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COLLEGE COLLECTION

A STATISTICAL STUDY TO DETERMINE THE VALUE OF
INTELLIGENCE QUOTIENTS AND GENERAL ACHIEVEMENT TEST SCORES
FOR PREDICTING SUCCESS IN FIRST-YEAR BOOKKEEPING

BY

MARY ANGELYN GILES

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Approved by

Mathilde Hardaway
Mathilde Hardaway, Adviser

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

The selection of pupils for first-year bookkeeping, for any other business subject, or for any field of study, is a problem of utmost importance to the pupil, the parent, the teacher, and the school administrator. Blackstone says:

If we but knew some way to determine in advance which students are unable to profit from instruction in a particular course because of lack of intelligence, capacity, interest, or attitude; if we could but discover the courses from which they are able to profit, we would be able to contribute a great deal to human success and happiness.....Adequate prognosis is a worthwhile objective, indeed, and one that should be pursued until it is efficient.¹

Two points of view seem now to be held as the proper procedure for selecting pupils for a course in bookkeeping. One point of view is that interest displayed by the pupil warrants entrance into the class. The other point of view is that only those pupils who can successfully complete the course should be allowed to pursue the study.

It appears at present that the first-mentioned point of view is the one that is followed in the majority of the schools today in regard to bookkeeping. On the other hand, alert business teachers and administrators are aware of the need for a valid means of selecting the pupils to prevent those who cannot be successful from wasting their time in a

¹ E. G. Blackstone, "Prognosis in Business Education," Business Education World, XIX (March, 1939), p. 533.

course. It is obvious that they have recognized the need for a guidance program, but as yet, research has not provided them with a testing program that gives a true measure of the ability to learn bookkeeping. Blackstone reports that during the period 1915 to 1939 there were "no less than a dozen experiments with prognosis in bookkeeping."² In regard to these studies he says, "Of these studies just mentioned, not a single one has been sufficiently valid and reliable to enable a teacher to depend upon its findings for the selection of individual students for any phase of business education."³ Now, more than ten years later, writers in the general field of educational prognosis say, "The status of research in prognosis shows that the problems apparent ten years ago still persist as major ones."⁴

After a careful reading of literature relating to prognosis in bookkeeping, the writer has concluded that no one factor should be used as a determinant of success in a particular subject because variables such as intelligence, aptitude, interest, former school achievement, attitude, personal traits and habits influence a pupil's achievement in the subject. Is there, though, a combination of predictive factors which can be used with a high degree of accuracy to foretell a pupil's success in first-year bookkeeping?

The present study is a result of the investigator's realization of a need for prognosis in bookkeeping, and it is an attempt to find a

² Ibid., p. 533.

³ Ibid., p. 534.

⁴ Leo F. Cain, John U. Michaelis, and Alvin C. Eurich, "Prognosis," Encyclopedia of Educational Research, (New York: The MacMillan Company, 1950), p. 892.

combination of factors by which success can be predicted with a fair degree of accuracy before a study of the course is begun. One of the weaknesses of research in the field of prognosis is the administration of the predictive measure or measures concurrently with the study of the subject. Hardaway says:

Predictive measures have often been applied after the students began the study of the course--sometimes even concurrently with the measure of success. What is to be gained if we should succeed in predicting results for six weeks or so in a course that takes two years to learn, or why should we predict after the event is over?⁵

Purpose of the Study

This study was undertaken to determine whether the success of pupils in first-year bookkeeping can be predicted by their scores on an intelligence test and on a general achievement test or any of its parts. This study involves these specific questions:

1. What is the relationship of intelligence quotients to first-semester bookkeeping examination scores and semester grades?
2. What is the relationship of achievement test scores to first-semester bookkeeping examination scores and semester grades?
3. What is the relationship of intelligence quotients to second-semester bookkeeping examination scores and semester grades?
4. What is the relationship of achievement test scores to second-semester bookkeeping examination scores and semester grades?
5. What is the relationship of intelligence quotients combined with achievement test scores to first-semester bookkeeping examination scores and semester grades?

⁵ Mathilde Hardaway, "Prognostic or Aptitude Tests for Skill Subjects," Business Education World, XXV (March, 1945), p. 371.

6. What is the relationship of intelligence quotients combined with achievement test scores to second-semester bookkeeping examination scores and semester grades?

The results of this study should aid teachers and counselors in the guidance of prospective bookkeeping pupils. In the event a high relationship between the factors is found, pupils could be encouraged to take bookkeeping if their intelligence quotients and achievement tests scores are high and discouraged if their intelligence quotients and achievement tests scores are low. If no high relationships are found, the conclusion may be drawn that these factors should be disregarded in the guidance of future bookkeeping pupils.

Scope of the Study

This study consists of two phases. The first phase of the study concerns itself with the 67 pupils who enrolled in or completed one year's study of bookkeeping at Senior High School, Greensboro, North Carolina, during the academic year 1949-1950. Data were lacking for either the predictive factors or the measures of success in bookkeeping for 4 pupils, leaving only 63 cases in the first phase of the study. This first phase is hereafter referred to as the "Original Study." The second phase of the study concerns itself with 56 pupils for whom data were available in the bookkeeping classes at the same school during the first semester of the academic year 1950-1951. The purpose of the second phase of this study is to verify the findings of the first phase of the study and is therefore called the "Check-up Study."

The nine-month school year is divided into two semesters of three six-week periods. In both academic years, there were two classes of

bookkeeping taught by the same two teachers. The teachers worked closely together during both years and adhered to school grading and testing policies as set forth by the school administration.

Source and Treatment of the Data

The two criteria of success in bookkeeping used in this study are the scores on the South-Western Publishing Company Bookkeeping Examination No. 1 (First Semester) and Bookkeeping Examination No. 2 (Second Semester) and the teacher's final grade at the end of each semester. These two criteria provide a double measure of bookkeeping success; the examination scores are strictly objective and the teacher's grades are partially subjective.

The first-semester bookkeeping examination, a copy of which appears in the appendix, is made up of five parts; namely, Recording Transactions in Special Journals, Journalizing Transactions, The Trial Balance, Classification of Accounts in Financial Reports, and Bookkeeping Principles. The second-semester bookkeeping examination, a copy of which appears in the appendix, is made up of four parts which are: Classification of Accounts, Bookkeeping Terms, Bookkeeping Principles, and The Work Sheet Statement Columns. The scores on the bookkeeping examinations were converted into percentages for the semester examination grades, but in this study, the raw scores were used.

The semester bookkeeping grade, the second criterion for measuring success in bookkeeping, is an average of the three six-week grades and the South-Western Publishing Company Bookkeeping Examination score used as the semester examination grade, each weighted equally as one-fourth in determining the final grade. The six-week grades were determined

by the teacher on the basis of the Carlson-Forkner-Prickett bookkeeping tests correlated with the textbook, tests of the teacher's own making, classwork, and homework.

It should be remembered by the reader that the first criterion, the bookkeeping examination score, is a component of the second criterion, the semester grade; that is, the bookkeeping examination score is one of the four factors that make up the semester grade.

The semester grades were copied from the permanent records of the high school. Since the examination scores were expressed as percentage figures in the permanent school records and raw scores were needed for the computations in this study, the raw scores on the bookkeeping examinations were copied directly from the examination papers which were kept by the teacher.

The two major predictive measures are the intelligence quotient and the general achievement test total score. The intelligence quotients were obtained from the Kuhlmann-Anderson Intelligence Tests, Fifth Edition, a copy of which appears in the appendix. This test was given and scored by the administration and staff of the high school as a part of the city-wide testing program in the city schools. The achievement test scores were obtained from the Tiegs and Clark Progressive Achievement Tests, Advanced Battery, Form A (Diagnostic tests keyed to the curriculum). A copy of the front sheet of the test, which indicates the elements measured by the test, may be seen in the appendix.* This test, too, was a part of the city testing program in the Greensboro city school system.

*In accordance with a request from the publishers, the test is not included in the appendix.

The achievement test is composed of five parts which are: Reading Vocabulary, Reading Comprehension, Mathematical Reasoning, Mathematical Fundamentals, and Language. The part scores and certain combinations of parts, as well as the total score, were used as predictive factors.

The intelligence quotients and achievement test scores were computed by the home-room teachers at the high school. These were copied on score sheets which accompanied the tests, and these sheets were placed in the pupils' individual folders in the permanent file. For use in this study, the intelligence quotients and the achievement test total scores and part scores were copied by the investigator from the score sheets in the permanent files.

The coefficients of correlation between the predictive factors and the two measures of success in bookkeeping were obtained by the Pearson product-moment method using ungrouped data. The analysis and interpretation of the coefficients of correlation of the intelligence quotients and achievement test scores with the bookkeeping examination scores and semester grades are given in Chapter III.

A review of previous studies on prognosis in bookkeeping is contained in Chapter II.

CHAPTER II

RELATED STUDIES

The purpose of this chapter is to acquaint the reader with research which has been done on prognosis in bookkeeping. It is interesting and encouraging to know that, while leaders say that no study has produced sufficiently high relationships to depend upon its findings for the selection of individual pupils for a course in bookkeeping, research workers are still aware of the need for a testing program to aid in guidance and are continuing their attempts to find predictive measures that may be used with confidence.

An examination of bibliographies of research studies in business education was made to find previous studies on prognosis in bookkeeping. All bibliographies from 1920 to the present time were examined, and those studies which the writer hoped would reveal pertinent findings were selected and reviewed. Those studies that found relationships between any factor and success in high school bookkeeping as measured by either a bookkeeping test score or a grade were judged to be related to this study. In this chapter, the significant findings of the related studies are presented. In Chapter III, the findings of those that used similar predictive factors are compared and contrasted with the findings of the present study.

The Stedman Study

Stedman¹ conducted an investigation to determine what factors influence success in bookkeeping and what relationships exist between certain test scores and both bookkeeping test scores and grades. The investigation involved 75 tenth-grade students studying first-semester bookkeeping at Bell High School in the Los Angeles school system in September, 1927. The results were verified by another study of a group of tenth-grade students in the same school in the fall of 1928. Stedman used test scores on the McQuarrie Test of Mechanical Aptitude, the Thurston Employment Test, the Terman Group Test of Mental Ability, and a spelling test and an arithmetic test made by the investigator. These test scores were correlated with scores on the Carlson bookkeeping test and with bookkeeping grades.

The conclusions of the Stedman study are as follows:

1. The findings of this study would indicate that a child with an intelligence quotient below 80 should, under no consideration, be allowed to take up the study of bookkeeping, while the child of an intelligence quotient between 80 and 90 should be allowed to take bookkeeping only if he has a capacity for hard work, is industrious, healthy, and if his position in life is such that he is to have definite need for it.

For the child with an intelligence quotient above 90, who is willing to work, has physical health, an aptitude for the work, and likes the subject, there is no positive assurance that he will succeed, but it is safe to allow him to try.

2. By use of the modified form of the Thurston Clerical Test and tests in the fundamentals of arithmetic it is possible to predict with almost absolute accuracy the maximum possibilities of any student entering a class of bookkeeping.²

¹ Melissa Branson Stedman, "Factors Influencing School Success in Bookkeeping," Journal of Applied Psychology, XIV (February, 1930), pp. 74-75.

² Ibid., p. 81.

Stedman³ based the first conclusion on an r of .64 between the scores on the Terman Group Test of Mental Ability and the bookkeeping test scores and an r of .55 between the scores on the Terman test and bookkeeping grades. She based her second conclusion on the following coefficients of correlation:

Thurston combined score minus test 5 with bookkeeping test scores	.73
Thurston combined score minus test 5 with bookkeeping grade	.74
Arithmetic fundamentals test score with bookkeeping grade	.62
Thurston combined score, minus test 5 combined with arithmetic test score with bookkeeping grade	.71

The Nelson Study

In 1928, Nelson⁴ reported the findings of his four-year study of 243 tenth-grade pupils at Windham High School, Willimantic, Connecticut. He measured success in bookkeeping by the teacher's grade at the end of one year of bookkeeping. He used grades of selected school subjects and the intelligence quotient obtained from the Terman Group Test of Mental Ability as predictive factors. Nelson found the following coefficients of correlation between the bookkeeping grades and the predictive factors: freshman average .63, freshman algebra .59, commercial arithmetic .54, freshman English .48, intelligence quotient .41, mental age .30, chronological age .19. Based on these coefficients of correlation, Nelson reached the following conclusions:

³ Ibid., p. 77.

⁴ H. Chester Nelson, "A Study of Bookkeeping Prognosis in the High School," Master's Thesis, Columbia University, 1928, pp. 5-30.

