

AN ANALYSIS OF RESPONSES ON THE DAVID JOHN DAVIS
TEST OF FUNCTIONAL COMPETENCE IN MATHEMATICS

A Thesis
Presented to
the Faculty of the Department of Education
Indiana State Teachers College

INDIANA STATE
TEACHERS COLLEGE
LIBRARY

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

Date of Submission _____

by

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May 1949

The thesis of Eugene L. Herbst,
Contribution of the Graduate School, Indiana State
Teachers College, Number 622, under the title
AN ANALYSIS OF RESPONSES ON THE DAVID
JOHN DAVIS TEST OF FUNCTIONAL COMPETENCE
IN MATHEMATICS

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of the Master's degree in the amount of 8 hours'
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Date of Acceptance May 31, 1949

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CHAPTER I

THE PROBLEM

Statement of the problem. This study is an analysis of responses to a standard mathematics test taken by non-mathematics majors enrolled in the mathematics course required in the general education curriculum at Indiana State Teachers College. The purpose of this study is to analyze the responses in an attempt to reveal the nature of the errors made by the group. The problem becomes a search for the answers to the following questions:

1. What does a study of the distribution of correct responses, incorrect responses, and omissions on the individual test items reveal concerning the general level of achievement?
2. What does a study of the distribution of correct responses, incorrect responses, and omissions reveal as to the particular types of incompetence?

Importance of the study. Today's school is being subjected to thorough evaluations by agencies representing levels of administration from the local community to the state and nation. Many of the criteria used in these investigations fail to some extent to consider the most important factors in the study of mathematics education. For the improvement of mathematics education, it is necessary

important product of the school--the qualitative values of the knowledges, skills, and attitudes imparted to the graduates. True, there is a vast and increasing number of follow-up studies of the success of high school graduates but they are, for the most part, of a quantitative nature. The management of an industry may be justly proud of the quantity of their product, but, in order to meet competition, they are most interested in the performance of that product.

Unlike industrial personnel, teachers seldom have information that is both valid and comprehensive concerning the qualitative performance of their former pupils. While various studies based on correct responses have been made, very few have been made that also indicate the existing conditions regarding the incorrect responses and omissions that students actually make.

Studies of pupil weaknesses, as revealed by the analysis of errors and omissions, may reveal opportunities for the improvement of teaching and should therefore prove particularly valuable to both teachers and school administrators. The recurrence of errors and omissions may tend to indicate a need for more emphasis on certain topics or further instruction along certain lines. Since this entire study is based on the assumption that success frequently results from the study of weaknesses or failures, suggestions for the improvement of instruction can be made only after

careful study and analysis in order to properly evaluate deficiencies and interpret them in terms of needed changes.

Source of data. Students who were non-mathematics majors taking the mathematic course, General Mathematics, required by the general education curriculum at Indiana State Teachers College were given the David John Davis Test of Functional Competence in Mathematics. The writer has been teaching Mathematics 101 (General Mathematics) during the current academic year. The test papers have been retained in the files of the mathematics department. The head of the mathematics department, Dr. Shriner, has kindly allowed the writer the use of these standard tests for the purposes of this investigation.

Students involved. The David John Davis Test of Functional Competence in Mathematics was administered to the students at the beginning of each quarter, starting with the Fall Quarter, 1948, and ending with the Winter Quarter, 1949. The aggregate consisted of the test papers of 328 pupils. Of this number, 153, or 47.26%, were men, and 173, or 52.74%, were women. Approximately 13% of the group were veterans.

Other studies of similar nature. Mr. Ira W. Vance, in an unpublished thesis, reported a study of errors in beginning algebra. In the study he analyzed the errors of high school students as revealed by the Hotz Algebra Scales.¹ Students of beginning algebra were given two of these tests at different times during the year. Mr. Vance classified the errors and tried to determine the effect of factors such as achievement in arithmetic, size of class, intelligence rating, and sex upon the types of errors made by the students.

Mr. Vance's conclusions were:

1. Certain trivial errors which are found on individual examination papers have an accumulative effect when considered enmasse, revealing that they are typical errors which pupils are likely to make.
2. The greatest per cent of errors was found in dealing with verbal problems and seemed to arise from the failure of pupils to comprehend the problem.
3. A type of error frequently made in beginning algebra is one dealing with the equation--solving technique.
4. There was not a great difference in the per cent distribution of errors of the different types made by ninth and tenth grade pupils.
5. Ninth grade pupils made more errors per pupil than tenth grade pupils. This was true for practically every type of error.

¹ Ira W. Vance, An Analysis of Errors in Beginning Algebra as Revealed by Two of The Hotz Algebra Scales, (M.A. Thesis, Indiana State Teachers College, 1932).

6. The fact that the tenth grade pupils were more skilled in arithmetic did not have much effect upon their arithmetic work in algebra.

7. There is no difference in the total number of errors per pupil for boys and girls.

8. Boys made more errors in equation solving technique than did the girls.

9. Girls made more errors in the comprehension of the conditions in written problems than did boys.

10. The factor of intelligence has a decided effect upon the number and type of errors which pupils make in beginning algebra.

11. The total number of errors per pupil increased with a decrease of intelligence.

12. Brighter pupils made fewer errors per pupil in equation solving technique than did the duller pupils.

13. The brighter pupils were more likely to comprehend the conditions of the written problems than the duller pupils.

14. The size of the class did not seem to be very important as a factor contributing to the type or number of errors which the pupils made in beginning algebra.²

Another study of errors made in mathematics was reported in an unpublished thesis by Frances Vickroy Higgins.³ Mr. Higgins, in his study, analyzed the errors made by students at Indiana State Teachers College when given the Iowa Placement Examination in the beginning mathematics course.

² Ibid., pp. 8-9.

³ Francis Vickroy Higgins, An Analysis of Errors as Revealed by the Iowa Placement Examination in Mathematics, (M.A. Thesis, Indiana State Teachers College, 1936).

His conclusions were:

1. The students involved in this study show a deplorable weakness in the fundamentals of arithmetic and algebra.

2. The students in this study are especially weak in fractions, per cent, powers, roots, and expressing words in symbols.

3. Certain types of errors were made repeatedly.

4. The greatest number of errors seem to be due to lack of comprehension of the problem on the part of the student.

5. The next greatest number of errors were errors involving fundamental operations.

6. The men involved show better mathematical training than did the women. However, the women in this study were largely students on elementary courses and probably had not the interest in mathematical achievement that the men students had.⁴

A third study of responses was reported by Henry N. Percy in an unpublished thesis.⁵ In his study, Mr. Percy analyzed the responses made by students at Indiana State Teachers College when they took the Shorling, Clark, Potter Hundred-Problem Arithmetic Test in their beginning mathematics course.

His conclusions were:

1. The students involved in this study show definite weaknesses in the fundamentals of arithmetic.

⁴ Ibid., pp. 7-8.

⁵ Henry N. Percy, An Analysis of Responses on the Shorling, Clark, Potter Hundred-Problem Arithmetic Test. (M.S. Thesis, Indiana State Teachers College, 1948).

2. The students in this study were especially weak in common fractions, decimal fractions, and per cent.

3. The types of problems on which the students made the greatest number of errors were multiplication of per cent and whole numbers, determining the size of decimal fractions, division of mixed decimals, changing per cents to decimal fractions, changing common fractions to decimal fractions, and finding rate of per cent with the product and base given.

4. The students involved in this study had the best results on problems involving the fundamental operations with whole numbers.

5. The women involved in the study showed better mathematical skill than did the men. However, a large number of the men students were veterans who had been separated from any form of education for various periods of time while most of the women were just out of high school.

6. The women completed more items than did the men and made fewer errors.

7. The women were most superior to the men on problems involving division.⁶

Although these studies are of a somewhat similar nature, this study differs from Mr. Vance's study in that Mr. Vance dealt with high school students in algebra, and it differs from Mr. Higgins' study in that Mr. Higgins dealt with algebra, arithmetic, and geometry. This study differs also from Mr. Percy's study in that Mr. Percy dealt with the fundamentals of arithmetic. The test used in this study involves the application of arithmetic, mensuration, algebra, trigonometry, and reasoning to the solving of problems typical of those necessary to the efficient solution of problems

⁶ Ibid., p. 61.

encountered in everyday life such as cost, discount, banking, investment, installment buying, graphs, budgeting, taxation, statistics, etc.

General Procedure. The David John Davis Test of Functional Competence in Mathematics (a copy of which is given in the appendix) is divided into four major areas or parts: Part I, entitled "Consumer Problems", contains twenty-seven test items concerning cost, discount, banking, investment, commission, insurance, installment buying, taxation, and budgeting; Part II, entitled "Graphs and Tables", contains ten test items concerning graphs and tables; Part III, entitled "Symbolism, Equations, etc.", contains twenty-eight test items concerning exponents, equations, mensuration, formulas, vectors and trigonometry; Part IV, entitled "Ratio, Tolerance, etc.", contains twenty-five test items concerning rounding of numbers, approximate and exact numbers, estimation, mensuration, ratio, statistics, and reasoning.

A tabulation of the test items was made; the number of correct responses, incorrect responses, and no responses was recorded for each item. Tables indicating the number and percentage of each type of response have been prepared for the entire group, as well as a similar table for the four areas of the test. (The percentages appearing in all tables have been rounded off to the nearest 0.1%.) Comparisons of the percentages have been made.

The actual errors could not be classified as to specific types of errors due to the fact that the test papers provided space for the answers only and did not provide space for actual computation.

CHAPTER II

ANALYSIS OF THE RESPONSES TO PART I OF THE TEST

Part I of the David John Davis Test of Functional Competence in Mathematics, entitled "Consumers Problems", contains twenty-seven items concerning banking, budgeting, commission, cost, discount, installment buying, insurance, investment, and taxation. The time allotted for this part of the test was twenty-eight minutes.

The items and corresponding responses are as follows:

1. If a suit marked \$60 is offered at a 15% discount, the selling price (without sales tax) is:

Response	Number	Per cent
Correct	249	75.91
Incorrect	73	22.25
Omitted	6	1.83

2. How much would you have to pay for a suit listed at \$55 if the sales tax is 3%?

Response	Number	Per cent
Correct	263	80.18
Incorrect	59	17.99
Omitted	6	1.83

3. When Mrs. Roberts asked the price of the perfume, the clerk said, "Five dollars plus a 3% sales tax and a 20% Federal tax." This perfume would cost Mrs. Roberts:

Response	Number	Per cent
Correct	254	77.44
Incorrect	68	20.73
Omitted	6	1.83

4. The cost of 3 yards 9 inches of velvet at \$4.80 per yard is: (Without tax)

Response	Number	Per cent
Correct	134	40.85
Incorrect	188	57.32
Omitted	6	1.83

5. What is the cost of burning five 60-watt lamps for 4 hours each night for 30 nights, if the cost of electricity is 3 cents per kilowatt hour? (Without tax)

Response	Number	Per cent
Correct	64	19.51
Incorrect	195	59.45
Omitted	69	21.04

6. A recipe for 4 servings calls for $3\frac{1}{3}$ cups of skim milk and $\frac{1}{2}$ cup of Cream of Wheat. If there are 16 tablespoons to a cup, how many tablespoons of Cream of Wheat are needed for 1 serving?

Response	Number	Per cent
Correct	184	56.10
Incorrect	118	35.97
Omitted	26	7.93

7. Two advertisements appeared in a newspaper. One advertised the sale of 19 ounces of frozen orange juice for 29 cents; the other advertised the sale of 46 ounces of regular canned orange juice for 25 cents. To the nearest cent, how much more does one ounce of frozen orange juice cost than one ounce of the regular canned orange juice?

Response	Number	Per cent
Correct	132	40.24
Incorrect	135	41.16
Omitted	61	18.60

8. Mr. Johnson's car averages 18 miles per gallon of gasoline. If gasoline costs 26 cents per gallon, how much will the gasoline cost Mr. Johnson for a trip of 549 miles?

Response	Number	Per cent
Correct	255	77.74
Incorrect	59	17.99
Omitted	14	4.27

9. Mr. Buchanan has an income of \$250 per month. In his budget, he allows 25% of his income for rent. If Mr. Buchanan stays within his budget, what is the most he can pay per month for rent?

Response	Number	Per cent
Correct	301	91.77
Incorrect	21	6.40
Omitted	6	1.83

10. On Sept. 1, Tom Kelley's bank balance was \$160.40. Deposits made and checks written during the month were as follows: (Excerpt of bank statement given.) Tom's bank balance on October 1 is:

Response	Number	Per cent
Correct	196	59.76
Incorrect	125	38.11
Omitted	7	2.13

11. Mrs. Allen wishes to borrow money from the Central Bank. She signs a promissory note written for \$200 for 90 days. If the bank discounts this note at 5%, Mrs. Allen will receive:

Response	Number	Per cent
Correct	58	17.68
Incorrect	249	75.91
Omitted	21	6.40

12. The original value of a house is \$20,000. If this house depreciates $2\frac{1}{2}\%$ of the original value each year, the value of the house at the end of 8 years will be:

Response	Number	Per cent
Correct	213	64.94
Incorrect	94	28.66
Omitted	21	6.40

13. Mr. Martin plans to rent a house which he bought for \$8,000. He figures his yearly expenses on the house as follows: taxes \$120; insurance, upkeep, and depreciation \$220; and loss of interest on the money invested in the house \$200. How much yearly rent must Mr. Martin charge in order to meet these yearly expenses and still receive a 5% yearly return on his \$8,000 investment.

Response	Number	Per cent
Correct	222	67.68
Incorrect	69	21.04
Omitted	37	11.28

14. If the total assessed valuation of the property in the city of Campbell is \$50,000,000, what tax rate is necessary to raise \$2,000,000 in property taxes?

Response	Number	Per cent
Correct	193	58.84
Incorrect	105	32.01
Omitted	30	9.15

15. The assessed valuation of Mr. Cooper's property is \$9,500. If the tax rate is 40 mills per dollar, Mr. Cooper's property tax is:

Response	Number	Per cent
Correct	55	16.77
Incorrect	150	45.73
Omitted	123	37.50

16. Mr. Jackson wishes to insure his house against loss by fire for \$4,000. An insurance company's representative tells him that the cost of a 3-year policy is $2\frac{1}{2}$ times the cost of a 1-year policy. If the rate on a 1-year policy is 42 cents per \$100 of fire insurance, how much would Mr. Jackson save by buying one 3-year policy rather than three 1-year policies?

Response	Number	Per cent
Correct	126	38.41
Incorrect	109	33.23
Omitted	93	28.35

17. If a real estate agent's commission is 5% of the selling price, what does he receive for selling a house for \$15,000?

Response	Number	Per cent
Correct	257	78.35
Incorrect	33	10.06
Omitted	38	11.58

18. Mr. Jones takes out an ordinary life insurance, policy for \$10,000. If the annual premium rate is \$22.85 per \$1,000 of insurance, Mr. Jones' annual premium is:

Response	Number	Per cent
Correct	267	81.40
Incorrect	15	4.57
Omitted	46	14.02

19. Mr. Sparrow bought forty \$100-G Bonds of the United States Government. Each bond bears simple interest at 2.5% per annum, the interest being paid semi-annually. How much interest does Mr. Sparrow receive every six months from his 40 bonds?

Response	Number	Per cent
Correct	138	42.07
Incorrect	110	33.54
Omitted	80	24.39

20. A typewriter can be bought for \$60 cash or on the installment plan for a \$10 down payment and \$5 each month for twelve months. If you bought this typewriter on the installment plan, the yearly rate of interest you would pay is approximately:

Response	Number	Per cent
Correct	22	6.71
Incorrect	162	49.39
Omitted	144	43.90

21. A purchase of \$6.12 is paid with a ten dollar bill. The accepted order for the clerk to make and to return the change is:

Response	Number	Per cent
Correct	156	47.56
Incorrect	60	18.29
Omitted	112	34.15

22. Which of the following statements in regard to banking procedure is true:

Response	Number	Per cent
Correct	113	34.45
Incorrect	76	23.17
Omitted	139	42.38

23. Which of the following statements in regard to taxation is true:

Response	Number	Per cent
Correct	154	46.95
Incorrect	13	3.96
Omitted	161	49.09

24. Which of the following investments is probably least safe:

Response	Number	Per cent
Correct	58	17.68
Incorrect	89	27.13
Omitted	181	55.18

25. Which of the following statements in regard to the budgeting of income is true:

Response	Number	Per cent
Correct	93	28.35
Incorrect	61	18.60
Omitted	174	53.05

26. Which of the following statements in regard to installment buying is true:

Response	Number	Per cent
Correct	63	19.21
Incorrect	75	22.87
Omitted	190	57.93

27. Which of the following statements in regard to insurance is true:

Response	Number	Per cent
Correct	72	21.95
Incorrect	53	16.16
Omitted	203	61.89

SUMMARY OF RESPONSE PERCENTAGES ON PART I

Percentages of correct responses. The highest percentage of correct responses was 91.77% on item nine. The second highest percentage of correct responses was 81.40% on item eighteen. The third highest percentage of correct responses was 80.18% on item two. The lowest percentage of correct responses was 6.71% on item twenty. The next lowest percentage of correct responses was 16.77% on item 15. The third lowest percentage was 17.68% on items eleven and twenty-four.

Percentages of incorrect responses. The highest percentage of incorrect responses was 75.91% on item eleven. The second highest percentage of incorrect responses was 59.45%

on item five. The third highest percentage of incorrect responses was 57.32% on item four. The lowest percentage of incorrect responses was 3.96% on item 23. The second lowest percentage of incorrect responses was 4.57% on item eighteen. The third lowest percentage of incorrect responses was 6.40% on item nine.

Percentages of omissions. The highest percentage of omissions was 61.89% on item twenty-seven. The second highest percentage of omissions was 57.93% on item twenty-six. The third highest percentage of omissions was 55.18% on item twenty-four. The lowest percentage of omissions was 1.83% on items one, two, three, four, and nine. The second lowest percentage of omissions was 2.13% on item ten. The third lowest percentage of omissions was 6.40% on items eleven and twelve.

