THE UNIVERSITY OF MANITOBA

THE EFFECTIVENESS OF SELECTED VARIABLES FOR PREDICTING GRADE IX AND GRADE X ACHIEVEMENT, AS MEASURED BY FINAL MARKS IN THESE GRADES

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ABSTRACT OF THESIS

Purpose. The purpose of the study was to determine the relationship between measured intelligence and measured achievement in grades nine and ten. This involved the determination of the relationship between: measured intelligence and Grade IX term marks; measured intelligence and Grade IX final marks; Grade IX term marks and Grade IX final marks; Grade IX term and final marks and Grade X final marks and average. The performance of provisionally-promoted students and under-age and over-age students was also investigated.

Procedures. Term and final examination scores and intelligence test results on the Co-operative School and College Ability Tests, Form 3A, and the Otis Quick-Scoring Gamma Test, Form Am, of 214 grade nine students were analyzed by the computation of means, medians, standard deviations, expectancy tables, correlations of co-efficient and regression equations. Significance of findings was determined by the t-test.

Similar procedures were applied to the examination scores and intelligence test results of 108 grade ten students, the total number of grade nine students continuing into grade ten in the same school in the University Entrance Course. The results recorded below emerged from the analysis of these data.

Results. Positive and significant relationships were found between the following factors: intelligence test scores and grade nine term marks; intelligence test scores and grade nine final marks; grade nine term and final marks; intelligence test scores and grade ten final marks; grade nine term marks and grade ten final marks, and grade nine final marks and grade ten final marks.

No significant statistical difference existed between the scores of the Co-operative School and College Ability Tests, Form 3A, and the Otis Quick-Scoring Gamma Test, Form Am, as predictor of either grade nine or grade ten results. No significant statistical difference existed between grade nine term or final marks as predictors of grade ten results, except in social studies, where the grade nine term marks were significantly better predictors than the grade nine final marks.

Grade nine provisional promotees scored significantly lower on both intelligence tests and on grade ten examinations than students who had complete promotions. Eighty per cent of grade nine students promoted provisionally failed to secure promotion from grade ten to grade eleven.

Over-age students did not score as well in grade nine as students of normal age for the grade, but in grade ten they scored as well as the others in all subjects except those demanding fluent lingual expression, such as composition and geography.

Under-age students achieved better results than students of normal age at the grade nine level, but they did not perform significantly better in grade ten.

Recommendations.

1. The School and College Ability Test should be replaced as a testing instrument at the grade nine level in Manitoba.

2. Department of Education final examinations at the grade nine level should be eliminated.

3. Exemptions in major subjects at the grade nine level should be instituted.

4. Additional research should be undertaken on the matter of over-age and under-age students, to determine why the performances of these two groups differ substantially from the normal in grade nine, but not in grade ten.

5. Additional research should be undertaken on the matter of provisional promotions into the grade ten University Entrance Course.

CHAPTER I

THE PROBLEM AND ITS IMPORTANCE

INTRODUCTION

Although six different course choices are available to students completing Grade IX in Manitoba,[1] the majority select the University Entrance Course. Parental pressures, societal and employer demands, and peer group pressures, especially in socio-economically privileged areas, partially account for this emphasis on the University Entrance program.

The Brodersen Report[2] shows the percentage of students who continue their education beyond Grade XI, and, although the figures indicate a trend toward increasing numbers and percentages of students continuing their education, in none of the years studied does the percentage of Grade XI students attempting the Senior Matriculation examination, exceed 52.4 per cent. Senior Matriculation during this period was either Grade XII or First Year University. Throughout the years of the study, the percentage of all Grade XI students continuing into Second Year University remains fairly constant, at around 11 per cent.

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[1] Program of Studies for the Schools of Manitoba 1963-64, p. 6.

[2] G. L. Brodersen, "A Statistical Study of the Academic Achievement Progress of Manitoba High School Students Beyond Grade XI," (Unpublished study, University of Manitoba, 1962). See Appendix A, Table XIII.

The disparity in percentages between University Entrance students, and students who actually enter University indicates an educational problem, which might partially be alleviated by proper course selection at the Grade X level.

Educators at present have little control over the course selection of each student at the end of Grade IX. Probably, in a democratic educational system, there should not be rigidity over the screening of applicants for any particular course. After an assessment of abilities, the candidates should be informed of their chances of success in a selected course. This prognosis should be based on statistically valid predictive studies.

In Manitoba, however, there are few predictive studies available, on which counselors and principals can base their analyses. It is an aim of this paper to provide such a study.

Statement of the Problem

The purpose of this study is to determine the relationship between measured intelligence, and measured achievement in grades nine and ten. The analysis of the relationship involves several sub-problems which will be considered:

1. What is the relationship between measured intelligence and Grade IX term marks?

2. What is the relationship between measured intelligence and Grade IX Departmental marks?

3. What is the relationship between Grade IX term marks and Grade IX Department of Education final marks?

4. What is the relationship between Grade IX term marks, Grade IX Departmental marks, and Grade X final achievement?

5. Which Grade IX variables are the best predictors of Grade X success?

6. How do provisionally promoted students compare with completely promoted Grade IX students in terms of Grade X final results in the University Entrance Course?

7. How do over-age and under-age students compare with the total group.

The Null Hypotheses

The following hypotheses will be tested:

1. There is no significant correlation between intelligence as measured by the School and College Ability Test, Form 3A (S.C.A.T.) and Otis Intelligence Gamma Test, Form Am, and Grade IX term marks.

2. There is no significant correlation between measured intelligence and Grade IX Departmental marks.

3. There is no significant correlation between Grade IX term marks and Grade IX Departmental marks.

4. There is no significant difference between intelligence scores, term marks, and Departmental marks as predictors of Grade X achievement.

5. No single Grade IX variable is a better predictor of total Grade X success than any other.

6. Provisional promotion into the Grade X University Entrance Course is as valid as complete promotion.

7. Over-age and under-age students within the sample do not differ significantly from the remainder of the sample.

IMPORTANCE OF THE PROBLEM

An investigation into these problems will be valuable for counselors and principals, school administrators and department of education officials, and educational researchers.

Counselors and principals are required to provide assistance in the selection of course choices. Walker[3] showed that, although counselors were more accurate in predicting school performance than job performance, there still was a wide range of accuracy in counselor prediction. Predictions, both academic and occupational, were least accurate for the student of low academic ability.

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[3]John L. Walker, "Counselor's Judgments in the Prediction of Occupational and Educational Performance of Former High School Students," Journal of Educational Research, XLIX, No. 2, (October, 1955)

Byrne points out:

> ... we cannot reduce decision-making to an automatic process through research procedures...However ... On some matters the appropriate answer may be identified through research studies.[4]

An examination of the relationships described should provide statistical information which would be useful in determining course choices at the Grade X level.

School administrators and department of education officials must make decisions concerning actual or contemplated changes within a provincial educational system. In Manitoba, information is needed on:

1. the advantages and disadvantages of exemptions at the Grade IX level;

2. the advantages and disadvantages of the provisional promotion to the University Entrance Course;

3. the value of intelligence tests used, and their relationship to other academic factors;

4. the value of the external Departmental examinations at the Grade IX level.

This study attempts to deal with these problems, providing administrators and departmental officials with factual material upon which to base or justify final decisions.

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[4]T. C. Byrne, "Research and Decision Making," C.S.A. Bulletin, IV, No. 4, (June, 1965), p. 8.

In this study of relationships educational researchers require a constantly growing body of information, from a varied segment of the population. Many studies have already been conducted dealing with marks and scores at various levels. Most of these, however, have been at the high school and freshman university level. This study should add to the total knowledge of educational research in the field of relationships, in that it deals with a group of Manitoba Students, at the Grades IX - X level.

Assumptions

The following are assumed to be true:

1. That testing conditions were the same for all students.

2. That the examinations administered to assess academic achievement are valid, i.e., that they represent a true measure of academic progress.

3. That the intelligence tests and examinations used are reliable.

4. That there is a reasonable degree of objectivity in scoring the tests. The Otis, S.C.A.T., and part of the Grade IX social studies final examination are objective and machine-scored. Objectivity of marking in the other examinations, however, is difficult to measure.

Definitions

To ensure clarity, the following definitions are presented:

Complete standing - means a student has attained a score of 50 per cent or better in all subjects.

Composite score or C-score or Term mark - means the average score in each subject, obtained by determining 40 per cent of the December mark and 60 per cent of the April mark, and adding the two. Composite averages may be obtained by averaging the composite subject scores.

Condition - means a failure to obtain a mark of 50 per cent or better in a specific Grade X subject. In Grade X, a student may have conditions in one or two subjects, and still continue with a portion of his Grade XI studies.

Departmental examinations - means examinations provided by the provincial Department of Education, commonly known as Inspectors' tests, for the purpose of examining the students of Grade IX for promotion. These examinations are marked centrally, by appointed markers.

Examination score or E-score - means the score obtained by the student on the Grade IX Departmental examination.

Exemption - means a recommendation from the school, in lieu of final examinations, standing in a subject. Exemptions are contingent on certain conditions, chief of which, in 1964, was a composite average of 75 per cent. No exemptions were permitted in the major subjects at the Grade IX level in 1964.

Fail - means the failure to obtain standing in a grade. In Grade IX, fail standing results from having two marks below 50 per cent in subjects designated as major. In Grade X, fail standing occurs when three final marks are below 50 per cent.

Final mark, Grade X - means the mark obtained by determining the composite score in each subject, and averaging this with the June mark.

Grade X June examinations - means examinations provided by the High School Examination Board, marked within the school by the subject teachers.

Major subjects - in Grade IX, mean English, social studies, mathematics, and science.

Minor subject - means a subject in which no final Departmental examination is written in Grade IX. They are French, Latin, music, health, physical education, industrial arts, home economics, art, and guidance.

Over-age - refers to Grade IX students older than 16 years, 6 months in June 1964.

Provisional standing - means a student may proceed to the work of Grade X in spite of having either one major failure, or one major failure and one minor failure, provided he has met the minimal attendance requirements.

Under-age - refers to Grade IX students younger than 14 years, 6 months in June 1964.

Treatment of the Data

The data will be analysed by the use of standard statistical procedures, including computation of frequency distributions, means, medians, standard deviations, frequency polygons, ogives, scatter diagrams, and expectancy tables. In addition, coefficients of correlation and regression equations will also be calculated. Significance of statistical findings will be determined by the t-test.

Limitations of the Study

This study will be limited in the following ways:

1. Grade IX group size - The group studied consists of 214 students, the total Grade IX enrolment at Grant Park School in 1964.

2. Missing data - Of the 214 students, only 211 wrote the Otis test and all Departmental examinations. Only 181 S.C.A.T. scores were available, because of absence at the time of administration of the tests (February, 1964), as well as unavailability of certain student records due to transfers to other schools.

3. Grade X group size - This is limited to 108 students who had taken Grade IX at Grant Park School, and who continued in the Grade X University Entrance Course program.

This study will be limited further, in that any conclusion derived from it must always be considered as only an approximation of the fact. In addition, since the multiple variables which make humans unpredictable cannot be fully taken into account, results of this study are not absolute.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter will present a review of current literature, with emphasis upon methods of prediction, and some of the more pertinent predictive studies.

CLINICAL OR STATISTICAL METHODOLOGY?

Although there is some disagreement about the relative efficacy of clinical and statistical methodology in prediction of achievement, both Fricke[1] and Meehle[2] cited the actuarial or statistical method as superior in the prediction of academic results. Fricke's conclusions were based on a review of twenty-seven studies, while Meehle, in comparing twenty studies using both actuarial and clinical methods, concluded that statistical predictions were superior to the clinical. Meehle was persuaded of the superiority of the statistical approach by Sarbin's[3] experiment, which showed r's varying from .45 for men to .70 for women, while the clinical approach showed r's of .35 for men to .69 for women.

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[1]Benno G. Fricke, "Prediction, Selection, Mortality, and Quality Control", College and University, XXXII (Fall 1956), pp. 34-52.

[2]Paul E Meehle, Clinical Versus Statistical Prediction, (Minneapolis, University of Minnesota Press, 1954), p. 119.

[3]Ibid., p. 90, from T. R. Sarbin, "A Contribution To The Study of Actuarial and Individual Methods of Prediction", American Journal of Sociology, 48: 593-602 (1942).

INTELLECTIVE AND NON-INTELLECTIVE PREDICTORS

Many researchers have been concerned with prediction of academic success based on intellective and non-intellective variables. Intellective variables may be described as those which relate directly to the academic function such as school tests, standardized achievement tests or aptitude tests, while non-intellective factors are those such as personality and temperament, which are not necessarily the product of the intellect. Dealing with the prediction of college grades, Fishman and Pasanella[4] located 580 studies made between 1950 and 1960; four hundred ten studies used intellective predictors only, while ninety studies used non-intellective predictors only, and eighty studies used both. Most of these studies used a global approach, in that they dealt with averages rather than specific subject area fields.

The most obvious intellective predictor was the high school record. For 263 studies, the r was roughly .50 with freshman grades. Correlations between aptitude tests and freshman intellective criteria were averaged at .47. The main aptitude tests used were the Scholastic Aptitude Test of the College Entrance Examination Board, the American Council on Education Psychological Examination, and the Ohio State University Psychological Examination. The Otis Quick Scoring Test of Mental Ability and the Co-operative School and College Ability Tests

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[4]Joshua A. Fishman and Ann K. Pasanella, "College Admission Selection Studies", Review of Educational Research, Vol. xxx No. 4, (October 1960), p. 298.

were less frequently used. Multiple correlation studies showed that when high school average has an aptitude test added, multiple r's increase from .00 to .23 beyond the zero order r used with a median rise of .07.

A positive relationship between introversion and attainment, as well as r's varying from .40 to .60 between I.Q. and attainment, is claimed by Child.[5]

High school rank was the best single predictor of freshman grades, with r's of .40 (significant at the .01 level) as compared with r's of .09 (male) and .02 (female) for the SAT Verbal, in an investigation by Holland,[6] although his study was primarily designed to check the influence of personality factors as predictors.

Watley and Mervin[7] attempted to determine the effectiveness of a number of intellectual and non-intellectual variables for predicting academic achievement for male freshmen in a college of business administration. Five predictors were identified as the best combination

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[5]Dennis Child, "The Relationship Between Introversion-Extroversion, Neuroticism and Performance in School Examinations", British Journal of Educational Psychology, Vol. XXXIV, Part 2, pp. 187-195.

[6]John L. Holland, "The Prediction of College Grades From Personality and Aptitude Variables", Journal of Educational Psychology, LI, No. 5, (October 1960), pp. 245-254.

[7]Donivan J. Watley and Jack C. Mervin, "The Effectiveness of Variables for Predicting Academic Achievement for Business Students", Journal of Experimental Education, Vol. XXXIII, No. 2, (1964). pp. 189-192.

of variables for this purpose: scores on the Mathematics and the Verbal Sub-tests of the Scholastic Aptitude tests, scores on the Restraint and the Thoughtfulness Sub-tests of the Guilford-Zimmerman Temperament Survey, and high school rank. The multiple correlation coefficient between these five predictor variables and the criterion was .82. Single correlations between college grades and the predictor variables were: Restraint-GZTS: .36, Thoughtfulness-GZTS: .33, Mathematics-SAT: .45, Verbal-SAT: .28, high school ranks: .57.

Finger and Schlesser[8] found that high school rank correlated between .60 and .80 with college achievement in various groups. Their paper was designed, however, primarily to study non-intellective factors of academic success, and the outstanding factor was persistence. Here the r's ranged from .80 to .90.

Studying seventy-six children longitudinally from Grade III through Grade IX, Haggard[9] determined a correlation of .62 between the Wechaler Intelligence Scale for Children and general achievement scores. This is as high as most intelligence test scores correlate with each other. Because performance of children having similar intelligence quotients varied widely, he suggested the inclusion of non-intellective factors in prediction.

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[8]John A. Finger and George E. Schlesser, "Non-intellective Predictors of Academic Success in School and College", The School Review Vol. LXXIII, No. 1, (Spring, 1965). p. 14.

[9]Ernest A. Haggard, "Socialization, Personality, and Academic Achievement in Gifted Children", The School Review, Vol. LXV, No. 4, (Winter, 1957). pp. 388-409.

For predictive purposes, as well as for selective criteria, some colleges have added personality and other factors to high school rank and intelligence test scores. According to Mayhew,[10] these additional factors sometimes increase, and sometimes decrease efficiency of prediction. The Rorschach, Minnesota Multi-Phasic Personality Inventory, and the Taylor Scale of Manifest Anxiety have been used in some twenty studies, making a median r of .22 with college grade-point averages (G.P.A.). Study habits inventories such as the Brown-Holtzman Survey of Study Habits and Attitudes, and the Kuder Preference Record or Strong Vocational Interest Inventory have also been used with similar or lower results.

Norton[11] attempted to determine whether achievement was more closely related to study habits than to intelligence, reading ability, and specific aptitudes. Ratings of study habits were found to be less valuable for predictive purposes than any other measure used. At the Grade IX level, the most significant predictor was seen to be the Differential Aptitude Test.

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[10]Lewis B. Mayhew, "Non-test Predictors of Academic Achievement", Educational and Psychological Measurement, Vol. XXV, No. 1, (1965). p. 38-43.

[11]Daniel P. Norton, "Relationship of Study Habits and Other Measures of Achievement in Ninth Grade General Science", Journal of Experimental Education, Vol. XXVII, (March, 1959). p. 27.

In a Manitoba study, Martens[12] attempted to predict final Grade IX marks using I.Q. scores and the Brown-Holtzman Survey of Study Habits and Attitudes. He found significant positive correlations between I.Q. and the final mark in all subjects, as well as between the Survey of Study Habits and Attitudes and all subjects except Social Studies. In analysing the multiple regression equations, however, he found that no significant loss in ability to predict occurred if the SSHA variable were dropped from the equations predicting mathematics, science and social studies for boys, or social studies for girls.

Prediction at Grade XII - University Level

By far the most extensive research in prediction studies has been carried out at the Grade XII-freshman University level. Mayhew[13] referred to 263 studies in which high school rank correlated roughly .50 with freshman grade-point averages, while aptitude tests correlated roughly .47. Achievement tests such as the Co-operative Tests, and the Iowa Tests of Educational Development also had r's of roughly .47. In the studies surveyed by Mayhew, the combining of high school rank and aptitude tests resulted in r's of from .37 to .83, with a median of .62.

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[12]Bruno Martens, "The Relationship of Intelligence, Attitudes and Study Habits to Academic Achievement, (Unpublished Master of Education Thesis, University of Manitoba, 1963). pp. 97.

[13]Mayhew, op. cit., p. 41.

When more than two indices were employed, the correlated gains were so slight as to be virtually useless. The addition of non-intellective factors did not improve the calculation.

Michael[14] claimed that typical validity coefficients for single tests fall somewhere between .30 and .50 for boys, and between .40 and .60 for girls. A coefficient of multiple correlation will rarely exceed .70.

Basing his research on 1,500 entering freshmen at the University of Minnesota, Berdie[15] found that high school percentile rank was the best predictor. He also claimed[16] that both achievement tests and high school records should be used for predicting future attainment. He states that between either aptitude tests or achievement tests and first year college grades, validity coefficients tend to range from .40 to .60.

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[14]William B. Michael, "Measurement and Prediction in the College Admissions Process: Some Possible Directions for Future Research", Educational and Psychological Measurement, Vol. XXV, No. 1. P. 55.

[15]Ralph F. Berdie, "Aptitude, Achievement, Interest and Personality Tests: A Longitudinal Comparison", Journal of Applied Psychology, Vol. XXXIX, No. 2, (1955). pp. 103-114.

[16]Ralph F. Berdie, "Testing Programs and Counselling in the Schools", National Society for the Study of Education, Sixty-second Year Book, Part II, (1963). p. 146.

Clifford and Fishman[17] claim that college admission programs properly reward pre-college achievement over mere tested intelligence.

In a study of National Merit Scholarship winners, Holland[18] pointed out that the SAT Mathematics factor, SAT total scores, and the selection formula 2 V + M are of value almost equal to the high school ranking, although he cited Thistlethwaite's statement[19] that high school evaluation still differentiates most clearly between selected and rejected candidates.

Garrett[20] surveyed 194 studies and concluded that high school scholarship is the best predictor of freshman success (r = .47).

Although they did not investigate high school ranking as a predictor, Heil and Horn[21] found r's of .32 between the S.R.A. Non-verbal test and grade-point averages (G.P.A.). Correlations between

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[17]Paul I. Clifford and Joshua A. Fishman, "The Impact of Testing Programs on College Preparation and Attendance", National Society for the Study of Education, Sixty-second Year Book, Part II, (1963), p. 82.

[18]John L. Holland, "Prediction of Scholastic Success for a High Aptitude Sample", School and Society, Vol. LXXXIV, No. 2135, (June 21, 1958), p. 290.

[19]D. L. Thistlethwaite, Memo Report No. 2, Research and Studies (Evanston: National Merit Corporation, 1957), p. 3. Cited by John L. Holland, "Prediction of Scholastic Success for a High Aptitude Sample" School and Society, Vol. LXXXIV, No. 2135 (June 21, 1958).

[20]H. F. Garrett, "A Review and Interpretation of Investigations of Factors Related to Scholastic Success", Journal of Experimental Education, XVIII, (December, 1949), p. 91 - 138.

[21]Walter G. Heil and Alice Horn, "A Comparative Study of the

Otis scores and G.P.A. were .39, while the California Test of Mental Measurement (C.M.M.) scores and G.P.A. correlated .41, and the Primary Mental Abilities (P.M.A.) scores and G.P.A. correlated at .46.

Rosilda[22] obtained an r of .42 between C.M.M. intelligence quotient scores and percentile ranks on a standardized algebra achievement test.

Confirming research which revealed that the most obvious intellective predictor of success is high school rank, Fishman and Pasanella[23] correlated high school record at .50 with freshman intellective criteria. Beyond first year, the r was .48 with intellective data. Correlations between aptitude tests and intellective criteria were averaged at .47.

Spaulding[24] found that standardized achievement test percentiles are poorer predictors than are high school marks for determining college success. After Grade IX, standardized achievement test results

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Data for Five Different Intelligence Test Administered to 284 Twelfth Grade Students at South Gate High School, Los Angeles", (Los Angeles City School Districts, Curriculum Division, February, 1950), pp. 25. (Mimeographed).

[22]Sister M. Rosilda, "Is an I.Q. an Index to Algebra Ability?" Journal of Education Research, Vol. XLIV, (January, 1951), pp. 391-393.

[23]Fishman and Pasanella, op. cit., p. 298.

[24]Geraldine Spaulding, "The Application of Secondary School Cululative Record Data to the Prediction of College Success", (New York: Educational Records Bureau, July, 1960), pp. 42. (Mimeographed).

for any one year have roughly the same predictive value as those of any other year.

Examining various factors leading to success in Medical School, Gratwick, Drasgow and Stockin[25] found that science course grades had the greatest predictive value. A correlation of .75 existed between science marks and Medical School grades. They therefore concluded that high school grades (especially science), when combined with a strong interest, were as accurate predictors as less objective and less easily obtained scores.

In two Canadian studies, Crompton[26] and Vaillancourt[27] attempted to predict freshman grades. Crompton found a high positive relationship between freshman standing and Grade XII averages, while Vaillancourt found a statistically significant, but low relationship between Otis test scores and freshman college achievement. Beyond the freshman year, the r tended to diminish.

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[25]Roger Gratwick, James Drasgow and Bruce Stockin, "Predicting Medical School Success - A Ten Year Study", Journal of Experimental Education, Vol. XXXI, No. 2, (December, 1962), pp. 203 - 205.

[26]Oneisa Crompton, "The Prediction of University Freshman Performance on the Basis of High School Achievement in British Columbia," (Unpublished Master of Arts Thesis, University of British Columbia, 1958).

[27]R. F. Vaillancourt, "Local College Prediction With the Otis and Otis-Ottawa, (Unpublished Master of Arts Thesis, University of Ottawa, 1955).

PREDICTION AT LEVELS OTHER THAN GRADE XII

In dealing with early achievement prediction Aikenhead[28] quotes Arlene Payne, to the effect that the lowest 25 per cent of pupils in Grade VI Arithmetic can be identified as early as Grade 1. In the early years, such factors as intelligence quotient, and parent's occupation may be important, while achievement test scores are more directly relevant later.