1. The general average of freshman subjects is the best predicting factor of bookkeeping success available at the close of the freshman year. The correlation of bookkeeping with freshman average is .63.

2. Subjects that have something in common with bookkeeping such as algebra or commercial arithmetic correlate more highly with bookkeeping than do subjects like English.

3. The grade of any single subject of the freshman year is a better measure of bookkeeping ability than an intelligence test.

4. Intelligence quotient is a better measure of bookkeeping ability than is mental age.

5. Chronological age, for high school ranges, has almost no relationship to bookkeeping ability.

6. Freshman algebra which correlates .59 is the best single subject from which to predict bookkeeping success the following year.

7. To predict success in bookkeeping, freshman average alone serves practically as well as freshman average and mental age combined.

8. On the basis of intelligence quotient alone, one cannot advise a pupil not to take bookkeeping.

9. By using freshman average alone, the guiding advice of the principal can be improved.⁵

The Rosenblum Study

Rosenblum⁶ conducted an investigation in an attempt to discover criteria for selecting pupils for a junior high school bookkeeping course. The investigation, made at East New York High School in 1926, comprised 70 pupils in the ninth grade. The predictive factors were grades of selected subjects taken in the seventh and eighth grades and the intelligence test score on the Terman Group Test of Mental Ability. Success in bookkeeping

⁵ Ibid., pp. 29-30.

⁶ Irving Rosenblum, "Criteria for the Selection of Pupils for the Junior High School Bookkeeping Course," Master's Thesis, School of Education, College of the City of New York, 1929. 16pp.

was measured by the score on a Carlson bookkeeping test and by a grade. The bookkeeping grade and the grades of the subjects used as predictive factors were each averages of the first and second-semester grades.

Rosenblum concluded that intelligence is of little value as a key to the ability to do bookkeeping. The coefficients of correlation between the intelligence test scores and the bookkeeping test scores and grades were .386 and .129, respectively. He found greater value in the scores on the sub-tests in analogies, logical selection, and arithmetic than in the total intelligence test score. The scores on these three sub-parts when correlated with the bookkeeping test scores produced coefficients of correlation of .533, .491, and .401, respectively. He further concluded that the subjects which are of most value in estimating potential bookkeeping achievement are arithmetic, grammar, geography, history, and literature. He based this conclusion on the following coefficients of correlation between the grades of the predictive subjects and the bookkeeping test scores and grades.

	<u>Bookkeeping test score</u>	<u>Bookkeeping grade</u>
Arithmetic grade	.493	.493
Grammar grade	.527	.371
Geography grade	.540	.378
History grade	.492	.399
Literature grade	.474	.407

The Tupper Study

Tupper⁷ completed a study in 1930 which was an effort to determine what tendencies or influences certain factors have on success in bookkeeping. A class of 50 students in first-semester bookkeeping at the Santa Clara Union High School, Santa Clara, California, was selected for this investigation. Success was measured by test scores (Carlson's Bookkeeping Tests, Numbers 1, 2, and 3, Series A) and amount of work accomplished (36 preliminary examples and a regular full set of single proprietorship books). Factors which were regarded as possible influences on success in bookkeeping were: "intelligence quotient, mental age, chronological age, sex, intention of continuing the subject through succeeding semesters, speed in amount of work performed, early understanding of the subject matter and theory of bookkeeping, relation of early completion of the semester's work to average test results secured during the semester, nationality, and respective rankings in the class at the completion of the preliminary theory exercises, as well as ultimate rankings in the completion of the semester's set of books."⁸

Tupper⁹ found a coefficient of correlation of .66 between the averaged bookkeeping test scores and the intelligence quotients, when computed by the Pearson product-moment method. Using the rank order method, he found the following coefficients of correlation between:

⁷ Clyde W. Tupper, "The Influence of Certain Factors Upon Success in a Bookkeeping Class," Master's Thesis, Leland Stanford Junior University, 1930, pp. 1-3.

⁸ Ibid., p. 2.

⁹ Ibid., pp. 10-30.

Intelligence quotients and ranks of the pupils in completing the semester's work	.23
Intelligence quotient distribution and the distribution of the ranks of the students completing the preliminary and preparatory 36 examples	.11
Intelligence quotients and scores of test 1	.67
Intelligence quotients and scores of test 2	.63
Intelligence quotients and scores of test 3	.56
Distributions of ranks of pupils in completing the preliminary 36 examples and the semester's work in its entirety	.80
Mental age and averaged test scores	.71
Chronological age and averaged test scores	.03

Tupper also found in his study that "the boys secured a better understanding of bookkeeping principles, while the girls outranked the boys in industry and ability to secure high rankings in the completion of the work to be performed during the first six weeks of the course and also during the entire semester's work"; "there is no significant relation between the amount of time spent in home study and the test scores secured"; "the nationality of either the students or the parents in this study can be considered to have but little bearing, if any, upon the degree of success achieved by the students in the averaged test scores"; "an early understanding of the subject matter encourages further effort in the study of and mastery of the subject and tends toward success in that subject"; and "there is a decided relation between the amount of time taken in performing the work assigned and later success in the averaged tests of the entire semester."¹⁰

¹⁰ Ibid., pp. 36, 37, 46, 50, 55.

The Strauss Study

Strauss¹¹ conducted an investigation to determine the effect of arithmetic achievement and general intelligence on success in bookkeeping. The Bowman and Percy bookkeeping test score was used as the measure of success in bookkeeping. The intelligence quotients were obtained from the Otis Mental Test, and the arithmetic scores were derived from the New Jersey State Arithmetic Examination. He concluded that a student's success in bookkeeping can be predicted with more than an ordinary degree of accuracy from his intelligence quotient and arithmetic examination score. Strauss based his conclusion on the following coefficients of correlation: bookkeeping test scores with intelligence quotients, .77; bookkeeping test scores with arithmetic test scores, .51; and bookkeeping test scores in multiple correlation with intelligence quotients and arithmetic test scores, .82.

The O'Brien Study

O'Brien¹² made a study of 191 pupils in a large senior high school to determine the relationship of eight traits and abilities to success in first-semester bookkeeping as measured by a bookkeeping test score and a bookkeeping grade. The eight traits were: reading ability, arithmetic ability, mental ability, perseverance, accuracy, initiative, neatness, and industry. O'Brien measured success in bookkeeping by the

¹¹ Harold W. Strauss, "The Effect of General Intelligence and Achievement in Arithmetic on Success in Bookkeeping," Master's Thesis, Rutgers University, 1930, pp. 41-47, cited by Raymond J. O'Brien, "Factors Contributing to Success in Learning Bookkeeping," Master's Thesis, University of Chicago, 1935, p. 4.

¹² Raymond J. O'Brien, "Factors Contributing to Success in Learning Bookkeeping," Master's Thesis, University of Chicago, 1935, pp. 1-13.

score on the Elwell-Fowlkes Bookkeeping Test, Form 1A, and the teacher's final grade. The intelligence quotients were derived from the Otis Self Administering Test of Mental Ability; the reading scores from the Iowa Silent Reading Test, Form A; and the arithmetic scores from Reavis and Breslich's Diagnostic Tests in the Fundamental Operations of Arithmetic and in Problem Solving. The personality traits of each pupil were evaluated by his bookkeeping teacher and rated on a five-point scale.

O'Brien's¹³ conclusions may be summarized as follows: Total reading comprehension is a major factor in bookkeeping success when measured by a bookkeeping test score ($r = .393$) but an insignificant factor when measured by a bookkeeping grade ($r = .056$). Total calculation ability is a factor in bookkeeping success when measured by both criteria ($r = .280$ and $.240$). Mathematical reasoning ability is a major factor in bookkeeping success when measured by a test score ($r = .394$) and not an important factor when measured by a grade ($r = .170$). Total arithmetic ability contributes to bookkeeping success when measured by both a test score ($r = .404$) and a grade ($r = .219$). Intelligence is a strong factor in bookkeeping success when measured by a bookkeeping test ($r = .472$) and an insignificant factor when measured by a grade ($r = .109$). The five personality traits (accuracy, initiative, neatness, industry, and perseverance) are strong factors entering into success in learning bookkeeping as measured by both a bookkeeping test score and a grade; the coefficients of correlation ranged from .436 to .586.

¹³ Ibid., pp. 35-98.

The MacDonald Study

MacDonald¹⁴ made a study of 59 pupils in first-semester bookkeeping at a high school in Owosso, Michigan, in 1938, to determine the relative value of vocabulary scores and arithmetic test scores in predicting bookkeeping achievement. Success in bookkeeping was measured by the Elwell-Fowlkes Bookkeeping Test, 1A. Vocabulary scores were obtained from the English Vocabulary, Worksample 95, Form AC; and arithmetic scores were obtained from the Schorling-Clark-Potter Arithmetic Test, Forms A and B.

He found an r of .31 between bookkeeping test scores and vocabulary scores and an r of .46 between bookkeeping test scores and arithmetic test scores. As a result, he concluded that vocabulary test scores are of little value in predicting bookkeeping achievement and that arithmetic test scores are of only slight value.

The Sexton Study

Sexton¹⁵ made a study at Memorial High School, Campbell, Ohio, to determine the relative value of English, junior business training and commercial arithmetic for predicting bookkeeping success. Two groups of pupils, a total of 460, were included in the investigation. The criterion of success in bookkeeping was the sum of the first-semester and second-semester grades. The two semester grades for each subject that was used

¹⁴ Donald D. MacDonald, "A Study of the Relative Value of Vocabulary Scores and Arithmetical Ability in Predicting Bookkeeping Achievement, with an Incidental Investigation Into Vocabulary Building and Arithmetical Improvement," Master's Thesis, University of Michigan, 1939, pp. 1-27.

¹⁵ Harrison T. Sexton, "A Statistical Study of the Relative Value of Grades in Junior Business Training, Commercial Arithmetic, and Ninth-Grade English in Predicting Success in Bookkeeping," Master's Thesis, Kent State University, 1940, pp. 1-44.

as a predictive factor were added to get one grade for each subject. The highest coefficient of correlation found by Sexton was between bookkeeping grades and junior business training grades ($r = .74$). From the findings of his study, Sexton reached the following conclusions:

1. Of the three subjects, English, commercial arithmetic, and junior business training, junior business training has the greatest value in predicting success in bookkeeping.
2. Commercial arithmetic has a little less value in predicting success in bookkeeping.
3. English has less value than either junior business training or commercial arithmetic in predicting success in bookkeeping.
4. A student who receives a low grade in both commercial arithmetic and junior business training should not be permitted to attempt to master bookkeeping.
5. A student who receives a low grade in junior business training should be advised to elect another subject instead of bookkeeping unless the low grade can be accounted for in such a way as to make success in bookkeeping seem likely in spite of it.¹⁶

The Stutsman Study

Stutsman¹⁷ made an investigation to determine the value of the following factors for predicting success in first-semester bookkeeping: intelligence quotient obtained from the Harmon-Nelson Mental Ability Test, selected ninth and tenth-grade subjects, and ninth-grade average. He also found the value of the first-semester bookkeeping grade for predicting success in second-semester bookkeeping, and the first-year bookkeeping grade for predicting success in second-year bookkeeping. The locale of the study was East High School, Columbus, Ohio.

¹⁶ Ibid., p. 45.

¹⁷ Galen A. Stutsman, "A Study of Some Bases for Prognosis in Bookkeeping," Master's Thesis, The Ohio State University, 1947, pp. 1-45.

Stutsman found the following coefficients of correlation between the bookkeeping grades and the grades in the predictive subjects and intelligence quotients:

Intelligence quotient and first-semester bookkeeping	.358
Ninth-grade average and first-semester bookkeeping	.636
Junior business training and first-semester bookkeeping	.423
Business arithmetic and first-semester bookkeeping	.435
Ninth-grade English and first-semester bookkeeping	.500
Tenth-grade English and first-semester bookkeeping	.700
Tenth-grade history and first-semester bookkeeping	.508
Attendance and first-semester bookkeeping	.260
First-semester bookkeeping and second-semester bookkeeping	.554
First-year bookkeeping and second-year bookkeeping	.760

No two of the studies reviewed in this chapter used the same criteria of success with the same predictive factors; therefore, no attempt has been made here to compare the findings of the related studies. However, the elements of the preceding studies that have a close similarity to the factors in the present study are compared and contrasted in the latter part of Chapter III.

