1937

A study of the use of diagnostic tests followed by drill in the teaching of agricultural arithmetic.

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A STUDY OF THE USE OF DIAGNOSTIC TESTS FOLLOWED BY DRILL IN THE TEACHING OF AGRICULTURAL ARITHMETIC

CARTWRIGHT - 1937

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OF THE USE OF DIAGNOSTIC TESTS FOLLOWED BY DRILL IN THE TEACHING OF AGRICULTURAL ARITHMETIC

By

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CONTENTS

CHAPTER I

Introduction

The students who enter the Essex County Agricultural School are selected from all over the county. The entrance requirements are the same as for all vocational schools established and operated under the Smith-Hughes Act, namely, that the applicant shall have reached fourteen years of age and shall be a resident of this county. Further selection is usually made on the basis of the student's project facilities and his interest in agriculture.

Consequently, the chronological age of the pupils varies from fourteen to sixteen years in the four year course and from sixteen to eighteen years or more in the three year special course. As a result of this wide selection, the pupils' training in the fundamental subjects, such as arithmetic, varies a great deal more than in the average local high school department.

The purpose of this study is an attempt to find out whether or not diagnostic tests followed by drill in fundamental processes should be used in the teaching of agricultural arithmetic.

Most agricultural teachers and supervisors believe that only the practical and real life problems closely related to agriculture should be taught in this and other similar schools. All agree that students who have chosen agriculture as their life's work will encounter numerous problems involving

arithmetic. Likewise, these problems will be even more difficult when they become owners and operators of their own farms.

Furthermore, vocational supervisors have strongly emphasized the practical problems and very little if any time has been allotted for drill in the fundamental processes. The time devoted to the study of arithmetic problems does not permit much review or drill on fundamentals. However, many pupils are now entering arithmetic classes with an inferiority complex or at least a dread of anything pertaining to figures. In fact, a number of the pupils have very little success in solving problems in agricultural arithmetic. Whether this difficulty is due to weaknesses in the fundamental processes, to the lack of persistence and accuracy, or to the lack of reasoning power, must be determined before success in solving agricultural problems can be obtained.

Therefore, if an efficient method of analyzing the weaknesses and difficulties of the pupils could be devised and habits in the easy use of mechanical processes fixed, there would be a great saving of time on the part of the pupils and the teacher. There would also be a saving of money on the part of these future land owners by more efficient handling of their farm enterprises.

While it is clear that the ability to operate a farm with success may not depend entirely upon arithmetical reasoning, it is evident that the most successful farmers keep accurate and up to date records of all major farm enterprises.

Furthermore, the management of by far the greater number of farms in New England, at least, involves the purchasing of materials and equipment and the selling of the products as well as the actual planting, growing, and harvesting of the crops. All of these enterprises require considerable arithmetical reasoning.

This problem is not just local in its scope as is shown by the fact that the State Extension Service supplies the services of an accounting specialist who teaches the farmers to keep records and accounts of all farm enterprises. If our students are properly trained to keep these records, they will be able to help not only themselves but also their neighbors.

As will be seen in the following chapter, educators advise the use of diagnostic tests in teaching arithmetic, but to date very few records have been kept to show the value of such a practice. Furthermore, very few if any studies have been made regarding the use of these tests in agricultural arithmetic. It is obvious that there is much need of further study along these lines.

CHAPTER II

Summary of Related Investigations

Numerous studies have been made within recent years relating to the use of diagnostic tests in the teaching of arithmetic, but as yet no one has applied these tests to the teaching of agricultural arithmetic, and, as previously stated, very few results have been kept to determine the effect of such a practice upon pupil progress.

The following summary of some of these previously made studies will be found valuable for purposes of comparison.

Study by Joseph C. Brown and Lotus D. Coffman (2)

This is an extensive study of the teaching of arithmetic and gives a simple and clear exposition of the best methods of teaching arithmetic known today. Part One is a presentation of the contribution which scientific studies have made toward standardizing the subject and contains a valuable study of the uses to which arithmetic is put in every day life. Part Two deals with certain fundamental principles that apply to arithmetic in general. Part Three explains the organization of the subject and the methods of teaching the various topics which are included in the textbooks of arithmetic in general use.

The authors express the following conception of testing in arithmetic: "In arithmetic the testing process has two distinct functions. One is the measurement of the ability to perform arithmetical operations or the ability to solve

arithmetic problems. The other function is concerned with finding out the specific difficulties which each pupil is encountering in his work. The second function is analytical and diagnostic in character."

In treating the subject of drill, the authors strongly emphasize the necessity of "intelligently directed practice". In other words, careful planning of drill to fit the needs of the individual pupils. In order to carefully plan these drill or practice sessions, the difficulties of the pupils must be determined by carefully planned diagnostic tests.

Study by Ella Probst (6)

A careful study was made in Minneapolis of pupils who were weak in the fundamental operations of arithmetic as revealed by the results of standardized tests. It was found that in many cases the difficulty was due to faulty habits of procedure in solving simple arithmetic examples and problems.

The author says: "The faulty habits of individual pupils are ordinarily not detected by the teacher when the entire class works as a unit, and they cannot be discovered from examination of the test papers. Diagnostic tests will always reveal certain pupils who are below their grade in ability. The problem before the teacher is to make the best use of these findings."

Study by Ernest W. Tiegs (8)

This is a detailed study of all kinds of tests and measurements for teachers. The author presents the standard-

ized tests and methods of analysis in a clear and precise manner.

The author's main conclusions in regard to testing in arithmetic are as follows:

1. The teacher's main objective in testing in arithmetic is to provide guidance for teaching. "The marking of numberless sets of papers once looked upon as a moral duty has probably interfered with teaching more than any one factor; and it has failed to provide much in the way of needed guidance."

2. Testing is a distinct aid to the competent teacher. "The scoring of standardized tests gives the teacher more information about the general status of individuals and particularly of the class as a whole than would be possible from merely reading the tabulated results."

3. Only when the teacher is in possession of the weaknesses and difficulties of the pupils can he hope to do effective remedial work.

Study by William C. Bagley and Marion E. MacDonald (1)

This is a clear and precise treatment of the standard practices in teaching. In the chapter devoted to testing the following principles are emphasized:

1. Give inventory tests to determine what the learners already know of the unit to be taught or how they have already mastered certain skills.

2. Give diagnostic tests to determine the needs or lacks of the learner. The results of such tests indicate

strengths or weaknesses. "In arithmetic it is something to know that a pupil or a class is weak in long division; it is far more to know in just what phase of the process the weakness lies."

3. The test papers should be corrected by the teacher. "Although scoring papers takes time, it repays the teacher to do this himself because only in this way can he get a picture of the accomplishment of each learner."

4. The teacher should so tabulate the results that the number of pupils failing in each item may be indicated, thereby revealing the strengths and weaknesses of the teaching as well as the units or processes that may need further attention.

Study by Professor G. W. Reagan (7)

This study deals with the fundamental principles of teaching and is designed to acquaint prospective teachers with the nature and meaning of teaching, the major problems encountered in the classroom, and various instructional procedures that superior teachers have found to be productive.

The chapter devoted to the measurement of the results of teaching emphasizes the following points about the use of diagnostic tests:

1. Diagnostic tests reveal the specific weaknesses of pupils in a given subject or portion of a subject.

2. To make a diagnosis of the weaknesses of the pupil, it is necessary to test him in detail in each of the fundamental processes.

3. Educators are placing increased emphasis on diagnostic testing as a phase of teaching. "It is obvious that the teacher cannot assist pupils in overcoming their weaknesses unless he first ascertains what these weaknesses are."

Study by Edwin S. Lide (5)

This intensive study analyzes the instruction practices in mathematics in a selected group of schools all over the United States. A wide variation in subjects taught and study outlines was found.

The chapter devoted to research and experiment emphasizes the following facts:

1. It is only through careful testing that diagnostic and remedial work of the proper kind can be applied to individual cases.

2. "In most city schools attempting work of this character, even where a department of research exists, the work of testing is independent of that department."

3. Difficulties which teachers seem most often to encounter concern the slow groups of pupils. "Specific suggestions which may aid teachers in this connection are lacking in most outlines."

4. "At Houston, Texas, fifty pages of the junior high school outline are devoted to diagnostic and remedial practice in the four fundamentals of arithmetic." The author strongly advises the use of such a practice.

Study by G. T. Buswell and Lenore John (6)

This intensive study of pupils' weaknesses in the

four fundamental operations of arithmetic was made in Chicago. In addition alone, a list of thirty-three specific difficulties, from errors in combinations, counting, adding carried numbers last, to forgetting to add, was revealed by these tests. The other three fundamental processes, namely, subtraction, multiplication, and division, showed an alarming number of specific difficulties also.

Study by Dr. Guy M. Wilson (9)

Announcing the results of an experiment made as a P. W. A. project among 17,000 school children in the Greater Boston Area, Dr. Guy M. Wilson, professor of education at Boston University, declared today before the American Educational Research Association that "even in the simplest of tests given in arithmetic, children in grades six, seven, and eight have not attained a proficiency which would be acceptable in any business office."

The research project was entitled "Corrective Load in the Fundamentals of Arithmetic in Grades Six, Seven, and Eight in 15 Representative Towns and Cities in the Metropolitan Boston Area."

He said that the study was undertaken to ascertain the number of children in grades six, seven and eight in representative towns and cities who need corrective work in the simple fundamentals of arithmetic.

The results seem to re-emphasize the fact that children apparently can go along through the schools without

being particularly noticed or taught by the teachers," the Boston University School of Education professor continued.

"It becomes apparent that teachers do not grasp the problem; do not see what children are doing, or if they do see, are helpless when it comes to doing anything about it. Route procedure is followed; so many examples are given to be worked out; the answers are checked right or wrong, and the teacher does not know what the child has done to get the answers."

Comment

It will be noted, upon inspection of the results of these studies, that all of the authors believe in the practice of using diagnostic tests in the teaching of arithmetic, while none of them refer to the use of these tests in the teaching of agricultural arithmetic, and that all have emphasized the value of these tests in diagnosing the weaknesses of the pupils.

The fact that so many studies along similar lines have been made proves that the problem is not wholly a new one, but so far no one has applied this practice to agricultural arithmetic teaching. And, as previously stated, the effect of these tests upon the progress of the pupils has not been thoroughly recorded. Therefore, it is evident that there is a definite need for further research along these lines.

CHAPTER III

Statement of Procedure

General Statement of Facts Concerning This Study

The problem which has been undertaken in the preparation of this thesis, then, is to find out whether or not diagnostic tests, followed by drill in the fundamental processes, should be used in the teaching of agricultural arithmetic. In other words, to show that, even in the decidedly practical vocational mathematics teaching, the weaknesses of the pupils must be carefully analyzed and corrected by carefully planned drill periods before successful solution of problems related to agriculture can be secured.

Lide, in his "Instruction in Mathematics" (5) says: "While many abuses have been committed in the use of tests, too much emphasis cannot be placed upon the use of tests to center the attention of teachers upon the needs of pupils and the necessity of remedial measures."

The problem in this case has been limited to students of the four year course group, namely, those pupils who have reached fourteen to sixteen years of age, and in some cases, at least, have had mathematical difficulties in the public school system. Consequently, they have been guided to this vocational school with the hope that they can fit themselves to earn a living in agriculture.

These students have been grouped, as nearly as possible, according to their abilities as shown by a series of agricultural background tests as well as the intelligence tests used for comparison in this study.

The freshmen are usually divided into three sections which are classified alphabetically according to their ability. The IA section has the highest ability and the IC section the lowest ability. The two divisions of sophomores, IIA and IIB, are usually selected in the same manner, but the partial elective schedule of courses does not permit as accurate an ability grouping in arithmetic and other related subjects as in the freshman year.

Description of tests given

All entering students in the Essex County Agricultural School are given the Army Alpha and the Kent-Shakow Intelligence tests during the first week of school.

The Army Alpha Battery is composed of a set of eight tests which are given in the following order: 1, Simple Directions; 2, Arithmetical Reasoning; 3, Choosing Correct Answers; 4, Same and Opposite Words; 5, Mixed Sentences; 6, Number Series; 7, Essential Property; and 8, Information. The standard time limits are observed, and forms five and seven are used in alternate years.

The Arithmetical Reasoning test is composed of twenty problems which are arranged in the order of difficulty.

The Kent-Shakow Battery, found on pages 18 to 24 was compiled by Dr. Grace H. Kent of the Danvers State Hospital, Hathorne, Massachusetts. The test forms are made up in sets

and are given in the following order: 1, Hard Directions; 2, Information; 3, Similarity; 4, Essential Property; 5, Essential Difference; 6, Arithmetical Reasoning; and 7, Sentence Completion. Each test is given with a time limit of two minutes. After time has been called for the last of the seven tests, the lead pencils are laid aside and the red pencils are given out. The students are allowed as much time as is necessary to complete all tests. This procedure allows scoring with and without time limits.

The Arithmetical Reasoning test is composed of sixteen problems arranged in order of difficulty. This test has been evaluated by the following two methods: 1, Sixteen items, with a two minute time limit, unweighted, one point each. 2, Sixteen items without time limit are weighted as follows: One point each for problems 1 and 2; two points each for problems 3, 4, 5, 6, 7, and 8; three points each for problems 9, 10, 11, 12, 13, and 14; and four points each for problems 15 and 16.

In October, 1933, all students in the sophomore arithmetic classes of the Essex County Agricultural School were given a group of seven diagnostic tests, by the author. These tests were taken from the Standard Service Arithmetic (4) and were given in the following order: 1, Whole Numbers; 2, Fractions; 3, Decimals; 4, Denominate Numbers; 5, Percentage; 6, Interest; and 7, Mensuration. The time limits are indicated on these tests which are found on pages 25 to 34.

These tests were analyzed and the results and weaknesses recorded on master sheets similar to the ones found on pages 39 to 41. The students in the IIB section were drilled, for about ten minutes at the beginning of each class period, on their weaknesses as shown by these tests. The remainder of each period was devoted to the solving of agricultural arithmetic problems. Each student was required to keep a notebook in which were kept rules on addition, subtraction, multiplication, and division, as well as general rules for solving agricultural arithmetic problems. Individual assistance was given to each pupil, as far as possible, to correct the weaknesses in drill as well as in problem solving. In some cases, special assignments were given to individuals on fundamental weaknesses.

The students of the IIA section were not allotted any time for drill on fundamentals, and the entire class periods were devoted to the solving of agricultural arithmetic problems. Each student was required to keep a notebook, which contained only the general rules for solving these problems. Individual assistance was given to each pupil, as far as possible, to correct weaknesses in problem solving, but no special effort was made to correct the weaknesses shown in the diagnostic tests.

In March, 1934, all sophomore students were given the first four diagnostic tests again. The results were recorded on the master sheets as before. Time did not permit the remaining tests to be given.

In October, 1934, a group of eight revised tests, as shown on pages 35 to 38 , were given to all sophomore students in the following order: 1, Addition; 2, Subtraction; 3, Multiplication; 4, Division; 5, Denominate Numbers; 6, Fraction Decimal Per Cent Equivalents; 7, Interest; and 8, Mensuration. The time limits are indicated on each test. The tests were analyzed and the results recorded in the same manner as in 1933.

The same procedure was used as with last year's sections, except that the IIA group was used for the drilled section and the IIB group as the check section.

In March, 1935, the same tests were given to all sophomore students and the results were recorded in the usual manner.

In October, 1934, the original group of diagnostic tests was given to all freshmen students. These were analyzed and the results recorded in the usual manner.

The students in the IB section were drilled on their weaknesses in the same manner as the sophomore students, and the IA and IC sections were used as check groups.

In October, 1935, the group of revised diagnostic tests was given to all sophomore students in the same order as in 1934. As time did not permit the retesting of all the freshmen in 1934, it seemed advisable to compare the results of the tests given in the freshman year with those given at the beginning of the sophomore year. These tests were

analyzed and the results were tabulated in the usual manner. Consequently, there seemed to be no need of testing this same group of students again.

In October, 1936, the group of revised diagnostic tests was given to all sophomore students in the same order as in previous years. The tests were analyzed and the results tabulated in the usual manner.

It seemed advisable to try to eliminate the factor of group variation in ability, so the two sections were rotated in the following manner:

The IIA group was used as the drilled section in addition, and the IIB group as the check section. In subtraction the groups were reversed. To aid in tabulation, the IIA group was used as the drilled section in both multiplication and division. The groups were reversed again in denominate numbers and in fractional decimal per cent equivalents. Finally, the IIA group was used as the drilled section in both interest and mensuration.

The procedure was the same as in previous years, except that the groups were re-tested at the end of each drill period of approximately four weeks. The results were again recorded as in previous years.

Description of Criteria

The revised diagnostic tests used in this study are not standardized tests, but it seemed advisable to cut down the time used in testing, due to the restricted time allotted to arithmetic.

However, the class time allotted to arithmetic was the same for all sections, averaging about three forty-minute periods weekly during the freshman year and about two forty-minute periods weekly during the sophomore year. Consequently, only one test was given at the beginning of each period.

While it is common knowledge that teachers' marks are extremely unreliable, it was decided to make comparisons of the quarter marks of each group during the freshman and sophomore years. There are so many factors which enter into the quarter marks that in most cases the marks are lower than the abilities shown by the diagnostic tests. For example, all sophomore students are given assignments based on class work, and if these assignments are not handed in on time the corresponding work is discounted in proportion to the tardiness. In most cases the assignment papers were kept by the teacher until the majority of them had been handed in, and when they were returned to the pupils a new assignment was required of the delinquents. This was done to avoid cheating.

The freshman marks were recorded by two or three different instructors while the sophomore marks were all recorded by the author.

Taken with these facts in mind, the marks may serve as a partial basis for comparison of pupil progress.

With your pencil make a dot over any one of these letters F G H I J, and a comma after the longest of these three words: **boy mother girl** Then, if Christmas comes in March, make a cross right here.....but if not, pass along to the next question, and tell where the sun rises..... .. .If you believe that Edison discovered America, cross out what you just wrote, but if it was some one else, put in a number to complete this sentence: "A horse has .....feet." Write *yes*, no matter whether China is in Africa or not.....; and then give a wrong answer to this question:, "How many days are there in the week?".....Write any letter except *g* just after this comma, and then write *no* if 2 times 5 are 10..... Now, if Tuesday comes after Monday, make two crosses here .....; but if not, make a circle here..... or else a square here ..... Be sure to make three crosses between these two names of boys: George. .....Henry. Notice these two numbers: 3, 5. If iron is heavier than water, write the larger number here....., but if iron is lighter write the smaller number here..... Show by a cross when the nights are longer: in summer?..... in winter?..... Give the correct answer to this question: "Does water run uphill?" .... and repeat your answer here ..... Do nothing here (5+7=.... ....), unless you skipped the preceding question; but write the first letter of your first name and the last letter of your last name at the ends of this line:

Draw a line under the word that makes the sentence true.
Mark just one word in each line.

Sample: Maple is a kind of bug cloud metal <u>tree</u>

1. America was discovered by Balboa Cabot Columbus DeSoto
2. A receiver is a part of a chair painting piano telephone
3. Thunder usually comes with hail sunshine lightning snow
4. Cheese comes from milk nuts vegetables eggs
5. A radiator is a part of a chest desk roof automobile
6. Thanksgiving comes in April February November December
7. The number of inches in a foot is 9 12 36 100
8. Bears live in dens dugouts houses kennels
9. The sun rises in the north south west east
10. Leather is obtained from birds animals fishes trees
11. Chicago is in Illinois California Ohio Vermont
12. A swan is like a pigeon pheasant goose quail
13. Paris is a city in Germany France Italy Russia
14. A wolf is a kind of a cat cow lynx dog
15. The iris is a part of the foot eye hand nose
16. Jerusalem is in Austria India Kamchatka Palestine
17. Copperhead is a kind of a bird coin snake turtle
18. Bricks are made of clay stone tar wood

Primaries are connected with baseball elections farming glasswork

20. Pasteur is the name of a merchant musician priest scientist
21. Gunpowder was invented by Americans Europeans Chinese Indians
22. Chess is played on a court board gridiron links
23. "The Merchant of Venice" was written by Shakespeare Scott Spenser Schiller
24. When it is summer here it is winter in China Turkey Australia Siberia
25. The law of gravitation was discovered by Aristotle Newton Copernicus Bacon

Draw a line under the word that makes the sentence true.
Mark just one word in each line.

Sample: Quiet means most like noisy quite <u>still</u> talkative

1. Warm means most like bake hot nice snow
2. Afraid means most like courage defray emotion fearful
3. Sickness means most like doctor health illness kindness
4. Begin means most like commence desist erase stop
5. Sleep means most like awake bed lull slumber
6. Old means most like beard gray ancient youth
7. Often means most like after frequent never times
8. Polite means most like courteous elite gentleman sulky
9. Wisdom means most like ages knowledge ignorance kingdom
10. Alert means most like desert drowsy eyesight keen
11. Frank means most like candid cranky taciturn zealous
12. Sly means most like slip spy stealthy straight
13. Eminent means most like cellar illustrious imminent unknown
14. Recline means most like decline hermit move rest
15. Contend means most like content struggle peace tender
16. Help means most like hinder house problem assist
17. Pretty means most like face ugly handsome lady
18. Sharp means most like edged cut dull razor
19. Stiff means most like pliable unyielding stand tiff
20. Failure means most like attempt life success defeat
21. Gentle means most like dental rough mild right
22. Broad means most like short narrow heavy wide
23. Cruel means most like ruthless duel humane true
24. Surly means most like curly genial crusty sure
25. Nomad means most like monad wanderer nominal settled
26. Command means most like order officer commend obey

Draw a line under the word that makes the sentence true.
Mark just one word in each line.

Sample: A man always has food glasses <u>head</u> shoes

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1. A river always has boats fishes logs water
2. A cat always has ball fur kittens ribbon
3. A house always has roof fireplace paint porch
4. A sled always has bells horses runners ropes
5. A dog always has kennel master license nose
6. A tree always has leaves roots fruit nuts
7. A kitchen always has cupboard mirror table floor
8. An auto always has cushions speedometer wheels windows
9. A library always has books chairs magazines tables
10. A shoe always has buttons sole laces lining
11. A fire always has coal wood heat paper
12. A snake always has legs poison rattles skin
13. A hill always has birds brooks height grass
14. A box always has cover sides hinges nails
15. A school always has pupils blackboards desks maps
16. A chimney always has bricks opening ivy smoke
17. A door always has hinges knocker lock top
18. A garden always has plants flowers vegetables weeds
19. A ship always has sail engine stern anchor
20. A reservoir always has fishes contents sand fence
21. A fish always has scales speckles spines stomach
22. A rowboat always has oars keel bottom rudder
23. Wood always has knots grain pitch bark
24. A leopard always has mate cubs prey spots
25. A grotto always has cavity fissures pools darkness
26. A trunk always has lock handles weight strap

In each line mark the one that is most different from the others.
Mark just one word in each line.

Samples: apple carrot peach pear

bitter sour sweet white

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1. breakfast dinner grapefruit supper
2. bedroom kitchen parlor stage
3. geography reading school spelling
4. camera flute piano violin
5. cow dog sheep tiger
6. box drawer field room
7. Lincoln Pershing Washington Wilson
8. beer grapejuice lemonade orangeade
9. bread candy meat potatoes
10. boots shoes slippers stockings
11. island lake river sea
12. hop jump skip walk
13. long loud short tall
14. mouse rabbit rat worm
15. book letter magazine newspaper
16. bricks concrete shingles window
17. cry shout whisper yell
18. bench chair sofa table
19. bag basket handle valise
20. recline rest sleep work
21. duck goose hen swan
22. chimney fire smokestack stovepipe
23. canary lark oriole robin
24. coal paper steel wood
25. Boston Florida Maine Ohio
26. forest grove tree woods

Name.....

Find the answers as quickly as you can, and write them on the dotted lines.

1. If a car travels 30 miles in an hour, how many miles does it travel in one-half hour? 15 .....
2. If you buy 4 notebooks at 5 cents each and give the clerk a half-dollar, how much change do you get? 30¢ .....
3. If a gallon of gas lasts for 10 miles, how many gallons would be used on a 200-mile trip? 20 .....
4. If 8 boys club together and pay 2 dollars for the use of a room, how much should each pay? 25¢ .....
5. A boat has 50 staterooms, each having 2 berths. If 80 berths are taken, how many berths are left unused? 20 .....
6. If a single trip cost $1.50 and a round trip $2.50, how much is saved by taking a round trip ticket instead of two singles?.....
7. In a class of 32 members, there are 2 visitors and a teacher. If 5 students are absent, how many persons in the room? ....
8. A girl had 75 cents. If she bought 6 oranges at 50 cents per dozen, how much money did she have left? .....
9. If there are 4 sausages to a pound, and you are to feed 4 people who can eat 3 sausages apiece, how many pounds would you buy? .....
10. If 2 pencils cost 5 cents, how much will 10 pencils cost? .....
11. If a man walks 4 miles an hour, how long will it take him to walk 7 miles? .....
12. If a boy saves 10 dollars each month, how much will he save in 2 years? .....
13. A movie theatre is open from 11 in the morning until 11 at night. If each performance lasts 2 hours, how many are given in a day? .....
14. If 2 yards of cloth cost 50 cents, how much will 5 yards cost?.....
15. In a 150-page magazine, pages 31 to 40 are cut out. How many pages remain? .....
16. If there are 50 nails to a pound and the empty keg weighs 10 pounds, how many nails in a keg weighing 110 pounds? .....

Name ..... **Only one word in each space.**

1. Apples grow.....trees.

2. A squash.....larger.....a potato.

3. The dog chased the....., and the cat .....up a..... .....

4. Hens lay.....,and we.....them.

5. Ice.....in summer, and.....freezes in winter.

6. Stoves .....made.....iron, tables are.....of

.....,and.....are made of glass.

7. A broom is.....for.....the floor.

8. Automobile.....are.....of rubber, filled..... .....air.

9. Most of us.....to bed at.....and get..... .....in the

....; but people who..... .....at night

have to.....in the daytime.

10. If we.....downstairs rapidly in the....., we

.....likely to.....

11. A cube has..... sides and eight.....

12. It.....a sultry day..... .....July. Suddenly the.....begins

to blow, ...a burst of.....is heard. A woman

..... is wheeling a.....carriage walks as.....as

she can, so as to get .....before it begins to .....

I. [illegible] TEST IN WHOLE NUMBERS.

Addition Time 4 Min.

Directions: Save copying whenever possible by placing your paper below the examples and writing only the answers.

1.	2.	3.	4.	5
13	925	225	2371	9509
21	137	589	3435	8794
50	656	764	1627	669
54	789	4396	8206	2084
64	477	7258	3679	8145

6.

2153
968
8756
648
9084

7. Copy and add: 3770, 9386, 334, 1002, 155

8. Copy and add: 910, 81, 7, 21, 96

Part 2. Subtraction (Time: 4 Min.)

1.	2.	3.	4.	5.
64989	33828	109300	60929	2[illegible]5402
24116	25019	75344	13762	20487

6.	7.	8.	9.	10.
84628	330336	81707	419604	50346
76545	59967	45602	93557	22050

11.	12.	13.
116584	215491	561477
74730	19694	85798

Copy and subtract:

14.) [illegible] - 693[illegible]

15.) 121350 - 29896

Part 3. Multiplication (Time: 6 min.)

1.	2.	3.	4.	5.	6.	7.	8.
534	810	102	453	4325	6973	9967	8796
463	789	864	379	3002	654	2031	789

Part 4. Division (Time: 6 min.)

(1) 34)9092 (2) 46)92850 (3) 38)17879

(4) 105)74466 (5) 19)9140 (6) 297)182754

Directions. Copy only when necessary.

Answers must be reduced when possible.

Part 1. Addition (Time allowed 5 min;)

1.	2.	3.	4.	5.
7/8	1/2	72 2/3	11 4/9	7 11/16
3/4	1/4	65 4/5	3 1/2	4 7/16
1/2	1/3		5/6	5 3/8
	5/6		13 2/3	12 1/2
			7	

6. 6 7/12 plus 3 1/6 plus 8 5/8 plus 1/2 plus 2 2/3

Answers must be reduced when possible.

Part 2. Subtraction (Time allowed 5 min.)

1.	2.	3.	4.	5.	6.
7/12	78 5/9	28	39 3/5	32 1/4	100 1/2
1/4	15	15 2/5	13 1/3	17 5/6	50 5/8

7. 92 1/3 - 89 2/3 8. 90 1/8 - 62 1/6

Answers must be reduced when possible.

Part 3. Multiplication (Time: 3 min.)

1. 5/8 x 7/6 2. 5/9 x 18/25 3. 4 x 3/8

4. 7 1/2 x 2/15 5. 5 1/3 x 18/24 6. 11 2/3 x 13 1/5

Answers must be reduced when possible.

Part 4. Division (Time: 4 min.)

1. 3/4 ÷ 1/8 2. 9/16 ÷ 3 3. 8 ÷ 3/4

4. 2 1/3 ÷ 1 1/5 5. 8 1/6 ÷ 1 1/6 6. 16 1/2 ÷ 5 2/3

Part 1. Addition (Time 2 min.)

Directions: copy, add and point off each answer correctly.

1) .02 plus 1.001 plus .065 plus 5.67 plus 4

2) 29.65 plus 20 plus 32.01 plus 37.6 plus 18.005

3) 12.125 plus 8.5 plus 6.04 plus 3 plus .5

Part 2. Subtraction (Time: 2min.)

Directions: point off each answer correctly.

1) 6.382 - 4.16 2) 10.7 - 7.035 3) 234 - 196.04

Part 3. Multiplication (Time; 3 min.)

Directions: point off each answer correctly

1)	2)	3)	4)
132	8.90	10.50	102.90
.0625	.05	.005	.0425

Part 4. Division (Time: 4 min.)

Directions: point off each answer Correctly.

1) $8.41\overline{)247.565}$ 2) $368\overline{)46.000}$

3) $.0625\overline{)120.0000}$ 3) $45\overline{).340}$

IV. Diagnostic Test in Denominate Numbers.

Part 1. Changing forms of Denominate Numbers.

Directions: Write on your paper only what should be on the blanks.

(Time allowed 4 min.)