The Report of the Royal Commission on Education in Ontario[29] disputed much of the evidence of the researchers, by questioning the predictive validity of examinations. It stated that the school term examinations have a much lower predictive value than is generally appreciated, and that other factors, particularly those related to personality, should be taken into account. Not withstanding this, internal examination results, by themselves, are at least as satisfactory in predicting future achievement as are external examinations.

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[28]J. D. Aikenhead, "Early Achievement Prediction", C.S.A. Bulletin, Vol. IV, No. 2, (December, 1964), from Arlene Payne, "Early Prediction and Achievement", Administrator's Notebook, (Chicago Midwest Administration Centre, University of Chicago, September, 1964), p. 34-35.

[29]Report of the Royal Commission on Education in Ontario, (King's Printer, Toronto, Ontario, 1950), p. 92.

Prediction at Grade IX Level

In dealing with prediction at the Grade IX level, Guilford, Hoepfner and Petersen[30] found that in predicting success in algebra and mathematics, the Differential Aptitude Tests were better than any other aptitude tests, and about equal to standardized achievement tests. They further found that as more relevant factors are added, predictive accuracy increases, but the D.A.T. scores were the best predictors among the aptitude tests.

Correlation coefficients ranging from .61 to .79 for girls and from .58 to .75 for boys were determined by Keller and Rowley[31] in predicting achievement test results from the Otis and Henmen-Nelson tests of intelligence in a Knoxville, Iowa Junior High School.

Gavinchuk[32] studied the relationship between certain group and individual intelligence tests as predictors of academic achievement at the Junior High School level. The I.Q. scores showed a significant relationship with the achievement raw scores, but he concluded that reasonable accuracy could not be expected in predicting an individual's

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[30]J. P. Guilford, Ralph Hoepfner and Hugh Petersen, "Predicting Achievement in Ninth Grade Mathematics from Measures of Intellectual-Aptitude Factors", Educational and Psychological Measurement, Vol. XXV, No. 3, (1965), p. 659-681

[31]E. Duwayne Keller and Vinton N. Rowley, "The Relations Among Anxiety, Intelligence, and Scholastic Achievement in Junior High School Children", Journal of Educational Research, Vol. LVIII, No. 4, (December, 1964), p. 167.

[32]M. N. Gavinchuk, University of Alberta Master of Education Thesis, cited in Canadian Education, Vol. X, No. 3, (June, 1955), p. 45.

probable success in academic achievement from an I.Q. The positive correlation, however, was valuable enough to make a reasonable prediction concerning class achievement. It was obvious that measured intelligence was only one of the important factors making for success in academic achievement.

Wrightstone[33] emphasizes the importance of teacher-made achievement tests to supplement the standardized tests as predictors.

Both the effectiveness of principals' ratings in predicting Grade IX final departmental marks, and the degree to which ratings could be improved by adding a test of academic aptitude were investigated by Black.[34] Principals' ratings ranged from .59 in literature to .72 in social studies. In contrast, S.C.A.T. Total ranges were from .76 in science and mathematics to .84 in reading. Black also found that, by increasing the number of predictor variables from one to eight, correlation coefficients increased as follows: reading: .61 - .88, social studies: .72 - .89, English: .64 - .88, literature: .59 - .84, mathematics: .66 - .82, and science: .67 - .87.

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[33]J. Wayne Wrightstone, "The Relation of Testing Programs to Teaching and Learning", N.S.S.E. Sixty-second Year Book, Part II, (1963), p. 45.

[34]D. B. Black, "A Study of the Relationship of Grade IX Principals' Rating to the Performance on the Alberta Grade IX Departmental Examination", Alberta Journal of Educational Research, Vol. IV, No. 4, (December, 1958). p. 227-236.

There was, however, only a slight loss from the eight predictor variables when only the principals' ratings in each subject and S.C.A.T. Verbal and Quantitative scores were used.

Black further found[35] that it is possible to predict success in a related University freshman course on the basis of Grade IX results, by developing multiple regression equations.

McNicholl[36] studied the relationship between intelligence and Grade IX final examinations and found correlations of .57 for literature, .49 for language, .47 for social studies, .58 for science, and .57 for mathematics.

In a Winnipeg School Division research project undertaken by Douglas Duncan,[37] the predictive values of the D.A.T., Otis, and S.C.A.T. tests were studied in relation to final Grade IX examination marks. He found that correlation coefficients for both the Otis and D.A.T. were higher than those of the S.C.A.T. Coefficients were as follows:

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[35]D. B. Black, "Prediction of University Freshman Success Using Grade IX Departmental Exam Scores", Alberta Journal of Educational Research, Vol. V, No. 4, (December, 1959). p. 229-239.

[36]Archie McNicholl, "Correlations of the Results of Two Standard Tests with Those of the School Achievement Examinations of 55 Grade IX Pupils and 61 Grade X Pupils of Charleswood Collegiate", (Unpublished Master of Education Thesis, University of Manitoba, 1960).

[37]Douglas Duncan, "Winnipeg School Division No. 1, Research Report", (October, 1964), pp. 3. (Mimeographed).

TABLE I

RELATIONSHIP BETWEEN FOUR MAJOR SUBJECTS AND FOUR MEASURES OF INTELLIGENCE

	DAT V	DAT N	SCAT T	OTIS
Language	.66	.67	.54	.71
Mathematics	.66	.77	.57	.73
Science	.68	.65	.55	.69
Social Studies	.55	.55	.46	.57

PREDICTIVE VALUE OF SELECTED TESTS

Examining various intelligence tests as predictors, Kolstoe[38] found that the S.C.A.T. test identified "talented" students who scored well in the freshman year, although the predictive validity was not directly determined. Smith,[39] examining the same problem, determined that S.C.A.T. scores were better for predicting freshman English success than the California Test Battery scores, whereas the California tests were superior to the S.C.A.T. in predicting mathematics.

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[38]Ralph H. Kolstoe, "The SCAT as a Predictive Device for North Dakota High School Students", College of Education Record, The University of North Dakota, Vol. XLVI, No. 5, (February, 1961). p. 84.

[39]W. N. Smith, "Differential Prediction of Two Test Batteries", Journal of Educational Research, Vol. LVII, No. 1, (September, 1963). P. 39-42.

Englehart and Beck[40] pointed out that the S.C.A.T. measures "learned" information to a greater degree than many other intelligence tests, and should therefore be a good predictor. Traxler and North[41] reported, however, that the Test Selection Committee of the Educational Records Bureau has continued to regard the A.C.E. Psychological Examination as more suitable than the S.C.A.T. for independent school use, even though the data concerning validity and reliability in the S.C.A.T. manual are superior to that claimed by the A.C.E. Psychological Examination.

Most researchers who have dealt with the predictive value of tests rate the Differential Aptitude Tests highly. Stanley[42] considered that the use of the Differential Aptitude Tests may obviate the need for the administration of group intelligence tests. In their Manual for Differential Aptitude Tests Seashore and Wesman indicate that where D.A.T. results are available group intelligence test results are unnecessary.

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[40] Max D. Englehart and John M. Beck, "The Improvement of Tests", N.S.S.E. Sixty-second Year Book, Vol. II, (1963), p. 163.

[41] Arthur E. Traxler and Robert D. North, "The Selection and Use of Tests in a School Testing Program", N.S.S.E. Sixty-second Year Book, Vol. II, (1963), p. 211.

[42] Julian C. Stanley, "Development and Applications of Tests of General Mental Ability", Review of Educational Research, Vol. XXIII, No. 1, (February, 1953), p. 11-19.

Considerable evidence exists as to the value of the D.A.T. Williams[43] found correlations of .73 between D.A.T. Verbal Reasoning and the Stanford-Binet, .55 between D.A.T. Abstract Reasoning and the Stanford-Binet, and .78 between D.A.T. Verbal and the Henmon-Nelson.

Duncan[44] found a correlation of .80 between D.A.T. Verbal Reasoning and the Otis, and .74 between D.A.T. Numerical Reasoning and the Otis. Correlations between D.A.T. Verbal and S.C.A.T. Verbal were .56, while D.A.T. Numerical Reasoning and S.C.A.T. Quantitative correlated at .44.

Rosinski[45] obtained a multiple correlation between D.A.T. Verbal Reasoning, D.A.T. Abstract Reasoning and Otis I.Q.'s (Grade XII) of .82, while Layton and Swanson[46] showed that D.A.T. Grade IX scores correlate very well (better than .50) with Grade XI intelligence and achievement tests.

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[43]Nancy Williams, "A Study of the Validity of the Verbal Reasoning Sub-test and the Abstract Reasoning Sub-test of the Differential Aptitude Test", Educational and Psychological Measurement, Vol. XII, (Spring, 1952), p. 129-131.

[44]Douglas Duncan, op. cit.

[45]Edwin F. Rosinski, "Must All Tests Be Multi-factor Batteries?" Journal of Experimental Education, Vol. XXVIII, (March, 1960), p. 235-40.

[46]Wilbur L. Layton and Edward O. Swanson, "Relationship of Ninth Grade Differential Aptitude Test Scores to Eleventh Grade Test Scores and High School Rank", Journal of Educational Psychology, Vol. XLIX, No. 3, (1958), p. 153-155.

Milholland and Fricke[47] claim that the most favoured multi-score instrument is the D.A.T.

Summary

From the research available, it would appear that both intellective and non-intellective factors have a bearing on predicting results from one level to another. Among the intellective factors, school examination results of the previous year appear to be the best predictors, followed by standardized achievement tests, aptitude tests, and group measures of intelligence.

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[47]John E. Milholland and Benno G. Fricke, "Development and Application of Tests of Special Aptitude", Review of Educational Research, Vol. XXXII, No. 1, (February, 1962), p. 25-37.

CHAPTER III

DESIGN OF THE INVESTIGATION

THE SETTING

The investigation was carried out in Grant Park High School, a 1700 pupil combined Junior-Senior High School, located in the south end of the City of Winnipeg, in an area generally considered socio-economically privileged. Although the school also serves a low-rental and war-time housing project, a curve of socio-economic status would be negatively skewed, indicating an above-average socio-economic standard.

The Grade IX group consisted of 214 students, this being the total enrolment in that grade during the academic year 1963-64. The classes were grouped on the basis of ability, into seven different Grade IX rooms, all but one of which was co-educational. Of the 214 students, only 211 wrote all Departmental examinations and the Otis Intelligence test. Only 181 School and College Ability Test scores were available, since several students either moved away at the end of the school year, or took courses other than the University Entrance Course.

The Grade X group consisted of 108 students, the total number of students who had taken their Grade IX at Grant Park, and who continued in the University Entrance program in the same school during the school year 1964-65.

THE TESTING

At the Grade IX level, two-hour examinations set by subject teachers were given in December and April. These examinations were marked within the school by the subject teachers. The Department of Education supplied the final Grade IX examinations in June, 1964. These were marked by centrally appointed markers, under the supervision of the departmental officials. The Grade IX social studies examination was marked partly by machine.

At the Grade X level, teacher-set examinations of two hours duration were given in December and April, and final examinations in June were supplied by the High School Examination Board. All Grade X examinations were marked by the subject teacher, within the school.

The Co-operative School and College Ability Tests, Form 3A, were administered in a single setting to all Grade IX students, by the two Junior High School Counsellors in February, 1964. The only material used other than the tests and answer sheets were electrographic pencils, a stopwatch, and scrap paper. Tests were machine-marked, and results were compared with norms for the Winnipeg School system, established by D. A. Duncan, Director of Research for the Winnipeg School Division Number 1.

The Otis Intelligence Gamma test, form Am, was given to all Grade IX students in June, 1964, under standardized conditions. The senior counsellor was in charge of the testing room, and was assisted by five teacher-procters. Testing time was thirty minutes as determined

by a stop watch, and tests were scored by machine and recorded by the Department of Education.

All scores used in this study were derived from tests administered as part of the normal testing routine, rather than from tests specifically given for the purpose of this study.

TREATMENT OF DATA

The percentage marks of the academic tests, the intelligence quotients as determined by the Otis Intelligence Test, and the percentiles of the School and College Ability Tests were used in the calculations.

To express numerically the similarity between scores, degrees of correlation were determined, using the following techniques:

1. scatter diagrams, from which expectancy tables[1] were calculated;

2. computation of coefficients of correlation between intelligence tests and C-scores, intelligence tests and E-scores, C-scores and E-scores, intelligence tests and Grade X marks and average, C-scores and Grade X marks and averages, and E-scores and Grade X marks and average, the significance of which was ascertained by reference to a table such as that given by Wert, Neidt, and Ahmann[2];

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[1] Expectancy Tables, A Way of Interpreting Test Validity, Test Service Bulletin, (The Psychological Corporation, December, 1949).

[2] James E. Wert, Charles O. Neidt, and J. Stanley Ahmann, Statistical Methods in Educational and Psychological Research, (New York: Appleton-Century-Crofts, Inc., 1954), p. 424.

3. calculation of simple regression equations between intelligence tests, C-scores, E-scores and Grade X marks.

The t-test technique was used to determine the significance of the difference between the means of the following:

1. scores of students with a provisional promotion, and those who passed Grade IX with a clear standing;

2. scores of over-age students, and those of students the right age for the grade;

3. scores of under-age students, and those of students the right age for the grade;

4. C-scores and E-scores;

5. Grade IX and Grade X intelligence test scores.

As a result of these computations, certain conclusions and generalizations were developed.. These conclusions will be presented in the subsequent chapters.

CHAPTER IV

THE DATA AND THE ANALYSES OF THE DATA

Data from the investigation and the score analyses are presented in the subsequent seven sections:

1. The intelligence tests used;

2. the relationship between measures of intelligence and term work;

3. the relationship between measures of intelligence and final marks;

4. the relationship between term marks and final marks;

5. the relationship between Grade IX and Grade X variables;

6. an analysis of provisional promoting;

7. the performance of over-age and under-age students relative to the remainder of the sample.

THE INTELLIGENCE TESTS

The measures of intelligence used were the Co-operative School and College Ability Test (SCAT) Form 3A, and the Otis Quick-Scoring Gamma test, Form Am. Frequency distributions (Appendix A, Tables XIV and XV) and frequency polygons (Appendix A, Figures 1, and 2) reveal a normal distribution on the Otis test, in contrast to a highly negatively skewed S.C.A.T. curve. Fifty per cent of the students scored in Q_1 on the S.C.A.T. Verbal, thirty-two per cent were in Q_1

on the S.C.A.T. Quantitative, and forty per cent were in Q_1 on S.C.A.T. Total scores. This compares with exactly twenty-five per cent of the pupils in Q_1 on the Otis distribution.

An examination of scatter diagram and expectancy table relationship (Appendix A, Tables XVI, XVII and XVIII) between these two intelligence tests shows that the Otis mean is the best predictor of S.C.A.T. Total scores.

Rank order correlation coefficients (Table II) for the two tests show a high positive relationship between the S.C.A.T. and Otis tests scores, especially between S.C.A.T. Total and Otis. All correlations are significant at the .01 level.

TABLE II

COEFFICIENTS OF CORRELATION BETWEEN S.C.A.T. AND OTIS INTELLIGENCE TESTS FOR 181 GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL

Name of Test	SCAT Q	SCAT T	Otis
SCAT Verbal	.46	.85	.66
SCAT Quantitative	-	.82	.64
SCAT Total	-	-	.76

Simple Linear regression equations using the S.C.A.T. scores as the criterion variable and the Otis scores as the prediction variable were calculated. X_1 is the S.C.A.T. Verbal score, X_2 is S.C.A.T. Quantitative, X_3 is S.C.A.T. Total, and X_4 is the Otis score. Regression equations are as follows:

$$X_4 = X_1 (.27622) \quad 90.76280$$
$$X_4 = X_2 (.24361) \quad 94.27047$$
$$X_4 = X_3 (.31165) \quad 88.88877$$

RELATIONSHIP BETWEEN MEASURES OF INTELLIGENCE AND TERM MARKS

Frequency distributions (Appendix A, Table XIX), frequency polygons (Appendix A, Figure 3) and cumulative frequency curves (Appendix A, Figure 4) for the composite scores in the four major subjects show a normal distribution. Mathematics marks tend to be lower than the others, while science scores are higher. The science frequency polygon most closely approximates a normal curve, with a slight negative skewness.

Scatter diagrams and expectancy tables (Appendix A, Tables XX - XXXV) show that the S.C.A.T. Quantitative mean is best for predicting Grade IX language and social studies C-scores, while the S.C.A.T. total seems most accurate in predicting Grade IX mathematics results, and the Otis in predicting science C-scores.

Correlation coefficients between the various measures of intelligence and C-score achievement are shown in Table III. In no instances is the S.C.A.T. Verbal correlation superior to the others. Although

the highest r for C-score language is the Otis test, and the S.C.A.T. Total is best for social studies and science, and the S.C.A.T. Quantitative for mathematics, nevertheless, where the S.C.A.T. is generally the best predictor, Otis correlation coefficients come almost as high. All r's are significant at the .01 level.

TABLE III

COEFFICIENTS OF CORRELATION BETWEEN INTELLIGENCE TEST SCORES AND C-SCORES FOR GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL

Subject	S.C.A.T. V	S.C.A.T. Q	S.C.A.T. T	Otis
Language	.44	.52	.52	.57
Social Studies	.53	.57	.60	.57
Mathematics	.47	.71	.67	.65
Science	.46	.41	.59	.49

A comparison of published and local correlations with various academic subjects is shown in Table IV. With the exception of S.C.A.T. Quantitative and mathematics, and also S.C.A.T. Total and science, local correlations are in line with published ones. In the case of mathematics, the local correlation coefficient is higher, while in science it is lower.

TABLE IV

COMPARISON OF COEFFICIENTS OF CORRELATION BETWEEN SCAT TESTS AND SCHOOL GRADES; SHOWING PUBLISHED CORRELATIONS[1] AND THOSE OF THE GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL

Correlation of	Published	C-score
S.C.A.T. V - Language	.47	.44
S.C.A.T. T - Language	.54	.52
S.C.A.T. Q - Mathematics	.58	.71
S.C.A.T. T - Mathematics	.53	.67
S.C.A.T. T - Social Studies	.61	.60
S.C.A.T. T - Science	.63	.51

The following regression equations have been calculated, using the C-score as the criterion variable and the intelligence test scores as the prediction variable. In these equations, X_1 = S.C.A.T. Verbal score, X_2 = S.C.A.T. Quantitative, X_3 = S.C.A.T. Total score, and X_4 = Otis Test score. Y_1 = C-score language, Y_2 = C-score social studies, Y_3 = C-score mathematics, and Y_4 = C-score science:

[1]Educational Testing Service, SCAT-STEP Supplement, (1958), p. 7.

$Y_1 = X_1$ (.20850) + 53.19292

$Y_2 = X_1$ (.33427) + 43.85120

$Y_3 = X_1$ (.31436) + 41.60664

$Y_4 = X_1$ (.21623) + 57.34174

$Y_1 = X_2$ (.23936) + 51.48176

$Y_2 = X_2$ (.27112) + 49.42480

$Y_3 = X_2$ (.43060) + 36.83037

$Y_4 = X_2$ (.17405) + 60.98215

$Y_1 = X_3$ (.23936) + 51.48176

$Y_2 = X_3$ (.36197) + 42.44882

$Y_3 = X_3$ (.43978) + 34.16883

$Y_4 = X_3$ (.23234) + 56.54610

$Y_1 = X_4$ (.67770) - 7.29708

$Y_2 = X_4$ (.89757) - 32.32315

$Y_3 = X_4$ (1.05774) - 53.30750

$Y_4 = X_4$ (.57910) + 7.78334

RELATIONSHIP BETWEEN MEASURES OF INTELLIGENCE AND FINAL MARKS

Frequency distributions (Appendix A, Table XXXVI), frequency polygons (Appendix A, Figure 5) and cumulative frequency graphs (Appendix A, Figure 6), show approximately normal distribution. The mathematics curve is platykurtic, showing slight negative skewness which indicates that more students obtained higher marks, and also that more students failed in mathematics, than in any of the other subjects. Science scores also show evidence of a moderate negative skewness.

Scatter diagrams and expectancy tables (Appendix A, Tables XXXVII - LII), show that the Otis mean is the best predictor of Grade IX language and science E-scores, the S.C.A.T. Quantitative mean of E-score mathematics, and the S.C.A.T. Total mean of E-score social studies.

Correlation coefficients between the various measures of intelligence and E-score achievement are shown in Table V. Once again, in no instance is the S.C.A.T. Verbal coefficient superior to the others. The highest r for Grade IX final language results is the Otis test, while the S.C.A.T. Total seems to forecast most accurately the results of E-score social studies and science, and the S.C.A.T. Quantitative of mathematics. In all cases, r's are significant at the .01 level.

TABLE V

CORRELATION BETWEEN INTELLIGENCE TEST SCORES AND FINAL EXAMINATION SCORES FOR GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL, 1963-1964

Subject	S.C.A.T. V	S.C.A.T. Q	S.C.A.T. T	Otis
E-Language	.51	.52	.58	.67
E-Social Studies	.57	.42	.59	.55
E-Mathematics	.48	.70	.69	.66
E-Science	.58	.43	.59	.58

TABLE VI

COMPARISON OF CORRELATIONS BETWEEN S.C.A.T. TESTS AND SCHOOL FINAL GRADES, SHOWING PUBLISHED CORRELATIONS[2] AND THOSE OF THE GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL, 1963-1964

Correlation of	Published	E-score
S.C.A.T. Verbal-Language	.47	.51
S.C.A.T. Total - Language	.54	.58
S.C.A.T. Quantitative-mathematics	.58	.70
S.C.A.T. Total-mathematics	.53	.69
S.C.A.T. Total-science	.63	.59
S.C.A.T. Total-social studies	.61	.59

Table VI shows a comparison between local and published correlations of S.C.A.T. scores and school grades. Local correlation coefficients for language and mathematics are considerably higher than the published ones, while local scores for social studies and science correlate lower than those published.

The following regression equations have been calculated, using the E-score as the criterion variable and the intelligence tests as the predictor variable. Designation of the intelligence tests will be the

[2] Ibid., p. 7.

same as previously stated, while E-scores will be shown as: $\bar{Y}_1$ - language, $\bar{Y}_2$ - social studies, $\bar{Y}_3$ - mathematics, and $\bar{Y}_4$ - science.

$$\bar{Y}_1 = X_1 \quad (.24807) + 48.08825$$
$$\bar{Y}_2 = X_1 \quad (.31904) + 45.70522$$
$$\bar{Y}_3 = X_1 \quad (.37043) + 42.02976$$
$$\bar{Y}_4 = X_1 \quad (.32148) + 45.23681$$
$$\bar{Y}_1 = X_2 \quad (.22604) + 50.77553$$
$$\bar{Y}_2 = X_2 \quad (.20908) + 53.77103$$
$$\bar{Y}_3 = X_2 \quad (.49704) + 38.05087$$
$$\bar{Y}_4 = X_2 \quad (.21690) + 53.01204$$
$$\bar{Y}_1 = X_3 \quad (.27596) + 46.60685$$
$$\bar{Y}_2 = X_3 \quad (.31884) + 46.00835$$
$$\bar{Y}_3 = X_3 \quad (.51432) + 33.54379$$
$$\bar{Y}_4 = X_3 \quad (.31859) + 45.70719$$
$$\bar{Y}_1 = X_4 \quad (.78970) - 21.82796$$
$$\bar{Y}_2 = X_4 \quad (.78696) - 20.24413$$
$$\bar{Y}_3 = X_4 \quad (1.25577) - 71.10967$$
$$\bar{Y}_4 = X_4 \quad (.79998) - 21.81690$$

RELATIONSHIP BETWEEN COMPOSITE SCORES AND FINAL SCORES

Grouped frequency distributions (Appendix A, Tables XIX and XXXVI) and frequency polygons (Appendix A, Figures 7 - 10) show that the composite language marks are higher than the final marks, and that the failure rate on the final examinations was higher than on the year's work. The t-test indicates a significant difference between the means, at the .10 level.

The E-score curve of social studies marks is more leptokurtic than the C-score curve, indicating that students scored higher marks on the year's work, whereas the C-score failure rate is greater than that of the final examinations. Means for the two sets of scores are almost identical, and an application of the t-test shows no significant difference between the means.

Both E-score and C-score curves for mathematics tend to be flatter than curves for the other subjects. The C-score curve is positively skewed, while the E-score curve is negatively skewed, indicating that students did better at the final examinations than on their term work, in spite of the fact that the failure rate in mathematics was the highest of the four subjects. An application of the t-test shows a significant difference between the means at the .05 level.