It should be noted here that item nine had the highest percentage of correct responses, the third lowest percentage of incorrect responses, and was one of the five items that had the lowest percentage of omissions. Item twenty had the lowest percentage of correct responses, the fourth highest percentage of incorrect responses, and the sixth highest percentage of omissions. Items twenty-three, twenty-four, twenty-five, twenty-six, and twenty-seven were those having the greatest percentages of omissions. This may be partially

explained by the fact that the students were allowed but ,
twenty-eight minutes for Part I of the test and several
probably did not finish the list because of lack of time.

The percentages of correct responses for each item of
the test are presented graphically in Figure 1, page twenty.
Figure 2 presents the incorrect response percentages.
Similarly, Figure 3, page twenty-two, presents the percentages
of omissions for each item. A summary graph, Figure 4, depicts
the total percentages of the various responses for Part I of
the test.

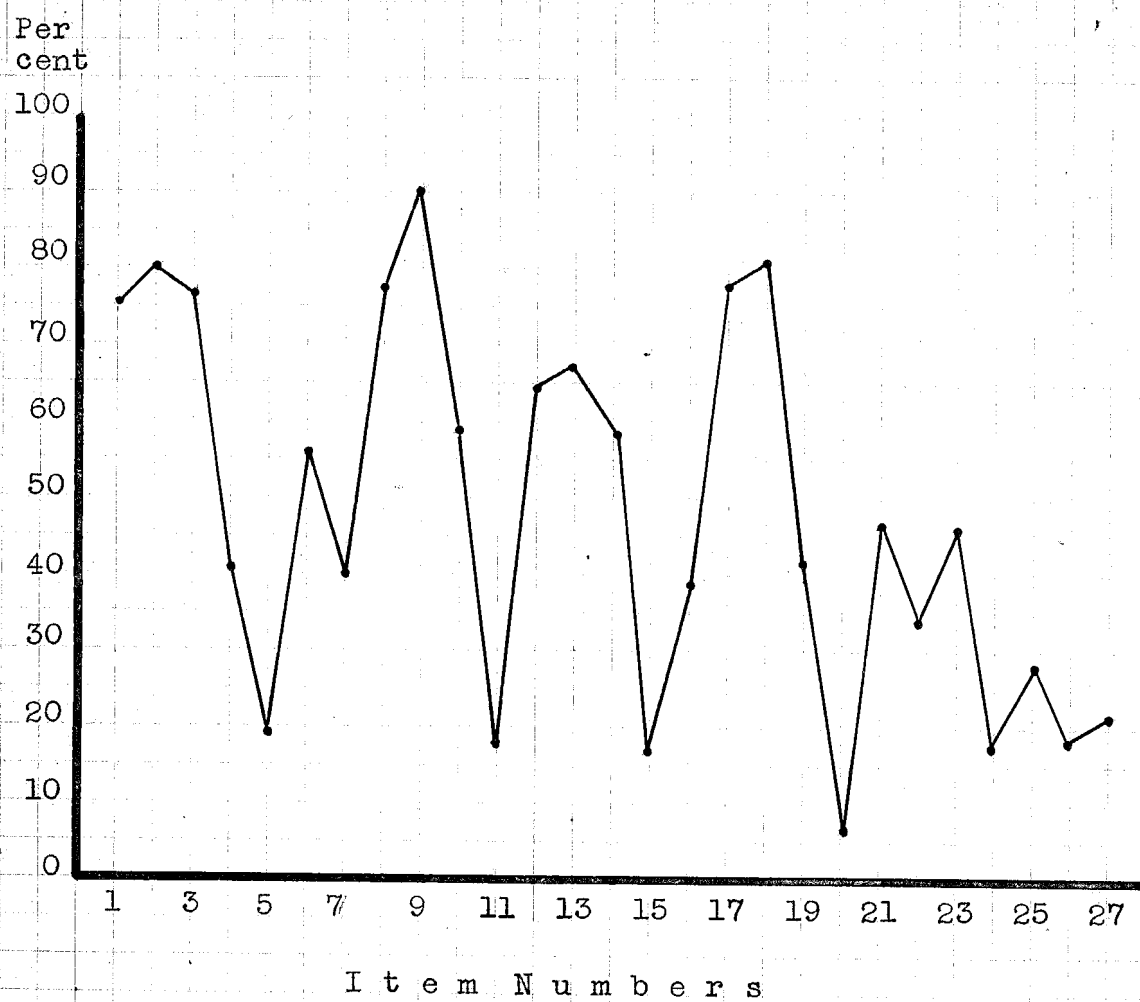


Figure 1

PERCENTAGE OF CORRECT RESPONSES

FOR EACH ITEM

OF PART I

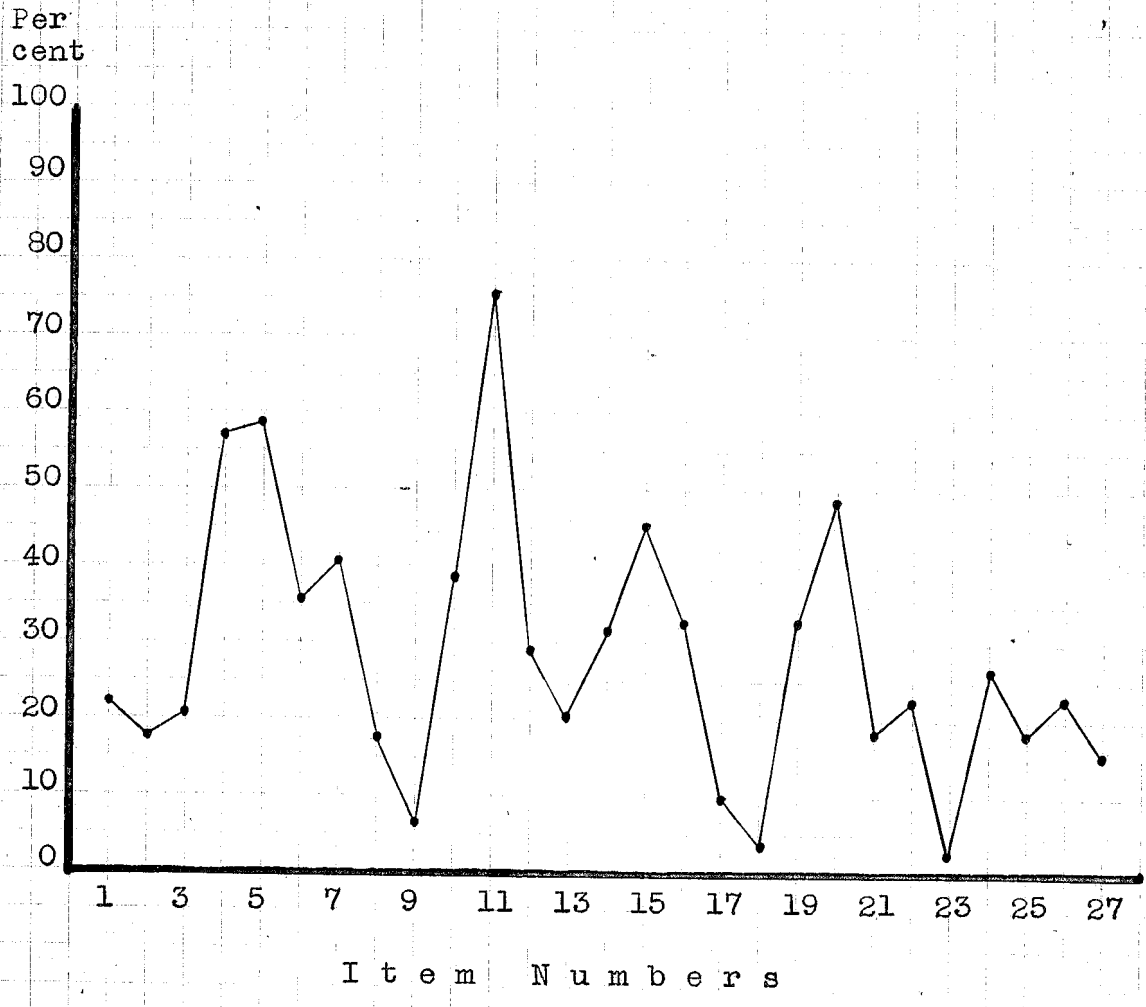


Figure 2
PERCENTAGE OF INCORRECT RESPONSES
FOR EACH ITEM
OF PART I.

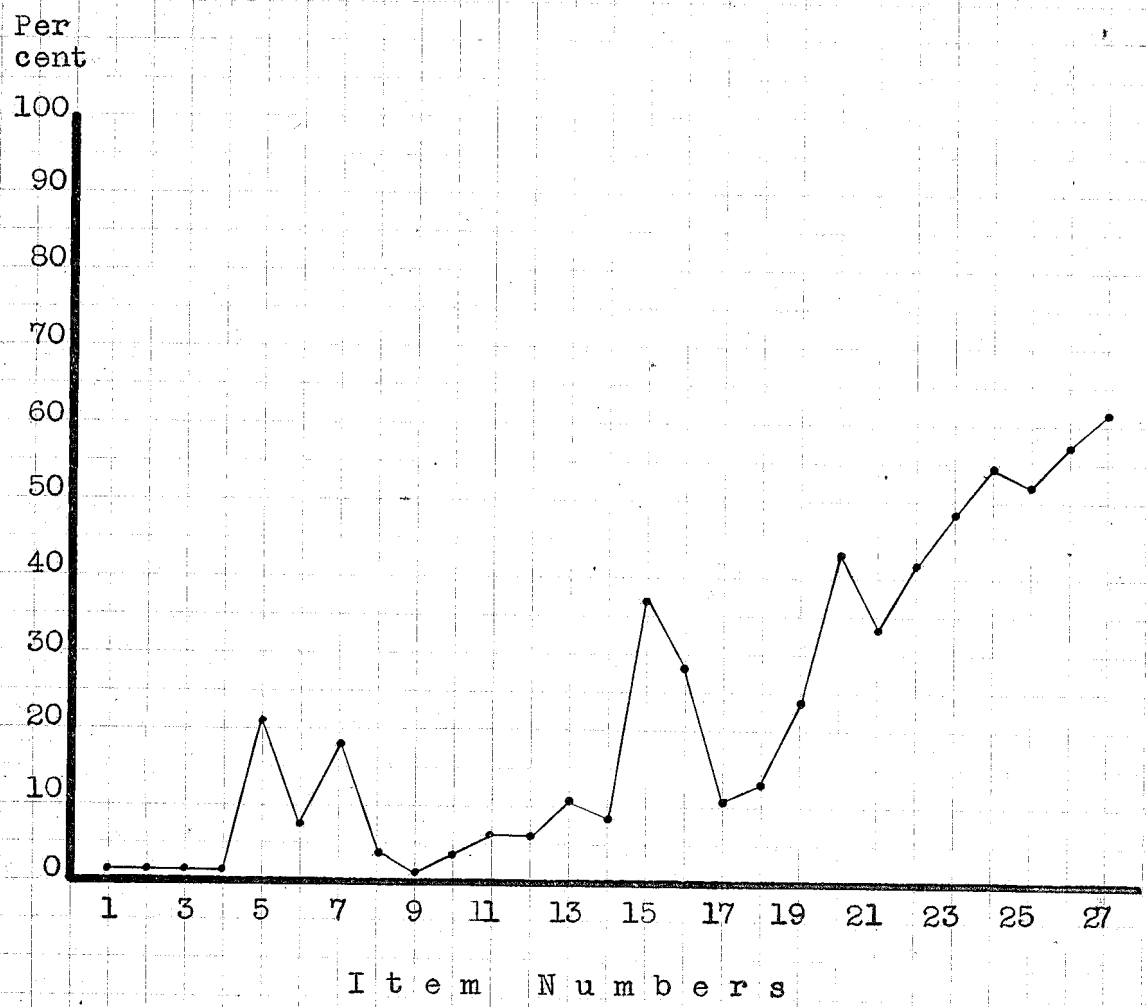


Figure 3
PERCENTAGE OF OMISSIONS
FOR EACH ITEM
OF PART I

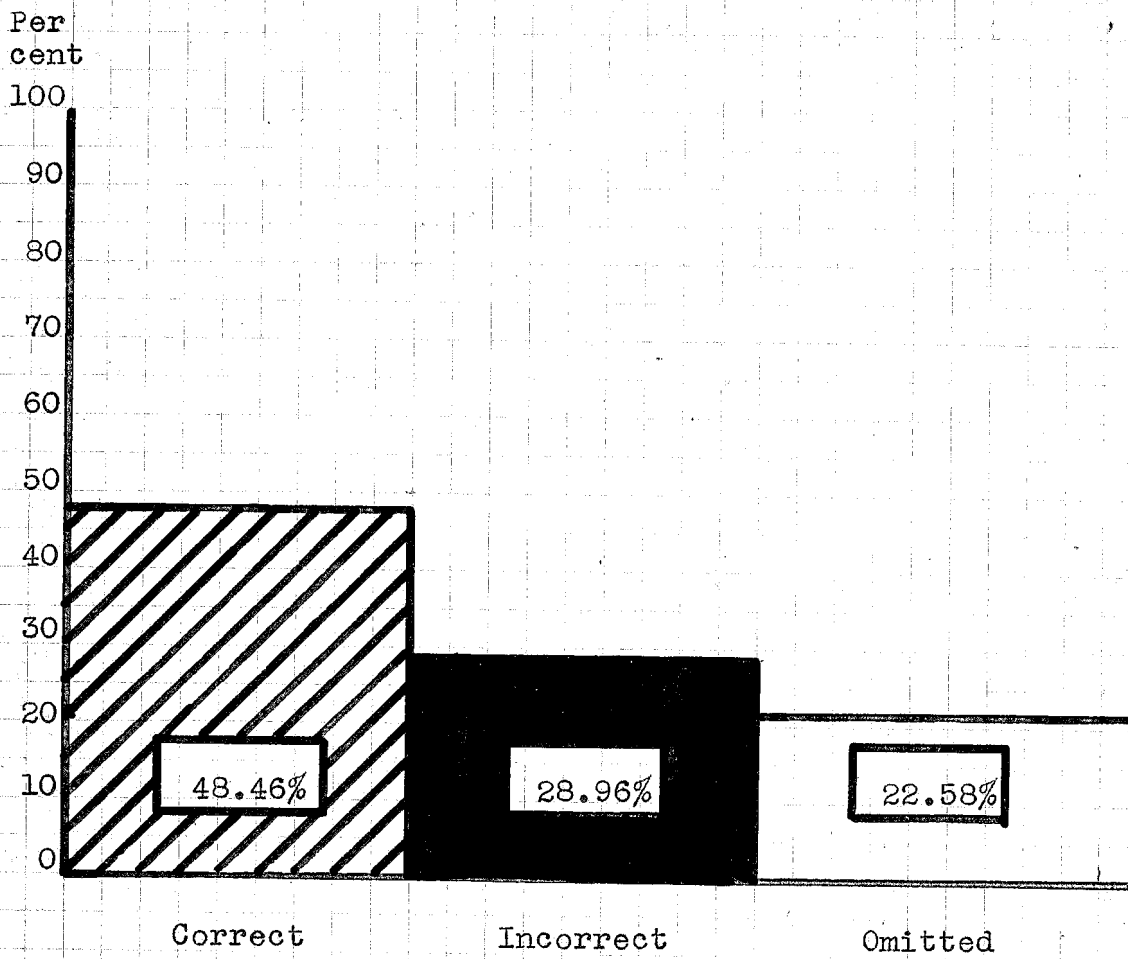


Figure 4
SUMMARY OF RESPONSES
FOR
PART I

CHAPTER III

ANALYSIS OF THE RESPONSES TO PART II OF THE TEST

Part II of the David John Davis Test of Functional Competence in Mathematics, entitled "Graphs and Tables", contains ten items concerning the interpretation of graphs and tables in the solving of problems involving rate of speed, taxes, roots and powers, trigonometric functions, and compound interest. The time allotted for this part of the test was twelve minutes.

The items and corresponding responses are as follows:

1. According to the graph in Figure 1, how many more feet are needed to stop a car traveling at 70 than at 50 miles per hour?

Response	Number	Per cent
Correct	187	57.01
Incorrect	135	41.16
Omitted	6	1.83

2. According to the graph in Figure 2, on which test was there the greatest difference in the number of problems worked correctly by Tom and Bill?

Response	Number	Per cent
Correct	263	80.18
Incorrect	57	17.38
Omitted	8	2.44

3. According to the graph in Figure 3, how many more accidents were caused by the careless operation of machinery than by unsafe machinery?

Response	Number	Per cent
Correct	265	80.79
Incorrect	50	15.24
Omitted	13	3.97

4. According to Table I, if a married man earns \$185 per month and has a wife and 1 child, both entirely dependent upon him, how much is withheld from his monthly wages for income taxes? (Note. Remember the taxpayer, himself, is also an exemption)

Response	Number	Per cent
Correct	277	84.45
Incorrect	45	13.72
Omitted	6	1.83

Use Table II to determine your answers in the next 3 exercises.

5. The square root of 52 is:

Response	Number	Per cent
Correct	277	84.45
Incorrect	45	13.72
Omitted	6	1.83

6. The square root of 53.5 is:

Response	Number	Per cent
Correct	113	34.45
Incorrect	150	45.73
Omitted	65	19.82

7. The cube root of 54,000 is:

Response	Number	Per cent
Correct	26	7.93
Incorrect	258	78.66
Omitted	44	13.41

Use Table III to determine your answers in the next 2 exercises.

8. $\cos 63^\circ 45'$ is equal to:

Response	Number	Per cent
Correct	108	32.93
Incorrect	95	28.96
Omitted	125	38.11

9. If $\tan A = 1.9697$, then angle A equals:

Response	Number	Per cent
Correct	77	23.48
Incorrect	98	29.88
Omitted	153	46.64

Use Table IV to determine your answer in the next exercise.