1.	31 in. =		ft.	in.
2.	9 qt. =		gal.	qt.
3.	131 min. =		hr.	min.
4.	7 pt. =		qt.	pt.
5.	16 ft. =		yd.	ft.
6.	1 cu. yd. =		cu. ft.	
7.	1½ lb. =		oz.	
8.	5 pk. =		bu.	pk.
9.	27 mo. =		yr.	mo.
10.	11 qt. =		pk.	qt.
11.	57 Cu. Ft. =		Cu. Yd.	cu. ft.
12.	43 cu. in. =		yd.	in.
13.	4150 lb. =		T.	lb.
14.	1 cu. ft. =		cu. in.	
15.	157 sq. in. =		sq. ft.	sq. in.
16.	640 A. =		sq. mi.	
17.	320 sq. rd. =		Acre	
18.	3 sq. mi. =		Section	

Part II. Computation with denominate numbers. (Time 4 min.)

Directions: Answers must be in <u>correct form.</u>

1. 6ft. 7in. plus 5ft. 5in. plus 1ft. 2in.
2. 2lb. 10oz. plus 7lb. 6oz. plus 9lb. 5oz.
3. 5gal. 2qt. plus 3qt. plus 2gal.
4. 2yd. plus 3yd. 2ft. plus 11y. 1ft.
5. 3hr. 10min. - 2hr. 25min.
6. 5lb. - 3lb. 8oz.
7. 9yd. 5in. - 8yd. 7in.
8. 3gal. 2qt. - 1gal. 3qt.

Multiply: (Time 2 min.)

(9)	(10)	(11)	(12)
2 gal. 1 qt.	4 ft. 7 in.	3 lb. 5 oz.	6 yd. 2 ft.
3	2	8	3

Divide: (Time 2 min.)

13. 3) 6 hr. 21 min.

14. 4) 9 hr. 24 min.

15. 3) 5 lb. 10 oz.

16. 3) 8 yd. 2 ft.

Percentage Diagnostic Test

Time allowance 30 min. for entire test.

Part I. Fraction-Decimal-Per Cent Equivalents
Directions: Write as your answer what should be on each blank. "Frac". means common fraction. "Dec." means decimal.

1) 3/4 of N_____% of N
2) 8½ % of N_____(dec.) of N
3) 66 2/3% of N_____(frac) of N
4) 1/8 of N_____%of N.
5) 7% of N_____(dec) of N.
6) .0425 of N_____% of N
7) 25% of N_____(frac) of N.
8) 130% of N_____(dec) of N.
9) 4½% of N_____(dec) of N.
10) 3/10 of N_____% of N.
11) 16 2/3 % of N_____(frac) of N.
12) 1.32 of N_____% of N.
13) 3% of N_____(frac) of N.
14) 1½ of N_____% of N.
15) 45% of N_____(frac) of N.
16) 110% of N_____(frac) of N.
17) 2/5 of N_____% of N.
18) .06 of N_____% of N.
19) 4.5% of N_____(dec) of N.
20) 5/6 of N_____% of N.

Part II. Choosing Correct Solutions in Percentage.
Directions: Five ways are shown below for working each example. Only one of the methods shown is correct. Do not work the examples simply check (X) the correct solution.

1) Find &% of 368

368 x7 ____ 268)7.00 ____ .07)368 ____ 1/7 x 368 ____ 368 x.07 ____

2) 43 is what % of 179?

43/179 ____ or 179)43.00 ____ 179 x43 ____ .43)179.00 ____ 179 x.43 ____ 179-43 ____

3) If 64 is 8% of N, 100% of N equals what?

64 x.08 ____ 64)8.00 ____ .08)64.00 ____ .08)100.00 ____ 64 x 100 ____

4) What number equals N, if 6½% of N - 94?

94 x6½ ____ .65)94.00 ____ .94)65.00 ____ .065)94.00 ____ 94 x.065 ____

5) 756 is what per cent of 421?

756 x421 ____ 756/421 ____ or 421)756 ____ 756-421 ____ 421/756 ____ or 756)421 ____ 756 x421 ____

6) What is 112½% of 384?

1.125)384 ____ 11/8 x 384 ____ 384)1.125 ____ 384 ÷ 1 1/8 ____ Add: 384 112½ ____

Part III. Computation of Percentage.
Directions: Work the examples and problems below.

1) Find 5% of 976.
2) 140 is what per cent of 875?
3) What is N, if 83% of N - $143.08?
4) What is 100% of an amount if 140% of it - $467.50?

5) Find 7½% of 396.
6) 142 is what per cent of 497?
7) The 1st. year pupils in a certain school were asked this question: "Suppose you had one hour for review work on the arithmetic topic about which you feel most uncertain. On what topic would you vote to spend the hour of drill?"

The votes of the pupils are given below. Express the votes for each topic in per cents of the total vote (935) writing these per cents in a column. (Carry answers to 2 decimal places.)

Topic	Number Votes	Per Cent
Fractions	170	_____
Areas & Volumes	102	_____
Decimals	136	_____
Percentage	289	_____
Interest	238	_____
Total	935	

8) A first year class spends 1500 minutes a week in school. Below is shown how some of this time is spent. How many minutes are used each week for each subject shown?

Subject	Per Cent of Time Given to Subject	Number of Minutes Given to Subject
Science	8 1/3%	_____
Arithmetic	12%	_____
English	14%	_____
Agriculture	15%	_____

9) Of the pupils in a certain school 85%, or 529, reported that they had already started an account at some savings bank. How many pupils were in the school?

10) In another school 93 pupils reported that they did not visit a dentist at least once a year. These pupils were only 15% of the entire school. How many pupils were there in that school?

11) In a percentage test this example was given: 46⅔% of an amount of money = $301.32. What is the amount of money?

VI. Interest Diagnostic Test

(Time allowance 30 minutes)

Part I. Important facts about interest.
Directions: underline the one word or phrase which makes the true statement in each of the following:

1. Interest is usually reckoned by the: day; week; month; three; months; year.
2. Interest is: the amount borrowed; the amount paid back; the balance; money paid for use of money; profit.
3. In the formula $i = p\ r\ t$, i means: the interest in money; the interest in per cent; the total amount to pay; the amount loaned; the time.
4. In which one of the five problems below would you use the formula $r = \frac{i}{p}$ to find the answer?
   (a) Find the interest on $400 @ 8% to earn $64?
   (b) If $400 earns $24 interest a year, at what per cent is it invested?
   (c) How long will it take $400 @ 8% to earn $64?
   (d) $400 invested at 7% for 3 years will earn how much interest?
   (e) In one year how much more will $400 : 6% earn than $400 at 5%?
5. Many savings banks pay interest at the rate: 5%; 1½%; 3½%; 7%, 10%
6. An interest table is used to determine: the safety of an investment; the worth of the security; the rate per cent; the interest in money; the principal.
7. The largest rate of interest which you should expect on a "safe" investment is: 2%, 6%, 10%, 12½%, 16%.

In examples 8to 12, "prin." means principal.

8. 4% for 6 mo. equals: 2% of prin.; 4% of prin.; 10% of prin.; 24% of prin.; 4/6 or 2/3 of prin.;.
9. 6% for 9 mo. equals: 3% of prin.; 4½% of prin.; 10% of prin.; 15% of prin.; 54% of prin.
10. 5% for 1 yr. equals: 4% of prin.; 5% of prin.; 6% of prin.; 15% of prin.;51% of prin.
11. 3% of 2 yr. 4 mo. equals: 3% of prin.; 5% of prin.; 6% of prin.: 7% of prin.; 9% of prin.
12. 7% for 30 day. means: 210% of prin.; 37% of prin.; 23% of prin.; 7% of prin.; 7/12% of prin.

Part II. Choosing Correct Solutions.
Directions: do not work the examples below. As your answer, check the solution you would use.

1. Find the interest on $500 @ 6% for 1 yr.

$500 x.06 $500 .6 $500 x6 $500 x .06 x 12 .06)500

2. Find the interest on $800 : 5½% for 1 yr. 6 mo.

$800 .055 $800 x .055 x 1/2 $800 x 5½ x 3/2 $800 x .055 x 3/2

.055)800

3. At what rate is $900 investe if it earns $60 a year?

$900 60 $900 x.06 60/900 or 900)60.00 $900 x60 60)$900

4. \$800 earned \$70 in 2 years. Find average rate of interest.

800 x .7 x 2   70/800   or 800)7000   800 70 2 (add)   800 x.7   35/800 or 800)35

5. Find the interest on \$1500 @ 5¼% for 3 yr. 8 mo.

\$1500 x .0525 x 44   \$1500 x .0525 x 11/3   Add: 1500 5¼ 32/3

6. \$2500 earned \$900 interest in 5 years. What was the average rate of interest?

Add: 2500 900 5   \$2500 x 9 x 5   180/2500 or \$2500)180.00

900/2500 or 2500)900   Subtract: 2500 900

Part III, Computing Interest.

Directions: Work the examples below. Give your answers to the nearest cent or nearest tenth of one per cent.

1. Find the interest on \$750 @ 6% for 6 mo.
2. Find the rate per cent on an investment of \$2000 which earned \$60 in a year.
3. Find the interest on \$2400 @ ~~6%~~ 4 1/4% for 1 year 3 mo.
4. p = \$900 r = 7% t = 3 yr. Find i.
5. p = \$1500 i = \$ 127.50 per year. Find r.
6. Find the total amount to be paid on a loan of \$500 @ 7% for 30 da.
7. Which investment is earning the higher rate?
   - (a) \$700 earns \$42 yearly
   - (b) \$900 earns \$49.50 per annum.
8. Find the interest on \$6000 @ 3 1/4% for 90 Da.

VII. Mensuration Diagnostic Test
Time Allowance - 30 min.

Part I. Vocabulary of Mensuration
Directions: Write on your papers only the facts which should be on the blanks.

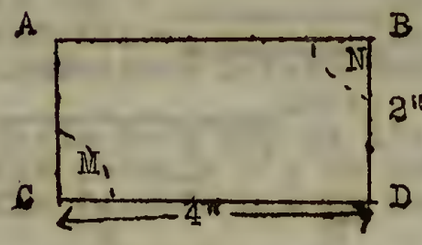


Fig. 1

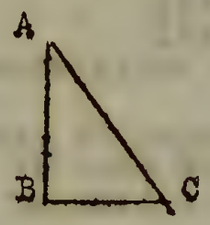


Fig. 2

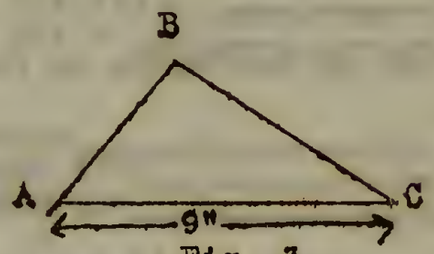


Fig. 3

1. In Fig. 1 angles M and N are _____ angles.
2. Fig. 1 is called a _____.
3. 4" and 2" are the _____ of Fig. 1.
4. The surface covered by Fig. 1 is called its _____.
5. In Fig. 1, lines A B and C D are not only straight lines; they are also lines _____ to each other.
6. Area of Fig. 1 would be expressed in _____ units.
7. Fig. 2 is a _____ triangle.
8. Area of Fig. 2 is found by taking 1/2 of _____ X _____
9. To find the area of Fig. 3 we must know the length of its _____
10. Angle B A C in Fig. 3 is called a (N) _____ angle.
11. Angle A B C in Fig. 3 is called a (N) _____ angle.

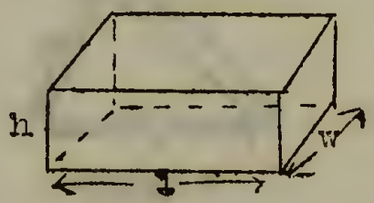
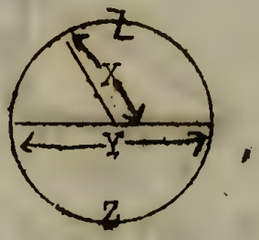


Fig. 4



12. The volume of Fig. 4 would be expressed in _____ units.
13. Fig. 4 is called a _____ solid.
14. Formula for finding the volume of Fig. 4 is V = _____
15. Line X in Fig. 5 is called a (n) _____
16. Line Y in Fig. 5 is called a (n) _____
17. Line Z in Fig. 5 is called the _____

Part II. Mensuration Facts.

Directions: Write as your answers the numbers or words that should be on the blanks.

1. 4 in. = _____ ft.
2. 1 sq. ft. = _____ sq. in.
3. 9 yd. = _____ ft.
4. 1 cu. yd. = _____ cu. ft.
5. 17 in. = _____ ft.
6. 4.5 ft. = _____ in.
7. 288 sq. in. = _____ sq. ft.
8. 1 cu. ft. = _____ cu. in.
9. $3\frac{1}{2}$ ft. = _____ in.
10. 4 2/3 yd. = _____ ft.
11. 2 3/4 ft. = _____ in.
12. 1 mi. = _____ ft.
13. Dimensions before being multiplied must be expressed in the _____ unit.
14. Scale on a map is 1"; 5 mi; 6" represents _____.
15. The formula A = ab would be used to find the _____.
16. The formula $A = \frac{ab}{2}$ would be used to find the _____.
17. The formula V = l w h would be used to find the _____.

Part III. Mensuration Problems.

Directions: Solve the following seven problems:

1. Area of Fig. 1 = ?

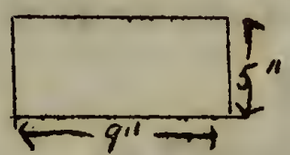


Fig. 1

2. Find area of Fig. 2

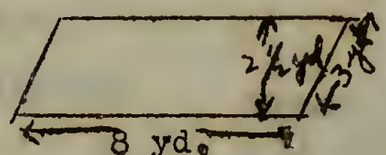


Fig. 2

3. Perimeter of Fig. 3 = ?

Fig. 3

4. Area of Fig. 4 = ?

Fig. 4

5. In Fig. 5: base = 1 sq. in. h = 6 in. V = ?

6. Find the volume of Fig. 6

7. In Fig. 7: A of base = 14 sq. yd. h = 15 ft. V = ?

Fig. 5

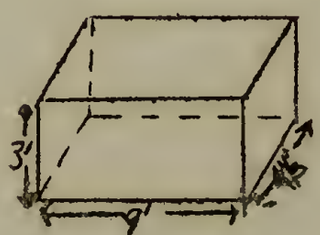


Fig. 6

Fig. 7

Diagnostic Test

Directions: Copy only when necessary, answers must be reduced when possible.

Part I Addition

Time 9 Min.

1. 263
367
548
192

2. 23 5/8
19 1/3
62 1/5
87 1/2

3. 6 7/12 + 3 1/6 + 8 5/8 + 2 2/3 =

4. 29.65 + .02 + .065 + 4 + .5 =

5. 6 7/12ft. + 5ft5in. + 1yd.10in. =

6. $5\frac{1}{2}$ gal. + 1 gal. 3 qts. + 3 qts 1 pint + $3\frac{3}{4}$ qts. =

7. $2\frac{1}{2}$ hrs. + 35min + 1 hr;20min. + 55 seconds

8. 2 acres + 240 sq. rds. + $\frac{3}{4}$ acre + 40 sq. rds. =

9. $2\frac{1}{2}$ bu. + 3 pks. + 3 qts. + $2\frac{1}{2}$ pks. =

10. 4.5 rd. + 5 yd + 3 rd. 2 ft. + 5.25rd. =

Part II Subtraction

Time-6 Min

1. 21,000
-18,729

2. $138.42
- 11.79

3. 20 3/5 - 14 2/3 =

4. $12\frac{1}{2} - 8\frac{3}{4}$ =

5. 24.005 - 11.146 =

6. $6\frac{1}{2}$ gal. - 1 gal 3 qts. =

7. $4\frac{3}{4}$ hrs. - 1 hr. 20 min. =

8. 2 acres 40 sq. rds - 120 sq. rds. =

9. 3.5 bu. - 3 pks. 5 qts. =

10. 3.75 rd. 3 yd. - 2 rds. 6 ft. =

Diagnostic Test

Directions: Copy only when necessary. Answers must be reduced when possible.

Part III Multiplication Time-10Min

1. $\begin{array}{r} 996 \\ \underline{625} \end{array}$ 2. $\begin{array}{r} 37.06 \\ \underline{36.2} \end{array}$ 3. $\begin{array}{r} 1.05 \\ \underline{.005} \end{array}$ 4. $5\ 5/8 \times 1/3 =$

5. $2/3$ of $4\frac{1}{2} =$

6. $\dfrac{2 \text{ gal. } 1 \text{ qt.}}{4}$ 7. $\dfrac{5 \text{ ft. } 9 \text{ in.}}{3}$ 8. $\dfrac{\$396.00}{7\frac{1}{2}\%}$

9. $40 \text{ rds.} \times 16\frac{1}{2} \text{ yds.} =$

10. $20 \text{ ft.} \times 16 \text{ ft.} \times 8 \text{ ft.} =$

Time 8 Min. Part IV Division Label ans. correctly

1. $56\overline{)\ 183,172}$ 2. $450\overline{).1080}$ 3. $.075\overline{)\ 2.25}$

4. $7\ 2/3 \div 9 =$ 5. $15\frac{1}{2} \div 3\ 2/3 =$ 6. $3\overline{)\ 9 \text{ hrs. } 15 \text{ min.}}$

7. $4 \text{ lbs. } 6 \text{ oz} \div 7 =$ 8. $\dfrac{5 \text{ rd. } 4 \text{ yd. } 6 \text{ ft.}}{3} =$

9. $8 \text{ ft.}\overline{)\ 96 \text{ sq. ft.}}$ 10. $25 \text{ sq. yd.}\overline{)\ 125 \text{ sq. yd.}}$

Diagnostic Test

Directions: Write on your paper only what should be on the blanks.

Part V Denominate Numbers

Time-5 Min.

1. 35 in = ft. in.
2. 11 qt. = gal. qt.
3. 141 min. = hr. min.
4. 9 pt. = qt. pt.
5. 17 ft. = yd. ft.
6. 1 cu.yd. = cu.ft.
7. 9 pk. = bu. pk.
8. 53 in = yd. in.
9. 3750lbs. = T. lb.
10. 1 cu.ft. = cu.in
11. 167 sq.in. = sq.ft. sq.in.
12. 320 sq.rd. = Acre
13. 640 acres = Sq. Mi.
14. 6000 ft. = mi. ft.

15. 36 oz. = lb. oz.

Part VI Fractional-Decimal Percent Equivalents

Time-5 Min.

1. $\frac{3}{4}$ of N = % of N.
2. $6\frac{1}{2}$ % of N = (dec.) of N.
3. 25% of N = (frac.) of N.
4. 130 % of N = (dec.) of N.
5. 2/3 of N = (%) of N.
6. 4.5% of N = (dec.) of N.
7. 3% of N = (frac.) of N.
8. $\frac{30}{40}$ of N = (%) of N.
9. .06 of N = % of N
10. $1\frac{1}{2}$ of N = % of N

Diagnostic Test

Part VII Interest Time 10 Min

Directions: Compute the following problems.

1. Find the interest on $750 @ 6% for 6 months.
2. Find the average rate per cent on an investment of $2000 which earned $180 in 3 years.
3. P $900 r 7% t 3 yr. Find i
4. P $1500 i $127.50 per yr. Find r.
5. I $175per year r 3½%. Find P

Part VIII Time 5 Min

Mensuration Facts and Formulas

1. The area of a plane surface is expressed in _____ units.
2. The volume of a solid is expressed in _____units.
3. Dimensions before being multiplied must be expressed in the _____units.
4. The formula V.= l w h is used to find the _____.
5. The formula for finding the area of a right triangle is_____.
6. The formula for finding the area of a trapezoid is _____.
7. $V = e^3$ is the formula for finding the _____.
8. The formula for finding the area of a circle is _____ .
9. $V = 4/3\pi R^3$ is the formula for finding the _____.
10. The formula for finding the area of a ring is _____.

TABLE NO. I

SUMMARY OF DIAGNOSTIC TESTS FOR TEACHING USE

		Addition	Subtraction	Multiplication	Division	Denom. Numbers	Fra. Dec. & Equiv.	Choosing Solutions	Computing Percent	Interest Facts	Similar Int. Rates	Choosing Int. Solu.	Computing Interests	Enumeration Vocabulary	Enumeration Memorization Facts & Form.	Computing Memorization	Total Score	Number Attempted	Rank in Section	Rank in Class
Total Possible Score		21	30	22	20	18	20	6	11	7	5	6	8	17	17	7	215			
Bachelder	+	13	20	16	12	10	7	2	0	4	5	3	2	12	12	3				
	−	5	9	4	6	5	4	4	1	3	0	3	0	1	2	1	121	171	4	4
Bellwood		4	11	10	2	1	2	1	2	2	0	1	0	5	4	1				
		11	11	6	12	4	4	2	1	1	4	5	3	8	6	2	46	129	16	47
Bengham		9	17	13	8	6	11	4	5	4	3	1	4	10	8	2				
		7	7	6	8	10	5	2	0	2	2	3	3	5	3	5	99	174	12	17
Cameron		13	19	14	13	10	12	5	1	3	0	3	0	9	4	0				
		8	7	6	8	1	3	1	4	3	0	1	3	3	7	3	104	160	10	14
Chambers C.		13	13	10	12	10	9	3	5	4	0	1	5	13	12	3				
		7	10	6	6	5	4	0	1	4	0	4	3	4	5	3	115	177	6	7
Chambers E.		12	19	13	14	9	14	5	5	5	0	2	4	6	11	2				
		8	10	3	6	6	6	3	0	2	0	4	2	7	5	2	123	189	3	3
Eastwood		9	16	14	7	11	9	5	1	6	1	3	2	13	12	3				
		2	1	1	7	3	9	1	0	1	4	3	0	4	4	2	112	153	7	8
Ford		6	14	10	6	7	3	1	1	0	0	1	4	9	6	2				
		1	10	9	9	9	10	5	6	1	5	5	4	7	9	2	78	180	14	26
Hurd		15	20	12	9	8	6	2	0	5	1	1	5	7	7	2				
		3	4	7	10	7	12	4	7	2	4	5	3	9	10	4	100	196	11	16
Jones		7	12	12	9	4	5	1	2	4	0	3	3	10	9	1				
		10	16	8	10	4	4	4	3	3	0	4	3	2	6	5	87	169	13	20
Marshall		11	20	8	9	10	8	3	6	3	0	3	4	12	13	4				
		5	5	10	12	3	0	0	1	1	2	3	3	3	8	2	109	159	8	10
Quinn		5	4	15	5	7	5	2	0	1	0	1	1	10	6	0				
		10	14	5	2	7	7	3	1	1	0	2	1	4	10	0	55	123	15	44
Robinson		19	29	16	17	10	7	2	4	3	1	3	2	9	12	4				
		2	1	4	1	3	7	3	2	4	4	2	6	4	1	1	135	184	2	2
Scribner		11	15	13	9	9	10	3	0	4	3	3	5	11	10	1				
		5	9	5	7	4	5	0	7	3	2	4	3	6	7	5	106	181	9	12
Tetaronis		18	18	12	14	11	8	3	5	2	1	2	2	13	11	3				
		0	7	7	3	7	12	3	3	4	4	4	3	7	5	1	120	190	5	5
Whitaker		13	20	11	12	14	16	4	5	7	1	3	6	11	13	6				
		3	5	10	7	4	4	2	3	0	4	3	2	6	4	1	142	202	1	1
Average		11.1	17	12.4	10.1	8.9	8	2.7	2.3	4.1	1.2	2	3.1	9.7	9.2	2.4	170.4			
		6.2	7.9	6.1	6.7	5.1	6	2.4	2.6	2.2	1.1	3.6	3	4.9	5.6	2.5	113.4		37 % Errors	

TABLE NO. II

COMMENTS ON ERRORS OF DIAGNOSTIC TESTS (see next page for key)

Bachelder	Weak on IIc,d; IIIa,b,c; IVb,c; V; VIa,b,c,d; VIIa,d,e; VIIIb,c; IXb,c; X and XI
Bellwood	Weak on Ia,d; IIa,b,c,d; IIIb,d; IVa,b,c,d; V, VIa,b,c,d; VIIa,b,c,d,e; VIIIa,b,c,d,e; IXa,b,c; X and XI
Bingham	Weak on IIa,d; IIId; IVa,b,c; VIb,c,d; VIIc,d; VIIIa,b,c,f; IXa,b,c; X and XI
Cameron	Careless on II; IIIand IVa,b,c,d; Weak on VIIIa,b,c,f; V, VIa,b,c,d; IXa,b,c; X and XI
Chambers C.	Slow on IIc; weak on IIIa,b; IVb,d; V, VIa,b,c,d; VIIa,b,c,e; VIIIb,c,e; IXb,c; X and XI
Chambers N.	Weak on IVa,b; VIa; VIIb,c,d,e,f; VIIIa,b,c,e; IXa,b,c; X and XI
Eastwood	Weak on IIa,d; IIIa,d; Careless IVd; V, VIa,b,c,d; VIIb,c,d,e,f; VIIIb,c; IXa,b,c; X and XI
Ford	Weak on Ia,c,d; IIb,d; IIIa,c,d; IVb,d; V, VIa,b,c,d; VIIb,c,d,e,f; VIIIa,b,c,e; IXa,b,c; X and XI
Hurd	Weak on Id; IIc,d; IIId,e; IVb,c; V, VIa,b,c,d; VIIb,c,d,e,f; VIIIb,c,f; IXa,b,c; X and XI
Jones	Weak on Ia; IIa,b; IIIa,b,c,d; IVb,c,d; V, VIa,b,c,d; VIIa,b,c,d,e,f; VIIIb,c,d,e; IXa,b,c; X and XI
Marshall	Weak on IIa,c,d; IIIa,d; IVb,c,d; V, VIa,b,c,d; VIIa,b,c,d,e,f; VIIIb,c,e,f; IXb,c; Xand XI
Quinn	Very weak on I, II, III, and IVa,b,c,d; V, VIa,b,c,d; VIIa,b,c,d,e,f; VIIIb,c,d,f; IXa,b,c; X and XI
Robinson	Slow IIIc,d; Weak on IVc; V, VI a,b,c,d; VIIb,c,d,e,f; VIIIb,c; IXa,b,c; X and XI
Scribner	Slow in Ia,b,d; Weak on IId; IIId; IVc; V, VIa,b,c,d; VIIa,b,c; VIIIb,c,e; IXa,b,c; X and XI
Tataronis	Careless on Ib; Weak on IIc; IVb,d; V, VIa,b,c,d; VIIa,b,c,d,e,f; VIIIb,c,e; IXa,b,c; X and XI
Whitaker	Careless on Ib,c; Weak on IIc; IVb,d; V, VI a,b,c,d; VIIa,b,c,d,e,f; VIIIb,c; IXa,b,c; X and XI

TABLE NO. III

Key to Errors of Diagnostic Tests

I...ADDITION
- A--Whole Numbers
- B--Fractions
- C--Decimals
- D--Denominate Numbers

II..SUBTRACTION
- A,B,C,D (same as I)

III.MULTIPLICATION
- A,B,C,D (same as I)

IV..DIVISION
- A,B,C,D (same as I)

V...FRACTION DECIMAL % EQUIVALENTS

VI..PERCENT
- A--Recognizing Solutions
- B--Finding % of a Given Number
- C--Finding % one Number is of Another
- D--Finding a Number When a Certain % is Given

VII.INTEREST
- A--Facts
- B--Recognizing Rates 5% for 2 yrs.-6% for 1 yr. etc.
- C--Finding Interest
- D--Recognizing Solutions
- E--Finding Rates
- F--Finding Principle

VIII.TABLES MEASURE, ETC.
- A--Linear Measure
- B--Square "
- C--Cubic "
- D--Liquid "
- E--Dry "
- F--Weights "
- G--Time "

IX..MENSURATION
- A--Facts
- B--Formulas
- C--Finding Area and Volumes

X...Reducing Answers

XI..LABELING ANSWERS

SUMMARY OF REVISED DIAGNOSTIC TESTS FOR TEACHING USE

TABLE NO. IV
IIA
1934-35

		Addition	Subtraction	Multiplication	Division	Denom. Numbers	Frac. Dec. & Equiv.	Interest	Mensuration	Total Score	Number Attended	Ranking Section	Rank in Class
Total Possible Score		10	10	10	10	15	10	5	10	80			
Bowley	+	3	1	3	0	9	2	0	2	20	47	19	34
	−	5	5	5	3	4	2	3	2				
Christensen	+	5	5	7	5	8	3	2	0	35	47	14	17
	−	1	2	3	2	0	0	1	2				
Conti	+	5	6	7	3	6	3	0	0	30	40	16	21
	−	1	1	1	1	0	2	2	0				
Foster	+	5	8	7	3	12	10	4	1	48	65	2	7
	−	4	3	2	6	1	0	1	0				
Freeman	+	6	7	9	6	13	8	5	5	59	74	4	4
	−	3	2	2	3	2	2	0	5				
Fullington	+	4	7	10	7	14	10	4	4	60	74	2	3
	−	5	3	0	3	1	0	1	1				
Grafham	+	7	6	8	3	11	6	2	2	45	65	11	11
	−	2	2	2	3	3	3	3	1				
Hayes	+	2	2	5	1	10	2	5	1	29	46	17	25
	−	2	2	4	2	5	1	0	1				
Lydon	+	4	6	7	0	7	4	3	1	31	54	15	13
	−	5	4	3	2	7	0	2	1				
Nicoll	+	5	6	6	7	10	6	4	5	47	65	3	3
	−	2	3	4	1	2	2	1	3				
Nimms	+	7	6	8	7	11	10	5	5	59	77	3	3
	−	3	3	3	1	4	0	0	5				
Rennie	+	3	6	7	3	10	3	3	3	38	64	13	16
	−	4	1	3	5	2	4	2	5				
Santin	+	5	6	8	5	12	10	0	4	48	69	6	6
	−	4	4	4	3	3	0	6	3				
Sheehy	+	6	8	8	5	10	4	3	3	40	73	12	15
	−	2	3	3	5	4	6	3	5				
Smith E.	+	4	7	7	4	12	10	1	2	47	64	8	8
	−	6	5	5	4	1	0	0	1				
Smolak	+	7	7	8	7	14	9	5	5	60	77	1	1
	−	3	3	4	1	1	1	0	4				
Thompson	+	3	7	9	4	12	7	4	3	46	72	10	13
	−	5	2	1	7	2	3	1	5				

[illegible] IV
1[illegible]4-35

		Addition	Subtraction	Multiplication	Division	Denominate Numbers Frac. Dec.	% Equiv	Interest	Mensuration	Total Score	Number Attempted	Rank in Sections	Rank in Class
Total Possible Score		10	10	10	10	15	10	5	10	80			
	+	3	2	4	0	10	2	0	1				
White	−	5	4	5	2	3	1	5	1	22	45	18	52
		6	7	5	8	14	2	2	5				
Wolfsen		4	5	3	1	2	1	1	3	51	67	5	5
		4.7	5.5	6.5	3.3	10.3	3.3	2.7	2.6				
Average		3.4	2.3	3	2	2.3	1.5	1.4	2.5	42.4	62.2	24	.75 Errors

TABLE NO. V

COMMENTS ON ERRORS OF REVISED DIAGNOSTIC TESTS (see next page for key)

Bowley	Weak on I, II, III and IVb,c,d; Vb,c; VI, VIIa,b,c; VIIIa,b; IX and X
Christenson	Very weak on I, II and IIIc,d; IVb,c,d; Vb,c; VI, VIIb,c; VIIIa,b; IX and X
Conti	Very weak on I, II, III and IVb,c,d; Vb,c; VI, VIIa,b, c; VIIIa,b; IX and X
Foster	Weak on I, II, III and IVc,d; Vb,c,e; VIIb; VIIIa,b; IX and X
Freeman	Weak on I, II, III and IVb; VIIIb; also IX and X
Fullington	Weak on Ib; V, Land Measure VIIIb; IX and X
Graffam	Weak on I, II, III and IVc,d; Vb,c,d; VI, VIIb,c; VIIIa,b; IX and X
Hayes	Slow and Very weak on I, II, III and IVc,d; Va,b,c; VI, VIIa,b,c; VIIIa,b; IX and X
Lydon	Careless and weak on I, II, III,c,d; IVa,b,c,f; VIc; VIIb,c; VIIIa,b; IX and X
Nicoll	Weak on I, II, IIIc,d; IVb,c,d; Vb,c; VI, VIIb,c; VIIIb; IX and X
Nimmo	Careless of work on I and IId; III and IVb,d; Vc; VI, VIIIb; IX and X
Rennie	Weak on I, II, III and IVb,c,d; Vb,c,e; VI, VIIb,c; VIIIb; IX and X
Santin	Weak on Ic; IId; IIId; IVc,d; Vb,c; VIIa,b,c; VIIIb; IX and X
Sheely	Weak on I and IIb,d; III and IVb,d; Vb,c,d; VI, VIIb,c; VIIIb; IX and X
Smith E.	Careless or weak on Ic,d; IId; III and IVd; VIIa,b,c; VIIIb; IX and X
Smolak	Careless on I, II, III and IVd; VIIIb; IX
Thompson	Weak on II, III and IVb,c,d; Va,c; VI; Careless VIIc; VIIIb; IX and X
White	Very weak on I, II, III and IVc,d; Va,b,c; VI, VIIa,b, c; VIIIa,b; IX and X
Wolfsen	Weak on I, II, III and IVd; Sq.Miles VI, VIIc; VIIIb; IX and X

TABLE NO. VI

Key to Errors of Revised Diagnostic Tests

I.....ADDITION
A--Whole Numbers
B--Fractions
C--Decimals
D--Denominate Numbers

II....SUBTRACTION
A,B,C,D (same as I)

III...MULTIPLICATION
A,B,C,D (same as I)

IV....DIVISION
A,B,C,D (same As I)

V.....TABLES MEASURES ETC.
A--Linear Measur
B--Square "
C--Cubic "
D--Liquid "
E--Dry "
F--Weights "
G--Time "

VI....FRACTION DECIMAL PERCENT EQUIVALENTS

VII...COMPUTING INTEREST
A--Finding Interest
B-- " Rate
C-- " Principal

VIII..MENSURATION
A--Facts
B--Formulas

IX....LABELING ANSWERS

X.....REDUCING ANSWERS TO LOWEST TERMS

CHAPTER IV

PRESENTATION OF DATA OBTAINED

The following table shows the number of pupils tested each year during the course of this study.

