separately.  
**F** irrelevant    **G** confused    **H** unrelated  
**J** irrational    **K** theoretical
- 3 Animals are subject to diseases, infections, and injuries just as human beings are, but they cannot help the doctor by ( ) their ailments.  
**A** magnifying    **B** ignoring    **C** concealing  
**D** bearing    **E** describing
- 4 If those who are never happy unless they are working insist on putting in extra work to please themselves, they should not ( ) that this is a painful sacrifice for them.  
**F** discover    **G** pretend    **H** appreciate  
**J** regret    **K** wonder
- 5 The journey was as ( ) as his victory in that it brought all that he had hoped for.  
**A** long    **B** tiresome    **C** peaceful  
**D** swift    **E** fruitful
- 6 Like any other major operation, it should be resorted to only when less ( ) measures fail.  
**F** drastic    **G** urgent    **H** desirable  
**J** protective    **K** purposeful
- 7 His success in converting the audience to his way of thinking was largely a result of his ( ) criticisms of the foregoing speaker's comments.  
**A** limited    **B** secret    **C** many  
**D** purposeful    **E** persuasive
- 8 He cares little for the facts his pupils have stored in their memories; his aim is to build men, not to make ( ).  
**F** schools    **G** students    **H** experiments  
**J** encyclopedias    **K** philosophers
- 9 Only the well-to-do can save money without ( ).  
**A** insurance    **B** inducement    **C** privation  
**D** disgrace    **E** enjoyment
- 10 Kentuckians objected strenuously to the ( ) of courts, which in some cases could not be reached without crossing the mountains.  
**F** prejudice    **G** number    **H** inefficiency  
**J** lack    **K** inaccessibility
- 11 Despite his expressed ( ) regarding the affairs of the world, he diligently followed all that went on, read widely, and often found himself better informed than his friends.  
**A** wisdom    **B** concern    **C** complacency  
**D** indifference    **E** hopefulness
- 12 In a world of equality a man is recognized for what he does rather than for his ( ).  
**F** cleverness    **G** birth    **H** character  
**J** occupation    **K** intelligence
- 13 If ( ) were the real incentive to what its promoters call "do it yourself," the boom would have come in the thirties when people had to make do with so little.  
**A** entertainment    **B** competition  
**C** economy    **D** productivity    **E** relaxation
- 14 The treaties were to remain in force for ten years and were subject to ( ) unless terminated by any signatory on twelve months' notice.  
**F** limitation    **G** ratification    **H** agreement  
**J** renewal    **K** nullification
- 15 The crises in history are the times at which questions that have been ( ) for centuries suddenly yawn wide open.  
**A** crucial    **B** closed    **C** asked  
**D** unknown    **E** discussed
- 16 In this society which deemed manual toil a badge of ( ), very seldom did a laborer break the fetters which bound his class and reach high political station.  
**F** courage    **G** hardship    **H** democracy  
**J** inferiority    **K** strength
- 17 Most of the facts that you excavate from the archives, like all ( ) of past human activity, are dumb things.  
**A** sources    **B** kinds    **C** lessons  
**D** relics    **E** opinions
- 18 The tides present a striking ( ) whose essence is that while the force that sets them in motion is cosmic, presumably acting impartially on all parts of the globe, the nature of the tide at any particular place is a local and highly individual matter.  
**F** progression    **G** paradox    **H** power  
**J** rhythm    **K** coincidence

Go on to the next page.