10. When Tom was 11 years old, his father put \$1,000 in a bank to help provide for Tom's future education. If this bank pays 2% interest compounded semi-annually, what is the total amount in the bank, 7 years later, when Tom is ready for college? (Determine your answer to the nearest cent)

Response	Number	Per cent
Correct	16	4.88
Incorrect	196	59.76
Omitted	116	35.36

SUMMARY OF RESPONSE PERCENTAGES ON PART II

Percentages of correct responses. The highest percentage of correct responses was 84.45 on items four and five. The second highest percentage of correct responses was 80.79% on item three. The third highest percentage of correct responses was 80.18% on item two. The lowest percentage of correct responses was 4.88% on item ten. The next lowest percentage of correct responses was 7.93% on item seven. The third lowest percentage of correct responses was 23.48% on item nine.

Percentages of incorrect responses. The highest percentage of incorrect responses was 78.66% on item seven. The second highest percentage of incorrect responses was 59.76% on item ten. The third highest percentage of incorrect responses was 45.73% on item six. The lowest percentage of incorrect responses was 13.72% for items four and five. The second lowest percentage of incorrect responses was 15.24% for item three. The third lowest percentage of incorrect responses was 17.38% on item two.

Percentages of omissions. The highest percentage of omissions was 46.65% on item nine. The second highest percentage of omissions was 38.11% on item eight. The third

highest percentage of omissions was 35.36% on item ten. The lowest percentage of omissions was 1.83% on items one, four, and five. The second lowest percentage of omissions was 2.44% on item two. The third lowest percentage of omissions was 3.97% on item three.

It should be noted here that items four and five had the highest percentage of correct responses; the lowest percentage of incorrect responses, and the lowest percentage of omissions. Item ten had the lowest percentage of correct responses, the second highest percentage of incorrect responses and the third highest percentage of omissions.

The percentages of correct responses for each item of Part II are presented graphically in Figure 5, page twenty-nine. Figures 6 and 7 present the incorrect response percentages and the omission percentages for each item respectively. A summary graph, Figure 8, depicts the total percentages of the various responses for Part II of the test.

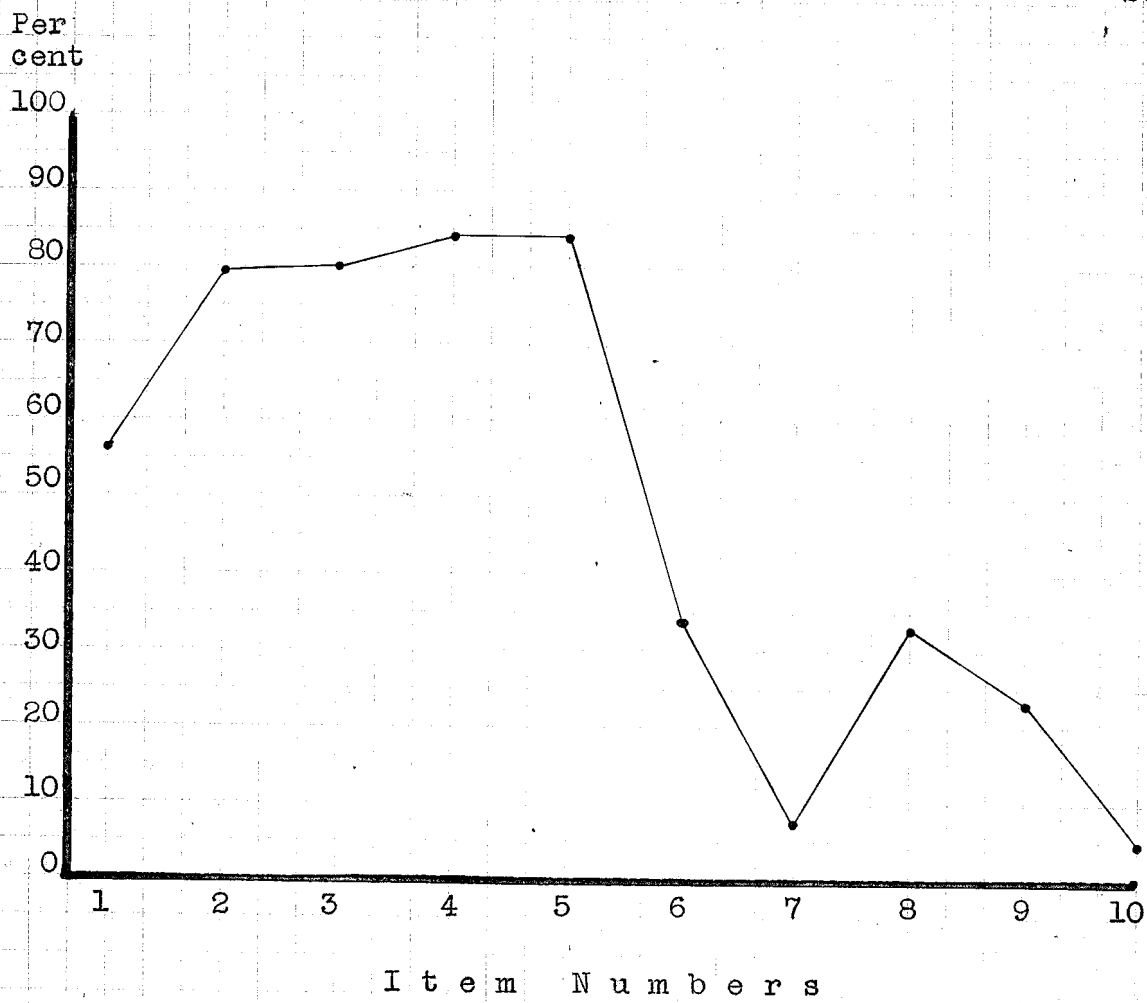


Figure 5
PERCENTAGE OF CORRECT RESPONSES
FOR EACH ITEM
OF PART II

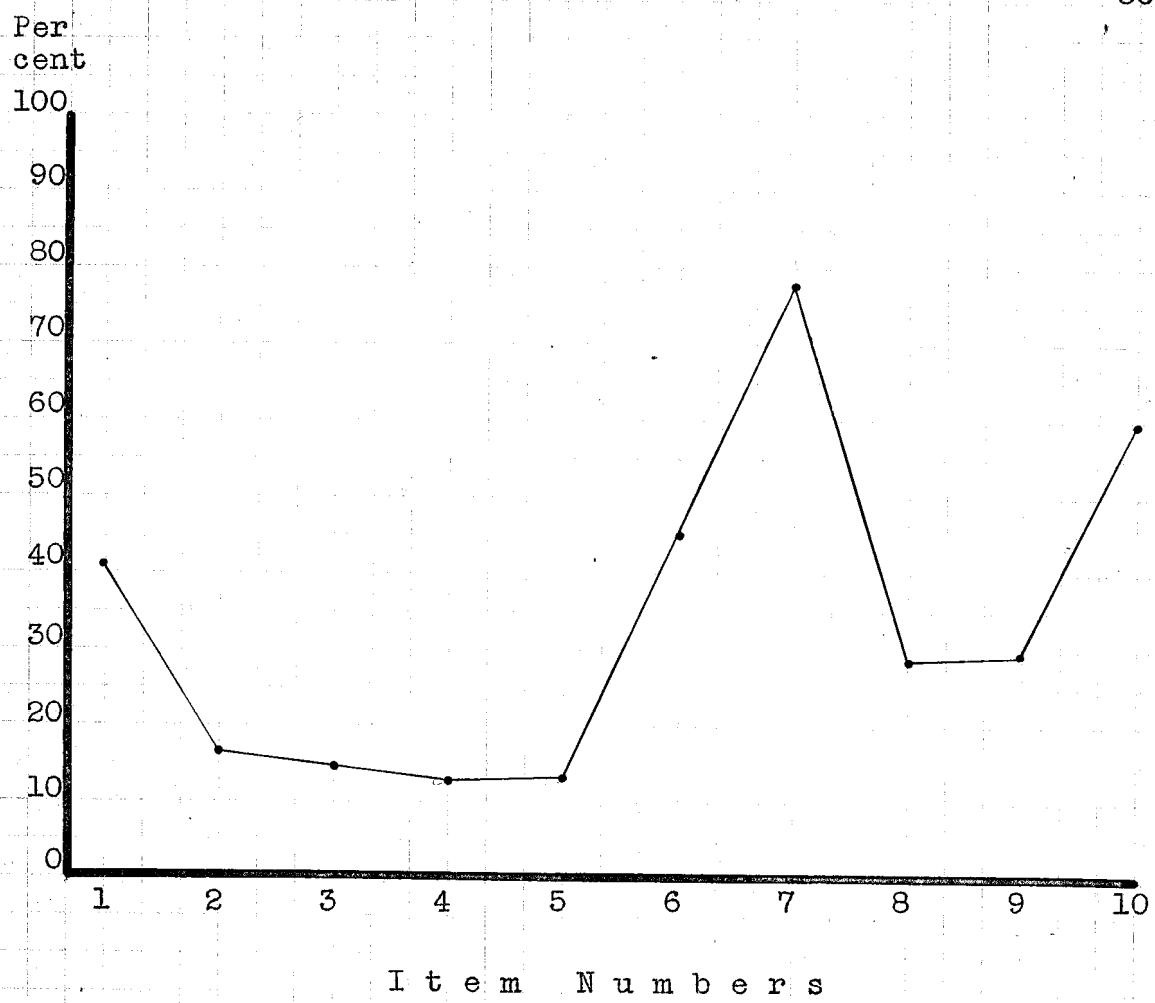


Figure 6
PERCENTAGE OF INCORRECT RESPONSES
FOR EACH ITEM
OF PART II

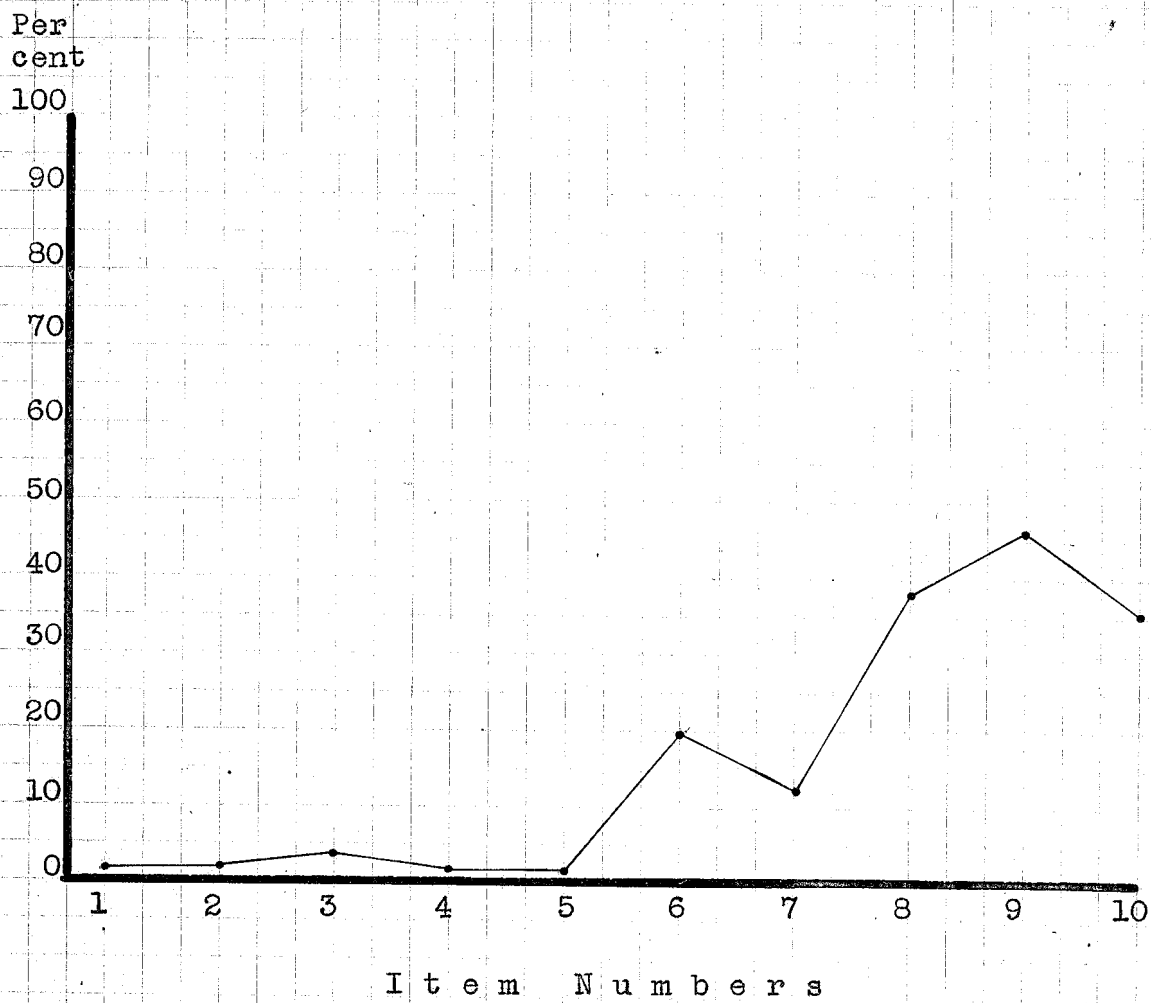


Figure 7
PERCENTAGE OF OMISSIONS
FOR EACH ITEM
OF PART II

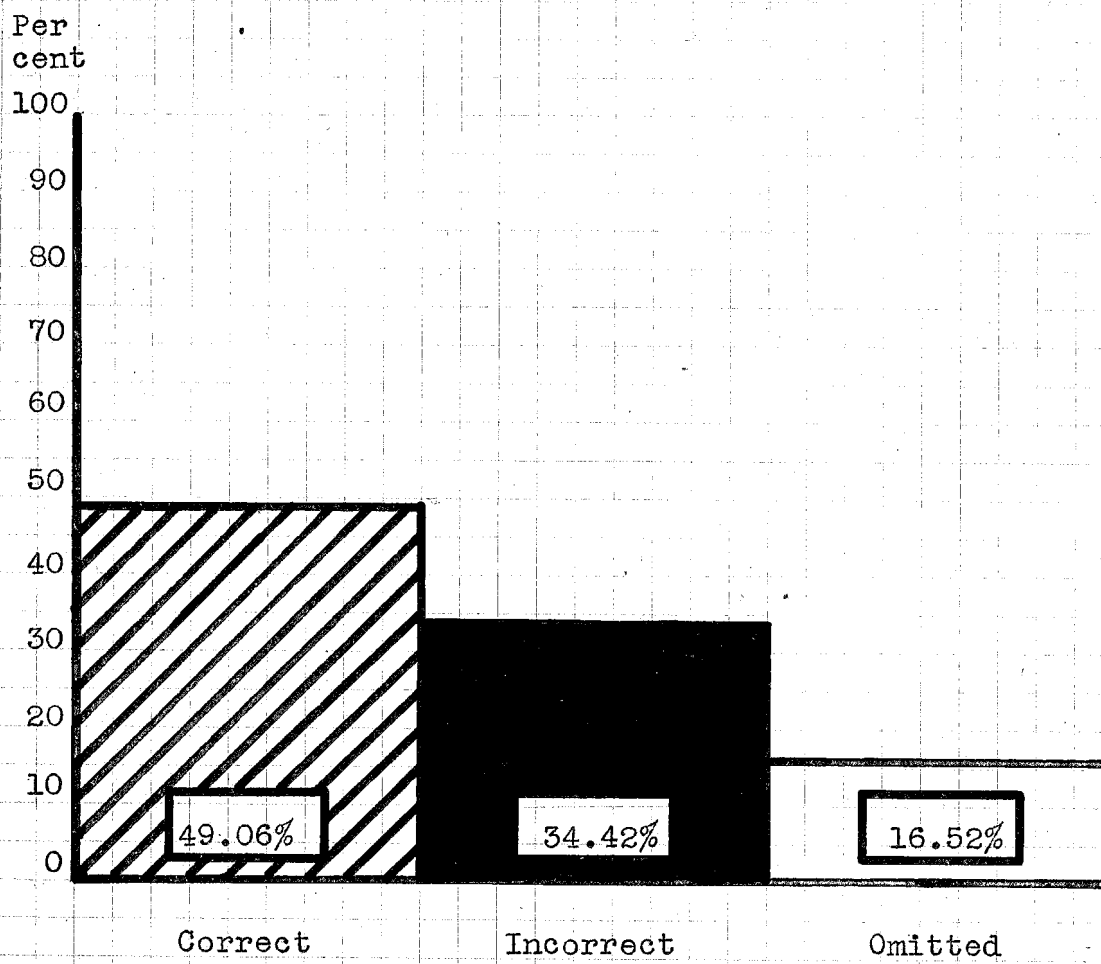


Figure 8

SUMMARY OF RESPONSES

FOR

PART II

CHAPTER IV

ANALYSIS OF THE RESPONSES TO PART III OF THE TEST

Part III of the David John Davis Test of Functional Competence in Mathematics, entitled "Symbolism, Equations, Etc.", contains twenty-eight items which deal with exponents, graphs of equations, equation solving, mensuration, vectors, roots, and trigonometry. The students were allowed twenty-five minutes for this part of the test.