TABLE NO. VII

	1933	1934	1935	1936	Totals
Arithmetic IA	---	16	---	---	16
Arithmetic IB	---	17	---	---	17
Arithmetic IC	---	17	---	---	17
Arithmetic IIA	14	19	15	16	64
Arithmetic IIB	14	19	15	13	61
	28	88	30	29	175

Diagnostic tests were not given to the freshman classes in 1933, 1935, and 1936 because the author did not teach freshman arithmetic classes during these years.

From this point on, data will be presented first for work done in the year 1933-'34, second for the year 1934-'35, third for the year 1935-'36, and finally for the year 1936-'37.

Tables VIII, IX, X and XI show all the data obtained during the first year's testing program, together with the quarter marks of the students.

It should be remembered in endeavoring to interpret the quarter marks, that the diagnostic test scores were excluded from all marks. Furthermore, drill on the fundamental processes was not given to the freshmen except in the year 1934-'35.

TABLE NO. VIII SUMMARY OF INTELLIGENCE AND BEGINNING DIAGNOSTIC TESTS 1933-34

IIB
Drill Section

	Total Possible Score	Score Math Test 215	Relative Rank	Army Alpha 212	Relative Rank	Math 20 (Alpha)	Relative Rank	Kent Test 262	Relative Rank	(Mathe) Kent 40	Relative Rank	Age Norm Kent Mathe
Aldrich		69	19	84	11	8	12	195	18	22	22	13
Amidon		111	8	93	7	9	10	208	14	27	14	14
Camarra		151	2	58	23	9	10	159	22	26	16	14
Damm		83	17	80	12	7	16	186	19	29	11	14
Field		95	11	106	5	6	21	227	4	30	9	14
Fiore		84	16	62	20	5	26	179	21	24	20	13
Gilman		40	25	60	22	4	27	196	17	13	25	11
Morrison		97	10	91	10	10	6	224	6	26	16	14
Norman		87	14	92	8	7	16	236	1	36	2	14+
Ovens		147	3	78	14	10	6	215	11	40	1	14+
Penttila		92	12	99	6	10	6	213	13	34	6	14+
Sears		33	28	49	26	6	21	103	26	5	27	10
Weeks		92	12	79	13	11	4	225	5	36	2	14+
Wheaton		128	6	140	2	14	1	220	9	27	14	14
Totals		1309		1171		116		2786		375		
Ave. Score		93.5		83.6		8.3		199		26.8		
Ave. % Score		43.5		39.5		41.4		76		67		
Median Score		92		82		8.5		210.5		27		
Median %Score		42.8		34		42.5		80.3		67.5		

TABLE NO. IX

IIA

SUMMARY OF INTELLIGENCE AND BEGINNING DIAGNOSTIC TESTS 1933-1934

Check Section	Score Mathe Test 215	Relative Rank	Army Alpha 212	Relative Rank	Mathe 20 (Alpha)	Relative Rank	Kent Test 260	Relative Rank	Mathe 40 (Kent) Weighted	Relative Rank	Age Norm Kent Mathe
Total Possible Score											
Auger	50	23	54	25	8	12	214	12	26	16	14
Buczek	143	5	78	14	12	2	224	6	33	7	14
Clark	65	21	65	19	7	16	185	20	29	11	14
Colby	34	27	46	27	4	27	83	27	1	28	9
Farmer	36	26	58	23	6	21	78	28	8	26	10
Hall	71	18	74	18	10	6	207	15	32	8	14
Hills	122	7	114	3	8	12	224	6	30	9	14
McGlew	87	14	92	8	8	12	230	3	28	13	14
Parker	50	23	76	16	7	16	117	24	14	23	11
Perkins	160	1	108	4	12	2	207	15	36	2	14+
Pohju	67	20	62	20	6	21	158	23	23	21	13
Spencer	144	4	153	1	11	4	231	2	36	2	14+
Tarbox	106	9	76	16	6	21	219	10	26	16	14
Trask	57	22	41	28	7	16	106	25	14	23	11
Totals	1192		1097		112		2483		336		
Ave. Score	85.14		78.4		8		177.4		24		
Ave. %Score	39.6		37		40		67.7		60		
Median Score	69		75		7.5		207		27		
Median %Score	32.1		35.4		37.5		79		67.5		

TABLE NO X

SUMMARY OF DIAGNOSTIC TESTS AND ARITHMETIC MARKS 1933-1934

Drilled Section

A-Beginning
B- Ending test
Total Possible Score

		Addition A 21	Addition B 21	Subtraction A 30	Subtraction B 30	Multiplication A 22	Multiplication B 22	Division A 20	Division B 20	Totals A 93	Totals B 93	Relative Rank A	Relative Rank B	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter
Aldrich	+	9	12	22	17	11	19	9	11	41	59								
	-	8	7	9	7	8	3	9	6	34	32	14	12	70	75	75	55	80	85
Amidon	+	7	14	19	23	16	18	8	12	50	67								
	-	10	3	2	0	3	2	6	6	23	11	9	7	60	85	80	45	50	80
Camarra	+	14	18	27	28	15	18	13	15	69	79								
	-	3	1	1	2	6	3	4	3	14	9	3	3	80	80	80	70	75	80
Damm	+	11	15	17	20	10	15	10	14	48	64								
	-	3	1	3	2	5	4	2	3	13	10	10	8	80	75	75	60	65	70
Field	+	9	12	16	20	11	16	9	11	45	59								
	-	2	1	3	2	4	3	4	4	13	10	12	12	60	67	85	60	75	75
Fiore	+	9	11	18	26	13	16	8	10	48	65								
	-	5	6	3	2	3	3	8	7	19	18	10	9	75	80	80	50	80	85
Gilman	+	2	4	6	9	4	6	5	7	17	26								
	-	10	9	9	5	5	4	5	4	30	23	26	26	70	70	65	35	40	60
Morrison	+	11	12	13	19	11	14	10	11	45	56								
	-	3	6	5	7	9	7	5	4	22	24	13	14	84	81	81	70	75	80
Norman	+	12	14	17	18	8	12	4	9	41	53								
	-	5	7	3	5	6	9	9	5	23	26	14	15	66	71	83	75	75	80
Ovens	+	12	15	19	24	16	19	15	17	62	75								
	-	5	4	5	3	3	2	2	0	15	9	5	4	85	90	90	80	85	80
Penttila	+	10	18	15	24	6	8	10	11	41	61								
	-	7	3	8	5	10	7	5	4	29	20	14	11	75	85	75	80	80	80
Sears	+	5	7	3	5	4	6	3	4	15	22								
	-	9	10	4	2	9	7	4	6	26	25	28	28	75	70	70	45	40	30
Weeks	+	8	10	10	12	12	17	7	11	39	50								
	-	8	8	5	3	3	2	4	3	20	16	18	17	78	83	81	35	65	60
Wheaton	+	14	17	21	27	10	13	8	12	53	69								
	-	7	4	7	3	11	8	10	8	35	23	7	5	65	71	80	70	75	80
Average Score		9.5	12.8	15.2	19.4	10.5	14.4	8.5	11.1	43.7	57.4			73.1	77.4	78.9	59.3	68.6	73.2
Average Errors		6.1	5	4.8	3.4	6.1	4.6	5.6	4.5	22.6	18.2								
Ave. Increase Score			3.3		4.2		3.9		2.6		13.7								
Decrease Errors			1.1		1.4		1.5		1.1		3.6								

TABLE NO. X (Con't) SUMMARY OF DIAGNOSTIC TESTS AND ARITHMETIC MARKS 1933-1934

	Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Totals A	Totals B	Relative Rank A	Relative Rank B	Freshman Marks 1st Quarter	Freshman Marks 2nd Quarter	Freshman Marks 3rd Quarter	Sophomore Marks 1st Quarter	Sophomore Marks 2nd Quarter	Sophomore Marks 3rd Quarter	Ave. 4 tests
Median Score	9.5	13	16.5	20	11	15.5	8.5	11	44	60			75	77.5	80	60	75	80	
Median Errors	6	5	4.5	3	6	3.5	5	4	22.5	19									
Median Score Inc.		35		3.5		4.5		2.5		16									4
Median Error-Decrease		1		1.5		2.5		1		3.5									.9
Mean Deviation																12.2	11.3	10.4	
Median Deviation																13.9	10.	8.2	

TABLE NO. XI

IIA Check Section

SUMMARY OF DIAGNOSTIC TESTS AND ARITHMETIC MARKS 1933-1934

A-Beginning Test
B-Ending Test

		Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Total A	Total B	Relative Rank A	Relative Rank B	Freshman Marks 1st Quarter	Freshman Marks 2nd Quarter	Freshman Marks 3rd Quarter	Sophomore Marks 1st Quarter	Sophomore Marks 2nd Quarter	Sophomore Marks 3rd Quarter
Total Possible		21	21	30	30	22	22	20	20	93	93								
Auger	+	5	7	8	8	7	12	3	5	23	32								
	−	12	6	8	1	5	4	4	5	29	16	24	24	70	75	75	70	70	75
Buczek	+	15	16	20	19	15	18	9	16	59	69								
	−	6	5	10	10	5	2	6	4	27	21	6	5	85	90	90	90	90	90
Clark	+	6	9	11	13	9	14	6	7	32	43								
	−	11	11	13	12	10	5	8	8	42	36	22	21	70	70	75	60	60	60
Colby	+	3	4	7	9	9	11	2	4	21	28								
	−	10	5	10	6	4	2	4	8	26	21	25	25	70	70	65	40	60	70
Farmer	+	7	7	5	8	4	8	2	2	18	25								
	−	9	12	10	10	15	3	6	7	40	32	27	27	70	70	70	50	65	70
Hall	+	15	19	9	18	11	10	2	5	37	42								
	−	0	1	12	9	4	5	5	3	21	18	20	22	60	80	86	70	80	80
Hills	+	15	10	18	19	11	12	8	12	52	53								
	−	3	3	4	3	2	6	4	1	13	13	8	15	51	73	65	25	40	30
McGlew	+	14	12	15	16	6	11	5	7	40	44								
	−	3	5	2	5	6	4	2	1	13	15	17	19	35	40	50	40	30	30
Parker	+	9	9	9	11	5	12	5	6	28	38								
	−	7	9	11	8	4	4	3	4	25	25	23	23	40	70	70	65	60	65
Perkins	+	16	18	27	26	17	20	12	16	72	80								
	−	3	3	1	2	3	1	6	4	13	10	2	2	89	73	89	45	85	85
Pohju	+	12	13	11	13	11	12	4	6	38	44								
	−	5	5	12	11	7	6	6	4	30	30	19	19	70	75	75	55	60	70
Spencer	+	20	20	29	28	16	21	17	18	82	87								
	−	1	2	1	2	3	0	2	2	7	6	1	1	95	91	89	90	95	95
Tarbox	+	15	11	22	24	16	16	11	12	64	63								
	−	5	7	6	5	4	5	6	6	21	23	4	9	70	70	75	75	80	85
Trask	+	8	14	10	11	12	13	6	8	36	46								
	−	5	2	9	7	6	8	9	9	29	26	21	18	50	60	65	50	60	60
Correct Ave. Score		11.4	12.1	14.4	15.9	10.6	13.6	6.6	8.9	43	49.6			66.1	71.9	74.2	58.9	66.8	68.9
Ave. Errors		5.7	5.4	7.8	6.5	5.6	3.9	5.1	4.7	24.1	20.9								
Ave. Score Increase			.7		1.5		3		2.3		6.6								
Ave. Decrease Errors			.3		1.3		1.7		.4		3.2								

TABLE NO. XI

SUMMARY OF DIAGNOSTIC TESTS AND ARITHMETIC MARKS 1933-1934

	Addition A	Addition B	Subtraction A	Subtrac-tion B	Multipli-cation A	Multipli-cation B	Division A	Division B	Totals A	Totals B	Relative Rank A	Relative Rank B	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter	Ave. of 4 tests
Median Score	13	12.5	11	14.5	10	12	5.5	7	37.5	44			70	71.5	75	57.5	62.5	70	
Median Errors	5	5	9.5	6.5	4.5	4	5.5	4	26	21									
Median % Score									40.3	47.3									
Median Score Inc.		.5		3.5		2		1.5		6.5									1.6
Median Error Decrease		0		3		.5		1.5		5									1.2
Mean Deviation																15.4	14.2	14.2	
Median Deviation																15.4	14.	14.	

Tables XII, XIII, XIV and XV on the pages immediately following show the comparisons worked out for the two arithmetic groups between--

1. the scores of intelligence tests;
2. the average and median score increase of the diagnostic tests;
3. the average and median error decrease of the diagnostic tests; and
4. the quarter marks.

Table No XII

Comparison Of Average and Median Percent Scores In Five Tests 1933-'34

Page 64

▯ = Median Scores
□ = Check Section
□ = Drilled Section
A = Diagnostic
B = Army Alpha
C = Army Alpha Mathe
D = Kent-Shakow
E = Kent-Shakow Mathe

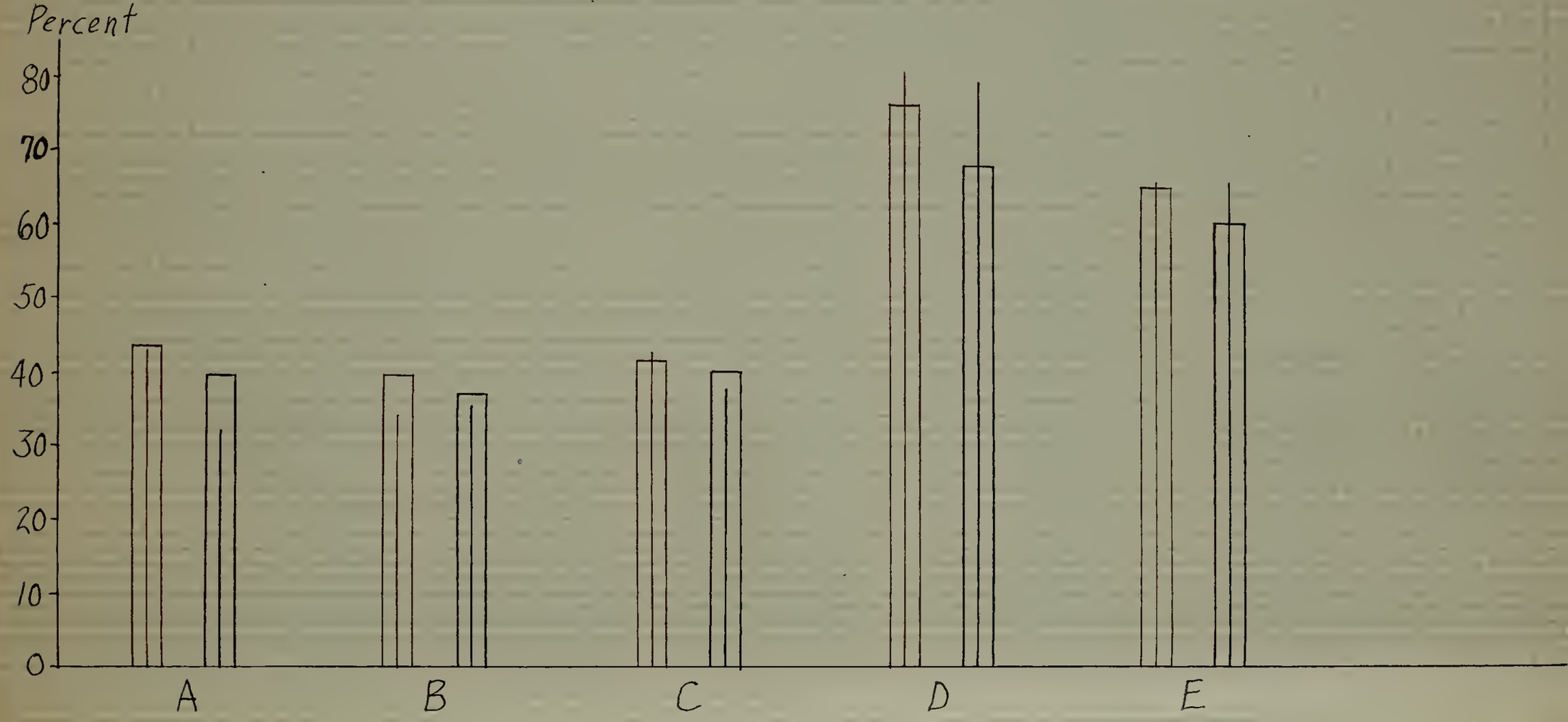


Table No XIII Comparison Of

Average and Median Score Increase

In Four Tests 1933-'34

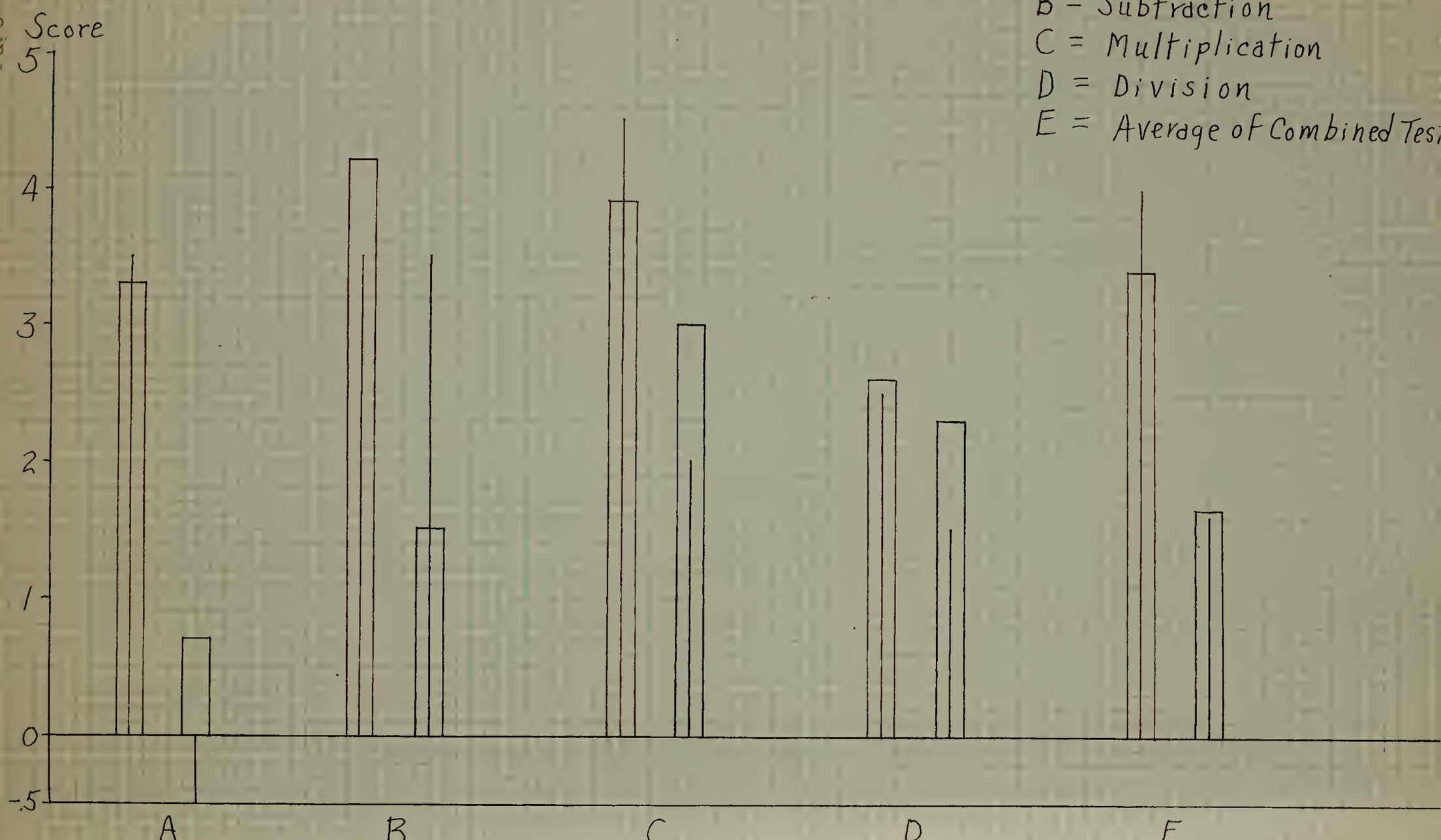


Table No XIV Comparison Of

Average and Median Error Decrease

In Four Tests 1933-'34

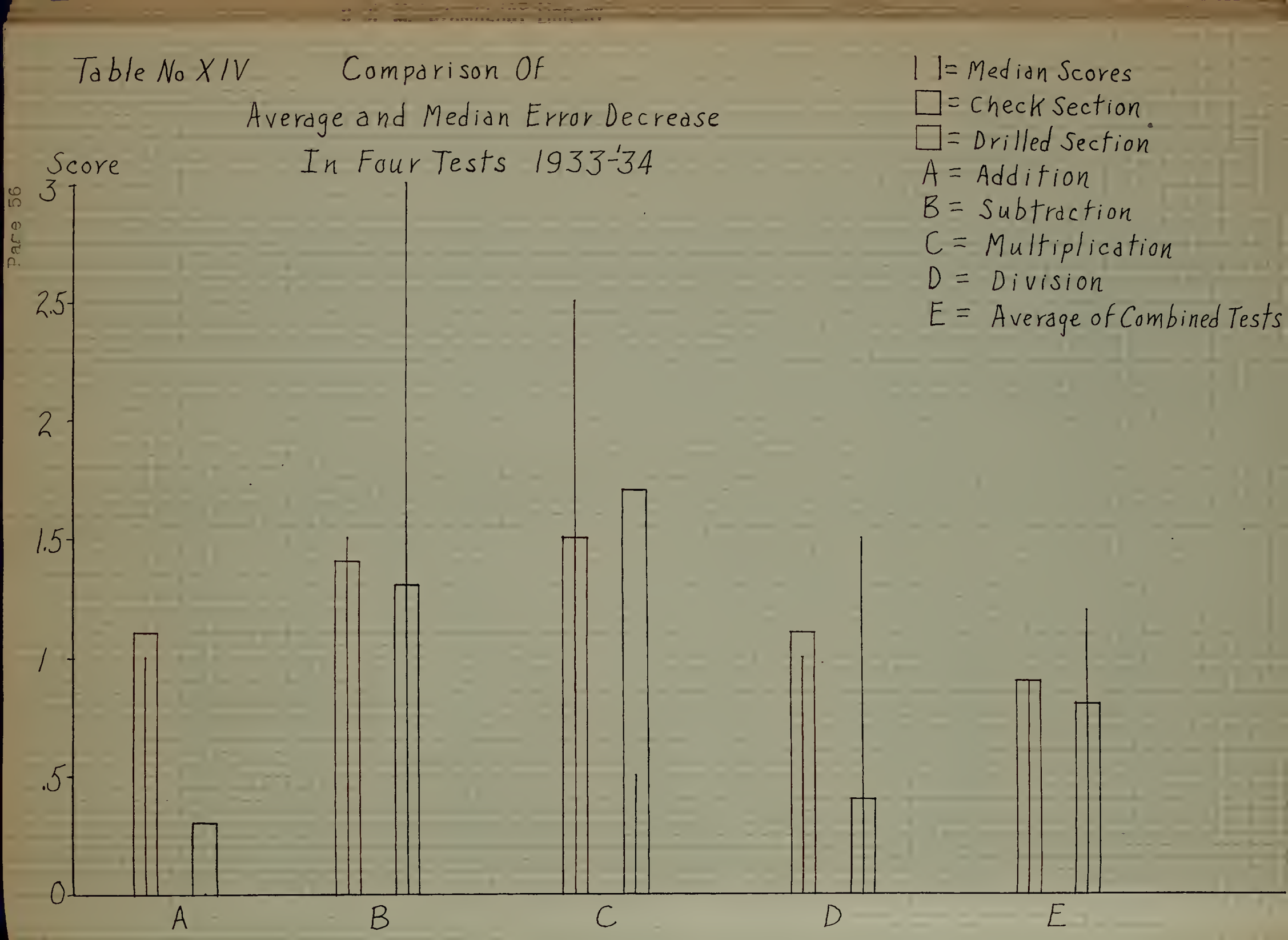


Table No XV

Comparison Of Average and Median Marks 1932-'34

|_|= Median Marks
□ = Check Section
□ = Drilled Section
Freshman Year
A = First Quarter
B = Second Quarter
C = Third Quarter
Sophomore Year
D= First Quarter
E= Second Quarter
F = Third Quarter

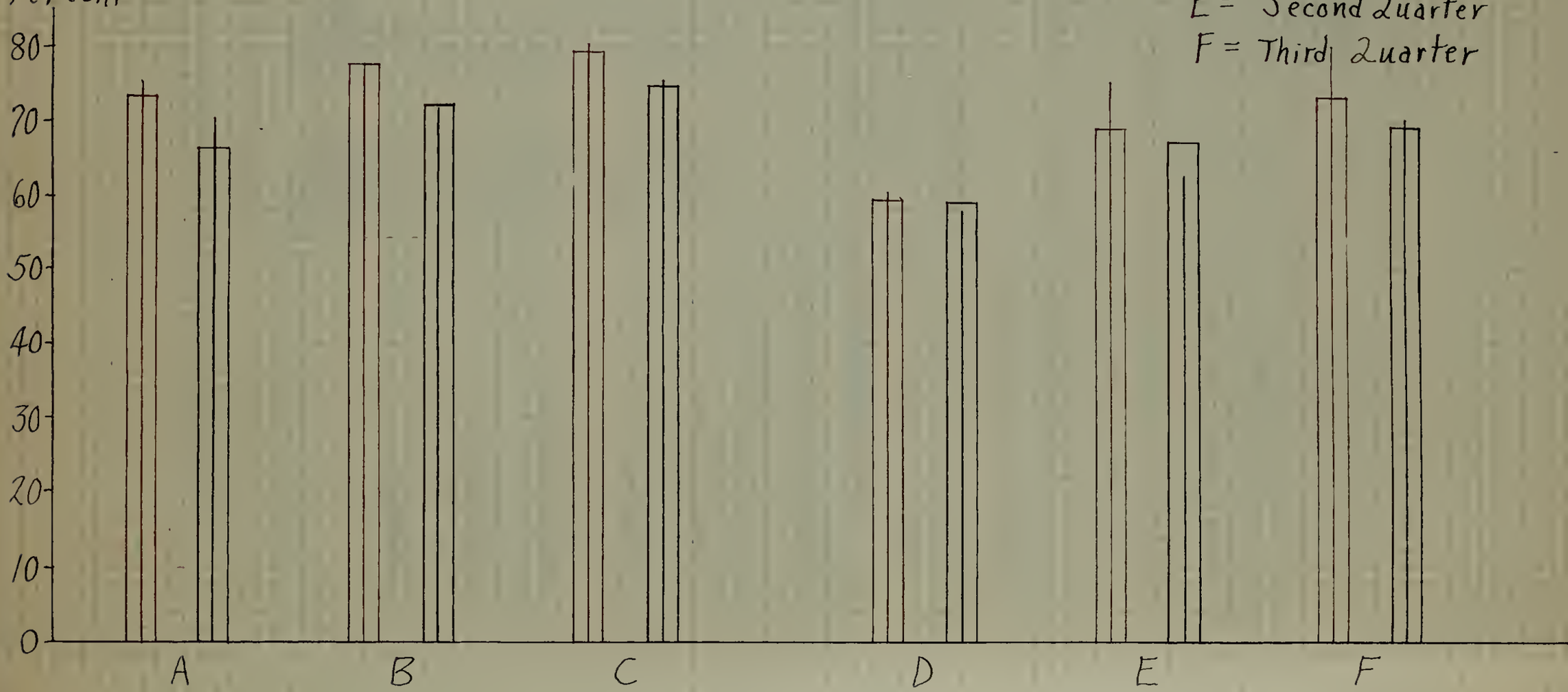


TABLE NO. XVI

Tabulation of Comparison Results -- 1933-1934

		Drilled Section		Check Section	
		Score Increase Percent	Error Decrease Percent	Score Increase Percent	Error Decrease Percent
Addition	A	16.7	4.8	-2.4	0
	B	15.8	5.2	3.3	1.4
Substraction	A	11.7	5	11.6	10
	B	14.	4.7	5	4.3
Multiplication	A	20.5	11.4	9	2.3
	B	17.8	6.8	13.6	7.8
Division	A	12.5	5	7.5	7.5
	B	13	5.5	11.5	2
Combined Tests	A	15.3	6.5	6.4	4.9
	B	15.1	5.5	8.3	3.9

A- Medium B- Average

Interpretation of Results:

In addition, there is a marked increase of score and a marked decrease of errors in the drilled section. The results show that properly directed drill increases both speed and accuracy in addition.