- 19 No other man in politics, his admirers said, could have brought together so many ( ) interests and made so effective a combination.  
**A** hostile    **B** comparable    **C** deep  
**D** harmonious    **E** forgotten
- 20 However strongly American patriots may have desired a ( ) cultural life, they could not, as men and women of ideas, taste, and learning, turn their backs on the wealth of traditional European culture.  
**F** personal    **G** leisurely    **H** distinctive  
**J** broad    **K** universal
- 21 Work is activity ( ) an end; play activity is an end.  
**A** without    **B** after    **C** for  
**D** until    **E** upon
- 22 Despite all our enthusiasm for the cathedrals and their sculptures, the world that produced Gothic architecture is ( ) to ours.  
**F** comparable    **G** unknown    **H** allied  
**J** comprehensible    **K** alien
- 23 During the war the scientist who had been cloistered in a university laboratory and had taken pride in paying no heed to the possible ( ) of his findings was thrust into emergency work of the most lethally practical sort.  
**A** fallacies    **B** applications    **C** reputation  
**D** distortion    **E** suppression
- 24 We understand each other only because large numbers of people over great areas of the earth have lived in mutual agreement that certain words are ( ) for certain meanings and not for other meanings.  
**F** substitutes    **G** sounds    **H** symbols  
**J** necessary    **K** ambiguous
- 25 Maugham thinks that the prose drama is the least ( ) of the arts and that practically all prose plays find their resting places on the library shelves after their brief day or few decades in the theater.  
**A** studied    **B** topical    **C** unpopular  
**D** enduring    **E** dignified
- 26 The gorgeous pages of piano arpeggios and figurations in the finale are not simply externals for display: they are ( ) strands in a texture of romantic expression.  
**F** integral    **G** disparate    **H** technical  
**J** ornamental    **K** melodious
- 27 He had the advantage of competence without the ( ) of being a pedant.  
**A** superiority    **B** need    **C** toil  
**D** desire    **E** limitation
- 28 The escape of neutrons from a quantity of uranium is a surface effect depending on the area of the surface, but fission capture occurs throughout the material and is therefore a ( ) effect.  
**F** subsidiary    **G** permanent    **H** volume  
**J** larger    **K** characteristic
- 29 There is an adultness in the quality of his dialogue, in his frequent allusions to art and literature, that would ( ) the hypothetical "average" reader.  
**A** delight    **B** alienate    **C** benefit  
**D** deceive    **E** warn
- 30 The mining camps, given over as they were to material ends, direct action, and boisterous recreation, presented in most respects the very ( ) of the conventional morals and intellectual values of the eastern regions.  
**F** degradation    **G** antithesis    **H** beginnings  
**J** anathema    **K** antagonist



**Stop. If you finish before time is called, check your work on this part. Do not go on to Part II until you are told to do so.**

## DIRECTIONS FOR PART II

There are 25 problems in Part II of the test. Following each problem there are five suggested answers. Work each problem in your head or on a piece of scratch paper. Then look at the five suggested answers and decide which one is correct. Blacken the space under its letter on the answer sheet.

Because the correct answer to the sample problem is 586, which is lettered **F**, the space marked **F** on the answer sheet is blackened. See how it has been marked on the answer sheet. Do *not* make any marks in your test booklet.

### Sample Problem

5413                    **F** 586    **G** 596    **H** 696  
 - 4827                **J** 1586    **K** None of these

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

## PART II / TIME: 20 MINUTES

- 1  $\frac{2}{7}$   
+  $\frac{1}{2}$   
A  $\frac{3}{14}$   
B  $\frac{1}{3}$   
C  $\frac{9}{14}$   
D  $\frac{11}{14}$   
E None of these
- 2  $1\frac{1}{3} \times 1\frac{1}{2}$   
F  $1\frac{1}{8}$   
G  $1\frac{1}{6}$   
H  $1\frac{1}{5}$   
J 2  
K None of these
- 3  $\begin{array}{r} 64444 \\ -55555 \\ \hline \end{array}$   
A 8889  
B 9999  
C 18889  
D 19999  
E None of these
- 4  $\begin{array}{r} 3 \text{ pounds } 4 \text{ ounces} \\ 6 \text{ pounds } 9 \text{ ounces} \\ + 4 \text{ pounds } 4 \text{ ounces} \\ \hline \end{array}$   
F 13 pounds 7 ounces  
G 14 pounds 1 ounce  
H 14 pounds 5 ounces  
J 14 pounds 7 ounces  
K None of these
- 5 15% of 30  
A .45  
B .5  
C 2  
D 200  
E None of these
- 6  $\frac{2}{5} - \frac{2}{15}$   
F  $\frac{1}{5}$   
G  $\frac{4}{15}$   
H  $\frac{1}{3}$   
J  $\frac{2}{3}$   
K None of these
- 7 Change  $\frac{5}{12}$  to a per cent.  
A  $37\frac{1}{2}$   
B 40  
C  $41\frac{1}{3}$   
D  $41\frac{2}{3}$   
E  $42\frac{1}{3}$
- 8  $37\overline{)38813}$   
F 149  
G 1048  
H 1049  
J 1051  
K None of these
- 9  $42.8 - 4.19$   
A .9  
B 38.61  
C 38.71  
D 38.79  
E None of these
- 10  $2\frac{1}{2} \times 2\frac{1}{2}$   
F 1  
G  $4\frac{1}{4}$   
H 5  
J  $6\frac{1}{5}$   
K  $6\frac{1}{4}$
- 11  $9\frac{3}{5} \div \frac{9}{10}$   
A  $\frac{3}{32}$   
B  $\frac{25}{216}$   
C  $8\frac{16}{25}$   
D  $10\frac{1}{5}$   
E  $10\frac{2}{3}$
- 12  $2\overline{)3 \text{ feet } 6 \text{ inches}}$   
F 1 foot 3 inches  
G 1 foot 8 inches  
H 1 foot 6 inches  
J 1 foot 9 inches  
K None of these
- 13  $8 \div 2\frac{1}{2}$   
A  $\frac{5}{16}$   
B  $3\frac{1}{16}$   
C  $3\frac{1}{5}$   
D 20  
E None of these
- 14  $5000 - 100.05$   
F 4899.95  
G 4900.05  
H 4900.95  
J 4999.95  
K None of these
- 15  $6 \div \frac{1}{3}$   
A  $\frac{1}{18}$   
B  $\frac{1}{2}$   
C 2  
D  $\frac{19}{3}$   
E None of these
- 16  $\begin{array}{r} 7\frac{1}{10} \\ 5\frac{2}{3} \\ + 11\frac{5}{6} \\ \hline \end{array}$   
F  $23\frac{3}{5}$   
G  $24\frac{17}{30}$   
H  $24\frac{3}{5}$   
J  $24\frac{19}{30}$   
K  $24\frac{2}{3}$
- 17  $.12\overline{)1524}$   
A 1.27  
B 12.7  
C 127  
D 1270  
E 12,700
- 18 What is the sum of .875 and  $1\frac{1}{5}$ , written as a decimal?  
F 995  
G 1.075  
H 2.075  
J 2.125  
K None of these
- 19  $\frac{59}{60} - \frac{49}{50}$   
A  $\frac{1}{3000}$   
B  $\frac{1}{300}$   
C  $\frac{1}{60}$   
D  $\frac{1}{50}$   
E  $\frac{1}{30}$