The items and corresponding responses for Part III of the test are as follows:

1. The value of $a^3 + 2a^3$ is equal to:

Response	Number	Per cent
Correct	133	40.55
Incorrect	185	56.40
Omitted	10	3.05

2. The value of $2x^2 \cdot x^3$ is equal to:

Response	Number	Per cent
Correct	112	34.15
Incorrect	197	60.06
Omitted	19	5.79

3. The value of $2x^6/x^2$ is equal to:

Response	Number	Per cent
Correct	79	24.08
Incorrect	201	61.28
Omitted	48	14.63

4. The value of 2.3^3 is equal to:

Response	Number	Per cent
Correct	170	51.83
Incorrect	123	37.50
Omitted	35	10.67

5. The coordinates of 5 points are given below. Which point lies on the graph of the equation $\bar{y} = 2x + 4$?

Response	Number	Per cent
Correct	60	18.29
Incorrect	85	25.91
Omitted	183	55.79

6. In the equation $3x + 6 = 12$, the value of x is:

Response	Number	Per cent
Correct	275	83.84
Incorrect	44	13.41
Omitted	9	2.74

7. In the equation $2y + 12 = -5$, the value of y is:

Response	Number	Per cent
Correct	215	65.55
Incorrect	85	25.91
Omitted	28	8.54

8. In the equation $\frac{3m}{4} - 6 = 15$, the value of m is:

Response	Number	Per cent
Correct	159	48.48
Incorrect	118	35.98
Omitted	51	15.55

9. The area of a circle with a diameter of 6.00 ft. is approximately:

Response	Number	Per cent
Correct	86	26.22
Incorrect	131	39.94
Omitted	111	33.84

10. The area of triangle ABC, in Figure 4, is:

Response	Number	Per cent
Correct	80	24.39
Incorrect	142	43.29
Omitted	106	32.32

11. Two carpenters are checking to make sure the foundation ABCD, in Figure 5, is square. They measure the diagonal distances AC and BD. If the foundation is a square, each diagonal distance will be:

Response	Number	Per cent
Correct	34	10.37
Incorrect	220	67.07
Omitted	74	25.56

12. How far would you travel in 3 hours and 20 minutes at a speed of 45 miles per hour?

Response	Number	Per cent
Correct	270	82.32
Incorrect	53	16.16
Omitted	5	1.52

13. In the formula $I = prt$; if $p = \$1,600$, $r = .03\frac{1}{2}$, and $t = \frac{1}{2}$, then I equals:

Response	Number	Per cent
Correct	215	65.55
Incorrect	86	26.22
Omitted	27	8.23

14. In the formula $A = \frac{1}{2}h(a + b)$; if $h = 7$ yd., $a = 10$ yd., and $b = 14$ yd., then A equals:

Response	Number	Per cent
Correct	240	73.17
Incorrect	50	15.24
Omitted	38	11.58

15. In the formula $S = \frac{(h - 2d)}{3}$; if $m = -2$, $h = -6$, and $d = 4$, then S is equal to:

Response	Number	Per cent
Correct	75	22.86
Incorrect	209	63.74
Omitted	44	13.41

16. How would you express a formula for the cost in cents (C) of one orange if n oranges cost b cents?

Response	Number	Per cent
Correct	119	36.28
Incorrect	177	53.96
Omitted	32	9.76

17. How would you express the fact that the cost in cents (C) of sending a package of n lb. by parcel post is ten cents for the first pound and two cents for each additional pound?

Response	Number	Per cent
Correct	49	14.94
Incorrect	223	67.99
Omitted	56	17.07

18. In the formula $r = d/t$, if the value of d is multiplied by 4 and the value of t is divided by 2, then the value of r is:

Response	Number	Per cent
Correct	83	25.30
Incorrect	158	48.17
Omitted	87	26.53

19. The formula for the volume of a cylindrical rod is $V = \pi r^2 L$. If a cylindrical rod with a diameter of 4 inches is machined until it has a diameter of 2 in., but the same length, the fractional part of the volume of the rod lost by machining is:

Response	Number	Per cent
Correct	33	10.06
Incorrect	163	49.70
Omitted	132	40.24

20. Which of the following statements contains a vector quantity?

Response	Number	Per cent
Correct	22	6.71
Incorrect	89	27.13
Omitted	217	66.16

21. In Figure 6, two forces are shown acting on point P. The resultant force is approximately: (Select most reasonable answer. Instruments are not needed)

Response	Number	Per cent
Correct	53	16.16
Incorrect	118	35.98
Omitted	157	47.86

22. At a point 100 feet away, and level with the base of a tree, the angle of elevation of the top of the tree is 32° . The height of the tree is: (Given: $\sin 32^\circ = .53$, $\cos 32^\circ = .85$, $\tan 32^\circ = .62$)

Response	Number	Per cent
Correct	20	6.10
Incorrect	62	18.90
Omitted	246	75.00

23. Examine the two similar triangles in Figure 7. In triangle ABC, the length of side BC is:

Response	Number	Per cent
Correct	79	24.08
Incorrect	104	31.71
Omitted	145	44.21

24. Bill used a 5 ft. stick, BC, to determine the height of the flag pole DE. By sighting from point A, Bill found the top of the stick in line with the top of the pole. Use the information in Figure 8 to find the height of the flag pole. This height is:

Response	Number	Per cent
Correct	47	14.33
Incorrect	90	27.44
Omitted	191	58.23

25. The size of each angle of triangle ABC, in Figure 9 is:

Response	Number	Per cent
Correct	101	30.79
Incorrect	73	22.26
Omitted	154	46.95

26. The size of angle DEF, in Figure 10, depends upon:

Response	Number	Per cent
Correct	42	12.80
Incorrect	100	30.49
Omitted	186	56.71

27. In any regular polygon:

Response	Number	Per cent
Correct	66	20.12
Incorrect	62	18.90
Omitted	200	60.98

28. If two sides of a triangle are 10 in. and 12 in. in length, the third side cannot have a length of:

Response	Number	Per cent
Correct	41	12.50
Incorrect	90	27.44
Omitted	197	60.06

SUMMARY OF RESPONSE PERCENTAGES ON PART III

Percentages of correct responses. The highest percentage of correct responses was 83.84% on item six. The second highest percentage of correct responses was 82.32% on item twelve. The third highest percentage of correct responses was 73.17% on item fourteen. The lowest percentage of correct responses was 6.10% on item twenty-two. The second lowest percentage of correct responses was 6.71% on item twenty.

The third lowest percentage of correct responses was 10.06% on item nineteen.

Percentages of incorrect responses. The highest percentage of incorrect responses was 67.99% on item seventeen. The second highest percentage of incorrect responses was 67.07% on item eleven. The third highest percentage of incorrect responses was 63.74% on item fifteen. The lowest percentage of incorrect responses was 13.41% on item six. The second lowest percentage of incorrect responses was 15.24% on item fourteen. The third lowest percentage of incorrect responses was 16.16% on item twelve.

Percentages of omissions. The highest percentage of omissions was 75.00% on item twenty-two. The second highest percentage of omissions was 66.16% on item twenty. The third highest percentage of omissions was 60.98% on item twenty-seven. The lowest percentage of omissions was 1.52% on item twelve. The second lowest percentage of omissions was 2.74% on item six. The third lowest percentage of omissions was 3.05% on item one.

It should be noted here that item six had the highest percentage of correct responses, the lowest percentage of incorrect responses, and the second lowest percentage of omissions. Item twelve had the second highest percentage of correct responses, the third lowest percentage of incorrect

responses, and the lowest percentage of omissions. The high percentage of omissions for items twenty-six, twenty-seven, and twenty-eight may be partially explained by the fact that the students were allowed but twenty-five minutes for Part III of the test and several probably did not finish the list because of lack of time.

The percentages of correct and incorrect responses and omissions are presented graphically in Figures 9, 10, and 11 respectively. Figure 12, page forty-five, presents the various percentages of the total responses for Part III.

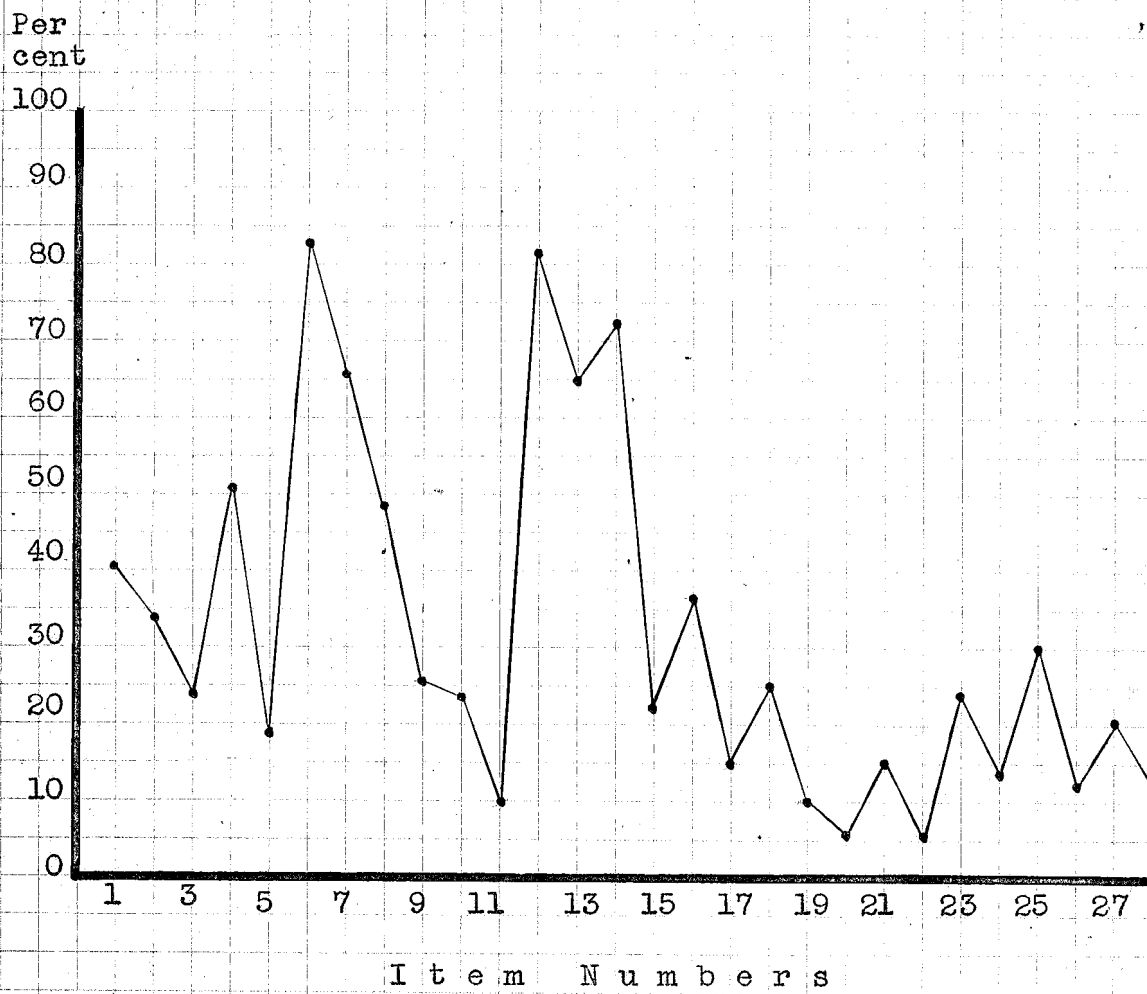


Figure 9

PERCENTAGE OF CORRECT RESPONSES

FOR EACH ITEM

OF PART III

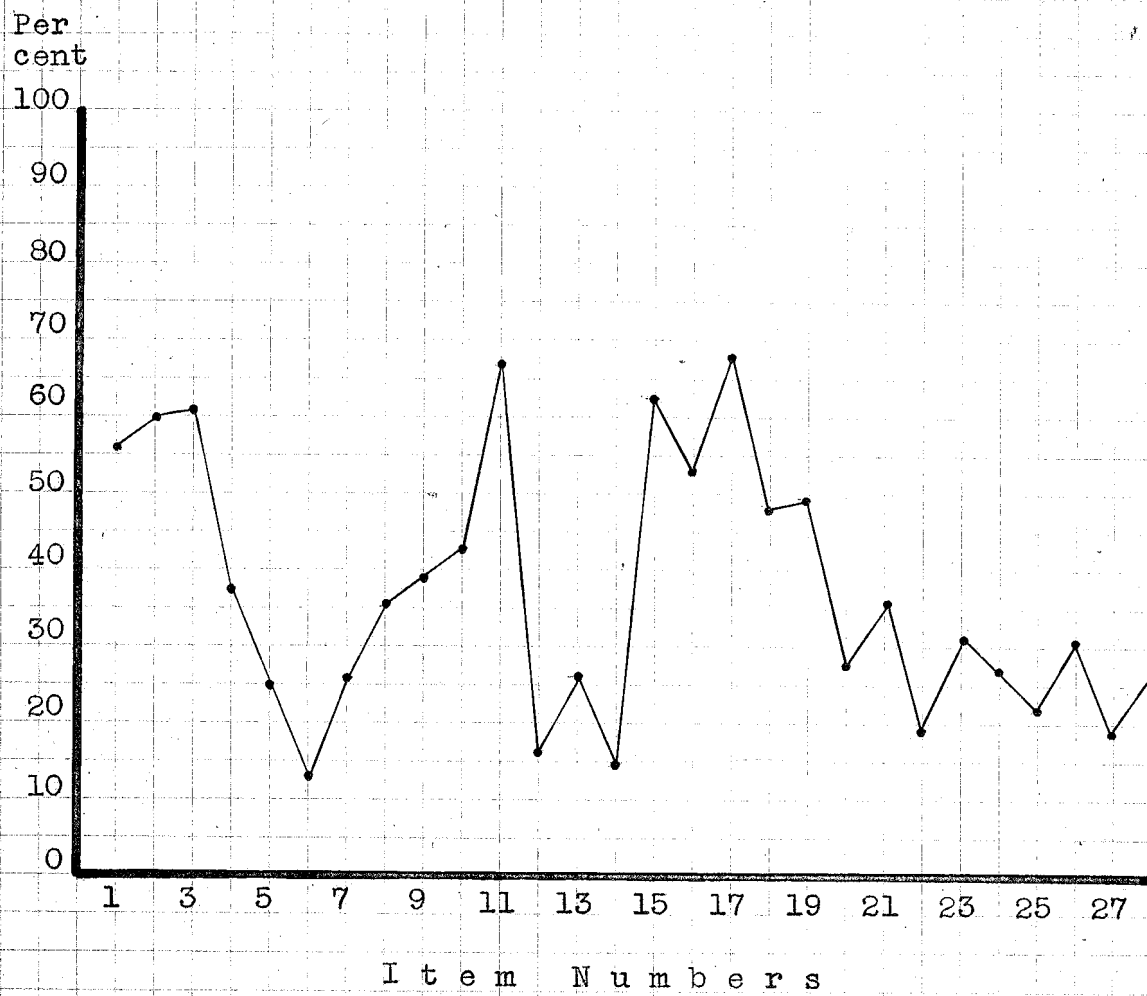
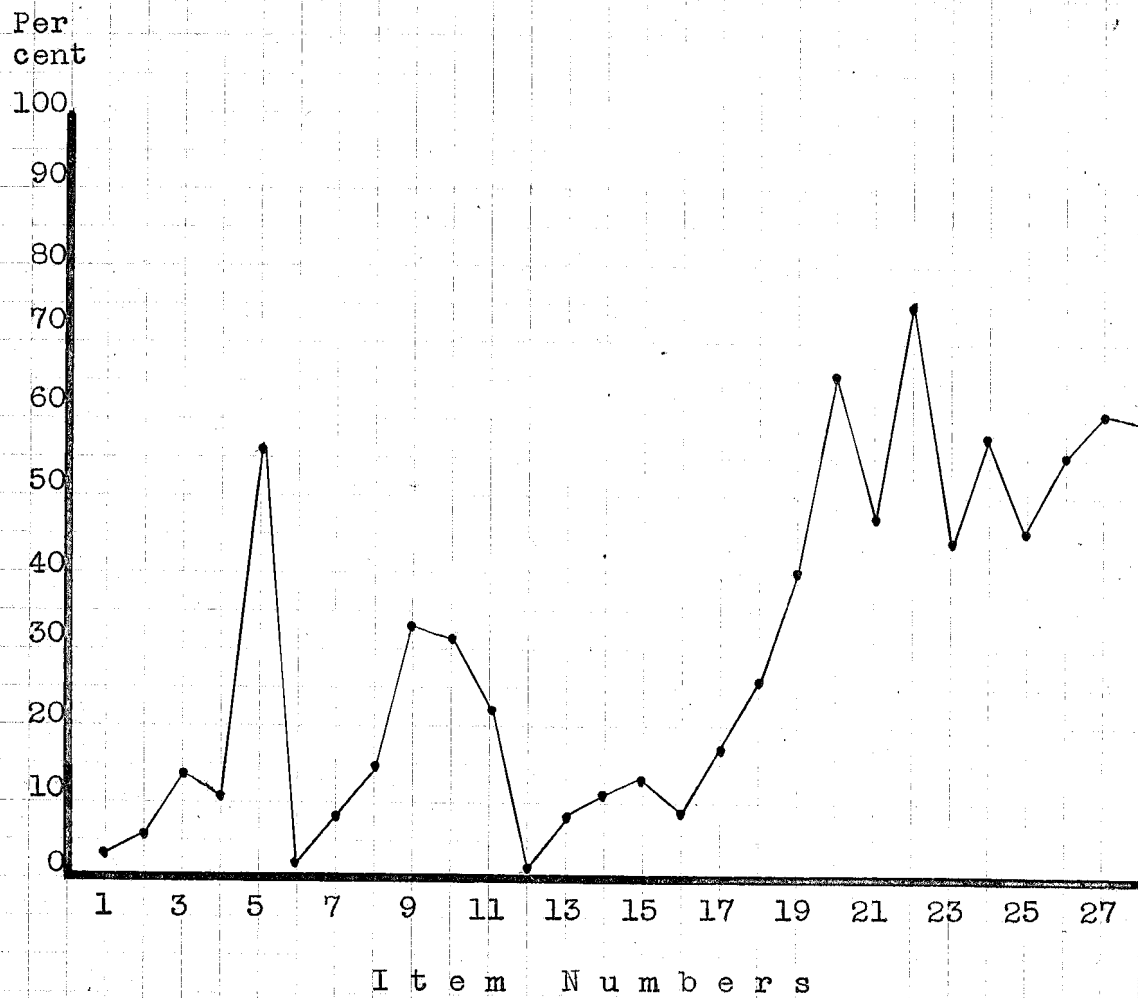