CHAPTER III

FINDINGS

The purpose of this study is to determine whether or not the success of pupils in first-year bookkeeping can be predicted from their intelligence quotients obtained from the Kuhlmann-Anderson Intelligence Test and from their scores on the Tiegs and Clark Achievement Test or on any of its parts. Based on the philosophy that no one factor should be used as a determinant of success in bookkeeping because a number of variables influence a pupil's achievement in the subject, this study also attempts to determine if a combination of these two predictive factors can be used to foretell a pupil's achievement in first-year bookkeeping.

Furthermore, this study uses two measures of achievement in bookkeeping: scores on the South-Western Publishing Company Bookkeeping Examination and bookkeeping final grades. The bookkeeping examination score, a more objective measure, is not as commonly obtainable as the grade; on the other hand, the grade, while readily available, may be less reliable because it is partially subjective.

The following coefficients of correlation between the two measures of success indicate that the two criteria measure practically the same thing.

Bookkeeping I examination scores and Bookkeeping I grades864

Bookkeeping II examination scores and Bookkeeping II grades . . .734

This high relationship between the bookkeeping examination scores and the bookkeeping grades is partly due to the fact that the examination

score is a component of the grade. The examination score is one of the four equally weighted parts used to determine the final grade.

To find the relationships between the predictive factors and the two measures of success, an analysis was made of the data taken from the high school records of 63 pupils who enrolled or completed one year of bookkeeping during the academic year 1949-1950. These 63 cases make up the original study. To verify the findings of this original study, similar data were obtained and analyzed for 56 pupils who took bookkeeping during the first semester of the academic year 1950-1951. These 56 cases comprise the check-up study.

Using ungrouped data, the coefficients of correlation were obtained between each predictive factor and each measure of success, and multiple correlations were made between the two predictive factors on the one hand and each measure of success on the other. This chapter presents the analysis and interpretation of the coefficients of correlation for the original study and the check-up study and makes comparisons between them. The latter part of the chapter compares and contrasts the findings of this study with the findings of the research studies that are reviewed in Chapter II.

The Original Study

The coefficients of correlation between the two predictive factors, the Tiegs and Clark Achievement Test scores and the Kuhlmann-Anderson Intelligence Test quotients, and the two measures of success in bookkeeping, the South-Western Publishing Company Bookkeeping Examination scores and the bookkeeping grades, are shown in Table I.

TABLE I

COEFFICIENTS OF CORRELATION BETWEEN TWO PREDICTIVE FACTORS
AND TWO MEASURES OF SUCCESS IN FIRST-YEAR BOOKKEEPING
FOR 63 PUPILS IN A SELECTED HIGH SCHOOL

Predictive Factor	Measure of Success in Bookkeeping			
	First Semester		Second Semester	
	Exam Score	Grade	Exam Score	Grade
Kuhlmann-Anderson Intelligence Quotient	.567	.566	.384	.382
Tiegs and Clark Achievement Test (Total Score)	.544	.627	.439	.447
Part I (Reading Vocabulary)	.466	.449	.293*	.332
Part II (Reading Comprehension)	.454	.486	.369	.383
Total Parts I and II	.500	.497	.350	.388
Part III (Mathematical Reasoning)	.520	.563	.373	.378
Part IV (Mathematical Fundamentals)	.404	.406	.314*	.312*
Total Parts III and IV	.517	.526	.383	.402
Part V (Language)	.347	.383	.330	.345

*These three figures reach the 5 per cent level of significance; all others reach the 1 per cent level of significance.

When the coefficients of correlation in Table I are tested against the null hypothesis with $N - 2$ degrees of freedom, all except three reach the 1 per cent level of significance. These three, which are Achievement Test, Part I, with second-semester bookkeeping examination score; Achievement Test, Part IV, with second-semester bookkeeping examination score; and Achievement Test, Part IV, with second-semester bookkeeping grade, reach the 5 per cent level of significance.

Intelligence Quotients and Total Achievement Test Scores

In all cases the relationship is higher between intelligence quotients and first-semester criteria of success than between intelligence quotients and second-semester criteria of success. The coefficients of correlation between the intelligence quotients and first-semester bookkeeping examination scores and bookkeeping grades are .567 and .566 respectively; between intelligence quotients and second-semester bookkeeping examination scores and bookkeeping grades are .384 and .382 respectively.

With the exception of one case, first-semester bookkeeping examination scores and intelligence quotients, the coefficients of correlation are higher when using the total scores of the Tiegs and Clark Achievement Test than when using the Kuhlmann-Anderson intelligence quotients.

The relationships of the Tiegs and Clark Achievement Test scores (both total scores and scores for the five major parts) are higher when correlated with the first-semester bookkeeping examination scores and bookkeeping grades than when correlated with the second-semester bookkeeping examination scores and bookkeeping grades. An analysis of Table I which lists the obtained coefficients of correlation between the predictive factors and the two measures of success reveals a consistency of higher relationships for first semester than for second semester.

Further examination of the coefficients of correlation listed in Table I shows that the total score on the achievement test when correlated with the two measures of success in bookkeeping is a better predictive factor than any of the parts. No one individual part or total of two related parts reaches the figures obtained when using the total score.

Single Parts and Totals of Related Parts of Achievement Test

Parts I and II of the achievement test pertain to reading ability; Part I is Reading Vocabulary and Part II is Reading Comprehension. The coefficients of correlation when using the scores of Part II are higher for first-semester grade, second-semester examination score, and second-semester grade than the coefficient of correlation when using the scores of Part I. For first-semester examination score, the coefficient of correlation is only slightly higher when using the Part I than when using the Part II. The totals of Parts I and II are better in three of the four correlations (first-semester examination score, first-semester grade, and second-semester grade) and almost as good in one correlation (second-semester examination score) for prediction of success in bookkeeping as Part I or Part II when used separately.

Parts III and IV are Mathematical Reasoning and Mathematical Fundamentals, respectively. When the scores on these two parts are correlated with the two criteria of success in bookkeeping, the Mathematical Reasoning coefficients of correlation are higher for both semesters than those with Mathematical Fundamentals. For first-semester predictive value, the total of Parts III and IV is not quite as good as Part III when used separately; but for second-semester predictive value, the total of Parts III and IV is slightly better than either of the two parts used separately.

Part V, Language, of the achievement test proves to have less value than the other four parts of the achievement test for predicting success in first-semester bookkeeping as measured by either criteria. This part, in common with the other four parts, has somewhat less predictive value for second semester bookkeeping than for first-semester bookkeeping. On the other hand, the language part is slightly higher than the mathematical fundamentals part and the reading vocabulary part when correlated with the second-semester measures of success. With the exception of the parts just mentioned, the other parts of the achievement test, then would serve as better predictive factors than the language part.

To summarize the findings up to this point, it is apparent that the total score on the achievement test when correlated with the two measures of success in bookkeeping is a better predictive factor than any one of the parts or the total of two related parts.

Combinations of Unrelated Parts of Achievement Test

In an effort to determine the best possible combination for predictive purposes, a review of Table I was made to find the two single parts which produced the highest coefficients of correlation. When comparisons are made of all the parts taken separately, Reading Comprehension (Part II) and Mathematical Reasoning (Part III), with one exception, establish themselves as being more related to success in bookkeeping than the other three parts: Reading Vocabulary, Mathematical Fundamentals, and Language. The scores of the two parts, Reading Comprehension and Mathematical Reasoning, when added, produce the following coefficients of correlation with the two measures of success in bookkeeping.

	<u>First Semester</u>		<u>Second Semester</u>	
	<u>Exam Score</u>	<u>Grade</u>	<u>Exam Score</u>	<u>Grade</u>
Total Parts II and III	.523	.478	.414	.391

All except one of these, first-semester grade, exceeds the respective coefficients of correlation of either of the parts when used separately. A further comparison of these coefficients of correlation with the coefficients of correlation when using the total achievement test scores (Table I) reveals that the total achievement test score, without an exception, is a better predictive factor than the total of these two parts.

Since the coefficients of correlation for Part V, Language, were lower in almost all cases than the other four parts, Reading Vocabulary, Reading Comprehension, Mathematical Reasoning, and Mathematical Fundamentals, a set of correlations was made eliminating Part V. The results of these correlations are as follows:

	<u>First Semester</u>		<u>Second Semester</u>	
	<u>Exam Score</u>	<u>Grade</u>	<u>Exam Score</u>	<u>Grade</u>
Total Parts I, II, III, IV	.515	.477	.543	.626

For first semester, these fall below Part III and the total of Parts III and IV for both criteria and below Part II and the total of Parts I and II for the grade. For second semester, they exceed any of the separate parts or other combinations used. A comparison of these coefficients of correlation with those obtained when using the total achievement test scores shows that the total score is still better than the sum of four of its parts for predicting success in first-semester bookkeeping as measured by both criteria. For predicting success in second-semester bookkeeping, the total of these four parts is better than the total achievement test score.

Inasmuch as additional effort would be required to segregate these four parts, it seemed desirable to know whether the results were significantly better or if the differences might have occurred through chance. A test developed by both Cochran and Hotelling was used to determine the significance of the difference between the correlated coefficients of correlation of second-semester bookkeeping examination scores with the totals of Parts I, II, III, and IV and with the total achievement test scores.* The r when using the totals of the four parts (.543) exceeds the r when using the total achievement test scores (.439) by an amount that is significant slightly below the 5 per cent level ($t = 1.93$). This same test was used to determine the significance of the difference between the r of second-semester bookkeeping grades with Parts I, II, III, and IV (.626) and with the total achievement test scores (.447). The difference produced a t of 3.73 which is significant well beyond the 1 per cent level.

To summarize the correlations of the achievement test scores and all of its parts with the criteria, it appears that the total achievement test score is the best predictive factor for first-semester bookkeeping success as measured by both a bookkeeping examination score and a bookkeeping grade. The total of Parts I, II, III, and IV is the best predictive factor for second-semester bookkeeping success as measured by both criteria.

* E. F. Lindquist, Statistical Analysis in Educational Research, (New York: Houghton Mifflin Company, 1940), p. 218.

Combination of Intelligence Quotients
and Achievement Test Total Scores

Although the coefficients of correlation between the scores on the achievement test and each of the two measures of success in bookkeeping were significant at the 1 per cent level and fairly high, they are scarcely high enough to be used with confidence for predicting success of individual pupils. It seemed desirable, therefore, to see if an improvement on the achievement test scores could be made by combining them through the multiple correlation technique with the intelligence quotients. The intercorrelation between the achievement test scores and the intelligence quotients was .695 which indicated more overlapping between the predictive factors than existed between either of them and either of the measures of success. It could not be expected then that the combination would greatly improve on the basic zero-order correlations. However, multiple coefficients of correlation were obtained between the two predictive factors on the one hand and each of the two measures of success in bookkeeping on the other. The results of the multiple correlations for both semesters are set forth below. The zero-order coefficients of correlation are also shown for easy comparison with the multiple coefficients of correlation.

	First Semester		Second Semester	
	<u>Exam Score</u>	<u>Grade</u>	<u>Exam Score</u>	<u>Grade</u>
Intelligence Quotient	.567	.566	.384	.382
Achievement Test Total Score	.544	.627	.439	.447
Intelligence Quotient and Achievement Test Total Score	.609	.653	.453	.456

A comparison of these coefficients with the intercorrelation coefficient (.695) reveals that the two predictive factors come nearer to measuring the same thing than either of them or both of them in combination come to predicting success in bookkeeping. For first semester, however, the multiple coefficients are higher than either of the basic coefficients or the coefficients obtained when using any part or combination of parts of the achievement test. For second semester, the multiple coefficients, while higher than either of the basic coefficients, are not as high as those obtained when using the total scores of Parts I, II, III, and IV of the achievement test (.543 and .626).

Even with the improvement in predictive value gained by the multiple correlations for first semester and by the combination of Parts I, II, III, and IV of the achievement test for second semester, the coefficients of correlation were not considered high enough to warrant working out prediction equations to be used in the individual selection of pupils for bookkeeping.

First-semester Criteria of Success With Second-semester Criteria

Correlations made between first-semester bookkeeping examination scores and second-semester bookkeeping examination scores and between first-semester bookkeeping grades and second-semester bookkeeping grades produced coefficients of .656 and .757, respectively. These are higher than the coefficients between the totals of Parts I, II, III, and IV of the general achievement test and second-semester bookkeeping examination scores and bookkeeping grades (.543 and .626). Therefore, for predicting success in second-semester bookkeeping after a study of the course has begun, the first-semester bookkeeping grade is the best factor as found

in this study. For predicting success in second-semester bookkeeping before a study of the course is begun, however, the total of Parts I, II, III, and IV is the best factor.