- 20 8% of  $17\frac{1}{2}$
- F 1.4  
G 5.36  
H 13.6  
J 14  
K None of these
- 21 4 yards 1 foot 2 inches  
– 3 yards 1 foot 11 inches
- A 3 inches  
B 2 feet 1 inch  
C 2 feet 3 inches  
D 9 feet 1 inch  
E None of these
- 22 8 pounds 4 ounces  $\div$  3
- F 2 pounds  $1\frac{1}{3}$  ounces  
G 2 pounds 2 ounces  
H 2 pounds 8 ounces  
J 2 pounds 12 ounces  
K None of these
- 23  $84 = (?)\%$  of 70
- A  $83\frac{1}{3}$   
B  $116\frac{2}{3}$   
C 120  
D 125  
E None of these
- 24 The average of  $7\frac{1}{3}$  and  $8\frac{1}{2}$  is
- F  $7\frac{5}{12}$   
G  $7\frac{5}{6}$   
H  $7\frac{11}{12}$   
J 8  
K None of these
- 25 Change .4375 to a fraction.
- A  $\frac{7}{16}$   
B  $\frac{7}{18}$   
C  $\frac{7}{20}$   
D  $\frac{17}{40}$   
E None of these



**Stop.** If you finish before time is called, check your work on this part. Do not go back to the previous part. Do not go on to Part III until you are told to do so.

### DIRECTIONS FOR PART III

Each of the questions in Part III consists of one word in large letters followed by five words or phrases in small letters. Read the word in large letters. Then pick, from the words or phrases following it, the one whose meaning is closest to the word in large letters. For example:

#### Sample Question

**chilly**

- A tired    B nice    C dry  
D cold    E sunny

In order to find the correct answer you look at the word **chilly** and then look for a word or phrase below it that has the same or almost the same meaning. When you do this you see that “cold” is the answer because “cold” is closest in meaning to the word “chilly.” Next, on the answer sheet you find the line numbered the same as the question and blacken the space which has the same letter as the word you have selected as the correct one. Because “cold” is the correct answer to the sample question, the space marked **D** on the answer sheet is blackened. See how it has been marked on the answer sheet. Do *not* make any mark in your test booklet.