Figure 10

PERCENTAGE OF INCORRECT RESPONSES
FOR EACH ITEM
OF PART III



Item Numbers

Figure 11

PERCENTAGE OF OMISSIONS

FOR EACH ITEM

OF PART III

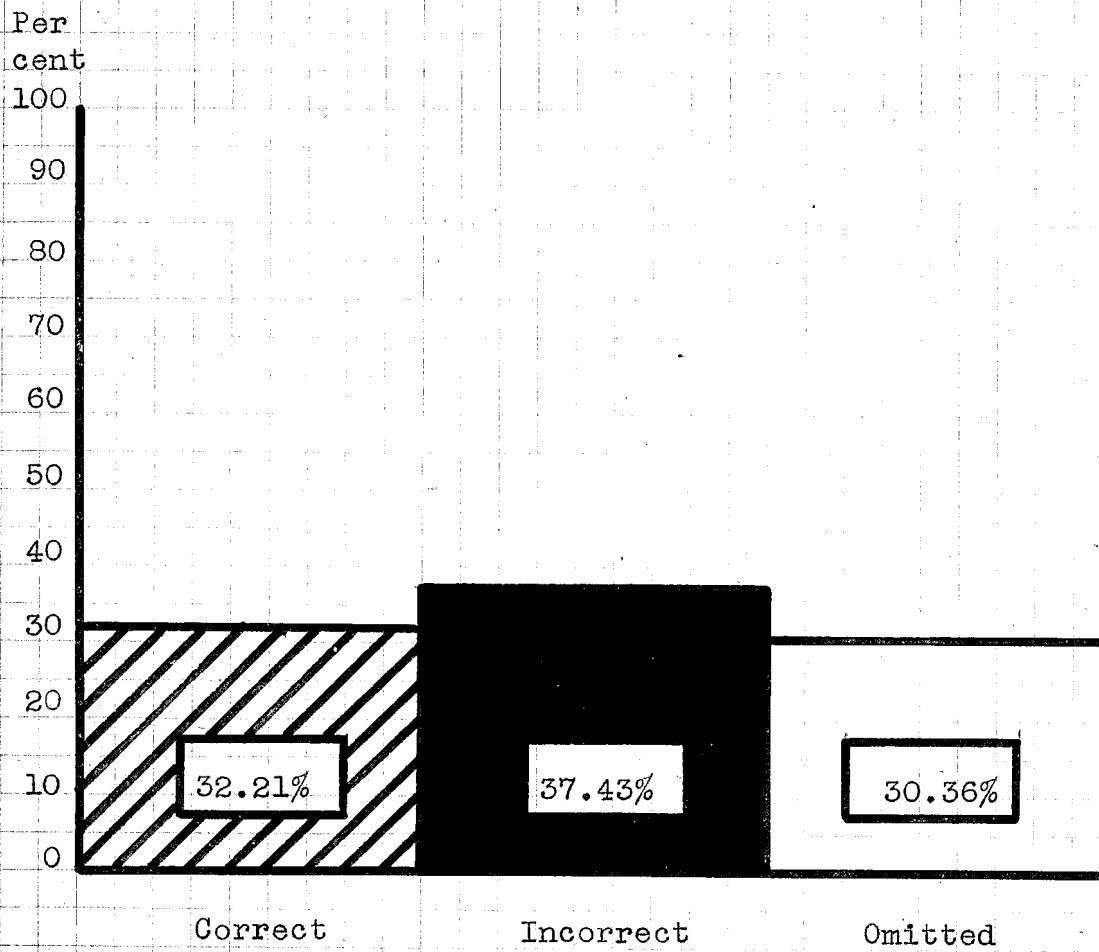


Figure 12

SUMMARY OF RESPONSES

FOR

PART III

CHAPTER V

ANALYSIS OF THE RESPONSES TO PART IV OF THE TEST

Part IV of the David John Davis Test of Functional Competence in Mathematics, entitled "Ratio, Tolerance, Etc.", contains twenty-five items which deal with significant numbers, estimation of results, mensuration, ratio, statistics, and reasoning. The students were allowed twenty-five minutes for this part of the test.

The items and corresponding responses for Part IV of the test are as follows:

1. The number 688,546 expressed correctly to the nearest thousand is:

Response	Number	Per cent
Correct	232	70.73
Incorrect	94	28.66
Omitted	2	0.61

2. The number 0.02449 expressed correctly to the nearest thousandth is:

Response	Number	Per cent
Correct	80	24.39
Incorrect	240	73.17
Omitted	8	2.44

3. The number one hundred and sixteen thousandths when written in figures is:

Response	Number	Per cent
Correct	50	15.24
Incorrect	275	83.84
Omitted	3	0.91

4. If 16.64 inches is measured correctly to the nearest hundredth inch, the largest possible error is:

Response	Number	Per cent
Correct	46	14.02
Incorrect	206	62.81
Omitted	76	23.17

5. The basic length of a metal bar to be made is 2.233 inches. If a tolerance of ± 0.004 in. is allowed, which of the lengths of finished bars below is acceptable?

Response	Number	Per cent
Correct	215	65.55
Incorrect	60	18.29
Omitted	53	16.16

6. Four of the 5 following statements contain approximate numbers. One statement contains an exact number. Which statement contains the exact number?

Response	Number	Per cent
Correct	98	29.88
Incorrect	220	67.07
Omitted	10	3.05

7. Before adding the approximate numbers; 28.4 in., 16.348 in., 9.4758 in., and 4.031 in.; round off to the least precise number. The sum is:

Response	Number	Per cent
Correct	86	26.22
Incorrect	174	53.05
Omitted	68	20.73

8. The numbers: 3.14 and 1.7 in.; are approximate numbers. When you multiply these numbers, your answer should be expressed as:

Response	Number	Per cent
Correct	56	17.07
Incorrect	256	78.05
Omitted	16	4.88

9. A reasonable estimate of the size of the angle in Figure 11 is: (Do not use a protractor)

Response	Number	Per cent
Correct	244	74.39
Incorrect	59	17.99
Omitted	25	7.62

10. A reasonable estimate of the value of $\frac{0.6567}{2.012 \times 1.232}$ is: (Determine your answer without use of pencil)

Response	Number	Per cent
Correct	127	38.72
Incorrect	161	49.09
Omitted	40	12.19

11. A reasonable estimate of the value of $\frac{9,999,664.6}{999.897}$ is: (Determine your estimate without use of pencil)

Response	Number	Per cent
Correct	152	46.34
Incorrect	158	48.17
Omitted	18	5.49

12. If 1 inch = 25.4 millimeters, how many centimeters are there in 1 inch?

Response	Number	Per cent
Correct	109	33.23
Incorrect	121	36.89
Omitted	98	29.88

13. How many square inches are there in 10 square feet:

Response	Number	Per cent
Correct	174	53.05
Incorrect	122	37.19
Omitted	32	9.76

14. How many cubic yards are there in 270 cubic feet?

Response	Number	Per cent
Correct	49	14.94
Incorrect	215	65.55
Omitted	64	19.51

15. The ratio of 2 feet to 6 inches is:

Response	Number	Per cent
Correct	142	43.29
Incorrect	167	50.92
Omitted	19	5.79

16. If a board 120 inches long is cut into two pieces, whose lengths are in the ratio of 3 to 5, the length of shorter piece is: (Do not consider width of saw cut)

Response	Number	Per cent
Correct	113	34.45
Incorrect	174	53.05
Omitted	41	12.50

17. On a blueprint, the scale used is $\frac{1}{4}$ in. = 10 feet. If the length of a building is represented on this blueprint by a straight line $3\frac{1}{2}$ inches long, the length of the building is:

Response	Number	Per cent
Correct	278	84.75
Incorrect	28	8.54
Omitted	22	6.71

18. Under a picture of a rhinoceros in Webster's Collegiate Dictionary the representative fraction (R. F.) is $\frac{1}{80}$. If the shoulder height in the picture is $3\frac{3}{4}$ in., the shoulder height of a rhinoceros is:

Response	Number	Per cent
Correct	220	67.07
Incorrect	36	10.98
Omitted	72	21.95

19. The distance from point A to point B is the map distance between two cities. The scale of miles used on this map is given in Figure 12. The actual distance between these two cities is: (Use ruler)

Response	Number	Per cent
Correct	103	31.40
Incorrect	181	55.19
Omitted	44	13.41

20. The length of line segment CD, in Figure 13, to the nearest $\frac{1}{16}$ inch is: (Use ruler)

Response	Number	Per cent
Correct	241	73.48
Incorrect	46	14.02
Omitted	41	12.50

21. On 5 tests in arithmetic, Bill receives the following marks: 20, 72, 80, 92, and 96. The median of these marks is :

Response	Number	Per cent
Correct	56	17.07
Incorrect	239	72.87
Omitted	33	10.06

22. If an airplane flew 180 m.p.h. for 2 hours and 200 m.p.h. for the next 3 hours; the mean, or average, speed of the airplane was:

Response	Number	Per cent
Correct	185	56.40
Incorrect	90	27.44
Omitted	53	16.16

23. A factory has 100 men on its payroll. A company report indicates that the mean, or average, yearly income of these 100 men is \$3,220; the median income is \$3,000, and the modal income is \$2,500. From this information you know that the yearly payroll for these 100 men is:

Response	Number	Per cent
Correct	124	37.81
Incorrect	95	28.96
Omitted	109	33.23

24. Assume the 3 following statements are true:

- (a) El Ropo Cigarettes are less irritating to the throat than any other cigarettes
- (b) Famous athletes smoke El Ropo cigarettes
- (c) More El Ropo Cigarettes are sold than any other brand of cigarettes

If the information above is true and is the only information you have, which one of the following statements is a logical conclusion to make?

Response	Number	Per cent
Correct	99	30.18
Incorrect	170	51.83
Omitted	59	17.99

25. Of all drivers of automobiles in a certain city who were involved in accidents which resulted in injury to individuals:

- 4% were under 18 years of age
- 20% were 18 to 25 years of age
- 70% were 26 to 65 years of age
- 6% were 66 or more years of age

If the information above is true and is the only information you have on automobile accidents in this city, which one of the following statements is a logical conclusion to make?

Response	Number	Per cent
Correct	117	35.67
Incorrect	137	41.77
Omitted	74	22.56

SUMMARY OF RESPONSE PERCENTAGES ON PART IV

Percentages of correct responses. The highest percentage of correct responses was 84.75% on item seventeen. The second highest percentage of correct responses was 74.39% on item nine. The third highest percentage of correct responses was 73.84% on item twenty. The lowest percentage of correct responses was 14.02% on item four. The second lowest percentage of correct responses was 14.94% on item fourteen. The third lowest percentage of correct responses was 15.24% on item three.

Percentages of incorrect responses. The highest percentage of incorrect responses was 83.84% on item three. The second highest percentage of incorrect responses was 78.05% on item eight. The third highest percentage of incorrect responses was 73.17% on item two. The lowest percentage of incorrect responses was 8.54% on item seventeen. The second lowest percentage of incorrect responses was 10.98% on item eighteen. The third lowest percentage of incorrect responses was 14.02% on item twenty.

Percentages of omissions. The highest percentage of omissions was 33.23% on item twenty-three. The second highest percentage of omissions was 29.88% on item twelve. The third

highest percentage of omissions was 23.17% on item four. The lowest percentage of omissions was 0.61% on item one. The second lowest percentage of omissions was 0.91% on item three. The third lowest percentage of omissions was 2.44% on item two.

It should be noted here that item seventeen had the highest percentage of correct responses and the lowest percentage of incorrect responses. Item eighteen had the fifth highest percentage of correct responses, the second lowest percentage of incorrect responses, and the fifth highest percentage of omissions. Item four had the lowest percentage of correct responses and the third highest percentage of omissions. Item three had the third lowest percentage of correct responses, the highest percentage of incorrect responses, and the second lowest percentage of omissions. Since items twenty-four and twenty-five had significantly lower percentages of omissions than item twenty-three, it is assumed that item twenty-three was omitted by some of the pupils because of a higher degree of difficulty rather than a lack of time.

The percentages of correct and incorrect responses and omissions are presented graphically in Figures 13, 14, and 15, respectively. Figure 16, page fifty-nine, presents the various percentages of the total responses for Part IV.

For purposes of comparison, the various percentages of

responses and omissions for each of the four parts of the test are presented graphically in Figure 17, page 60. Figure 18, page 61, is a graph showing the percentages of each type of response for the entire test.

