A COMPARISON OF THE PREDICTIVE VALUES OF COUNTY EXAMINATION AND TEACHERS' MARKS, TOGETHER WITH A STUDY OF THE EFFICACY OF THE REVIEW PERIOD, IN THE RURAL AND GRADED SCHOOLS OF PRATT COUNTY, KANSAS

by

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TABLE OF CONTENTS

	Page
CHAPTER I - - - INTRODUCTION	1
CHAPTER II - - PRESENT STATUS OF THE PROBLEM	5
CHAPTER III - - THE SPECIFIC PROBLEM	7
CHAPTER IV - - PROCEDURE	8
CHAPTER V - - - PRESENTATION AND INTERPRETATION OF DATA	12
CHAPTER VI - - SUMMARY AND CONCLUSIONS	43
BIBLIOGRAPHY	46
APPENDIX	
DIAGRAMS	47-58
LETTERS TO TEACHERS	59-60
COUNTY EXAMINATION QUESTIONS	62
TESTS USED IN THE STUDY	

LIST OF TABLES

		Page
TABLE I	THE SCORES OF 103 EIGHTH GRADE PUPILS OF PRATT COUNTY	16
TABLE II	RANK OF PUPILS ON THE BASIS OF CRITERION SCORE, COUNTY EXAMINATION, AND TEACHERS' MARKS	23
TABLE III	MARKS OF PUPILS ASSIGNED A MARK ACCORDING TO RANK	25
TABLE IV	DEVIATION OF COUNTY EXAMINATION MARKS FROM CRITERION MARKS	27
TABLE V	DEVIATION OF TEACHERS' MARKS FROM CRITERION MARKS	28
TABLE VI	LENGTH OF TIME SPENT IN REVIEW FOR THE COUNTY EXAMINATIONS	30
TABLE VII	SCORES ON TWO FORMS OF THE WOODY-MCCALL, STEVENSON AND BUCKINGHAM TESTS, ADMINISTERED ONE MONTH APART	32
TABLE VIII	GAINS AND LOSSES SHOWN BY FORMS I AND II OF THE BUCKINGHAM SCALE OF ARITHMETIC PROBLEMS ADMINISTERED ONE MONTH APART	35
TABLE IX	GAINS AND LOSSES SHOWN BY FORMS I AND II OF THE STEVENSON ARITHMETIC READING TEST ADMINISTERED ONE MONTH APART	36
TABLE X	GAINS AND LOSSES SHOWN BY FORMS I AND II OF THE WOODY-MCCALL MIXED FUNDAMENTALS TEST ADMINISTERED ONE MONTH APART	38
TABLE XI	THE NUMBER AND PERCENTAGES OF BOYS AND GIRLS RECEIVING HIGHER, LOWER, AND IDENTICAL SCORES ON TWO FORMS OF THE TESTS INDICATED, ADMINISTERED ONE MONTH APART	41

FIGURES

		Page
FIGURE I	THE DISTRIBUTION OF COUNTY EXAMINATION AND TEACHERS' MARKS OF 103 EIGHTH GRADE PUPILS OF PRATT COUNTY, KANSAS, 1930	15
FIGURE II	THE DISTRIBUTION OF SCORES MADE BY 92 EIGHTH GRADE PUPILS ON TWO FORMS OF THE BUCKINGHAM SCALE IN ARITHMETIC PROBLEMS ADMINISTERED ONE MONTH APART	31
FIGURE III	THE DISTRIBUTION OF SCORES MADE BY 92 EIGHTH GRADE PUPILS ON TWO FORMS OF THE STEVENSON ARITHMETIC READING TEST, ADMINISTERED ONE MONTH APART	37
FIGURE IV	THE DISTRIBUTION OF SCORES MADE BY EIGHTH GRADE PUPILS ON TWO FORMS OF THE WOODY-McCALL MIXED FUNDAMENTALS TEST, ADMINISTERED ONE MONTH APART	39

DIAGRAMS

		Page
DIAGRAM I	THE CORRELATION BETWEEN THE DIPLOMA AVERAGE AND ARITHMETIC AVERAGE	47
DIAGRAM II	THE CORRELATION BETWEEN THE CRITERION AND COUNTY EXAMINATION MARKS	48
DIAGRAM III	THE CORRELATION BETWEEN THE CRITERION AND THE T.M.	49
DIAGRAM IV	THE CORRELATION BETWEEN THE CRITERION AND THE A.A.	50
DIAGRAM V	THE CORRELATION BETWEEN THE T.M. AND THE C.E.	51
DIAGRAM VI	THE CORRELATION BETWEEN THE UPPER QUARTILE OF CRITERION SCORES AND C.E. MARKS	52
DIAGRAM VII	THE CORRELATION BETWEEN THE UPPER QUARTILE OF CRITERION SCORES AND THE T.M.	53
DIAGRAM VIII	THE CORRELATION BETWEEN THE MIDDLE 50% and C.E. MARKS	54
DIAGRAM IX	THE CORRELATION BETWEEN THE MIDDLE 50% and T.M.	55
DIAGRAM X	CORRELATION BETWEEN THE LOWER QUARTILE AND C.E. MARKS	56
DIAGRAM XI	CORRELATION BETWEEN THE LOWER QUARTILE AND T.M.	57

CHAPTER I

INTRODUCTION

Each year several thousand pupils in the district schools of Kansas are faced with the task of securing a passing mark in the county examinations as provided by law,(1) while at the same time hundreds of Kansas teachers are confronted with the problem of aiding their pupils in making a passing mark.

With pupils these examinations are a final hurdle to be crossed before they may receive their diplomas admitting them to High School, and consequently many of them train strenuously in order that they may sail over with flying colors. The period before the examinations is filled with a last minute attempt to prepare on what they and the teachers feel may be asked.

The teacher, knowing that often his reputation as an instructor is judged by whether or not his pupils "pass' the examinations, does his best to insure that those about to undergo the ordeal know the answers to most of the questions asked in these examinations for the past few years. Review books covering this material may be obtained from several publishing houses and are quite extensively used. (2)

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1. Kansas Statutes, 1913, Chapter 271, Sec. 2
   Kansas Statutes, 1923, Chapter 182, Sec. 1
   Kansas Statutes, 1911, Chapter 263, Sec. 3

2. "Classified Eighth Grade Examinations", School Specialties Co., Sioux City, Iowa.
   "Kansas Eighth Grade Question Books", Lincoln School Supply Co., Lincoln, Neb.

When pupils fail in the examinations the reaction of many parents is to blame the teacher. In some cases this is undoubtedly where it belongs. However, the feeling that the failure of a pupil in a small rural district is more likely to be followed by unpleasant results to the teacher than will the failure of a pupil in a larger system, together with the idea that one disapproving patron in a rural district may cause a teacher to lose his job, regardless of his worth, tends to have the effect of causing the teacher to do everything in his power to see that his professional reputation is maintained. The statement, "He has never had a pupil to fail in the county examinations", casts a halo about the head of an otherwise mediocre teacher.

There are several ways whereby a teacher may avert this unpleasant situation. 1. He may use his intelligence, knowledge, and skill throughout the year in aiding the pupil to acquire a true mastery of the work. 2. He may spend the last month or so before the county examinations in an attempt to drill into the pupil those facts and items which have been asked in the past or may be asked in this examination. 3. He may give the pupil such a high mark on his "daily grades" and bimonthly examinations that the pupil can receive a low mark in the examination, and yet the average of the examination and teacher's marks will still be above the deadline.

It is no uncommon occurrence to hear teachers criticize the county examination system severely, especially if the efficacy of their own instruction is being measured by it. Whether or not

their criticisms are justifiable depends upon whether or not the examinations measure that which they purport to measure--their validity. If the county examination as it exists today is valid, there can be little fundamental cause for complaint. If, on the other hand, the system does not measure what it pretends to measure, criticism is justifiable.

Teachers are sometimes accused of deliberately giving weaker pupils higher marks than they really deserve in order that these marks may compensate for a low mark in the examination. Little can be said in defense of this practice, if it be true.

If a teacher's mark is to mean much, it must be as nearly an accurate measurement of the actual achievement of the pupil as it is humanly possible for the teacher to determine, using all the devices and techniques of the modern method. On the other hand, if an examination mark is to mean much, it must be the result of an accurate, objective scoring of a valid, reliable examination.

The period of intensive review and drill preceding the county examinations is sometimes criticized, the critics intimating that if the subject matter were carefully and thoroughly taught throughout the year, it would be unnecessary for pupils and teachers to resort to the final "cramming period" which is indulged in by so many schools. The justification of this criticism rests upon the fact as to whether it is the pupils' real achievement in and mastery of the subject which is increased; or whether the gain is merely in

ability to pass the specific examination. All this leads back to the question of the validity of the examination; is it a measure of the pupils' actual achievement, or is it a subjective estimate of what they know?

From still another point of view, if intelligence consists of ability to meet the demands of environment, it is a mark of intelligence to adequately meet this phase of an environmental problem which annually confronts hundreds of pupils and teachers in Kansas. Who knows but that a collection of examination questions for the past few years would make a good text book.

CHAPTER II

PRESENT STATUS OF THE PROBLEM

As far as the writer has been able to discover, nothing regarding these phases of the county examinations in Kansas has been published. The system seems to have been taken as a matter of course and no studies deemed of sufficient importance to justify publication have been made.

A summary of the system itself follows. On a specified date, a week before the close of most of the schools of the state, pupils taking the examinations report to designated examining centers, usually the county seat or the larger schools of the county, where, under the supervision of individuals appointed by the County Superintendent, they write on the examinations. These examinations are sent out from the office of the State Superintendent of Public Instruction in printed form.(1)

The examination papers are then transmitted to the County Superintendent, where they are scored by an Examining Board appointed by the County Superintendent. Each paper is given a percentage grade.

Previous to the examination each teacher has sent to the County Superintendent a card for each of his pupils taking the examinations, on which is placed the "daily grades" of the pupil, his bi-monthly examination grade, and the average of the two, in each subject, expressed in percentage.

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1. See appendix, p. 62

This average, hereafter referred to as the teacher's mark (T M), is averaged with the county examination mark (C E), each being given an equal weight, to furnish the final average for the subject. This final average will hereafter be called, in the case of Arithmetic, the Arithmetic average. (A A)

The final averages in all subjects are then averaged, each being given equal weight, to provide the Diploma Average upon which the failure or success of the pupil is based. This Diploma Average must not be less than "80" with no subject mark lower than "60". Exceptions to this are sometimes made, particularly in the "60" requirement.

Different examinations are given to the eight and nine month schools, the procedure being the same in each case. The eight month schools take their examinasions a month earlier than do those with a term of nine months.

CHAPTER III

THE SPECIFIC PROBLEM

Among the questions which arise regarding the county examination system as it operates in Kansas are the following:

1. Are county examinations valid measuring devices?
2. Are teachers' marks valid measuring devices?
3. Is the "final average" a true measure of pupil achievement?
4. Which of the above is the most valid measure?
5. Will a combination of the teacher's mark and the county examination mark provide a better measure of pupil achievement than either alone?
6. If so, what weight should be assigned to the county examination mark?
7. Do teachers consistently tend to give higher marks to weaker pupils than they really deserve?
8. Does the period of intensive review result in a gain in achievement for the group as a whole?
9. In what part of the distribution is a gain or loss noted?
10. Which tend to make the greater improvement, boys or girls?

Chapter IV

PROCEDURE

Pratt County, a south-central, agricultural county in Kansas was chosen for this study, chiefly because of the fact that as the writer teaches in this county, it would be easier to secure the necessary cooperation of the County Superintendent and teachers. It is realized fully that the educational situation in Pratt County may not be duplicated in every county of the State, yet it is the opinion of the writer that Pratt County is fairly representative.

The study was carried on during the spring of 1930.

In order to limit the field to a sufficiently narrow scope as to enable a fairly intensive study and yet to cause the minimum interference with the work of the various schools and secure maximum cooperation from the teachers, one subject, arithmetic, was selected as the basis of the study.

Arithmetic was chosen because of the fact that it is one of the subjects in the curriculum considered most fundamental, and upon which great emphasis is laid, particularly in the rural schools. Furthermore, it is generally supposed that from its nature, scoring and marking in arithmetic may be carried on with more objectivity than in other subjects. One may expect that teachers' marks and county examination marks in this subject will be among the most objective marks given the pupils.

Arithmetic is one subject in which there has been rapid progress in the measurement of results. Hence, the availability of numerous

tests of accepted validity was an argument which could not be overlooked in the selection of the subject for study.

Three phases of arithmetical ability were selected, the composite of the three to form the criterion against which to measure the county examination and teachers' marks; first, ability in fundamental operations as measured by the Woody McCall Mixed Fundamentals test; second, ability to read a problem and understand it, determine the process to be used, and approximate the answer as measured by the Stevenson Arithmetic Reading Test; third, ability in the solution of problems as measured by the Buckingham Scale in Arithmetic.

The increase in achievement was determined by the changes in scores made on two forms of the above tests administered one month apart.

In gathering data, the assistance of the County Superintendent was invaluable. It was he who supplied the data regarding the teachers' marks, county examination marks and averages; as well as reassuring teachers suspicious as to the motives back of the study.

Without the help of the teachers of the County, little could have been accomplished. A letter[1] was sent to the teacher of each school having eighth grade pupils who were to take the county examinations. This letter explained the nature and purposes of the study and asked their help. With three exceptions, every teacher expressed a willingness to assist. The card upon which their reply

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1. Appendix.

was sent[1] provided a blank in which each was to indicate the length of time spent in preparation for the county examinations.

The first forms of the tests were mailed so that the teacher would receive them one month and three days before the county examinations. The next day they were to be administered. An attempt was made to make the instructions[2] sent with the tests so explicit that the time and conditions under which the tests were administered would be as uniform as possible throughout the county. The writer has no way of knowing exactly how each test was administered, but he does know most of the teachers personally, and believes that each teacher did his best to carry out the instructions. After the tests were administered, they were returned to the writer for scoring.

One month later a second form of the same test was administered as nearly as possible under the same conditions as the first, and returned to the writer for scoring and tabulation.

Three schools with a total of six eighth grade pupils did not return the second group of tests. Three pupils were absent from school when the tests were administered, while one school with three pupils failed to receive the tests in time. This left a total of 103 cases for whom data on the final tests were available. Incompleteness of the data on the first tests for 11 pupils left the scores of 92 pupils complete for both the first and second tests.

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1. See appendix p. 60
2. Ibid p. 60

It was hoped that every pupil in the county eligible to the county examinations might be included in the study. The writer examined all scores available for those not included and found them scattered throughout the distribution. Consequently he believes that the results of the study would have been little influenced either way had it been possible to include all the pupils.