The check-up Study

A review of the coefficients of correlation found in the original investigation of the present study revealed that first semester coefficients were consistently fairly high and much higher than those of second semester. Only when using one combination of parts of the achievement test did the coefficients for second semester compare favorably with those of first semester. Furthermore, in the original study, it was found that the first-semester bookkeeping grade, although a somewhat less desirable factor than the achievement test score because a portion of the course must be taken before the final outcome can be predicted, was the best factor for predicting success in second-semester bookkeeping. Consequently, it seemed highly desirable to verify the findings of the first semester of the original study by testing the same predictive factors against the same criteria with another group of pupils. This was done through a check-up study which involved 56 pupils who took bookkeeping during the first-semester of the academic year 1950-1951, the year immediately following that of the original study.

The coefficients of correlation between the two predictive factors (the Kuhlmann-Anderson Intelligence Test quotients and the Tieg's and Clark Achievement Test scores) and the two measures of success in bookkeeping (the South-Western Publishing Company Bookkeeping Examination scores and the bookkeeping grades) for these 56 cases were shown in Table II.

TABLE II

COEFFICIENTS OF CORRELATION BETWEEN TWO PREDICTIVE FACTORS
AND TWO MEASURES OF SUCCESS IN FIRST SEMESTER BOOKKEEPING
FOR 56 PUPILS IN A SELECTED HIGH SCHOOL

Predictive Factor	Measure of Success in Bookkeeping	
	Exam Score	Grade
Kuhlmann-Anderson Intelligence Quotient	.495	.478
Tiegs and Clark Achievement Test (Total Score)	.544	.573
Part I (Reading Vocabulary)	.192*	.227*
Part II (Reading Comprehension)	.407	.341
Total Parts I and II	.424	.308
Part III (Mathematical Reasoning)	.540	.473
Part IV (Mathematical Fundamentals)	.540	.500
Total Parts III and IV	.561	.484
Part V (Language)	.469	.574

*These two figures do not reach the 5 per cent level of significance;
all others reach the 1 per cent level of significance.

All the coefficients of correlation in Table II except Part I of the achievement test and the two measures of success in bookkeeping reach the 1 per cent level of significance. These two, however, do not even reach the 5 per cent level of significance.

Intelligence Quotients and Total Achievement Test Scores

As in the first-semester of the original study, the coefficients of correlation are higher when the two measures of success are correlated with the achievement test total scores than when correlated with the intelligence quotients.

When correlated with the two measures of success in bookkeeping, the total achievement test score, with two exceptions, is better than any single part or total of two related parts. These two exceptions, Total Parts III and IV with examination scores ($r = .561$) and Part V with grades ($r = .574$), are only slightly higher than the comparable coefficients of correlation when using the total achievement test scores (.544 and .573, respectively). This finding tends to substantiate that of the original study in which the total achievement test score was better than any part or total of two related parts for predicting success in first-semester bookkeeping.

Single Parts and Totals of Related Parts
of Achievement Test

The coefficient of correlation between the combined scores of Parts I and II and the bookkeeping examination scores is slightly higher than Part II when used separately and much higher than Part I when used separately. However, when the combined scores of Parts I and II were correlated with the grades, the resulting coefficient of correlation lies between those

obtained from Part I and Part II separately. As in the original study, the coefficients of correlation when using the combined scores of Parts I and II are not as high as when using the total achievement test scores.

When the scores of the two parts of the achievement test that pertain to mathematics, Parts III and IV, were correlated with the bookkeeping examination scores, the sum of the two parts produced a higher coefficient of correlation than either part used separately. On the other hand, when the sum of the two parts was correlated with the bookkeeping grades, the coefficient of correlation was higher than Part III used separately but not as high as Part IV used separately. In the original study, the total achievement test score was better than the total of Parts III and IV for predicting success in first-semester bookkeeping as measured by either criteria; in the check-up study, however, the total achievement test score is better for predicting success as measured by the grade, but not as good as the sum of Parts III and IV for predicting success as measured by the examination score.

The outstanding difference between the original study and the check-up study is the high coefficients of correlation obtained in the check-up study when Part V, Language, was correlated with the two measures of success. Part V produced higher coefficients of correlation than any other single part or total of two related parts, with the exception of the mathematical parts correlated with the examination scores. In the original study, the coefficients of correlation when using Part V proved to have less value than the other four parts for predicting success as measured by either criteria. Because of the findings of the check-up study, however, Part V cannot be said to have less value than the other parts for predicting success in first-semester bookkeeping. In the check-up study,

on the other hand, the total achievement test score is better than Part V for predicting success as measured by the examination score and almost as good as Part V for predicting success as measured by the grade. It will be recalled that the total achievement test score had a distinct advantage over Part V in the original study.

Combinations of Unrelated Parts of Achievement Test

In the original study an effort was made to find the best possible combination of Parts of the achievement test for predicting success in bookkeeping. The same combinations were correlated with the two measures of success in the check-up study and the results are as follows:

	<u>Exam Score</u>	<u>Grade</u>
Total Parts II and III	.540	.454
Total Parts I, II, III, and IV	.536	.486

The coefficients of correlation when using the total of Parts II and III exceed the coefficients of correlation when using Part II separately for both criteria. Part III used separately, however, produced the same coefficient of correlation as the total of Parts II and III with the bookkeeping examination scores and a higher coefficient of correlation than the total of Parts II and III with the grades. The coefficients of correlation when using the total of Parts I, II, III, and IV exceed the results when using the separate parts and related combinations with the following exceptions: Part III, Part IV, and total Parts III and IV with the examination score, and Part IV and Part V with the grade. Neither the combination of the two parts or the four parts just tested, however, produced as high a coefficient of correlation with either criteria as the total achievement test score.

The summary of the findings of the check-up study in regard to the achievement test and all its parts is as follows: The total achievement test score, with two exceptions, is better than any single part or combination of parts for predicting success in first-semester bookkeeping as measured by either the examination score or the grade. The difference by which the two coefficients of correlation when using the scores of the parts exceed the coefficients of correlation when using the total achievement test scores is insignificant. Therefore, the findings of the check-up study thus far verify the findings of the original study in that the total achievement test score is as good as or better than any single part or any combination of parts for predicting success in first-semester bookkeeping.

Combination of Intelligence Quotients and Achievement Test Total Scores

In the original study, the combined predictive value of the intelligence quotient and the total achievement test score was determined by the use of multiple correlations. Likewise, in the check-up study, multiple coefficients of correlation were secured between the two predictive factors on the one hand and each of the measures of success on the other. Even though an intercorrelation of .614 indicated much overlapping between the two predictive factors and little expectation of improvement from combining them, multiple correlations were made. It will be seen in the listing on the next page that the multiple coefficients of correlation of .581 and .595 with examination scores and grades, respectively, offer little improvement over the basic coefficients of correlations. Also, they are somewhat lower than those found in the original study.

	<u>Exam Score</u>	<u>Grade</u>
Intelligence Quotient	.495	.478
Achievement Test Total Score	.544	.573
Intelligence Quotient and Achievement Test Total Score	.581	.595

As in the original study, it appears that the two predictive factors come nearer to measuring the same thing than they come to predicting success in first-semester bookkeeping. Also, in agreement with the findings of the original study, the multiple coefficients of correlation are higher than either of the basic coefficients or the coefficients obtained from any part or combination of parts of the achievement test, but not high enough to justify working out prediction equations.

Comparison of Present Study with Other Studies

In Chapter II a review was given of research studies which have been made to find relationships between various predictive factors and various measures of success in bookkeeping. The following presentation compares the findings of those studies with the findings of the present study. It should be remembered that no other study used the identical criteria of success coupled with the identical predictive factors as those used in the present study. All studies used either a grade or a test score or both as the criteria of success. None, however, used the same bookkeeping test as the present investigation and none, insofar as is known, used the same factors for determining the grade. Several studies used intelligence quotients and achievement test scores for predictive factors but none used the Kuhlmann-Anderson Intelligence Test and the Tieggs and Clark Achievement Test which were used in this investigation.

Intelligence Quotients and the
Criteria of Success in Bookkeeping

The coefficients of correlation between intelligence quotients and first-semester bookkeeping examination scores are .567 and .495, respectively, for the original and check-up investigations; between intelligence quotients and first-semester bookkeeping grades are .566 and .478 for the original and check-up investigations. Stutsman¹ reported an r of .358 between intelligence quotients and first-semester bookkeeping grades, which is lower than the comparable figures of this study. O'Brien² found coefficients of .472 and .109 between intelligence quotients and bookkeeping test scores and grades, respectively, which are lower than those of this study. Stedman³ reported an r of .648 between intelligence quotients and bookkeeping test scores and an r of .557 between intelligence quotients and grades. His coefficient of correlation when using the test scores is higher than the comparable figures of this study; when using the grade, however, his coefficient is slightly lower than that of the original study but higher than that of the check-up study. Tupper⁴ found an r of .66 between intelligence quotients and test scores which exceeds those found in either investigation of the present study.

¹ Galen Stutsman, "A Study of Some Bases for Prognosis in Bookkeeping," Master's Thesis, Ohio State University, 1947, p. 18.

² Raymond Joseph O'Brien, "Factors Contributing to Success in Learning Bookkeeping," Master's Thesis, University of Chicago, 1935, p. 82.

³ Melissa Branson Stedman, "Factors Influencing School Success in Bookkeeping," Journal of Applied Psychology, XIV (February, 1930), p. 77.

⁴ Clyde W. Tupper, "The Influence of Certain Factors upon Success in a Bookkeeping Class," Master's Thesis, Leland Stanford Junior University, 1930, p. 10.

The coefficients of correlation between intelligence quotients and second-semester examination scores and grades are .384 and .382 in this study. Rosenblum⁵ found an r of .386 between intelligence quotients and bookkeeping test scores and an r of .129 between intelligence quotients and grades. In the first case, Rosenblum's coefficient is almost the same as that of the present study; but, in the second case, it falls below that of the present study. Nelson⁶ obtained an r of .41 between intelligence quotients and grades which slightly exceeds the r of .382 of this study. Strauss⁷ reported an r of .77 between intelligence quotients and bookkeeping test scores which is much higher than the r of .384 of the present investigation and the highest in any study reviewed.

For first semester, when bookkeeping examination scores are used as the criterion of success, the coefficients of both investigations of the present study are lower in two cases and higher in one case than the coefficients of the related studies. When grades are used as the criterion, the coefficients of the two investigations of the present study are higher in two cases. In a third case the coefficient of the related study lies between that of the present original study and that of the present check-up study.

⁵ Irving Rosenblum, "Criteria for the Selection of Pupils for the Junior High School Bookkeeping Course," Master's Thesis, College of the City of New York, 1929, p. 16.

⁶ Chester H. Nelson, "A Study of Bookkeeping Prognosis in the High School," Master's Thesis, Columbia University, 1928, p. 29.

⁷ Harold Walter Strauss, "The Effect of General Intelligence and Achievement in Arithmetic on Success in Bookkeeping," Master's Thesis, Rutgers University, 1930, pp. 41-47, cited by O'Brien, *op. cit.*, p. 4.

For second semester, when bookkeeping examination scores are used as the criterion, the coefficient of one of the related studies is much higher than that of the present study and the coefficient of another related study is almost the same as that of the present study. When grades are used as the criterion, the coefficient of the present study is higher in one case and slightly lower in another case.

Reading Ability Scores and the Criteria of Success in Bookkeeping

Two authors of research studies attempted to find some phase of reading ability that would serve as a predictive factor for success in bookkeeping. O'Brien⁸ found coefficients of correlation of .393 and .056 between reading comprehension scores and first-semester bookkeeping test scores and grades. These are lower than the comparable figures in both the original and check-up investigations of the present study. MacDonald⁹ reported an r of .31 between vocabulary scores and first-semester bookkeeping test scores. This r is lower than the r of .466 of the original investigation and higher than the r of .192 of the check-up investigation.

Mathematical Ability Scores and the Criteria of Success in Bookkeeping

Five authors of the research studies reviewed by the writers made attempts to find predictive value in some phase of mathematics. O'Brien¹⁰

⁸ O'Brien, *op. cit.*, p. 35.

⁹ Donald D. MacDonald, "A Study of the Relative Value of Vocabulary Scores and Arithmetical Ability in Predicting Bookkeeping Achievement, With an Incidental Investigation into Vocabulary Building and Arithmetical Improvement," Master's Thesis, University of Michigan, 1939, p. 20.