In subtraction, there is an indicated increase of both speed and accuracy. This increase is more pronounced in the averages than in the medians. However, the increase is not great enough to show any marked results.

The increase of both speed and accuracy in multiplication is high enough to indicate a positive result.

The increase of both speed and accuracy in division also indicates that the drilled group has made better progress.

The results of the combined tests show that the drilled group has doubled the score increase of the check group, while the error decrease of this group has increased about thirty percent above the check group.

The comparison of the intelligence test scores found in table XII on page 54 indicates that the diagnostic tests are closely correlated with the Army Alpha and the Army Alpha Mathe tests. However, the correlation of the Kent-Shakow tests indicates that the latter are too easy for the mental age of this group of students. The scores of all tests were from one to seven percent higher for the drilled group. These scores indicate that the intelligence of the drilled group was slightly higher than that of the check group.

The comparison of the quarter marks of the two groups during the freshman and spohomore years is found in table XV on page 57. This comparison indicates that the marks were higher during the freshman year than during the sophomore year. However, it must be remembered that the freshman year marks were given by different instructors and the time allotted for arithmetic was also greater in the freshman year than in the sophomore year.

The comparison of the first and third quarter marks for the sophomore year shows that the drilled group had an average increase of 13.9% and a median increase of 20%. The check group had an average increase of 10% and a median increase of 12.5% for the same period.

The drilled group had a yearly average mark of 67% and a median yearly average mark of 71.7% for the sophomore year. The check group had a yearly average mark of 64.9% and a median yearly average mark of 63.3% for the same period.

The comparison of the mean and median deviations of the first and third quarter marks for the sophomore year found in tables X and XI, shows that the drilled group had a mean deviation decrease of 1.8 and a median deviation decrease of 4.7. The check section had a mean deviation decrease of 1.2 and a median deviation decrease of 1.4 for the same period.

These facts indicate that the drilled group has made better progress than the check group.

TABLE NO XVII
Drilled Section

SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1934-1935

Total Possible Score	80 Diagnostic	Relative Rank	212 Army Alpha	Relative Rank	Mathe & Alpha (	Relative Rank	Kent 185 Time	Relative Rank	Mathe 1 (Kent T)	Relative Rank	Kent No 252 Time	Relative Rank	Math Kent No Time 38	Relative Rank	Freshman Marks 1st Quarter	2nd Quarter	3rd Quarter	Sophomore Marks 1st Quarter	2nd Quarter	3rd Quarter
Bowley	19	30	98	10	6	26	147	8	5	11	213	12	25	17	54	55	20	60	60	70
Christensen	23	25	93	14	9	12	91	25	4	17	194	24	13	23	47	65	70	60	75	80
Conti	27	16	72	33	9	12	102	21	4	17	218	10	28	13	53	86	85	60	78	80
Foster	41	3	No records		Omitted on all Test Averages										74	93	90	70	85	90
Freeman	40	4	126	4	14	1	155	7	11	13	240	3	36	2	75	90	90	88	90	92
Fullington	50	1	133	3	10	8	171	3	13	1	229	6	36	2	86	90	95	90	92	95
Graffman	33	11	142	2	12	2	181	2	7	6	238	4	27	15	70	83	85	85	92	90
Hays	22	26	71	25	3	29	94	24	2	27	189	25	17	26	55	75	75	70	75	80
Lydon	26	18	147	1	8	15	132	1	12	2	244	1	36	2	48	55	60	50	50	50
Nicoll	31	12	120	5	12	2	158	4	10	5	230	5	34	6	48	75	85	80	80	85
Nimmo	40	4	79	20	9	12	114	16	3	22	210	14	29	9	72	86	90	80	85	90
Rennie	24	22	88	18	10	8	134	11	5	11	210	14	28	13	70	76	75	65	80	80
Santin	38	6	105	8	11	4	146	9	6	8	241	2	37	1	74	85	90	85	80	85
Sheeley	29	14	No record		Omitted on all test averages										70	80	85	85	90	90
Smith, F.	35	8	No record		Omitted on all test averages										50	80	90	85	87	93
Smolok	44	2	89	17	10	8	99	22	6	8	198	23	23	21	80	95	90	93	95	93
Thompson	35	8	116	7	8	15	115	15	5	11	210	14	32	8	75	80	80	78	75	75
White, W.	18	31	92	15	1	31	136	10	3	22	218	10	27	15	34	60	75	60	70	75

TABLE NO XVII

SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1934-1935

Drilled Section	Diagnostic	Relative Rank	Army Alpha	Relative Rank	Mathe 2 (Alpha)	Relative Rank	Kent Time	Relative Rank	Mathe 16 (Kent T)	Relative Rank	Kent No Time	Relative Rank	Math Kent No Time	Relative Rank	Freshman Marks 1st Quarter	2nd Quarter	3rd Quarter	Sophomore Marks 1st Quarter	2nd Quarter	3rd Quarter
Total Possible Score	80		212		20		189		16		222		40							
Wolfsen	33	6	120	5	11	4	157	5	7	6	222	8	34	16	70	70	80	78	85	85
Average Score	31.4		105.7		8.9		136.4		6.4		219		29.2		63.4	77.3	79.5	74.8	80.2	83.1
Average % Score	39.2		49.9		44.5		72.2		40		83.6		73							
Median Score	32		101.5		9.5		141		5.5		218		28.5		70	80	85	78	80	85
Median Score	40		47.9		47.5		74.6		34.4		83.2		71.2							
Mean Deviation																		10.9	8.4	7.8
Median Deviation																		10.4	8.3	7.5

TABLE NO XVIII

SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1934-1935

Check Section

Freshmans Marks — Sophomore Marks

	Diagnostic	Relative Rank	Army Alpha	Relative Rank	Mathe (Alpha)	Relative Rank	Kent Time	Relative Rank	Mathe (Kent T.)	Relative Rank	Kent No Time	Relative Rank	Math Kent No Time	Relative Rank	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter
Total Possible Score	36		212		20		189		16		362		40							
Ambrey	24	18	65	26	7	20	113	17	4	21	201	17	24	18	55	65	70	80	80	left
Bowden	26	14	64	27	7	20	73	30	3	31	139	22	10	30	70	91	80	70	45	75
Buder	31	10	96	11	11	4	157	5	11	7	226	3	36	2	75	79	75	85	80	90
Cail	20	22	95	13	8	15	105	18	5	18	209	11	17	26	39	65	80	50	50	50
Dichivico	24	18	55	29	7	20	76	28	2	27	161	27	13	23	59	75	80	60	50	80
Fairbrother	11	31	50	31	2	30	89	26	1	30	140	30	8	31	39	65	65	30	40	40
Grant	17	26	105	8	11	4	104	20	3	14	210	22	24	18	55	65	75	85	50	40
Kilililae	13	28	80	19	6	26	99	22	5	20	204	11	24	18	25	50	60	70	70	70
Long	25	17	72	23	8	15	121	14	4	9	221	17	29	9	54	85	85	70	70	80
Mansfield	29	14	No records				Omitted on all tests in Averages etc.								48	79	85	50	60	75
Mello	34	10	No records				Omitted on all tests in Averages etc.								65	73	75	75	80	85
Moore	34	8	74	22	7	20	76	23	3	29	142	22	18	23	70	72	85	75	70	70
Newton	26	14	96	11	10	8	130	12	6	13	212	8	29	9	41	65	70	55	55	55
Purdy	22	26	No records				Omitted on all tests Averages etc.								26	68	80	70	70	left
Rosi	11	37	No records				Omitted on all tests Averages								70	81	85	70	70	75
Slattery	12	29	79	20	8	15	105	18	5	21	201	11	29	9	45	50	70	70	60	70
Smith M.	27	12	53	30	4	24	62	31	2	28	150	27	11	29	40	85	85	70	60	left
Ward	12	29	92	15	7	20	122	13	4	18	209	17	19	22	24	42	65	65	70	65

TABLE NO XVIII

Check Section

Total Possible Score		Monson		Army Alpha		Mathe (Alpha)		Kent Time		Mathe (KentT)		Kent No Time		Mathe Kent No Time		1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter
30	Diagnostic	16		212		20		189		16		262		40							
	Relative Rank	27		58		28		27		1		26		30		28	27	67	70	65	75	75
	Average Score	21.2		75.6		7		100.7		3.9		186.5		20.8		48.7	69.5	75.8	86.8	63.4	63.4
	Average % Score	26.5		35.7		35		53.3		24.4		71.1		52							
	Median Score	24		74		7		104		4		201		19		43	68	75	70	70	72.5
	Median % Score	30		34.9		35		55.1		25		76.7		47.5							
	Mean Deviation																		9.5	10.6	11.5
	Median Deviation																		8.7	10.5	9.2

* 16 Students only

TABLE NO. XIX
Drilled Section
1934-1935
A-Beginning Test
B-Ending Test
Total Possible Score

SUMMARY OF DIAGNOSTIC TESTS 1934-1935

		Addition A 10	Addition B 10	Subtraction A 10	Subtraction B 10	Multiplication A 10	Multiplication B 10	Division A 10	Division B 10	Denominate Numbers A 15	Denominate Numbers B 15	Frac. Dec. & Per C. A 10	Frac. Dec. & Per C. B 10	Interest A 5	Interest B 5	Mensuration A 10	Mensuration B 10	Totals A 80	Totals B 80	Relative Rank A	Relative Rank B
Bowley	+	2	3	2	1	2	3	1	0	3	3	2	2	0	0	2	2	12	20		
	−	4	3	6	5	3	5	4	5	5	4	3	2	4	3	4	2	33	29	30	34
Christensen	+	3	5	3	5	3	7	3	5	7	3	2	3	1	2	1	0	23	35		
	−	2	1	3	2	3	2	3	2	2	0	3	0	4	3	3	2	33	12	25	17
Conti	+	4	5	5	6	6	7	3	3	5	6	3	3	1	0	0	0	27	30		
	−	1	1	2	1	1	3	2	1	1	0	3	2	3	2	2	0	13	10	16	21
Foster	+	4	5	5	6	3	7	2	3	10	12	3	10	3	4	1	1	41	48		
	−	5	4	4	3	2	2	5	6	2	1	2	0	2	1	1	0	33	17	3	6
Freeman	+	4	6	4	7	5	9	4	6	10	13	7	8	3	5	3	5	40	59		
	−	3	3	3	2	3	1	3	3	3	2	2	2	2	0	4	5	23	18	4	3
Graffam	+	4	7	6	6	4	8	1	3	10	11	5	6	2	2	1	2	33	45		
	−	3	2	3	2	3	2	4	3	3	3	4	3	2	2	2	1	24	18	11	11
Gullington	+	4	4	6	7	7	10	6	7	12	14	9	10	3	4	3	4	50	60		
	−	5	5	2	3	2	0	4	3	2	1	1	0	2	1	2	1	20	14	1	1
Hayes	+	1	2	3	2	5	6	1	1	8	10	2	2	2	5	0	1	22	29		
	−	3	2	2	2	3	4	3	2	5	5	3	1	2	0	2	1	23	17	26	22
Lydon	+	3	4	6	6	5	7	1	0	7	7	3	4	1	2	0	1	26	31		
	−	4	5	5	4	3	2	4	2	6	7	2	0	3	2	2	1	29	23	18	18
Nicoll	+	2	5	4	6	3	6	4	7	9	10	5	6	2	4	2	3	31	47		
	−	3	2	5	3	4	4	3	1	4	2	3	2	2	1	4	3	28	18	12	8
Nimmo	+	4	7	4	6	5	8	4	7	10	11	7	10	4	5	2	5	40	59		
	−	1	3	4	3	0	2	3	1	3	4	1	0	1	0	4	5	17	18	4	3
Rennie	+	2	3	2	6	4	7	2	3	8	10	3	3	2	3	1	3	24	38		
	−	4	4	5	1	3	3	6	5	4	2	3	4	1	2	6	5	32	26	22	16
Santin	+	3	5	5	6	5	6	4	5	9	12	8	10	1	0	3	4	38	48		
	−	5	4	5	4	5	4	4	3	4	3	1	0	3	0	4	3	31	21	6	6
Sheely	+	3	6	4	5	4	5	4	5	8	10	3	4	1	2	2	3	29	40		
	−	3	2	3	3	3	5	5	5	6	4	5	6	3	3	4	5	32	33	14	14
Smith E.	+	4	4	6	7	4	7	3	4	8	12	8	10	1	1	1	2	35	47		
	−	5	6	3	2	4	3	5	4	2	1	2	0	1	0	2	1	24	17	8	8
Smolak	+	4	7	7	7	5	6	4	7	8	14	7	9	4	5	5	5	44	60		
	−	4	3	3	3	4	4	2	1	2	1	2	1	1	0	2	4	20	17	2	1
Thompson	+	2	3	5	7	4	7	2	1	9	12	8	7	3	4	2	3	35	46		
	−	4	5	3	2	2	1	6	7	5	2	2	3	2	1	4	5	28	26	8	10
White W.	+	2	3	2	2	3	4	1	0	3	10	2	2	0	0	0	1	18	22		
	−	6	5	4	4	4	3	4	2	3	2	3	1	4	5	3	1	31	23	31	32

TABLE NO. XIX

SUMMARY OF DIAGNOSTIC TESTS 1934-1935

		Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Numbers A	Denominate Numbers B	Frac. Dec. & % A	Frac. Dec. & % B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B	Relative Rank A	Relative Rank B
Total Possible Score		10	10	10	10	10	10	10	10	15	15	10	10	5	5	10	10	80	80		
Wolfsen	+	4	6	6	7	4	5	6	8	10	14	2	2	3	4	3	5	38	51		
	−	3	4	2	3	4	3	3	1	3	0	2	1	1	1	3	3	21	16	6	5
Average Score		3.1	4.7	4.5	5.5	4.5	6.7	2.9	4	8.6	10.8	4.9	5.8	2	2.7	1.7	2.6	32.2	42.8		
Average Errors		3.6	3.4	3.5	2.7	3	2.8	3.8	3	3.4	2.3	2.5	1.5	2.3	1.4	3.1	2.5	25.2	19.6		
Average Increase Score			1.6		1.0		2.2		1.1		2.2		.9		.7		.9		10.6		1.3
Average Decrease Error			.2		.8		.2		.8		1.1		1		.9		.6		5.6		.7
Median Score		3	5	5	6	4	7	3	4	8	11	5	6	2	3	2	3	33	46		
Median Errors		4	3	3	3	3	3	4	3	3	2	2	1	2	1	3	2	24	18		
Median Increase Score			2		1		3		1		3		1		1		1		13		1.6
Median Decrease Errors			1		0		0		1		1		1		1		1		6		.75

SUMMARY OF DIAGNOSTIC TESTS 1934-1935

TABLE NO. XX

Check Section
A-Beginning
B-Ending

		Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Numbers A	Denominate Numbers B	Fra. Dec. % A	Fra. Dec. % B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B	Relative Rank A	Relative Rank B
Total Possible Score		10	10	10	10	10	10	10	10	15	15	10	10	5	5	10	10	80	80		
Ambrey	+	2	2	3	2	2	3	2	1	8	9	4	5	2	1	1	2	24	25		
	−	4	5	4	7	6	7	6	8	4	3	2	1	3	4	2	1	31	36	22	30
Bawden	+	1	2	2	3	5	6	2	1	6	7	6	8	2	1	2	3	26	31		
	−	4	4	2	1	2	3	5	6	5	3	3	2	3	2	3	4	27	26	18	18
Buder	+	1	2	4	6	4	8	3	5	10	9	7	6	1	1	1	3	31	40		
	−	3	4	3	2	4	1	4	3	2	3	2	4	2	3	4	3	24	23	12	14
Cail	+	2	2	3	5	3	3	1	1	7	9	2	1	1	0	1	0	20	21		
	−	3	1	3	0	4	6	3	2	3	2	1	0	2	1	2	0	21	12	29	33
Dichirico	+	3	3	5	3	5	4	3	4	5	6	3	5	0	0	0	1	24	26		
	−	2	4	2	5	4	6	4	5	5	4	3	4	3	2	2	0	25	30	22	28
Fairbrother	+	2	1	2	1	1	0	1	0	1	0	2	1	0	0	2	1	11	4		
	−	6	8	5	6	4	3	3	2	2	0	3	1	3	2	1	0	27	22	37	38
Grant	+	3	3	2	5	3	5	1	2	4	7	2	3	1	2	1	2	17	29		
	−	3	4	4	2	5	4	5	4	4	5	4	5	3	2	3	2	30	29	32	27
Killilae	+	2	3	3	4	3	6	1	3	3	4	1	3	0	2	0	2	13	27		
	−	4	4	3	2	4	3	3	2	3	1	5	7	3	1	2	1	27	21	34	26
Long	+	2	2	8	8	4	4	2	0	7	8	1	0	2	3	1	2	25	27		
	−	3	1	2	0	4	5	2	3	5	4	3	0	2	2	4	5	24	30	21	25
Mansfield	+	4	7	6	5	2	3	4	7	6	9	4	6	1	2	2	3	29	42		
	−	4	1	2	3	5	4	5	5	5	3	4	3	2	0	4	3	30	20	14	13
Mello	+	5	5	6	7	3	4	3	4	10	12	4	6	1	2	2	3	34	43		
	−	5	2	2	1	6	5	2	2	3	2	5	4	3	3	2	0	26	19	10	12
Moore	+	3	2	3	4	4	3	4	3	7	9	1	3	2	3	2	1	26	28		
	−	5	4	3	3	5	6	2	2	2	1	2	0	2	1	4	5	25	22	18	24
Newton	+	3	3	2	2	3	6	1	2	9	10	4	3	0	0	0	0	22	26		
	−	4	3	2	3	5	4	5	4	3	2	4	4	2	1	3	0	27	21	26	28
Purdy	+	1	2	3	5	4	6	3	2	8	9	1	2	2	1	0	0	22	27		
	−	2	1	2	2	5	4	3	4	2	2	3	0	3	4	3	2	22	19	26	25
Rosi	+	2	0	2	2	3	4	1	2	1	0	2	1	0	1	0	1	11	11		
	−	2	3	2	1	6	5	5	5	2	2	1	2	3	2	2	2	23	22	37	37
Slattery	+	1	3	2	2	2	6	1	2	3	7	3	4	0	0	0	0	12	24		
	−	5	4	4	5	5	3	5	4	4	2	3	2	3	4	5	7	34	31	35	31
Smith, W.	+	3	2	4	5	6	6	4	5	6	7	1	2	2	3	1	1	27	31		
	−	4	4	3	2	2	3	4	3	3	2	2	1	2	2	3	3	25	20	16	18
Ward	+	1	1	1	2	1	2	1	0	5	8	2	1	0	0	1	0	12	14		
	−	5	4	4	5	6	7	3	1	3	4	2	0	4	4	3	0	30	25	35	36

Table No.XX
Check Section

SUMMARY OF DIAGNOSTIC TESTS 1934-1935

		Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Numbers A	Denominate Numbers B	Fra. Dec. % A	Fra. Dec. % B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B	Relative Rank A	Relative Rank B
Total Possible Score		10	10	10	10	10	10	10	10	15	15	10	10	5	5	10	10	80	80		
Wonson Class	+	1	1	2	3	3	4	1	0	7	8	1	2	1	0	0	0	16	18		
	−	2	4	4	4	5	4	2	1	2	3	1	0	2	2	3	4	21	22	33	35
Average Score		2.2	2.4	3.2	3.9	3.2	4.4	2.1	2.3	6	7.3	2.7	3.3	1	1.2	.9	1.3	21.2	26		
Class Average Errors		3.5	3.4	2.9	2.8	4.6	4.4	3.7	3.3	3.3	2.6	2.7	2.1	2.6	2.2	2.8	2.2	26.7	23.1		Average of Combination Tests
Score Average Increase			.2		.7		1.2		.2		1.3		.6		.2		.4		4.8		.6
Error Average Decrease			.1		.1		.2		.4		.7		.6		.4		.6		3.1		.4
Median Score		2	2	3	4	3	4	2	2	6	8	2	3	1	1	1	1	22	27		
Median Errors		3	4	3	2	5	4	4	3	3	2	3	2	3	2	3	2	26	22		
Score Median Increase			0		1		1		0		2		1		0		0		5		.6
Error Median Decrease			-1		1		1		1		1		1		1		1		4		.5

Table No XXI Comparison Of

Average and Median Percent Scores

In Seven Tests 1934-'35

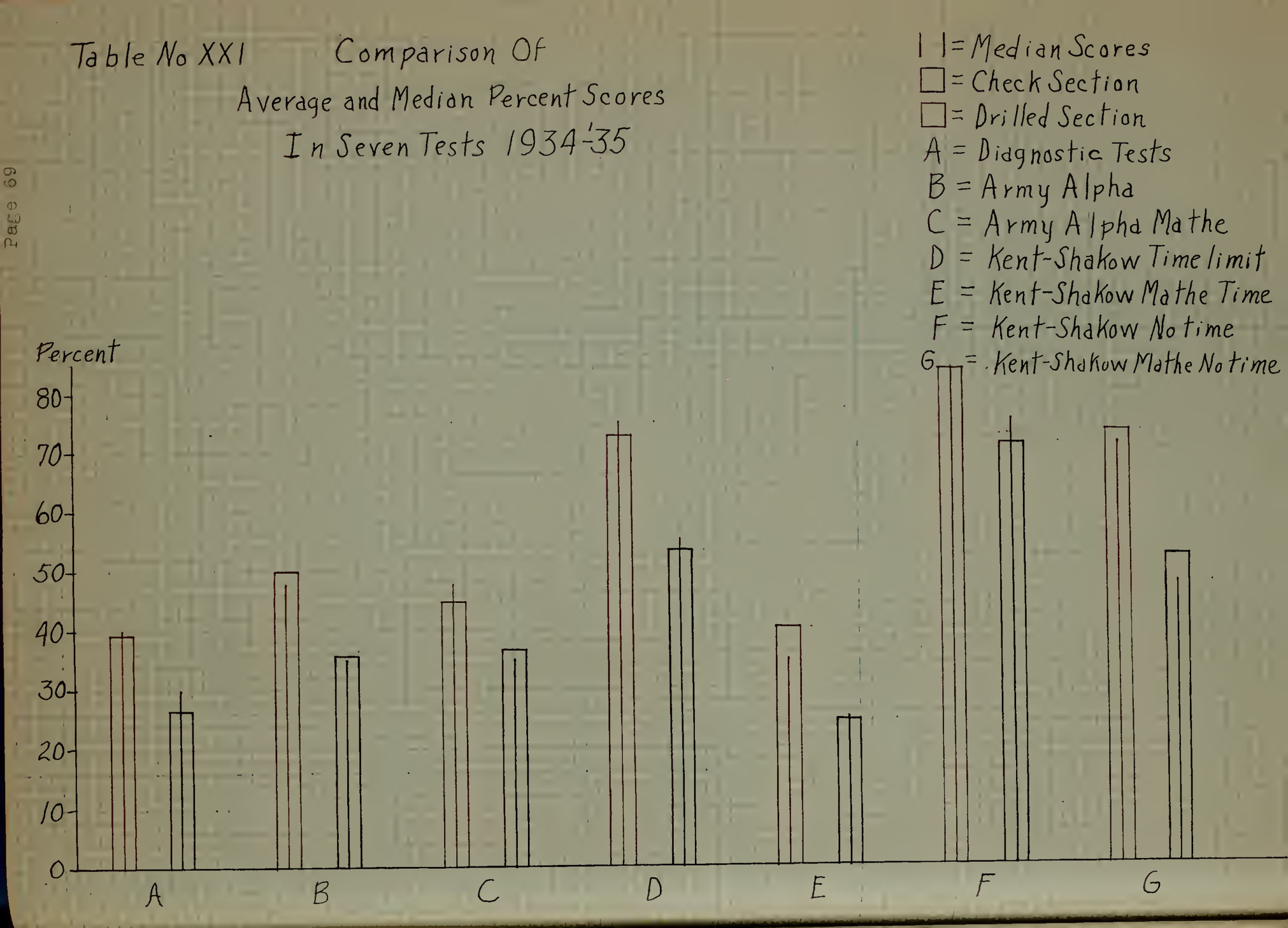
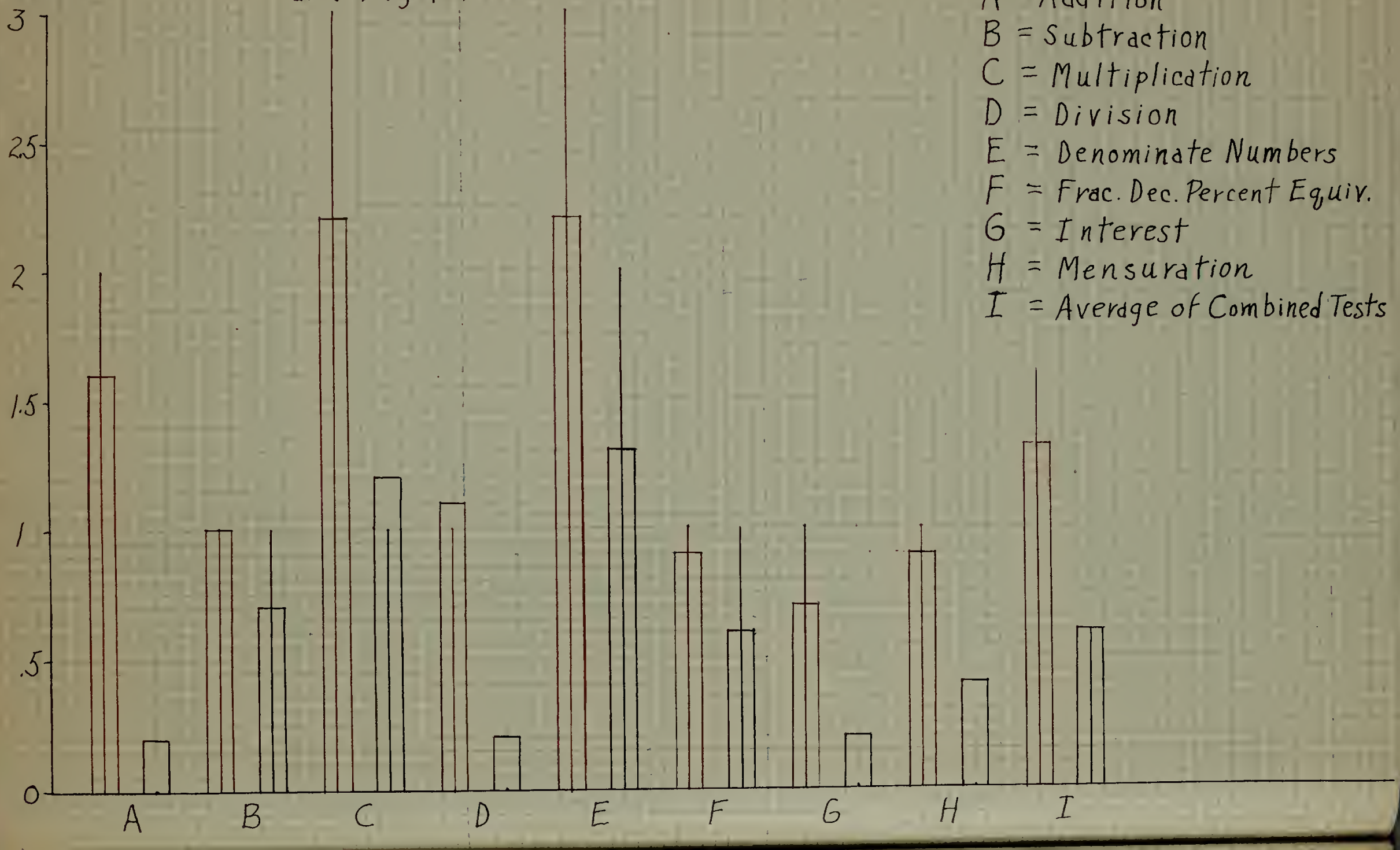


Table No XXII Comparison Of

Average and Median Score Increase

In Eight Tests 1934-'35



| | = Median Scores
□ = Check Section
□ = Drilled Section
A = Addition
B = Subtraction
C = Multiplication
D = Division
E = Denominate Numbers
F = Frac. Dec. Percent Equiv.
G = Interest
H = Mensuration
I = Average of Combined Tests

Table No XXIII Comparison Of
Average and Median Error Decrease
In Eight Tests 1934-'35

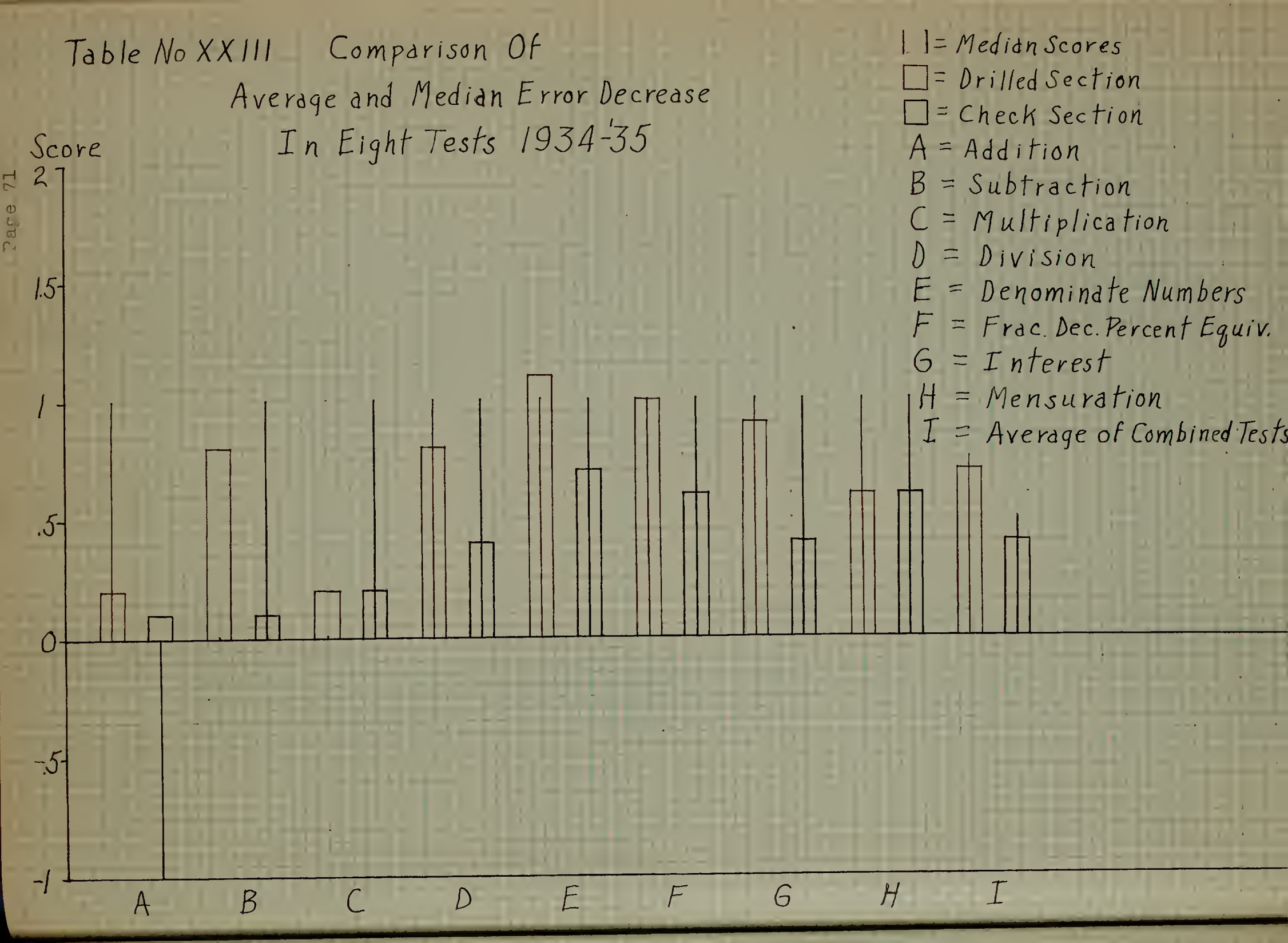


Table No XXIV Comparison Of Average and Median Marks 1933-'35

| = Median Marks
□ = Check Section
□ = Drilled Section
A = First Quarter Freshman Yr.
B = Second Quarter Freshman Yr.
C = Third Quarter Freshman Yr.
D = First Quarter Sophomore Yr.
E = Second Quarter Sophomore Yr.
F = Third Quarter Sophomore Yr.