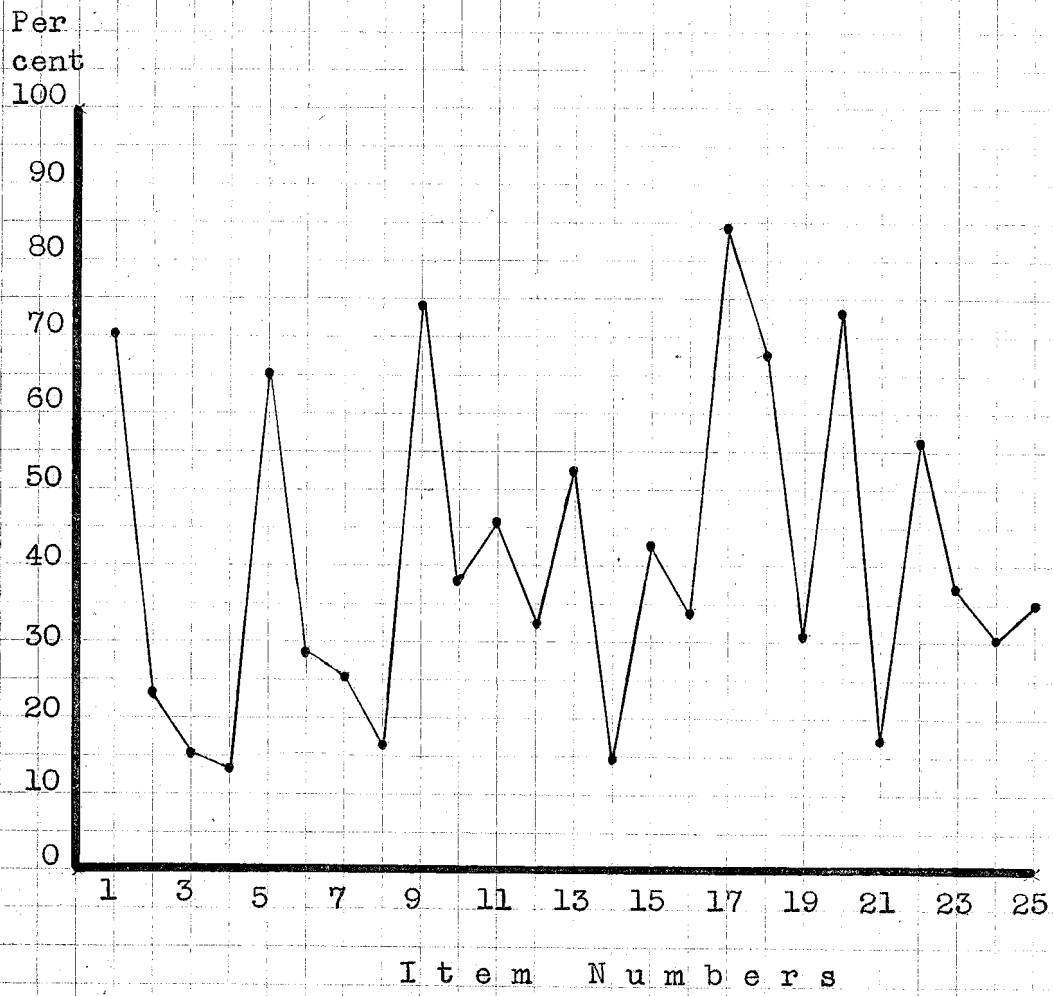


Figure 13

PERCENTAGE OF CORRECT RESPONSES

FOR EACH ITEM

OF PART IV

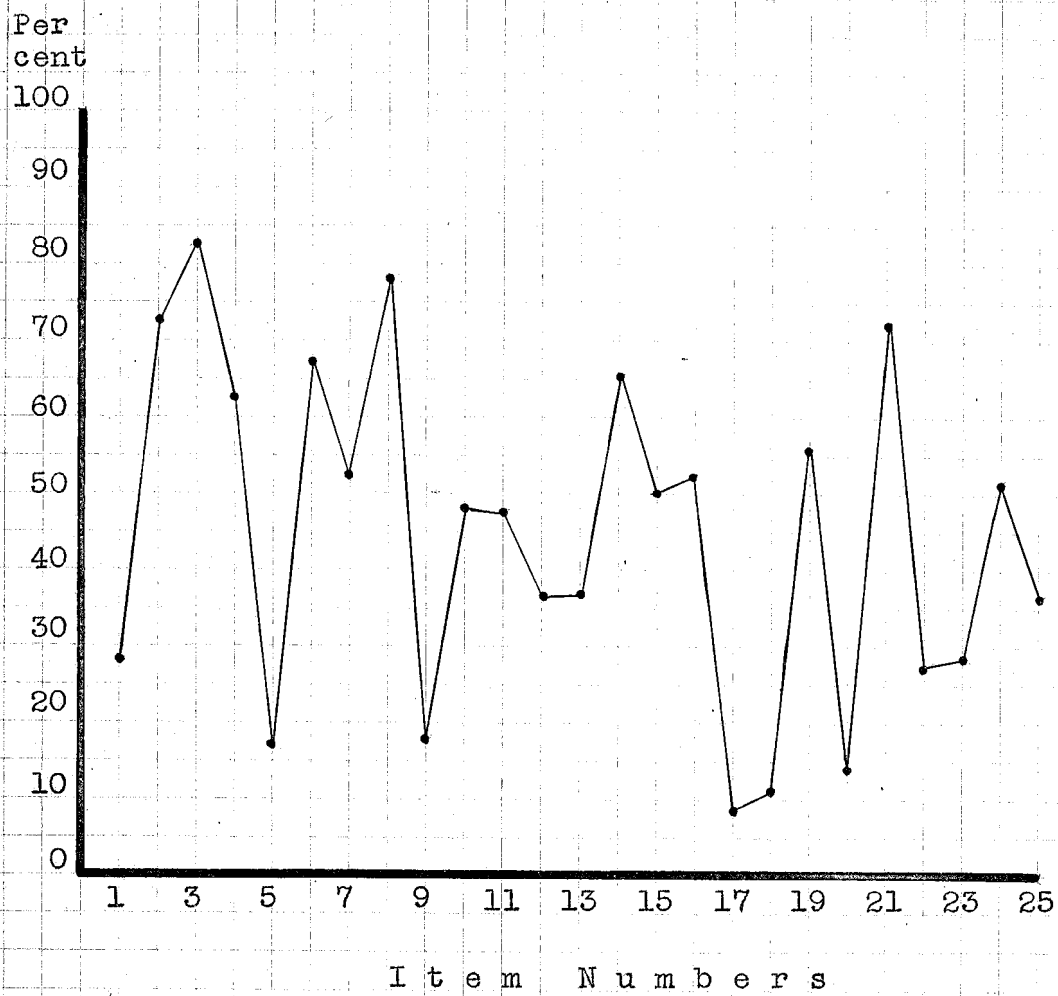


Figure 14

PERCENTAGE OF INCORRECT RESPONSES

FOR EACH ITEM

OF PART IV

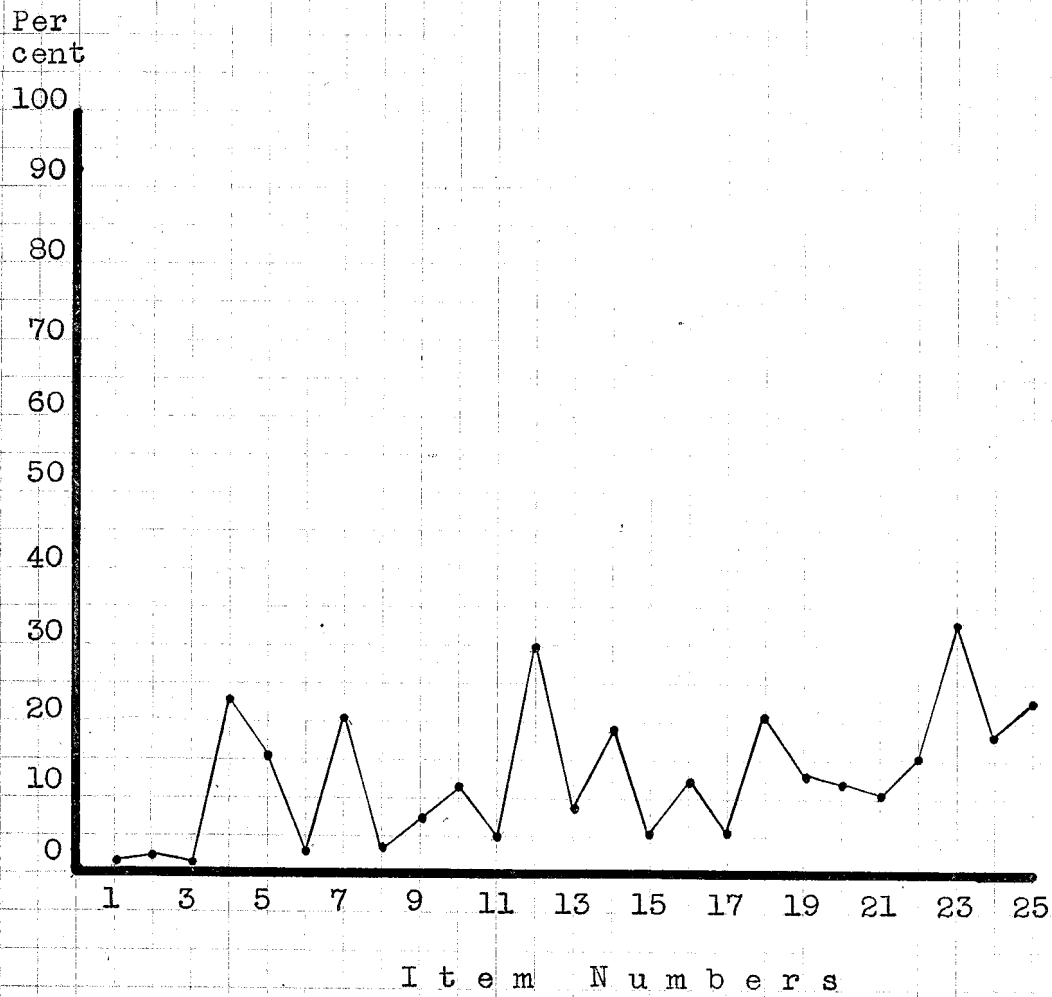


Figure 15

PERCENTAGE OF OMISSIONS

FOR EACH ITEM

OF PART IV

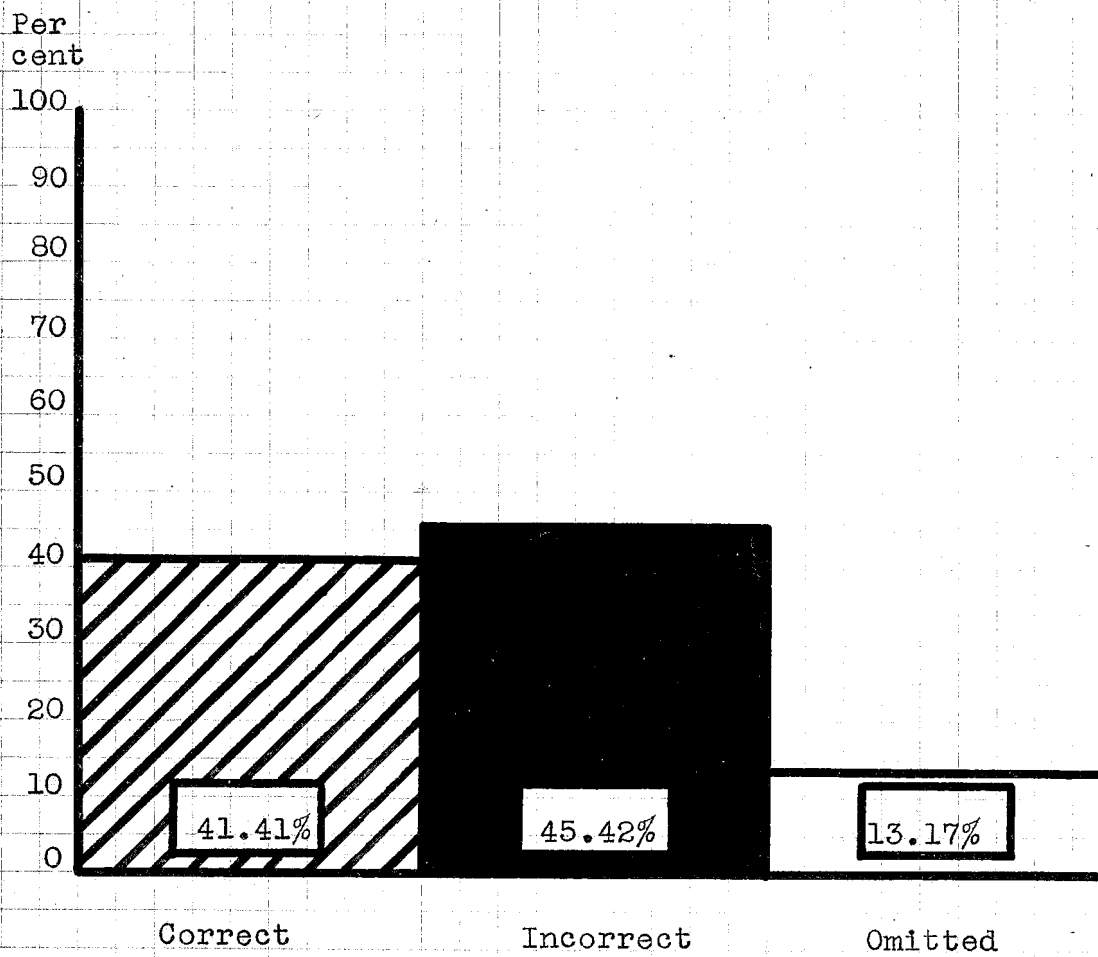


Figure 16

SUMMARY OF RESPONSES

FOR

PART IV

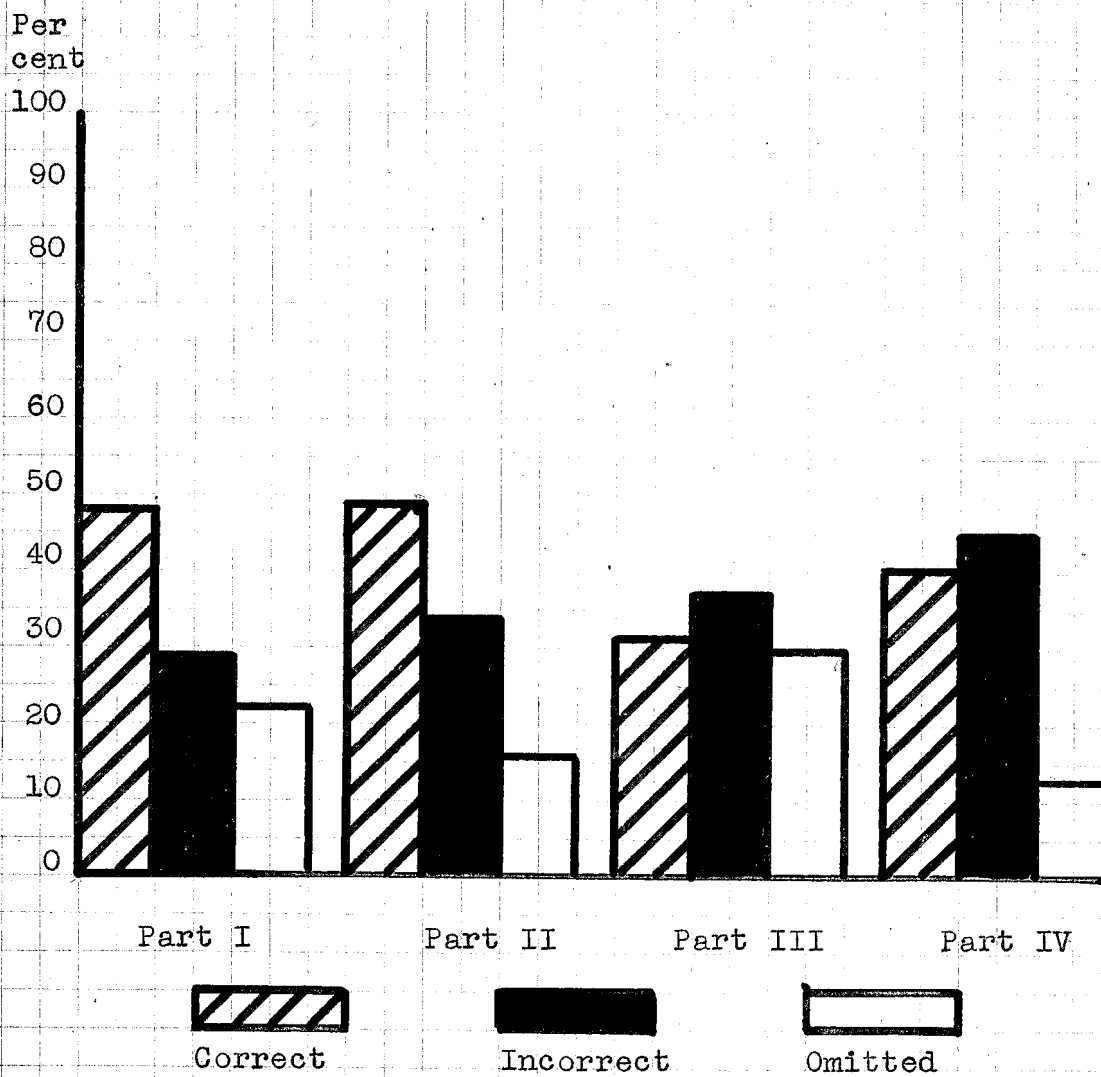


Figure 17

COMPARISON OF RESPONSES
FOR THE VARIOUS PARTS
OF THE TEST
(BY PERCENTAGES)

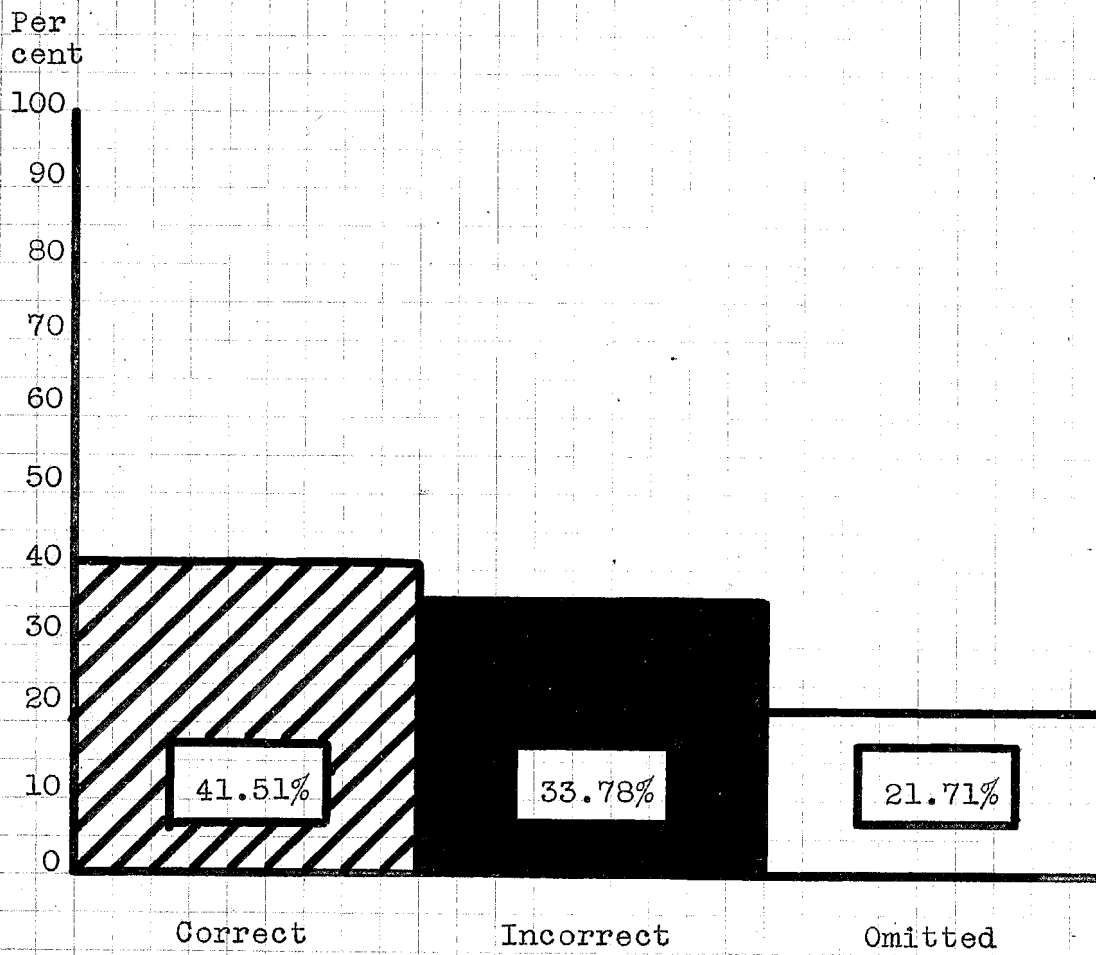


Figure 18

PERCENTAGE OF RESPONSES

FOR THE

ENTIRE TEST

CHAPTER VI

SUMMARY

In summarizing the findings, it was thought that the inclusion of probable reasons for the more outstanding variations in the percentages of right, wrong, or omitted items would make the study more meaningful as well as more useful.

Summary of the findings.

1. The greatest proficiency shown on Part I of the test was on items two, three, nine, seventeen, and eighteen which had the highest percentages of correct responses and the lowest percentages of incorrect responses and omissions. These items all dealt with per cent.

2. The high percentages of incorrect responses and low percentages of omissions on items four, five, and eleven indicated that these problems dealing with fractions, the watt-kilowatt relationship, and bank discount presented the most difficulty to the pupils on Part I of the test.

3. Incompetence is indicated by the high percentages of incorrect responses and omissions on item fifteen, in which tax rates expressed as mills were involved.

4. Items two, three, four, and five, on Part II of the test, had the highest percentages of correct responses

and the lowest percentages of incorrect responses. These results indicate proficiency in the direct interpretation of simple graphs and the use of tables where interpolation is not required. It is interesting to note that items five, six, and seven make use of the same table but require increasingly detailed knowledge of interpolation and roots and that this relationship is vividly mirrored by the corresponding incorrect responses.

5. The greatest proficiency shown on Part III of the test was on items six, twelve, and fourteen which had the highest percentages of correct responses and the lowest percentages of incorrect responses. These items involved simple equation solving, finding the distance traveled when the rate and time are given, and substituting in a formula.

6. Items eleven, fifteen, and seventeen had the highest percentages of incorrect responses and relatively low percentages of correct responses and omissions. This would indicate that the pupils encountered difficulty with problems involving indirect measurement or application of the Pythagorean theorem, evaluation of a formula in which negative numbers are used, and fabrication of a formula from given relationships.

7. The high percentages of correct responses and the corresponding low percentages of incorrect responses and omissions on items seventeen, eighteen, and twenty, of Part IV

indicate proficiency in solving problems involving ratio and in the use of a ruler in measuring a line segment.

8. Items two, three, and eight had the highest percentage of incorrect responses and were among the five lowest percentages of omissions. This indicated incompetency in rounding numbers, interpreting written numbers, and determination of significant places.