Curves for the science scores also show normal distribution. Although both frequency polygons have the same mode (71-75), the E-score curve is cons iderably less skewed than the C-score. A comparison

of the curves below the 50 per cent level reveals that forty-two students scored lower than this on the final examination, whereas only seventeen failed on the composite scores. This represents the greatest differential in failure rate of all subjects. A contrasting of the means, and an application of the t-test reveals that the difference between the means is significant at the .001 level.

TABLE VII

ANALYSIS OF DIFFERENCE BETWEEN MEANS - GRADE IX C - AND E-SCORES

Subject	k_1	k_2	$\bar{X}_1$	$\bar{X}_2$	d/f	t	p
Language	214	213	65.8	63.49	212	1.86	.10
Social Studies	214	212	64.495	64.65	212	.11	.90
Mathematics	214	213	60.855	64.71	212	2.06	.05
Science	214	213	70.035	64.225	212	3.52	.001

Scatter diagrams and expectancy tables (Appendix A, Tables LIII - LV) reveals that 93 per cent of students passing term work in language and social studies, 92 per cent of students passing mathematics, but only 86 per cent of students scoring above 50 per cent on composite marks in science, could expect to pass the final examination in these subjects.

Correlation coefficients for C-score and E-scores are shown in Table VIII. All of these r's are high, and significant at the 1 per cent level. The lowest r is for social studies, in which the final examination was 70 per cent objective.

Table IX shows the correlation coefficients between subjects not directly related in content. There is a high correlation between social studies and science (.77, .78, and .75), as well as between language and mathematics (.70, .67, and .71).

The following regression equations have been calculated between C-score and E-score marks. The delineation is the same as outlined earlier.

$$\bar{Y}_1 = Y_1 \quad (.81908) + 9.37737$$

$$\bar{Y}_2 = Y_2 \quad (.68182) + 20.63138$$

$$\bar{Y}_3 = Y_3 \quad (1.01340) + 2.77627$$

$$\bar{Y}_4 = Y_4 \quad (.95442) + 2.64303$$

TABLE VIII

CORRELATION BETWEEN C-SCORES AND E-SCORES FOR GRADE IX STUDENTS AT GRANT PARK HIGH SCHOOL 1963 - 1964

Language	.82
Social Studies	.75
Mathematics	.87
Science	.82

TABLE IX

CORRELATION BETWEEN SUBJECTS NOT DIRECTLY RELATED IN CONTENT GRADE IX STUDENTS AT GRANT PARK HIGH SCHOOL 1963 - 1964

Subject	1	2	3	4	5	6	7	8
C-Language	-	.74	.70	.65	—	.53	.67	.60
C-Social Studies	-	—	.65	.77	.71	—	.69	.78
C-Mathematics	-	—	—	.65	.74	.60	—	.68
C-Science	-	—	—	—	.66	.66	.63	—
E-Language	-	—	—	—	—	.58	.71	.65
E-Social Studies	-	—	—	—	—	—	.63	.75
E-Mathematics	-	—	—	—	—	—	—	.67

1 = C-Language
2 = C-Social Studies
3 = C-Mathematics
4 = C-Science
5 = E-Language
6 = E-Social Studies
7 = E-Mathematics
8 = E-Science

RELATIONSHIP BETWEEN GRADE IX AND GRADE X VARIABLES

Grouped frequency distributions (Appendix A, Tables LVII and LVIII) and frequency polygons (Appendix A, Figures 11 and 12) for the two measures of intelligence of the Grade X sample reveal the same pattern as that for Grade IX. The curve for the Otis scores is normal, and the S.C.A.T. curves all show a decided negative skewness. For each of the parts of the S.C.A.T. test, the mode is the upper decile. The

t-test indicates that significant differences exist between all the intelligence test means for the Grade IX and Grade X samples.

TABLE X

ANALYSIS OF DIFFERENCE BETWEEN INTELLIGENCE SCORE MEANS - GRADE IX AND GRADE X

Test	K_1	k_2	$\bar{X}_1$	$\bar{X}_2$	d/f	t	P
S.C.A.T.-V	181	108	62.39	69.77	144	2.47	.02
S.C.A.T.-Q	181	108	55.865	66.19	144	2.81	.01
S.C.A.T.-T	181	108	61.675	71.41	144	3.12	.01
Otis	211	108	106.08	112.3	158	4.60	.001

Grouped frequency distributions (Appendix A, Table LIX) and frequency polygons (Appendix B, Figure 13) for the five Grade X subjects all show a normal distribution, although literature and composition scores are negatively skewed, science scores are positively skewed, and the mathematics curve has a much greater range than the others. The failure rates in mathematics and science (16.7 per cent) and (14.8 per cent) are much lighter than in the other three subjects.

In contrasting Grade X results with Grade IX C-scores and E-scores (Appendix A, Figures 14 - 18) it is noted that Grade X literature and composition results most closely approximate to language C-scores,

while geography and mathematics correspond most closely with their E-score counterparts. There is no clear relationship between the Grade X science and either of the Grade IX science scores.

Scatter diagrams and expectancy tables (Appendix A, Tables LX - LXXXIV) show the E-score mean as the superior predictor of Grade X results for all subjects except mathematics.

Coefficients of correlation between intelligence test scores and Grade X final marks show little difference between the S.C.A.T. Verbal and S.C.A.T. Total as predictors of literature composition and geography. S.C.A.T. Quantitative results correlate better than S.C.A.T. Total with mathematics, but the reverse is true for science. Otis scores are not as accurate as the S.C.A.T. scores in the prediction of Grade X results. All coefficients between intelligence tests and final Grade X marks are significant at the .01 level.

Coefficients of correlation between Grade IX subject results and Grade X results (Table X) are considerably higher than those involving the intelligence tests. Except for the E-score in social studies, in no case is the r between C-scores or E-scores and Grade X final results less than .65.

TABLE XI

CORRELATION BETWEEN 12 GRADE IX VARIABLES AND FINAL GRADE X EXAMINATION RESULTS

Grade IX Variable	X Literature	X Composition	X Geography	X Mathematics	X Science
1.	.48	.56	.41	-	-
2.	-	-	-	.56	.47
3.	.47	.52	.41	.51	.59
4.	.40	.47	.35	.49	.49
5.	.65	.73	-	-	-
6.	-	-	.73	-	-
7.	-	-	-	.78	-
8.	-	-	-	-	.66
9.	.67	.77	-	-	-
10.	-	-	.54	-	-
11.	-	-	-	.75	-
12.	-	-	-	-	.74

Where: 1 = S.C.A.T. Verbal 2 = S.C.A.T. Quantitative
3 = S.C.A.T. Total 4 = Otis
5 = C-score Language 6 = C-score Social Studies
7 = C-score Mathematics 8 = C-score Science
9 = E-score Language 10 = E-score Social Studies
11 = E-score Mathematics 12 = E-score Science

The Grade IX C-score is the best predictor of Grade X results, with the exception of science.

Coefficients of correlation between Grade IX measures of intelligence and Grade X average (Table XII) are in the .50 range, and are all lower than the subject matter correlations. The most efficient single predictor of Grade X average (.81) is the composite mark in social studies.

Simple linear regression equations were calculated using the intelligence test scores and the C-scores as the prediction variable, and the Grade X final marks as the criterion variable. X_1 is the S.C.A.T. Verbal score, X_2 is the S.C.A.T. Quantitative score, X_3 is the S.C.A.T. Total score, X_4 is the Otis test score, X_5 is the Grade IX C-score in language, X_6 is the C-score in social studies, X_7 is the C-score in mathematics, X_8 is the C-score in science, X_9 is the E-score in language, X_{10} is the E-score in social studies, X_{11} is the E-score in mathematics, and X_{12} is the E-score in science. Grade X results are represented by Y_1 for literature, Y_2 for composition, Y_3 for geography, Y_4 for mathematics, and Y_5 for science.

Regression equations for Grade X literature are:

$$Y_1 = X_1 \quad (.28679) + 49.81496$$

$$Y_1 = X_3 \quad (.28214) + 49.67707$$

$$Y_1 = X_4 \quad (.58857) + 3.72922$$

$$Y_1 = X_5 \quad (.99346) - 1.06119$$

TABLE XII

CORRELATION BETWEEN 12 GRADE IX VARIABLES AND GRADE X AVERAGE

Grade IX Variable	r	Level of Significance
S.C.A.T. Verbal	.52	.01
S.C.A.T. Quantitative	.50	.01
S.C.A.T. Total	.58	.01
Otis	.51	.01
C-score Language	.70	.01
C-score Social Studies	.81	.01
C-score Mathematics	.72	.01
C-score Science	.69	.01
E-score Language	.73	.01
E-score Social Studies	.60	.01
E-score Mathematics	.68	.01
E-score Science	.76	.01

Equations representing Grade X composition are:

$$Y_2 = X_1 \quad (.22155) + 54.89415$$

$$Y_2 = X_3 \quad (.20869) + 55.44959$$

$$Y_2 = X_4 \quad (.45688) + 19.04572$$

$$Y_2 = X_5 \quad (.74710) + 17.04477$$

$$Y_2 = X_9 \quad (.73091) + 19.28261$$

Regression equations for Grade X geography are:

$$Y_3 = X_1 \quad (.18786) + 53.24455$$

$$Y_3 = X_3 \quad (.19402) + 52.49735$$

$$Y_3 = X_4 \quad (.39213) + 22.31636$$

$$Y_3 = X_6 \quad (.64189) + 20.04600$$

$$Y_3 = X_{10} \quad (.51752) + 29.81337$$

Equations representing Grade X mathematics are:

$$Y_4 = X_2 \quad (.39000) + 42.19692$$

$$Y_4 = X_3 \quad (.40822) + 38.85881$$

$$Y_4 = X_4 \quad (.93555) - 37.04956$$

$$Y_4 = X_7 \quad (1.01047) - 1.59171$$

$$Y_4 = X_{11} \quad (1.07112) - 12.87045$$

Regression equations for Grade X science are:

$$Y_5 = X_2 \quad (.24530) + 48.03312$$

$$Y_5 = X_3 \quad (.35407) + 38.98506$$

$$Y_5 = X_4 \quad (.71509) - 16.03389$$

$$Y_5 = X_8 \quad (.94406) - 7.55910$$

$$Y_5 = X_{12} \quad (.87085) + 2.77680$$

Provisional Promotions

An analysis of provisional promotions (Appendix A, Tables LXXXV and LXXXVI) into the University Entrance Course shows that eight of the ten provisionally promoted students failed Grade X, and one of the remaining two failed Grade XI. A significant difference exists at the .001 level between the means of provisionally promoted students and the entire Grade X group for all examination results and the Otis test. There is a significant difference for all S.C.A.T. scores.

Over-age and Under-age Students

In comparing the over-age group with the total Grade IX group (Appendix A, Tables LXXXVII and LXXXVIII), a significant difference between the means exists for all the Grade IX variables except S.C.A.T. Verbal and E-score language. At the Grade X level, significant differences exist only in composition and geography.

In comparing the under-age group to the total Grade IX group (Appendix A, Tables LXXXIX and XC), a significant difference between the means exists for all Grade IX variables except S.C.A.T. Verbal. There is no significant difference between the means of under-age students and the total Grade X group.

Summary.

This chapter has presented the data of the investigation showing the relationships between intelligence test scores and marks at the Grade IX and Grade X level through the use of frequency polygons, cumulative frequency curves, scatter diagrams and expectancy tables, coefficients of correlation, and regression equations. The following chapter will present the summary, recommendations, and conclusions of the study.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

The purpose of this study was to determine the relationships between measured intelligence and measured achievement in grades nine and ten. Analysis of the relationship involved the determination of the following sub-problems:

1. the relationship between measured intelligence and grade nine term marks;

2. the relationship between measured intelligence and grade nine final marks;

3. the relationship between grade nine term marks and grade nine final marks;

4. the relationship between grade nine marks and grade ten final achievement;

5. the best grade nine predictors of grade ten success;

6. the comparison of provisionally promoted and completely promoted grade nine students in terms of grade ten final results in the University Entrance Course;

7. the comparison of over-age and under-age students with the total group.

Scores of 211 grade nine students were analysed using normal statistical procedures, and relationships were determined by means of expectancy tables, and by computation of coefficients of correlation

and regression equations. Significance of findings were determined by the t-test.

Similar procedures were then applied to the test scores of 108 grade ten students, the total number of grade ten University Entrance Course students in the school year 1964-65 who had attended the same school in grade nine during the previous year.

CONCLUSIONS

1. There is a positive and significant relationship between all measures of intelligence and grade nine term marks. The significance of the difference between the coefficients of correlation involving the School and College Ability Test, Form 3A, Total Score and term marks, and those between the Otis Quick-Scoring Gamma Test, Form Am and term marks, was determined by application of a formula developed by Hotelling.[1] No significant statistical difference exists.

2. There is a positive and significant relationship between all measures of intelligence and grade nine final marks. Analysis of the difference between coefficients of correlation involving the School and College Ability Test Total Score and final marks, and those involving the Otis score and final marks show once again, that no significant difference exists.

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[1]Harold Hotelling, "The Selection of Variates for Use in Prediction with Some Comments on the General Problem of Nuisance Parameters", Annals of Mathematical Statistics, Vol. IX, 1940, pp 271-283.

3. There is a positive and significant relationship between term marks and final marks. A comparison of the coefficients of correlation involving term marks and final marks, with those involving intelligence scores and final marks shows that term marks are significantly better predictors than are intelligence test scores.

4. There is a positive and significant relationship between all intelligence test scores and grade ten final examination results. This relationship tends to be less pronounced than that of the grade nine intelligence test scores and final examination results.

5. A positive and significant relationship exists between grade nine term results and final grade ten results, as well as between grade nine and grade ten final results. There is no significant difference between grade nine term and final results as predictors of grade ten results, except in social studies, where term marks are a significantly better predictor of grade ten geography results. The best single predictor of grade ten average is the grade nine term mark in social studies.

6. Students who are promoted provisionally from grade nine into the University Entrance Course score significantly lower on all intelligence tests, as well as on all grade ten examinations. Eighty per cent of students provisionally promoted from grade nine failed to obtain promotion in the following year in grade ten.

7. Over-age students did not score as well in grade nine as did students of normal age for the grade. In grade ten, they scored as high as the others in all except subjects demanding fluent lingual expression, such as composition and geography.

Under-age students achieved better results than students of normal age at the grade nine level, but they did not perform significantly better in grade ten.

RECOMMENDATIONS

From this study, the following conclusions and recommendations emerge:

1. The School and College Ability Test, Form 3A, should be replaced as a testing instrument at the grade nine level for the following reasons:

A. The excessive negative skewness of all S.C.A.T. score curves, especially in relation to the normal distribution of all other scores involved in the study, calls into question the ability of this test to discriminate effectively at the upper levels

B. The S.C.A.T. test has not been proved to be a significantly superior predictor of either grade nine or grade ten final results, in comparison with either the Otis Quick-Scoring Gamma Test, Form Am, or with grade nine term results.

C. The time required to administer the S.C.A.T. tests does not coincide with the normal forty-five minute class periods, since

actual testing time is in excess of ninety minutes.

This study, as well as consideration of available research findings, leads the writer to suggest that a possible replacement for the S.C.A.T. could be the Verbal and Numerical Reasoning sections of the Differential Aptitude Tests, or the Otis Quick-Scoring Gamma Test, Form Am.

2. Department of Education final examinations at the grade nine level should be eliminated, since grade nine term marks predict future achievement as effectively, or better than, final examinations.

3. Exemptions in the major subjects as well as in the minor subjects should be instituted at the grade nine level, since term marks are as effective as final marks as predictors of future achievement.

4. Additional research should be undertaken on the matter of over-age and under-age students, to determine why the performances of these two groups differ substantially from the normal in grade nine, but not in grade ten.

5. Provisional promotion from grade nine to the grade ten University Entrance Course must be questioned because of the significant differences between the means of provisional promotees as compared with students having a complete promotion, as well as because of the high failure rate of students so promoted. It is recommended that additional research on this subject be conducted, on a wider basis, using larger groups than those contained in this study.

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APPENDIX "A"

TABLE XIII

PERCENTAGE OF TOTAL GRADE XI

CONTINUING TO GRADE XII[1]

Table E (b) 3

Grade & Year	Total No.	Grade & Year	Total No.	%
XI - 1957	5412	XII - 1958	1503	27.8%
XI - 1958	5741	XII - 1959	1769	30.8%
XI - 1959	6689	XII - 1960	2665	39.8%
XI - 1960	7730	XII - 1961	3453	44.7%
XI - 1961	7928	XII - 1962	3718	46.9%

PERCENTAGE OF TOTAL GRADE XI

CONTINUING TO FIRST YEAR UNIVERSITY[2]

Table E (c) 3

Grade & Year	Total No.	Grade & Year	Total No.	%
XI - 1957	5412	Univ I - 1958	515	9.5%
XI - 1958	5741	Univ I - 1959	541	9.4%
XI - 1959	6689	Univ I - 1960	511	7.6%
XI - 1960	7730	Univ I - 1961	516	6.7%
XI - 1961	7928	Univ I - 1962	435	5.5%

[1]G. L. Brodersen, A Statistical Study of the Academic Progress of Manitoba High School Students Beyond GradeXI. Unpublished Study University of Manitoba, 1962 Rept IV, p. 50.

[2]Ibid., p. 53.

PERCENTAGE OF GRADE XI TOTAL

CONTINUING TO SECOND YEAR UNIVERSITY[3]

Table E (d) 5

Grade & Year	Total Number	% of Total Grade XI
XI - 1957	662	12.2%
XI - 1958	610	10.6%
XI - 1959	719	10.7%
XI - 1960	893	11.5%
XI - 1961	916	11.6%

[3] Ibid., p. 59.

TABLE XIV

FREQUENCY DISTRIBUTION OF THE I.Q. SCORES OF 211 GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL ON OTIS TEST OF MENTAL ABILITY, 1963-64

Score Interval	Otis I. Q.
135 - 140	2
130 - 134	3
125 - 129	14
120 - 124	12
115 - 119	26
110 - 114	28
105 - 109	45
100 - 104	32
95 - 99	30
90 - 94	12
85 - 89	4
80 - 84	2
75 - 79	1
Total	211
Mean	106.08
s	10.605

TABLE XV

FREQUENCY DISTRIBUTION OF THE PERCENTILE SCORES OF 181 GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL, ON SCHOOL AND COLLEGE ABILITY TESTS, 1963-1964

Score Interval	SCAT Verbal	SCAT Quantitative	SCAT Total
96 - 100	15	12	23
91 - 95	13	18	17
86 - 90	30	13	9
81 - 85	0	14	8
76 - 80	12	0	16
71 - 75	20	12	0
66 - 70	0	11	10
61 - 65	12	7	18
56 - 60	17	0	0
51 - 55	0	16	18
46 - 50	13	11	0
41 - 45	13	7	25
36 - 40	0	12	7
31 - 35	10	2	0
26 - 30	10	15	7
21 - 25	0	4	9
16 - 20	3	9	0
11 - 15	3	3	3
6 - 10	4	7	8
0 - 5	6	8	3
Total	181	181	181
Mean	62.39	55.865	61.675
s	26.31	28.625	27.56

TABLE XVI

EXPECTANCY TABLE BASED ON STUDENTS' SCORES IN OTIS AND SCAT VERBAL

Total No.	0-11.1	11.2-22.3	22.4-33.5	33.6-44.7	44.8-55.9	56.0-67.1	67.2-78.3	78.4-89.5	89.6-99.7	Otis Test Scores	0-11.1	11.2-22.3	22.4-33.5	33.6-44.7	44.8-55.9	56.0-67.1	67.2-78.3	78.4-89.5	89.6-99.7	Total %
2									2	135-140									100	
3								1	2	130-134								33	67	100
12						1	1	3	7	125-129						8	8	25	59	100
9								3	6	120-124								33	67	100
24				2	1	3	7	4	7	115-119				8	4	13	29	17	29	
25			1	1	4	5	4	8	2	110-114			4	4	16	20	16	32	8	
37			3	7	1	9	10	6	1	105-109			8	19	3	24	27	16	3	
25	1	1	1	7	3	4	5	2	1	100-104	4	4	4	28	12	16	20	8	4	
25	4	3	4	4	4	3	2	1		95-99	16	12	16	16	16	12	8	4		
10	2	1	1	2		1	2	1		90-94	20	10	10	20		10	20	10		
4	2				1		1			85-89	50				25		25			
2		1				1				80-84		50				50				
1	1									75-79	100									

Number Receiving Each Score=

Per Cent Receiving Each Score

FIGURE 1

FREQUENCY POLYGON OF DISTRIBUTION OF OTIS SCORES OF 211 GRADE IX STUDENTS

FIGURE 2

FREQUENCY POLYGONS OF DISTRIBUTION OF S.C.A.T. SCORES-VERBAL, QUANTITATIVE AND TOTAL OF 181 STUDENTS

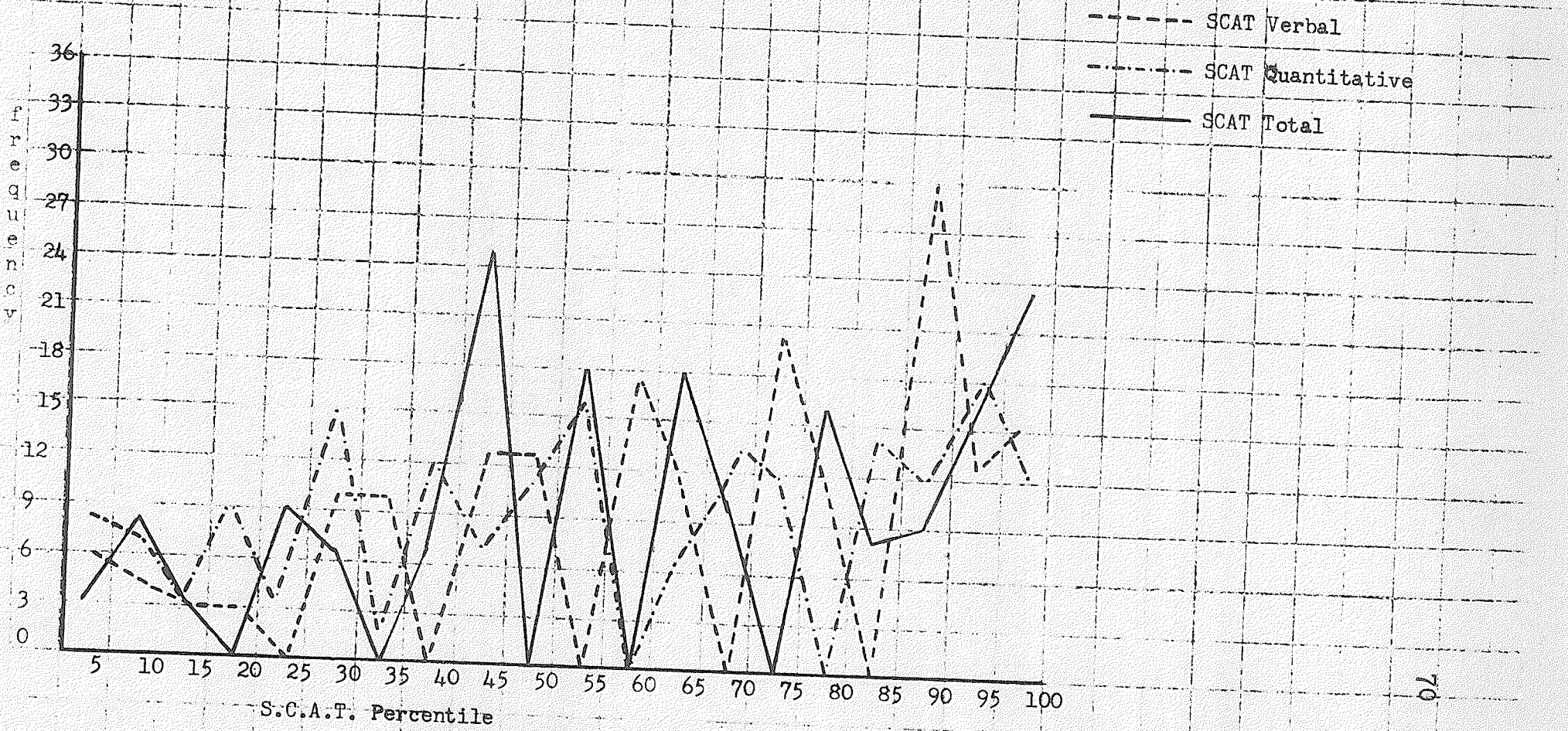


TABLE XVII

EXPECTANCY TABLE BASED ON STUDENTS' SCORES IN OTIS AND SCAT QUANTITATIVE

Total No.	0-11.1	11.2-22.3	22.4-33.5	33.6-44.7	44.8-55.9	56.0-67.1	67.2-78.3	78.4-89.5	89.6-99.7	Otis Test Scores	0-11.1	11.2-22.3	22.4-33.5	33.6-44.7	44.8-55.9	56.0-67.1	67.2-78.3	78.4-89.5	89.6-99.7	Total %
2									2	135-140									100	100
3									3	130-134									100	100
12							3	1	8	125-129							25	8	67	100
9		1					1	1	6	120-124		11					11	11	67	100
24				3	3	2	1	5	10	115-119				13	13	8	4	21	41	100
25	1	2	1	2	8	2	1	3	5	110-114	4	8	4	8	32	8	4	12	20	100
37	2	4	4	4	7	6	2	5	3	105-109	5	11	11	11	19	16	5	14	8	100
25	2	3	2	3	5	6	3		1	100-104	8	12	8	12	20	24	12		4	100
25	3	3	7	6	3	2			1	95-99	12	12	28	24	12	8			4	100
10	3	3	1		1		1	1		90-94	30	30	10		10		10	10		100
5	2		1	2						85-89	40		20	40						100
1	1									80-84	100									100
1	1									75-79	100									100