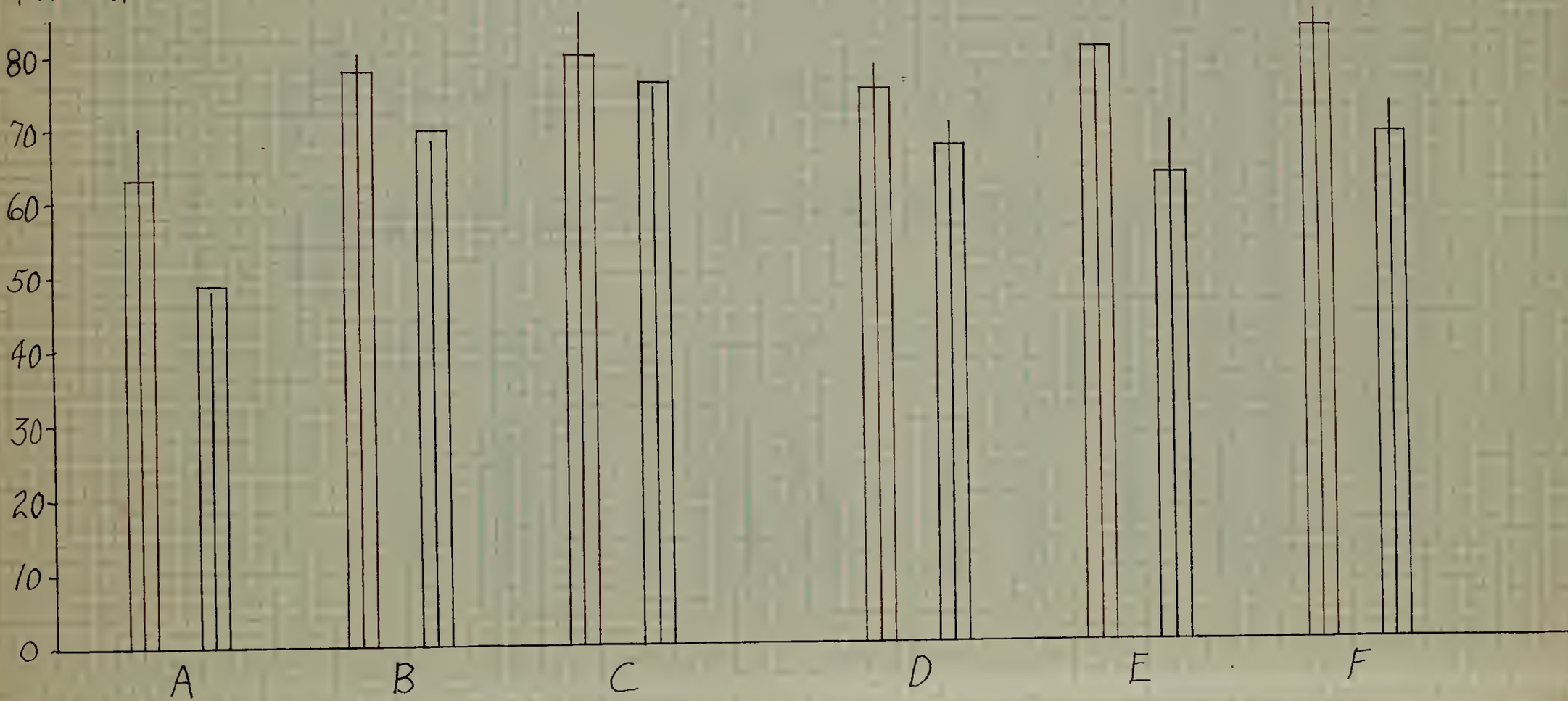


TABLE NO XXV

Tabulation of Comparison Results -- 1934-1935

		Drilled Section		Check Section	
		Score Increase Percent	Error Decrease Percent	Score Increase Percent	Error Decrease Percent
Addition	A	20	10	0	-10
	B	16	2	2	1
Subtraction	A	10	0	10	10
	B	10	8	7	1
Multiplication	A	30	-10	10	10
	B	25	2	12	2
Division	A	10	0	0	10
	B	11	8	2	4
Denominate Numbers	A	20	6.7	13.3	6.7
	B	14.7	7.4	8.7	4.7
Frac. Dec. % Equiv.	A	10	10	10	10
	B	9	10	6	6
Interest	A	20	20	0	20
	B	14	18	4	8
Mensuration	A	10	10	0	10
	B	9	6	4	6
Combined Tests	A	16.3	7.5	6.2	5
	B	13.3	7	6	3.4

A- Median B- Average

Interpretation of Results:

The results shown in the above table and those in table XVI which show the first year's work are, in many respects, quite similar. The increase of both speed and accuracy in addition, subtraction, multiplication and division is even more apparent than in last year's results. There is a greater increase of speed than of accuracy, as shown by the score

increase and the error decrease. In subtraction the speed and accuracy of both the drilled and check groups is again very similar.

In both denominate numbers and interest, the drilled group has doubled the score increase of the check group while the error decrease is only slightly in favor of the drilled group in both cases.

The score increase and the error decrease of the drilled section is also higher than that of the check section in both fraction decimal percent equivalents and mensuration. However, the increase of speed and accuracy is not as great as in denominate numbers and interest.

The results of the combined eight tests show, even more conclusively than those of last year's tests, that the drilled group has more than doubled the score increase of the check group. Likewise, the error decrease of the drilled group is more than fifty percent greater than that of the check group.

The comparison of the intelligence test scores found in table XXI on page 69 shows very similar results to those of last year. The diagnostic tests are closely correlated with the Army Alpha and the Army Alpha Mathe tests. However, the correlation of the Kent-Shakow tests again indicates that the latter are too easy for the mental age of this group of students. The scores of all tests are from eight to twenty percent higher for the drilled group. These scores indicate that the intelligence of the drilled group was considerably higher than that of the check group.

The comparison of the quarter marks of the two groups during the freshman and sophomore years are found in table XXIV on page 72. The drilled group shows higher marks than the check group during both years. As there was no specialized drill given in the freshman year, the effect of the drill would not be apparent until the second quarter of the sophomore year.

The comparison of the first and third quarter marks for the freshman year, found in tables XVII and XVIII, shows that the group, which was drilled in the sophomore year, had an average increase of 16.1% and a median increase of 15%. The Check group had an average increase of 27.1% and a median increase of 27% for the same period.

The comparison of the first and third quarter marks for the sophomore year shows that the drilled group had an average increase of 6.3% and a median increase of 7%. The check group had an average increase of 1.6% and a median increase of 2.5% for the same period.

The drilled group had a yearly average mark of 82.7% and a median yearly average mark of 77.7% for the sophomore year. The check group had a yearly average mark of 66.2% and a median yearly average mark of 70.8% for the same period.

The comparison of the mean and median deviations of the first and third quarter marks for the sophomore year, found in tables XVII and XVIII, shows that the drilled group had a mean deviation decrease of 3.1 and a median deviation decrease

of 2.9. The check group had a mean deviation increase of 2 and a median deviation increase of .5 for the same period.

These facts indicate that the drilled group has made much better progress than the check group.

SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1935-1936

TABLE NO. XXVI

Drilled Section

	Freshman Marks												Sophomore					
Total Possible Score	Diagnostic Tests 21	Relative Rank	Army Alpha 212	Relative Rank	Mathe Alpha 20	Relative Rank	Kent Time 109	Relative Rank	Mathe Kent Time	Relative Rank	Kent Co Time	Relative Rank	Mathe Kent Co 40	Relative Rank	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter
Bergeron	57	27	80	18	8	13	93	22	4	22	200	14	30	5	70	80	80	75	80	75
Coles	69	20	91	14	9	6	123	12	7	5	199	15	28	10	50	75	85	70	85	85
Day	95	11	100	10	8	13	106	20	6	9	224	5	37	2	75	80	85	80	90	90
DeVeau	80	14	103	13	12	1	116	14	6	9	170	22	28	10	60	85	88	80	85	85
Hamel	79	15	No records omitted on all test averages												80	80	87	80	87	88
Luxton	84	13	85	16	7	16	105	21	5	17	171	21	16	24	70	75	78	75	75	70
MacLean	70	18	86	16	7	16	113	15	7	5	193	18	30	5	70	70	75	30	70	left
Morrill	71	78	70	20	6	24	107	17	3	24	202	12	24	17	50	65	65	50	50	70
Peatman	52	24	89	15	7	16	158	1	6	9	211	8	20	19	45	80	90	75	80	80
Pingree	106	7	73	19	9	6	109	16	6	9	186	19	27	14	60	70	55	70	75	80
Average Score	77.1		86.4		8.1		114.4		5.6		195.1		26.7		63	76	77.8	68.5	77.7	80.3
Av. % Score	35.9		40.8		40.5		60.5		35		74.5		66.7							
Median Score	71		86		8		109		6		199		28		65	77.5	80	75	80	80*
Med. % Score	33		40.6		40		59.7		37.5		76		70							
Mean Deviation															10	5.1	7.7	11.4	8.2	5.3
Median Deviation															10	5	7.2	9.5	7.7	5.9

* 9 students only

TABLE NO. XXVII SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1936-1936

Check Section / Total Possible Score	Diagnostic Tests 215	Relative Rank	Army Alpha 212	Relative Rank	Mathe Alpha 20	Relative Rank	Kent 189	Relative Rank	Mathe Kent T 16	Relative Rank	Kent No Time 262	Relative Rank	Mathe Kent No. 40	Relative Rank	Freshman Marks 1st Quarter	Freshman Marks 2nd Quarter	Freshman Marks 3rd Quarter	Sophomore Marks 1st Quarter	Sophomore Marks 2nd Quarter	Sophomore Marks 3rd Quarter
Batchelder	121	3	108	5	9	6	126	10	6	9	218	6	29	9	86	80	70	80	90	90
Barr	40	29	48	29	4	28	63	28	2	26	130	28	5	29	70	65	46	40	50	60
Beal	67	21	65	22	7	16	91	23	1	29	163	25	15	27	57	85	93	85	85	80
Bingham	99	10	96	13	7	16	107	17	5	17	201	13	13	28	56	60	45	50	70	70
Cameron	104	9	112	4	10	3	157	3	8	2	205	10	21	18	43	70	71	75	75	75
Eastwood	112	5	103	8	9	6	119	13	5	17	225	4	27	14	71	91	80	87	90	90
Ford	78	15	108	5	7	16	154	4	6	9	207	9	28	10	44	70	70	60	75	70
Jones	87	12	104	7	9	6	152	5	5	17	203	11	25	16	60	50	70	70	75	78
Jacobson	63	23	70	20	5	26	87	24	4	22	154	27	17	22	70	71	75	65	75	75
Marshall	109	6	132	1	10	3	141	8	8	2	243	1	30	5	84	73	82	80	85	85
Mahoney	53	28	61	25	7	16	82	26	2	26	159	26	16	24	47	43	65	20	65	60
Noyes	58	26	55	27	4	28	85	25	5	17	170	22	17	22	40	65	65	80	75	75
Ouellette	64	22	52	28	7	16	80	27	7	5	169	24	32	4	73	90	85	75	80	80
Prophet	76	16	56	26	5	26	60	29	2	26	126	29	19	21	72	80	80	90	80	80
Robinson	138	2	99	12	12	13	125	11	7	5	187	17	30	5	84	91	76	88	90	90
Scribner	106	7	118	3	10	3	145	7	9	1	215	7	28	10	72	84	84	80	85	85
Tataronis	120	4	100	10	9	6	146	6	6	9	198	16	16	24	82	80	87	70	85	85
Whittaker	142	1	126	2	11	2	158	1	8	2	227	3	38	1	87	77	74	90	90	90

TABLE NO. XXVII

SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1935-1936

Freshman Work Sophomore

Check Section	Diagnostic Tests	Relative Rank	Army Alpha	Relative Rank	Mathe Alpha	Relative Rank	Kent Time	Relative Rank	Mathe Kent T	Relative Rank	Kent No Time	Relative Rank	Mathe Kent No	Relative Rank	1st Quarter	2nd Quarter	3rd Quarter	1st Quarter	2nd Quarter	3rd Quarter
Total Possible Score	215		212		20		189		16		262		40							
Wilcox	70	18	65	22	6	24	107	17	3	24	186	19	20	19	81	90	91	75	70	70
Zielski	60	25	65	22	9	6	135	2	6	2	230	2	36	3	70	71	70	50	75	75
Average Score	88.5		97.1		7.6		116		5.2		191.3		23.1		67.4	73.9	74	70	78.2	77.6
Av. % Score	41.1		41.1		38.2		61.4		32.5		73		57.7							
Median Score	41.5		97.5		7.5		122		5.5		199.5		23		70.5	75	74.5	75	77.5	79
Median % Score	43.6		46		37.5		64.5		34.4		76.1		57.5							
Mean Deviation															12.5	9.7	9.3	13.5	7.7	7.9
Median Deviation															11.7	9.7	9.3	12.5	7.7	7.8

SUMMARY OF DIAGNOSTIC TESTS 1935-1936

TABLE NO. XXVIII
Drilled Section
1935-1936
A-Beginning
B-Ending

		Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Nos. A	Denominate Nos. B	Frac. Dec. P.C. A	Frac. Dec. P.C. B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B	Relative Rank A	Relative Rank B
Total Possible Score		21	10	30	10	22	10	20	10	18	15	20	10	8	5	34	10	173	80		
Bergeron	+	6	2	11	4	7	3	2	5	9	8	3	6	1	0	6	0	45	28		
	−	7	6	4	3	7	6	7	1	3	1	2	3	2	4	15	3	47	27	28	23
Coles	+	13	4	15	5	6	3	3	7	7	12	7	7	0	3	14	4	65	45		
	−	5	3	11	3	9	7	8	3	6	3	13	2	2	2	17	6	71	29	17	9
Day	+	12	3	14	4	15	6	8	4	8	10	6	9	4	2	13	5	80	43		
	−	9	4	6	3	2	3	3	1	3	4	3	1	3	1	9	4	38	21	11	11
DeVeau	+	11	4	12	3	7	5	7	5	6	9	2	7	4	3	8	0	67	40		
	−	9	6	8	3	12	5	7	5	6	6	1	3	3	2	16	6	62	38	15	12
Hamel	+	12	6	13	3	12	10	6	6	7	11	4	8	3	5	14	5	71	56		
	−	7	5	10	3	8	0	10	4	8	4	8	1	3	0	15	4	69	21	14	1
Luxton	+	8	3	13	3	13	5	7	1	6	10	5	3	1	1	19	2	72	28		
	−	5	1	7	1	3	7	4	3	7	3	9	0	1	3	7	0	45	18	13	23
MacLean	+	6	3	13	5	8	4	7	3	11	10	5	2	5	3	9	1	64	31		
	−	10	5	9	3	6	5	6	4	9	5	3	8	2	1	17	6	62	37	19	20
Morrill	+	5	3	13	6	5	6	3	3	11	11	2	3	3	2	18	4	60	38		
	−	8	0	3	1	4	3	5	3	4	2	1	4	1	1	13	5	39	19	20	13
Peatman	+	7	2	11	4	6	3	1	1	8	13	1	0	1	2	16	1	51	26		
	−	8	3	14	4	12	4	12	7	10	1	3	0	4	3	18	4	81	25	25	25
Pingree	+	5	4	14	7	10	5	12	3	13	11	13	8	4	4	17	5	88	47		
	−	10	3	10	1	6	4	3	5	3	2	7	2	4	0	11	4	54	21	8	7
Average Score		8.5	3.4	13.5	5.0	8.9	5.0	5.6	3.8	8.9	10.5	4.8	5.3	2.6	2.5	13.4	2.7	66.3	38.2		
Average Errors		7.8	3.6	8.2	2.5	6.9	4.4	6.5	3.6	5.9	3.1	5.0	2.4	2.5	1.7	13.8	4.2	56.6	25.5		
Av. % Score		40.5	34	45.3	50	40.5	50	28	38	49.4	70	24.	53.	32.5	50	39.4	27	38.3	47.8		
Av. % Errors		37.1	36	27.3	25	31.4	44	32.5	36	32.8	20.7	25	24	31.2	34	40.6	42	32.7	31.9		
Av. % Score Increase			-6.5		4.7		9.5		10		20.6		29		17.5		-12.4		9.5		
Av % Error Decrease			1.1		2.3		-12.6		-3.5		12.1		1		-2.8		-1.4		.8		
Median Score		7.5	3	13	5	7.5	5	6.5	3.5	8.5	10.5	4.5	6.5	3	2.5	14	3	66	39		
Median % Score		35.7	30	43.3	50	34.1	50	32.5	35	47.2	70	22.5	65	37.5	50	41.2	30	38.2	48.8		

TABLE NO. XXVIII

SUMMARY OF DIAGNOSTIC TESTS 1935-1936

Total Possible Score	Addition A 21	Addition B 10	Substraction A 30	Substraction B 10	Multiplication A 22	Multiplication B 10	Division A 20	Division B 10	Denominate Nos. A 18	Denominate Nos. B 15	Frac. Dec. & P.C. A 20	Frac. Dec. & P.C. B 10	Interest A 8	Interest B 5	Mensuration A 34	Mensuration B 10	Totals A	Totals B	Relative Rank A	Relative Rank B
Median Errors	8	3.5	8.5	3	6.5	4.5	6.5	3.5	6	3	3	2	2.5	1.5	15	4	58	23.5		
Median % Errors	38.1	35	28.3	30	29.5	45	32.5	35	33.3	20	15	20	31.2	30	44.1	40	33.5	29.4		
Median % Score Increas		-5.7		6.7		15.9		2.5		22.8		42.5		12.5		-11.2		10.6		
Median % Error Decrease		3.1		-1.7		-15.5		-2.5		13.3		-5		1.2		-4.1		4.1		

TABLE NO. XXIX
Check Section
1935-1936
A-Beginning
B-Ending
Total Possible Score

SUMMARY OF DIAGNOSTIC TESTS 1935-1936

		Addition A 21	Addition B 10	Substraction A 30	Substraction B 10	Multiplication A 22	Multiplication B 10	Division A 20	Division B 10	Denominate Nos. A 18	Denominate Nos. B 15	Frac. Dec. P.C. A 20	Frac. Dec. P.C. B 10	Interest A 8	Interest B 5	Mensuration A 34	Mensuration B 10	Totals A 173	Totals B 80	Relative Rank A	Relative Rank B
Bachelder	+	13	5	20	6	16	7	12	3	10	11	7	8	2	3	24	3	104	46		
	−	8	5	9	3	4	3	6	5	5	4	4	1	2	2	3	3	38	26	5	8
Barr	+	6	2	7	2	6	2	2	1	5	7	2	5	0	3	3	0	31	22		
	−	8	1	5	2	2	7	4	0	2	5	0	2	0	1	8	1	29	19	30	28
Beal	+	7	1	15	2	8	3	7	2	5	7	4	3	2	1	11	1	59	20		
	−	11	6	15	4	10	4	12	7	10	5	11	7	4	4	20	6	93	43	22	29
Bingham	+	9	2	17	5	13	7	8	6	6	9	11	4	4	2	15	1	83	36		
	−	7	4	7	3	6	3	8	4	10	6	5	6	3	1	13	5	59	32	10	16
Cameron	+	13	3	19	3	14	6	13	4	10	7	12	5	0	3	13	2	94	33		
	−	8	4	7	5	6	3	6	5	1	3	3	5	3	1	10	3	44	29	5	18
Eastwood	+	9	2	16	7	14	8	7	6	11	13	9	8	2	4	25	4	93	52		
	−	2	2	1	1	1	1	7	1	2	2	9	2	0	1	8	2	30	12	6	5
Ford	+	6	3	14	2	10	5	6	2	7	5	5	5	4	4	15	3	67	29		
	−	12	3	10	6	9	5	9	3	9	7	10	5	4	0	16	7	79	36	15	21
Jones	+	7	1	12	2	12	5	9	4	10	7	5	4	3	4	19	2	77	29		
	−	10	5	16	4	8	4	10	3	4	4	4	4	3	1	8	4	63	29	12	21
Jacobsen	+	4	0	12	3	4	4	4	3	10	8	5	4	0	0	13	2	52	24		
	−	10	5	10	4	10	6	7	4	4	4	2	5	1	4	15	3	59	35	24	26
Marshall	+	11	0	20	5	8	5	5	4	10	12	2	9	4	5	25	4	85	44		
	−	5	5	5	2	10	3	12	4	5	1	0	1	3	0	3	2	41	18	9	10
Mahoney	+	5	1	6	1	14	4	5	0	4	8	4	2	0	1	4	0	42	17		
	−	12	5	6	6	5	6	6	4	2	2	2	8	3	3	17	0	53	34	29	30
Noyes	+	4	1	12	3	9	5	5	5	5	6	2	2	3	1	10	0	50	23		
	−	8	6	1	5	8	5	7	2	3	5	11	8	1	2	18	7	57	40	27	27
Ouellette	+	8	6	8	7	5	4	3	5	8	8	10	3	0	3	12	0	54	36		
	−	9	6	4	1	6	4	4	3	4	4	9	0	0	2	12	1	48	15	23	16
Prophet	+	13	1	10	7	13	5	7	4	7	7	7	6	1	0	7	3	65	33		
	−	2	0	8	0	3	4	6	2	1	4	3	2	1	3	8	3	32	18	17	18
Robinson	+	19	7	29	6	16	6	17	9	10	12	7	9	2	4	21	3	121	56		
	−	2	1	1	1	4	1	1	0	3	1	7	1	6	0	5	3	29	8	1	1
Scribner	+	11	4	15	6	13	6	9	7	9	10	10	8	5	5	21	4	93	50		
	−	5	3	8	3	5	2	7	2	4	2	5	2	3	0	13	4	51	18	6	6
Tataronis	+	13	4	18	5	12	7	14	9	11	11	8	10	2	4	21	5	104	55		
	−	0	2	7	1	7	2	3	1	7	3	12	0	3	0	12	3	51	12	3	3
Whittaker	+	13	2	20	7	11	6	12	6	14	14	16	10	6	4	24	4	116	53		
	−	5	7	5	3	10	3	7	3	4	1	4	0	2	1	10	5	47	23	2	4

SUMMARY OF DIAGNOSTIC TESTS 1935-1936

TABLE NO. XLIX

Check Section (con't)

1935-1936
A-Beginning
B-Ending
Total Possible Score

		Addition A (21)	Addition B (10)	Subtraction A (30)	Subtraction B (10)	Multiplication A (22)	Multiplication B (10)	Division A (20)	Division B (10)	Denominate Nos. A (18)	Denominate Nos. B (15)	Frac. Dec. P. C. A (20)	Frac. Dec. P. C. B (10)	Interest A (8)	Interest B (5)	Mensuration A (34)	Mensuration B (10)	Totals A (173)	Totals B (80)	Relative Rank A	Relative Rank B
Wilcox	+	7	3	10	3	9	7	4	5	4	10	5	6	2	1	19	3	80	38		
	−	11	2	12	4	11	2	11	3	5	3	6	3	3	4	11	5	70	26	20	13
Zielski	+	8	2	5	3	11	7	4	4	7	12	2	4	0	3	14	2	51	37		
	−	6	1	9	0	2	1	3	1	5	1	1	0	0	1	5	0	31	5	25	15
Average Score		9.5	2.5	14.2	4.2	10.9	5.4	7.6	4.4	8.1	9.2	6.6	5.7	2.1	2.7	15.8	2.3	75.0	36.7		
Average Errors		8.9	3.3	7.3	3.9	6.3	3.4	6.8	2.8	4.4	3.3	5.4	3.1	21.2	1.5	10.7	3.3	50.2	23.9		
Av. % Score		45.2	25	47.3	42.5	49.9	54.5	38.2	44.5	45.3	61.3	33.2	57.5	26.2	54	46.5	23	43.4	45.9		
Av. % Errors		32.8	33	24.3	29	28.6	34.5	34	28.5	24.4	22.3	27	31	27.5	30	31.5	33.5	29	29.9		
% Inc. Score			-20.2		-4.8		5		6.3		16		24.3		27.8		-23.5		2.5		
% Dec. Errors			-.2		-4.7		-5.9		5.5		2.1		-4		-2.5		-2		-.9		
Median Score		8.5	2	14.5	4	11.5	5.5	7	4	8.5	8.5	6	5	2	3	15	2.5	72	36		
Median Errors		7.5	3.5	7	3	6	3	7	3	4	3.5	4.5	2	3	1	10.5	3	48.5	24.5		
Median % Score		40.5	20	48.3	40	52.3	55	35	40	47.2	56.7	30	50	25	60	44.1	25	41.6	45		
Median % Errors		35.7	35	23.3	30	27.3	30	35	30	22.2	233	22.5	20	37.5	20	30.9	30	23.6	30.6		
Median % Score Increase			-20.5		-8.3		2.7		5		9.5		20		35		-19.1		3.4		
Median % Error Decrease			-.7		-6.7		-2.7		5		-1.1		2.5		17.5		-.9		-.2		

Table No XXX Comparison Of

Average and Median Percent Scores

In Seven Tests 1935-'36

| | = Median Scores
□ = Check Section
□ = Drilled Section
A = Diagnostic Tests
B = Army Alpha
C = Army Alpha Mathe
D = Kent-Shakow Time limit
E = Kent-Shakow Mathe Time
F = Kent-Shakow No time
G = Kent-Shakow Mathe No time