9. The average for the entire group was 41.51% correct, 36.78% incorrect, and 21.71% omitted.

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APPENDIX

TEST OF FUNCTIONAL COMPETENCE IN MATHEMATICS

by
DAVID JOHN DAVIS

Please print:

Eugene L. Herbert

Name _____ Sex _____
 Last First Middle M. or F.
 Age _____ Grade _____ Date _____
 Yrs. Mos. Present
 Name of School _____ City _____ State _____

Since the end of the 8th grade, how many years have you studied the following kinds of mathematics? Count one semester as $\frac{1}{2}$ year and one quarter as $\frac{1}{4}$ year. If you have repeated a course, say, the first semester of algebra, count the time as $\frac{1}{2}$ year not as 1 full year. The same applies to any quarter of work repeated. Include courses you are now taking and write in any courses you have taken which are not listed below. If you have not taken any mathematics since the 8th grade put a check mark (✓) after the first item in the following list:

<u>Courses</u>	<u>Years</u>	<u>Courses</u>	<u>Years</u>	<u>Courses</u>	<u>Years</u>
No Mathematics	_____	General Mathematics	_____	Social Mathematics	_____
Algebra	_____	Business Mathematics	_____	Consumer Mathematics	_____
Geometry	_____	Shop Mathematics	_____	_____	_____
Trigonometry	_____	Commercial Mathematics	_____	_____	_____

GENERAL DIRECTIONS: Do not turn this page until the examiner tells you to do so. Make certain you have pencils and a ruler. This examination consists of four parts, and requires 90 minutes of working time. The directions for each part are printed at the beginning of the part. Read them carefully, and proceed at once to answer the questions. **DO NOT SPEND TOO MUCH TIME ON ANY ONE ITEM. THERE IS A TIME LIMIT FOR EACH PART.** The examiner will tell you when to stop work on one part and go on to the next. Never return to a part after the examiner has asked you to stop work on that part. However, if you finish a part before the examiner tells you to stop work on that part you may go on to the next part.

Avoid wild guessing, since wrong answers will result in a subtraction from the number of correct answers. No questions may be asked after the examination has begun. If you have any questions ask them now.

When the examiner says "go" turn the page and go to work on Part I.

Part	Minutes	Score
I Consumer Problems	28	
II Graphs and Tables	12	
III Symbolism, Equations, etc.	25	
IV Ratio, Tolerance, etc.	25	
Total	90	

PART I
(28 minutes)

DIRECTIONS: Each of the following exercises is followed by five answers, only one of which is correct. Work each exercise, determine the correct answer, and put the number of that answer in the parentheses at the right of the exercise. If the correct answer is not given, write the number 5 in the parentheses. The sample, below, is done correctly.

Sample: Add:
 $10 + 10 = \underline{\quad ? \quad}$
1. 15
2. 17
3. 20
4. 25
5. Correct answer not given. . . (3)

Explanation: Since the correct answer is 20, the number 3 was placed in the parentheses. If the correct answer, 20, had not been given, the correct response would have been number 5, and a 5 would have been placed in the parentheses

1. If a suit marked \$60 is offered at a 15% discount, the selling price (Without sales tax) is:
1. \$9.00
2. \$45.00
3. \$51.00
4. \$59.10
5. Correct answer not given. . . ()

5. What is the cost of burning five 60-watt lamps for 4 hours each night for 30 nights if the cost of electricity is 3 cents per kilowatt hour? (Without tax)
1. \$10.80
2. \$3.60
3. \$0.36
4. \$1.08
5. Correct answer not given. . . ()

2. How much would you have to pay for a suit listed at \$55, if the sales tax is 3%?
1. \$71.50
2. \$55.17
3. \$53.35
4. \$56.65
5. Correct answer not given. . . ()

6. A recipe for 4 servings calls for $\frac{3}{8}$ cup of skim milk and $\frac{1}{2}$ cup of Cream of Wheat. If there are 16 tablespoons to a cup, how many tablespoons of Cream of Wheat are needed for 1 serving?
1. 4
2. 1
3. 2
4. 8
5. Correct answer not given. . . ()

3. When Mrs. Roberts asked the price of the perfume, the clerk said, "Five dollars plus a 3% sales tax and a 20% Federal tax." This perfume would cost Mrs. Roberts:
1. \$6.18
2. \$6.23
3. \$6.50
4. \$3.85
5. Correct answer not given. . . ()

7. Two advertisements appeared in a newspaper. One advertised the sale of 19 ounces of frozen orange juice for 29 cents; the other advertised the sale of 46 ounces of regular canned orange juice for 25 cents. To the nearest cent, how much more does one ounce of frozen orange juice cost than one ounce of the regular canned orange juice?
1. 4 cents
2. 1 cent
3. 2 cents
4. 3 cents
5. Correct answer not given. . . ()

4. The cost of 3 yards 9 inches of velvet at \$4.80 per yard is: (Without tax)
1. \$15.60
2. \$18.00
3. \$16.00
4. \$17.60
5. Correct answer not given. . . ()

Mr. Johnson's car averages 26 cents per gallon. If gasoline cost Mr. Johnson \$19.14 for 100 miles.
1. \$10.14
2. \$5.49
3. \$9.10
4. \$14.27
5. Correct answer not given.
Mr. Buchanan has an income of \$160.00. In his budget, he has income for rent. If he stays within his budget, he can pay per month for rent.
1. \$50.00
2. \$37.50
3. \$60.50
4. \$62.50
5. Correct answer not given.
On Sept. 1, Tom Kelley's bank balance was \$160.00. Deposits made during the month were:

DATE	DEPOSITS
Sept. 3	
Sept. 18	\$150.65
Sept. 25	\$65.46
Sept. 30	

Mr. Allen wishes to borrow from the Central Bank. She signed a note written for \$200 for 90 days. The bank discounts this note at 6%. How much will she receive?
1. \$200.00
2. \$197.50
3. \$190.00
4. \$202.50
5. Correct answer not given.
The original value of a house is \$16,000. This house depreciates at the rate of 2% each year. How much will the house be worth at the end of 8 years?
1. \$16,000
2. \$4,000
3. \$24,000
4. \$19,600
5. Correct answer not given.

8. Mr. Johnson's car averages 18 miles per gallon of gasoline. If gasoline costs 26 cents per gallon, how much will the gasoline cost Mr. Johnson for a trip of 549 miles?
1. \$10.14
 2. \$5.49
 3. \$9.10
 4. \$14.27
 5. Correct answer not given. . . ()

9. Mr. Buchanan has an income of \$250 per month. In his budget, he allows 25% of his income for rent. If Mr. Buchanan stays within his budget, what is the most he can pay per month for rent?
1. \$50.00
 2. \$37.50
 3. \$60.50
 4. \$62.50
 5. Correct answer not given. . . ()

10. On Sept. 1, Tom Kelley's bank balance was \$160.40. Deposits made and checks written during the month were as follows:

DATE	DEPOSITS	CHECKS
Sept. 3		\$40.50
Sept. 18	\$150.65	\$26.35
Sept. 25	\$65.46	
Sept. 30		\$38.27

- Tom's bank balance on October 1 is:
1. \$481.63
 2. \$110.99
 3. \$271.39
 4. \$321.23
 5. Correct answer not given. . . ()

11. Mrs. Allen wishes to borrow money from the Central Bank. She signs a promissory note written for \$200 for 90 days. If the bank discounts this note at 5%, Mrs. Allen will receive:
1. \$200.00
 2. \$197.50
 3. \$190.00
 4. \$202.50
 5. Correct answer not given. . . ()

12. The original value of a house is \$20,000. If this house depreciates 2½% of the original value each year, the value of the house at the end of 8 years will be:
1. \$16,000
 2. \$4,000
 3. \$24,000
 4. \$19,600
 5. Correct answer not given. . . ()

13. Mr. Martin plans to rent a house which he bought for \$8,000. He figures his yearly expenses on the house as follows: taxes \$120; insurance, upkeep, and depreciation \$220; and loss of interest on the money invested in the house \$200. How much yearly rent must Mr. Martin charge in order to meet these yearly expenses and still receive a 5% yearly return on his \$8,000 investment?
1. \$400
 2. \$940
 3. \$980
 4. \$580
 5. Correct answer not given. . . ()

14. If the total assessed valuation of the property in the city of Campbell is \$50,000,000, what tax rate is necessary to raise \$2,000,000 in property taxes?
1. 25%
 2. 4%
 3. 0.4%
 4. 2.5%
 5. Correct answer not given. . . ()

15. The assessed valuation of Mr. Cooper's property is \$9,500. If the tax rate is 40 mills per dollar, Mr. Cooper's property tax is:
1. \$3.80
 2. \$38.00
 3. \$0.38
 4. \$237.50
 5. Correct answer not given. . . ()

16. Mr. Jackson wishes to insure his house against loss by fire for \$4,000. An insurance company's representative tells him that the cost of a 3-year policy is 2½ times the cost of a 1-year policy. If the rate on a 1-year policy is 42 cents per \$100 of fire insurance, how much would Mr. Jackson save by buying one 3-year policy rather than three 1-year policies?
1. \$8.40
 2. \$0.84
 3. \$1.05
 4. \$4.20
 5. Correct answer not given. . . ()

17. If a real estate agent's commission is 5% of the selling price, what does he receive for selling a house for \$15,000?
1. \$75.00
 2. \$300.00
 3. \$750.00
 4. \$333.00
 5. Correct answer not given. . . ()

Go on to the next page.

18. Mr. Jones takes out an ordinary life insurance policy for \$10,000. If the annual premium rate is \$22.85 per \$1,000 of insurance, Mr. Jones' annual premium is:

- 1. \$2,285.00
- 2. \$229.00
- 3. \$22.90
- 4. \$228.50
- 5. Correct answer not given. ()

19. Mr. Sparrow bought forty \$100-G Bonds of the United States Government. Each bond bears simple interest at 2.5% per annum, the interest being paid semi-annually. How much interest does Mr. Sparrow receive every six months from his 40 bonds?

- 1. \$100
- 2. \$10
- 3. \$50
- 4. \$500
- 5. Correct answer not given. ()

20. A typewriter can be bought for \$60 cash or on the installment plan for a \$10 down payment and \$5 each month for 12 months. If you bought this typewriter on the installment plan, the yearly rate of interest you would pay is approximately:

- 1. 2%
- 2. 6%
- 3. 14%
- 4. 20%
- 5. 40%. ()

21. A purchase of \$6.12 is paid with a ten dollar bill. The accepted order for the clerk to make and to return the change is:

- 1. Two dimes, 3 nickels, three 1-dollar bills, 3 pennies, 1 half-dollar
- 2. Three 1-dollar bills, 1 nickel, 1 quarter, 8 pennies, 1 half-dollar
- 3. Three 1-dollar bills, 3 quarters, 2 nickels, 3 pennies
- 4. Three pennies, 1 dime, 1 quarter, 1 half-dollar, three 1-dollar bills
- 5. One half-dollar, 2 nickels, three 1-dollar bills, 1 quarter, 3 pennies. . . ()

22. Which of the following statements in regard to banking procedure is true:

- 1. When you pay a bill by check, the "filled out" stub of that check is your receipt proving the bill has been paid
- 2. When you endorse a check you write your name in the bottom right hand corner of the check
- 3. People open savings accounts at banks because of the convenience offered for paying bills by check
- 4. If the monthly statement sent by the bank shows that you still have \$640 in your checking account, but your check stubs show only \$600 remaining; then, either you or the bank must have made an error in figuring
- 5. A canceled check is one that has been paid by a bank and when returned to you should be kept as a receipt. ()

23. Which of the following statements in regard to taxation is true:

- 1. Cooperative sharing of the cost of governmental services is a basic idea in taxation
- 2. The sales tax is determined according to a person's ability to pay
- 3. As the general price level rises the amount of taxes paid per person tends to decrease
- 4. As the services and functions of the government increase and expand, the amount of taxes paid per person tends to decrease
- 5. People in our country are not taxed for public services and conveniences, provided by the government, unless they actually use them. ()

Which of the following investments

- 1. 4% mortgage bonds of the
- 2. Common stock of the
- 3. 6% preferred stock of the
- 4. 3% bonds of the state of
- 5. 2 1/2% bonds of the federal

Which of the following statements

- 1. It is safer to underinvest
- 2. If your income varies more
- 3. If you receive \$100 each
- 4. People in the lower income
- 5. A budget will increase your

Which of the following statements

- 1. The installment price is
- 2. The difference between the
- 3. The annual rate of interest
- 4. When you buy on the installment
- 5. The down payment is the

Which of the following statements

- 1. A fundamental idea in
- 2. The use made of a building
- 3. The older the person the
- 4. People living in large
- 5. The rates on all mortgages

24. Which of the following investments is probably least safe:
1. 4% mortgage bonds of the Interstate Railroad Company
 2. Common stock of the Interstate Railroad Company
 3. 6% preferred stock of the Interstate Railroad Company
 4. 3% bonds of the state of New York
 5. 2½% bonds of the United States Treasury. ()
25. Which of the following statements in regard to the budgeting of income is true:
1. It is safer to underestimate than to overestimate your necessary expenses
 2. If your income varies from month to month, it is safer to underestimate than to overestimate your monthly income
 3. If you receive \$200 each month, you will have \$50 each week to budget
 4. People in the lower income groups should plan to take their yearly fuel, insurance, and emergency expenses from one month's income
 5. A budget will increase your monthly income. ()
26. Which of the following statements in regard to installment buying is true:
1. The installment price is less than the cash price
 2. The difference between the cash and the installment prices is the profit for the seller
 3. The annual rate of interest charged in installment buying is usually about 6%
 4. When you buy on the installment plan you are actually borrowing the use of money
 5. The down payment in installment buying is usually about 50% of the cash price. ()
27. Which of the following statements in regard to insurance is true:
1. A fundamental idea in insurance is cooperative sharing of losses
 2. The use made of a building does not affect the cost of fire insurance on the building
 3. The older the person the lower the rate that is paid for each \$1,000 of life insurance taken out
 4. People living in large cities pay lower premium rates for automobile-liability insurance than do people living in small towns
 5. The rates on an ordinary life insurance policy are higher than the rates on either a 20-payment life or on a 20-year endowment policy. ()

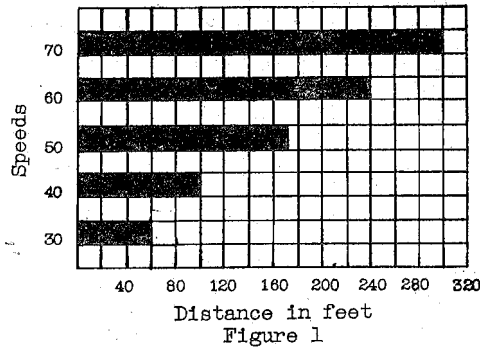
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Score _____

PART II
(12 minutes)

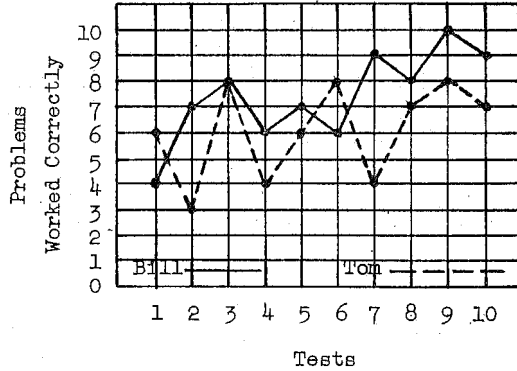
DIRECTIONS: Proceed as in the preceding exercises.

DISTANCES NEEDED TO STOP A CAR
AT CERTAIN SPEEDS



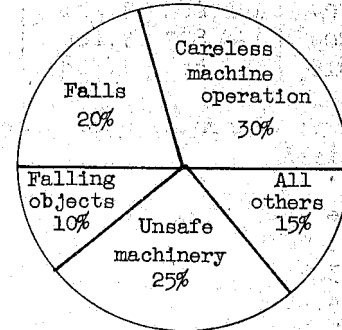
1. According to the graph in Figure 1, how many more feet are needed to stop a car traveling at 70 than at 50 miles per hour?
- 130
 - 120
 - 135
 - 125
 - Correct answer not given. . . ()

TESTS IN ARITHMETIC



2. According to the graph in Figure 2, on which test was there the greatest difference in the number of problems worked correctly by Tom and Bill?
- 2nd
 - 3rd
 - 7th
 - 10th
 - Correct answer not given. . . ()

CAUSES OF 1,000 INDUSTRIAL ACCIDENTS



3. According to the graph in Figure 3, how many more accidents were caused by the careless operation of machinery than by unsafe machinery?
- 25
 - 300
 - 250
 - 100
 - Correct answer not given. . . ()

Table I

TAX WITHHELD
FROM MONTHLY WAGES

Monthly Wage		Number of Exemptions			
At Least	But Less Than	1	2	3	4
\$48	\$52	\$0.60	0	0	0
60	64	2.70	0	0	0
100	104	9.50	1.60	0	0
140	144	16.40	8.40	.50	0
160	164	19.80	11.90	4.00	0
184	188	23.90	16.00	8.10	.10

4. According to Table I, if a married man earns \$185 per month and has a wife and 1 child, both entirely dependent upon him, how much is withheld from his monthly wages for income taxes? (Note. Remember the taxpayer, himself, is also an exemption)
- \$4.00
 - \$11.90
 - \$16.00
 - \$8.10
 - Correct answer not given. . . ()

Go on to the next page.

Table II
ROOTS AND POWERS

No.	Squares	Cubes	SS
51	2,601	12,651	7.
52	2,704	140,608	7.
53	2,809	148,877	7.
54	2,916	157,464	7.

Table II to determine
next 3 exercises.

The square root of 52 is:

- 2.704
- 3.733
- 14.0608
- 7.280
- Correct answer not given.

The square root of 53.5 is:

- 7.294
- 7.284
- 7.325
- 7.314
- 7.341.

The cube root of 54,000 is:

- 378.0
- 15,7464
- 37.80
- 157,464
- Correct answer not given.

Table III
SINES COSINES AND TANGENTS

Angle	Sin	Cos
65°	.910	.433
10°	.174	.985
20°	.342	.937
30°	.500	.866
40°	.643	.766
50°	.766	.643

Table III to determine
next 2 exercises.

cos 65° 45' is equal to:

- 0.4449
- 0.4423
- 0.4441
- 0.4431
- Correct answer not given.