After the county examinations had been scored and marks recorded the teacher's marks, county examination mark, arithmetic average and diploma average for each pupil was obtained from the records of the County Superintendent.

CHAPTER V

PRESENTATION AND INTERPRETATION OF DATA

In an effort to determine whether the final average in Arithmetic was a representative mark the correlation was found by the difference method[1] between the Arithmetic Average and Diploma Average.[2] An r of .76 ± .027, k = .65, indicates that the Arithmetic Average is a significant factor in the Diploma Average.

After all scores had been arranged in frequency distributions, it was discovered in the case of the Stevenson Arithmetic Reading test that a very negatively skewed distribution (see Fig. II) was present in the second form of the test. Evidently the test was too easy, or the practice effect of the first test was great. Consequently, it was believed that the results of the first Stevenson test would give a more accurate measure of the relative achievement of each member of the group. Hence the results of the first Stevenson test were used with the scores of the second Woody-McCall and Buckingham tests to form a composite score; this complete score was to serve as a criterion against which to measure the county examination and teachers' marks.

Scores in the Buckingham tests were reported in terms of number of problems solved correctly. This method of scoring implies a similarity of difficulty in the problems which may not be entirely

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1. Otis, A. S., Statistical Method in Educational Measurements, p. 199.
2. See Diagram I, p. 47.

warranted, but it has the advantage of being a simple, direct and easily understood procedure. Furthermore, a pupil solving no problems cannot be assigned a score on the scale. Several pupils failed to solve any problems. It was believed that the ability to assign these pupils a score and include them in the study would outweigh any deviations incurred from a change in the method of scoring.

Percentile scores were then calculated(1) for each pupil in each of the above tests. The percentile scores were then averaged to find the Criterion score. Table I shows the Woody-McCall, Stevenson and Buckingham scores from which the Criterion score was obtained, the Criterion score, County Examination mark, Teachers' Mark, Arithmetic Average, and Diploma Average.

Figure I indicates the distribution of the County Examination and Teachers' Marks. The real difference which exists between the two(2) both pretending to measure achievement in Arithmetic, will be readily noted. Evidently they do not measure the same thing, or they do it in a different way.

In order to determine the predictive value of these marks the correlation technique was employed. An r of .206 = .063 k = .92 between the Criterion and the County Examination marks(3) indicates that in so far as the Criterion may be considered valid, the predictive value of County Examinations as to pupil achievement in Arithmetic is very low. Nevertheless these marks are counted as one-half

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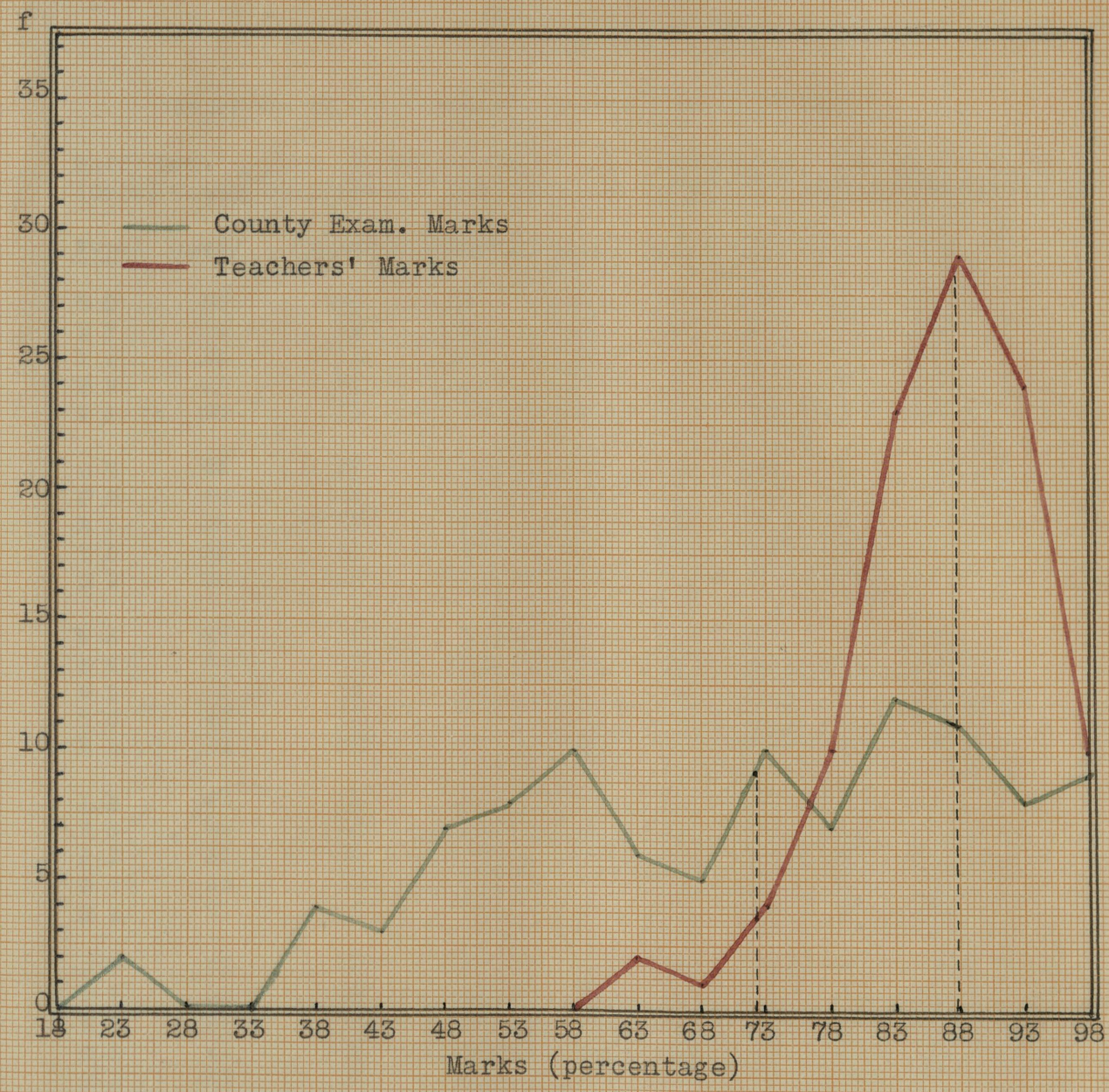
1. Garret, H. E., Statistics in Psychology and Education, p. 47.
2. $\frac{D}{\sigma_{diff}} = 7.8$
3. See Diagram II, p. 48

of the pupils' final mark in Arithmetic. Evidently the county examination is measuring something other than or in addition to Arithmetic; perhaps the inadequacy of the examination, the method of scoring, or the person scoring the examination.

FIGURE I



Distributions of County Examination and Teachers' Marks of 103 Eighth Grade Pupils of Pratt County, Kansas-1930

County Exams.		Teachers' Marks	
Median----	73.9	Median---	89.7
Mean------	72.16	Mean-----	87.47
σ dis.----	18.55	σ dis.---	7.177
σ av.-----	1.82	σ av.----	.707

Diff. av.----- 15.31

σ diff.------- 1.95

$\frac{D}{\sigma \text{ diff.}}$ ------ 7.8

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TABLE I

THE SCORES OF 103 EIGHTH GRADE PUPILS OF PRATT COUNTY

Woody-McCall, Form II, Stevenson, Form I. Buckingham, Form II Criterion (Crit) County Examination (C E) Arith. Average (A A) Diploma Average (D A)

Pupil	Woody	Steven.	Bucking.	Crit.	C E	T M	A A	D A
G C	30	22	19	75	85	91	88	88
B T	28	14	13	51	60	80	70	80
W C	26	16	10	43	71	83	77	80
R P	34	21	15	90	84	95	90	86
V N	30	16	5	37	39	74	57	76
O M	34	22	5	68	57	74	66	86
F M	20	13	3	9	37	70	54	70
E K	28	19	8	48	52	77	65	82
T H	32	20	8	68	52	83	68	81
H D	32	18	8	43	62	71	67	80
W S	27	17	6	32	49	65	57	73
G C	32	17	13	71	89	88	89	81
R C	31	22	8	70	70	83	77	82
B C	30	21	7	57	66	79	73	82
H B	34	20	12	83	67	88	78	84
L B	31	21	11	75	63	87	75	73
R W	30	11	7	36	66	80	73	70
N P	31	20	9	68	60	76	68	81
S T	26	15	7	30	71	86	78	85
M K	23	12	5	14	53	77	65	81
J P	33	21	12	85	95	91	93	90
P B	22	20	4	30	47	62	55	81
H W	23	12	0	6	70	88	79	80
R E	24	12	1	9	88	85	87	87
M H	27	19	8	45	95	88	92	87
E B	31	20	4	52	92	92	92	85
C B	28	21	7	52	61	88	80	86
J E	32	21	11	80	61	95	78	87
A A	31	22	11	78	90	96	93	93
J G	29	22	12	75	93	95	94	89
H B	32	23	11	87	96	98	97	96
E B	22	16	3	15	92	87	90	88
E H	28	16	5	32	75	95	80	82
T H	25	18	4	25	96	93	95	87
H H	28	18	3	28	98	90	94	84

TABLE I (Cont.)

Pupil	Woody	Steven.	Bucking.	Crit.	C E	T M	A A	D A
T W	27	24	5	53	82	92	88	53
H H	31	17	9	58	92	91	91	85
I B	29	19	5	42	83	86	85	87
M H	32	19	8	63	72	95	84	90
D S	32	21	9	75	90	98	94	93
M B	30	23	9	73	84	96	90	93
F F	31	23	13	86	96	88	92	87
M B	28	21	14	71	98	91	95	90
P D	31	20	12	75	88	92	90	86
J K	32	20	13	81	86	81	84	85
R C	24	19	12	50	88	94	91	87
M H	25	18	12	48	77	87	82	84
A A	32	17	11	67	74	87	81	81
A N	30	17	7	43	88	93	91	91
K H	31	16	10	58	85	90	88	82
E S	27	15	3	22	65	76	71	76
K L	31	16	7	47	71	81	76	83
G P	27	15	3	22	94	82	88	86
R S	30	14	8	43	84	85	85	80
J K	30	11	8	41	78	84	81	81
O M	30	23	8	68	88	88	88	90
C R	25	22	6	43	79	83	81	83
H H	32	24	9	87	77	93	85	91
H F	29	23	8	67	80	90	85	87
J M	25	20	7	40	85	83	84	85
C H	28	15	9	45	85	85	85	87
V R	28	15	4	28	44	84	64	80
B R	25	20	4	33	74	87	79	82
F B	25	17	8	35	83	85	84	88
D H	31	22	10	77	85	95	90	88
M W	27	21	11	62	72	93	83	90
M H	26	15	2	19	39	85	62	82
C B	30	7	10	47	60	89	75	82
E N	26	21	4	40	50	79	65	80
E N	28	19	8	48	49	84	67	84
D C	25	19	8	40	60	88	74	80
R O	26	18	7	35	47	90	69	85
H W	30	19	10	60	49	96	73	84
S H	27	7	3	15	23	96	60	72
T W	26	17	0	20	60	90	75	84
J H	23	19	3	22	73	89	81	82
V M	25	14	1	13	43	86	65	84
K K	15	20	4	27	60	71	66	80
S B	31	24	13	89	40	89	65	80
C N	30	23	13	81	100	96	98	94

TABLE I (Cont.)

Pupil	Woody	Steven.	Bucking.	Crit.	C E	T M	A A	D A
W N	28	24	8	67	87	84	86	92
L G	28	22	9	65	54	84	69	86
M C	34	24	13	98	100	95	98	95
L H	24	8	2	8	60	80	70	83
L T	27	12	2	17	50	80	65	84
L S	14	15	1	8	59	80	69	80
E T	19	12	6	15	25	82	54	75
F B	25	19	8	40	51	89	70	86
A G	30	23	8	68	82	94	88	90
D L	30	20	9	63	79	92	86	89
L G	31	23	12	65	91	92	92	92
A B	33	22	6	72	78	89	84	91
E D	31	22	7	65	97	90	94	92
I B	28	20	6	45	58	85	72	82
E O	24	19	6	30	65	86	76	86
V O	26	13	7	27	73	86	80	84
V B	26	14	6	25	53	97	70	88
P V	23	19	3	23	45	96	71	81
B E	28	20	2	37	52	92	72	80
L S	28	20	5	43	74	81	78	86
V H	26	20	7	43	53	87	70	81
M B	32	24	11	90	98	98	98	95

Number of Boys - - - - - 54

Number of Girls - - - - 49

Schools Participating - 26

It is interesting to note that notwithstanding the criticisms that have been leveled at teachers' marks, an r of .435 ± .054 with a k of .90 between the Criterion and Teachers' Marks [1] shows that the T.M. are a better predictive measure of pupil achievement than are the C.E. marks.

A $\frac{D}{\sigma \text{ diff}}$ of 2.79 gives 97 chances in 100 that the difference is greater than zero. It may then be inferred that the T.M. are approximately a 7 per cent better predictive measure of pupil achievement than are the C.E. marks. Neither has much of which to boast.

A correlation between the Criterion and the Arithmetic Average[2] of .319 ± .059, k = .898, indicated, as was anticipated, that the Arithmetic Average as a predictive measure lies between the C.E. and T.M.

An r of .432 ± .054, k = .906, between C.E. and T.M.[3] may indicate that while neither is an excellent measure of pupil achievement, both perhaps share the same weaknesses. It must be remembered that while the T.M. are given by teachers, the county examinations are also prepared, administered, and scored more or less subjectively by teachers. The subjective judgment of teachers enters into both. Perhaps the above correlation may be due to this factor.

In an attempt to determine in which part of the distribution, if any, C.E. and T.M. correlate highly with Criterion scores,

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1. See Diagram III.
2. See Diagram IV.
3. See Diagram V.

correlations were found between Criterion scores and C.E. marks,[1] and between Criterion scores and T.M.[2] for the upper quartile, the inter-quartile range and the lower quartile. The results are shown below.

UPPER QUARTILE

Criterion and C.E. -----r = .206 ± .089 k = .978[3]
Criterion and T.M. -----r = .421 ± .107 k = .906[4]
PE diff. between r's = .170
$\frac{D}{PE\ diff.}$ ----------= 2.32

Correlation is almost absent in the case of the Criterion and C.E., while present to some extent in the case of the Criterion and T.M. The $\frac{D}{PE\ diff}$ of 2.32[5] indicates that there are about 94 chances in 100 that the difference between the two coefficients is a real difference. One may infer that there is a good chance of T.M. being a bettermeasure of achievement of the stronger pupils than are the C.E. marks.