¹⁰ O'Brien, *op. cit.*, pp. 67-68.

found that total calculation ability scores when correlated with first-semester bookkeeping test scores and grades produced coefficients of correlation of .280 and .240 respectively; that arithmetical reasoning ability scores correlated with the two measures of success produced coefficients of .394 and .170; and that total arithmetical ability scores correlated with the two measures of success produced coefficients of .404 and .219. In all cases, the above figures fall below comparable figures of both investigations of the present study. MacDonald¹¹ reported an r of .46 between arithmetic ability scores and first-semester bookkeeping test scores, which is not as high as the parallel figures of the present study. Stedman¹² found an r of .628 between arithmetic fundamental scores and first-semester bookkeeping grades which exceeds the comparable coefficients of both parts of this study.

Rosenblum¹³ found coefficients of correlation of .493 and .493 respectively between arithmetic test scores on the one hand and second-semester bookkeeping test scores and grades on the other. These exceed the coefficients of correlation of .383 and .402 of the present investigation. Strauss¹⁴ reported an r of .51 between arithmetic test scores and second-semester bookkeeping test scores which exceeds the comparable figure of the present investigation.

For first semester, the findings of the present study show a clear superiority over the reviewed studies in that seven of the eight coefficients

¹¹ MacDonald, op. cit., p. 21.

¹² Stedman, op. cit., p. 77.

¹³ Rosenblum, op. cit., p. 16.

¹⁴ Strauss, op. cit., p. 41-47, cited by O'Brien, op. cit., p. 4.

that pertain to any phase of mathematical ability are higher than those of the related studies. In only one case, between arithmetic fundamentals and first-semester bookkeeping grades, did the coefficient of the reviewed study exceed those of the present study. For second semester, however, in all three cases, the coefficients of correlation of the other studies exceed those of the present investigation.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to determine whether or not the success of pupils in first-year bookkeeping can be predicted from their intelligence quotients and their scores on a general achievement test or on any of its parts.

This study consisted of two investigations made at Senior High School, Greensboro, North Carolina. The first or original investigation was concerned with 63 pupils in two classes of first-year bookkeeping during the academic year 1949-1950. The second or check-up investigation was concerned with 56 pupils in two classes of first-semester bookkeeping during the academic year 1950-1951. The check-up investigation was made to verify the findings of the first-semester of the original study because the first-semester coefficients of correlation were consistently fairly high and much higher than those for the second semester. Also, the first-semester grade was found to be the best factor for predicting second-semester success.

The two criteria of success in bookkeeping were a bookkeeping examination score and a bookkeeping grade at the end of the semester. The bookkeeping examination scores were obtained from the South-Western Publishing Company Bookkeeping Examinations No. 1 and No. 2 given at the end of the first and second semesters. The semester grades were obtained by averaging the three six-week grades and the scores on the corresponding bookkeeping examination, which was used as the semester examination. The predictive factors were the intelligence quotient obtained from the

Kuhlmann-Anderson Intelligence Test and the total score on the Tiegs and Clark Progressive Achievement Test and scores on its parts and combinations of parts.

Using ungrouped data, correlations were made for both semesters of the original study and the one semester of the check-up study between (1) intelligence quotients and both measures of success, (2) achievement test total scores and both measures of success, (3) scores on each of the five sub-parts of the achievement test and both measures of success, (4) two combinations of scores on related parts of the achievement test and both measures of success, and (5) two combinations of scores on unrelated parts of the achievement test and both measures of success. In addition to the above-listed zero-order correlations, multiple correlations were made between the two major predictive factors (the intelligence quotients and the achievement test total scores) on the one hand and each measure of success on the other.

The achievement test total scores when correlated with first-semester bookkeeping examination scores produced coefficients of correlation of .544 and .544 in the original and the check-up study, respectively; the same scores when correlated with the bookkeeping grades produced coefficients of .627 and .573, respectively. These coefficients are higher than the coefficients obtained when the same bookkeeping examination scores and grades were correlated with the intelligence quotients except in one case, the coefficient of .567 between intelligence quotients and bookkeeping examination scores in the original study. Moreover, the achievement test total score established itself as being a better predictive factor than the score on any of the five single parts or the score on any combination of parts of the achievement test. In both investigations, however, the

multiple coefficients of correlation between the two major predictive factors and both measures of first-semester bookkeeping success were higher than any of the zero-order coefficients. These two predictive factors in multiple correlation with the bookkeeping examination scores produced coefficients of .609 and .581 in the original and check-up study, respectively; in multiple correlation with the bookkeeping grades, they produced coefficients of .653 and .595, respectively.

The factors listed above produced lower coefficients of correlation with the second-semester criteria of success than with the first-semester criteria, but the second-semester findings were in general agreement with those of the first semester in that the relative strengths of the relationships were the same with one exception. The sum of the scores of Parts I, II, III, and IV of the achievement test when correlated with the bookkeeping examination scores and the grades produced coefficients of correlation of .543 and .626, respectively. These exceed the zero-order coefficients obtained when using the total achievement test scores (.439 and .447) or the multiple coefficients when using the achievement test total scores and the intelligence quotients (.453 and .456).

In the original study, correlations made between the first-semester criteria and the second-semester criteria revealed that the first-semester bookkeeping grade is the best predictive factor for the second semester bookkeeping grade ($r = .757$). This, however, is a somewhat less usable factor than the sum of Parts I, II, III, and IV of the achievement test because a portion of the course must be taken before the final outcome can be predicted.

The findings of this study may be summarized as follows: For predicting success in first-semester bookkeeping, the achievement test total

score combined through the multiple correlation technique with the intelligence quotient is the best factor. For predicting success in second-semester bookkeeping before a study of the course is begun, the sum of Parts I, II, III, and IV of the achievement test is the best factor. For predicting second-semester success after a study of the course is begun, the first-semester bookkeeping grade is the best factor.

Even though the relationships between the best factors and the criteria of success were fairly high and significant well beyond the 1 per cent level, the obtained coefficients were not considered high enough to justify working out prediction equations to be used in the selection of individual pupils for a course in bookkeeping. Inasmuch as these factors may be considered only as indicators of the ability to learn bookkeeping, however, it is not to be interpreted that they have no value for guiding students in the selection of bookkeeping. In view of these high positive relationships, it is suggested that these factors when used with supporting evidence that the student possesses other required traits besides ability to learn may be an effective basis for prognosis and guidance.

In view of the findings of this study and other related studies which found predictive factors that fairly well measure the ability to learn bookkeeping, it appears that research is needed outside the scope of these studies to find some means by which other required traits, such as interest and industry, may be measured.

Insofar as is known by the writer, the findings of no prognostic study in bookkeeping have been tested by an administrative follow-up study. If the findings of the studies which have been made and are being made are to be of value, it seems that they should be validated by use in actual guidance situations.

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APPENDIX

89

1

Permission is granted to reproduce this examination. Answers to the questions will be furnished upon request. Additional copies of the examination may be obtained at 2 cents a copy, postpaid, for quantities less than 100; 1½ cents a copy, postpaid, for quantities over 100. (Cash with order.)

BOOKKEEPING EXAMINATION No. 1 (1949-1950)

For Use at the End of the First Semester (First Year)

PUBLISHED BY

SOUTH-WESTERN PUBLISHING COMPANY

Cincinnati New York Chicago San Francisco Dallas

School..... Name.....

City and State..... Date.....

INSTRUCTIONS

Do not begin to write your answers until you are told to do so. First fill in the blanks given above between the two sets of double lines.

The contents of this test are outlined in the scoring form at the right. Section A is an identification or classification test; Section B is a debit-credit test; Section C is a problem test; Section D is an identification or classification test; and Section E is a yes-no test.

Specific directions regarding the work to be done and one sample are given at the beginning of each section of the test. All samples are marked "0."

Do not ask questions while writing this test.

For Use in Scoring	Perfect Score	Student's Score
Section A—Recording Transactions in Special Journals	10	10
Section B—Journalizing Transactions	20	20
Section C—The Trial Balance	19	19
Section D—Classification of Accounts in Financial Reports	15	15
Section E—Bookkeeping Principles	26	25
Total Score	90	89

SECTION A — RECORDING TRANSACTIONS IN SPECIAL JOURNALS

DIRECTIONS: Indicate in which book of original entry each of the following types of transactions should be recorded by writing the letter or letters indicating the journal in the answers column at the right of each item. A list showing the letters to be used is given at the right of these directions. The first statement, "0," is completed as a sample. Each answer counts one point.

- CP. Cash Payments Journal
- CR. Cash Receipts Journal
- J. General Journal
- P. Purchases Journal
- S. Sales Journal

	Answers	For Scoring		Answers	For Scoring
0. A sale of merchandise for cash.....	CR	0. ✓	6. An opening entry for an investment of two or more assets.....	J	6.
1. A purchase of merchandise on account.....	P	1.	7. A receipt of cash from a customer.....	CR	7.
2. An opening entry for an investment of cash only.....	CR	2.	8. A withdrawal of cash by the proprietor for his personal use.....	CP	8.
3. A correcting entry.....	J	3.	9. An adjusting entry.....	J	9.
4. A sale of merchandise on account.....	S	4.	10. A closing entry.....	J	10.
5. A cash purchase of merchandise.....	CP	5.			

Section A: Perfect Score 10 — Deductions _____ = Net Score

SECTION B—JOURNALIZING TRANSACTIONS

DIRECTIONS: Indicate the titles of the accounts to be debited and credited in making the general journal entries for the transactions given below by writing the numbers of the account titles in the appropriate columns. Select the numbers from the "List of Accounts" given at the left of the transactions. The first transaction, "O," is given as a sample. Each transaction counts two points — one point for the debit or debits and one point for the credit or credits.

LIST OF ACCOUNTS <small>(Arranged alphabetically)</small>	TRANSACTIONS	Debit	Credit	For Scoring	
				Dr.	Cr.
(1) A. C. Able — Accounts Payable	0-0. Bought on account from Big Supply Co. supplies for use in operating the business.....	0. 19	0. 2	0. ✓	0. ✓
(2) Big Supply Co. — Accounts Payable	1-2. E. S. Conley recorded the opening entry for his business. His assets were: cash and merchandise inventory. He had no liabilities.....	11 15	2. 6	1.	2.
(3) Callan Bros. — Accounts Payable	3-4. M. R. Preston reported that he was charged for merchandise not purchased by him. The sale should have been charged to M. P. Prexton.....	3. 14	4. 13	3.	4.
(4) Callen & Son — Accounts Payable	5-6. Purchased delivery truck on credit from A. C. Able.	5. 8	6. 1	5.	6.
(5) Cash	7-8. A purchase of merchandise from Callan Bros. was incorrectly recorded in the account with Callen & Son.....	7. 4	8. 3	7.	8.
(6) E. S. Conley, Capital	9-10. E. S. Conley took merchandise from stock for personal use.....	9. 7	10. 16	9.	10.
(7) E. S. Conley, Draw- ing (or Personal)	11-12. Recorded the new merchandise inventory at the end of a fiscal period.....	11. 11	12. 16	11.	12.
(8) Delivery Equipment	13-14. Adjusted the supplies account at the end of the fiscal period.....	13. 20	14. 19	13.	14.
(9) Delivery Expense	15-16. Adjusted the prepaid insurance account at the end of a fiscal period.....	15. 10	16. 12	15.	16.
(10) Expired Insurance	17-18. Closed the sales account at the end of a fiscal period.....	17. 18	18. 15	17.	18.
(11) Merchandise Inventory	19-20. Closed the salary expense account.....	19. 15	20. 17	19.	20.
(12) Prepaid Insurance					
(13) M. R. Preston — Accounts Receivable					
(14) M. P. Prexton — Accounts Receivable					
(15) Profit and Loss (or Profit and Loss Summary)					
(16) Purchases					
(17) Salary Expense					
(18) Sales					
(19) Supplies					
(20) Supplies Used					

Section B: Perfect Score 20 — Deductions _____ = Net Score

SECTION C—THE TRIAL BALANCE

DIRECTIONS: The accounts given in the first column below appear on the trial balance of W. E. Coast. The balance of each account is shown in parentheses after the account title. Two columns are provided at the right in which to write the debit and credit balances. Write each account balance in the appropriate column. The first account balance is written in the appropriate column as a sample. Total each column of the trial balance, including the balance of the cash account. Each debit balance and each credit balance counts one point; the correct totals count five points.