Number Receiving Each Score

Per Cent Receiving Each Score

TABLE XVIII

EXPECTANCY TABLE BASED ON STUDENTS' SCORES IN OTIS AND SCAT TOTAL

Total No.	0-11.1	11.2-22.3	22.4-33.5	33.6-44.7	44.8-55.9	56.0-67.1	67.2-78.3	78.4-89.5	89.6-99.7	Otis Scores	0-11.1	11.2-22.3	22.4-33.5	33.6-44.7	44.8-55.9	56.0-67.1	67.2-78.3	78.4-89.5	89.6-99.7	Total %
2									2	135-140									100	100
3									3	130-134									100	100
12							1	3	8	125-129							8	25	67	100
9							1		8	120-124							11		89	100
24				1		3	5	4	11	115-119				4		13	21	17	45	100
25		1			6	4	6	2	6	110-114		4	4		24	16	24	8	24	100
37		1	1	1	14	7	8	3	2	105-109		3	3	3	37	18	25	7	4	100
25		3	1	3	9	3	2	4		100-104		12	4	12	36	12	8	16		100
25	3	6	3	1	10	1	1			95-99	12	24	12	4	40	4	4			100
10	3	1	2	1	1		1	1		90-94	30	10	20	10	10		10	10		100
5	3				2					85-89	60				40					100
1	1									80-84	100									100
1	1									75-79	100									100

Number Receiving Each Score

Per Cent Receiving Each Score

TABLE XIX

GROUPED FREQUENCY DISTRIBUTION OF THE SCORES OF 214 GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL, SHOWING COMPOSITE MARKS (C-SCORES) 1963-1964

Score Interval	Language	Social Studies	Mathematics	Science
96 - 100	0	1	2	0
91 - 95	3	9	7	10
86 - 90	8	11	11	16
81 - 85	13	21	15	22
76 - 80	29	26	15	25
71 - 75	35	23	20	37
66 - 70	28	16	19	31
61 - 65	27	19	16	24
56 - 60	19	24	21	21
51 - 55	23	16	22	11
46 - 50	13	14	17	9
41 - 45	10	20	23	5
36 - 40	5	3	12	2
31 - 35	1	4	7	0
26 - 30		2	1	1
21 - 25		1	4	
16 - 20		3	2	
11 - 15		1		
Total	214	214	214	214
Mean	65.8	64.495	60.855	70.035
s	12.91	17.31	17.76	12.865

FIGURE 3

FREQUENCY POLYGONS OF DISTRIBUTION OF C-SCORES-LANGUAGE, SOCIAL STUDIES, MATHEMATICS AND SCIENCE

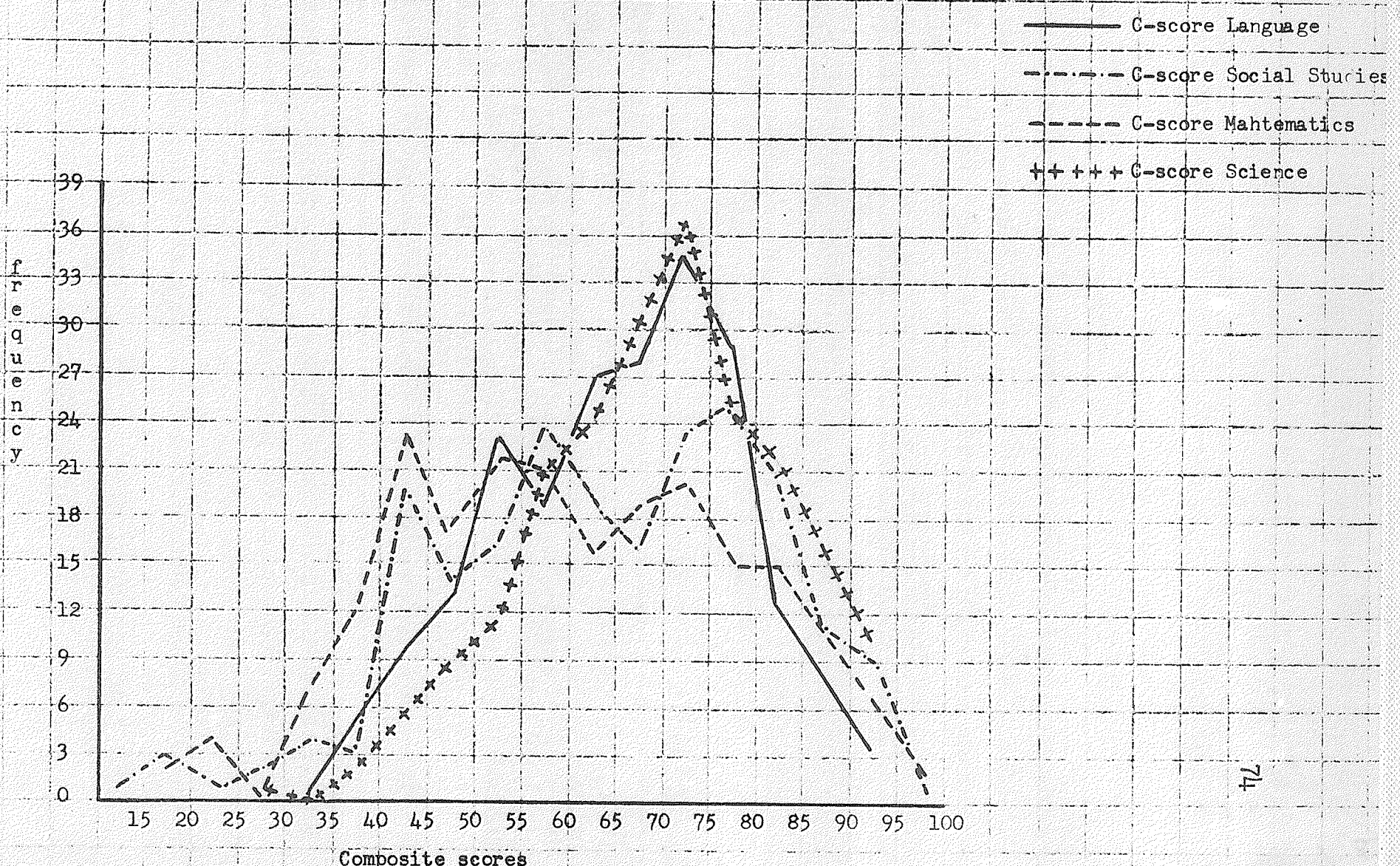


FIGURE 4

CUMULATIVE FREQUENCY CURVE SHOWING STUDENT C-SCORES IN LANGUAGE, SOCIAL STUDIES, MATHEMATICS AND SCIENCE

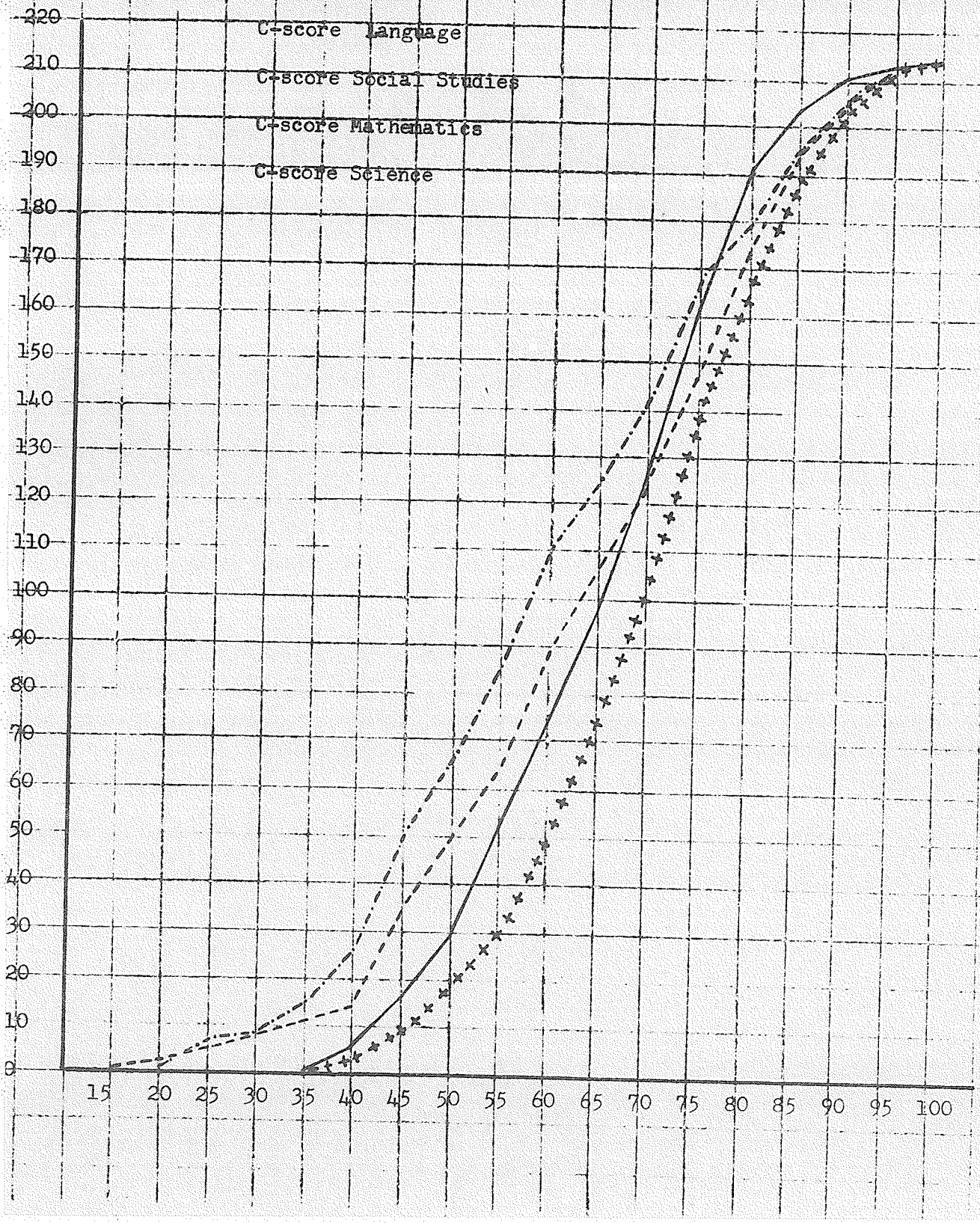


TABLE XX

EXPECTANCY TABLE BASED ON STUDENT SCORES IN SCAT VERBAL AND C-SCORE LANGUAGE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Verbal	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Total
28						1	5	11	9	2	91-100						4	18	39	32	7	100%
30					2	6	6	9	6	1	81-90					7	20	20	30	20	3	100%
32					3	6	15	7	1		71-80					9	19	47	22	3		100%
12					3	4	3	2			61-70					25	33	25	17			100%
17						2	7	8			51-60						12	41	47			100%
26				1	3	5	8	8	1		41-50				4	11	19	31	31	4		100%
10					1	3	3	3			31-40				10	10	30	30	30			100%
10				1		2	3	3	1		21-30				33		20	30	30	10		100%
6				2	1	1	2				11-20					17	17	33				100%
10					3	6		1			1-10					30	60		10			100%

TABLE XXI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT QUANTITATIVE AND C-SCORE LANGUAGE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Q	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Total
30							5	12	12	1	91-100							17	40	40	3	100%
27					1	3	10	10	3		81-90					4	11	37	37	11		100%
12					2	2	2	3	1	2	71-80					17	17	17	25	7	17	100%
18						6	5	6	1		61-70						33	28	33	6		100%
16					1	3	4	8			51-60					6	19	25	50			100%
18				1	2	4	8	3			41-50				5	11	23	44	17			100%
14					5	2	3	3	1		31-40					36	15	21	21	7		100%
19				2	1	7	9				21-30				10	5	36	49				100%
12						5	2	5			11-20						42	16	42			100%
15				1	4	4	4	2			0-10				7	26	26	26	14			100%

TABLE XXII

EXPECTANCY TABLE BASED ON STUDENT SCORES IN SCAT TOTAL AND C-SCORE LANGUAGE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Total	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
40						1	6	15	15	3	91-100						2	15	38	38	7	100%
17					1	3	6	6	1		81-90					6	18	35	35	6		100%
16					2	2	7	5			71-80					12.5	12.5	44	31			100%
28					4	6	9	9			61-70					14	21	32	32			100%
18					1	4	5	8			51-60					5	23	28	44			100%
25				1	2	6	11	4	1		41-50				4	8	24	44	16	4		100%
7						2	3	1	1		31-40						28	42	15	15		100%
16				1	3	4	4	4			21-30				9	16	25	25	25			100%
3				1		1	1				11-20				33		33	33				100%
11				1	3	7					0-10				9	27	64					100%

TABLE XXIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS AND C-SCORE LANGUAGE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Otis	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2									2		135-140									100		100%
3								2	1		130-134								67	33		100%
14						1	2	8	3		125-129						7	15	57	21		100%
12							1	3	7	1	120-124							9	25	57	9	100%
26						1	8	10	5	2	115-119						4	31	38	19	8	100%
28					1	5	10	11	1		110-114					4	17	36	39	4		100%
45					5	12	14	12	2		105-109					11	27	31	27	4		100%
32				2	5	8	6	11			100-104				6	16	25	19	34			100%
30				3	4	9	10	4			95-99				10	14	30	33	14			100%
12					4	4	3	1			90-94					33	33	25	9			100%
4					1	2	1				85-89					25	50	25				100%
2				1	1						80-84				50	50						100%
1					1						75-79					100						100%

TABLE XXIV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT VERBAL AND C-SCORE SOCIAL STUDIES

Total	Number of Students											Per Cent of Students									Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT V	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	Total
28						1	2	13	8	4	91-100						4	7	47	28	12	100%
30				2	2	3	5	5	9	4	81-90				7	7	10	17	17	30		100%
32			1		7	3	8	10	3		71-80			4		22	9	25	31	9		100%
12					4	3	1	1	3		61-70					33	25	8.5	8.5	25		100%
17					2	5	3	5	1	1	51-60					12	29	18	29	6	6	100%
26				1	4	9	6	4	2		41-50				4	15	34	23	15	9		100%
10					4	2	2	2			31-40					40	20	20	20			100%
10			1		1	3	2	3			21-30			10		10	30	20	30			100%
6		2			1	3					11-20		33			17	50					100%
10		1		1	5	2	1				0-10		10		10	50	20	10				100%

TABLE XXV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT QUANTITATIVE AND C-SCORE SOCIAL STUDIES

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Q	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
30					1	2	2	10	11	4	91-100					3	7	7	33	37	13	100%
27					2	3	7	10	5		81-90					7	11	26	37	19		100%
12			1			3	1	1	3	3	71-80			8			25	8	8	25	25	100%
18					3	3	5	4	2	1	61-70					16	16	27	23	11	5	100%
16					3	4	3	6			51-60					18	25	18	39			100%
18				1	4	6	3	3	1		41-50				5	23	33	17	17	5		100%
14				1	5	2	4	1	1		31-40				7	35	15	29	7	7		100%
19		2	1		3	5	2	4	2		21-30		11	5		15	26	11	21	11		100%
12				1	3	2	1	3	1	1	11-20				8	25	17	8	25	8	8	100%
15		1		1	6	4	1	2			0-10		7		7	40	26	7	13			100%

TABLE XXVI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT TOTAL AND C-SCORE SOCIAL STUDIES

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT T	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
40						1	3	15	14	7	91-100						3	7	38	35	17	100%
17					3	4	3	3	4		81-90					18	23	18	18	23		100%
16			1			3	4	6	2		71-80			6			18	25	39	12		100%
28				1	5	4	8	7	2	1	61-70				4	16	14	30	25	7	4	100%
18				1	4	1	5	6		1	51-60				5	24	5	28	33		5	100%
25					6	11	4	2	2		41-50					24	44	16	8	8		100%
7						2	2	1	2		31-40						28	28	14	28		100%
16		1	1		5	6		3			21-30		6	6		31	39		18			100%
3		1			1	1					11-20		33			33	33					100%
11		1		2	6	1	1				0-10		9		18	55	9	9				100%

TABLE XXVII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS AND C-SCORE SOCIAL STUDIES

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2								1	1		135-140								50	50		100%
3								2	1		130-134								67	33		100%
14						2		3	9		125-129						15		22	63		100%
12								3	5	4	120-124								25	42	33	100%
26					1	1	5	11	6	2	115-119					4	4	19	42	23	8	100%
28					4	7	5	7	3	2	110-114					14	26	17	26	10	7	100%
45			1	1	6	12	10	12	2	1	105-109			2	2	14	27	22	27	4	2	100%
32			1	2	6	6	7	4	5	1	100-104			3	6	19	19	22	12	16	3	100%
30		3	1	2	8	8	7	1			95-99		10	3	7	27	27	23	3			100%
12				1	4	3	1	3			90-94				9	33	25	9	25			100%
4				1	2			1			85-89				25	50			25			100%
2					2						80-84					100						100%
1		1									75-79		100									100%

TABLE XXVIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT VERBAL AND C-SCORE MATHEMATICS

Total	Number of Students											Per Cent of Students									Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT V	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
28					2	3	3	7	6	7	91-100					7	11	11	25	21	25	100%
30				2	1	6	5	3	11	2	81-90				7	3	20	17	10	36	7	100%
32				2	11	5	6	6	2		71-80				6	34	16	19	19	6		100%
12		1		2	4	1		4			61-70		8		17	33	8		33			100%
17				2		5	5	3	2		51-60				12		29	29	18	12		100%
26				4	7	6	5	3	1		41-50				16	25	23	19	13	4		100%
10				2	3	3	1		1		31-40				20	30	30	10		10		100%
10			1	2		2	2	3			21-30			10	20		20	20	30			100%
7			1		3	2	1				11-20			14		43	29	14				100%
10		1	1	1	3	3	1				0-10		10	10	10	30	30	10				100%

TABLE XXIX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT QUANTITATIVE AND C-SCORE MATHEMATICS

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Q	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
30					1		1	7	14	7	91-100					3		3	23	47	23	100%
27					2	1	6	13	4	1	81-90					7	4	22	48	15	4	100%
12				1	2	3		2	3	1	71-80				8	17	25		17	25	8	100%
18				3	2	3	5	3	2		61-70				17	11	17	27	17	11		100%
16				1	4	8	1	2			51-60				6	25	50	6	13			100%
18				1	3	7	6	1			41-50				5	17	39	33	5			100%
14		1			4	5	3	1			31-40		7			29	36	21	7			100%
19			1	2	10	3	3				21-30			5	10	53	16	16				100%
12				5	1	2	4				11-20				42	8	17	33				100%
15		1	2	3	5	4					0-10		7	14	20	33	26					100%

TABLE XXX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT TOTAL AND C-SCORE MATHEMATICS

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT T	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
40					2	1	3	9	16	9	91-100					5	2	7	23	40	23	100%
17				1	2	2	3	5	4		81-90				6	12	12	18	29	23		100%
16					2	5	3	6			71-80					13	31	18	38			100%
28				1	4	8	7	5	3		61-70				4	14	29	24	18	11		100%
18		1		3	3	6	4	1			51-60		5		17	17	33	23	5			100%
25				5	10	4	3	3			41-50				20	40	16	12	12			100%
7				1	2	2	2				31-40				15	28	28	28				100%
16			1	2	5	6	2				21-30			6	13	31	37	13				100%
3					2		1				11-20					67		33				100%
11		1	2	3	2	3					0-10		9	18	27	18	27					100%

TABLE XXXI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS AND C-SCORE MATHEMATICS

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2									1	1	135-140									50	50	100%
3								1	1	1	130-134								33	33	33	100%
14						1	3	5	4	1	125-129						7	21	36	29	7	100%
12					1		1	3	5	2	120-124					9		9	25	41	16	100%
26					1	5	6	4	6	4	115-119					4	20	23	15	23	15	100%
28				1	4	9	5	6	3		110-114				4	14	32	18	21	11		100%
45				4	8	13	11	7	2		105-109				9	18	29	24	16	4		100%
32			1	3	10	5	5	4	4		100-104			3	8	31	16	16	13	13		100%
30			1	6	9	9	3	2			95-99			3	20	30	30	10	7			100%
12		1		4	4	1	1	1			90-94		9		33	33	9	9	9			100%
4			1	1	2						85-89			25	25	50						100%
2		1	1								80-84		50	50								100%
1					1						75-79					100						100%

TABLE XXXII

EXPECTANCY TABLE BASED ON STUDENTS SCORES ON
SCAT VERBAL AND C-SCORE SCIENCE

Table	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT V	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
28						1	4	11	9	3	91-100						4	14	39	32	11	100%
30						4	4	8	8	6	81-90						13	13	27	27	20	100%
32					1	8	10	7	5	1	71-80					3	25	31	22	16	3	100%
12					2	1	6	1	2		61-70					17	8	50	8	17		100%
17						1	7	5	4		51-60						6	41	29	24		100%
26						3	9	9	5		41-50						13	34	34	19		100%
10						4	4	2			31-40						40	40	20			100%
10				1	1	1	1	4	2		21-30				10	10	10	10	40	20		100%
6			1			3		2			11-20			17			50		33			100%
10					3	3	3	1			0-10					30	30	30	10			100%

TABLE XXXIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT QUANTITATIVE AND C-SCORE SCIENCE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Q	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
30						2	2	9	13	4	91-100						7	7	30	43	13	100%
27						2	4	14	6	1	81-90						7	15	53	22	3	100%
12					1	1	2	3	1	4	71-80					8	8	18	25	8	33	100%
18						4	6	3	5		61-70						23	33	17	27		100%
16					1	4	6	4	1		51-60					6	25	38	25	6		100%
18						7	6	3	2		41-50						39	33	17	11		100%
14					2	2	3	4	3		31-40					15	15	21	28	21		100%
19			1	1	1	2	6	5	3		21-30			5	5	5	11	32	26	16		100%
12						3	7		1	1	11-20						25	58		8	8	100%
15					2	2	6	5			0-10					14	14	40	33			100%

TABLE XXXIV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT TOTAL AND C-SCORE SCIENCE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT T	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
40						1	1	15	16	7	91-100						3	3	37	40	17	100%
17						4	5	2	4	2	81-90						23	30	12	23	12	100%
16					1	2	6	5	2		71-80					6	13	37	31	13		100%
28					1	6	8	7	6		61-70					4	21	30	24	21		100%
18					1	3	6	6	1	1	51-60					5	17	33	33	5	5	100%
25						6	10	6	3		41-50						24	40	24	12		100%
7						1		4	2		31-40						15		57	28		100%
16				1	1	2	7	4	1		21-30				6	6	13	44	25	6		100%
3			1		1			1			11-20			33		33			33			100%
11					2	4	5				0-10					18	36	46				100%

TABLE XXXV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
OTIS AND C-SCORE SCIENCE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2								1	1		135-140								50	50		100%
3								2	1		130-134								67	33		100%
14							2	8	3	1	125-129							15	57	21	7	100%
12							1	4	4	3	120-124							9	33	33	25	100%
26							6	5	11	4	115-119							23	19	43	15	100%
28					1	6	6	10	4	1	110-114					4	21	21	36	14	4	100%
45						10	18	11	6		105-109						21	40	24	15		100%
32					4	6	8	6	7	1	100-104					13	19	25	19	21	3	100%
30			1	2	3	4	10	10			95-99			3	7	10	14	33	33			100%
12					2	2	3	4	1		90-94					16	16	25	33	9		100%
4						2	2				85-89						50	50				100%
2					1	1					80-84					50	50					100%
1					1						75-79				100							100%