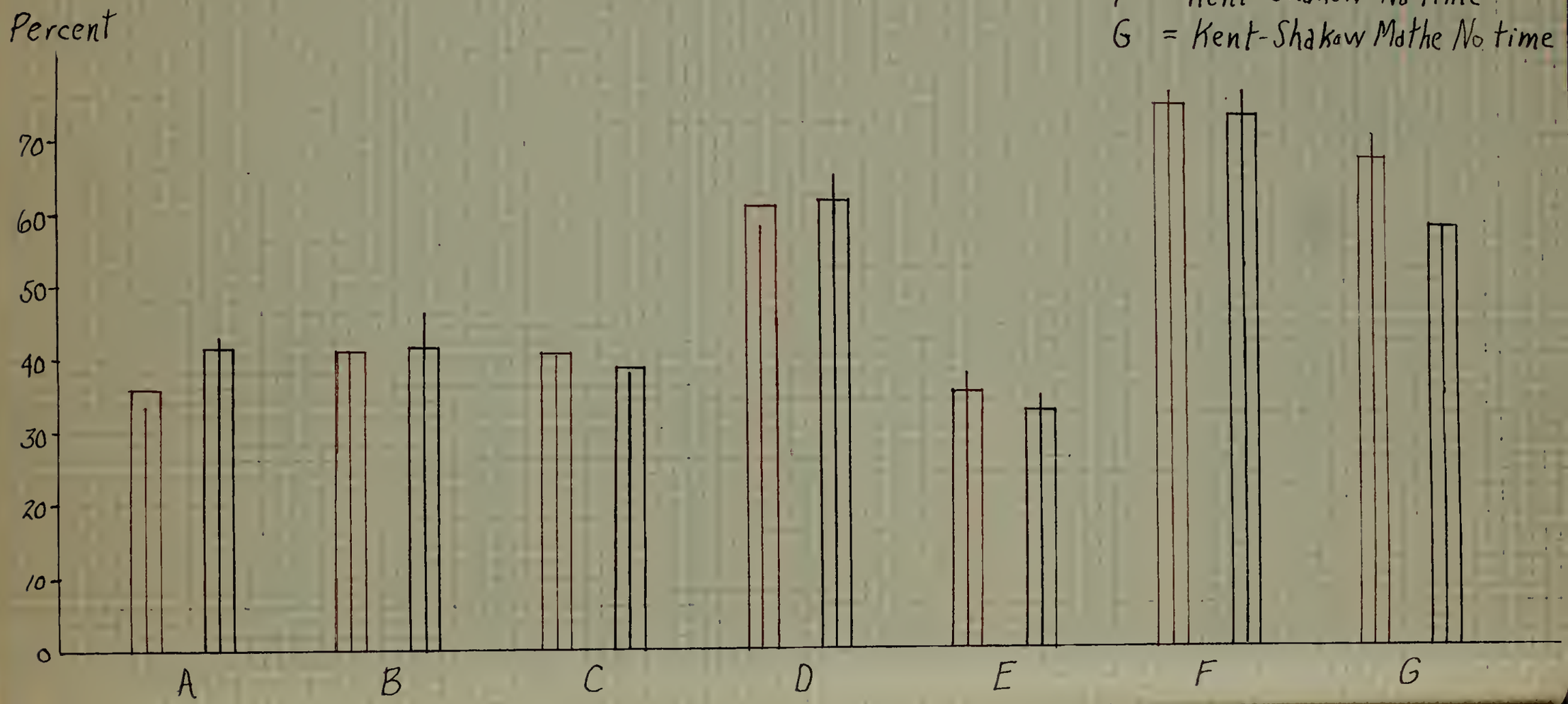


Table No XXXI

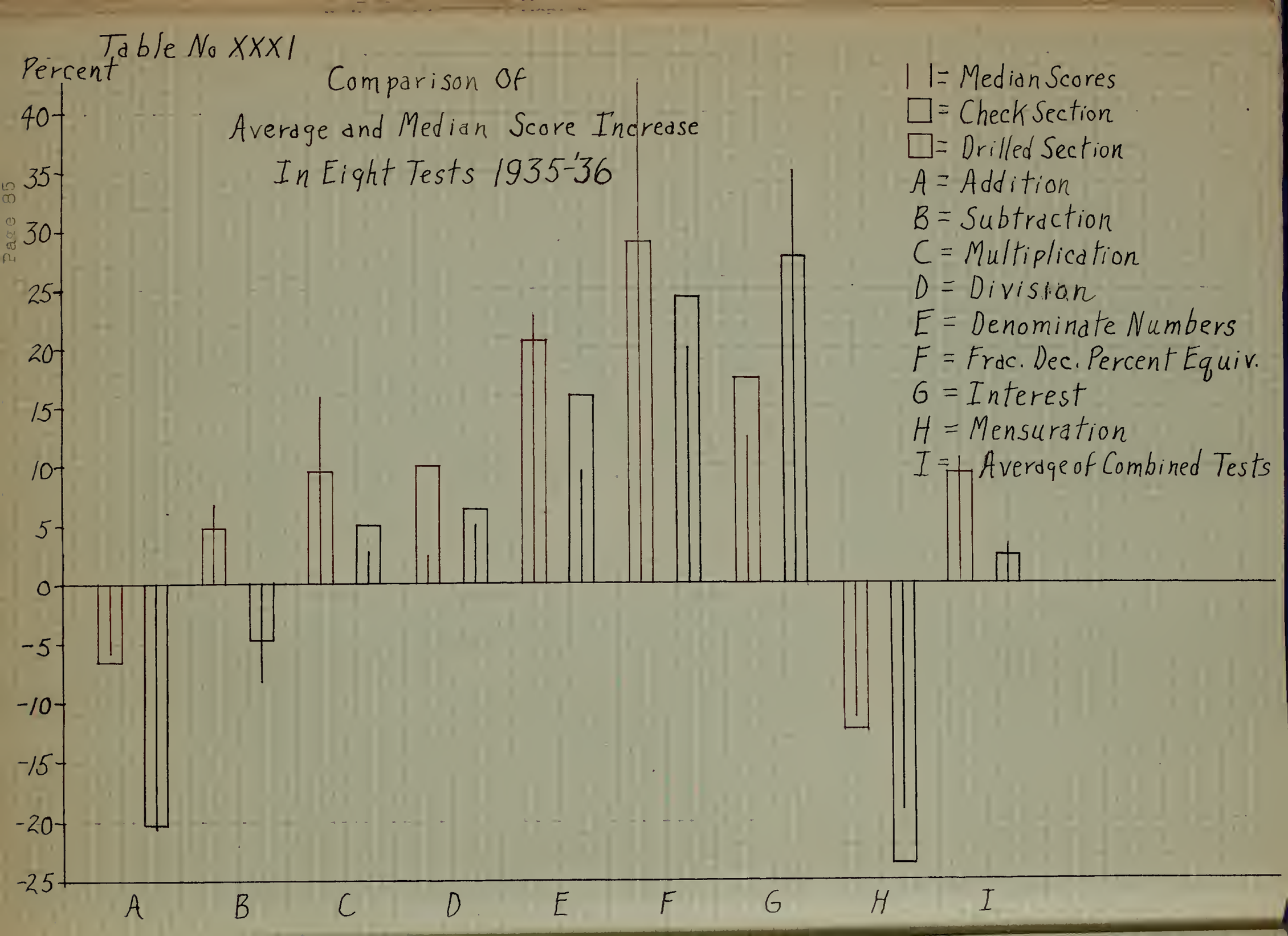
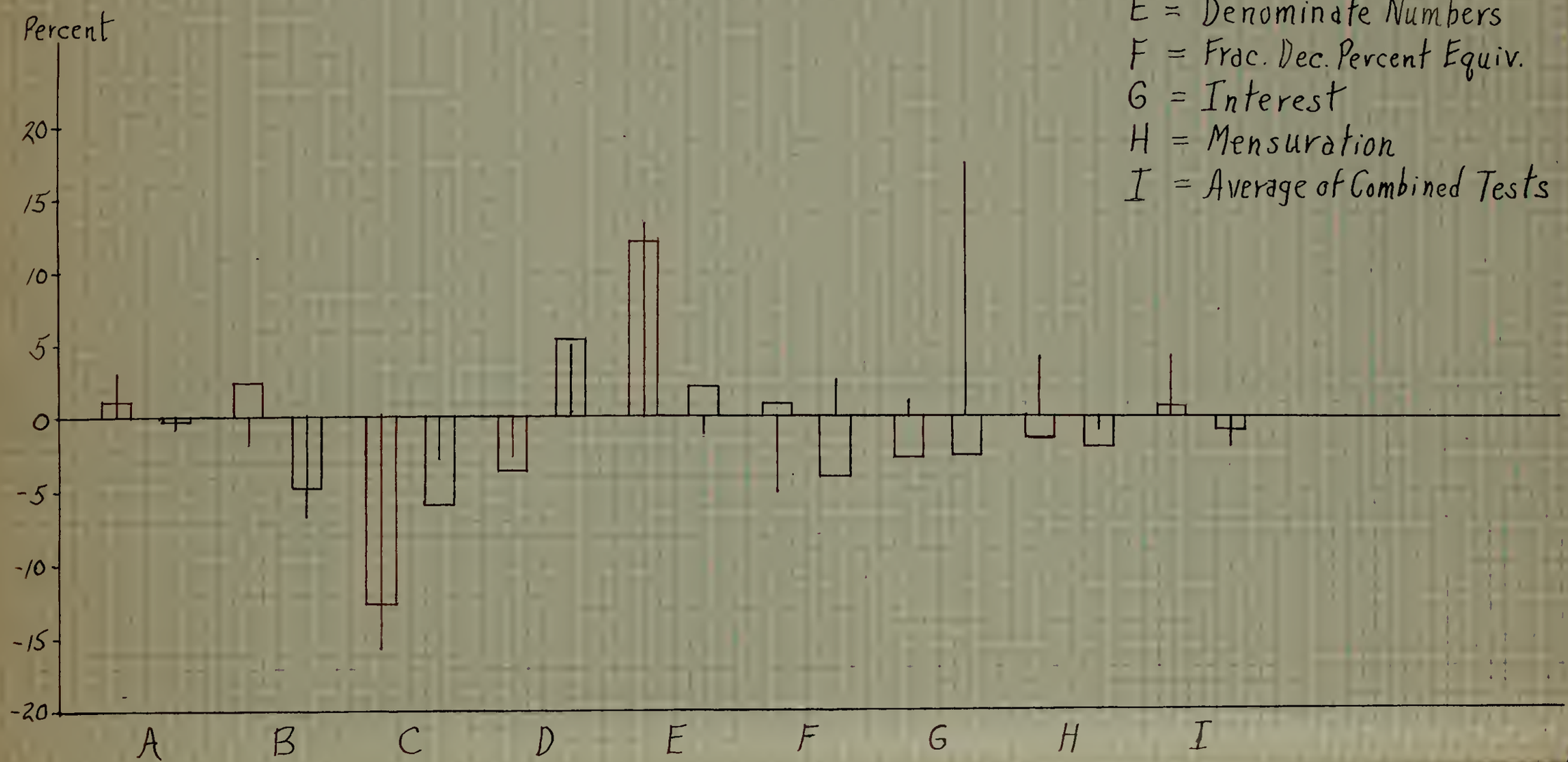


Table No XXXII Comparison Of

Average and Median Error Decrease

In Eight Tests 1935-'36



| | = Median Scores
□ = Drilled Section
□ = Check Section
A = Addition
B = Subtraction
C = Multiplication
D = Division
E = Denominate Numbers
F = Frac. Dec. Percent Equiv.
G = Interest
H = Mensuration
I = Average of Combined Tests

Table No XXXIII Comparison Of

Average and Median Marks

1934-'36

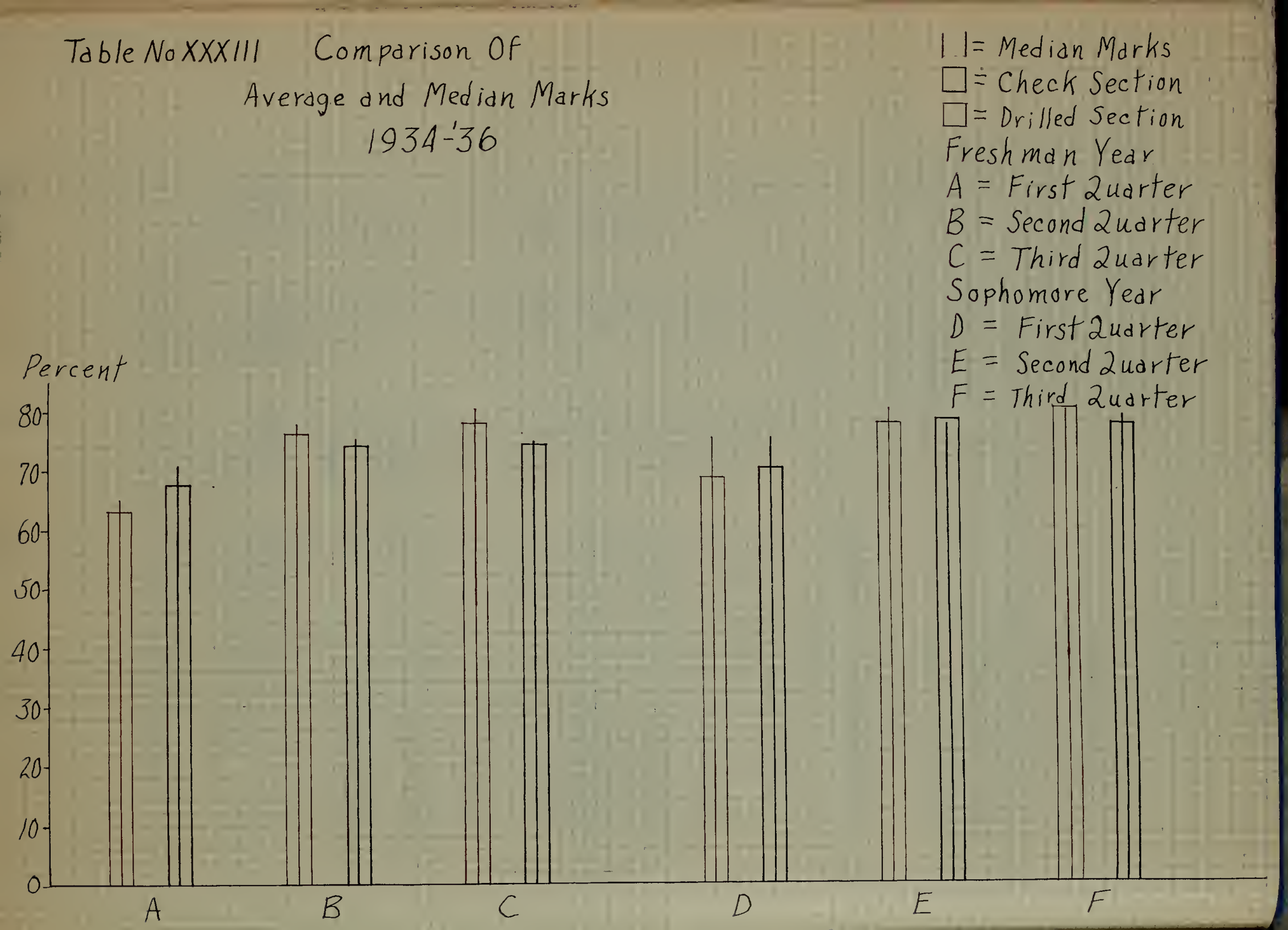


TABLE NO XXXIV

Tabulation of Comparison Results 1935-1936

		Drilled Section		Check Section	
		Score Increase Percent	Error Decrease Percent	Score Increase Percent	Error Decrease Percent
Addition	A	-5.7	3.1	-20.5	.7
	B	-6.5	1.1	-20.2	-.2
Subtraction	A	6.7	-1.7	-8.3	-6.7
	B	4.7	2.3	-5.3	-4.7
Multiplication	A	15.9	-15.5	2.7	-2.7
	B	9.5	-12.6	5	-5.9
Division	A	2.5	-2.5	5	5
	B	10	-3.5	6.3	5.5
Denominate Numbers	A	22.8	13.3	9.5	-1.1
	B	20.6	12.1	16	2.1
Frac.Dec. % Equiv.	A	42.5	-5	20	2.5
	B	29	1	24.3	-4
Interest	A	12.5	1.2	35	17.5
	B	17.5	-2.8	27.8	-2.5
Mensuration	A	-11.2	4.1	-19.1	.9
	B	-12.4	-1.4	-23.5	-2
Combined Tests	A	10.6	4.1	3.4	-2
	B	9.5	.8	2.5	-.9

A- Median B- Average

Interpretation of Results:

The results shown in the above table and those in tables XVI and XXV, which show the last two years' results, are in many respects quite similar. The score increase is apparent in all tests except addition and mensuration. There is a noticeable error decrease in addition, subtraction and denominate numbers.

The drilled section has again shown the greatest score increase in all tests except interest. This fact seems to indicate that the check group had more or better training in interest than the drilled group.

The results of the combined tests show, even more strikingly than in previous years, that the drilled group has made better progress than the check group. The score increase and the error decrease of the drilled group are both about three times that of the check group.

It should be remembered, when interpreting the results of this year's work, that the ending tests were given one year after the beginning tests. In other words, the students were tested at the close of a six month's project season and not during the school year as was the case in previous years. This accounts in part for the increase of errors in some tests.

The comparison of the intelligence test scores, found in table XXX on page 84, shows very similar results to those of previous years. The Kent-Shakow tests, except the Mathe time test, again indicate that the latter are too easy for the mental age of this group of students. The Army Alpha and the Kent-Shakow time test indicate that the groups were of about equal intelligence. The diagnostic tests indicate that the check group was of higher intelligence, while the remaining tests indicate that the drilled group was of higher intelligence.

The comparison of the quarter marks of the two groups found in table XXXIII on page 87. shows that the drilled group made

better progress than the check group during the freshman year. It should be remembered that this group was drilled during the freshman year instead of the sophomore year. The marks of the drilled group were higher in all cases except the first quarter of the freshman year.

The comparison of the first and third quarter marks of the freshman year, found in tables XXVI and XXVII, shows that the drilled group had an average increase of 15.5% and a median increase of 15%. The check group had an average increase of 6.6% and a median increase of 4% for the same period.

The drilled group had a yearly average mark of 72.3% and a median yearly average mark of 74.2% for the freshman year. The check group had a yearly average mark of 71.6% and a median yearly average mark of 73.3% for the same period.

The comparison of the mean and median deviations of the first and third quarter marks for the freshman year are found in tables XXVI and XXVII on pages 77 to 79. The drilled group had a mean deviation decrease of 2.3 and a median deviation decrease of 2.8. The check group had a mean deviation decrease of 3.2 and a median deviation decrease of 2.4 for the same period. These deviations are not great enough to be of any significance.

The effect of the drill is also carried over to the sophomore year as is shown by the following:

(1) The comparison of the first and third quarter marks of the sophomore year shows that the drilled section had an average increase of 11.8% and a median increase of

5%. The check section had an average increase of 5.3% and a median increase of 4% for the same period.

(2) The drilled group had a yearly average mark of 74.2% and a median yearly average mark of 78.3% for the sophomore year. The check group had a yearly average mark of 75.3% and a median yearly average mark of 77.2% for the same period.

(3) The comparison of the mean and median deviations of the first and third quarter marks for the sophomore year shows that the drilled group had a mean deviation decrease of 6.1 and a median deviation decrease of 5.6. The check group had a mean deviation decrease of 5.6 and a median deviation decrease of 4.7 for the same period.

The results of this year's work indicate that the drilled group has made a definite increase in progress above the check group, as indicated by the marks as well as the diagnostic test scores.

TABLE NO. XXXV SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1936-1937

IIA

Total Possible Score	Diagnostic Tests 50	Relative Rank	Army Alpha 212	Relative Rank	Mathe (Alpha) 20	Relative Rank	Kent 189 Time	Relative Rank	Mathe (K) 6 Time	Relative Rank	Kent No 262 Time	Relative Rank	Mathe (K) 40 No Time	Relative Rank	Freshman Year 1st Quarter	2nd Quarter	3rd Quarter	Sophomore Year 1st Quarter	2nd Quarter	3rd Quarter
Burkhardt	53	1	77	15	9	6	113	14	6	7	219	6	31	4	86	86	90	85	75	82
Burton	30	13	73	18	10	3	103	18	7	3	222	5	28	11	65	80	80	50	78	75
Craven	43	5	81	13	7	15	102	19	6	7	183	18	29	10	86	75	88	70	40	75
Dedarian	54	1	103	4	13	1	No records ommited on all tests								89	85	90	90	80	90
Delisio	46	3	99	7	10	3	118	11	5	10	231	3	32	3	98	95	95	95	90	95
Hocter	20	22	77	15	18	12	106	17	3	17	192	16	22	17	90	80	80	70	85	88
Kelly P.	28	16	100	6	11	1	129	7	7	3	230	4	30	8	85	75	85	75	80	90
Kenney	29	14	110	3	9	6	159	1	7	3	206	9	25	14	75	80	75	75	75	80
McDonough	29	14	82	12	5	21	148	2	9	1	233	2	35	1	65	65	80	60	50	70
Nealey	24	19	87	10	9	6	114	13	2	21	198	12	31	4	70	77	80	70	90	85
Nollett	37	8	94	8	7	15	123	8	4	11	189	17	24	16	90	90	84	85	90	95
Paulsen	23	20	102	4	5	21	119	10	1	25	196	14	13	25	80	70	75	70	75	78
Rock	36	9	114	1	10	3	145	3	7	3	201	11	31	4	80	75	70	80	80	83
Stone	46	3	71	20	9	6	139	4	4	11	196	14	18	20	93	90	92	80	70	80
True	31	14	No records omitted on all tests												77	80	85	90	80	80
Walker	39	7	114	1	11	1	132	6	8	2	234	1	33	2	90	85	85	80	70	80
Average Score	34.5		91.5		8.6		125		5.4		209.6		27.3		82.4	80.5	83.4	75.9	74.9	82.9
Average % Score	43.1		43.2		43		66.1		33.8		80		68.2							

TABLE NO. XXV (con't) SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1936-1937

IIA

	Diagnostic Tests	Relative Rank	Army Alpha	Relative Rank	Mathe (K) Time	Relative Rank	Kent Time	Relative Rank	Mathe (K) Time	Relative Rank	Kent No Time	Relative Rank	Mathe (K) No Time	Relative Rank	Freshman Year 1st Quarter	2nd Quarter	3rd Quarter	Sophomore Year 1st Quarter	2nd Quarter	3rd Quarter
Total Possible Score	80		212		20		99		50		82		90							
Median Score	33		90.5		9		121		6		203.5		29.5		85.5	80	84.5	77.5	79	81
Median % Score	41.2		42.7		45		64		37.5		77.7		73.7							
Mean Deviation																		8.4	8.7	5.7
Median Deviation																		8.4	8.2	5.4

TABLE NO. XLVI SUMMARY OF INTELLIGENCE TESTS AND ARITHMETIC MARKS 1936-1937

IIB

Total Possible Score	Dignostic 30	Relative Rank	Army Alpha 212	Relative Rank	Mathe (Alpha) 20	Relative Rank	Kent Time 189	Relative Rank	Mathe (K) Time 16	Relative Rank	Kent No Time 262	Relative Rank	Mathe (K) No Time 40	Relative Rank	Freshman Year 1st Quarter	2nd Quarter	3rd Quarter	Sophomore Year 1st Quarter	2nd Quarter	3rd Quarter
Connell	4	29	No records omitted on all tests												20	20	60	20	30	40
Draper	23	16	69	21	6	19	82	22	3	17	172	23	18	20	90	80	85	70	70	80
Edmands	21	21	81	13	5	21	133	5	2	21	183	20	16	23	65	70	72	65	75	75
Johnson	36	9	101	5	6	19	115	14	4	11	197	13	15	24	78	88	90	80	90	90
Kelley D	11	26	55	25	5	21	59	26	2	21	135	26	22	17	85	60	70	65	70	78
Lynch	35	11	77	15	8	12	94	20	4	11	184	19	31	4	85	85	85	75	85	90
Nicholson	42	6	60	22	7	15	120	9	3	17	203	10	25	14	80	80	80	50	80	70
Pead	47	2	91	9	9	6	87	21	4	11	214	7	28	11	87	87	90	90	95	98
Russell	16	24	57	24	5	21	107	16	1	25	169	24	10	26	65	80	60	40	40	75
Ryan	19	23	42	26	5	21	72	25	4	11	165	25	18	20	75	60	75	70	75	80
Silva	15	25	60	22	8	12	78	24	2	21	182	21	26	13	60	70	75	30	40	65
Strong	32	12	87	10	9	6	115	12	6	7	210	8	30	8	82	80	76	70	78	80
Thomas	27	18	73	18	7	15	89	23	3	17	176	22	21	19	80	85	90	75	78	80
Average Score	27.4		71.1		6.7		95		3.2		175		21.7		73.2	70.4	77.5	61.5	69.7	77
Average % Score	34.2		33.5		33.5		50.3		20		66.8		54.2							
Median Score	27.5		71		6.5		90.5		3		182.5		21.5		80	80	76	70	75	80
Median % Score	34.4		33.5		47.9		18.8		89.6		53.7		34.4							
Mean Deviation																		16.3	15.2	9.5
Median Deviation																		14.6	13.9	8.8

TABLE NO. XXXVII — SUMMARY OF DIAGNOSTIC TEST — 1936-1937

IIA

A- Beginning
B- Ending

		Addition A	Addition B	Substraction A	Substraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Nos. A	Denominate Nos. B	Frac. Dec. Eq. A	Frac. Dec. Eq. B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B	Relative Rank A	Relative Rank B
Total Possible Score		10	10	10	10	10	10	10	10	15	15	15	10	5	5	10	10	80	80		
		Drilled		Check		Drilled		Drilled		Check		Check		Drilled		Drilled					
Burkhardt	+	5	7	6	9	8	7	7	7	9	9	10	9	5	5	3	5	53	58		
	−	1	3	2	1	1	3	2	3	4	4	0	1	0	0	6	4	16	19	2	6
Burton	+	4	5	3	7	4	8	2	5	12	9	1	3	1	3	3	3	30	43		
	−	1	2	3	3	6	1	4	5	3	3	3	1	3	2	1	2	24	19	15	15
Craven	+	3	6	4	9	6	10	3	9	10	12	9	9	5	4	3	4	43	63		
	−	4	4	3	1	4	0	5	1	5	3	1	1	0	1	2	4	26	19	6	2
Dedarian	+	6	8	8	10	4	7	5	9	13	14	9	10	5	5	4	7	54	70		
	−	2	2	2	0	6	3	2	1	2	1	1	0	0	0	3	0	18	7	1	1
Delisio	+	2	6	7	8	7	10	7	9	9	10	6	9	4	5	4	6	46	63		
	−	3	0	0	2	2	0	0	1	3	1	1	1	1	0	1	3	11	8	4	2
Hocter	+	1	2	3	6	4	6	1	7	8	7	3	1	0	3	0	1	20	33		
	−	4	5	4	2	6	3	3	3	2	3	3	1	4	2	4	6	30	25	24	23
Kelley P.	+	2	6	5	6	1	6	1	7	10	8	6	8	0	2	3	6	23	49		
	−	2	2	0	3	5	3	1	0	2	3	0	2	4	3	0	0	14	16	18	11
Kenney	+	3	6	3	4	5	7	3	7	11	10	3	5	1	4	0	5	29	48		
	−	3	4	3	4	4	3	4	1	0	1	1	0	1	0	0	0	16	13	16	14
McDonough	+	3	7	6	2	3	6	1	1	8	9	5	5	3	2	0	3	29	35		
	−	2	1	1	1	5	3	2	0	3	0	5	4	2	1	4	3	24	13	16	20
Mealey	+	3	7	3	2	3	6	1	3	7	9	5	5	1	1	1	5	24	38		
	−	0	1	2	1	2	2	2	2	4	3	5	4	1	1	1	5	17	19	21	17
Nollett	+	1	4	6	8	6	7	4	9	10	10	6	8	3	3	1	5	37	54		
	−	5	4	2	0	4	2	3	1	3	4	3	2	2	2	2	4	24	19	9	10
Paulsen	+	0	3	3	6	4	5	1	6	8	8	5	3	2	2	2	5	25	38		
	−	5	1	4	4	2	4	2	3	3	0	4	1	3	2	1	0	24	15	22	17
Rock	+	2	5	6	10	3	9	3	6	12	12	8	9	0	5	2	6	36	62		
	−	1	3	1	0	3	1	2	3	2	3	2	1	4	0	2	3	17	14	10	4
Stone	+	3	6	4	9	8	9	6	8	11	10	10	9	4	4	0	4	46	59		
	−	1	3	4	1	2	1	2	2	4	5	0	1	1	1	5	4	19	18	4	5
True	+	5	4	4	8	4	8	1	3	9	11	6	8	2	3	0	4	31	49		
	−	1	4	0	2	2	2	5	3	6	3	4	1	2	2	0	2	20	19	14	11
Walker	+	2	6	5	9	4	4	5	7	8	13	9	8	4	5	2	4	39	56		
	−	4	2	3	1	3	4	3	3	4	1	1	2	0	0	4	4	22	17	8	7
Average Score		2.8	5.5	4.7	7.1	4.6	7.2	3.2	6.4	9.7	10.1	6.2	6.8	2.5	3.5	1.7	4.6	35.5	51.1		

TABLE NO. XXXVII (con't) SUMMARY OF DIAGNOSTIC TESTS 1936-1937

IIA

A- Beginning B- Ending Total Possible Score	Addition A 10	Addition B 10	Subtraction A 10	Subtraction B 10	Multiplication A 10	Multiplication B 10	Division A 5	Division B 10	Denominate Nos. A 5	Denominate Nos. B 5	Frac. Dec. Eq. A 10	Frac. Dec. Eq. B 10	Interest A 5	Interest B 5	Mensuration A 10	Mensuration B 10	Totals A 80	Totals B 80	Relative Rank A	Relative Rank B
Average Errors	2.4	2.6	2.1	1.6	3.6	2.2	2.6	2	3.1	3.4	2.1	1.4	1.7	1.1	2.2	2.7	20	16		
Average Score Increase		2.7		2.4		2.6		5.2		.4		.6		1		2.9		15.6		
Average Error Decrease		-.2		.5		1.4		.6		.7		.7		.6		-.5		4		
Median Score	3	6	4.5	8	4	7	3	7	9.5	10	6	8	2.5	3.5	2	5	33.5	51.5		
Median Errors	2	2.5	2	1	3.5	2.5	2	2	3	3	1.5	1	1.5	1	2	3	19.5	16.5		
Median Score Increase		3		3.5		3		4		.5		2		1		3		18		
Median Error Decrease		-.5		1		1		0		0		.5		.5		-1		3		