ACCOUNT TITLES AND BALANCES	Debit	Credit	For Scoring
0. Cash (\$533).....	5 3 3.—		0. ✓
1. Notes Receivable (\$156).....	✓		1.
2. Accounts Receivable (\$287).....	✓		2.
3. Merchandise Inventory (\$2,430).....	✓		3.
4. Supplies (\$63).....	✓		4.
5. Equipment (\$462).....	✓		5.
6. Accounts Payable (\$698).....		✓	6.
7. W. E. Coast, Capital (\$3,406).....		✓	7.
8. W. E. Coast, Drawing (or Personal) (\$272).....	✓		8.
9. Sales (\$1,783).....		✓	9.
10. Returned Sales (\$78).....	✓		10.
11. Purchases (\$1,549).....	✓		11.
12. Returned Purchases (\$63).....		✓	12.
13. Delivery Expense (\$42).....	✓		13.
14. Miscellaneous Expense (\$78).....	✓		14.
15. Totals.....			15. (5 points)

Section C: Perfect Score 19 - Deductions _____ = Net Score

SECTION D—CLASSIFICATION OF ACCOUNTS IN FINANCIAL REPORTS

DIRECTIONS: Indicate the *section* of the balance sheet or profit and loss statement in which each account should appear by writing the letter of the section in the answers column. The following list shows the letters to be used. The first account is given as a sample. Each correct answer counts one point.

BALANCE SHEET SECTIONS

- A. Current Assets
- B. Deferred Charges
- C. Current Liabilities
- D. Proprietorship

PROFIT AND LOSS SECTIONS

- E. Income from Sales
- F. Cost of Merchandise Sold
- G. Operating Expenses

ACCOUNT TITLES	Answers	For Scoring	ACCOUNT TITLES	Answers	For Scoring
0. Accounts Receivable	A	0.	8. Owner's Capital Account..	D	8.
1. Cash.....	A	1.	9. Owner's Drawing Account	D	9.
2. Delivery Expense.....	G	2.	10. Prepaid Insurance.....	B	10.
3. Expired Insurance.....	B	3.	11. Purchases.....	F	11.
4. Merchandise Inv. (Ending)	A	4.	12. Rent Expense.....	F	12.
5. Miscellaneous Expense....	G	5.	13. Salary Expense.....	G	13.
6. Notes Payable.....	C	6.	14. Sales.....	E	14.
7. Notes Receivable.....	A	7.	15. Supplies.....	B	15.

Section D: Perfect Score 15 - Deductions _____ = Net Score

SECTION E—BOOKKEEPING PRINCIPLES

DIRECTIONS: After each question given below, indicate your answer by drawing a line under "yes" or "no" at the right. Each answer counts one point.

	Answers		For Scoring
	Yes	No	
0. Is the trial balance a test of the equality of the debits and credits in the ledger?.....	<u>Yes</u>	No	0. ✓
1. Is a debtor one to whom a debt is owed?.....	<u>Yes</u>	No	1.
2. If A's liabilities are \$2,000 and his proprietorship is \$6,000, are his assets \$4,000?.....	Yes	<u>No</u>	2.
3. Is the process of transferring entries from a journal to a ledger called posting?.....	<u>Yes</u>	No	3.
4. Is the period covered by the profit and loss statement known as the fiscal period?.....	<u>Yes</u>	No	4.
5. Is a decrease in a liability recorded as a credit?.....	Yes	<u>No</u>	5.
6. Is an increase in an expense recorded as a debit?.....	<u>Yes</u>	No	6.
7. Is the difference between the footings of the two sides of an account called the total?.....	Yes	<u>No</u>	7.
8. Is the difference between what is owned and what is owed called net worth?.....	<u>Yes</u>	No	8.
9. Is the credit side of an account the right side?.....	<u>Yes</u>	No	9.
10. Is an increase in an asset recorded as a debit?.....	<u>Yes</u>	No	10.
11. Is a decrease in proprietorship recorded as a credit?.....	Yes	<u>No</u>	11.
12. Is a decrease in income recorded as a credit?.....	Yes	<u>No</u>	12.
13. Does the profit and loss statement list the balances of all the asset accounts?.....	Yes	<u>No</u>	13.
14. If the total income is larger than the total expenses, is the difference net profit?.....	<u>Yes</u>	No	14.
15. Is each account receivable usually listed on the balance sheet separately?.....	Yes	<u>No</u>	15.
16. If the credit side of the profit and loss summary account is the smaller side at the time it is ready to be closed, is the balance a net loss?.....	<u>Yes</u>	No	16.
17. When all the closing entries have been posted, does the sales account show a debit balance?.....	Yes	<u>No</u>	17.
18. Are withdrawals of cash by the proprietor usually recorded in the general journal when special journals are used?.....	Yes	<u>No</u>	18.
19. Is the total of the sales journal posted to the credit side of the sales account?.....	<u>Yes</u>	No	19.
20. Is a journal entry that transfers the balance of one account to another account an adjusting entry?.....	<u>Yes</u>	No	20. ✓
21. Is the trial balance taken after the closing entries have been posted called a post-closing trial balance?.....	<u>Yes</u>	No	21.
22. Does the balance sheet report the financial condition of the business on a specific date?.....	<u>Yes</u>	No	22.
23. Is an account that is closed by transferring its balance to the debit side of the profit and loss summary account an income account?.....	Yes	<u>No</u>	23.
24. Does the use of special journals decrease the amount of posting?.....	<u>Yes</u>	No	24.
25. Is each individual entry in the purchases journal posted to the credit side of the account named?.....	Yes	<u>No</u>	25.
26. Does each entry in the sales journal represent a debit to a creditor's account?.....	Yes	<u>No</u>	26.

Section E: Perfect Score 26 - Deductions _____ = Net Score

3

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BOOKKEEPING EXAMINATION No. 2 (1949-1950)

For Use at the End of the Second Semester (First Year)

PUBLISHED BY

SOUTH-WESTERN PUBLISHING COMPANY

Cincinnati New York Chicago San Francisco Dallas

School Name

City and State Date

INSTRUCTIONS

Do not begin to write your answers until you are told to do so. First fill in the blanks given above between the two sets of double lines.

The contents of this test are outlined in the scoring form at the right. Section A is a classification test; Section B is a matching test; Section C is a yes-no test; and Section D is a check-list test.

Specific directions regarding the work to be done and one sample are given at the beginning of each section of the test. All samples are marked "O."

Do not ask questions while writing this test.

For Use in Scoring	Perfect Score	Student's Score
Section A—Classification of Accounts	17	16
Section B—Bookkeeping Terms	20	20
Section C—Bookkeeping Principles	24	23
Section D—Work Sheet, Statement Columns	31	30
Total Score	92	89

SECTION A — CLASSIFICATION OF ACCOUNTS

DIRECTIONS: Use the following classification of accounts:

- | | |
|-------------------------|---------------------------------|
| 11. Current Assets | 41. Income from Sales |
| 12. Deferred Charges | 42. Other or Financial Income |
| 13. Fixed Assets | 51. Cost of Merchandise Sold |
| 21. Current Liabilities | 52. Operating Expenses |
| 31. Proprietorship | 53. Other or Financial Expenses |

Classify each account given below by writing its classification number in the answers column. The first account is given as a sample. Each correct answer counts one point.

	Answers	For Scoring		Answers	For Scoring
0. Supplies	12	0. ✓	11. Prepaid Insurance	12	11.
1. Notes Payable	21	1.	12. Interest Payable	21	12.
2. Interest Receivable	11	2.	13. Discount on Purchases (or Purchases Discount)	42	13.
3. Purchases	51	3.	14. Bad Debts (or Loss from Bad Debts)	11	14. <i>asset</i>
4. Delivery Expense	52	4.	15. Transportation on Purchases (or Freight and Drayage In)	51	15.
5. Accounts Receivable	11	5.	16. Interest Expense (or Interest Cost)	52	16.
6. Equipment (or Furniture and Fixtures)	13	6.	17. Depreciation Expense	52	17.
7. Sales	41	7.			
8. Accounts Payable	21	8.			
9. Cash	11	9.			
10. Owner's Capital Account	31	10.			

Section A: Perfect Score 17 — Deductions _____ = Net Score

SECTION B — BOOKKEEPING TERMS

DIRECTIONS: For each definition below in Column II select from Column I the term it defines and write the identifying capital letter of that term in the answers column. The first answer is given as a sample.

COLUMN I	COLUMN II	Answers	For Scoring
(Terms arranged alphabetically)	0. Interest charged in advance by a bank.....	E	0. ✓
A. accrual basis	1. The term used by a buyer in referring to a cash discount on an invoice taken by him...	J	1.
B. accrued expense	2. A note in which the maker has agreed to pay the face of the note with interest.....	N	2.
C. accrued income	3. The amount received by a borrower for a note after the bank has deducted the discount.....	T	3.
D. bad debts	4. The term used by a buyer in referring to the credit received by him because of inferior or damaged merchandise.....	U	4.
E. bank discount	5. The term used by a seller in referring to a cash discount he allows on an invoice.....	K	5.
F. book value	6. The title of the account credited for the estimated amount of bad debts.....	V	6.
G. cash basis	7. The face value of a note plus the interest....	Q	7. ✗
H. credit memorandum	8. A special business form that contains a record of the credit granted for returns and allowances.....	H	8.
I. depreciation	9. The term used by a seller in referring to the credit allowed to a customer because of inferior or damaged merchandise.....	X	9.
J. discount on purchases	10. An expense incurred but not paid.....	B	10.
K. discount on sales	11. The method of keeping accounts in which no entries are made until cash is actually received or paid.....	A	11.
L. fixed assets	12. The amount of interest expense incurred but not paid.....	B	12.
M. interest	13. Income earned but not received.....	C	13.
N. interest-bearing note	14. The estimated present value of equipment as shown by the records.....	F	14.
O. interest payable	15. The accounts with customers that cannot be collected.....	D	15.
P. interest receivable	16. The decrease in the value of fixed assets because of wear and the passing of time....	I	16.
Q. maturity value	17. The amount paid for the use of money.....	M	17.
R. petty cash fund	18. The amount of money borrowed.....	S	18.
S. principal	19. Assets that will be in service for a number of fiscal periods.....	L	19.
T. proceeds	20. A fund from which small payments are made	R	20.

Section B: Perfect Score 20 - Deductions _____ = Net Score

SECTION C — BOOKKEEPING PRINCIPLES

DIRECTIONS: After each question given below, indicate your answer by drawing a line under "yes" or "no" at the right. The first question is given as a sample.

QUESTIONS	Answers	For Scoring
0. Is income sometimes earned in one fiscal period and collected in another?	Yes <u>No</u>	0. ✓
1. When a cash discount is given on a sales invoice, does the buyer call it a discount on sales?	Yes <u>No</u>	1. _____
2. To compute interest at 6 per cent for 60 days, is the decimal point in the principal moved three places to the left?	Yes <u>No</u>	2. _____
3. Is the beginning merchandise inventory added to the net cost of merchandise purchased to determine the total cost of merchandise available for sale?	Yes <u>No</u>	3. _____
4. Is the petty cash fund usually provided to take care of large payments?	Yes <u>No</u>	4. _____
5. On the profit and loss statement, is the cost of merchandise sold subtracted from net sales to determine the gross profit on sales?	Yes <u>No</u>	5. _____
6. Is the inventory of supplies shown on the profit and loss statement?	Yes <u>No</u>	6. _____
7. Does the balance sheet show the present value of the equipment on hand?	Yes <u>No</u>	7. _____
8. In calculating the cost of purchases, should you subtract the transportation charges from the value of the merchandise?	Yes <u>No</u>	8. _____
9. When a special column is provided in the cash payments journal for discount on purchases, is the amount of each discount posted daily to the general ledger?	Yes <u>No</u>	9. _____
10. Should an account receivable that is considered uncollectible be charged off as a bad debt?	Yes <u>No</u>	10. _____
11. Should the collection of a bad debt be shown in the customer's account?	Yes <u>No</u>	11. _____
12. Does the balance sheet show the balance of the reserve for depreciation of equipment account?	Yes <u>No</u>	12. _____
13. Should the profit and loss statement include only those expenses paid during the fiscal period?	Yes <u>No</u>	13. _____
14. Is the collection of interest recorded in the cash receipts journal?	Yes <u>No</u>	14. _____
15. Should the debit balance of the equipment account show the cost value of the equipment on hand?	Yes <u>No</u>	15. _____
16. Are the individual amounts in the general ledger columns of the combined cash journal posted separately?	Yes <u>No</u>	16. _____
17. At the end of the fiscal period should the account for interest income be adjusted to show all the interest earned during the period?	Yes <u>No</u>	17. _____
18. Is the account for returned sales and allowances shown in the cost of merchandise sold section of the profit and loss statement?	Yes <u>No</u>	18. _____
19. Are depreciation rates on various kinds of equipment the same?	Yes <u>No</u>	19. _____
20. Usually are only collectible accounts included in the balance of the accounts receivable account?	Yes <u>No</u>	20. _____
21. Do reversing entries prepare the ledger accounts for the new fiscal period?	Yes <u>No</u>	21. _____
22. Does the profit and loss statement show the balance of the reserve for bad debts account?	Yes <u>No</u>	22. _____
23. Is expired insurance classified as an operating expense?	Yes <u>No</u>	23. _____
24. Is the amount of the insurance prepaid at the end of the fiscal period shown on the profit and loss statement?	Yes <u>No</u>	24. _____

Section C: Perfect Score 24 — Deductions _____ = Net Score

SECTION D — WORK SHEET, STATEMENT COLUMNS

DIRECTIONS: The final sections of a work sheet — the statement columns — are shown below. After each account title make a check mark (✓) in the appropriate column to indicate in which column of the work sheet the balance will appear.