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



**PART III / TIME: 10 MINUTES****1 breed**

- A consolidate
- B keep alive
- C labor
- D dwell
- E produce offspring

**2 affiliate**

- F subordinate
- G stranger
- H associate
- J competitor
- K kinsman

**3 recur**

- A hold in bounds
- B alternate
- C revolve
- D happen again
- E save

**4 partiality**

- F favoritism
- G regularity
- H insufficiency
- J friendliness
- K divisibility

**5 longevity**

- A expansion
- B long life
- C long-suffering
- D senility
- E remoteness

**6 obscene**

- F inhuman
- G indecent
- H fawning
- J out of date
- K dim

**7 reimburse**

- A collect
- B grow larger
- C pay back
- D give new strength
- E reward

**8 clemency**

- F absolution
- G promptness
- H delicacy
- J peacefulness
- K mercy

**9 rectify**

- A justify
- B set right
- C cure
- D purify
- E set erect

**10 affect**

- F happen
- G produce
- H handle
- J influence
- K result

**11 intact**

- A coarse
- B reticent
- C unimpaired
- D abrupt
- E uncontrollable

**12 ultimate**

- F high
- G final
- H lowest
- J eternal
- K distant

**13 bibliography**

- A table of contents
- B index
- C account of a life
- D study of ancient books
- E list of writings

**14 illicit**

- F vicious
- G absent
- H unrecorded
- J false
- K unlawful

**15 ostracism**

- A eastern cult
- B banishment
- C conviction
- D criticism
- E heresy

**16 forego**

- F travel far
- G temporize
- H relinquish
- J bring to conclusion
- K grab

**17 applicable**

- A adhesive
- B straightforward
- C capable
- D easily reached
- E suitable

**18 rabble**

- F defeated army
- G rough stone
- H noisy mob
- J festival
- K shapeless mass

**19 evolve**

- A unfold
- B initiate
- C shirk
- D spin
- E think over

**20 dogged**

- F loyal
- G brutal
- H determined
- J ragged
- K playful

**21 fetus**

- A ambush
- B foul odor
- C unborn young
- D bondman
- E contraband

22 ruc

- F feel guilty
- G be terrified
- H spoil
- J regret
- K make trouble

23 copious

- A drunk
- B plentiful
- C toilsome
- D complete
- E tottering

24 glower

- F provide warmth
- G squint
- H throw out sparks
- J look angrily
- K shine through

25 embellish

- A celebrate
- B enliven
- C make war on
- D add ornaments to
- E brighten

26 clandestine

- F effeminate
- G spiteful
- H secret
- J dishonest
- K eccentric

27 buffet

- A encroach
- B strike
- C polish
- D brandish
- E subdue

28 parsimony

- F frugality
- G rhythm
- H acquisitiveness
- J eastern religion
- K inheritance

29 dearth

- A scarcity
- B plague
- C dissolution
- D frustration
- E odium

30 cataclysm

- F massacre
- G waterfall
- H whirlpool
- J severing
- K upheaval



**Stop.** If you finish before time is called, check your work on this part. Do not go back to either previous part. Do not go on to Part IV until you are told to do so.

### DIRECTIONS FOR PART IV

There are 25 problems in Part IV of the test. Following each problem there are five suggested answers. Work each problem in your head or on a piece of scratch paper. Then look at the five suggested answers and decide which one is correct. Blacken the space under its letter on the answer sheet.

Because the correct answer to the sample problem is 8, which is lettered **H**, the space marked **H** on the answer sheet is blackened. See how it has been marked on the answer sheet.

Do *not* make any marks in your test booklet.

#### Sample Problem

Four \$10-bills are equal to how many \$5-bills?

- F 20    G 10    H 8  
J 40    K 2

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

**PART IV / TIME: 25 MINUTES**

- 1 John has 10 marbles, Mike has 2 more than John, and Pete has 2 more than Mike. How many marbles do John, Mike, and Pete have together?
- A 26  
B 32  
C 34  
D 36  
E 38
- 2 A telephone directory has  $12\frac{1}{2}$  pages of listings for a certain town. If the average number of telephone numbers per page is 120, how many telephones are listed for this town?
- F 1400  
G 1440  
H 1446  
J 1460  
K 1500
- 3 A man worked  $7\frac{1}{2}$  hours starting at 8:15 a.m. with no time out for lunch. At what time did he finish?
- A 3:15 p.m.  
B 3:45 p.m.  
C 4:15 p.m.  
D 4:45 p.m.  
E 5:45 p.m.
- 4 A briefcase is marked \$39.50 plus tax. If the tax is 20%, how much must the customer pay for the briefcase?
- F \$31.60  
G \$40.29  
H \$41.48  
J \$47.40  
K \$49.38
- 5 
$$\frac{2 + 4 - 1}{(?)}$$
- A  $\frac{1}{8}$   
B  $\frac{1}{6}$   
C 1  
D 6  
E 8
- 6 If a roll of quarters has 40 quarters and a roll of dimes has 50 dimes, what is the value of 3 rolls of quarters and 5 rolls of dimes?
- F \$27  
G \$45  
H \$55  
J \$80  
K \$125
- 7 John spent \$1.00 of his allowance on a book, half the remainder on a movie, and then had 60 cents left. What was his allowance?
- A \$1.60  
B \$2.10  
C \$2.20  
D \$2.40  
E \$2.60
- 8 For each cup of coffee either  $1\frac{1}{4}$  measures of coffee X or  $1\frac{1}{2}$  measures of coffee Y are used. How many fewer measures of X than Y would be needed to make 10 cups of coffee?
- F  $2\frac{1}{2}$   
G 5  
H 10  
J  $12\frac{1}{2}$   
K 15
- 9 Which of the following is the smallest possible sum of four United States coins, no two of which are of the same denomination?
- A 17 cents  
B 41 cents  
C 81 cents  
D 86 cents  
E 90 cents
- 10 How much more do 4 dozen two-for-a-nickel gumdrops cost than 5 dozen three-for-a-nickel gumdrops?
- F  $1\frac{2}{3}$  cents  
G 20 cents  
H 24 cents  
J 40 cents  
K \$1.20
- 11 The mean elevation of California is 2900 feet above sea level. How many feet below the mean elevation of California is Death Valley, which is 282 feet below sea level?
- A 2182  
B 2618  
C 2859  
D 3041  
E 3182