MIDDLE 50%

Criterion and C.E. ----- r = .206 ± .089 k = .978[6]
Criterion and T.M. ----- r = .179 ± .089 k = .983[7]
PE diff. between r's ----- = .126
$\frac{D}{PE\ diff}$ ----------= .21

The small $\frac{D}{PE\ diff}$ shows the extreme unreliability of the small differences which exist between the two coefficients. Neither C.E. or T.M. have a significant predictive value for the middle 50% of the pupils.

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1. See Diagrams VI, VIII, X
2. See Diagrams VII, IX, XI
3. See Diagram VI
4. See Diagram VII
5. Garret, Table XV, p. 135
6. See Diagram VIII
7. See Diagram IX

LOWER QUARTILE

Criterion and C.E. ----- r = .167 ± .127 k = .985[1]
Criterion and T.M. ----- r = .515 ± .098 k = .857[2]
PE diff. between r's -----.160

$$\frac{D}{PE\ diff.} \text{ ----------} 2.17$$

There are about 93 chances out of 100 that T.M. are a better measure of achievement than are C.E. marks for the weaker pupils. The difference between the k's would indicate that the superiority of the T.M. is significant.

The above findings strengthen the belief of the investigator that as far as this study is concerned, teachers' marks are a better measure of pupil achievement than are county examination marks.

However, if the county examination and teachers' marks are intended to measure Arithmetic achievement, they are not doing it very consistently in so far as correlation with the criterion is concerned. There is great room for improvement in both, particularly in the case of the county examination marks. There is little to be said for an examination upon which one-half a pupil's mark is based that is only approximately 3% better than pure chance as a prediction of what his score should be.

The author believes that an Arithmetic examination, carefully and painstakingly prepared, with provisions for objective scoring, would measure some phases of Arithmetic with a fair degree of accuracy. He is inspired to mild wonder that the State of Kansas

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1. See Diagram X.
2. See Diagram XI.

has not used this type of examination. Surely if the achievement of thousands of pupils and the efficiency of hundreds of teachers is to be judged by these examinations, it is only reasonable to ask that they measure that which they purport to measure.

Would a combined score of the C.E. and T.M. correlate more closely with the Criterion scores than either one alone? Would the results of the C.E. marks which correlate .206 with the Criterion add anything of value to the T.M. which correlate .435 with the Criterion, the correlation between C.E. and T.M. being .423?

Using the multiple correlation formula[1] a value for $R_{6.12}$ of .435 ± .059 was found. Hence, as the r between the Criterion scores and T.M. was .435 ± .059, the C.E. marks will add nothing to the T.M. as a predictive measure.

Do teachers tend to give higher marks to weaker pupils than they really deserve? In Table II the comparative rankings of the 103 pupils in Criterion score, C.E. score, T.M., and Arithmetic Average is shown. An inspection of this table will bring out at once the radical difference in rank of identical pupils on the various scores. Without exception every pupil in the lower decile of Criterion scores is assigned a higher rank by his teacher than his Criterion rank. Pupil H.W. for example, ranking 103 in the Criterion column, has a T.M. rank of 49.5. T.W., a boy, ranking 91 in Criterion score, has a rank of 37.5 according to his teacher. S.H. with a Criterion rank of 95, has a T.M. rank of 7.5.

1. $R_{C.12} = \sqrt{\dfrac{r^2_{C1} + r^2_{C2} - 2\, r_{C1} r_{C2} r_{12}}{1 - r^2_{12}}}$

Otis, A.S., Statistical Method in Ed. Meas., p. 239.

TABLE II

Rank of Pupils on the Basis of Criterion Score, County Examination and Teachers' Marks

Pupil	Crit.	C.E.	T.M.	Pupil	Crit.	C.E.	T.M.
M C	1.	1.5	14.	E B	45.5	15	27.5
R P	2.5	35.	14.	C B	45.5	68.5	49.5
M B	2.5	4.	2.	B T	47	73.5	88
S B	4.	98.	43.	R C	48	24	19
H B	5.5	8.	2.	E K	50	84.5	93.5
H H	5.5	46.5	22.5	M H	50	46.5	56
F F	7.	8.	49.5	E N	50	91	72.5
J P	8.	10.5	32.5	K L	52.5	57	84
H B	9.	61.	49.5	C B	52	73.5	43
J K	10.5	28.	72.5	M H	55	10.5	49.5
C N	10.5	1.5	7.5	C H	55	31	66.5
J E	12.	68.5	14.	I B	55	79	66.5
A A	13.	18.5	7.5	W C	60	57	77.5
D H	14.	31	14	V H	60	82.5	56.
G C	17.5	31	32.5	C R	60	42	77.5
P D	17.5	24	27.5	H D	60	67	99.5
C B	17.5	20.5	19	A N	60	24	27.5
L B	17.5	66	56	R S	60	35	66.5
J G	17.5	13	14	L S	60	50	84
D S	17.5	18.5	2	I B	64	37.5	61
M B	21	35	7.5	J K	65	44.5	72.5
A B	22	44.5	43	J M	67.5	31	77.5
G C	23.5	20.5	49.5	E N	67.5	89	93.5
M B	23.5	4	32.5	F B	67.5	88	43
R C	25	59.5	77.5	D C	67.5	73.5	49.5
O M	27.5	80	97.5	V N	67	99.5	97.5
T H	27.5	84.5	77.5	B E	70.5	84.5	27.5
N P	27.5	73.5	95.5	R W	72	62.5	88
O M	27.5	24	49.5	F B	73.5	37.5	66.5
A G	27.5	39.5	19	R O	73.5	93.5	37.5
A A	32	50	56	B R	75	50	72.5
H F	32	42	37.5	W S	76	91	102
W N	32	27	72.5	E H	76	48	14
L G	35	80	72.5	S T	79	57	61
L G	35	17	27.5	P B	79	93.5	103
E D	35	6	37.5	E O	79	64.5	61

TABLE II (Cont.)

Pupil	Crit.	C E	T M	Pupil	Crit.	C E	T M
M H	37.5	54.5	14	H H	81.5	4	37.5
D L	37.5	42	27	V R	81.5	96	72.5
M W	39	54.5	22.5	K K	83.5	73.5	99.5
H W	40	91	7.5	V O	83.5	57.5	61.5
H H	41.5	15	32.5	T H	85.5	8	27.5
K H	41.5	31	37.5	V B	85.5	82.5	4
B C	43	62.5	91.5	P V	87	95	7.5
T W	44	39.5	27.5	J H	89	52.5	43
E S	89	64.5	95.5	G P	89	12	81.5
T W	91	73.5	37.5	M H	92	99.5	66.5
L T	93	102	88	E B	95	15	56
S H	95	103	7.5	E T	95	102.5	84
M K	97	84.5	93.5	V M	98	97	61
F M	99.5	102.5	101	R E	99.5	24	66.5
L H	101.5	73.5	88	L S	101.5	78	88
H W	103.	59.5	49.5				

TABLE III

Marks of Pupils Assigned a Mark According to Rank

7% A		24% B		38% C		24% D		7% F	
Pupil	Crit.	C E	T M	Pupil	Crit.	C E	T M		
M C	A	A	B	C B	C	C	C		
R P	A	C	B	B T	C	D	D		
M B	A	A	A	R C	C	B	B		
S B	A	F	C	E K	C	D	D		
H B	A	B	A	M H	C	C	C		
H H	A	C	B	E N	C	D	C		
F F	A	B	C	K L	C	C	D		
J P	B	B	C	C B	C	D	C		
H B	B	C	C	M H	C	B	C		
J K	B	B	D	C H	C	B	C		
C N	B	A	C	I B	C	D	C		
J E	B	A	C	W C	C	C	D		
A A	B	C	B	V H	C	D	C		
D H	B	B	B	C R	C	C	D		
G C	B	B	B	H D	C	C	D		
P D	B	B	B	A N	C	B	B		
C B	B	B	B	R S	C	C	C		
L B	B	C	C	L S	C	C	D		
J G	B	B	B	I B	C	C	C		
D S	B	B	A	J K	C	C	D		
M B	B	C	C	J M	C	B	D		
A B	B	C	C	E N	C	D	D		
M B	B	A	B	F B	C	D	C		
R C	B	C	D	D C	C	D	C		
O M	B	D	F	V N	C	F	F		
T H	B	D	D	B E	C	D	B		
N P	B	D	D	R W	D	C	D		
O M	B	B	C	F B	D	C	C		
A G	B	C	B	R O	D	D	C		
A A	B	C	A	B R	D	C	D		
H F	B	C	C	W S	D	D	F		
W N	B	B	D	E H	D	C	B		
L G	C	D	D	S T	D	C	C		
L G	C	B	B	P B	D	D	F		
E D	C	A	C	E O	D	C	C		
M H	C	C	B	H H	D	A	C		
D L	C	C	B	V R	D	D	D		
M W	C	C	B	K K	D	D	F		
H W	C	D	A	V O	D	C	C		
H H	C	B	B	T H	D	B	B		

TABLE III (Cont.)

Pupil	Crit.	C E	T M	Pupil	Crit.	C E	T M
K H	C	B	C	V B	D	D	A
B C	C	C	D	P V	D	D	B
T W	C	C	B	J H	D	C	C
E B	C	B	B	E S	D	C	C
G P	D	B	D	M K	F	D	D
T W	D	D	C	V M	F	F	C
M H	D	F	C	F M	F	F	F
L T	D	F	D	R E	F	B	C
E B	D	B	C	L H	F	D	D
S H	D	F	A	L S	F	D	D
E T	D	F	D	H W	F	C	C

Criterion vs. County Examination Marks

	Higher	Same	Lower	Total
Upper decile	1	4	6	11
Upper quartile	2	12	12	26
Upper 50%	8	22	22	52
Middle 50%	14	19	18	51
Lower 50%	22	18	12	52
Lower Quartile	14	8	4	26
Lower decile	6	2	3	11
Entire Group	30	39	34	103

Criterion vs. Teachers Marks

	Higher	Same	Lower	Total
Upper decile	0	2	9	11
Upper quartile	1	9	16	26
Upper 50%	25	13	14	52
Middle 50%	15	17	19	51
Lower 50%	23	17	12	52
Lower Quartile	18	6	2	26
Lower decile	8	3	0	11
Entire Group	33	33	37	103

V B, with a Criterion rank of 85.5 and a C.E. rank of 82.5, has T.M. rank of 4.

If the reader is interested, a study of the lower quartile of TABLE II will reveal some enlightening discrepancies.

Because of the fact that such fine distinctions as to ranks are not wholly justified, the writer arbitrarily assigned marks to the various scores as follows: beginning at the top of the various distributions, 7% were assigned the mark of A; 24%, B; 38% C; 24% D; 7%, F.

These marks may be found in TABLE III. The number of pupils making higher, the same, and lower scores was then determined for the upper decile, quartile, middle 50%, lower quartile, lower decile, and for the group as a whole.

Comparisons of the C.E. marks with the Criterion score, and the T.M. with the Criterion score, are shown in TABLE IV and TABLE V respectively.

TABLE IV

Deviations of C.E. marks from Criterion

	Higher	Same	Lower	Total
Upper decile - - - - - - - - -	1	4	6	11
Upper Quartile - - - - - - - -	2	12	12	26
Middle 50% - - - - - - - - - -	14	19	18	51
Lower Quartile - - - - - - - -	14	8	4	26
Lower Decile - - - - - - - - -	6	2	3	11
Entire Group - - - - - - - - -	30	39	34	103

TABLE V

Deviations of T.M. from Criterion

	Higher	Same	Lower	Total
Upper decile - - - - - - - - -	0	2	9	11
Upper quartile - - - - - - - -	1	9	16	26
Middle 50% - - - - - - - - - -	14	18	19	51
Lower quartile - - - - - - - -	18	6	2	26
Lower decile - - - - - - - - -	8	3	0	11
Entire Group - - - - - - - - -	33	33	37	103

Evidently teachers and county examinations alike tend to score the lower pupil higher than he really deserves, at the same time ranking the better pupil lower. The writer realizes that in both extremes of the distribution the direction of deviation is limited, but the fact that the sum of those having the same or higher scores in the lower quartile is not equal to those receiving lower scores sufficiently indicates the general trend.

In the lower quartile, 2 pupils ranked lower on the basis of T.M. than the Criterion ranking, only 6 received the same ranking, while 18 had a higher rank. A slightly smaller tendency to underrate the higher ranking pupils was found. In the upper and lower deciles the same tendency is noted in a greater degree.

The writer believes that he has a good basis for concluding that teachers consistently over-rate the weaker pupils, at the same time under-rating the stronger.

As to whether or not teachers intentionally "pad" the marks of some of their weaker pupils, the data do not warrant a definite

statement. There are indications that some such practice must have been used in individual cases. When both the Criterion score and county examination mark are a great deal lower than the teacher's mark in the distribution, as is found in several cases in TABLE II, something is the cause.

The writer has no way of knowing just why the pupil received this high mark from his teacher, but the fact remains that he did get it. The most plausible explanation is that for some cause the teacher felt that this pupil, although poor in Arithmetic, should have a high mark; perhaps to please the pupil, the parents, to get him through the examination, as a defense mechanism for poor teaching, or perhaps just because of plain inability to accurately evaluate the pupil's work. The reader may take his choice, none of them reflecting much credit on the teacher.

Does the period of intensive review result in a gain in achievement in the various phases of Arithmetic?

The approximate length of time spent in review for the County Examinations by the various schools participating in the study is shown in TABLE VI.

TABLE VI

Length of Time Spent in Review for the County Examinations

Length of time	No. Schools
Two days	1
Two or three days	1
Two weeks	3
Two or three weeks	4
Three weeks	4
Three or four weeks	1
One month	9
TWO MONTHS	1
No reply	2

No. of schools - - 26
Median time, Three or four weeks

- - - - - - - - - - - - - - - - - - -

Time spent in review is seen to vary widely, 2 schools spending less than a week, with 10 reviewing for one month or more. One-eighth to one-ninth of the school year spent in getting ready for the county examinations should yield big results.

The writer will not enter into the controversy relative to theefficacy of "cramming" as to delayed retention, etc., but will merely attempt to find whether a significant gain in achievement is noted and where it occurs. Do the weaker or stronger pupils gain the most? Do the boys or girls?

In problem solving ability as measured by Forms I and II of the Buckingham test, administered one month apart, the change in the distribution may be noted by an examination of FIGURE II. The difference in the means is 1.728 points with a $\frac{D}{\sigma \text{ diff.}}$ of 2.94, which indicates a real gain. In order to determine where the gain occurred, an analysis of individual scores is shown in TABLE VIII.