ACCOUNT TITLES	P. & L. Statement		Balance Sheet		For Scoring
	Dr.	Cr.	Dr.	Cr.	
0. Accounts Receivable			✓		0. ✓
1. Cash			✓		1.
2. Social Security Taxes	✓				2.
3. Advertising Expense	✓				3.
4. Employees Income Taxes Payable				✓	4.
5. Depreciation Expense (Depreciation of Equipment)	✓				5.
6. Merchandise Inventory			✓		6.
7. Bad Debts (Loss from Bad Debts)				✓	7. X
8. Interest Payable				✓	8.
9. Accounts Payable				✓	9.
10. Interest Expense (Interest Cost)	✓				10.
11. Equipment			✓		11.
12. Social Security Taxes Payable				✓	12.
13. Discount on Sales (Sales Discount)	✓				13.
14. Interest Receivable			✓		14.
15. Purchases	✓				15.
16. Interest Income (Interest Earned)		✓			16.
17. Notes Payable				✓	17.
18. Returned Sales and Allowances (Sales Returns and Allowances)	✓				18.
19. Prepaid Insurance			✓		19.
20. Proprietor's Capital Account				✓	20.
21. Discount on Purchases (Purchases Discount)		✓			21.
22. Notes Receivable			✓		22.
23. Reserve for Bad Debts				✓	23.
24. Returned Purchases and Allowances (Purchases Returns and Allowances)		✓			24.
25. Reserve for Depreciation of Equipment				✓	25.
26. Sales		✓			26.
27. Salaries Payable				✓	27.
28. Supplies Used	✓				28.
29. Supplies	✓		✓		29.
30. Expired Insurance	✓				30.
31. Transportation on Purchases (Freight and Drayage In)	✓				31.

Section D: Perfect Score 31 - Deductions _____ = Net Score

Kuhlmann-Anderson Tests

Fifth Edition

GRADE IX - Maturity

NAME Boy Girl

Grade Teacher

Date School

Year Month Day

Born City

Year Month Day

Age Days

Years Months Days

Test Results

EDUCATIONAL TEST BUREAU — Minneapolis - Nashville - Philadelphia

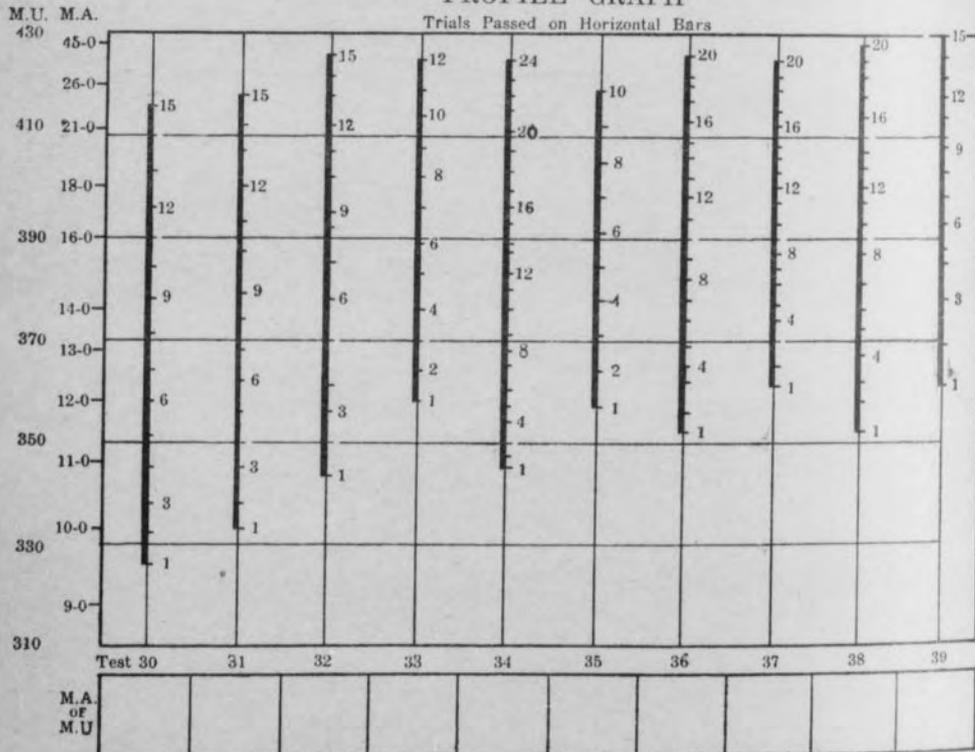
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Printed in U. S. A.

TABULATIONS

M.U.	M.A.								
*	380	14-5	391	16-2	400	17-11	410	20-10
.....	380	14-6	391	16-3	400	18-0	411	21-2
358	12-0	381	14-7	392	16-4	400	18-1	412	21-6
360	12-2	381	14-8	392	16-5	401	18-2	412	21-7
361	12-3	382	14-9	393	16-6	401	18-3	413	21-11
361	12-4	383	14-10	393	16-7	401	18-4	414	22-3
362	12-5	383	14-11	394	16-8	402	18-5	414	22-4
364	12-7	384	15-0	394	16-9	402	18-6	414	22-5
365	12-9	384	15-1	395	16-10	402	18-7	415	22-10
367	12-11	385	15-2	395	16-11	403	18-8	415	22-11
368	13-0	385	15-3	395	17-0	403	18-9	416	23-1
369	13-2	386	15-4	396	17-1	403	18-10	417	23-10
370	13-3	386	15-5	396	17-2	404	18-11	418	24-2
371	13-4	387	15-6	397	17-3	404	19-0	418	24-3
372	13-6	387	15-7	397	17-4	405	19-3	418	24-5
374	13-8	388	15-8	397	17-5	406	19-6	419	25-1
374	13-8	388	15-9	398	17-6	406	19-7	419	25-2
374	13-9	389	15-10	398	17-7	407	19-10	420	26-0
376	14-0	389	15-11	399	17-8	408	20-0	*	.....
377	14-1	390	16-0	399	17-9	408	20-2	.....	.....
378	14-3	390	16-1	399	17-10	409	20-5	.....	.....

* Zero scores and M.U. or M.A. scores above and below those listed should be written in these spaces. To find the median Mental Growth Units or Mental Age take the average of the 5th & 6th scores.

PROFILE GRAPH



Median Mental Age or Median Mental Growth Units

EXAMPLES:

my not is book that
ran the boy the street down

1. apples trees on grow
2. play boys like marbles to
3. grow boys men to become up
4. is lesson girl her studying the
5. there days are the week in seven
6. children room of the out ran six
7. away winter for nuts store squirrels
8. Mary I runs as as fast
9. do go we Saturday school on not to
10. she youngest selected our the in girl room
11. thousand many a year cars makes Ford
12. true stories teacher about the a told them colonies
13. who her lost girl pencil the another bought
14. allowed upon skate to they never river were the
15. an embankment train leaped lost lives their and many people the

EXAMPLES:

	2	4	6	8	9	10	12
	9	8	7	2	6	5	4
(1)	3	5	7	8	9	11	
(2)	1	4	7	10	12	13	
(3)	9	7	4	5	3	1	
(4)	18	15	12	9	6	5	
(5)	2	5	4	6	8	10	
(6)	1	5	9	11	18	17	
(7)	12	11	10	8	6	4	
(8)	3	6	9	12	14	15	
(9)	1	5	10	15	20	25	
(10)	2	4	6	8	10	32	
(11)	27	24	21	18	17	15	
(12)	18	17	16	14	12	10	
(13)	3	7	11	13	15	19	
(14)	8	10	11	14	17	20	
(15)	32	29	27	22	17	12	

EXAMPLES:

quarter nickel dollar dime penny
rod yard inch mile foot

1. gallon teacup bushel quart pint
2. one multitude few none many
3. clause syllable sentence letter word
4. infancy adolescence old-age childhood maturity
5. warm cold hot torrid frigid
6. president alderman governor mayor citizen
7. company regiment squad division army
8. colossal tiny small enormous large
9. inaudible distinct deafening faint loud
10. millennium eon century year decade
11. lieutenant corporal general colonel captain
12. frequently occasionally never usually always
13. square-rod section county acre state
14. good naughty wicked mischievous angelic
15. pennyweight pound ounce grain carat

EXAMPLES:

What is the number which is 2 less than $\frac{1}{3}$ of 9?

What is the number which if added to 3 is $\frac{1}{2}$ of 12?

1. What is the number which is 2 more than $\frac{1}{2}$ of 10?
2. What is the number which if multiplied by 2 is 3 times 6?
3. What is the number $\frac{1}{3}$ of which is $\frac{1}{5}$ of 15?
4. What is the number which if divided by 2 leaves 1 less than 5?
5. What is the number which if added to 8 makes 3 less than 15?
6. What is the number which if multiplied by 2 makes 3 more than 11?
7. What is the number which if multiplied by itself is $\frac{1}{4}$ of 100?
8. What is the number $\frac{1}{3}$ of which is $\frac{5}{6}$ of 18?
9. What is the number which if subtracted from 17 leaves 4 more than $\frac{2}{3}$ of 15?
10. What is the number which if added to 9 gives twice the product of 2 times $\frac{1}{3}$ of 24?
11. What is the number which if multiplied by 2 and added to 5 is 1 and $\frac{1}{2}$ times $\frac{1}{2}$ of 12?
12. What is the number $\frac{1}{6}$ of which added to 6 is 3 times $\frac{1}{3}$ of 36?

Write one number after each one of these words:

IF THE WORD CONTAINS

A, E, and N, write 1 after it.

A and E, but not N, write 2 after it.

A and N, but not E, write 3 after it.

E and N, but not A, write 4 after it.

EXAMPLES: Eaten 1 Nation 3
Elated 2 Plenty 4

Treasure Signature

Wrinkle Handle

Mental Envelope

Fountain Special

Herald Caution

IF THE WORD CONTAINS

I, R, and E, write 1 after it.

I, but not R nor E, write 2 after it.

E, but not R nor I, write 3 after it.

I and E, but not R, write 4 after it.

I and R, but not E, write 5 after it.

EXAMPLES: Practice 1 Bicycle 4
Kinship 2 Wrist 5
Basket 3

Bishop Envelope

Whisper Simpleton

Similar Picture

Continent Writing

Animal Satchel

Basket Fiction

Retire Delight

Draw a line under the middle one of these three numbers: 3 8 9.

Write here a word meaning the opposite of *good*.

Draw a line through the middle letter in the longer of these two words: Revenge, Assert. Write here a word of five letters meaning the opposite of *slow*. Write here

a word which rhymes with *hay* and means a part of a week.

Draw a line after each of these two letters A B making the first line half as long as the second. Think what year this is, then write here the digits in the reverse order, the one

which belongs last coming first. Cross out one digit in each of these

numbers which does not appear in the other number: 43689, 64378.

Put in the correct signs in this example: $12 \quad 2 \quad 6 = 30$. Notice

these four numbers: 7, 6, 4, 2; if the difference between the

first two is equal to the difference between the last two, write the sum

of the first and third numbers here; if not, write the difference

between the second and fourth numbers here Write here

an odd number greater than 25 which is divisible by both 7 and 3.

Notice these four words: beauty, happiness, willing, cheerful.

If the letter U appears in the same word with the letter E as often

as the letter I appears in the same word with the letter N, write here

..... the word that has neither A nor U in it; if not,

write here the word with both A and U in it.