- 12 At the rate of 45 words per minute, how many hours will it take a typist to type a 7200-word article?
- F  $1\frac{3}{5}$   
 G  $2\frac{1}{3}$   
 H  $2\frac{2}{3}$   
 J  $3\frac{3}{4}$   
 K 16
- 13 A farmer uses 35 pounds of a certain spray dust per acre of land. If this dust is 3% DDT, how many pounds of DDT (to the nearest pound) does he use on a 21-acre field?
- A 1  
 B 22  
 C 24  
 D 105  
 E 245
- 14 In January a salesman sold  $\frac{2}{3}$  of his monthly quota. If he sold \$660 worth of merchandise, what was his monthly quota?
- F \$220  
 G \$330  
 H \$440  
 J \$880  
 K \$990
- 15 What is the average of 1 pound 5 ounces and 2 pounds 15 ounces?
- A 1 pound 10 ounces  
 B 1 pound 15 ounces  
 C 2 pounds 2 ounces  
 D 2 pounds 10 ounces  
 E 3 pounds 2 ounces
- 16 A hotel needs window curtains requiring  $1\frac{1}{8}$  yards of material each. How many of these curtains can be made from a 72-yard bolt of material?
- F 63  
 G 64  
 H 80  
 J 81  
 K 82
- 17 One inch is equal to approximately 2.5 centimeters. Twenty centimeters are equal to approximately how many inches?
- A 8  
 B  $12\frac{1}{2}$   
 C  $22\frac{1}{2}$   
 D 25  
 E 50
- 18 If each stroke of a file removes 0.0016 inch of metal, how many strokes are needed to reduce the thickness of a metal block from 9.27 inches to 8.95 inches?
- F 20  
 G 50  
 H 200  
 J 500  
 K 2000
- 19 In a certain company, 5 employees got a \$20 bonus, 16 got a \$50 bonus, and 9 got an \$80 bonus. What was the average bonus for these 30 employees?
- A \$25  
 B \$30  
 C \$50  
 D \$54  
 E \$75
- 20 The bill for a pair of shoes and a pair of skates was \$19.50. If the skates cost \$1.50 more than the shoes, how much did the skates cost?
- F \$9.75  
 G \$10.00  
 H \$10.50  
 J \$10.75  
 K \$11.25
- 21 If 2 yards 9 inches of material cost \$4.95, what is the cost per yard?
- A \$1.71  
 B \$1.86  
 C \$2.20  
 D \$2.83  
 E \$3.96
- 22 If the property in a city is assessed at \$75,000,000 what tax rate is necessary to raise \$6,000,000 in property taxes?
- F 0.6%  
 G 0.8%  
 H 4.5%  
 J 6%  
 K 8%
- 23 If a table is sold for \$60 after a 20% discount, what was the price before the discount?
- A \$12.00  
 B \$48.00  
 C \$72.00  
 D \$75.00  
 E \$80.00



- 24 In a certain high school, 25% of the girls and 50% of the boys attended a football game. If 48% of all the students are girls, what per cent of all the students went to the game?

F  $33\frac{1}{3}$   
G 36  
H  $37\frac{1}{2}$   
J 38  
K 75

- 25 Two machines plus three men can do the work that 16 men did with no machines. How many men will a dozen of these machines replace?

A 18  
B 36  
C 78  
D 96  
E 156

**If you finish before time is called,  
check your work on this part. Do  
not go back to any previous part.**