FIGURE II

Distribution of Scores Made by 92 Eighth Grade Pupils on Two Forms of the Buckingham Scale in Arithmetic Problems, Administered One Month Apart

First Test (April)		Second Test (May)	
Median-----	8.2	Median----	8.4
Mean-------	7.239	Mean------	8.967
σ dis.-----	4.659	σ dis.----	3.17
σ av.------	.485	σ av.-----	.33
	Diff. av.----------		1.728
	σ diff.----------		.586
	$\frac{D}{\sigma \text{ diff.}}$----------		2.94

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TABLE VII

Scores on Two Forms of the Woody-McCall, Stevenson and Buckingham Tests, Administered One Month Apart

Pupil	Woody-McCall		Stevenson		Buckingham	
	I	II	I	II	I	II
G C	27	30	22	24	8	14
B T	23	28	14	20	6	13
W C	22	26	16	16	2	10
R P	29	34	21	20	8	15
V N	27	30	16	21	8	5
O M	28	34	22	20	5	5
F M	18	20	13	14	5	3
E K	24	28	19	22	6	8
T H	33	32	20	24	11	8
H D	25	32	18	19	9	8
W S	28	27	17	18	3	6
G C	31	32	17	24	9	13
R C	23	31	22	22	8	8
B C	28	30	21	23	5	7
H B	29	34	20	24	10	12
L B	23	31	21	24	12	11
R W	27	30	11	17	9	7
N P	28	31	20	22	13	9
S T	31	26	15	16	9	7
M K	20	23	12	16	6	5
J P	29	= 33	21	22	13	12
P B	22	22	20	14	3	4
H W	23	23	12	19	0	0
R E	21	24	12	14	0	1
M H	23	27	19	21	7	8
E B	26	31	20	20	5	4
C B	27	28	21	19	7	7
J E	28	32	21	23	9	11
A A	33	31	22	24	9	11
J G	29	29	22	24	8	12
H B	35	32	23	24	12	11
E B	25	22	16	15	1	3
E H	27	28	16	18	2	5
T H	24	25	18	20	4	4
H H	27	28	18	24	2	3
Y W	31	27	24	21	8	5
H H	32	31	17	22	12	9
I B	28	29	19	23	6	5
M H	32	32	19	24	12	8
D S	31	31	22	21	11	9

TABLE VII (Cont.)

Pupil	Woody-McCall		Stevenson		Buckingham	
	I	II	I	II	I	II
M B	30	30	23	23	10	9
F F	30	31	23	23	5	13
M B	27	28	21	23	9	15
P D	30	31	20	22	10	12
J K	27	32	20	23	8	13
R C	31	24	19	24	11	12
M H	24	25	18	21	1	12
A A	27	32	17	23	10	11
A N	29	30	17	22	10	7
K H	29	31	16	16	8	10
E S	25	27	15	20	7	3
K L	25	31	16	18	3	7
G P	22	27	15	18	4	3
R S	25	30	14	13	9	8
J K	24	30	11	13	3	8
O M	28	30	23	24	9	8
C R	24	25	22	24	2	6
H H	31	32	24	24	7	9
H F	30	29	23	24	6	8
J M	18	25	20	24	4	7
C H	27	28	15	20	4	9
V R	27	28	15	19	3	4
B R	20	25	20	23	5	4
F B	24	25	17	22	4	8
D H	34	31	22	24	12	10
M W	31	27	21	22	11	11
M H	25	26	15	20	0	2
C B	25	30	11	23	4	10
E N	25	26	21	23	5	4
D C	25	25	19	17	9	8
R O	25	26	18	23	6	7
H W	32	30	19	23	11	10
S H	22	27	7	12	6	3
T W	21	26	17	12	7	0
S B	31	31	24	24	11	13
C N	29	30	23	24	10	13
W N	25	28	24	24	8	8
L G	29	28	22	20	11	9
M C	32	34	24	23	14	13
A G	33	30	23	21	8	8

TABLE VII (Cont.)

Pupil	Woody-McCall		Stevenson		Buckingham	
	I	II	I	II	I	II
D L	30	30	20	23	11	9
L G	30	31	23	23	10	12
A B	33	33	22	24	7	6
E D	31	31	22	24	4	7
I B	26	28	20	18	5	6
E O	18	24	19	23	8	6
V O	27	26	13	19	3	7
V B	26	26	14	22	10	6
B E	27	28	20	20	6	2
V H	21	26	20	22	10	7
M B	29	32	24	23	12	11
C B	16	32	20	23	12	10

TABLE VIII

Gains and Losses Shown By Forms I and II of the Buckingham Scale of Arithmetic Problems Administered One Month Apart

	Higher	Same	Lower	Av. Gain
Upper decile - - - - - - -	0	0	9	-2.00
Upper quartile - - - - - -	5	1	17	-1.89
Upper 50% - - - - - - - -	16	3	27	- .19
Middle 50% - - - - - - -	-19	5	22	.26
Lower 50% - - - - - - - -	28	5	13	1.45
Lower quartile - - - - -	-20	2	1	3.00
Lower decile - - - - - - -	8	1	0	3.55
Entire group - - - - - -	-44	8	40	.52

It is at once evident that the effect of the last month of school on pupil achievement in ability to solve problems varies greatly. Without exception the lower decile shows gains, while the upper decile shows losses to every pupil. This same condition still holds in the upper and lower quartiles to a marked extent, and is still present in the upper and lower 50%. The middle 50% show about equal numbers of gains and losses.

The weak pupils gain while the stronger ones lose.

A large change in the distributions is noted in a comparison of frequency polygons of the two forms of the Stevenson Arithmetic Reading test shown in FIGURE III. Evidently this test is too easy, or the practice effect is too great. TABLE IX shows the gains and losses present in the various parts of the distribution.

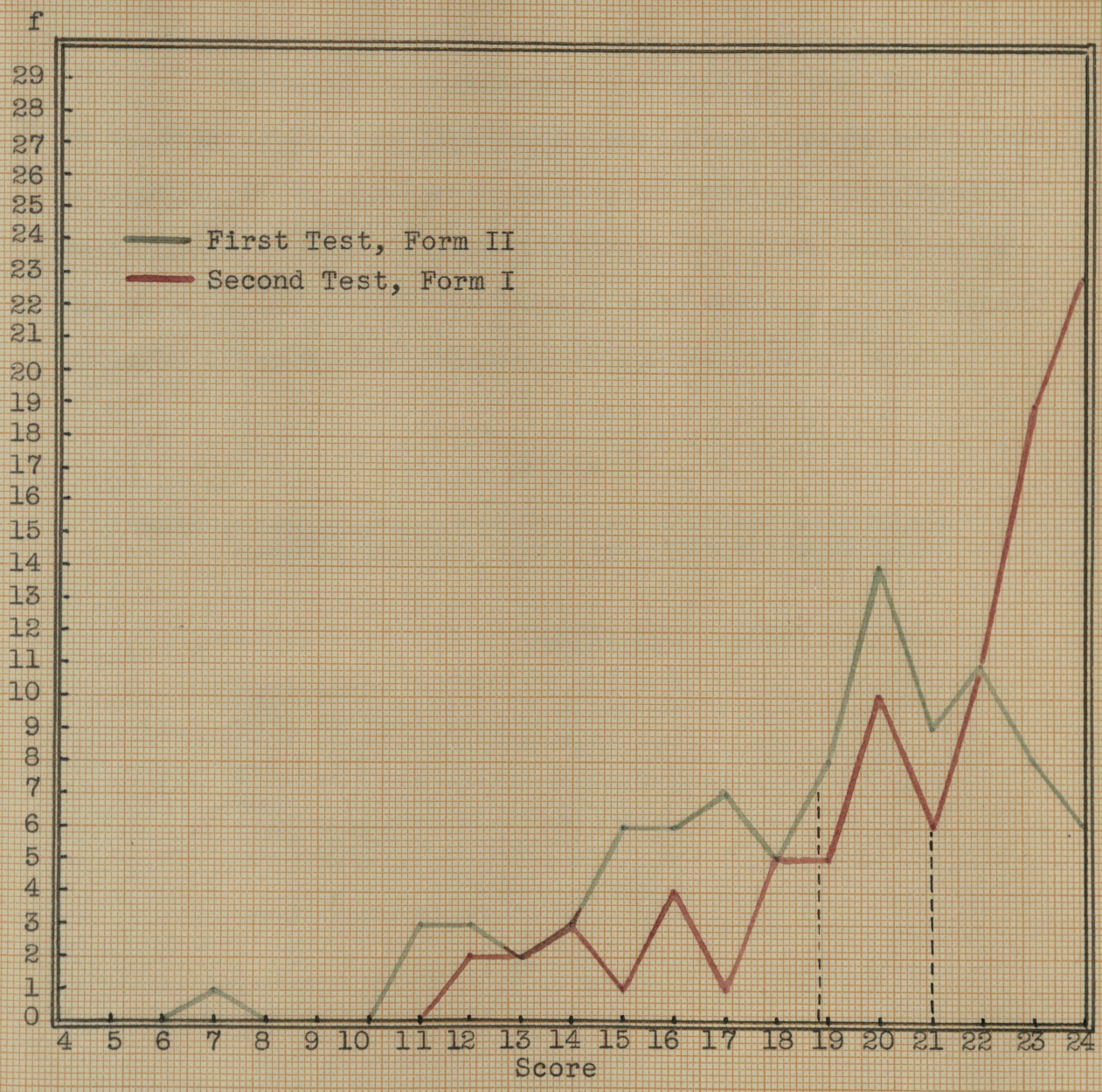
TABLE IX

Gains and Losses Shown By Forms I and II of the Stevenson Arithmetic Reading Test Administered One Month Apart

	Higher	Same	Lower	Av. Gain
Upper decile - - - - - -	1	5	3	-4.44
Upper quartile- - - -	9	7	7	.08
Upper 50% - - - - - - -	26	9	11	.67
Middle 50% - - - - - -	-37	3	6	2.09
Lower 50% - - - - - - -	40	2	4	3.48
Lower quartile - - -	-20	1	2	3.87
Lower decile - - - - -	9	0	0	5.00
Entire group - - - - -	-66	11	15	2.07

An increase in average score is noted throughout the distribution with the exception of the upper decile, where, as in the Buckingham Test, a loss is shown. Particularly in the lower ranking students is the increase large.

FIGURE II‡



Distribution of Scores Made by 92 Eighth Grade Pupils on Two Forms of the Stevenson Arithmetic Reading Test, Administered One Month Apart

First Test (April)		Second Test (May)	
Median----	20.1	Median---	22.7
Mean------	18.8	Mean-----	20.98
σ dis.----	3.603	σ dis.---	3.22
σ av.-----	.3756	σ av.----	.335

Diff. Av.------ 2.18
σ diff.------- .4832

$$\frac{D}{\sigma \text{ diff.}} \text{ ------- } 4.51$$

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In ability in fundamentals as measured by Forms III and II of the Woody-McCall Mixed Fundamentals test administered one month apart, a repetition of the situation as shown by the Stevenson and Buckingham tests is found. FIGURE IV shows the distribution of the scores on the two tests. A difference of the means of 1.227 with a $\frac{D}{\sigma \text{ diff.}}$ of 3.44 indicates a real gain in achievement as measured by these tests.

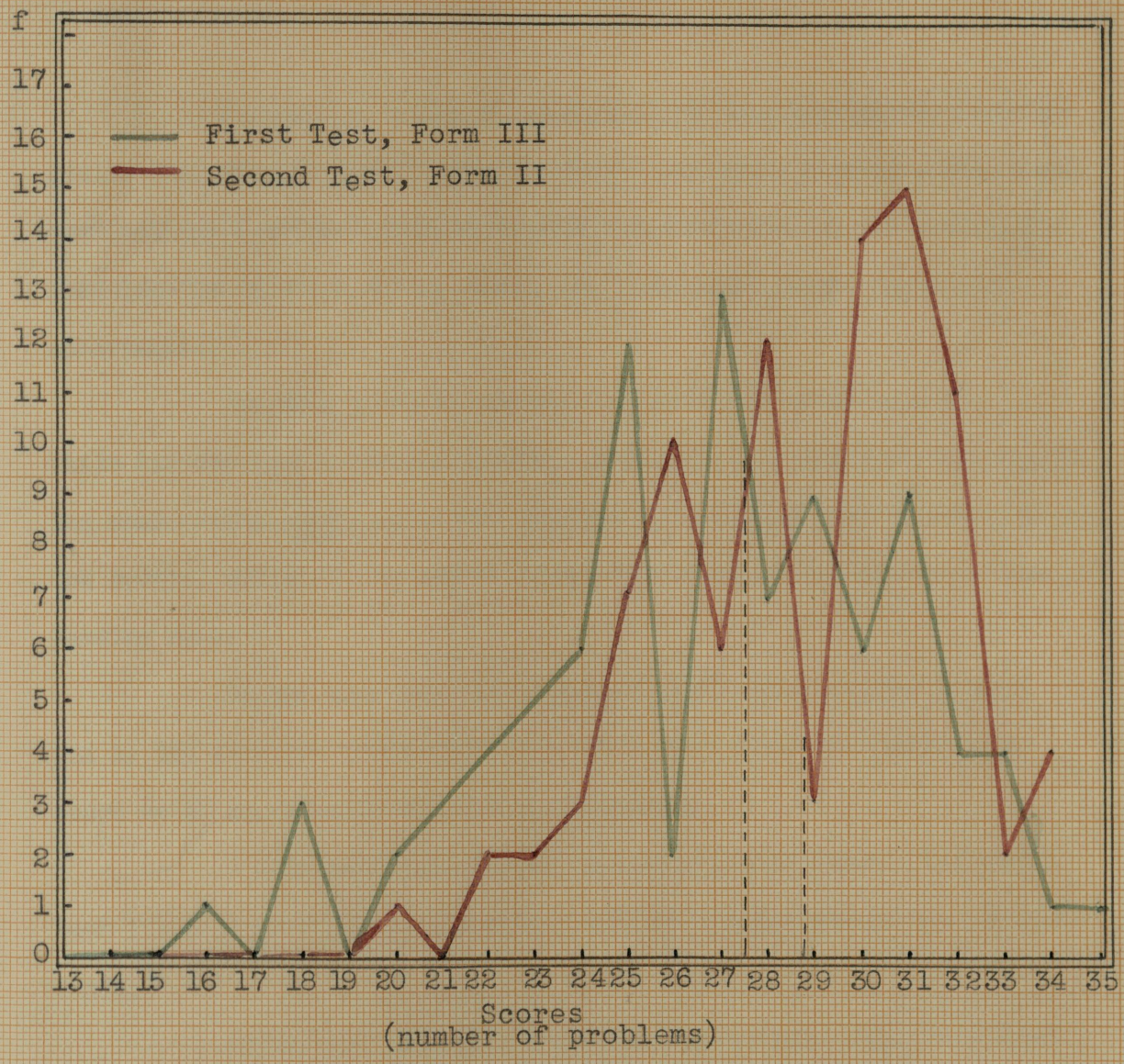
TABLE X

Gains and Losses Shown by Forms I and II of the Woody-McCall Mixed Fundamentals Test Administered One Month Apart

	Higher	Same	Lower	Av. Gain
Upper decile - - - - - - -	0	2	7	-1.66
Upper quartile - - - - - -	5	6	12	-1.3
Upper 50% - - - - - - - -	24	8	14	- .41
Middle 50% - - - - - - -	38	4	4	2.24
Lower 50% - - - - - - - -	40	2	4	3.37
Lower quartile - - - - -	21	2	0	4.39
Lower decile - - - - - - -	9	0	0	5.77
Entire group - - - - - -	64	10	18	1.48

Every pupil in the lower decile increased his score, while every pupil in the upper decile lowered his. A much stronger tendency to gain is shown in the lower quartile than to lose in the upper quartile. The upper 50% show a slight average loss while the lower 50% show a marked average gain.