Write one letter on the line after each one of these statements:

- Write A If always true, as Birds are hatched from eggs . . . A
- Write B If true in some cases, as . . Snow melts as it falls B
- Write C If not true, as There are eleven inches in a foot . . C
- Write D If only an opinion, as . . Skating is better sport than swimming D

1. The lizard is a kind of insect 1
2. The largest cities in the world are seaports 2
3. A boy's uncle is the brother of one of his parents 3
4. A city is the best place in which to live 4
5. Very light boats sometimes float up-stream 5
6. Water boils more quickly in a high altitude 6
7. A concert is the best form of entertainment 7
8. Civil war is strife between different nations 8
9. People lose their self-control in a crisis 9
10. Capital punishment should be abolished 10
11. The largest city in a state is the capital 11
12. War greatly increases a nation's indebtedness 12
13. The most valuable advice is disregarded 13
14. Anarchy is a means of promoting better government 14
15. It is easier to swim in salt water than in fresh water 15
16. Limitation of armaments would prevent war 16
17. More than half of the twelve months have 31 days 17
18. Holders of political offices are corrupt 18
19. Immigration should be restricted 19
20. One's temperature becomes lower in case of a fever 20

EXAMPLES:

table	wood	<u>stove</u>	bottle	paper	<u>iron</u>	cork
door	house	chimney	gate	yard	swing	window

- | | | | | | | |
|---------------|------------|-----------|-----------|---------------|-----------|----------|
| 1. good | bad | taste | sweet | conduct | sour | polite |
| 2. wash | face | sweep | broom | nail | straw | floor |
| 3. straw | hat | soft | feather | leather | shoe | cool |
| 4. Sunday | week | January | hour | Wednesday | year | noon |
| 5. tears | sorrow | sob | girls | grin | laughter | joy |
| 6. parents | command | shall | children | obey | must | order |
| 7. eraser | ink | lightning | storm | dirt | clothes | water |
| 8. book | writer | statue | liberty | sculptor | picture | state |
| 9. yes | sir no sir | always | meanwhile | however | perhaps | never |
| 10. singer | song | choir | organist | preacher | pulpit | sermon |
| 11. December | January | last | first | least | worst | month |
| 12. quarrel | enemy | foe | agree | policeman | agreeable | friend |
| 13. palace | king | hut | barn | farm | peasant | city |
| 14. lobby | hotel | author | preface | book | porter | elevator |
| 15. doctor | patient | lawyer | nurse | client | hospital | court |
| 16. Japanese | Japan | Russia | Dutch | Serbia | Spanish | Holland |
| 17. ruler | length | hour | distance | clock | time | alarm |
| 18. telephone | hear | shout | spyglass | telegraph | distance | see |
| 19. wrist | cuff | neck | leg | giraffe | collar | foot |
| 20. peninsula | continent | boats | bay | Massachusetts | pay | ocean |

EXAMPLES:

- nose - - - a fragrant flower R.....
 doll - - - a place for voting
1. cheat - - - a cereal grain
 2. felt - - - an animal's skin
 3. door - - - the state of one who seeks charity
 4. ounce - - - a stupid person
 5. hunt - - - a relative
 6. duet - - - animal fat
 7. move - - - to wander about
 8. doze - - - soft mud
 9. rest - - - enjoyment of living
 10. base - - - state of being comfortable
 11. break - - - a monstrosity
 12. fuse - - - a trick
 13. acorn - - - contempt
 14. stone - - - to make amends
 15. crude - - - an over-modest person
 16. crate - - - angry
 17. threw - - - a scolding woman
 18. sward - - - to give earned recognition
 19. plate - - - to make happy
 20. spine - - - to think

EXAMPLES:

	2	4	6	8	10	.....	.....
		18	15	12	9	.....	.....
(1)	5	8	11	14	17	.....	.....
(2)	1	2	4	8	16	.....	.....
(3)	27	23	19	15	11	.....	.....
(4)	11	14	13	16	15	.....	.....
(5)	27	9	3	1	$\frac{1}{3}$	.....	.....
(6)	5	6	8	11	15	.....	.....
(7)	25	23	24	22	23	.....	.....
(8)	4	5	8	9	12	.....	.....
(9)	2	4	5	10	11	.....	.....
(10)	19	18	16	13	12	.....	.....
(11)	32	16	14	7	5	.....	.....
(12)	25	28	30	31	34	.....	.....
(13)	45	15	18	6	9	.....	.....
(14)	13	26	24	48	46	.....	.....
(15)	27	9	18	6	12	.....	.....

h 8 Jan '52

Advanced Battery
Grades 9 to Adult

PROGRESSIVE ACHIEVEMENT TESTS—ADVANCED BATTERY Form A

(Diagnostic Tests Keyed to the Curriculum)
Devised by Ernest W. Ties and Willis W. Clark

Name Occupation or Grade

Date Age Birthday Sex: M-F

Examiner Organization

TEST	SUBJECT	Possi- ble Score	Stu- dent's Score	Percent- ile Rank for Grade.....	DIAGNOSTIC PROFILE											Grade Place- ment
					(Chart student's percentile rank here)											
					1	10	20	30	40	50	60	70	80	90	99	
1.	Reading Vocabulary . . .	100	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	A. Mathematics	25	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	B. Science	25	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	C. Social Science	25	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	D. General	25	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
2.	Reading Comprehension . . .	55	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	E. Following Directions . . .	10	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	F. Reference Skills	15	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	G. Interpretations	30	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	Total Reading	155	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
3.	Mathematical Reasoning . . .	60	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	A. Number Concepts	20	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	B. Symbols and Rules	15	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	C. Numbers and Equations . . .	10	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	D. Problems	15	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
4.	Math. Fundamentals	80	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	E. Addition	20	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	F. Subtraction	20	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	G. Multiplication	20	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	H. Division	20	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	Total Mathematics	140	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
5.	Language	125	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	A. Capitalization	15	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	B. Punctuation	10	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	C. Words and Sentences	25	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	D. Grammar	30	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	E. Spelling	30	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	F. Handwriting	15	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	TOTAL	420	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

DIAGNOSTIC ANALYSIS OF LEARNING DIFFICULTIES

If the diagnostic profile on page 2 of this test indicates that the student is making normal progress in all fields, the teacher will have no use for the following diagnostic analysis. However, where the diagnostic profile shows achievement below a desirable standard in one or more major fields, the following device will assist in identifying and analyzing the specific causes of difficulty as a basis for remedial instruction.

The numerals and capital letters in the diagnostic analysis correspond to the sections of the test similarly marked. For example, if the diagnostic profile shows unsatisfactory achievement in Test 4, Sec. E (addition in arithmetic fundamentals), an inspection of the unsatisfactory responses in this section of the test (by number) will reveal whether or not remedial instruction is needed in carrying, use of zeros, reducing to common denominators, and the like. These topics are then checked by the teacher as the basis for remedial work.

Once an adequate diagnosis has been made, remedial instruction is frequently a simple matter. However, teachers have in the past found the clerical work incident to following each individual student a heavy burden. Such extra work is almost completely eliminated if this diagnostic analysis is torn from the test booklet and kept on the teacher's desk, where the various items may be checked off as the student masters them.

READING

<p>1. Reading Vocabulary</p> <p>A. MATHEMATICS: ___ Basic vocabulary.....1-25</p> <p>B. SCIENCE: ___ Basic vocabulary.....1-25</p> <p>C. SOCIAL SCIENCE: ___ Basic vocabulary.....1-25</p> <p>D. LITERATURE: ___ Basic vocabulary.....1-25</p>	<p>2. Reading Comprehension</p> <p>E. FOLLOWING SPECIFIC DIRECTIONS: ___ Directions in mathematical situations...1, 2, 5, 9, 10 ___ Reading definitions and following directions...3, 4, 6, 7, 8</p> <p>F. REFERENCE SKILLS: ___ Vocabulary.....1-6 ___ Use of index.....7-9 ___ Selecting references.....10-13 ___ Report outline.....14-15</p>	<p>G. INTERPRETATION OF MEANINGS: ___ Selecting topic or central idea.....1, 10 ___ Understanding directly stated facts.....4, 5, 7, 8, 11, 12, 13, 14, 19, 22, 26, 28, 29 ___ Making inferences.....2, 3, 6, 9, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 30.</p>
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MATHEMATICS

<p>3. Mathematical Reasoning</p> <p>A. NUMBER CONCEPT: ___ Writing integers.....1-3 ___ Writing money.....4 ___ Writing fractions.....5-7 ___ Roman numbers.....8-10 ___ Fractions and decimals...11-13 ___ Exponents and roots.....14-16 ___ Negative numbers.....17 ___ Abstract numbers.....18-20</p> <p>B. SYMBOLS AND RULES: ___ Symbols.....1-3, 8-10 ___ Vocabulary.....4-7 ___ Rules.....11-15</p> <p>C. NUMBERS AND EQUATIONS: ___ Negative numbers.....1-4 ___ Solving equations.....5-10</p> <p>D. PROBLEMS: ___ Simple problems.....1-2 ___ Sharing and averaging...3-4 ___ Square and cubic measure.....5-6 ___ Budgeting.....12 ___ Ratio and percentage...7-11 ___ Insurance and discount...13-15</p> <p>4. Mathematical Fundamentals</p> <p>E. ADDITION: ___ Simple combinations.....1</p>	<p> ___ Carrying.....2-4 ___ Zeros.....1, 6 ___ Column addition.....3, 4 ___ Adding money.....4, 6 ___ Denominate numbers.....4-6 ___ Adding numerators.....7 ___ Reducing fractions to common denom.....8, 10-13 ___ Adding mixed nos.....9-13 ___ Adding fractions and decimals.....14-15 ___ Writing decimals in column.....16-17 ___ Adding percentages.....18 ___ Adding abstract nos.....19-20</p> <p>F. SUBTRACTION: ___ Simple combinations.....1 ___ Borrowing.....2-5 ___ Zeros.....1, 3, 5 ___ Subtracting money.....4, 5 ___ Denominate numbers.....4-6 ___ Subtracting numerators...7-8 ___ Reducing fractions to common denominators...9-10 ___ Integer from mixed no.....11 ___ Borrowing with mixed numbers.....12, 13 ___ Subtraction: fractions and decimals.....14, 15</p>	<p> ___ Writing decimals in column.....16, 17 ___ Subt. abstract nos.....19, 20</p> <p>G. MULTIPLICATION: ___ Tables.....1-5 ___ Zeros in multiplicand.....2, 5 ___ Zeros in multiplier.....4, 5 ___ Two-place multipliers...3-5 ___ Denominate nos.....6 ___ Mult. denominators.....8 ___ Cancellation of fractions.....7, 9, 10, 11, 13 ___ Fractions and mixed numbers.....12 ___ Fractions and decimals...15 ___ Pointing off decimals...16, 17 ___ Mult. abstract nos.....19, 20</p> <p>H. DIVISION: ___ Tables.....1-5 ___ Zeros in quotient.....1-4 ___ Remainders.....5 ___ Inverting divisor in fractions.....6-13 ___ Mixed numbers.....11-13 ___ Reducing fractions to decimals.....14 ___ Pointing off decimals...15-17 ___ Cancel. of fract.....18 ___ Div. abstract nos.....19-20</p>
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LANGUAGE

<p>5. Language</p> <p>A. CAPITALIZATION: ___ First word of sentence.....1 ___ Names of persons.....2, 7, 9 ___ Names of places.....2, 3, 8, 9 ___ Days of week and months...4, 6 ___ Titles.....5, 7 ___ First word of quotation...6 ___ Over-capitalization.....</p> <p>B. PUNCTUATION: ___ Commas..... ___ Question marks..... ___ Quotation marks.....</p>	<p> ___ Quotation within quotation..... ___ Over-punctuation.....</p> <p>C. WORDS AND SENTENCES: ___ Singulars and plurals...1, 8, 11 ___ Case.....5, 6, 9, 12 ___ Tense.....2, 4, 7, 8, 10, 13-15 ___ Good usage.....3 ___ Recognizing sentences...16-25</p> <p>D. GRAMMAR: ___ Vocabulary of grammar...1-7 ___ Parts of sentences.....8-10 ___ Kind of sentences.....11-13 ___ Parts of speech.....14-30</p>	<p> ___ Nouns..... ___ Pronouns..... ___ Verbs..... ___ Adjectives..... ___ Adverbs..... ___ Conjunctions..... ___ Prepositions.....</p> <p>E. SPELLING: ___..... ___.....</p> <p>F. HANDWRITING: ___ Quality and legibility.....</p>
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