TABLE NO. XXXVIII — SUMMARY OF DIAGNOSTIC TESTS 1936-1937

IIB

A- Beginning
B- Ending
Total Possible Score

		Addition A 10	Addition B 10	Substraction A 10	Substraction B 10	Multiplication A 10	Multiplication B 10	Division A 10	Division B 10	Denominate Nos. A 15	Denominate Nos. B 15	Frac. Dec. Eq. A 10	Frac. Dec. Eq. B 10	Interest A 5	Interest B 5	Mensuration A 10	Mensuration B 10	Totals A 80	Totals B 80	Relative Rank A	Relative Rank B
		Check		Drilled		Check		Check		Drilled		Drilled		Check		Check					
Connell	+	2	2	2	4	0	1	0	0	0	0	0	1	0	0	0	0	4	8		
	−	1	2	2	2	3	7	0	1	7	3	3	5	1	1	1	4	18	25	29	29
Draper	+	4	7	5	7	6	6	1	4	7	6	3	6	1	2	1	2	26	40		
	−	2	1	2	2	1	2	2	2	1	1	3	4	1	0	4	2	16	14	18	16
Edmands	+	1	3	4	4	3	6	1	1	6	6	4	5	0	0	2	2	21	34		
	−	3	3	2	2	4	2	4	2	5	2	5	6	4	2	3	2	30	21	23	26
Johnson P	+	4	7	5	6	7	8	3	4	6	10	8	10	3	3	0	1	36	49		
	−	1	0	0	1	0	2	2	2	2	1	2	0	0	1	0	2	7	9	10	11
Kelley D	+	1	4	2	2	0	3	0	1	6	6	1	3	0	0	1	0	11	19		
	−	3	1	4	2	4	4	2	2	1	0	1	1	5	2	0	3	20	15	28	28
Lynch	+	4	7	4	10	8	9	3	5	10	11	3	8	2	2	1	4	35	56		
	−	3	3	3	0	2	1	4	4	5	4	7	2	1	1	0	3	25	18	12	7
Nicholson	+	6	5	4	4	7	6	4	4	11	10	8	5	1	3	1	1	42	38		
	−	3	5	3	5	3	4	2	6	3	3	2	5	4	2	3	2	23	32	7	17
Pead	+	5	7	8	7	8	8	4	8	12	11	8	10	4	4	0	1	47	56		
	−	3	2	0	1	1	2	0	0	0	1	2	0	0	0	0	1	6	7	3	7
Russell	+	2	6	1	4	3	2	3	2	4	4	2	1	1	0	0	1	16	20		
	−	2	0	6	2	5	5	3	2	5	6	0	1	4	0	3	0	28	16	26	27
Ryan	+	0	4	1	6	3	4	2	4	8	6	3	5	2	3	0	0	19	32		
	−	7	1	7	1	3	6	4	4	1	5	2	5	1	2	0	4	25	28	25	24
Silva	+	2	4	5	7	2	2	0	1	6	7	0	6	0	0	0	0	15	27		
	−	2	9	2	2	3	4	2	1	2	3	1	1	0	0	0	1	12	21	27	25
Strong	+	4	3	7	6	5	5	4	6	7	8	3	6	2	1	0	0	32	35		
	−	2	3	1	3	3	5	3	0	3	2	2	4	2	0	1	0	17	26	13	20
Thomas	+	3	4	3	5	3	2	4	3	8	9	5	7	1	3	0	1	27	34		
	−	7	4	4	4	6	7	2	4	3	1	5	3	4	1	4	4	35	28	20	22
Average Score		2.9	4.8	3.9	5.5	4.1	4.8	2.2	3.3	7	7.2	3.7	5.4	1.3	1.6	.5	1	35.6	33.7		
Average Errors		3	2.6	2.8	2.1	2.9	3.9	2.3	2.3	2.9	2.5	2.7	2.8	2.1	.9	1.3	2.8	30.2	20		
Average Score Increase			1.9		1.6		.7		1.1		.2		1.7		.3		.5		8.1		
Average Error Decrease			.4		.7		-1		0		.4		-.1		1.2		-1.3		.2		

TABLE NO. XXVIII (con't) SUMMARY OF DIAGNOSTIC TESTS 1936-1937

IIB

A- Beginning
B- Ending

	Total Possible Score	Addition A10	Addition B10	Substraction A10	Substraction B10	Multiplication A10	Multiplication B10	Division A10	Division B10	Denominate Nos. A15	Denominate Nos. B15	Frac. Dec. Eq. A10	Frac. Dec. Eq. B10	Interest 5 A	Interest 5 B	Mensuration A10	Mensuration B10	Totals 80 A	Totals 80 B	Relative Rank A	Relative Rank B
Median Score		3	4	4	6	3	5	3	4	7	7	3	6	1	2	0	1	27	34		
Median Errors		3	2	3	3	3	4	2	2	3	3	2	3	1	1	1	2	20	21		
Median Score Increase			1		2		2		1		0		3		1		1		7		
Median Error Decrease		1			0		-1		0		0		-1		0		-1		-2		

TABLE NO. XXXIX SUMMARY OF AVERAGE AND MEDIAN SCORES AND ERRORS 1936-1937

A-Beginning B-Ending / Drilled Section	Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Nos. A	Denominate Nos. B	Frac. Dec. P.C. Eq. A	Frac. Dec. P.C. Eq. B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B	Average of Combined Test
Average Score	2.8	5.5	3.9	5.5	4.6	7.2	3.2	6.4	7	7.2	3.7	5.4	2.5	3.5	1.7	4.6	29.4	45.3	
Average Errors	2.4	2.6	2.8	2.1	3.6	2.2	2.6	2	2.9	2.5	2.7	2.8	1.7	1.1	2.2	2.7	20.9	18	
Average Score Increase		2.7		1.6		2.6		3.2		.2		1.7		1		2.9		15.9	2
Average Error Decrease		-.2		.7		1.4		.6		.4		-.1		.6		-.5		2.9	.36
Median Score	3	6	4	6	4	7	3	7	7	7	3	6	2.5	3.5	2	5	28.5	47.5	
Median Errors	2	2.5	2	2	3.5	2.5	2	2	3	3	2	3	1.5	1	2	3	18	19	
Median Score Increase		3		2		3		4		0		3		1		3		19	3.1
Median Error Decrease		-.5		0		1		0		0		-1		.5		-1		-1	-.12
Check Section																			
Average Score	2.9	4.8	4.7	7.1	4.1	4.8	2.2	3.3	9.7	10.1	6.2	6.8	1.3	1.6	.5	1	31.6	39.5	
Average Errors	3	2.6	2.1	1.6	2.9	3.9	2.3	2.3	3.1	2.4	2.1	1.4	2.1	.9	1.5	2.8	19.1	17.9	
Average Score Increase		1.9		2.4		.7		1.1		.4		.6		.3		.5		7.9	1
Average Error Decrease		.4		.5		-1		0		.7		.7		1.2		-1.3		1.2	.15
Median Score	3	4	4.5	8	3	5	3	4	9.5	10	6	8	1	2	0	1	30	42	
Median Errors	3	2	2	1	3	4	2	2	3	3	1.5	1	1	1	1	2	16.5	16	
Median Score Increase		1		3.5		2		1		.5		2		1		1		12	1.5
Median Error Decrease		1		1		-1		0		0		.5		0		-1		.5	.06

TABLE NO. XI SUMMARY OF RELATIVE RANKS IN DIAGNOSTIC TESTS 1936-1937

	Beginning Tests									Ending Tests								
	Addition	Substraction	Multiplication	Division	Denominate Numbers	Frac. Dec. & Equiv.	Interest	Mensuration	Combined Tests	Addition	Substraction	Multiplication	Division	Denominate Numbers	Frac. Dec. & Equiv.	Interest	Mensuration	Combined Tests
Burkhardt	3	5	1	1	12	1	1	3	2	2	4	10	7	14	4	1	5	6
Burton	6	20	13	17	2	26	16	3	15	16	11	6	15	14	23	10	15	15
Connell	17	26	28	27	29	28	23	16	29	23	32	29	29	29	27	25	25	29
Craven	11	14	7	11	8	3	1	3	6	8	4	1	1	3	4	6	10	2
Dedarian	1	1	13	4	1	3	1	1	1	1	1	10	1	1	1	1	1	1
Delisio	17	3	4	1	12	10	4	1	4	9	8	1	1	8	4	1	2	2
Draper	6	9	7	19	21	18	16	10	13	2	11	14	17	24	15	18	17	16
Edmands	24	14	19	19	24	17	23	6	23	25	22	14	25	24	26	25	17	26
Hocter	24	20	13	19	15	18	23	17	24	28	15	14	7	22	27	10	19	23
Johnson	6	9	4	11	24	6	8	16	10	2	15	6	17	8	1	10	19	11
Kelley D.	24	26	28	27	24	26	23	10	28	19	27	25	25	24	23	25	25	28
Kelley P.	17	9	27	19	8	10	23	3	18	9	15	14	7	19	9	18	2	11
Kenney	11	20	11	11	5	18	16	16	16	9	22	10	7	8	18	6	5	14
Lynch	6	14	1	11	8	13	11	10	12	2	1	3	15	5	9	8	10	7
McDonough	11	5	19	19	15	14	8	16	16	2	27	14	25	14	18	18	15	20
Nealey	11	20	19	19	21	14	16	10	21	2	27	14	21	14	18	23	5	17
Nicholson	1	14	4	6	5	6	16	10	7	16	22	14	17	8	9	10	19	17
Nollett	24	5	7	6	8	10	8	10	9	19	8	10	1	8	18	10	5	10

TABLE NO. XL (con't) SUMMARY OF RELATIVE RANKS IN DIAGNOSTIC TESTS 1936-1937

	Beginning Tests									Ending Tests								
	Addition	Substraction	Multiplication	Division	Denominate Numbers	Frac. Dec. % Equiv.	Interest	Mensuration	Combined Tests	Addition	Substraction	Multiplication	Division	Denominate Numbers	Frac. Dec. % Equiv.	Interest	Mensuration	Combined Tests
Paulsen	28	20	13	19	15	18	11	6	22	25	15	21	12	19	23	18	5	17
Pead	3	1	7	6	2	6	4	16	3	2	11	6	5	5	1	6	19	7
Rock	17	5	19	11	2	6	23	6	10	16	1	3	12	3	4	1	2	4
Russell	17	23	19	11	23	25	16	16	26	9	22	26	24	23	27	25	19	27
Ryan	23	28	19	17	15	18	11	16	25	19	15	23	17	24	18	10	25	24
Silva	17	9	26	27	24	23	23	16	27	19	11	26	25	22	15	25	25	25
Stone	11	14	1	3	5	1	4	16	4	9	4	3	5	8	4	6	10	20
Strong	6	3	11	6	21	13	11	16	13	25	15	21	12	19	15	23	25	5
Thomas	11	20	19	6	15	14	16	16	20	19	21	26	21	14	14	10	19	22
True	3	14	13	19	12	10	11	16	14	19	8	6	21	5	9	10	10	11
Walker	17	9	13	4	15	3	4	6	8	9	4	23	7	2	9	1	10	7

Table No XLI Comparison Of

Average and Median Percent Scores

In Seven Tests 1936-'37

| | = Median Scores
□ = IIB Section
□ = IIA Section
A = Diagnostic Tests
B = Army Alpha
C = Army Alpha Mathe
D = Kent-Shakow Time limit
E = Kent-Shakow Mathe Time
F = Kent-Shakow No time
G = Kent-Shakow Mathe No time

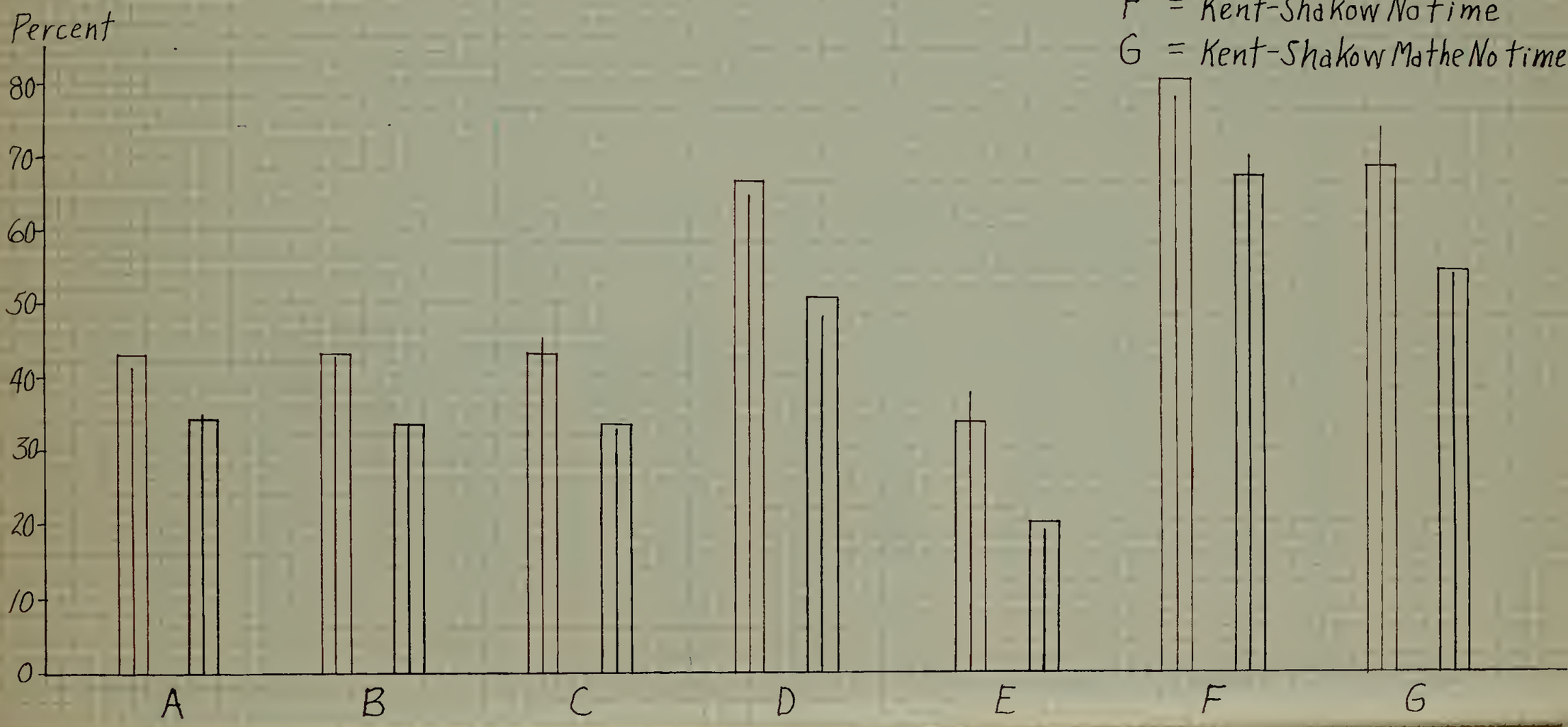


Table No XLII Comparison Of
Average and Median Score Increase
In Eight Tests 1936-37

| | = Median Scores
□ = Check Section
□ = Drilled Section
A = Addition
B = Subtraction
C = Multiplication
D = Division
E = Denominate Numbers
F = Frac. Dec. Percent Equiv.
G = Interest
H = Mensuration
I = Average of Combined Tests

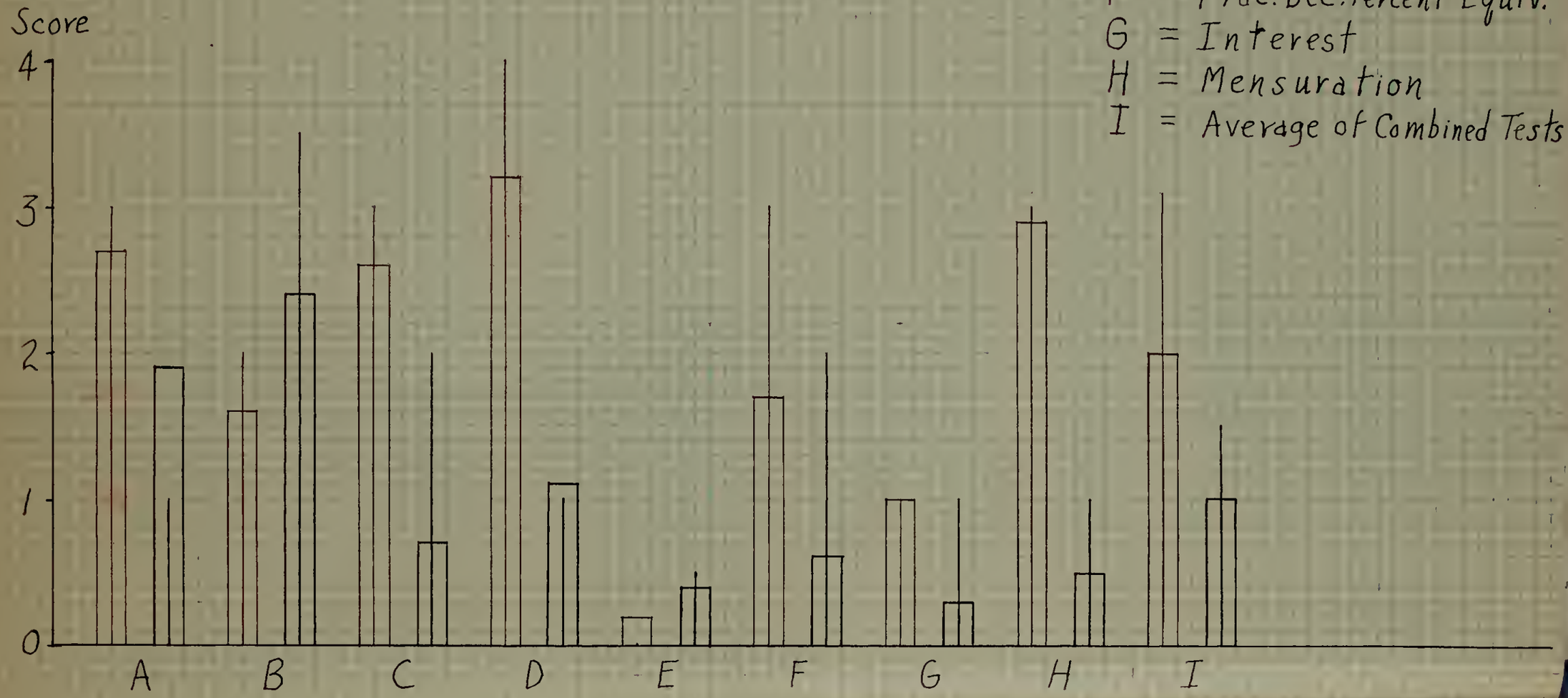


Table No XLIII Comparison Of
Average and Median Error Decrease
In Eight Tests 1936-37

| | = Median Scores
□ = Check Section
□ = Drilled Section
A = Addition
B = Subtraction
C = Multiplication
D = Division
E = Denominate Numbers
F = Frac. Dec. Percent Equiv.
G = Interest
H = Mensuration
I = Average of Combined Tests

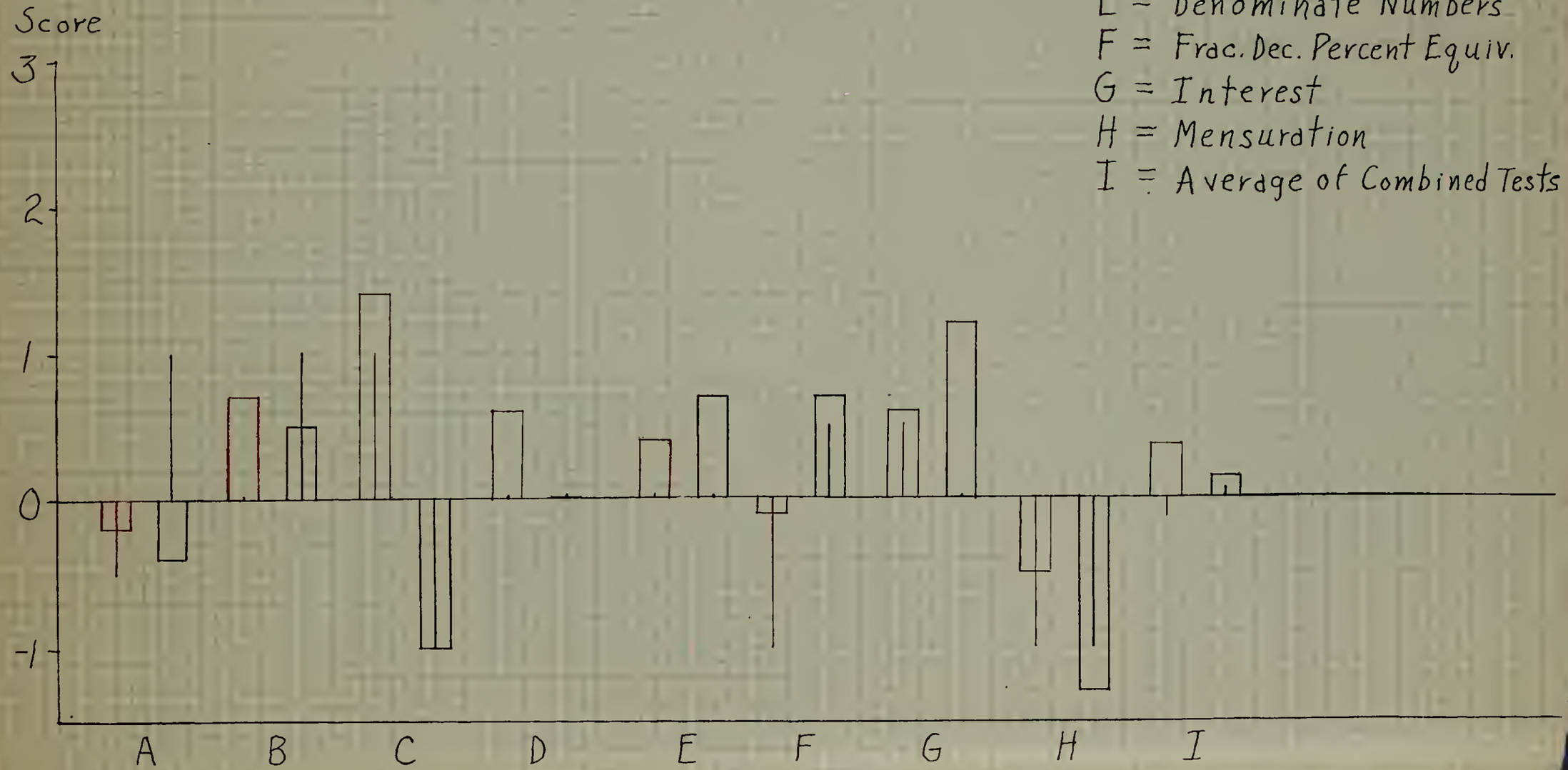


Table No XLIV Comparison Of Average and Median Marks 1935-'37

| = Median Marks
□ = IIB Section
□ = IIA Section
A = First Quarter Freshman Yr.
B = Second Quarter Freshman Yr.
C = Third Quarter Freshman Yr.
D = First Quarter Sophomore Yr.
E = Second Quarter Sophomore Yr.
F = Third Quarter Sophomore Yr.

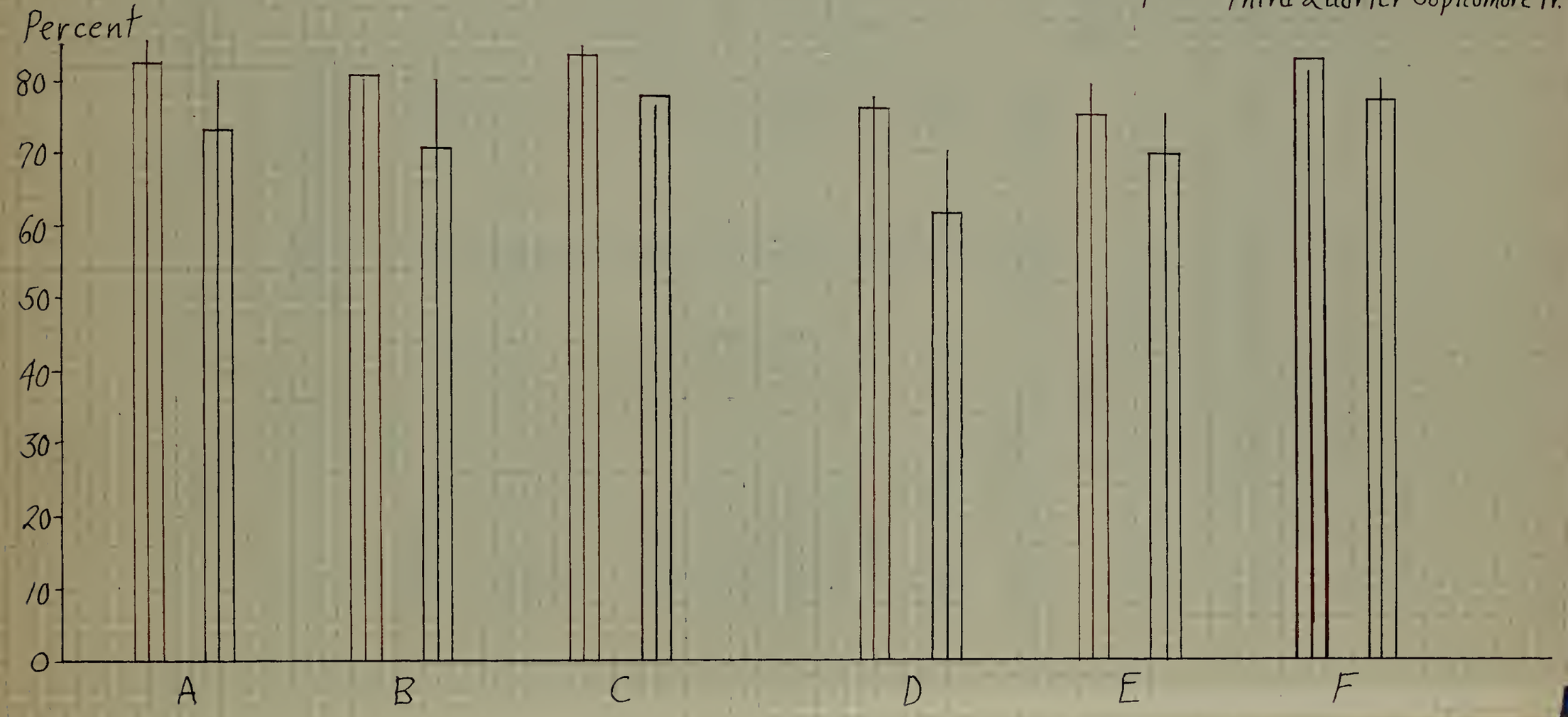


TABLE NO. XLV

Table of Comparison Results 1936-1937

			Drilled Section			Check Section	
			Score Increase Percent	Error Decrease Percent		Score Increase Percent	Error Decrease Percent
Addition	A	1	30	-5	2	10	10
	B		27	-2		19	4
Subtraction	A	2	20	0	1	35	10
	B		16	7		24	5
Multiplication	A	1	30	10	2	20	-10
	B		26	14		7	-10
Division	A	1	40	0	2	10	0
	B		32	6		11	0
Denominate Numbers	A	2	0	0	1	3.4	0
	B		1.3	2.6		2.6	4.7
Frac. Dec. % Equiv.	A	2	30	-10	1	20	5
	B		17	-1		6	7
Interest	A	1	20	10	2	20	0
	B		20	12		6	24
Mensuration	A	1	30	-10	2	0	-10
	B		29	-5		5	-13
Combined Tests	A		23.8	-1.2		15	.6
	B		19.9	3.6		9.9	1.9

A- Median
B- Average
1- IIA Section
2- IIB Section

Interpretation of Results:

It should be remembered that the groups were rotated this year to offset the differences of group ability.

The results shown in the table above and in tables XVI, XXV and XLIV, which show the results of the previous three years' work are in many respects, quite similar. In the units in

which the IIA section was used as the drilled group, it showed the greatest increase in both speed and accuracy in all cases. In the units in which the IIB section was used as the drilled group, it showed the highest score increase in fraction decimal percent equivalents but was lowest in both speed and accuracy in subtraction and denominate numbers.

The results of the combined tests show that the drilled group has doubled the score increase and the error decrease of the check group. These results are similar to those of previous years.

The comparison of the intelligence test scores found in table XLI on page 102 shows very similar results to those of previous years. The ease of the Kent-Shakow tests in comparison with the other tests is again apparent. There was also a wider difference of intelligence between the two groups of students. The IIA group had from ten to sixteen percent higher scores than the IIB group on all tests.

The comparison of the quarter marks, found in table XLIV on page 105, shows that both groups have made good progress. It should be remembered that both groups were rotated as the drill and check sections. A noticeable leveling off of the marks is shown in the second and third quarters of the sophomore year. This fact indicates that the effect of drill on both groups is showing up as in previous years.

The comparison of the first and third quarter marks of the sophomore year, found in tables XXXV and XXXVI, shows that the

IIA section had an average increase of 7% and a median increase of 3.5%. The IIB section had an average increase of 15.5% and a median increase of 10% for the same period.

The IIA group had a yearly average mark of 77.9% and a median yearly average mark of 79.3% for the sophomore year. The IIB group had a yearly average mark of 69.4% and a median yearly average mark of 75% for the same period.

The comparison of the mean and median deviations of the first and third quarters of the sophomore year, found in tables XXXV and XXXVI, shows that the IIA group had a mean deviation decrease of 2.7 and median deviation decrease of 3. The IIB group had a mean deviation decrease of 6.8 and a median deviation decrease of 5.8 for the same period.

All of the above facts indicate that the effects of drill are showing up as in previous years, as indicated by the quarter marks as well as the diagnostic test scores.

CHAPTER V

Summary and Conclusions

The summary of the four years'work to determine whether or not diagnostic tests, followed by drill in the fundamental processes, should be used in the teaching of agricultural arithmetic is found on the following pages.

The author realizes that the number of cases tested was not great enough to establish norms. Likewise, the selection of the groups by intelligence quotient ratings, if it had been possible, would have eliminated the variation of group ability.