Figure IV



Distribution of Scores Made by 92 Eighth Grade Pupils on Two Forms of the Woody-McCall Mixed Fundamentals Test, Administered One Month Apart

First Test (April		Second Test (May)	
Median----	27.6	Median---	29.2
Mean------	27.48	Mean-----	28.707
σ dis.----	3.906	σ dis.---	3.12
σ av.-----	.407	σ av.----	.325

Diff. av.----- 1.227
σ diff.------- .356

$$\frac{D}{\sigma \text{ diff.}} \text{------} 3.44$$

KEUFFEL & ESSER CO., N. Y. NO. 359-14
Millimeters, 10th lines heavy

The writer is led to conclude from this part of the investigation that the period of intensive review and drill preceding the county examinations increases ability to make a higher score on the tests given. Assuming the validity of the tests, the "cramming" period increases achievement.

The weak pupil in particular profits from the period, while his stronger associate slumps. Evidently the threat of the impending examination serves as a spur to both the pupil and his teacher, causing special effort to be made to bring this pupil up in ability to make a passing mark.

At the same time the stronger pupils seem to take a rest, and by the time the review period is over, many show less ability to score on an examination than at the beginning.

A much more satisfactory educational situation would have been indicated had all pupils made a gain in achievement during the last month.

Which tend to make the greater improvement, boys or girls?

The number and percentages of boys and girls receiving higher, identical and lower scores on two forms of the tests indicated below, administered one month apart, are shown in TABLE XI.

TABLE XI

The Number and Percentages of Boys and Girls Receiving Higher, Lower and Identical Scores on Two Forms of the Tests Indicated Below, Administered One Month Apart

BUCKINGHAM

Changes	Boys No.	Boys %	Girls No.	Girls %	Both No.	Both %
Higher	22	44	23	54.8	45	48.9
Same	3	6	5	11.9	8	8.7
Lower	25	50	14	33.3	39	42.4

WOODY-McCALL

Higher	37	74	27	64.3	64	69.6
Same	7	14	5	11.9	12	13
Lower	6	12	10	23.8	16	17.4

STEVENSON

Higher	36	72	29	69.1	65	70.7
Same	7	14	5	11.9	12	13
Lower	7	14	8	19.	15	16.3
Totals	50		42		92	

			%
Buckingham	Boys	Same or Lower	56
		Higher	44
	Girls	Same or Lower	52.2
		Higher	54.8
Woody	Boys	Same or Lower	26
		Higher	74
	Girls	Same or Lower	35.7
		Higher	64.3
Stevenson	Boys	Same or Lower	28
		Higher	72
	Girls	Same or Lower	30.9
		Higher	69.1

The figures in TABLE XI indicate that in problem solving ability, more girls make an increase in achievement than boys. In fundamental operations, the boys' increase is more than that of the girls. In the increase shown in reading ability in Arithmetic, the percentage of boys and girls which show a gain is substantially the same.

Perhaps the girls are more stimulated by the threat of the impending examination than are the boys.

CHAPTER VI

Summary and Conclusions

This investigation was carried on in 26 rural and graded schools of Pratt County, Kansas, in the spring of 1930. One hundred three eighth grade pupils participated in the study. Data were gathered by the administration of two forms of the Woody-McCall, Stevenson, and Buckingham Arithmetic test. The two forms were administered one month apart by the teachers of the schools according to instructions and directions provided by the author. All tests were scored by the writer and assistants. All other data were secured from the records of the County Superintendent.

An interpretation of the data leads the writer to the following conclusions, conditioned by the questions below.

a. Is Pratt County a representative County?

b. Is Arithmetic a representative subject?

c. Are the criteria valid?

d. Was a satisfactory technique used in the interpretation of the data?

1. An r of .206 ± .063 indicates that County Examination marks are practically equal to chance as a predictive measure of pupil achievement.

2. An r of .435 ± .054 indicates that teachers' marks are only about 10% better than pure chance as a predictive measure of pupil achievement.

3. An r of .319 ± .059 places the arithmetic average between the county examination and teachers' marks as measures of achievement.

4. Teachers' marks are a better predictive measure of pupil achievement than are county examination marks.

5. The multiple correlation technique indicates that a combination of county examination and teachers' marks will not provide a better predictive measure of pupil achievement than the teachers' marks alone.

6. No weight should be given the county examination.

7. Teachers consistently tend to over-rate their weaker pupils, at the same time under-rating the stronger.

8. The period of review results in a reliable gain for the group as a whole.

9. The period of review helps weaker pupils to make substantial gains while the stronger pupils lose.

10. The period of review aids girls to make greater gains than boys in the ability to solve problems. The boys' gains exceed those of the girls' in fundamental operations, while the gains of boys and girls are practically the same in reading ability and in arithmetic.

The writer declines to make any blanket recommendations from the results of this investigation. He does believe that the findings indicate that:

1. The county examination system of Kansas should be studied with the view of improving the validity, the reliability and objectivity of the examinations.

2. Teachers should have instruction as to what teachers' marks mean, and as to methods and techniques whereby marks may be more accurately and justly assigned.

3. If the period of intensive review must be used, provisions should be made for keeping the stronger pupil progressing as well as aiding the weaker ones.

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APPENDIX

* * *

DIAGRAM I

CORRELATION BETWEEN DIPLOMA AVERAGE AND ARITHMETIC AVERAGE

	Diploma Average														
	69-70	71-72	73-74	75-76	77-78	79-80	81-82	83-84	85-86	87-88	89-90	91-92	93-94	95-96	Total
54-57	1		1	2			1								5
58-61		1													1
62-65						2	3	2							7
66-69						4	2	1	3						10
70-73	1			1		2	4	2	1	1					12
74-77			1		1	2	3	1							8
78-81						1	5	3	3	1					13
82-85						1		2	1	4	2	2			12
86-89							2		1	2	3	2	1		11
90-93									4	4	1	2	3		14
94-97								1		1	2	1	1	1	7
98-100													1	2	3
Total	2	1	2	3	1	12	20	12	13	13	8	7	6	3	103

$r = .76 \pm .027$

$k = .65$

DIAGRAM II

CORRELATION BETWEEN CRITERION AND COUNTY EXAMINATION MARKS

County Examination Marks	Criterion 1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Totals
20-24		1									1
25-29		1									1
30-34											0
35-39	1	1		1							3
40-44		1	1						1		3
45-49			2	2	1	1					6
50-54		2	1	3	2		2				10
55-59	1				1		1				3
60-64	1	1	1	1	2	2	1	2			11
65-69			2	1		1			1		5
70-74	1		3	1	3		4				12
75-79				1	3		1	1	1		7
80-84				1	2	1	2	1	1		8
85-89	1			1	3	1	2	5	1		14
90-94		1	1			2	1	3			8
95-99		2			1		1	1	4		9
100									1	1	2
Totals	5	8	13	12	18	8	15	13	10	1	103

$r = .206 \pm .063$

$k = .97$

DIAGRAM III

CORRELATION BETWEEN CRITERION AND TEACHERS' MARKS

	Criterion										
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Totals
62-65			1								1
65-67				1							1
68-70	1										1
71-73			1		1						2
74-76			1	1			2				4
77-79		1		1	1	1					4
80-82	2	2	1	1	2	1			1		10
83-85	1	1	1	3	7		4				17
86-88	1	2	4	1	4	1	2	2	2		19
89-91		1	1	2	1	2	2	3	2		14
92-94			1	1	2	2	4	2	1		13
95-97		1	2	1		1	1	5	2	1	14
98-100								1	2		3
Totals	5	8	13	12	18	8	15	13	10	1	103

$r = .435 \pm .0536$

$k = .90$

DIAGRAM IV

CORRELATION BETWEEN CRITERION AND ARITHMETIC AVERAGE

	Criterion																	
	0-5	6-11	12-17	18-23	24-29	30-35	36-41	42-47	48-53	54-59	60-65	66-71	72-77	78-83	84-89	90-95	96-100	Total
54-57		1	1			2	1											5
58-61													1					1
62-65			3	1			1		1					2				8
66-69		1						1	1		1	3		1	1			9
70-73		1		2	1		3	2	1	1					1			12
74-77				1			1	3					3					8
78-81		1		1	1	3	1	2	1			1		2				13
82-85						1	1	3	1		2	1		1	2	1		13
86-89		1		1					1	1	1	4		1				10
90-93			1					1	2	1	1		3	1	2	2		14
94-97					2							1	2		1	1		7
98-100														1		1	1	3
Totals		5	5	6	4	6	8	12	8	3	5	10	9	9	7	5	1	103

$r = .319 \pm .059$

$k = .898$

DIAGRAM V

CORRELATION BETWEEN TEACHERS MARKS AND COUNTY EXAMINATION GRADES

	Teachers' Marks														
	59-61	62-64	65-67	68-70	71-73	74-76	77-79	80-82	83-85	86-88	89-91	92-94	95-97	98-100	Total
20-24.9													1		1
25-29.9								1							1
30-34.9															0
35-39.9				1		1			1						3
40-44.9									1	1	1				3
45-49.9		1	1						1		1		2		6
50-54.9							3	1	2	1	1	1	1		10
55-59.9						1		1	1						3
60-64.9					2	1		2		3	2		1		11
65-69.9							2	1		2					5
70-74.9								2	3	4		1	1		11
75-79.9									2	1	1	2	1		7
80-84.9									2	1	1	2	2		8
85-89.9								1	4	3	2	4	1		15
90-94.9								1		1	1	2	2	1	8
95-99.9										2	4	1		2	9
100													2		2
Total		1	1	1	2	3	5	10	17	19	14	13	14	3	103

$r = .423 \pm .054$

$k = .906$

DIAGRAM VI

CORRELATION BETWEEN UPPER QUARTILE OF CRITERION SCORES AND COUNTY EXAMINATION MARKS

	Criterion Scores																
	68-69	70-71	72-73	74-75	76-77	78-79	80-81	82-83	84-85	86-87	88-89	90-91	92-93	94-95	96-97	98-99	Tot.
40-43											1						1
44-47																	
48-51																	
52-55																	
56-59	1																1
60-63				1			1										2
64-67								1									1
68-71		1															1
72-75																	
76-79			1							1							2
80-83																	
84-87			1	1		1						1					5
88-91		1		3		1											5
92-95				1					1								2
96-99		1								2		1					4
100							1									1	2
Totals	1	3	2	6	1	1	3	1	1	3	1	2				1	26

$r = .026 \pm .133$
$k = .999$

DIAGRAM VII

CORRELATION BETWEEN UPPER QUARTILE CRITERION AND TEACHERS' MARKS

	Upper Quartile Criterion																
	67-68	69-70	71-72	73-74	75-76	77-78	79-80	81-82	83-84	85-86	87-88	89-90	91-92	93-94	95-96	97-98	99-100	Total
71-72																		
73-74	1																	1
75-76																		
77-78																		
79-80																		
81-82								1										1
83-84		1																1
85-86																		
87-88			1		1				1	1								4
89-90			1									1						2
91-92			1		2					1								4
93-94					1						1							2
95-96				1	1	2	1				1	1				1		8
97-98					1						1	1						3
99-100																		
Totals	1	1	3	1	6	2	1	1	1	2	3	3				1		26

$r = .421 \pm .107$

$k = .906$

DIAGRAM VIII

CORRELATION BETWEEN MIDDLE 50% CRITERION AND COUNTY EXAMIATION MARKS

	Middle 50% Criterion													
	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60	61-63	64-66	67-69	Total
38-41			1											1
42-45														
46-49	1	1				1				1				4
50-53			1	2	1	1							1	6
54-57												1		1
58-61			1		1	1	1	1					1	6
62-65					1									1
66-69		1							1					2
70-73					1	1					2			4
74-77	2				1	1							1	5
78-81				1	1						1		1	4
82-85		1		2	2			1		1			1	8
86-89					1		1						2	4
90-93								1		1		1		3
94-97					1							1		2
Total	3	3	3	5	10	5	2	3	1	3	3	3	7	51

$r = .206 \pm .089$

$k = .978$

DIAGRAM IX

CORRELATION BETWEEN MIDDLE 50% AND TEACHERS' MARKS

	Middle 50% 31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60	61-63	64-66	67-69	Total
64-65	1													1
66-67														
68-69														
70-71					1									1
72-73														
74-75			1											1
76-77						1							1	2
78-79				1					1					2
80-81		1			1	1	1							4
82-83				1	2								1	4
84-85	1	1		1	3	1						1	1	9
86-87				1	1	1							1	4
88-89			1	1	1	1		1					1	6
90-91		1								2		1	1	5
92-93			1		1			2			2	1		7
94-95	1						1				1		1	4
96-97										1				1
Total	3	3	3	5	10	5	2	3	1	3	3	3	7	51

$r = .179 \pm .089$

$k = .983$

DIAGRAM X

CORRELATION BETWEEN LOWER QUARTILE CRITERION AND COUNTY EXAMINATION MARKS

	Lower Quartile Criterion													
	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28	29-30	Total
21-25						2								2
26-30														0
31-35														0
36-40			1					1						2
41-45					1					1		1		3
46-50							1						1	2
51-55					1						1			2
56-60		2						1				1		4
61-65									1				1	2
66-70	1													1
71-75									1			1	1	3
76-80														0
81-85														0
86-90			1											1
91-95						1			1					2
96-100											1	1		2
Total	1	2	2	0	2	3	1	2	3	1	2	4	3	26

$r = .167 \pm .127$

$k = .985$

DIAGRAM XI

CORRELATION BETWEEN LOWER QUARTILE CRITERION AND TEACHERS' MARKS

	Lower Quartile Criterion													
	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28	29-30	Total
62-63													1	1
64-65														
66-67														
68-69														
70-71			1									1		2
72-73												1		1
74-75														
76-77					1				1					2
78-79														
80-81		2					1							3
82-83						1			1					2
84-85			1					1				1		3
86-87					1	1							2	4
88-89	1								1					2
90-91								1				1		2
92-93											1			1
94-95														0
96-97						1				1	1			3
Total	1	2	2		2	3	1	2	3	1	2	4	3	26

$r = .515 \pm .098$
$k = .857$

Preliminary Letter to Teachers (copy)

Cullison, Kansas,
February 27, 1930.