TABLE XXXVI

GROUPED FREQUENCY DISTRIBUTION OF THE SCORES OF 213 GRADE IX STUDENTS OF GRANT PARK HIGH SCHOOL, SHOWING DEPARTMENTAL RESULTS (E-SCORES), 1963 - 1964

Score Interval	Language	Social Studies	Mathematics	Science
96 - 100	1	3	5	0
91 - 95	0	4	14	6
86 - 90	1	10	17	11
81 - 95	18	14	22	15
76 - 80	24	19	17	17
71 - 75	25	26	18	35
66 - 70	23	35	20	18
61 - 65	33	23	16	28
56 - 60	30	29	13	14
51 - 55	27	14	14	26
46 - 50	15	10	15	19
41 - 45	8	8	6	12
36 - 40	4	5	13	4
31 - 35	2	7	7	4
26 - 30	1	3	8	1
21 - 25	1	0	4	2
16 - 20		2	1	
11 - 15			1	
6 - 10			2	
Total	213	212	213	212
Mean	63.49	64.65	64.71	64.225
s	12.75	15.51	21.15	15.09

FIGURE 5

FREQUENCY POLYGONS OF DISTRIBUTION OF E-SCORES IN LANGUAGE, SOCIAL STUDIES, MATHEMATICS AND SCIENCE

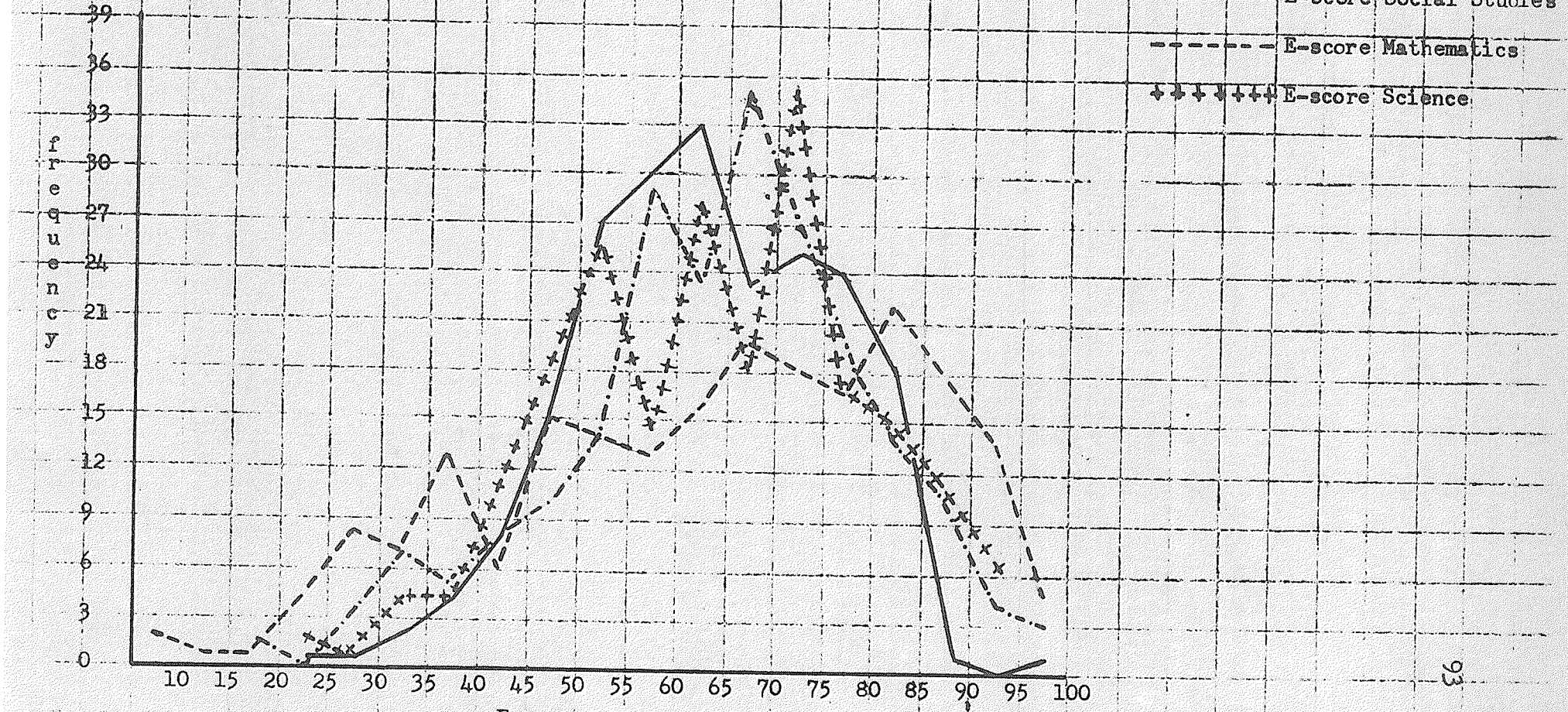


FIGURE 6

CUMULATIVE FREQUENCY CURVE SHOWING STUDENT E-SCORES IN LANGUAGE, SOCIAL STUDIES, MATHEMATICS AND SCIENCE

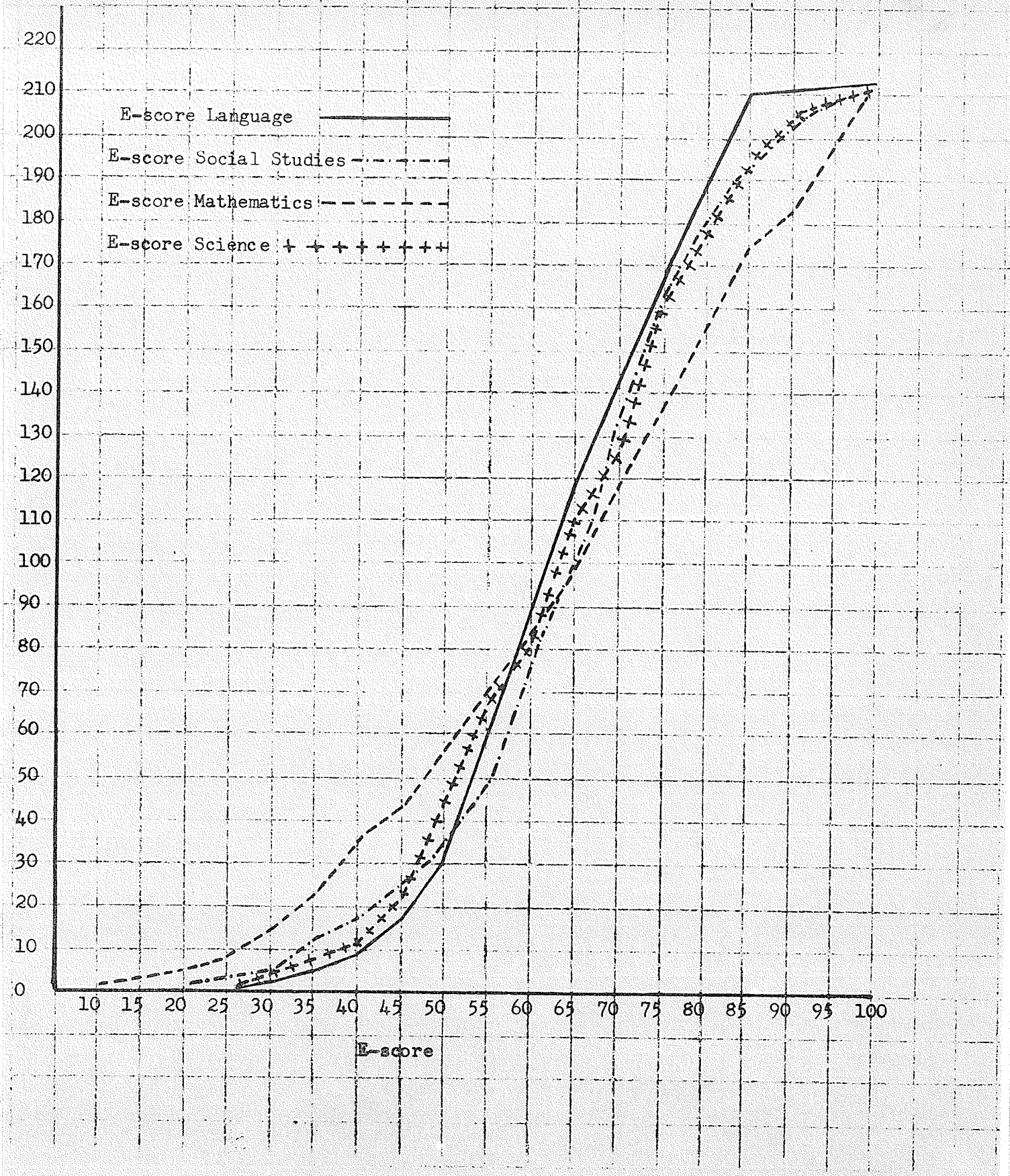


TABLE XXXVII

EXPECTANCY TABLES BASED ON STUDENT SCORES ON SCAT VERBAL AND E-SCORE LANGUAGE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT V	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
27						1	4	14	7	1	91-100						4	15	51	26	4	100%
30				1	2	4	5	12	6		81-90				3	7	13	17	40	20		100%
32					3	12	10	6	1		71-80					9	38	31	19	3		100%
12			2		1	3	4	1	1		61-70			17		8	25	33	8	8		100%
17						3	9	5			51-60						18	53	29			100%
26				1	6	6	8	3	2		41-50				4	23	23	30	12	8		100%
10					1	5	4				31-40					10	50	40				100%
10				1	3	4		2			21-30				10	30	40		20			100%
6					2	3	1				11-20					33	50	17				100%
10				1	1	7	1				0-10				10	10	70	10				100%

TABLE XXXVIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT QUANTITATIVE AND E-SCORE LANGUAGE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Q	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
29						1	4	13	11		91-100						4	13	45	38		100%
27					1	4	10	10	2		81-90					4	15	37	37	7		100%
12			1		1	2	2	3	2	1	71-80			7		7	18	18	25	18	7	100%
18					2	3	7	5	1		61-70					11	17	39	27	5		100%
16					2	7	4	3			51-60					13	43	25	19			100%
18					4	5	5	4			41-50					23	27	27	23			100%
14			1	1	1	5	4	1	1		31-40			7	7	7	36	28	7	7		100%
19				1	4	8	5	1			21-30				5	21	42	27	5			100%
12				1	1	5	3	2			11-20				8	8	42	25	17			100%
15				1	3	8	2	1			0-10				7	20	54	14	7			100%

TABLE XXXIX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT TOTAL AND E-SCORE LANGUAGE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT T	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
39							6	19	13	1	91-100							16	48	33	3	100%
17					1	5	4	6	1		81-90					6	29	23	36	6		100%
16					2	1	7	5	1		71-80					13	6	44	31	6		100%
28			1		3	7	10	6	1		61-70			4		11	24	36	21	4		100%
18			1	1	1	7	4	4			51-60			5	5	5	39	23	23			100%
25				1	4	11	8	1			41-50				4	16	44	32	4			100%
7					1	2	2	1	1		31-40					15	28	28	15	15		100%
16				1	3	6	5	1			21-30				6	19	37	32	6			100%
3					1	2					11-20					33	67					100%
11				1	3	7					0-10				9	27	64					100%

TABLE XL

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS AND E-SCORE LANGUAGE

Total	Number of Students											Per Cent of Students									Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2									2		135-139									100		100%
3								3			130-134								100			100%
14							4	7	3		125-129							29	50	21		100%
12								9	3		120-124								75	25		100%
26						1	9	9	6	1	115-119						4	35	35	22	4	100%
28					1	7	10	9	1		110-114					4	25	35	32	4		100%
45				1	5	15	14	7	3		105-109				2	11	33	31	16	7		100%
32				2	6	9	13	2			100-104				6	20	28	50	6			100%
30			1	1	7	13	6	1	1		95-99			3	3	23	44	21	3	3		100%
12			1		2	8	1				90-94			9		15	67	9				100%
4					1	3					85-89					25	75					100%
2			1		1						80-84			50		50						100%
1				1							75-79				100							100%

TABLE XLI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT VERBAL AND E-SCORE SOCIAL STUDIES

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT V	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
27						1	7	6	8	5	91-100						4	25	23	29	19	100%
30						5	6	10	8	1	81-90						17	20	33	27	3	100%
32				1	3	11	7	8	2		71-80				3	9	35	21	25	7		100%
12					2	1	4	4	1		61-70					17	8	33	33	8		100%
16						4	4	6	1	1	51-60						25	25	38	6	6	100%
26					3	8	11	3	1		41-50					12	30	42	12	4		100%
10				2	3		3	2			31-40				20	30		30	20			100%
10				2		4	3	1			21-30				20		40	30	10			100%
6			2		1	2	1				11-20			33		17	33	17				100%
10		1		4		2	3				0-10		10		40		20	30				100%

TABLE XLII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT QUANTITATIVE AND E-SCORE SOCIAL STUDIES

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Q	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
29						3	8	5	10	3	91-100						10	28	17	35	10	100%
27				1		3	11	7	4	1	81-90				4		11	41	25	15	4	100%
12					1	1	2	5	1	2	71-80					8	8	17	42	8	17	100%
18				3	1	4	3	4	2	1	61-70				25	8	33	25	33	18	8	100%
16					2	5	3	5	1		51-60					13	31	19	31	6		100%
17		1				8	4	4			41-50		7				47	23	23			100%
14				1	1	4	5	3			31-40				8	8	28	35	21			100%
19			2	1	2	4	6	3	1		21-30			11	5	11	21	31	16	5		100%
12				1		3	4	2	2		11-20				8		33	25	17	17		100%
15				2	5	3	3	2			0-10				14	33	20	20	14			100%

TABLE XLIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT TOTAL AND E-SCORE SOCIAL STUDIES

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT T	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
39						2	9	8	14	6	91-100						5	23	20	36	16	100%
17				1		2	4	9	1		81-90				6		12	23	53	6		100%
16						3	8	5			71-80						19	50	31			100%
28					1	10	6	7	3	1	61-70					4	36	21	24	11	4	100%
17					1	7	5	3	1		51-60					6	41	29	18	6		100%
25				3	3	6	8	4	1		41-50				12	12	24	32	16	4		100%
7					3		2	1	1		31-40					42		28	15	15		100%
16			1	1	2	5	4	3			21-30			6	6	12	32	25	19			100%
3			1				2				11-20			33				67				100%
11		1		4	2	3	1				0-10		9		37	19	26	9				100%

TABLE XLIV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS AND E-SCORE SOCIAL STUDIES

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2									1	1	135-140									50	50	100%
3								1	2		130-134								33	67		100%
14							5	5	3	1	125-120							36	36	21	7	100%
12							2	2	6	2	120-124							16.5	16.5	50	16.5	100%
26						5	8	8	3	2	115-119						19	31	31	11	8	100%
27				1	2	7	5	9	3		110-114				4	7	26	19	33	11		100%
45				2	3	12	16	9	3		105-109				4	7	27	35	20	7		100%
32				3	5	6	8	6	3	1	100-104				9	16	19	25	19	9	3	100%
30		2	2	2	5	9	8	2			95-99		7	7	7	16	30	26	7			100%
12			1	1	1	2	6	1			90-94			9	9	9	15	50	9			100%
4				2	1	1					85-89				50	25	25					100%
2						1		1			80-84						50		50			100%
1				1							75-79				100							100%

TABLE XLV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT VERBAL AND E-SCORE MATHEMATICS

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT V	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
27						3	3	4	7	10	91-100						11	11	15	26	37	100%
30				2	2	2	3	7	10	4	81-90				7	7	7	10	23	33	13	100%
32			1	5	3	5	6	6	3	3	71-80			3	16	9	16	19	19	9	9	100%
12			1	4		1	2	2	2		61-70			8	33		8	17	17	17		100%
17			2				5	6	4		51-60			12				29	36	23		100%
26			2		5	7	3	4	4	1	41-50			8		19	25	12	16	16	4	100%
10		1	1	2	1	2	2		1		31-40		10	10	20	10	20	20		10		100%
10				2	1	2	2	2	1		21-30				20	10	20	20	20	10		100%
6	1			1	1	2	1				11-20	17			17	17	33	17				100%
10		1	1	2	3		2	1			0-10		10	10	20	30		20	10			100%

TABLE XLVI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT QUANTITATIVE AND E-SCORE MATHEMATICS

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Q	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
29							2	3	13	11	91-100							7	10	45	38	100%
27					1	1	5	7	10	3	81-90					4	4	19	25	37	11	100%
12				1	2	2	1	1	2	3	71-80				7	18	18	7	7	18	25	100%
18			1		2	3	1	8	3		61-70			5		11	18	5	44	17		100%
16				3	1	2	5	4		1	51-60				19	6	13	31	25		6	100%
18			1		2	4	5	5	1		41-50			5		11	23	28	28	5		100%
14			1	2	2	2	3	3	1		31-40			7	15	15	15	21	21	7		100%
19			1	5	3	7	2		1		21-30			5	26	16	37	11		5		100%
12			2	4	1	1	2	1	1		11-20			17	34	8	8	17	8	8		100%
15	1	2	2	3	2	2	3				0-10	8	14	14	20	14	14	20				100%

TABLE XLVII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT TOTAL AND E-SCORE MATHEMATICS

Total	Number of Students											Per Cent of Students									Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT T	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
39						1	3	6	14	15	91-100						3	7	16	36	38	100%
17					1	3	1	4	6	2	81-90					6	18	6	23	35	12	100%
16				1	2	2	3	5	3		71-80				6	13	13	19	31	19		100%
28				2	1	2	7	8	7	1	61-70				8	4	8	24	28	24	4	100%
18			1	5	2	2	4	3	1		51-60			5	28	11	11	23	17	5		100%
25			4	3	3	8	4	3			41-50			16	12	12	32	16	12			100%
7					2	1	2	1	1		31-40					28	15	28	15	15		100%
16			1	4	1	5	4	1			21-30			6	25	6	32	25	6			100%
3				2	1						11-20				67	33						100%
11	1	2	2	1	3	1	1				0-10	9	19	19	9	26		9	9			100%

TABLE XLVIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS AND E-SCORE MATHEMATICS

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2									1	1	135-140									50	50	100%
3										3	130-134										100	100%
14						3	1	2	7	1	125-129						21	7	15	50	7	100%
12							2		5	5	120-124							16		42	42	100%
26							5	8	9	4	115-119							19	31	35	15	100%
28			1		1	3	9	8	3	3	110-114			4		4	10	33	29	10	10	100%
45			2	6	4	6	7	11	8	1	105-109			4	14	9	14	16	24	17	2	100%
32	1		1	4	5	6	7	5	2	1	100-104	3		3	12	16	19	22	16	6	3	100%
30			3	6	9	8	1	1	2		95-99			10	20	30	27	3	3	7		100%
12		1	2	3		2	3	1			90-94		9	16	25		16	25	9			100%
4			1	1	2						85-89			25	25	50						100%
2	1		1								80-84	50		50								100%
1		1									75-79		100									100%

TABLE XLIX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT VERBAL AND E-SCORE SCIENCE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT V	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
27						2	2	13	7	3	91-100						7	7	49	26	11	100%
30					2	3	5	7	11	2	81-90					7	10	17	23	36	7	100%
32					7	5	5	13	2		71-80					21	16	16	40	7		100%
12					3	2	2	4	1		61-70					25	17	17	33	8		100%
16					2	3	8	1	1	1	51-60					13	19	50	6	6	6	100%
26					5	6	10	4	1		41-50					19	23	39	15	4		100%
10					2	3	3	2			31-40					20	30	30	20			100%
10					4	2	2	2			21-30					40	20	20	20			100%
6			1	1	1	3					11-20			17	17	17	50					100%
10			2	1	2	3	1	1			0-10			20	10	20	30	10	10			100%

TABLE L

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT QUANTITATIVE AND E-SCORE SCIENCE

otal	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT Q	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
29						1	6	8	12	2	91-100						4	21	27	41	7	100%
27					2	1	8	11	5		81-90					7	4	29	41	19		100%
12					2	2	1	2	2	3	71-80					17	17	7	17	17	5	100%
18					6	3	4	3	1	1	61-70					33	17	22	17	5		100%
16					1	8	4	3			51-60					7	50	25	18			100%
17			1		1	7	3	4	1		41-50			6		6	41	18	23	6		100%
14					3	3	2	6			31-40					21	21	15	43			100%
19			1	1	5	5	4	2	1		21-30			5	5	26	26	21	12	5=		100%
12					4	1	1	5	1		11-20					34	8	8	42	8		100%
15			1	1	4	1	5	3			0-10			7	7	26	7	33	20			100%

TABLE LI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT TOTAL AND E-SCORE SCIENCE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT T	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
39						1	4	15	16	3	91-100						3	11	38	41	7	100%
17					2	2	5	4	2	2	81-90					12	12	29	23	12	12	100%
16					3		7	4	2		71-80					18		44	25	13		100%
28					4	8	6	8	1	1	61-70					14	30	20	30	4	4	100%
17					4	5	2	5	1		51-60					23	29	13	29	6		100%
25					4	8	7	6			41-50					16	32	28	24			100%
7					1	3		2	1		31-40					15	42		28	15		100%
16				1	6	1	6	2			21-30				6	38	6	38		12		100%
3			1		1	1					11-20			33		33	33					100%
11			2	1	3	3	1	1			0-10			19	9	27	27	9	9			100%

TABLE LII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
OTIS AND E-SCORE SCIENCE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2								1		1	135-140								50		50	100%
3								2	1		130-134								67	33		100%
14						1	1	7	4	1	125-129						7	7	50	29	7	100%
12							1	3	7	1	120-124							9	25	57	9	100%
26						1	6	12	6	1	115-119						4	23	46	23	4	100%
27					3	4	12	5	3		110-114					10	13	41	16	10		100%
45				1	7	13	11	11	2		105-109				2	17	29	24	24	4		100%
32				2	6	9	6	5	2	2	100-104				6	19	28	19	16	6	6	100%
30			2	2	9	7	7	3			95-99			8	8	30	22	22	10			100%
12				1	3	4		3	1		90-94				9	25		33	25	9		100%
4			1		1	1	1				85-89			25		25	25	25				100%
2					2						80-84					100						100%
1				1							75-79				100							100%