If tan A = 1.9697, then angle A is:

- 63° 15'
- 63° 5'
- 63° 3'
- 63° 8'
- Correct answer not given.

Table II

ROOTS AND POWERS

No.	Squares	Cubes	Square Roots	Cube Roots
51	2,601	132,651	7.141	3.708
52	2,704	140,608	7.211	3.733
53	2,809	148,877	7.280	3.756
54	2,916	157,464	7.348	3.780

Use Table II to determine your answers in the next 3 exercises.

5. The square root of 52 is:
 1. 2.704
 2. 3.733
 3. 14.0608
 4. 7.280
 5. Correct answer not given. . . ()
6. The square root of 53.5 is:
 1. 7.294
 2. 7.284
 3. 7.325
 4. 7.314
 5. 7.341. ()
7. The cube root of 54,000 is:
 1. 378.0
 2. 15.7464
 3. 37.80
 4. 157.464
 5. Correct answer not given. . . ()

Table III

SINES COSINES AND TANGENTS

Angle	Sin	Cos	Tan
63°	.8910	.4540	1.9626
10'	.8923	.4514	1.9768
20'	.8936	.4488	1.9912
30'	.8949	.4462	2.0057
40'	.8962	.4436	2.0204
50'	.8975	.4410	2.0353

Use Table III to determine your answers in the next 2 exercises.

8. $\cos 63^\circ 45'$ is equal to:
 1. 0.4449
 2. 0.4423
 3. 0.4441
 4. 0.4431
 5. Correct answer not given. . . ()
9. If $\tan A = 1.9697$, then angle A equals:
 1. $63^\circ 15'$
 2. $63^\circ 5'$
 3. $63^\circ 3'$
 4. $63^\circ 8'$
 5. Correct answer not given. . . ()

Table IV

AMOUNT OF \$1-COMPOUND INTEREST

Periods	1%	2%
1	1.010000	1.020000
5	1.051010	1.104081
6	1.061520	1.126162
7	1.072135	1.148686
8	1.082857	1.171659
9	1.093685	1.195093
10	1.104622	1.218994
11	1.115668	1.243374
12	1.126825	1.268242
13	1.138093	1.293607
14	1.149474	1.319479

Use Table IV to determine your answer in the next exercise.

10. When Tom was 11 years old, his father put \$1,000 in a bank to help provide for Tom's future education. If this bank pays 2% interest compounded semi-annually, what is the total amount in the bank, 7 years later, when Tom is ready for college? (Determine your answer to the nearest cent)
 1. \$1,149.47
 2. \$1,072.14
 3. \$1,319.48
 4. \$1,148.69
 5. Correct answer not given. . . ()

Go on to the next part.

Score _____

DIRECTIONS: Proceed as in the preceding exercises.

1. The value of $a^3 + 2a^3$ is equal to:
1. $3a^3$
 2. $3a^6$
 3. $2a^6$
 4. $3a^9$
 5. $2a^9$ ()

2. The value of $2x^2 \cdot x^3$ is equal to:
1. $3x^6$
 2. $2x^6$
 3. $4x^5$
 4. $4x^6$
 5. $2x^5$ ()

3. The value of $2x^6/x^2$ is equal to:
1. 2^3
 2. $2x^3$
 3. $(2x)^3$
 4. $64x^3$
 5. $2x^4$ ()

4. The value of $2 \cdot 3^3$ is equal to:
1. 18
 2. 12
 3. 54
 4. 216
 5. 27 ()

5. The coordinates of 5 points are given below. Which point lies on the graph of the equation $y = 2x + 4$?
1. (2,8)
 2. (-4,-8)
 3. (-2,2)
 4. (4,10)
 5. (3,12) ()

6. In the equation $3x + 6 = 12$, the value of x is:
1. 3
 2. 1
 3. 2
 4. 4
 5. Correct answer not given . . . ()

7. In the equation $2y + 12 = -5$, the value of y is:
1. $3\frac{1}{2}$
 2. -6
 3. $-8\frac{1}{2}$
 4. $-3\frac{1}{2}$
 5. Correct answer not given . . . ()

8. In the equation $\frac{3m}{4} - 6 = 15$, the value of m is:
1. 18
 2. 28
 3. 12
 4. 9
 5. Correct answer not given . . . ()

9. The area of a circle with a diameter of 6.00 ft. is approximately:
1. 28.3 sq. ft.
 2. 18.8 sq. ft.
 3. 113.0 sq. ft.
 4. 37.7 sq. ft.
 5. 12.6 sq. ft. ()

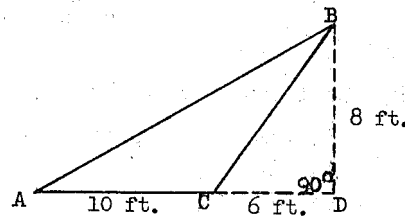


Figure 4

10. The area of triangle ABC, in Figure 4, is:
1. 48 sq. ft.
 2. 80 sq. ft.
 3. 64 sq. ft.
 4. 128 sq. ft.
 5. 40 sq. ft. ()

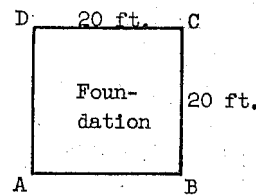


Figure 5

11. Two carpenters are checking to make sure the foundation ABCD, in Figure 5, is square. They measure the diagonal distances AC and BD. If the foundation is a square, each diagonal distance will be:
1. 30 ft.
 2. $\sqrt{40}$ ft.
 3. 25 ft.
 4. $\sqrt{400}$ ft.
 5. $\sqrt{800}$ ft. ()

Go on to the next page.

2. How far would you travel in 3 hours and 20 minutes at a speed of 45 miles per hour?
1. 144 miles
 2. 157.5 miles
 3. 150 miles
 4. 160 miles
 5. Correct answer not given. . . ()
3. In the formula $I = prt$; if $p = \$1,600$, $r = .03\frac{1}{2}$, and $t = \frac{1}{2}$, then I equals:
1. \$560
 2. \$56
 3. \$28
 4. \$2.80
 5. Correct answer not given. . . ()
14. In the formula $A = \frac{1}{2}h(a + b)$; if $h = 7$ yd., $a = 10$ yd., and $b = 14$ yd., then A equals:
1. 84 sq. yd.
 2. 15.5 sq. yd.
 3. 49 sq. yd.
 4. 42 sq. yd.
 5. Correct answer not given. . . ()
15. In the Formula $S = \frac{(h - 2d)}{m}$; if $m = -2$, $h = -6$, and $d = +4$, then S is equal to:
1. +7
 2. -1
 3. -7
 4. +1
 5. Correct answer not given. . . ()
16. How would you express a formula for the cost in cents (C) of one orange if n oranges cost b cents?
1. $C = nb$
 2. $C = b/n$
 3. $C = n/b$
 4. $C = b - n$
 5. Correct answer not given. . . ()
17. How would you express the fact that the cost in cents (C) of sending a package of n lb. by parcel post is ten cents for the first pound and two cents for each additional pound?
1. $C = 10 + 2n$
 2. $C = 10n + 2$
 3. $C = 10 + 2n - 1$
 4. $C = 10 + 2(n + 1)$
 5. Correct answer not given. . . ()

18. In the formula $r = d/t$, if the value of d is multiplied by 4 and the value of t is divided by 2, then the value of r is:
1. Multiplied by 2
 2. Divided by 2
 3. Multiplied by 8
 4. Multiplied by 4
 5. Correct answer not given. . . ()
19. The formula for the volume of a cylindrical rod is $V = \pi r^2 L$. If a cylindrical rod with a diameter of 4 inches is machined until it has a diameter of 2 in., but the same length, the fractional part of the volume of the rod lost by machining is:
1. $1/4$
 2. $1/2$
 3. $1/3$
 4. $3/4$
 5. Correct answer not given. . . ()
20. Which of the following statements contains a vector quantity?
1. A building is 100 ft. long
 2. The temperature is 90° Fahrenheit
 3. A map has the scale 1 inch = 100 miles
 4. An airplane heads north at 220 miles per hour
 5. Kyle Junior High School closes at 3:30 in the afternoon. . . ()

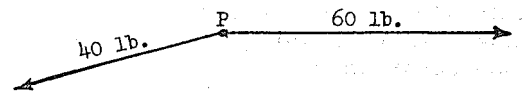


Figure 6

21. In Figure 6, two forces are shown acting on point P. The resultant force is approximately: (Select most reasonable answer. Instruments are not needed)
1. 10 lb.
 2. 25 lb.
 3. 85 lb.
 4. 105 lb.
 5. 125 lb. ()
22. At a point 100 feet away, and level with the base of a tree, the angle of elevation of the top of the tree is 32° . The height of the tree is: (Given: $\sin 32^\circ = .53$, $\cos 32^\circ = .85$, $\tan 32^\circ = .62$)
1. 53 ft.
 2. 62 ft.
 3. 85 ft.
 4. 45 ft.
 5. Correct answer not given. . . ()

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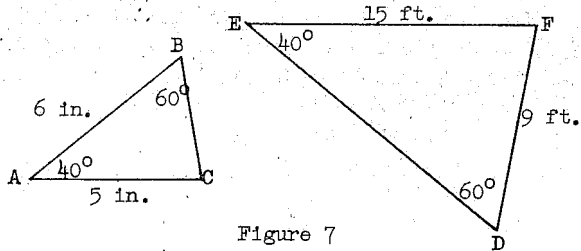


Figure 7

23. Examine the two similar triangles in Figure 7. In triangle ABC, the length of side BC is:
1. 2 in.
 2. 3 in.
 3. 4 in.
 4. $4\frac{1}{2}$ in.
 5. Correct answer not given. . . ()

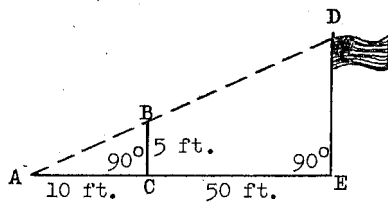


Figure 8

24. Bill used a 5 ft. stick, BC, to determine the height of the flag pole DE. By sighting from point A, Bill found the top of the stick in line with the top of the pole. Use the information in Figure 8 to find the height of the flag pole. This height is:
1. 20 ft.
 2. 25 ft.
 3. 10 ft.
 4. 30 ft.
 5. Correct answer not given. . . ()

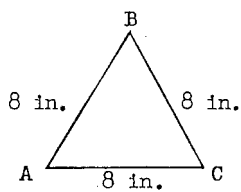


Figure 9

25. The size of each angle of triangle ABC, in Figure 9 is:
1. 30°
 2. 45°
 3. 40°
 4. 50°
 5. Correct answer not given. . . ()

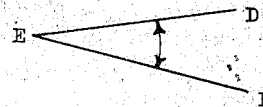


Figure 10

26. The size of angle DEF, in Figure 10, depends upon:
1. The lengths of line segments DE and EF
 2. The distance from D to F
 3. The area inclosed by line segments DE and EF and a straight line segment drawn from D to F
 4. The amount of rotation of line segment EF around point E necessary to reach the position of line segment ED
 5. Correct answer not given. . . ()
27. In any regular polygon:
1. Each angle is a right angle
 2. No two sides are equal
 3. There are 4 equal sides and 4 equal angles
 4. The angles are of equal size and the sides of equal length
 5. Two and only two sides are parallel. ()
28. If two sides of a triangle are 10 in. and 12 in. in length, the third side cannot have a length of:
1. 2 in.
 2. 3 in.
 3. 20 in.
 4. 12 in.
 5. 10 in. ()

Go on to the next part.

Score _____

DIRECTIONS: Proceed as follows:

1. The number 668,548 to the nearest thousand is:
 1. 669,000
 2. 669,000
 3. 700,000
 4. 668,500
 5. Correct answer not given.
2. The number 0.0249 to the nearest thousandth is:
 1. 0.025
 2. 0.026
 3. 0.025
 4. 0.024
 5. Correct answer not given.
3. The number 123,456 to the nearest hundred is:
 1. 123,500
 2. 123,400
 3. 123,450
 4. 123,450
 5. Correct answer not given.
4. If 16.64 inches is rounded to the nearest hundredth, the possible error is:
 1. 0.01 in.
 2. 0.02 in.
 3. 0.001 in.
 4. 0.005 in.
 5. Correct answer not given.
5. The best length for a piece of material made to 2.333 inches is:
 1. 2.33 in.
 2. 2.335 in.
 3. 2.335 in.
 4. 2.34 in.
 5. 2.33 in.
6. Four of the following are appropriate names for a state that contains the exact number of people:
 1. Bill's state
 2. Wacker's state
 3. The average state
 4. The Central state
 5. 192.5 people
 6. Mary is 5 feet tall
 7. Floyd Lewis is 115-117 miles long

PART IV
(25 minutes)

DIRECTIONS: Proceed as in the preceding exercises.

1. The number 688,546 expressed correctly to the nearest thousand is:
 1. 689,000
 2. 690,000
 3. 700,000
 4. 688,500
 5. Correct answer not given. . . ()
2. The number 0.02449 expressed correctly to the nearest thousandth is:
 1. 0.030
 2. 0.020
 3. 0.025
 4. 0.0245
 5. Correct answer not given. . . ()
3. The number one hundred and sixteen thousandths when written in figures is:
 1. 116,000
 2. 0.116
 3. 10,016
 4. 0.0116
 5. Correct answer not given. . . ()
4. If 16.64 inches is measured correctly to the nearest hundredth inch, the largest possible error is:
 1. ± 0.01 in.
 2. ± 0.05 in.
 3. ± 0.001 in.
 4. ± 0.005 in.
 5. Correct answer not given. . . ()
5. The basic length of a metal bar to be made is 2.233 inches. If a tolerance of ± 0.004 in. is allowed, which of the lengths of finished bars below is acceptable?
 1. 2.203 in.
 2. 2.238 in.
 3. 2.229 in.
 4. 2.241 in.
 5. 2.133 in. ()
6. Four of the 5 following statements contain approximate numbers. One statement contains an exact number. Which statement contains the exact number?
 1. Bill's salary each month after taxes are withheld is \$207.53
 2. Market Street is 50 feet wide
 3. The average weight of the men on the Central football team is 192.5 pounds.
 4. Mary is 5 feet $4\frac{1}{2}$ inches tall
 5. Floyd Davis' racing car averaged 115.117 miles per hour. . . . ()

7. Before adding the approximate numbers; 28.4 in., 16.348 in., 9.4758 in., and 4.031 in.; round off to the least precise number. The sum is:
 1. 58.2548 in.
 2. 58.3 in.
 3. 58.2 in.
 4. 58.255 in.
 5. 58.26 in. ()
8. The numbers: 3.14 and 1.7 in.; are approximate numbers. When you multiply these numbers, your answer should be expressed as:
 1. 5.4 in.
 2. 5.338 in.
 3. 5.34 in.
 4. 5.27 in.
 5. 5.3 in. ()

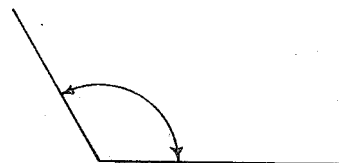


Figure 11

9. A reasonable estimate of the size of the angle in Figure 11 is: (Do not use a protractor)
 1. 120°
 2. 45°
 3. 80°
 4. 200°
 5. 150° ()
10. A reasonable estimate of the value of $\frac{0.6567}{2.012 \times 1.232}$ is: (Determine your answer without use of pencil)
 1. 30
 2. 300
 3. 3
 4. 0.03
 5. 0.3. ()
11. A reasonable estimate of the value of $\frac{9,999,664.6}{999.897}$ is: (Determine your estimate without use of pencil)
 1. 1,000
 2. 10,000
 3. 100,000
 4. 1,000,000
 5. 10,000,000. ()

Go on to the next page.

22. If an airplane flew 180 m.p.h. for 2 hours and 200 m.p.h. for the next 3 hours; the mean, or average, speed of the airplane was:
1. 192 m.p.h.
 2. 195 m.p.h.
 3. 190 m.p.h.
 4. 188 m.p.h.
 5. Correct answer not given. . . ()

23. A factory has 100 men on its payroll. A company report indicates that the mean, or average, yearly income of these 100 men is \$3,220; the median income is \$3,000, and the modal income is \$2,500. From this information you know that the yearly payroll for these 100 men is:
1. \$250,000
 2. \$322,000
 3. \$300,000
 4. \$290,667
 5. Correct answer not given. . . ()

24. Assume the 3 following statements are true:
- (a) El Ropo Cigarettes are less irritating to the throat than any other cigarettes
 - (b) Famous athletes smoke El Ropo Cigarettes
 - (c) More El Ropo Cigarettes are sold than any other brand of cigarettes

If the information above is true and is the only information you have, which one of the following statements is a logical conclusion to make?

1. All athletes who smoke El Ropo Cigarettes are famous
2. Some other cigarettes may be less irritating to the throat than El Ropo Cigarettes
3. More El Ropo Cigarettes are sold because more money is spent to advertise them
4. Fewer El Smoko than El Ropo Cigarettes are sold
5. More El Ropo than any other cigarettes are smoked by athletes because El Ropo Cigarettes are less irritating to the throat. ()

25. Of all drivers of automobiles in a certain city who were involved in accidents which resulted in injury to individuals:
- 4% were under 18 years of age
 - 20% were 18 to 25 years of age
 - 70% were 26 to 65 years of age
 - 6% were 66 or more years of age

If the information above is true and is the only information you have on automobile accidents in this city, which one of the following statements is a logical conclusion to make?

1. The safest automobile drivers in this city are under 18 years of age
2. City automobile drivers, 26 to 65 years of age are the most careless
3. Six per cent of all automobile drivers in this city are 66 or more years of age
4. The greatest number of deaths was caused by city automobile drivers from 26 to 65 years of age
5. Of all drivers of automobiles in this city, who were involved in accidents resulting in injury to individuals, more were from 18 to 25 than were 66 or more years of age. ()

Score _____