I am writing you to ask your assistance in a study being made to serve as the basis of a thesis for the University of Kansas.

An attempt will be made to compare the validity of teachers' marks, county examination grades, and an average of teachers' marks and county examination grades as criteria for the promotion or failure of eighth grade pupils. This study will be made in Arithmetic.

In no sense is this to be an investigation of the teacher or her methods; all that is desired is the record of the pupils. The records of separate schools will not be disclosed, only the marks of all the eighth grade pupils in the county who take the examinations, taken as a group and not as individuals. However, I shall be glad to furnish you the data regarding your own pupils if you care to have it.

Briefly, here is what I ask you to do. Administer to your eighth grade pupils three standard Arithmetic tests according to directions which will be supplied. One set of tests is to be given about a month before the county examinations; another set about two or three days before the county examinations. Return the tests to me at once. All directions, tests, postage, etc., will be supplied. You need not score the tests.

If you will cooperate with me in this study, will you kindly fill out the enclosed post-card and return it to me at once? If you do not feel that you care to, just write a big NO on it and return it anyhow.

However, I feel sure that as the expenditure to you in money will be nothing, and in time, very little, you will be willing to take part in this survey which has the approval of your County Superintendent and the School of Education of the University of Kansas.

Yours truly,

MINTER E. BROWN

GENERAL INSTRUCTIONS

In order that this study shall measure the same thing, under the same conditions, at the same time, it will be necessary that you adhere to the following directions as closely as possible. These tests should be given on _____ and in the following order:

1. Woody-McCall Mixed Fundamentals.
2. Buckingham Scale for Problems in Arithmetic.
3. Stevenson Arithmetic Reading Test.

I suggest that the Woody-McCall and Buckingham tests be administered in the morning and the Stevenson test be given in the afternoon. The Woody test could be given before the morning recess and the Buckingham test after the recess. Your individual programs will determine at just what time they are given, but under no circumstances deviate from the ORDER of giving them. Follow the time limits EXACTLY. Do not split a test, that is, give a part of it before recess and the rest after recess.

After the tests have been administered, place them, together with the envelope in which they came, into the stamped, self-addressed envelope supplied, and mail them to me at your earliest convenience. If you would like to know the scores of your pupils, I shall be glad to furnish them. Indicate this when you return the tests.

Another group of tests will be sent to you a few days before the county examinations. The same procedure will be followed.

I certainly appreciate your willingness to cooperate in this matter and I hope that the results of the investigation will be of some value. By following the directions given, you may aid in giving the study an accuracy that it otherwise would not have.

COPY OF RETURNED CARD

Will you take part in this study_____

How many eighth grade students_____

About how long do you spend in review for the county examinations_____

Signed_____ Dist._____

Address_____

DIRECTIONS FOR ADMINISTERING THE TESTS

Woody-McCall-----1. Clear desks, provide each pupil with a sharpened pencil, and say, "One of these papers will be laid on your desk, face down. Leave it face down until I tell you to turn it."

2. Distribute the papers. Then say, "Turn the paper and write your name and grade". "Pencils up as soon as you finish".

3. Then say, "I want to SEE HOW WELL YOU CAN ADD, SUBTRACT, MULTIPLY AND DIVIDE. READ WHAT IS SAID AT THE TOP AND BEGIN AT ONCE. BEGIN".

Give no help to the pupils and see that they get no help from one another. At the end of EXACTLY 20 MINUTES call "STOP" and collect the papers.

Buckingham Scale. Complete directions are on the front of the test. Follow them exactly. Give the pupils EXACTLY ONE HOUR AND FIFTEEN MINUTES OF TIME.

STEVENSON Problem Analysis.

1. Have each pupil write his name and grade at the top of the first page.

2. Read the directions aloud and have each pupil do the trial test.

3. After the pupils have finished the trial test and you are sure they understand what to do, read aloud the diredtions at the bottom of the first page.

4. This is NOT a speed test, so allow ample time for all to finish the test.

IN ALL THE ABOVE TESTS, ANSWER NO QUESTIONS AFTER WORK HAS STARTED. SEE THAT EACH PUPIL RECEIVES NO HELP FROM ANOTHER

Examination for Common-School Diplomas

NINE-MONTH TERMS

Friday, May 9, 1930

These questions are to be used only on the above date. The questions for each day must be opened in the presence of a majority of the examining committee.

An average of 80 per cent with no grade below 60 per cent is required for graduation. Grades of 80 per cent or more may be carried two years.

At the option of the county superintendent, credit may be given on school work to the amount of 50 per cent in each subject.

The subjects for Saturday, May 11, will be, a. m., Writing, United States History, Spelling; p. m., Grammar, Agriculture.

The diploma examination for eight-month schools was held April 19 and 26, 1930.

GEO. A. ALLEN, JR.,
State Superintendent of Public Instruction.

13-3444

A. M.	P. M.
Reading and Classics	Civil Government .....
Arithmetic	Geography .....
Physiology	Kansas History .....

READING AND CLASSICS.

(Mrs. Nettie H. Morss.)

FOR EIGHTH GRADE ONLY.

1. What is a legend? Name one, and tell who wrote it.
2. The Eighth Reader is divided into ——— main parts. They are called ——— ———; ——— ———; ——— ———; and ———, ———.
3. Who is your ideal of a good American citizen? Name three Americans who are considered great men by the American people.
4. Name two stories and poems studied this year which refer to the World War. Give the authors.
5. Who wrote the following selections?
   (*a*) The Vision of Sir Launfal.
   (*b*) Rip Van Winkle.
   (*c*) A Fight with a Cannon.
   (*d*) The Man Without a Country.
   (*e*) A Christmas Carol.
6. Number the names in column two to match the selections in column one:

(1) Evangeline.	( ) Philip Nolan.
(2) Scaling a Waterfall.	( ) Theodore Roosevelt.
(3) The Man Who Overcame.	( ) Gabriel.
(4) As You Like It.	( ) Lorna Doone.
(5) The Man Without a Country.	( ) Rosalind.

7. From what selections were the following quotations taken?
   (*a*) "The Court decides, subject to the approval of the President, that you never hear the name of the United States again."
   (*b*) "The ship is anchored safe and sound, its voyage closed and done. From fearful trip the victor ship comes in with object won."
   (*c*) "And now abideth faith, hope, charity, these three; but the greatest of these is charity."
   (*d*) "If I could work my will, every idiot who goes about with 'Merry Christmas' on his lips should be boiled with his own pudding and buried with a stake of holly through his heart."
   (*e*) "Master of human destinies, am I!
   Fame, love, and fortune on my footsteps wait.
   Cities and fields I walk."
8. Draw a line under the word that makes these sentences true:
   (*a*) Last Bull wheeled, pawed the sod, put his muzzle to the ground, and bellowed a (sonorous beautiful sweet) challenge.
   (*b*) The grizzly bear is of a grayish color, very large and (wild ferocious timid friendly).
   (*c*) A loon is a (flower small animal diving bird).
   (*d*) (Evangeline Rip Van Winkle The Vision of Sir Launfal) has been called the most beautiful of American legends.
9. Write from memory one of the following: "The Gettysburg Address," or not less than twenty lines from "Evangeline" or "To-day."
10. Name two of the Reading Circle books which you have read this year. Write a review of one, and be sure to name the author.
11. What is the purpose of the Audubon Society? Name three of the farmer's best bird friends. (This question is taken from the seventh reader. It may be substituted for any one of the first ten.)

ARITHMETIC.

(Ray D. Hodgell.)

FOR EIGHTH GRADE ONLY.

1. How much will a customer have to pay in cash for each of the following:
   (*a*) Regular price $24 less 3% for cash?
   (*b*) Regular price $75 less 5% for cash?
   (*c*) Regular price $27.60 less 2½% for cash?
2. The list price is $4800, and there are two successive discounts of 37½% and 12½%. Find the net price.
3. Frank was offered $10 per week and 5% of his sales. How much will his sales have to be in order to make his complete salary $30 per week?
4. The bank discount at 6% on $5,000 for 30 days is ———.
5. Fill the blanks:
   (*a*) The profits paid to stockholders are called ———.
   (*b*) $35 is ——% of $20.
   (*c*) 250% of 40 cents equals ——— cents.
   (*d*) 20% less than ——— equals 40.
   (*e*) 40 equals ——% of 50.
6. If the school tax in District No. 76 is 15 mills, how much school tax must a man pay whose property is assessed at $6,000?
7. (*a*) I filled my coal bin ⅝ full at a cost of $145. At the end of the season it is still ⅓ full. What did the used coal cost me?
   (*b*) Last year a man drove 18.6 mi. per gallon of gasoline in his car. This year he is getting but 16.2 mi. per gallon. How much further would 80 gal. have carried him last year than this year?
8. (*a*) Find in rods the diagonal of a section of land.
   (*b*) How wide a strip 40 rods long will contain 3 acres?
9. A steam pipe is 20 ft. long and 4 inches in diameter. How much heating surface does it have?
10. Fill the blanks:
    (*a*) The volume of a pyramid is but ——— as great as of a prism of the same dimensions.
    (*b*) A equals ———r^2. (Pertains to circles.)
    (*c*) The square on the hypotenuse of any right triangle is equal to the ——— of the squares on the other two ———.
    (*d*) A trapezoid is a figure of ——— straight sides only ——— of which are parallel.
    (*e*) A mile equals ——— rods, equals ——— yards, equals ——— feet.

PHYSIOLOGY.

(Geo. L. McClenny.)

FOR SEVENTH GRADE.

1. Name the parts of the eye.
   Discuss the proper care of the eye.
2. What first-aid treatment should you use for burns?
3. Name three uses of the teeth.
   What causes a tooth to decay?
4. Trace the circulation of the blood through the body, starting with the left auricle.
5. Why is ventilation so important to health?
   How would you ventilate a schoolroom?
6. Place a plus sign before each true statement and a minus sign before each false statement:
   (*a*) Tea and coffee do not nourish the body.
   (*b*) The person who uses alcohol has greater endurance and more resistance to disease than one who does not use it.
   (*c*) The scholarship standing of pupils who smoke is higher than that of those who do not smoke.
   (*d*) The villi are located in the stomach.
   (*e*) The blood carries oxygen and food to all parts of the body.
7. Answer each of the following questions with a single word:
   (*a*) What is the name of the tiny blood vessels which connect the arteries and the veins? ———
   (*b*) What food builds and repairs tissues? ———
   (*c*) What is the name of the science which teaches us how to care for the body? ———
8. Select the correct words in the following statements. Write the statements as corrected:
   (*a*) Smallpox may be prevented through treatment by (antitoxin, radiation, vaccination, transfusion).
   (*b*) Bacteria are (plants, animals, organisms, insects) that may aid or injure mankind.
   (*c*) The tooth is covered with a hard, shiny substance called (dentine, periosteum, enamel, epidermis).
9. Fill in the blanks with correct words:
   (*a*) Headache medicines weaken the ———.
   (*b*) Alcohol dulls the ——— and weakens the ———.
   (*c*) Keep the body clean by ——— once each ———.
   (*d*) The nervous system consists of the ———, ———, and ———.
   (*e*) The divisions of the skeleton are the ———, ———, and ———.
10. Complete the statements in column I by using the proper words found in column II:

I.	II.
(*a*) Pure foods and meats are protected mainly through ———	yellow fever
(*b*) Disease is commonly prevented by ———	quinine.
(*c*) Malaria is commonly treated by using ———	vaccination.
(*d*) Extermination of the mosquito is necessary to control ———	breeding places.
(*e*) The best way to swat the fly is to destroy the ———	inspection.

CIVIL GOVERNMENT.

(Frank La Plant.)

FOR EIGHTH GRADE ONLY.

Answer any five of the first six questions.

1. (*a*) Name three city problems we have solved that old cities did not need to solve.
   (*b*) Prove the statement that "Our town cannot be prosperous unless the surrounding country is."
2. (*a*) What is meant by calling this a "city age"?
   (*b*) What is a "Congressional Township"?
3. (*a*) Name the steps leading up to the adoption of the Federal Constitution.
   (*b*) What great fundamental basis of union existed in the colonies from the beginning?
4. (*a*) Name four state elective offices. Name present officers for two of them.
   (*b*) Name the two U. S. senators from Kansas.
5. What is the direct primary? What is its purpose? Give one argument for and one against its use.
6. (*a*) Give at least three rules that should be observed with reference to our national flag.
   (*b*) Name your state senator and state representative.

Answer any five of the remaining six questions.

7. (*a*) The three fundamental causes of city growth are:
   1. ———. 2. ———. 3. ———.
   (*b*) Three forms of direct taxes are:
   1. ———. 2. ———. 3. ———.
8. (*a*) Cities are classified by the United States Census Bureau according to their ———.
   (*b*) Six county offices are: 1. ———. 2. ———. 3. ———. 4. ———. 5. ———. 6. ———.
9. (*a*) We trace all of our liberties back to one great group of laws in English history known as the ——— ———.
   (*b*) The ——— amendment of U. S. Constitution gave to women the right to vote.

Underline the correct word.

10. (*a*) The (judicial, legislative, executive) department of our government makes the laws.
    (*b*) A special kind of tax that is levied upon property at the death of the owner, and is paid by the heirs is (income, personal, inheritance) tax.

Underline True or False.

11. (*a*) The next primary election in Kansas will be held in August, 1930. (True, false.)
    (*b*) The president of the United States will be elected next fall. (True, false.)
12. (*a*) Using the native fertility of the soil without restoring anything to it which will keep it productive is called exploiting the soil. (True, false.)
    (*b*) Areas not separated are called "contiguous territory." (True, false.)

GEOGRAPHY.