FIGURE 7

FREQUENCY POLYGONS OF THE DISTRIBUTION OF C-SCORES AND E-SCORES -LANGUAGE

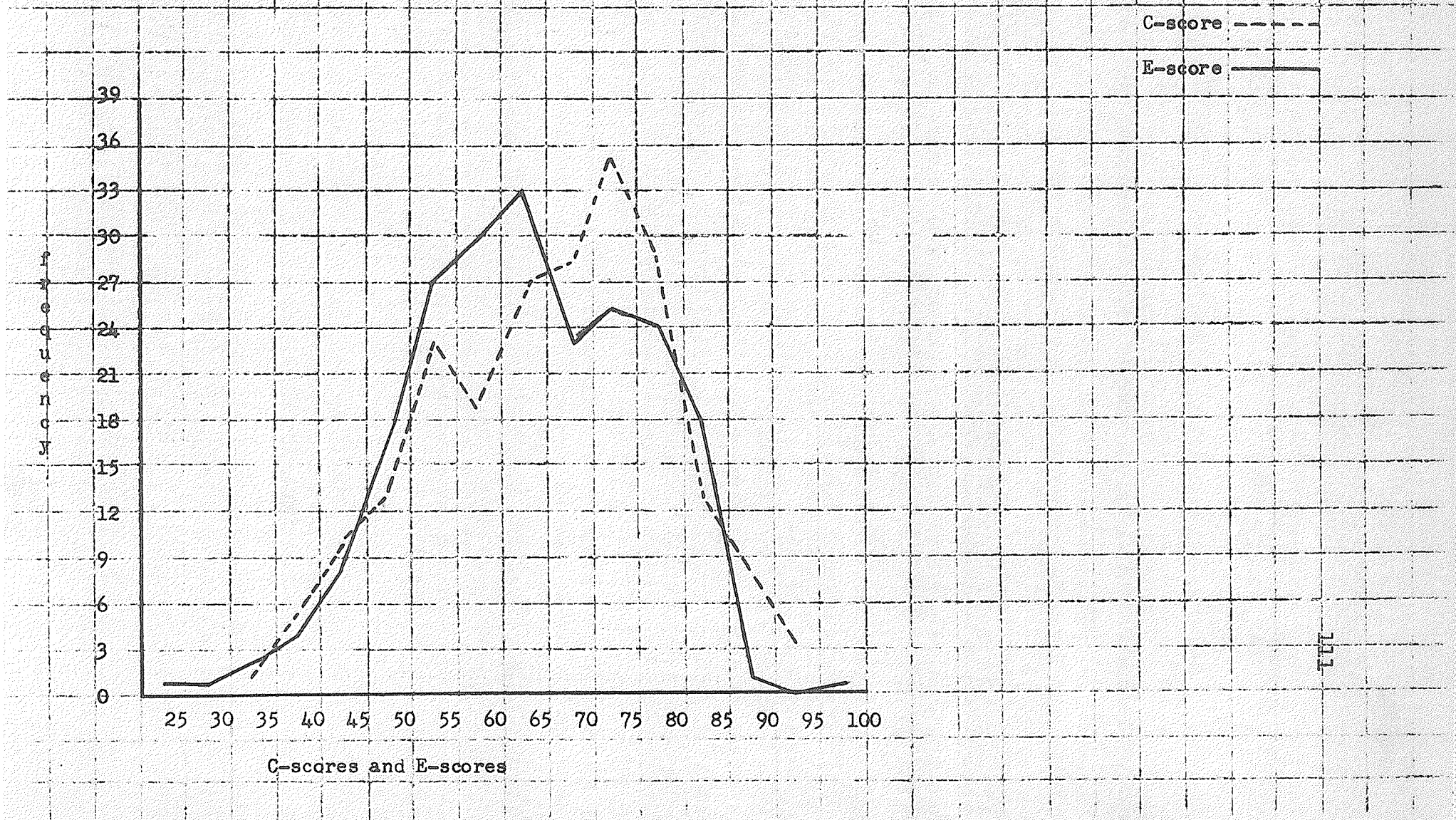


FIGURE 8

FREQUENCY POLYGONS OF DISTRIBUTION OF C-SCORES AND E-SCORES - SOCIAL STUDIES

FIGURE 9

FREQUENCY POLYGONS OF DISTRIBUTION OF C-SCORES AND E-SCORES - MATHEMATICS

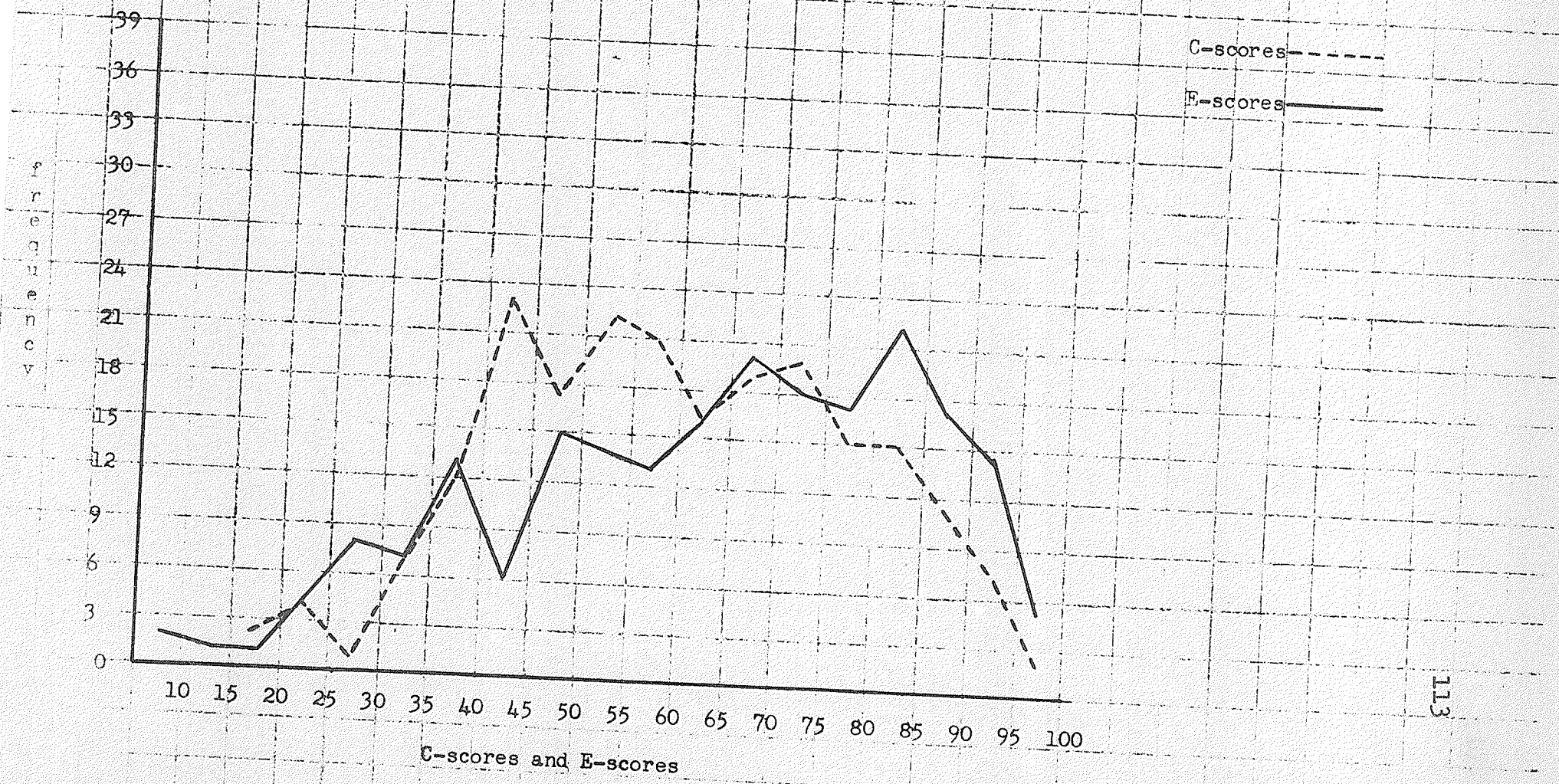


FIGURE 10

FREQUENCY POLYGONS OF DISTRIBUTION OF C-SCORES AND E-SCORES- SCIENCE

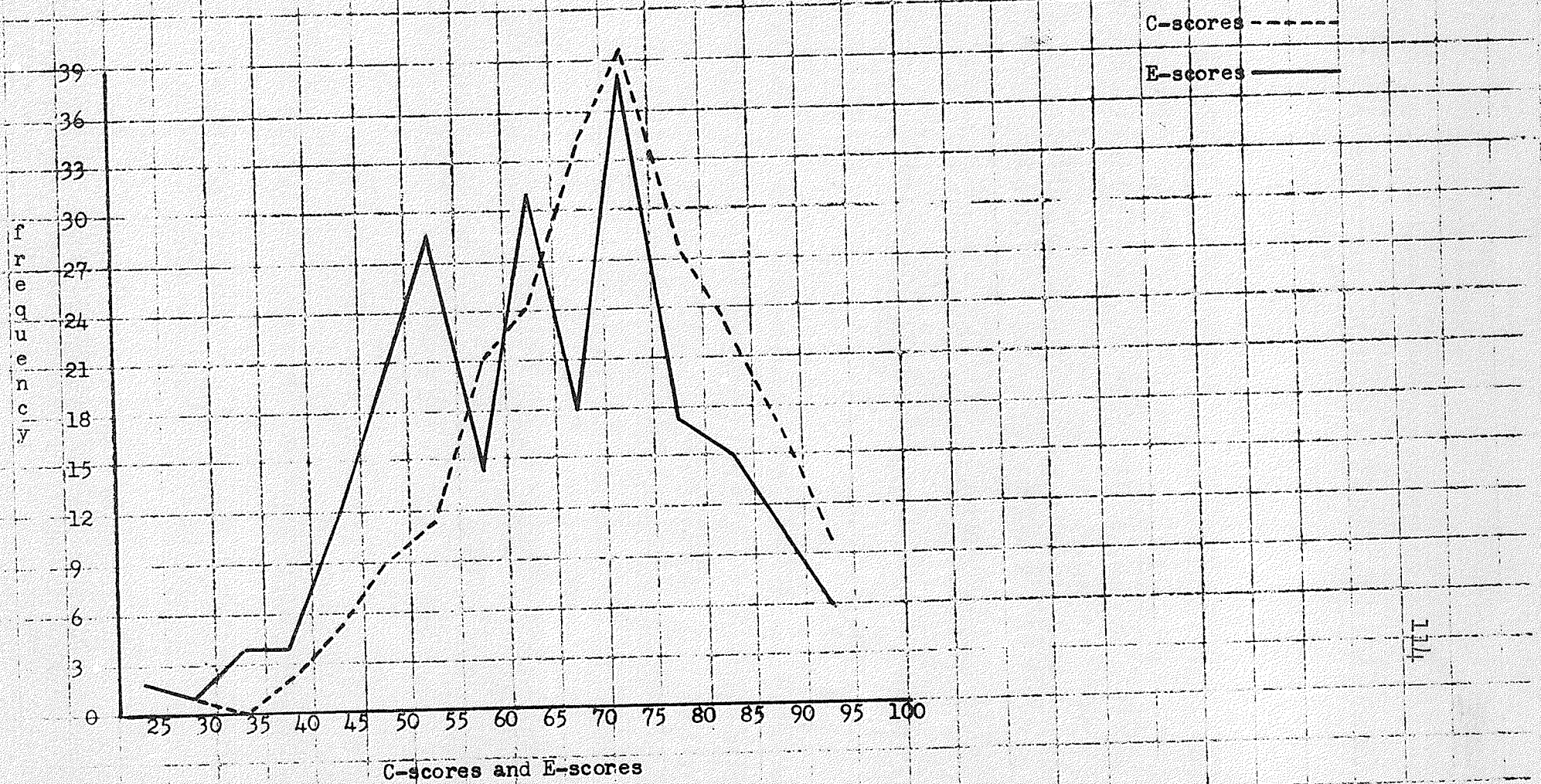


TABLE LIII

EXPECTANCY TABLE BASED ON STUDENT C-SCORES AND E-SCORES - LANGUAGE

Total	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	C-SCORE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
3									2	1	91-100									67	33	100%
21							1	8	12		81-90							5	38	57		100%
64						7	23	30	4		71-80						11	36	47	6		100%
54					2	18	24	9	1		61-70					4	33	44	17	2		100%
42				1	9	24	6	2			51-60				3	21	57	14	5			100%
23			2	3	9	8	1				41-50			9	13	39	35	4				100%
6				2	4						31-40				33	67						100%
											21-30											
											11-20											
											0-10											

TABLE LIV

EXPECTANCY TABLE BASED ON STUDENT C-SCORE AND E-SCORE - SOCIAL STUDIES

Total	Number E-Scores											Per Cent E-Scores										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	C-SCORE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
10								2	4	4	91-100								20	40	40	100%
32					1		4	12	12	3	81-90					3		12	38	38	9	100%
48						12	14	15	7		71-80						25	29	31	15		100%
35					3	9	16	6	1		61-70					8	26	46	17	3		100%
39				2	5	10	15	7			51-60				5	13	26	38	18			100%
34				5	8	11	7	3			41-50				14	24	32	21	9			100%
7		1	1	2	1	2					31-40		14	14	29	14	29					100%
3				2			1				21-30				67			33				100%
4		1	2	1							11-20		25	50	25							100%
											0-10											

TABLE LV

EXPECTANCY TABLE BASED ON STUDENT C-SCORES AND E-SCORES - MATHEMATICS

Total	Number E-Scores											Per Cent E-Scores										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	C-SCORE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
9								1		8	91-100								11		89	100%
26								1	19	6	81-90								4	73	23	100%
34							5	13	12	4	71-80							15	38	35	12	100%
35					2	6	9	10	7	1	61-70					5	17	26	29	20	3	100%
43				3	7	9	14	9	1		51-60				7	16	21	33	21	2		100%
40		1		11	8	11	8	1			41-50		3		27	20	27	20	3			100%
19		1	9	5	3	1					31-40		5	48	26	16	5					100%
5	2		1	1	1						21-30	40		20	20	20						100%
2			2								11-20			100								100%
											0-10											

TABLE LVI

EXPECTANCY TABLE BASED ON STUDENT C-SCORES
AND E-SCORE - SCIENCE

Total	Number E-Scores											Per Cent E-Scores										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	C-SCORE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
10									7	3	91-100									70	30	100%
38						1	3	17	14	3	81-90						3	8	44	37	8	100%
62					3	10	19	26	4		71-80					5	17	30	42	6		100%
55					8	15	22	9	1		61-70					15	27	40	16	2		100%
31			2	2	13	12	2				51-60			6	6	42	39	6				100%
13				5	6	2					41-50				39	46	15					100%
2				1	1						31-40				50	50						100%
1			1								21-30			100								100%
											11-20											
											0-10											

TABLE LVII

GROUPED FREQUENCY DISTRIBUTION OF OTIS I.Q. SCORES OF 108 GRADE X STUDENTS OF GRANT PARK HIGH SCHOOL, 1964 - 1965

Score Interval	Frequency
135 - 140	2
130 - 134	2
125 - 129	12
120 - 124	7
115 - 119	22
110 - 114	18
105 - 109	25
100 - 104	9
95 - 99	8
90 - 94	2
85 - 89	1
Total	108
Mean	112.30
Median	112.0
Standard deviation	10.066

TABLE LVIII

GROUPED FREQUENCY DISTRIBUTION OF THE PERCENTILE SCORES OF 108 GRADE X STUDENTS OF GRANT PARK HIGH SCHOOL ON SCHOOL AND COLLEGE ABILITY TESTS, 1964 - 1965

Score Interval	SCAT Verbal	SCAT Quantitative	SCAT Total
91 - 100	25	26	36
81 - 90	23	22	13
71 - 80	18	9	12
61 - 70	3	11	16
51 - 60	12	6	7
41 - 50	13	11	11
31 - 40	4	7	4
21 - 30	6	7	7
11 - 20	1	5	0
1 - 10	3	4	2
Total	108	108	108
Mean	69.77	66.19	71.41
Median	74.2	72.2	73.4
Standard deviation	24.65	27.84	24.17

FIGURE 11

FREQUENCY POLYGON OF DISTRIBUTION OF OTIS I.Q. SCORES FOR 108 GRADE X STUDENTS

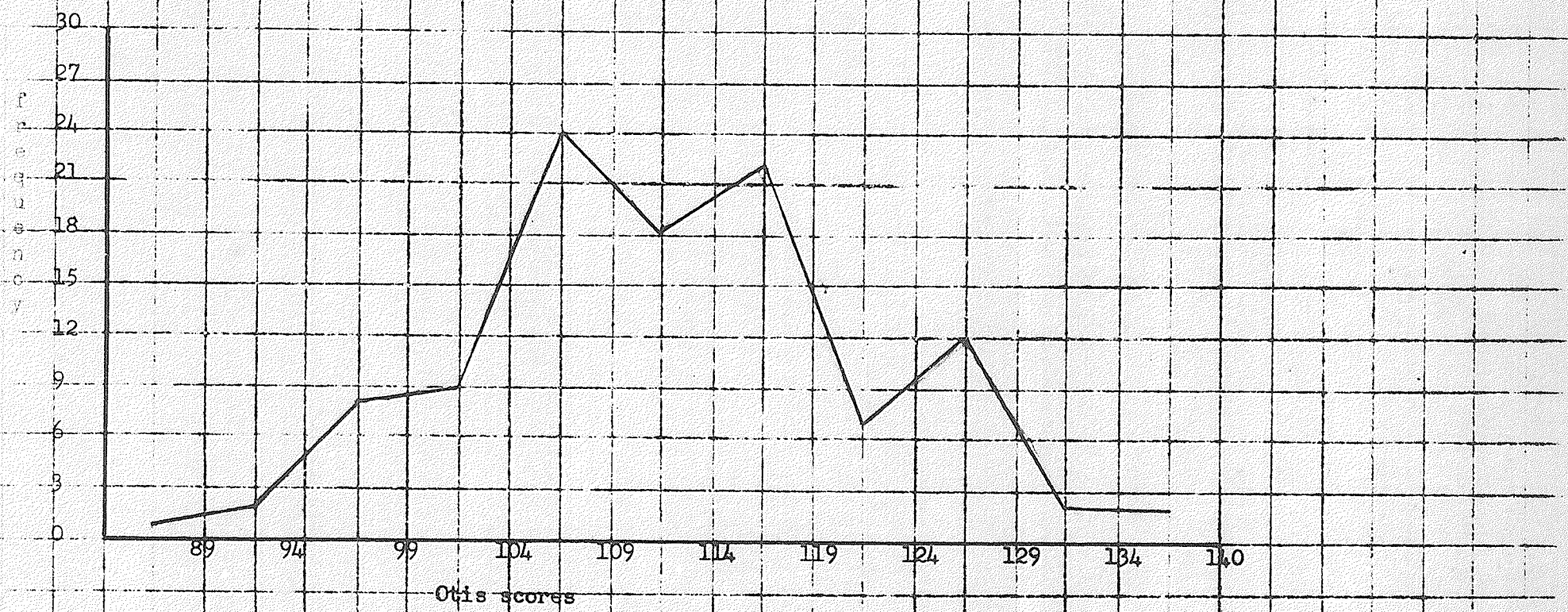


FIGURE 12

FREQUENCY POLYGONS OF DISTRIBUTION OF SCAT VERBAL, QUANTITATIVE AND TOTAL PERCENTILES FOR 108 GRADE X STUDENTS

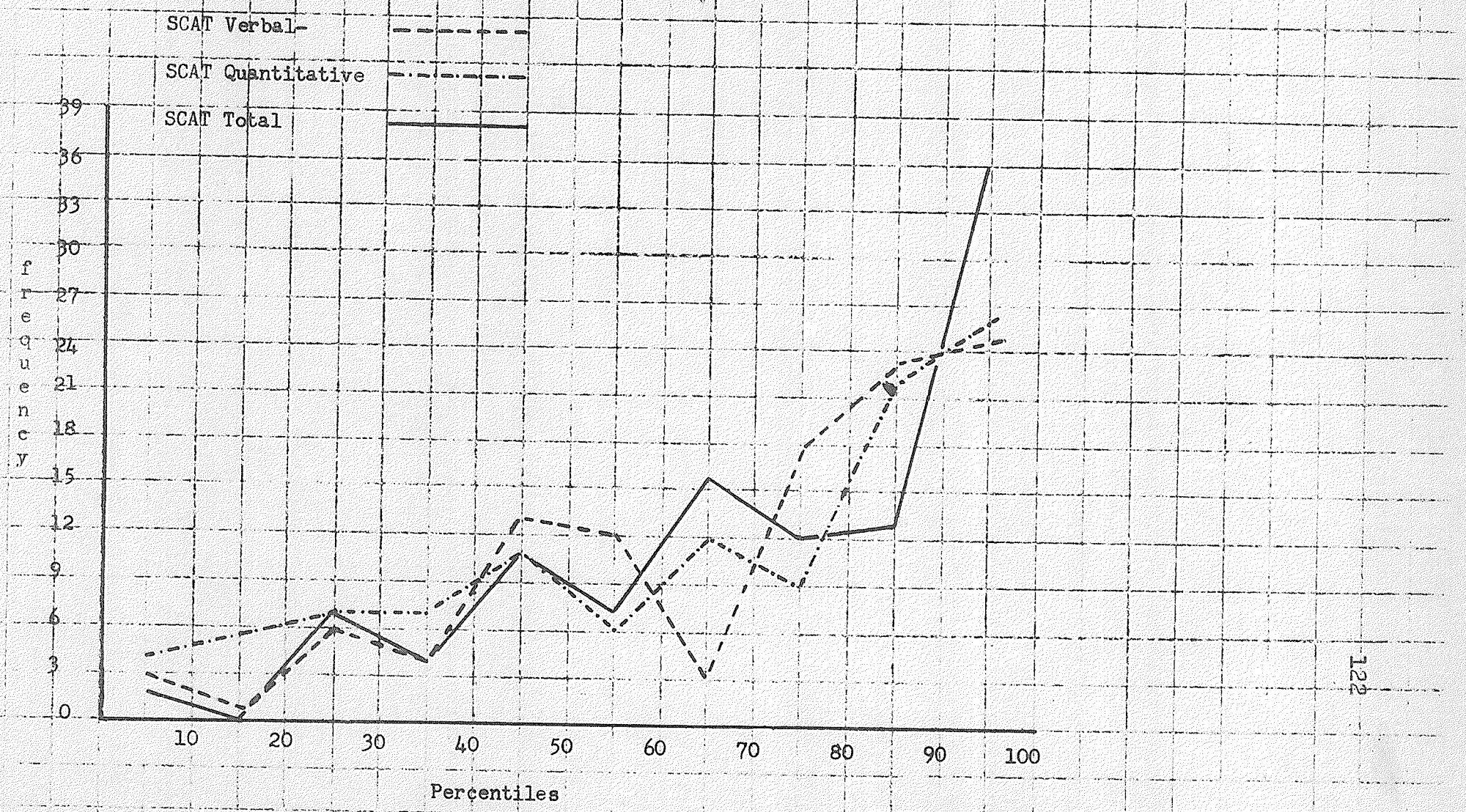


TABLE LIX

GROUPED FREQUENCY DISTRIBUTION OF THE FINAL MARKS OF 108 GRADE X STUDENTS OF GRANT PARK HIGH SCHOOL 1964 - 1965

Score Interval	Literature	Composition	Geography	Mathematics	Science
96 - 100	0	0	0	1	1
91 - 95	5	0	0	12	1
86 - 90	13	2	5	10	7
81 - 85	16	13	8	7	8
76 - 80	10	24	11	14	10
71 - 75	10	22	17	10	9
66 - 70	9	18	14	8	15
61 - 65	12	7	21	7	12
56 - 60	9	11	13	13	14
51 - 55	11	8	9	8	15
46 - 50	10	2	5	5	3
41 - 45	3	1	5	1	6
36 - 40				4	4
31 - 35				2	2
26 - 30				4	1
21 - 25				0	
16 - 20				1	
11 - 15				0	
6 - 10				1	
0 - 5					
Total	108	108	108	108	108
Mean	69.82	70.35	66.35	68.01	64.26
Median	70.5	72.1	65.8	70.5	64.2
Standard deviation	14.62	9.77	11.35	19.35	14.62