TABLE NO. XLVI

COMBINED SUMMARY OF INTELLIGENCE AND BEGINNING DIAGNOSTIC TESTS 1933-1936

	Drilled Sections									Check Sections								
	Number of Cases	Diagnostic	Army Alpha	Alpha Mathe	Kent Time	Mathe (Kent) T.	Kent No Time	Mathe Kent No Time		Number of Cases	Diagnostic	Army Alpha	Alpha Mathe	Kent Time	Mathe Time	Kent No Time	Mathe Kent No Time
Average % Scores									Average % Scores								
1933-'34	14	43.5	39.5	41.4	Not Given		76	67		14	39.6	37	40	Not Given		67.7	60
1934-'35	19	39.2	49.9	44.5	72.2	40	83.6	73		19	28.5	35.7	36.5	53.5	24.4	71.7	52
1935-'36	10	35.9	40.8	40.5	80.5	35	74.5	66.7		20	41.1	41.1	38.2	61.4	32.5	73	57.7
True Average		39.8	44.4	42.6	71.6	38.3	79	69.6			35.1	38.1	38.1	57.5	26	71.3	56.3
Median % Scores									Median % Scores								
1933-'34	14	42.8	34	42.5	Not Given		80.3	67.5		14	32.1	35.4	37.5	Not Given		79	67.5
1934-'35	19	40	47.9	47.5	74.6	34.4	83.2	71.2		19	30	34.9	35	55.1	25	76.7	47.5
1935-'36	10	33	40.6	40	59.7	37.5	76	70		20	42.6	46	37.5	64.5	34.4	76.1	57.5
True Median		39.3	41.7	44.1	69.5	35.4	80.6	69.7			36.1	39.2	36.6	59.9	29.8	77.1	56.6

TABLE NO. XLVII

COMBINED SUMMARY OF ARITHMETIC TEST SCORES 1933-1937

Drilled Sections

A-Beginning
B-Ending
Average % Score

	Number of Cases	Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Nos. A	Denominate Nos. B	Frac. Dec. & Eq. A	Frac. Dec. & Eq. B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B
1933-1934	14	45.2	61	50.7	64.7	47.7	65.5	42.5	55.5										
1934-1935	19	31	47	45	55	45	67	29	40	57.3	72	49	58	40	54	17	26	40.2	53.5
1935-1936 A-	10	40.5	34	45.3	50	40.5	50	28	38	49.4	70	24	53	32.5	50	39.4	27	38.3	47.8
1936-37 B-	13	28	55	39	55	46	72	32	64	46.7	48	37	54	50	70	17	46	36.7	56.6
True Average		35.2	50	45.1	56.5	45.1	65.1	32.8	50	52.1	64.1	39.3	55.6	41.9	58.8	22	33.3	39.2	54.2
Av % Inc. Median Percent Score			14.8		11.4		20		17.2		12		16.3		16.9		11.3		15
1933-34	14	45.2	61.9	55	66.7	38	70.5	42.5	55										
1934-35	19	30	50	50	60	40	70	30	40	53.3	73.3	50	60	40	60	20	30	41.2	57.5
1935-36 A-	10	35.7	30	43.3	50	34.1	50	32.5	35	47.2	70	22.5	65	37.5	50	41.2	30	38.2	48.8
1936-37 B-	13	30	60	40	60	40	70	30	70	46.7	46.7	30	60	50	70	20	50	35.6	59.4
True Median		34.6	52.1	47.7	59.9	41.4	66.7	33.4	50.8	49.8	64.3	37.3	61.2	43	61.3	24.7	37.1	39	56.7
Median Percent Increase			17.5		12.2		25.3		17.4		14.5		23.9		18.3		13.4		17.7

TABLE NO XLVIII — COMBINED SUMMARY OF DIAGNOSTIC TEST SCORES 1933-1937

Check Sections A-Beginning B-Ending	Number of Cases	Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Nos. A	Denominate Nos. B	Frac. Dec. & Eq. A	Frac. Dec. & Eq. B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B
Average % Score																			
1933-1934	14	54.3	57.6	48	53	48.2	61.8	33	44.5										
1934-'35	19	22	24	32	39	32	44	21	23	40	48.7	27	33	20	24	9	13	26.5	32.5
1935-'36	20	45.2	25	47.3	42	49.5	54.5	33.2	44.5	45.3	61.3	33.2	57.5	26.2	54	46.5	23	43.4	45.9
	A- 16	B	B	A	A	B	B	B	B	A	A	A	A	B	B	B	B		
1936-'37	B- 13	29	48	47	71	41	48	22	36	64.7	67.3	62	68	26	32	5	10	39.5	49.4
True Average		37.3	36.2	43.2	50.1	42.5	51.7	29	36	49.1	58.7	39.4	52.1	23.9	37.5	22.4	16.1	35.8	42.3
Average % Increase			-1.1		6.9		9.2		7		9.6		12.7		13.6		-6.3		6.5
Median Percent Score																			
1933-'34	14	61.9	59.5	36.7	48.3	45.5	54.5	27.5	35										
1934-'35	19	20	20	30	40	30	40	20	20	40	53.3	20	30	20	20	10	10	27.5	33.7
1935-'36	20	40.5	20	48.3	40	52.3	55	35	40	47.2	56.7	30	50	25	60	44.1	25	41.6	45
	A- 16	B	B	A	A	B	B	B	B	A	A	A	A	B	B	B	B		
1936-'37	B- 13	30	40	45	80	30	50	30	40	63.3	66.7	60	80	20	40	10	10	37.5	52.5
True Median		37.1	33.8	40.1	51	40	41.3	29.6	33.2	49.4	58.4	35.3	51.8	21.9	40.4	23.1	15.8	34.6	40.7
Median % Increase			-3.3		10.9		1.3		3.6		9		16.5		18.5		-7.3		6.1

TABLE NO. XLIX COMBINED SUMMARY OF DIAGNOSTIC TEST ERRORS 1933-1937

Drilled Sections A-Beginning B-Ending	Number of Cases	Addition A	Addition B	Subtraction A	Subtraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Nos. A	Denominate Nos. B	Frac. Dec. P.C. Eq. A	Frac. Dec. P.C. Eq. B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B
Average % Errors																			
1933-'34	14	29	23.8	16	11.3	27.7	20.9	28	22.5										
1934-'35	19	36	34	35	27	30	28	38	30	22.7	15.3	25	15	46	28	31	25	31.5	24.5
1935-'36	10	37.1	36	27.3	25	31.4	44	32.5	36	32.8	20.7	25	24	31.2	34	40.6	42	32.7	31.9
A	16	A	A	B	B	A	A	A	A	B	B	B	B	A	A	A	A		
1936-'37 B	13	24	26	28	21	36	22	26	20	19.3	16.7	27	28	34	22	22	27	28.1	32.5
True Average		31.3	29.7	27.2	21.3	33	27.4	31.4	26.5	24	17	25.2	21.1	38.4	27.2	29.9	29.5	29.8	25
Average % Decrease			1.6		5.9		5.6		4.9		7		2.1		11.2		.4		4.8
Median % Errors																			
1933-'34	14	28.6	23.8	15	10	27.3	15.9	25	20										
1934-'35	19	40	30	30	30	30	40	30	30	20	13.3	20	10	40	20	30	20	30	22.5
1935-'36	10	38.1	35	23.3	30	29.5	45	32.5	35	33.3	20	15	20	31.2	30	44.1	40	33.5	29.4
A	16	A	A	B	B	A	A	A	A	B	B	B	B	A	A	A	A		
1936-'37 B	13	20	25	20	20	35	25	20	20	20	20	20	30	30	20	20	30	22.5	23.7
True Median		31.5	28	23.6	22.7	30.6	31.1	26.5	25.8	23.2	17	18.8	18.6	34.5	22.2	29.6	28	27.3	24.2
Median % Decrease		3.5		.9		-.5		.7		6.2		.2		12.3		1.6			3.1

TABLE NO. L — COMBINED SUMMARY OF DIAGNOSTIC TEST ERRORS 1933-1937

Check Sections A-Beginning B-Ending		Number of Cases	Addition A	Addition B	Substraction A	Substraction B	Multiplication A	Multiplication B	Division A	Division B	Denominate Nos. A	Denominate Nos. B	Frac. Dec. P.C. Sq. A	Frac. Dec. P.C. Sq. B	Interest A	Interest B	Mensuration A	Mensuration B	Totals A	Totals B
Average % Errors																				
1933-'34		14	27.1	25.7	26	21.7	25.5	17.7	25.5	23.5										
1934-'35		19	35	34	29	28	46	44	37	33	22	17.3	27	21	52	44	28	22	32.7	28.9
1935-'36		20	32.8	33	24.3	29	28.6	34.5	34	28.5	24.4	22.3	27	31	27.5	30	31.5	33.5	29	29.9
	A-	16	B	B	A	A	B	B	B	B	A	A	A	A	B	B	B	B		
1936-'37	B-	13	30	26	21	16	29	39	23	23	20.7	16	21	14	42	18	15	28	23.9	22.4
True Average			31.7	30.4	23.7	24.2	33	34.6	30.9	27.5	22.5	18.7	25.3	22.6	39.9	32.1	26.1	27.9	29.1	27.2
Average % Decrease				1.3		-.5		-1.6		3.4		3.8		2.7		7.8		-1.8		1.9
Median % Errors																				
1933-'34		14	23.8	23.8	31.7	21.7	20.5	18.2	27.5	20										
1934-'35		19	30	40	30	20	50	40	40	30	20	13.3	30	20	60	40	30	20	32.5	27.5
1935-'36		20	35.7	35	23.3	30	27.3	30	35	30	22.2	23.3	22.5	20	37.5	20	30.9	30	28.6	30.6
	A-	16	B	B	A	A	B	B	B	B	A	A	A	A	B	B	B	B		
1936-'37	B-	13	30	20	20	10	30	40	20	20	20	20	15	10	20	20	10	20	20.6	20
True Median Average % Decrease			30.4	31.1	26.1	20.9	32.9	32.3	31.9	25.9	20.8	18.9	22.9	17.1	41.3	27.3	25.3	23.8	28.9	24.7
				-.7		5.2		.6		6		1.9		5.8		14		1.5		4.2

TABLE NO. LI — COMBINED SUMMARY OF QUARTER MARKS 1933-1936

Drilled Sections	No. of Cases	Average Marks: Freshman Year 1st Quarter	2nd Quarter	3rd Quarter	Yearly Average	Inc. of 1st over 3rd Quarter	Sophomore Year 1st Quarter	2nd Quarter	3rd Quarter	Yearly Average	Inc. of 1st over 3rd Quarter	Median Marks: Freshman Year 1st Quarter	2nd Quarter	3rd Quarter	Yearly Average	Inc. of 1st over 3rd Quarter	Sophomore Year 1st Quarter	2nd Quarter	3rd Quarter	Yearly Average	Inc. of 1st over 3rd Quarter
1933-'34	14	73.1	77.4	78.9	76.5	5.8	59.3	68.6	73.2	67	13.9	75	77.5	80	77.5	5	60	75	80	71.7	20
1934-'35	19	63.4	77.8	79.5	70.3	16.1	74.8	80.2	83.1	82.7	8.3	70	80	85	78.3	15	78	80	85	77.7	7
1935-'36	10	63	*76	*77.8	*72.3	15.8	68.2	77.7	80.3 [a]	75.5	11.8	*65	*77.5	*90	74.2	15	75	80	80	78.3	5
True Average		66.5	77.2	78.9	74.2	12.4	64.3	75.3	79.2	74.4	10.0	70.5	73.6	82.2	77.1	11.7	71.4	78.4	82.3	77.4	10.9

*-drilled

a-9 students only

Check Sections

1933-'34	14	66.1	71.9	74.2	70.7	8.1	58.9	66.8	68.9	64.9	10	70	71.5	75	72.2	5	57.5	62.5	70	63.3	12.5
1934-'35	19	48.7	69.5	75.3	64.7	27.1	66.8	63.4	68.4 [b]	62.2	1.6	48	68	75	63.7	27	70	70	73.5 [b]	70.9	2.5
1935-'36	20	67.4	73.4	74	71.6	6.6	70	73.2	77.6	75.3	5.3	70.5	75	74.5	73.3	4	75	77.5	79	77.8	4
True Average		60.4	71.6	74.7	63.9	13.3	65.5	69.9	72.2	69.2	6.7	62.3	71.6	74.8	69.6	12.5	68.6	70.8	74.4	71.5	5.8

b-16 students only

Table No LII Comparison Of Combined Average and Median Percent Scores In Seven Tests 1933-36

| | = Median Scores
□ = Check Sections
□ = Drilled Sections
A = Diagnostic Tests
B = Army Alpha
C = Army Alpha Mathe
D = Kent-Shakow Time limit
E = Kent-Shakow Mathe time
F = Kent-Shakow No time
G = Kent-Shakow Mathe No time

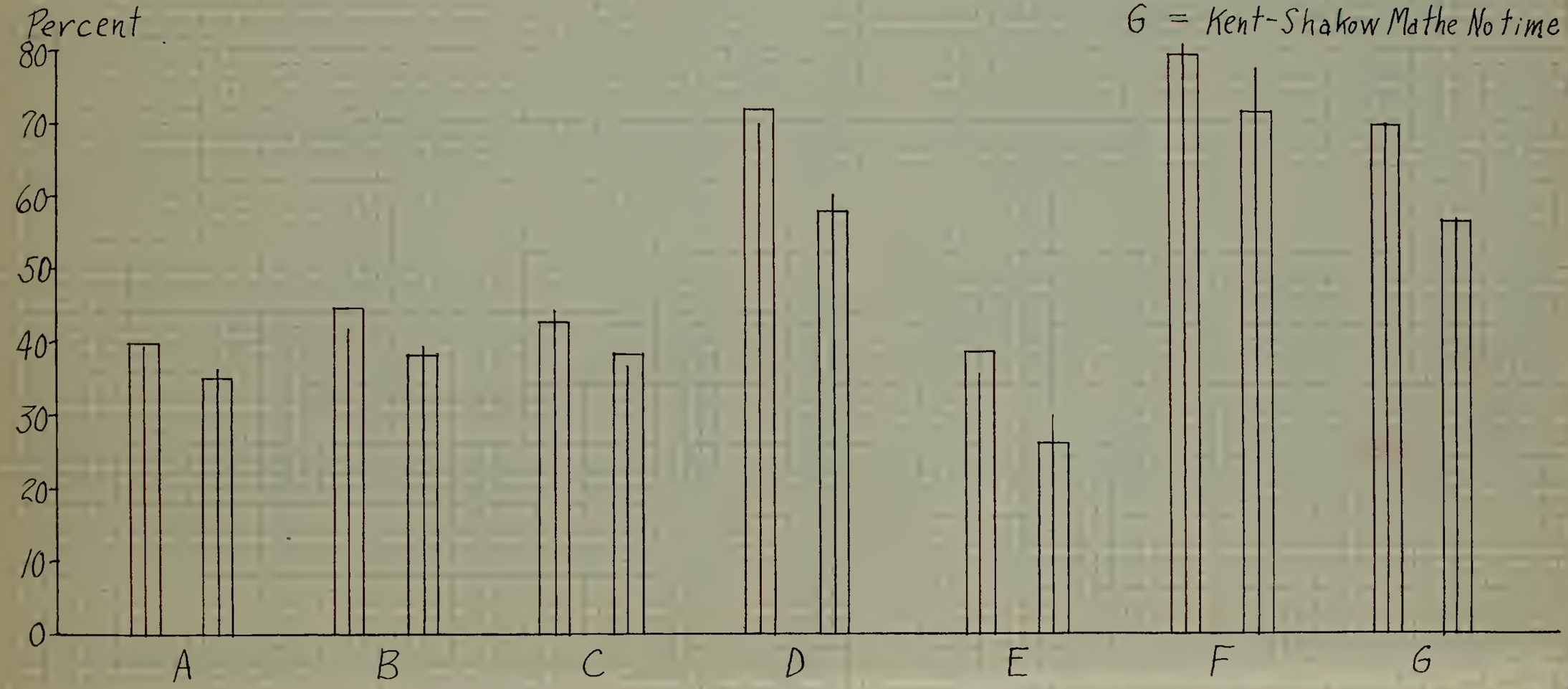


Table No L III Comparison Of Combined

Average and Median Score Increase

In Eight Tests 1933-37

| | = Median Scores
□ = Check Sections
□ = Drilled Sections
A = Addition
B = Subtraction
C = Multiplication
D = Division
E = Denominate Numbers
F = Frac. Dec. Percent Equiv.
G = Interest
H = Mensuration
I = Average of Combined Tests

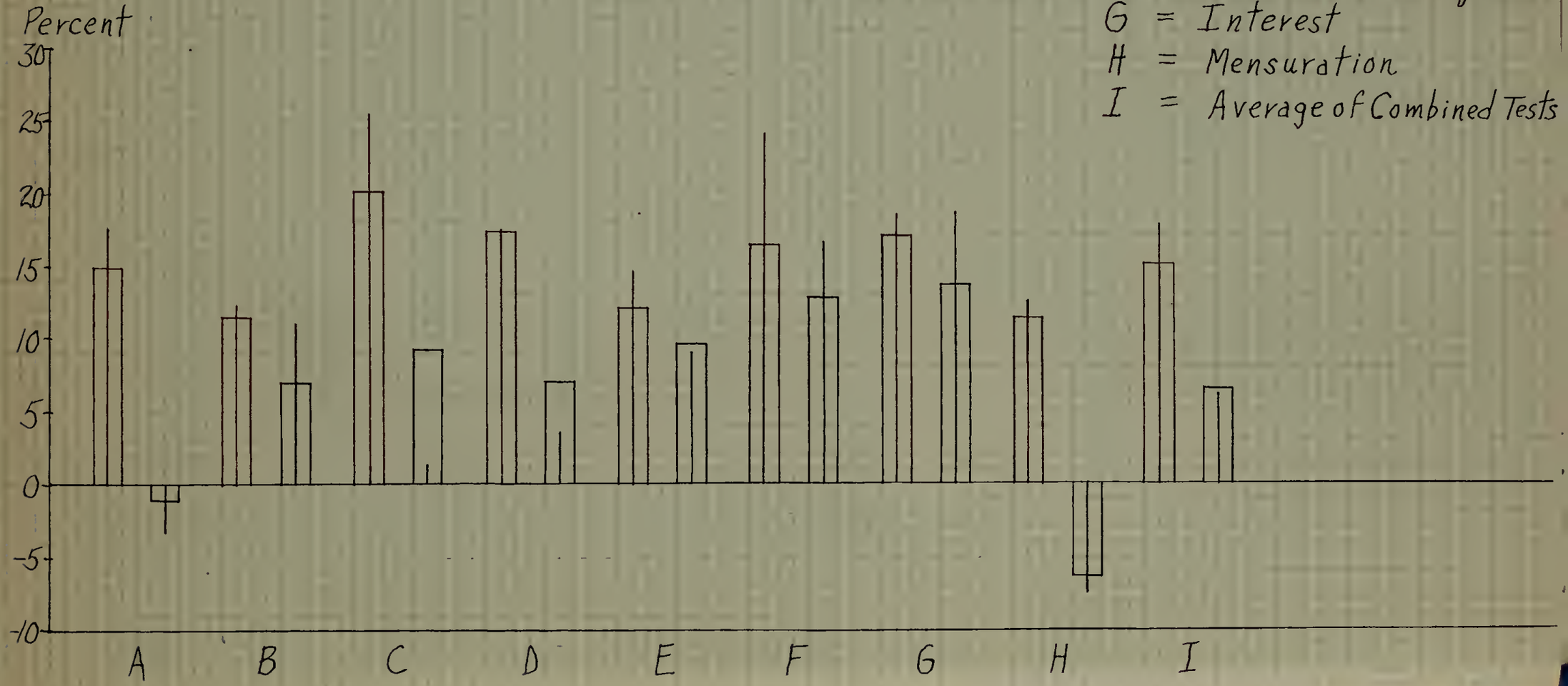


Table No LIV Comparison Of Combined Average and Median Error Decrease In Eight Tests 1933-'37

| | = Median Scores
□ = Check Sections
□ = Drilled Sections
A = Addition
B = Subtraction
C = Multiplication
D = Division
E = Denominate Numbers
F = Frac. Dec. Percent Equiv.
G = Interest
H = Mensuration
I = Average of Combined Tests

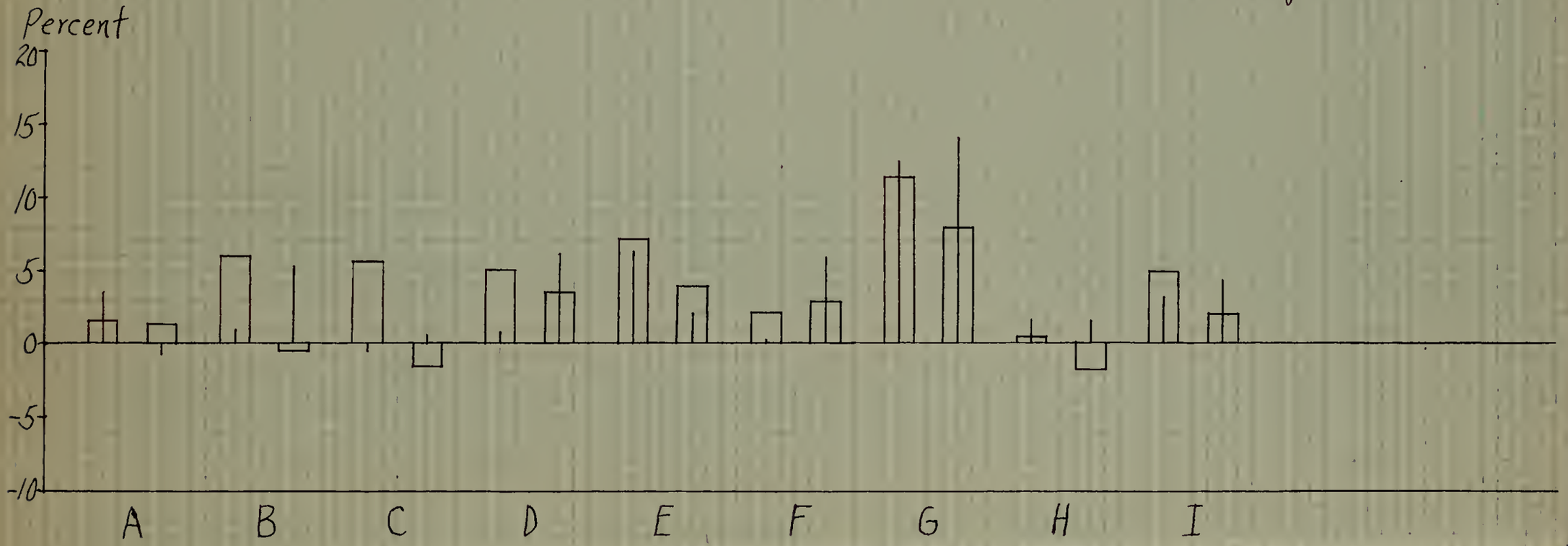


Table No LV Comparison Of Combined Average and Median Marks 1933-'36

| | = Median Marks
□ = Check Sections
□ = Drilled Sections
A = First Quarter Freshman Yr.
B = Second Quarter Freshman Yr.
C = Third Quarter Freshman Yr.
D = First Quarter Sophomore Yr.
E = Second Quarter Sophomore Yr.
F = Third Quarter Sophomore Yr.

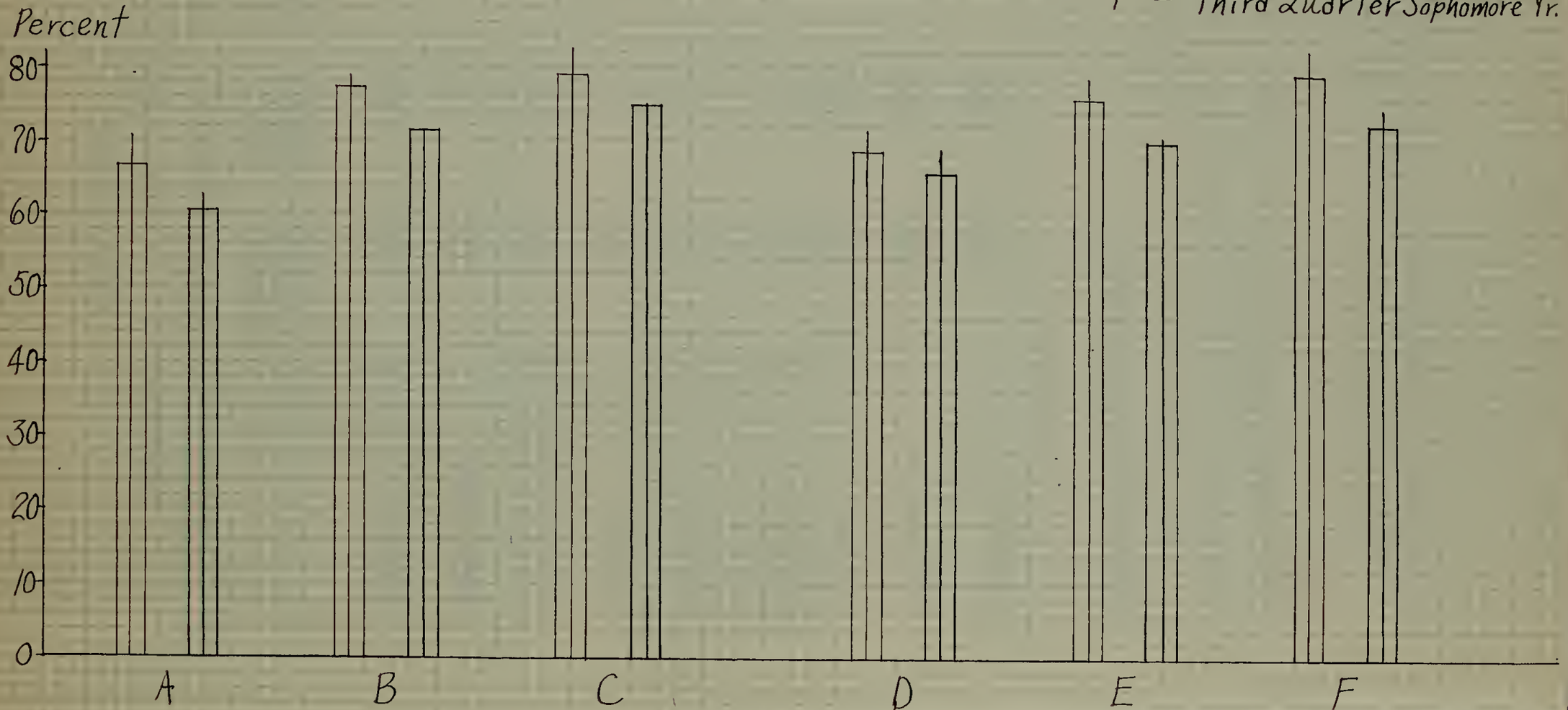


TABLE NO. LVI

Comparison of Four Years Results 1933-1937

		Drilled Section		Check Section	
		Score Increase Percent	Error Decrease Percent	Score Increase Percent	Error Decrease Percent
Addition	A	17.5	3.5	-3.3	-.7
	B	14.8	1.6	-1.1	1.3
Subtraction	A	12.2	.9	10.9	5.2
	B	11.4	5.9	6.9	-.5
Multiplication	A	25.3	-.5	1.3	.6
	B	20	5.6	9.2	-1.6
Division	A	17.4	.7	3.6	6
	B	17.2	4.9	7	3.4
Denominate Numbers	A	14.5	6.2	9	1.9
	B	12	7	9.6	3.8
Frac. Dec. % Equiv.	A	23.9	.2	16.5	5.8
	B	16.3	2.1	12.7	2.7
Interest	A	18.3	12.3	18.5	14
	B	16.9	11.2	13.6	7.8
Mensuration	A	12.4	1.6	-7.3	1.5
	B	11.3	.4	-6.3	-1.8
Combined Tests	A	17.7	3.1	6.1	4.2
	B	15	4.8	6.5	1.9

A- Median B- Average

Interpretation of Results:

The results of the combined four years'testing program shown in the table above are very similar to those of the individual years. The drilled groups show a very marked increase of both speed and accuracy above the check groups in all cases. Although the score increase shows up greater than the error decrease in all tests, both are more than double those of the check groups.

The combined summary of the intelligence test scores is found in table XLVI on page 110. The scores are similar in many respects for all four years. Each year's results show that the diagnostic test scores are closely correlated with the Army Alpha and the Army Alpha Mathe test scores. The Kent-Shakow Mathe time test has scores similar to the above tests during two of the four years. However, the other three Kent-Shakow test scores show that they are too easy for the mental age of this group of students.

The comparison of the combined scores of the intelligence tests for the first three years is found in table LII on page 116. It seemed best not to include the scores of the 1936-'37 groups because they were both used as drilled and check groups.

The scores of the Army Alpha, the Army Alpha Mathe and the Diagnostic tests show that the drilled groups have made an average score of from 4½ to 6% higher than the check groups. The median scores of the drilled groups are from 2½ to 7½% higher than the check groups for these three tests. The average scores of the Kent-Shakow tests are from 7 3/4 to 14% higher for the drilled groups, while the median scores of these tests are from 3½ to 13% higher for the drilled groups.

Thus the scores of all intelligence tests indicate that the drilled groups had the highest intelligence.

The comparison of the combined quarter marks for the first three years are found in table LV on page 119. It again seemed

best not to include the marks of the 1936-'37 groups because they were both rotated as drilled and check groups.

The comparison of the first and third quarter marks of the freshman year, found in table LI, shows that the groups which were drilled in the sophomore year have made an average increase of 12.4% and a median increase of 11.7%. The check groups have made an average increase of 13.3% and a median increase of 12.5% for the same period.

The drilled groups have a yearly average mark of 74.2% and a median yearly average mark of 77.1% for the freshman year. The check groups have a yearly average mark of 68.9% and a median yearly average mark of 69.6% for the same period.

It must be remembered that the effect of drill on the marks is not apparent until the second quarter of the sophomore year. It should also be noticed that the effect of drill during the year 1934-'35 is included in the above averages. This fact tends to show higher marks and a greater increase in progress for the drilled groups during the freshman year, than is actually true.

The comparison of the first and third quarter marks in the sophomore year shows that the drilled groups have made an average increase of 10.0% and a median increase of 10.9%. The check groups have made an average increase of 6.7% and a median increase of 5.3% for the same period.

The drilled groups have a yearly average mark of 74.4% and a median yearly average mark of 77.4% for the sophomore year. The check groups have a yearly average mark of 69.3% and a median yearly average mark of 71.3% for the same period.

Conclusions:

The results of the combined four years' work seem to warrant the following conclusions:

1. That the drilled groups have made a definite increase in progress above the check groups, as indicated by the marks as well as the diagnostic test scores.

2. That the drill had more influence upon score increase than upon error decrease, which seems to indicate that drill increases speed more than accuracy.

3. That diagnostic tests reveal pupils weaknesses which are not detected by the teacher when correcting their papers.

4. That carefully planned drill is effective in correcting the weaknesses of the pupils.

5. That drill is effective in securing a more homogeneous grouping, as is shown by the decrease in the mean and median deviations of the marks.

6. Finally, that the teacher cannot teach efficiently without first diagnosing the weaknesses of the pupils and then carefully planning corrective exercises.

Suggestions:

1. The author advises the use of a master sheet, similar to the one found in table XL on pages 100 and 101, on the class bulletin board, to show the relative ranks of the students in each test. Such a plan as this one helps to stimulate interest and enthusiasm on the part of the pupils, by creating a spirit of rivalry.

3. Although the correcting and scoring of the diagnostic tests takes a considerable part of the teachers time, the author believes that this is the only way in which the teacher can really discover the weaknesses of the pupils. After all, there is no greater satisfaction in teaching than to watch the pupils' progress. Anything that the teacher can do to increase this progress will pay dividends to the teacher, the pupil and society, by helping to equip the individual for his life's work.

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Date Apr. 17, 37