(Mrs. Deane M. Hart.)

FOR SEVENTH GRADE.

Copy these statements, and underscore the correct terms:

1. The United Kingdom has extensive (cotton growing gold mining manufacturing) industries.
2. (Czechoslovakia Germany Switzerland) is a country that was formed after the World War.
3. The (Tundras Everglades) are treeless plains.
4. Constantinople is a seaport in the (Bosporus Dardanelles Gibraltar Straits).
5. Egypt and Mesopotamia are ruled by the (French English Turks).
6. Johannesburg is noted or its (gold wild animals diamonds).

Write *true* as the answer to statements which are true; write *false* as the answer to statements which are false. Copy the statements first:

7. Asia is the smallest continent. ———.
8. Dry farming means growing crops which do not require water. ———.
9. The race of people in China and Japan is Mongolian. ———.
10. Madagascar is an island near South America. ———.
11. The Indus and Ganges rivers are in China. ———.

12-15. Match the first column with the second column:

(1) Palm Beach.	( ) diamonds.
(2) Brussels.	( ) desert.
(3) Kimberley.	( ) wheat.
(4) Sahara.	( ) carpets.
(5) Rhine.	( ) island.
(6) Russia.	( ) great evergreen forest.
(7) Monsoon.	( ) river.
(8) Fiji.	( ) summer resort.
(9) Taiga.	( ) fertilizer.
(10) Nitrate.	( ) wind.

Copy the following statements, then fill the blanks with the correct word or words:

16. ——— has more population than any other continent.
17. The ——— is known as the ship of the desert.
18. Four important exports of Europe are ———, ———, ———, ———.
19. Four important seaports of the United States are ———, ———, ———, ———.
20. The Philippine Islands export ———, ———, ———, ———.
21-22. Tell where the Suez Canal is and of what help it has been to civilization.

23-25. Match the following cities with their countries:

(1) Cairo.	( ) China.
(2) Athens.	( ) Straits Settlements.
(3) Canton.	( ) Greece.
(4) Singapore.	( ) Egypt.
(5) Havana.	( ) Cuba.
(6) Berlin.	( ) Germany.

KANSAS HISTORY.

(Wm. A. Sailors.)

FOR SEVENTH AND EIGHTH GRADES.

1. Compare Coronado's opinion of Kansas with Pike's opinion of it.
2. Name two early missionaries and two missions founded. Locate.
3. What tribe of Indians was known as the Quiviras?
4. Fill the blanks with the proper answer:
   (*a*) The first state governor of Kansas was ———.
   (*b*) The constitution was adopted ———.
   (*c*) The State Capitol is at ———.
5. How did the Kansas-Nebraska bill affect Kansas? Explain.
6. Who and what were or are the following: John Brown; Pawnee; Clyde M. Reed; Geo. A. Allen, Jr.; Charles Curtis?
7. Match the words in the first column with the dates in second column:

Panic, ———.	1803
Wyandotte Constitution, ———.	1854
Louisiana Purchase, ———.	1861
Kansas becomes a territory, ———	1859
Kansas becomes a state, ———.	1893

8. Draw a map of Kansas locating two rivers, the state capitol, the state school nearest your home, one oil center, and one dairy center.
9. Name two leading modes of transporting products from Kansas.
10. How did the discovery of gold in California affect Kansas?

Examination for Common-School Diplomas

NINE-MONTH TERMS

Saturday, May 10, 1930

These questions are to be used only on the above date. The questions for each day must be opened in the presence of a majority of the examining committee.

An average of 80 per cent with no grade below 60 per cent is required for graduation. Grades of 80 per cent or more may be carried two years.

At the option of the county superintendent, credit may be given on school work to the amount of 50 per cent in each subject.

The subjects for Friday, May 10, were, a. m., Reading, Arithmetic, Physiology; p. m., Civics, Geography, Kansas History.

The diploma examination for eight-month schools was held April 19 and 26, 1930.

GEO. A. ALLEN, JR.,
State Superintendent of Public Instruction.

13-3444

A. M.	P. M.
Writing	Grammar .....
United States History	Agriculture .....
Spelling	

WRITING.

(L. H. Hausam.)

The quality of writing is to count for 50% and the answers to the theory questions for 50%.

1. Make the two-spaced oval across the page; and the two-spaced push-pull drill across the page.
2. Make the capitals on two lines in their proper groups (*OCEA NMHK QZXW VUY TFD PBR SGL IJ*).
3. Write the numerals three times on one line.
4. Write the following sentence: *This is my best arm-movement writing upon completing book eight in the Kansas Practical Writing Course.*
5. What often makes the lines too heavy in practicing penmanship?
6. Answer the following questions with either *yes* or *no:*
   (*a*) Should the hand and wrist rest on the desk while writing? ———
   (*b*) Should the penholder point outside the elbow of the writing arm? ———
   (*c*) Should the first joint of the first finger of the writing hand be bent down while writing? ———
   (*d*) Should both arms rest on the desk while writing? ———
   (*e*) Should the weight of the hand rest on the pen while writing? ———
7. Write this sentence: *All who try right learn to write right,* and answer the following questions concerning it:
   (*a*) Which of the small letters are as high as the capital *A*?
   (*b*) Which of the small letters are as high as the small *w*?
   (*c*) Which of the small letters have only straight down strokes?
   (*d*) Which of the small letters have both straight and curved down strokes?
   (*e*) Which of the small letters have only curved down strokes?
8. (*a*) Make a capital *I* and a capital *J*, and indicate with a small arrow where each begins.
   (*b*) Do the upper loops in capitals *I* and *J* have the same slant as the upper loops in *S, G,* and *L*?
   (*c*) Which capitals in groups 7 and 8 should be connected to the small letters in writing words commencing with these capitals?
9. (*a*) Does your teacher show you how to use the arm movement and how to make the drills and letters with the arm movement?
   (*b*) Does your teacher explain the details of letters before you practice them?
10. Write your own name and address five times.

UNITED STATES HISTORY.

(Mrs. Effie Wilkins.)

FOR EIGHTH GRADE ONLY.

1. Define any five of the following terms as used in our history: Spoils System; Nullification; Emancipation Proclamation; Freedmen; Melting Pot; Constitutional Amendment; Restriction of Immigration.
2. California was acquired from Mexico in 1848, and became a state in 1850. Give the reason for these early dates.
3. Name in order the persons who have served as president of the United States since the Civil War.
4. Why did the United States enter the World War?
5. Write from fifty to seventy-five words about the "Industrial Revolution."
6. Complete with one word or name:
   (*a*) The Old Man Eloquent was ———.
   (*b*) Old Hickory was a name given to ——— ———.
   (*c*) Henry Clay was called ———.
   (*d*) The author of the Declaration of Independence was ———.
   (*e*) The author of the Emancipation Proclamation was ——— ———.
7. Underscore the correct words in the following:
   (*a*) Oh Captain! My Captain! is a poem written about (Grant Lincoln John Brown Jefferson Davis).
   (*b*) W. J. Bryan advocated (gold standard free coinage of silver at the ratio of 16 to 1).
   (*c*) (France England The United States) built the Panama Canal.
   (*d*) John J. Pershing was an (author banker American general aviator senator).
   (*e*) The United States acquired Louisiana in (1819 1812 1803 1861 1845).
8. Fill the blanks with words necessary to make complete facts:
   (*a*) The ——— ——— was adopted to prevent the European nations from gaining colonies or possessions in Central or South America.
   (*b*) The ——— ——— provided for National Prohibition.
   (*c*) ——— ——— captured Harper's Ferry.
   (*d*) ——— ——— was the first president of the Woman's Christian Temperance Union.
   (*e*) Gettysburg was a decisive battle of the ——— ———.
9. Mark as either True or False:
   (*a*) (———) Cuba belongs to the United States.
   (*b*) (———) Stephen A. Douglas was the author of the Kansas-Nebraska Bill.
   (*c*) (———) The Underground Railroad was an organization that helped the negroes escape from their masters.
   (*d*) (———) William J. Bryan was elected president in 1900.
   (*e*) (———) The Kansas-Nebraska Bill caused Kansas to be settled rapidly.
   (*f*) (———) Tariff prevents our manufacturers from exporting goods.
   (*g*) (———) The Homestead Laws hindered the settlement of the West.
   (*h*) (———) Clara Barton was one of the early leaders of the Red Cross Movement.
   (*i*) (———) The boundary line between the slave states and free states was called the Mason and Dixon line.
   (*j*) (———) U. S. Grant was a Southern General.
10. Match the names in the first column with the correct terms in the second column:

(*a*) Pennsylvania.	( ) early education.
(*b*) Eli Whitney.	( ) Purchase of Louisiana.
(*c*) De Soto.	( ) Indian chief.
(*d*) Horace Mann.	( ) Battle Hymn of the Republic.
(*e*) Daniel Boone.	( ) Revolutionary War.
(*f*) Thomas Jefferson.	( ) first settlement in Virgina.
(*g*) Jamestown.	( ) settled by Quakers.
(*h*) Julia Ward Howe.	( ) discovered Mississippi river.
(*i*) Pontiac.	( ) pioneer of Kentucky.
(*j*) Washington.	( ) invented cotton gin.

SPELLING.

(Agnes L. Praeger.)

FOR EIGHTH GRADE ONLY.

1. Write the plurals of the following: solo, body, survey, delivery, process, locality, tariff, senior, column, negro.
2. Use these words correctly in sentences: clause, we've, effects, weights, counsel, wears, sole, crepe, vary, affected.
3. Write the singular of these words in sentences: families, memories, errors, curiosities, freshmen.
4. Add "ed" and "ing" to these words: step, rule, occur, submit, transfer.
5. Give the five steps or directions given by the authors of our new speller on how to learn to spell a word.

Allow 50% for the question below:

6-10. Spell correctly when examiner pronounces:

humor	receiver	statistics
angels	specialty	affidavit
shouldn't	alliance	necessitate
foresee	partially	psychology
accepted	literally	mortgage
bureau	acquainted	illustrious
all right	parcel post	facilitate
kimono	amiable	
acoused	proceeding	

OUR ENGLISH.

(Alta S. Hepler.)

FOR EIGHTH GRADE ONLY.

1. Write a paragraph expanding one of the following ideas: I like to see a cherry tree in bloom (describe how it looks). The wind played havoc on our street (tell in detail what it did). One night I thought I saw a ghost (tell the story).
2. Classify the following sentences according to form and according to use:
   (1) We built a shack in the woods near grandfather's house.
   (2) Have you heard about the little coral animals and their great islands in the sea?
   (3) Look at the pilot!
   (4) Mary's work is finished, but yours has just begun.
   (5) The two boys who won the honors were cheered when they passed us.

3-4. Diagram the fifth sentence of question 2.

5. (*a*) Write the following sentences, choosing the correct verb form:
   (1) We are sure the ball was deliberately (threw, thrown) through the window.
   (2) When were you (spoke, spoken) to about this matter?
   (3) Why isn't this work (did, done) by the children?
   (4) A path through the woods has been (wore, worn) by the children.
   (5) Permission to camp there was (give, gave, given) to us by the owner.
   (*b*) Give the tense, person, number, mood, and voice of each of the verbs in sentences 1 and 2.
6. (*a*) List the adjectives, predicate adjectives, and adverbs in the following sentences:
   (1) His brave act was cheered by interested spectators.
   (2) How bright the stars are!
   (3) Heavy thunder immediately followed the lightning.
   (*b*) Write the comparison of all adjectives and adverbs in the above sentences.
7. (*a*) Write the following sentences correctly, using the correct preposition. Give the reason for your choice:
   (1) We went (in, into) the museum and looked at the curios (in, into) the cases.
   (2) There is no choice (among, between) these two roads.
8. (*a*) Name the five parts of a friendly letter. Illustrate.
   (*b*) You have heard that the Monarch Grocery Company, 1234 Frankfort Avenue, Louisville, Ky., is about to expand its business. Write a letter of application for a position in one of its new departments.

9-10. Write "true" before those that are correct, and "false" before those that are incorrect:
   (*a*) (———) A sentence is a group of words expressing a complete thought.
   (*b*) (———) A verb is a word used to tell or assert something.
   (*c*) (———) A conjunction is a word used in place of a noun.
   (*d*) (———) When the verb is used to express a command, a request, or an entreaty, it is in the subjunctive mood.
   (*e*) (———) A gerund is a verb form which is used partly as an adjective and partly as a verb.
   (*f*) (———) A possessive adjective should agree with its antecedent in person, number, and gender.
   (*g*) (———) A participle is a verb form, ending in *ing*, that partakes of the nature of a noun.
   (*h*) (———) A subordinate conjunction is one that joins a subordinate clause to a principal clause.
   (*i*) (———) A noun or a pronoun used as the direct object of a verb is in the dative case.
   (*j*) (———) A pronoun is a word used to name a person, place, or thing.

AGRICULTURE.

(P. W. Kirkpatrick.)

FOR EIGHTH GRADE ONLY.

1. Number the terms in the second column to match the names in the first column:

(1) mistletoe.	( ) bird.
(2) tuberculosis.	( ) flowering parasite.
(3) quail.	( ) oats.
(4) tractor.	( )
(5) corn.	( ) wheat.
(6) irrigation.	( ) 10-20.
(7) soil.	( ) concentrates.
(8) Kanota.	( ) head of water.
(9) bin-burnt.	( ) contagious disease.
(10) tillering.	( ) erosion.

2. Name five kinds of wheat. Which kinds are grown in your community?
3. Define legumes, and name four legumes.
4. Define: nodules, weed, subsoil, humus, and film water.
5. What is contour plowing, and why is it done?
6. Who is the Secretary of Agriculture of the United States? Tell something about him.
7. Name five vegetables which need transplanting. Why?
8. Why should the farm home be made attractive with flowers, shrubs, paint, etc.?
9. Name five harmful and five helpful birds seen in Kansas.
10. Name one or two highways which pass through your county. Of what benefit are gravel or paved roads to a community?

WOODY-McCALL MIXED FUNDAMENTALS: FORM III

Name..... *Age*..... *Grade*..... *Building*..... *City*.....

Get the right answer to as many examples as you can in 20 minutes. Do all work on the front or back of this sheet.