FIGURE 13

FREQUENCY POLYGONS OF DISTRIBUTION OF GRADE X FINAL MARKS- ALL SUBJECTS

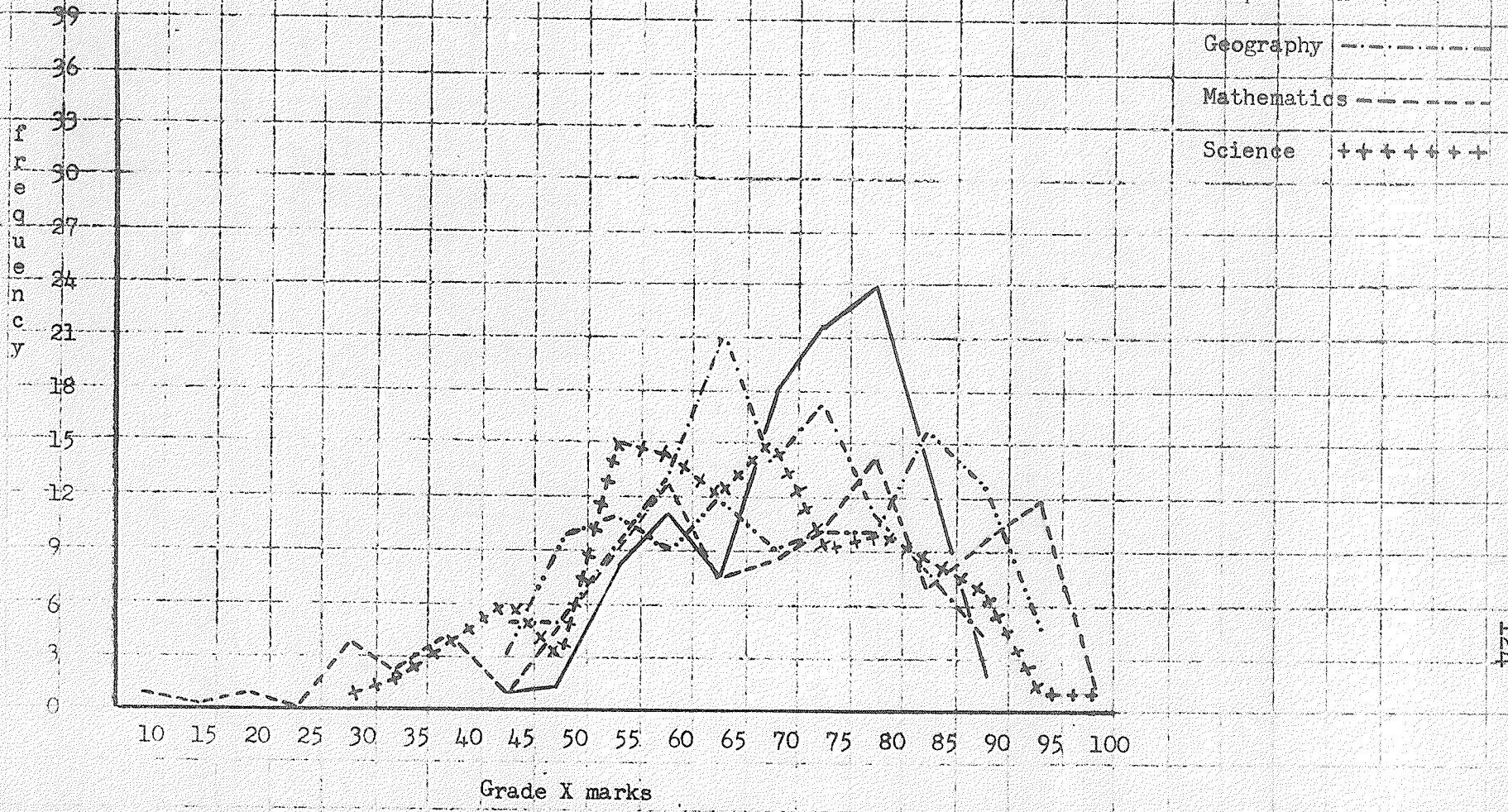


FIGURE 14

FREQUENCY POLYGON OF DISTRIBUTION OF GRADE X LITERATURE MARKS AND GRADE IX C-SCORES AND E-SCORES - LANGUAGE

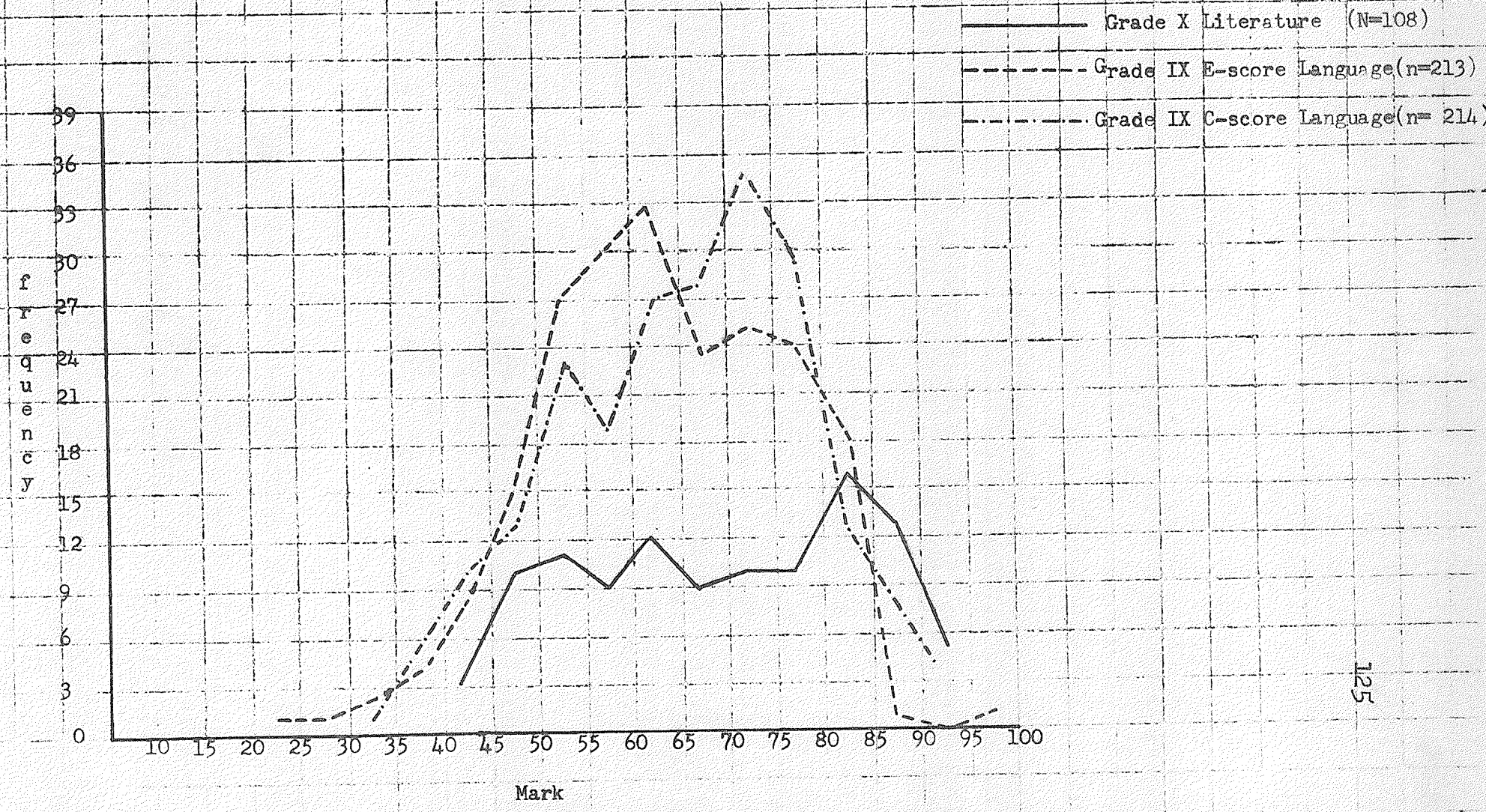


FIGURE 15

FREQUENCY POLYGON OF DISTRIBUTION OF GRADE X COMPOSITION MARKS AND GRADE IX C-SCORES AND E-SCORES -LANGUAGE

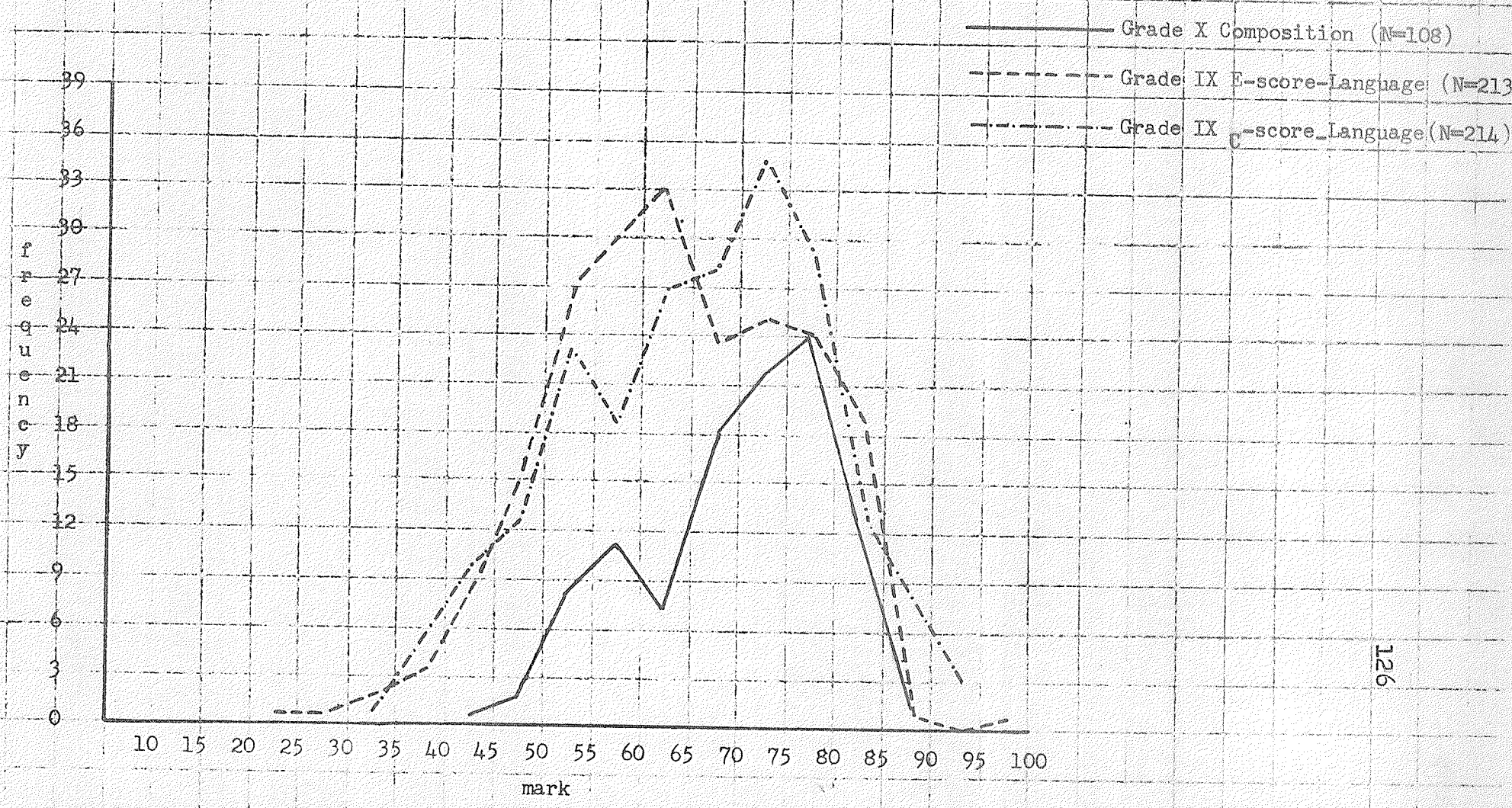


FIGURE 16

FREQUENCY POLYGONS OF DISTRIBUTION OF GRADE X GEOGRAPHY MARKS AND GRADE IX C-SCORES AND E-SCORES

SOCIAL STUDIES

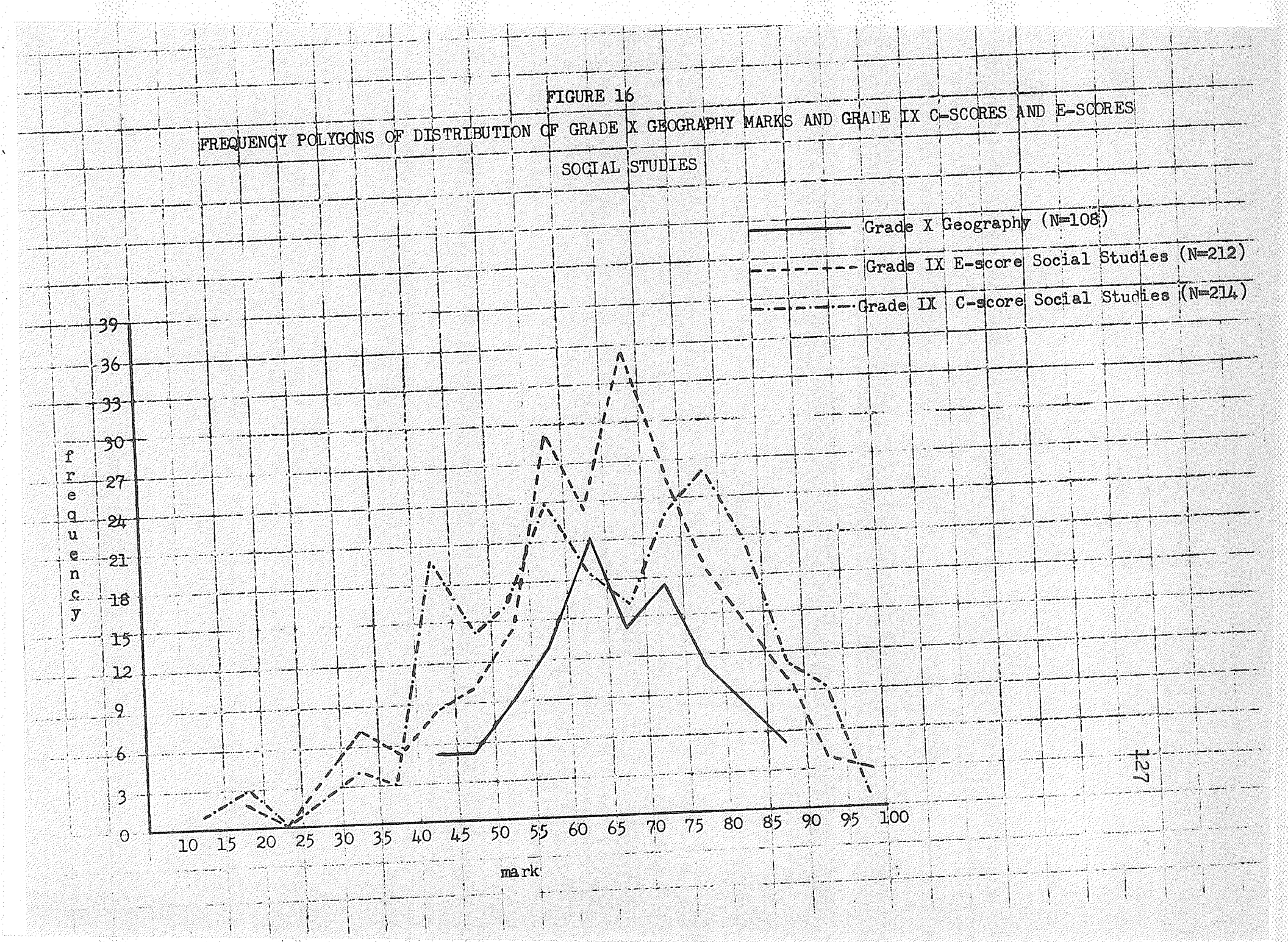


FIGURE 17

FREQUENCY POLYGONS OF DISTRIBUTION OF GRADE X MATHEMATICS AND GRADE IX C-SCORES AND E-SCORES-MATHEMATICS

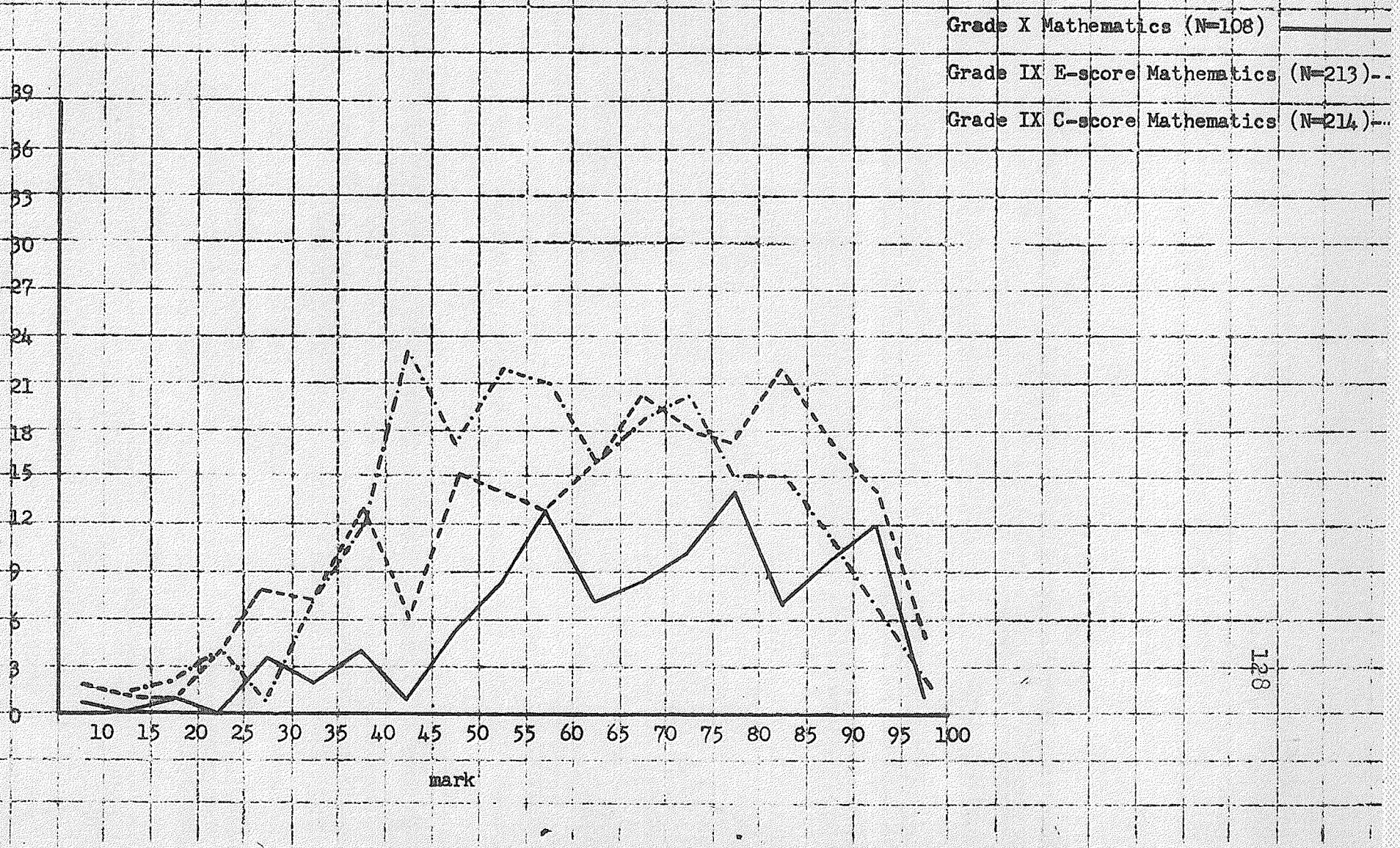


FIGURE 18

FREQUENCY POLYGONS OF DISTRIBUTION OF GRADE X SCIENCE MARKS AND GRADE IX C-SCORES AND E-SCORES- SCIENCE

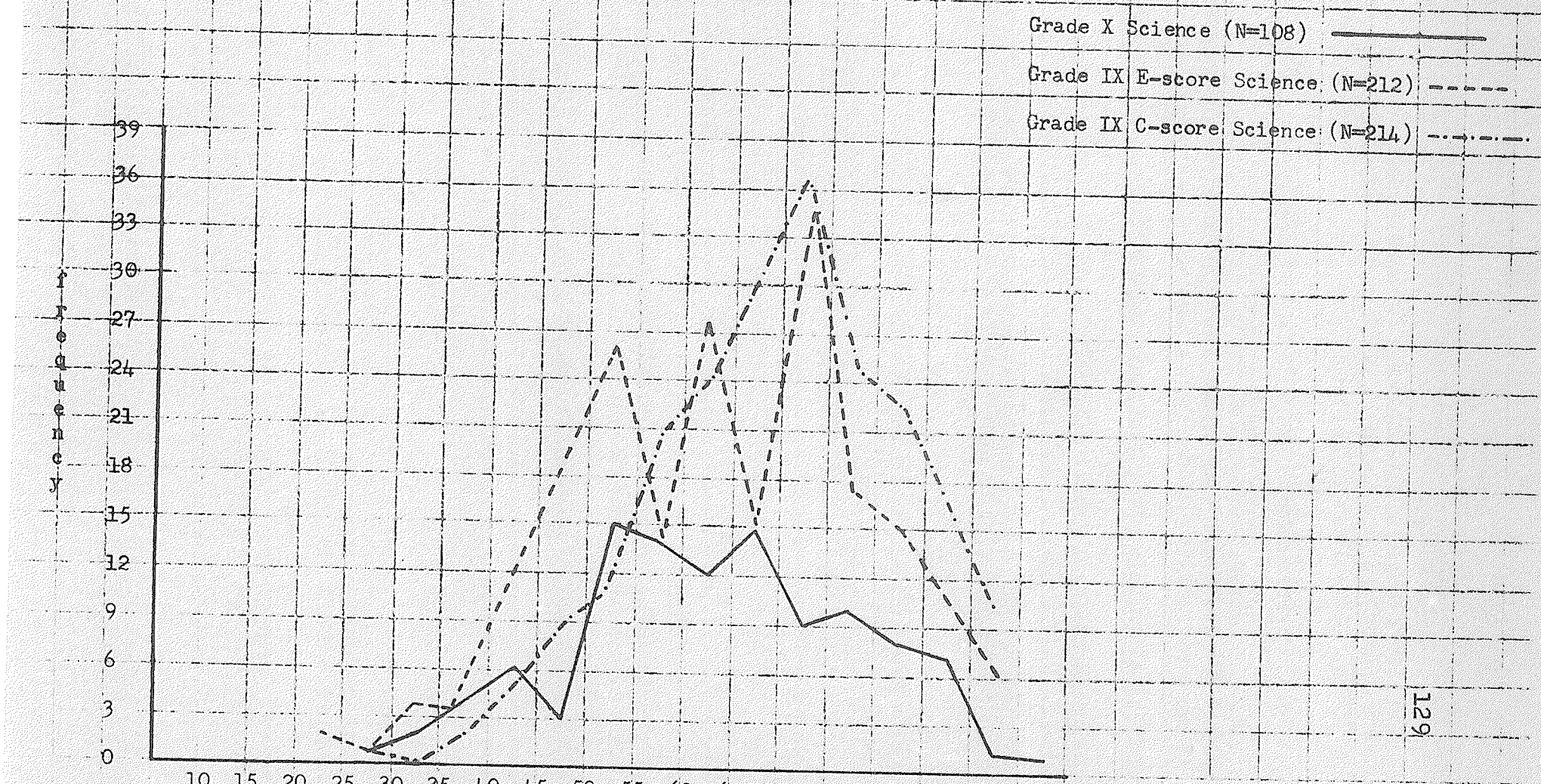


TABLE LX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT VERBAL (GRADE IX) AND
GRADE X LITERATURE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT VERBAL	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
25						2	5	8	8	2	91-100						8	20	32	32	8	100%
23					1	4	3	2	11	2	81-90					4	17	13	8	48	8	100%
18					4	2	1	6	4	1	71-80					22	11	6	33	22	6	100%
3							1	1	1		61-70							33	33	33		100%
12					2	2	5	1	2		51-60					17	17	42	8	17		100%
13					2	5	2	2	2		41-50					15	39	15	15	15		100%
4					1	2	1				31-40					25	50	25				100%
6					1	1	3		1		21-30					17	17	50		17		100%
1						1					11-20						100					100%
3					2	1					0-10					67	33					100%

TABLE LXI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT TOTAL (GRADE IX) AND
GRADE X LITERATURE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT TOTAL	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
36					1	1	5	8	17	4	91-100					3	3	14	22	47	11	100%
13					1	6	1	2	3		81-90					8	46	8	15	23		100%
12					1	3	2	4	2		71-80					8	25	17	33	17		100%
16					3	2	4	3	3	1	61-70					19	13	25	19	19	6	100%
7						1	3	1	2		51-60						14	43	14	28		100%
11					4	1	5	1			41-50					36	9	44	9			100%
4						1		1	2		31-40						25		25	50		100%
7					1	5	1				21-30					14	72	14				100%
0											11-20											
2					2						0-10					100						100%

TABLE LXII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS (GRADE IX) AND GRADE X LITERATURE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2								1	1		135-139								50	50		100%
2							1		1		130-134							50		50		100%
12					1	2	1	5	3		125-129					8	17	8	42	25		100%
7							1	2	4		120-124							14	28	58		100%
22						2	4	2	11	3	115-119						9	18	9	50	14	100%
18					4	2	3	4	4	1	110-114					22	11	17	22	22	6	100%
25					4	5	8	5	3		105-109					16	20	32	20	12		100%
9						4	3		2		100-104						44	33		22		100%
8					3	4				1	95-99					38	50				13	100%
2						1		1			90-94						50		50			100%
1					1						85-89					100						100%

TABLE LXIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON IX-C LANGUAGE AND GRADE X LITERATURE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-C LANGUAGE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
3									1	2	91-100									33	67	100%
15							2	3	9	1	81-90							13	20	60	7	100%
39						7	8	9	15		71-80						18	21	23	39		100%
37					7	9	8	7	4	2	61-70					19	24	22	19	11	5	100%
12					4	4	3	1			51-60					33	33	25	8			100%
2					2						41-50					100						100%
											31-40											
											21-30											
											11-20											
											0-10											