(1) **Add**

2
4

(2)

$6 \times 2 =$

(3)

$2 \overline{)\ 4}$

(4) **Subtract**

3
2

(5) **Multiply**

31
2

(6) **Subtract**

15
9

(7) **Add**

15
4

(8)

$5 + 1 =$

(9) **Subtract**

17
8

(10) **Multiply**

257
5

(11)

$6 \div 2 =$

(12) **Add**

12
13
29

(13) **Subtract**

493
167

(14)

$2 \overline{)\ 15}$

(15) **Add**

19
7
19
34
88

(16) **Multiply**

4097
6

(17)

$3\frac{2}{3} - 1 =$

(18) **Add**

$13.25
16.50
17.75

(19) **Multiply**

7889
9

(20)

$\frac{1}{3}$ of 129 =

(21) **Add**

486
765
524
140
812
466
355
834
567

(22) **Multiply**

397
.05

(23)

$195 \div 7 =$

(24) **Subtract**

38
$15\frac{3}{5}$

(25) **Add**

5.099
2.710
6.102
3.52

(26) **Multiply**

5839
85

(27)

$\frac{5}{6}$ of 576 =

(28) **Add**

.39
.27
.72
.85
1.59
11
.44
.27
2.02
.66
.78
.57
.76
1.10
.19
.65

(29)

$\frac{1}{6} \times 3 =$

(30) **Multiply**

$789\frac{3}{4}$
26

(31)

$\frac{7}{8} \div 6 =$

(32)

$9.5 - 5.00073 =$

(33)

$9 \overline{)\ 58 \text{ lb. } 8 \text{ oz.}}$

(34) **Multiply**

$.0893\frac{1}{8}$
.084

(35)

$24.081 + 200.6 + 28 + 97.29 + 18.3515 =$

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Chart of Correct Answers					
Problem	Questions				Total Scores
	A	B	C	D	
1					
2					
3					
4					
5					
6					
Totals					

Put a check in each space under A-B-C and D for a correct answer to the question. Maximum score 24.

TEST II

ARITHMETIC READING TEST

(Problem Analysis)

By P. R. STEVENSON

ame of Pupil.....

ame of School..... Grade..... Date.....

ame of Teacher ..... City.....

DIRECTIONS

Look at the problem below. Read it carefully, then read the part eaded A. Four answers are given to the question, "Which of the following cts are given in the problem?" Only one of the answers is correct. Find e correct answer. If more than one answer seems correct, select the best ne. The correct answer is number 1, "The different amounts deposited." Vrite the "1" in the parentheses to the left of the question.

Now read question B and its four answers. Which is the correct answer? Vrite the number "3" just to the left of question B. Read question "C." stimate the best answer and write its number just to the left of the question. n question D find the correct answer and write its number in the parentheses.

TRIAL TEST

On May 5th, Alice deposited $0.50 in the school bank; on the 10th, she eposited $1.50; on the 15th, she put in $0.50; and on the 20th, she deposited 1.00. How much did she deposit altogether during May?

( ) A. WHICH OF THE FOLLOWING FACTS ARE GIVEN IN THE PROBLEM?

1. The different amounts deposited.
2. The total amount deposited.
3. The interest paid by the bank.
4. The time when money was withdrawn.

( ) B. WHICH OF THE FOLLOWING THINGS ARE YOU ASKED TO FIND OUT IN THE PROBLEM?

1. The profit gained on the deposits.
2. The number of times that she deposited money.
3. The total amount deposited.
4. The amount of each deposit.

( ) C. WHICH OF THE FOLLOWING IS THE MOST REASONABLE ANSWER?

1	2	3	4
$22.00	$15.50	$1.00	$3.50

( ) D. WHICH PROCESS SHOULD BE USED IN SOLVING THE PROBLEM?

1	2	3	4
Addition	Subtraction	Multiplication	Division

On the following pages there are a number of exercises similar to these. Vork as rapidly as possible but be sure to get the answer right.

emember:

Find the correct or best answer to each question.
Write its number in the parentheses to the left of the question.

When you have finished the problems on one page, go on to the next page ithout stopping until you have finished all the pages or are told to stop. If ou do not know the answer to a question, go on to the next.

I. The pupils in the Irving School agreed to make 675 badges for the school field meet. The day before the meet the third grade turned in 20, the fourth grade, 40; the fifth, 70; the sixth, 130; the seventh, 160; and the eighth, 200. How many badges were turned in?

( ) A. WHICH OF THE FOLLOWING FACTS ARE GIVEN IN THE PROBLEM?

1. The cost of the materials.
2. The number of badges each grade made.
3. The time necessary to make the badges.
4. The number of badges each grade should have made.

( ) B. WHICH OF THE FOLLOWING THINGS ARE YOU ASKED TO FIND OUT IN THE PROBLEM?

1. The total number of badges promised.
2. The number of pupils who worked.
3. The total number of badges made.
4. How many teachers helped.

( ) C. WHICH OF THE FOLLOWING IS THE MOST REASONABLE ANSWER?

1	2	3	4
250	410	750	620

( ) D. WHICH PROCESS SHOULD BE USED IN SOLVING THE PROBLEM?

1	2	3	4
Addition	Subtraction	Multiplication	Division

II. A speculator bought a farm of 360 acres on the edge of town for $72,000.00. After keeping it for two months, he sold it to a development company to be cut up into small farms and city lots. The company paid him $90,000.00 for the whole farm. How much did he gain by the deal?

( ) A. WHICH OF THE FOLLOWING FACTS ARE GIVEN IN THE PROBLEM?

1. The selling price for each city lot.
2. The number of small farms and lots formed.
3. The selling price of the whole farm.
4. The amount gained in the deal.

( ) B. WHICH OF THE FOLLOWING THINGS ARE YOU ASKED TO FIND OUT IN THE PROBLEM?

1. The purchase price.
2. The name of the company.
3. The size of the farm.
4. The amount gained.

( ) C. WHICH OF THE FOLLOWING IS THE MOST REASONABLE ANSWER?

1	2	3	4
$360,000.00	$10,000.00	$18,000.00	$90,000.00

( ) D. WHICH PROCESS SHOULD BE USED IN SOLVING THE PROBLEM?

1	2	3	4
Addition	Subtraction	Multiplication	Division

III. **Dick made 50 toy boats. He sold 24 of them at 30 cents each, 10 at 25 cents each, 6 at 20 cents, and the rest at 15 cents each. How much did he receive for those he sold at 30 cents?**

( ) A. WHICH OF THE FOLLOWING FACTS ARE GIVEN IN THE PROBLEM?

1. The number he sold at 30 cents each.
2. The amount he received for all the boats.
3. The cost of the materials.
4. The number of boats sold at 50 cents each.

( ) B. WHICH OF THE FOLLOWING THINGS ARE YOU ASKED TO FIND OUT IN THE PROBLEM?

1. The amount received for all the boats.
2. The material used in making the boats.
3. The number of people who bought boats.
4. The amount received for the 30-cent boats.

( ) C. WHICH OF THE FOLLOWING IS THE MOST REASONABLE ANSWER?

1	2	3	4
$7.00	$5.00	$3.00	$12.50

( ) D. WHICH PROCESS SHOULD YOU USE IN SOLVING THE PROBLEM?

1	2	3	4
Addition	Subtraction	Multiplication	Division

IV. **From Cincinnati, Ohio to Cleveland, Ohio by way of Columbus is 262 miles. A train leaving Cleveland at 4:50 will be in Columbus at 7:50 and in Cincinnati at 11:00. If it is 140 miles from Cleveland to Columbus, how far is it from Cincinnati to Columbus?**

( ) A. WHICH OF THE FOLLOWING FACTS ARE GIVEN IN THE PROBLEM?

1. The distance from Cincinnati to Columbus.
2. The distance from Cincinnati to Cleveland.
3. The cost of a ticket from Cleveland to Columbus.
4. The number of hours it takes to make the trip.

( ) B. WHICH OF THE FOLLOWING THINGS ARE YOU ASKED TO FIND OUT IN THE PROBLEM?

1. The time needed to go from Cleveland to Columbus.
2. The distance from Cleveland to Cincinnati.
3. The price of a ticket from Cincinnati to Columbus.
4. The distance from Columbus to Cincinnati.

( ) C. WHICH OF THE FOLLOWING IS THE MOST REASONABLE ANSWER?

1	2	3	4
120	200	402	95

( ) D. WHICH PROCESS SHOULD BE USED IN SOLVING THE PROBLEM?

1	2	3	4
Addition	Subtraction	Multiplication	Division

V. Mrs. Jones spent 13 hours making a dress. The 3 yards of goods used cost $2.75 per yard and the trimmings, buttons, and thread cost $4.25. If Mrs. Jones' time is worth 40 cents an hour, what did the work on the dress cost?

( ) A. WHICH OF THE FOLLOWING FACTS ARE GIVEN IN THE PROBLEM?

1. The time spent on the work.
2. The cost of the work on the dress.
3. How many spools of thread were used.
4. What the trimmings cost.

( ) B. WHICH OF THE FOLLOWING THINGS ARE YOU ASKED TO FIND OUT IN THE PROBLEM?

1. The length of the dress.
2. The cost of the work.
3. The time spent on the work.
4. The total cost of the dress.

( ) C. WHICH OF THE FOLLOWING IS THE MOST REASONABLE ANSWER?

1	2	3	4
$7.60	$12.25	$21.50	$5.20

( ) D. WHICH PROCESS SHOULD BE USED IN SOLVING THE PROBLEM?

1	2	3	4
Addition	Subtraction	Multiplication	Division

VI. Mr. Brown's bill at the restaurant was larger than he expected so he checked over the items. He had had soup at 15 cents, a steak at 50 cents, French fried potatoes, 25 cents; bread and butter, 10 cents; pie ala-mode, 25 cents; coffee, 10 cents; and a cigar at 15 cents. How much should his meal have cost him if he tipped the waiter a quarter?

( ) A. WHICH OF THE FOLLOWING FACTS ARE GIVEN IN THE PROBLEM?

1. The total bill.
2. The amount of food served.
3. How much time he spent at the table.
4. The cost of the items of food.

( ) B. WHICH OF THE FOLLOWING THINGS ARE YOU ASKED TO FIND OUT IN THE PROBLEM?

1. The amount of the tip.
2. The total cost of the meal.
3. How much the steak cost.
4. The number of items on the bill.

( ) C. WHICH OF THE FOLLOWING IS THE MOST REASONABLE ANSWER?

1	2	3	4
$3.00	$1.15	$1.75	$2.50

( ) D. WHICH PROCESS SHOULD BE USED IN SOLVING THE PROBLEM?

1	2	3	4
Addition	Subtraction	Multiplication	Division.

THIRD DIVISION
Grades 7 and 8
Form 1

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Number Correct.....
Score .....

SCALE FOR PROBLEMS IN ARITHMETIC

by

B. R. Buckingham

City..... County..... State..... Date.....

Name..... Age today.....
(Years, Months)

Race..... Sex..... School.....

Grade..... Teacher.....

Directions

Special precautions should be taken throughout the test to prevent communication and to secure independent work.

Distribute the papers face up and tell the children not to turn them over or open them. Distribute no other paper.

Have the children fill in the data called for on the first page. Assist them if necessary. Then read the following, letting the children read silently from their own copies.

"On the inside of this folder you will find some problems in arithmetic. The first one is the easiest, the next is a little harder, and so on to the last which is the hardest. When I tell you to begin, turn the page and try the first problem. You may do as much of your work as you wish 'in your head' but do all your written work in the space under the problem without using any other paper. Then copy your answer in the square where it says 'ANSWER.' If the answer is in money, don't forget the dollar sign and decimal point. After you have tried the first problem, try the second, then the third, and so on. Be sure to try them in the order in which they are printed. Do not skip around. If you omit a problem, I shall think you have tried it and could not solve it. Do not hurry. You will have plenty of time. Begin."

Children should have all the time they can usefully employ; but it is suggested that not more than an hour and a quarter be devoted to the work. At the end of the exercise, tell the children to look over their work and be sure that they have (1) tried the problems in regular order, (2) copied their answers in the proper place, (3) put in the dollar sign and decimal point when an answer is in money. Collect the papers.

Children who solve none of the problems should be given the next lower division of the scale. Otherwise no valid score for such pupils can be obtained.

Value (65)		ANSWER
	1. A man bought a house for $7250. After spending $321.50 for repairs, he sold it for $9125. How much did he gain?	
(67)	2. How many weeks will it take Joseph to save 21 dollars for a bicycle if he saves $1\frac{1}{2}$ dollars a week?	ANSWER
(69)	3. George walks at the rate of $2\frac{1}{3}$ miles per hour. Henry starts with him and walks in the same direction at the rate of 3 miles an hour. How many miles apart will they be in 3 hours?	ANSWER
(71)	4. If 0.78 of the weight of potatoes is water how many pounds of water are there in a bushel of potatoes, if a bushel of potatoes weighs 60 pounds?	ANSWER
(73)	5. Two boys agreed to cut a lawn for 90 cents. The first boy worked one hour and the second boy worked 4 hours. How much money should each receive?	ANSWER

Value (75)

6. Find the total cost of the following purchases: 8½ yds. flannel at 96 cents, 4¾ yds. braid at 16 cents, 12 yds. embroidery at 22½ cents, 10 yds. lace at 27½ cents.

ANSWER

(77)

7. The distance from New York to Chicago is 998 miles. The running time, by the New York Central is 19 hours. Because of floods, an engine goes only 296 miles the first 7 hours. After that how many miles per hour must it go to reach Chicago on time?

ANSWER

(79)

8. A, B, and C owned all the stock in a certain store worth $4,800. A owned 16 shares, B 3 shares, and C 5 shares. What was the money value of each person's share of the stock?

ANSWER

(81)

9. A real estate dealer made a profit of $5,000 on a plot of ground. The rate of profit was 20%. Find the cost of the plot.

ANSWER

(83)

10. It is estimated that if the house fly were kept from food, deaths in cities in summer would be ⅓ less. If the deaths in the summer months are at the rate of 12 per 1,000 people, how many lives might thus be saved in one summer in a city of 1,000,000 inhabitants?

ANSWER

Value (85)	11. I bought a cask of molasses containing 84 gallons for $28. Nine gallons having leaked out, at what price per gallon must I sell the remainder to gain $4.25?	ANSWER
(87)	12. A contractor completed $\frac{2}{5}$ of a job in 12½ days. How many days longer should it take to finish the job?	ANSWER
(89)	13. In the manufacturing of jute twine, the raw jute costs $8\frac{3}{5}$ cents a pound, the spinning costs $\frac{7}{8}$ of a cent a pound, and the twisting and finishing costs $\frac{15}{16}$ of a cent a pound. Find the cost of 1,500 pounds of jute twine.	ANSWER
(91)	14. On a map, a line 2¾ inches long represents a distance of 132 miles. How many miles are represented by a line 8½ inches long?	ANSWER
(94)	15. Mr. Wood had 250 baseballs. He sold 20% of them the first day and 40% of the remainder the second day. What percent of his original stock was left?	ANSWER