TABLE LXIV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON IX-E LANGUAGE AND GRADE X LITERATURE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-E LANGUAGE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
1										1	91-100										100	100%
16						1		4	9	2	81-90						6		25	56	13	100%
41					1	4	11	7	18		71-80					2	10	27	17	44		100%
32					4	10	6	8	2	2	61-70					13	31	19	25	6	6	100%
12					5	4	2	1			51-60					42	33	17	8			100%
6					3	1	2				41-50					50	17	33				100%
											31-40											
											2 1-30											
											11-20											
											0-10											

TABLE LXV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT VERBAL (GRADE IX) AND
GRADE X COMPOSITION

Total F	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT VERBAL	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
25						2	4	12	7		91-100						8	16	48	28		100%
23						2	3	13	5		81-90						8	13	57	22		100%
18						4	3	9	2		71-80						22	17	50	11		100%
3							2	1			61-70							67	33			100%
12					1	1	5	5			51-60					8	8	42	42			100%
13						3	5	4	1		41-50						22	39	30	8		100%
4						2	1	1			31-40						50	25	25			100%
6					1	2	2	1			21-30					17	33	33	17			100%
1						1					11-20						100					100%
3						3					0-10						100					100%

TABLE LXVI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT TOTAL (GRADE IX) AND
GRADE X COMPOSITION

Total f	Number of Students										Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT TOTAL	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
36						1	4	19	12		91-100						3	11	53	33		100%
13						3	2	8			81-90						23	15	62			100%
12						2	5	5			71-80						17	42	42			100%
16						4	5	6	1		61-70						25	31	38	6		100%
7							2	4	1		51-60							28	57	14		100%
11					1	4	5	1			41-50					9	36	44	9			100%
4						1		2	1		31-40						25		50	25		100%
7					1	3	2	1			21-30					14	43	28	14			100%
0											11-20											
2						2					0-10						100					100%

TABLE LXVII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS (GRADE IX) AND GRADE X COMPOSITION

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2								1	1		135-140								50	50		100%
2								1	1		130-134								50	50		100%
12						2	2	6	2		125-129						17	17	50	17		100%
7							1	4	2		120-124							14	58	28		100%
22							3	13	6		115-119							14	59	27		100%
18						4	5	7	2		110-114						22	28	39	11		100%
25					1	6	9	8	1		105-109					4	24	36	32	4		100%
9						2	4	3			100-104						22	44	33			100%
8					1	4	1	2			95-99					13	50	13	25			100%
2						1		1			90-94						50		50			100%
1						1					85-89						100					100%

TABLE LXVIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
IX-C LANGUAGE AND GRADE X COMPOSITION

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-C LANGUAGE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
3									3		91-100									100		100%
15							1	7	7		81-90							7	47	47		100%
39						1	8	26	4		71-80						2	21	67	10		100%
37					1	8	15	12	1		61-70					3	22	41	32	3		100%
12					1	9	1	1			51-60					8	75	8	8			100%
2						2					41-50						100					100%
											31-40											
											21-30											
											11-20											
											0-10											

TABLE LXIX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
IX-E LANGUAGE AND GRADE X COMPOSITION

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-E LANGUAGE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
1									1		91-100									100		100%
16							2	6	8		81-90							13	37	50		100%
41						1	8	27	5		71-80						2	19	66	12		100%
32						7	12	12	1		61-70						22	38	38	3		100%
12					1	7	3	1			51-60					8	58	25	8			100%
6					1	5					41-50					17	83					100%
											31-40											
											21-30											
											11-20											
											0-10											

TABLE LXX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT VERBAL (GRADE IX) AND
GRADE X GEOGRAPHY

Total f	Number of Students										Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT VERBAL	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
25						5	6	9	5		91-100						20	24	36	20		100%
23					1	4	5	8	5		81-90					4	17	22	35	22		100%
18					1	3	8	5	1		71-80					6	17	44	28	6		100%
3							1	1	1		61-70							33	33	33		100%
12					1	1	7	3			51-60					8	8	59	25			100%
13					4	6	1	2			41-50					30	47	8	15			100%
4					1		3				31-40					25		75				100%
6					2	1	2		1		21-30					33	17	33		17		100%
1							1				11-20							100				100%
3						2	1				0-10						67	33				100%

TABLE LXXI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT TOTAL (GRADE IX) AND
GRADE X GEOGRAPHY

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT TOTAL	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
36					1	4	8	14	9		91-100					3	11	22	39	25		100%
13						4	4	4	1		81-90						30	30	30	8		100%
12					1	3	5	3			71-80					8	25	42	25			100%
16					2	3	6	4	1		61-70					13	19	38	25	6		100%
7						2	3	1	1		51-60						28	43	14	14		100%
11					4	2	3	1	1		41-50					36	18	27	9	9		100%
4					1		2	1			31-40					25		50	25			100%
7					1	3	3				21-30					14	43	43				100%
											11-20											
2						1	1				0-10						50	50				100%

TABLE LXXII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS (GRADE IX) AND GRADE X GEOGRAPHY

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2									2		135-140									100		100%
2							1	1			130-134							50	50			100%
12					1	2	3	6			125-129					8	17	25	50			100%
7						1		4	2		120-124						14		58	28		100%
22						3	9	6	4		115-119						14	41	27	18		100%
18					1	6	6	3	2		110-114					6	33	33	17	11		100%
25					5	3	10	5	2		105-109					20	12	40	20	8		100%
9						3	3	2	1		100-104						33	33	22	11		100%
8					3	3	1	1			95-99					38	38	13	13			100%
2							2				90-94							100				100%
1						1					85-89						100					100%

TABLE LXXIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON IX-C SOCIAL STUDIES AND GRADE X GEOGRAPHY

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-C SOCIAL STUDIES	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
7								2	5		91-100								28	72		100%
24							7	12	5		81-90							29	50	21		100%
36						6	13	14	3		71-80						17	36	39	8		100%
17					2	7	8				61-70					12	41	47				100%
18					6	6	6				51-60					33	33	33				100%
6					2	3	1				41-50					33	50	17				100%
											31-40											
											21-30											
											11-20											
											0-10											

TABLE LXXIV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON IX-E SOCIAL STUDIES AND GRADE X GEOGRAPHY

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-E SOCIAL STUDIES	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
5							1	1	3		91-100							20	20	60		100%
18							2	9	7		81-90							11	50	39		100%
30					2	6	9	10	3		71-80					7	20	30	33	10		100%
32					5	7	13	7			61-70					16	22	41	22			100%
19					1	7	10	1			51-60					5	37	53	5			100%
2					1	1					41-50					50	50					100%
2					1	1					31-40					50	50					100%
											21-30											
											11-20											
											0-10											

TABLE LXXV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON SCAT QUANTITATIVE (GRADE IX) AND GRADE X MATHEMATICS

Total f	Number of Students											Per Cent of Students									Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT QUANTITATIVE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
26						1	3	5	9	8	91-100						4	12	19	35	31	100%
22					1	3	4	9	4	1	81-90					5	14	18	41	18	5	100%
9			1	1				3	1	3	71-80			11	11				33	11	33	100%
11		1		1	1	3	2	1	2		61-70		9		9	9	27	18	9	18		100%
6				1	2	2		1			51-60				17	33	33		17			100%
11				1	1	3	2	3	1		41-50				9	9	27	18	27	9		100%
7			2				3	2			31-40			28				43	28			100%
7				1	1	5					21-30				14	14	72					100%
5	1			1		1	1			1	11-20	20			20		20	20			20	100%
4			1			3					0-10			25			75					100%

TABLE LXXVI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT TOTAL (GRADE IX) AND
GRADE X MATHEMATICS

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT TOTAL	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
36					1	2	5	7	10	11	91-100					3	6	14	19	28	30	100%
13		1	1	1		1	1	3	4	1	81-90		8	8	8		8	8	23	30	8	100%
12			1		1	3	2	4	1		71-80			8		8	25	17	33	8		100%
16				1	1	5	3	5	1		61-70				6	6	31	19	31	6		100%
7					1	1	3	1		1	51-60					14	14	43	14		14	100%
11			1	2	1	4		2	1		41-50			9	18	9	36		18	9		100%
4				1		2		1			31-40				25		50		25			100%
7	1			1	1	3	1				21-30	14			14	14	43	14				100%
											11-20											
2			1					1			0-10			50					50			100%

TABLE LXXVII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS (GRADE IX) AND GRADE X MATHEMATICS

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2										2	135-140										100	100%
2						1			1		130-134						50			50		100%
12			1		1		1	3	5	1	125-129			8		8		8	25	42	8	100%
7						1		1	2	3	120-124						14		14	28	43	100%
22				1		1	5	8	3	4	115-119				5		5	23	36	14	18	100%
18			1		2	2	4	4	4	1	110-114			6		11	11	22	22	22	6	100%
25				3	1	11	2	6	1	1	105-109				12	4	44	8	24	4	4	100%
9		1			2	1	3		1	1	100-104		11			22	11	33		11	11	100%
8	1		1	2		2		2			95-99	13		13	25		25		25			100%
2				2							90-94						100					100%
1			1								85-89			100								100%

TABLE LXXVIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
IX-C MATHEMATICS AND GRADE X MATHEMATICS

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-C MATHEMATICS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
8									2	6	91-100									25	75	100%
20							3	4	7	6	81-90							15	20	35	30	100%
22						4	2	10	6		71-80						18	9	46	27		100%
24				2	2	6	5	7	1	1	61-70				8	8	25	21	29	4	4	100%
21			2	1	3	6	5	3	1		51-60			9	5	14	29	24	14	5		100%
10		1	2	1	1	5					41-50		10	20	10	10	50					100%
3	1			2							31-40	33			67							100%
											21-30											
											11-20											
											0-10											

TABLE LXXIX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
IX-E MATHEMATICS AND GRADE X MATHEMATICS

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-E MATHEMATICS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
15						1	1	2	5	6	91-100						7	7	13	33	40	100%
30						4	5	7	8	6	81-90						13	17	23	27	20	100%
26				2	2	2	5	11	3	1	71-80				8	8	8	19	42	12	4	100%
21				1	2	10	4	3	1		61-70				5	10	48	19	14	5		100%
11		1	3	1	2	4					51-60		9	27	9	18	36					100%
4			1	2				1			41-50			25	50				25			100%
											31-40											
1	1										21-30	100										100%
											11-20											
											0-10											

TABLE LXXX

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT QUANTITATIVE (GRADE IX) AND
GRADE X SCIENCE

Total f	Number of Students											Per Cent of Students									Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT QUANTITATIVE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
26							11	6	8	1	91-100							42	23	31	4	100%
22				1		7	6	5	3		81-90				5		32	27	23	14		100%
9					1	1	1	2	3	1	71-80					33	33	33	22	33	11	100%
11				2	2	4	1	2			61-70				18	18	36	9	18			100%
6				1		5					51-60				17		83					100%
11					2	3	2	4			41-50					18	27	18	36			100%
7					2	2	3				31-40					28	28	43				100%
7					1	4	2				21-30					14	58	28				100%
5				2		2			1		11-20				40		40			20		100%
4			1		1	1	1				0-10			25		25	25	25				100%

TABLE LXXXI

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
SCAT TOTAL (GRADE IX) AND
GRADE X SCIENCE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	SCAT TOTAL	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
36						4	9	11	10	2	91-100						11	25	30	28	6	100%
13					1	2	5	1	4		81-90					8	15	39	8	30		100%
12						7	3	2			71-80						58	25	17			100%
16				2	1	7	3	3			61-70				13	6	44	19	19			100%
7					1	2	2	1	1		51-60					14	28	28	14	14		100%
11				2	3	2	3	1			41-50				18	27	18	27	9			100%
4					1	2	1				31-40					25	50	25				100%
7			1	2	1	3					21-30			14	28	14	43					100%
											11-20											
2					1		1				0-10					50		50				100%

TABLE LXXXII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON OTIS (GRADE IX) AND GRADE X SCIENCE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	OTIS	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
2								1		1	135-140								50		50	100%
2							1	1			130-134							50	50			100%
12						3	2	4	3		125-129						25	17	33	25		100%
7						2		3	2		120-124						28		43	28		100%
22						5	7	5	4	1	115-119						23	32	23	18	5	100%
18						7	6	1	4		110-114						39	33	6	22		100%
25				4	4	7	8	1	1		105-109				16	16	28	32	4	4		100%
9					2	2	2	2	1		100-104					22	22	22	22	11		100%
8			1	2	2	1	1	1			95-99			13	25	25	13	13	13			100%
2						2					90-94						100					100%
1					1						85-89					100						100%

TABLE LXXXIII

EXPECTANCY TABLE BASED ON STUDENT SCORES ON
IX-C SCIENCE AND GRADE X SCIENCE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-C SCIENCE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
10								3	6	1	91-100								30	60	10	100%
29						4	9	10	6		81-90						14	31	34	21		100%
38			1	2	4	10	12	6	2	1	71-80			3	5	11	26	32	16	5	3	100%
22				3	3	11	4		1		61-70				14	14	50	18		5		100%
9				1	2	4	2				51-60				11	22	44	22				100%
											41-50											
											31-40											
											21-30											
											11-20											
											0-10											

TABLE LXXXIV

EXPECTANCY TABLE BASED ON STUDENT SCORES ON IX-E SCIENCE AND GRADE X SCIENCE

Total f	Number of Students											Per Cent of Students										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	IX-E SCIENCE	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
4								1	2	1	91-100								25	50	25	100%
21						2	1	10	8		81-90						10	5	48	38		100%
37					2	10	11	8	5	1	71-80					5	27	29	22	14	3	100%
25				1	1	10	13				61-70				4	4	40	52				100%
11				2	3	4	2				51-60				18	27	36	18				100%
10			1	3	3	3					41-50			10	30	30	30					100%
											31-40											
											21-30											
											11-20											
											0-10											

TABLE LXXXV

ANALYSIS OF VARIANCE OF PROVISIONAL PROMOTIONS

Variable	N	s^2	d/f	F	P
SCAT-V	10	43.56	9,180	15.8	.02
SCAT-Q	10	725.40	9,180	1.13	.10
SCAT-T	10	485.61	9,180	1.57	.10
Otis	10	60.06	9,210	1.87	.10
C-Language	10	84.64	9,213	1.97	.10
C-Social Studies	10	43.56	9,213	6.87	.02
C-Mathematics	10	42.96	9,213	7.36	.02
C-Science	10	87.42	9,213	1.89	.10
E-Language	10	25.0	9,212	6.45	.02
E-Social Studies	10	184.9	9,211	1.29	.10
E-Mathematics	10	87.43	9,212	5.09	.02
E-Science	10	89.30	9,211	2.55	.10
X-Literature	10	34.22	9,107	6.05	.02
X-Composition	10	19.36	9,107	5.18	.02
X-Georgraphy	10	43.56	9,107	3.02	.02
X-Mathematics	10	512.09	9,107	1.96	.10
X-Science	10	60.06	9,107	3.62	.02

TABLE LXXXVI

ANALYSIS OF DIFFERENCE BETWEEN MEANS OF PROVISIONALLY PROMOTED STUDENTS AND TOTAL GRADE X SAMPLE

Variable	k_1	k_2	$\bar{X}_1$	$\bar{X}_2$	d/f	t	P
SCAT-V	108	10	69.77	47.7	59	2.91	.01
SCAT-Q	108	10	66.19	42.1	59	2.56	.02
SCAT-T	108	10	71.41	48.1	59	3.11	.01
Otis	108	10	112.3	101.8	59	3.72	.001
X-Literature	108	10	69.82	49.0	59	8.22	.001
X-Composition	108	10	70.35	53.3	59	9.97	.001
X-Geography	108	10	66.35	51.4	59	5.84	.001
X-Mathematics	108	10	68.01	40.4	59	3.64	.001
X-Science	108	10	64.26	45.6	59	5.57	.001

TABLE LXXXVII

ANALYSIS OF VARIANCE OF OVER-AGE STUDENTS

Variable	N	s^2	d/f	F	P
SCAT-V	24	604.90	23,180	1.14	.10
SCAT-Q	24	748.02	23,180	1.09	.10
SCAT-T	24	650.25	23,180	1.17	.10
Otis	29	44.22	28,210	2.54	.02
C-Language	30	102.01	29.213	1.65	.10
C-Social Studies	30	166.41	29,213	1.80	.02
C-Mathematics	30	251.32	29,213	1.25	.10
C-Science	30	148.84	29,213	1.11	.10
E-Language	30	89.30	29,212	1.81	.02
E-Social Studies	30	217.56	29,211	1.10	.10
E-Mathematics	30	214.62	29,212	2.09	.02
E-Science	30	166.41	29,211	1.37	.10

TABLE LXXXVIII

ANALYSIS OF DIFFERENCE BETWEEN MEANS OF OVER-AGE STUDENTS AND TOTAL STUDENT SAMPLE

Variable	k_1	k_2	$\bar{X}_1$	$\bar{X}_2$	d/f	t	P
SCAT-V	181	24	62.39	51.34	102	1.91	.10
SCAT-Q	181	24	55.87	37.8	102	3.13	.01
SCAT-T	181	24	61.68	44.05	102	3.03	.01
Otis	211	29	106.08	97.5	120	3.86	.001
C-Language	214	30	65.8	55.5	122	5.95	.001
C-Social Studies	214	30	64.495	53.9	122	3.58	.001
C-Mathematics	214	30	60.855	46.25	122	5.02	.001
C-Science	214	30	70.035	62.5	122	3.41	.01
E-Language	213	30	63.49	51.35	121	8.55	.001
E-Social Studies	212	30	64.65	57.35	121	2.45	.02
E-Mathematics	213	30	64.71	45.85	121	5.11	.001
E-Science	212	30	64.225	53.35	121	4.03	.001
*X-Literature	108	4	69.82	60.0	56	1.20	.30
*X-Composition	108	4	70.35	54.5	56	3.78	.001
*X-Geography	108	4	66.35	60.5	56	3.08	.01
*X-Mathematics	108	4	68.01	51.5	56	1.39	.20
*X-Science	108	4	64.26	57.25	56	1.58	.20

* Limited sample of over-age students.

TABLE LXXXIX

ANALYSIS OF VARIANCE OF UNDER-AGE STUDENTS

Variable	N	s^2	d/f	F	P
SCAT-V	22	410.0	21,180	1.69	.02
SCAT-Q	22	537.22	21,180	1.53	.02
SCAT-T	22	436.81	21,180	1.74	.02
Otis	27	190.44	26,210	1.69	.02
C-Language	27	68.89	26,213	2.42	.10
C-Social Studies	27	102.01	26,213	2.93	.10
C-Mathematics	27	197.4	26,213	1.15	.02
C-Science	27	48.3	26,213	3.35	.10
E-Language	27	67.24	26,212	2.42	.10
E-Social Studies	27	140.39	26,211	1.71	.02
E-Mathematics	27	196.0	26,212	2.28	.10
E-Science	27	139.24	26,211	1.64	.02
X-Literature	18	140.39	17,107	1.52	.02
X-Composition	18	64.0	17,107	1.49	.02
X-Geography	18	113.42	17,107	1.14	.02
X-Mathematics	18	194.82	17,107	1.92	.02
X-Science	18	162.54	17,107	1.31	.02

TABLE XC

ANALYSIS OF DIFFERENCE BETWEEN MEANS OF UNDER-AGE STUDENTS AND TOTAL STUDENT SAMPLE

Variable	k_1	k_2	$\bar{X}_1$	$\bar{X}_2$	d/f	t	P
SCAT-V	181	22	62.39	71.4	100	1.89	.10
SCAT-Q	181	22	55.87	70.1	100	2.42	.01
SCAT-T	181	22	61.68	74.4	100	4.48	.001
Otis	211	27	106.08	118.7	119	5.46	.001
C-Language	214	27	65.8	73.8	120	4.28	.001
C-Social Studies	214	27	64.495	73.3	120	3.87	.001
C-Mathematics	214	27	60.855	72.8	120	3.85	.001
C-Science	214	27	70.035	76.4	120	3.59	.001
E-Language	213	27	63.49	72.01	120	4.75	.001
E-Social Studies	212	27	64.65	71.9	119	2.61	.01
E-Mathematics	213	27	64.71	76.0	120	3.61	.001
E-Science	212	27	64.225	71.6	119	2.95	.01
X-Literature	108	18	69.82	71.9	68	.65	.50
X-Composition	108	18	70.35	72.0	68	.61	.50
X-Geography	108	18	66.35	68.0	68	.53	.50
X-Mathematics	108	18	68.01	74.5	68	1.71	.10
X-Science	108	18	64.26	68.0	68	1.23	.30

APPENDIX "B"

OTIS QUICK-SCORING MENTAL ABILITY TESTS

By ARTHUR S. OTIS, PH.D.

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

Gamma

AM

GAMMA TEST: FORM AM

IQ..... For Senior High Schools and Colleges Score.....

Read this page. Do what it tells you to do.

Do not open this booklet, or turn it over, until you are told to do so.
Fill these blanks, giving your name, age, birthday, etc. Write plainly.

Name..... Age last birthday .....years
First name, initial, and last name

Birthday..... Teacher..... Date.....19.....
Month Day

Grade..... School..... City.....

This is a test to see how well you can think. It contains questions of different kinds. Here are three sample questions. Five answers are given under each question. Read each question and decide which of the five answers below it is the right answer.

Sample a: Which one of the five things below is soft?

① glass ② stone ③ cotton ④ iron ⑤ ice.....

1 2 3 4 5
| | | ▮ | | |

The right answer, of course, is *cotton;* so the word *cotton* is underlined. And the word *cotton* is No. 3; so a heavy mark has been put in the space under the 3 at the right. This is the way you are to answer the questions.

Try the next sample question yourself. Do not write the answer; just draw a line under it and then put a heavy mark in the space under the right number.

Sample b: A robin is a kind of —

⑥ plant ⑦ bird ⑧ worm ⑨ fish ⑩ flower....

6 7 8 9 10
| | | | | |

The answer is *bird;* so you should have drawn a line under the word *bird*, and *bird* is No. 7; so you should have put a heavy mark in the space under the 7. Try this one:

Sample c: Which one of the five numbers below is larger than 55?

⑪ 53 ⑫ 48 ⑬ 29 ⑭ 57 ⑮ 16.....

11 12 13 14 15
| | | | | |

The answer, of course, is 57; so you should have drawn a line under 57, and that is No. 14; so you should have put a heavy mark in the space under the 14.

The test contains 80 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.

ANSWER SHEET

Otis Quick-Scoring : Gamma : Am

Page 6

64 66 67 68 69 70
65 71 72 73 74 75
66 76 77 78 79 80
67 1 2 3 4 5
68 6 7 8 9 10
69 11 12 13 14 15
70 16 17 18 19 20
71 21 22 23 24 25
72 26 27 28 29 30
73 31 32 33 34
74 36 37 38
75 41 42 43 44
76 46 47 48 49 50
77 51 52 53 54 55
78 56 57 58 59 60
79 61 62 63 64 65
80 66 67 68 69 70

Page 5

46 66 67 68 69 70
47 71 72 73 74 75
48 76 77 78 79 80
49 81 82 83 84 85
50 86 87 88 89
51 1 2 3
52 6 7 8 9 10
53 11 12 13 14 15
54 16 17 18 19 20
55 21 22 23 24 25
56 26 27 28 29
57 31 32 33 34 35
58 36 37 38 39 40
59 41 42 43 44 45
60 46 47 48 49 50
61 51 52 53 54
62 56 57 58 59 60
63 61 62 63 64 65

Page 4

22 26 27 28 29 30
23 31 32 33 34 35
24 36 37 38 39 40
25 41 42 43
26 46 47 48 49 50
27 51 52 53 54 55
28 56 57 58 59 60
29 61 62 63 64 65
30 66 67 68 69 70
31 71 72 73 74 75
32 76 77 78 79 80
33 1 2 3 4
34 6 7 8 9 10
35 11 12 13 14
36 16 17 18 19 20
37 21 22 23
38 26 27 28 29 30
39 31 32 33 34 35
40 36 37 38 39 40
41 41 42 43 44 45
42 46 47 48 49 50
43 51 52 53
44 56 57 58 59 60
45 61 62 63 64

Page 3

1 1 2 3 4 5
2 6 7 8 9 10
3 11 12 13 14 15
4 16 17 18 19 20
5 21 22 23 24 25
6 26 27 28 29 30
7 31 32 33 34 35
8 36 37 38 39
9 41 42 43 44 45
10 46 47 48 49 50
11 51 52 53 54 55
12 56 57 58 59 60
13 61 62 63 64 65
14 66 67 68 69 70
15 71 72 73 74 75
16 76 77 78 79 80
17 1 2 3 4 5
18 6 7 8 9 10
19 11 12 13 14
20 16 17 18 19 20
21 21 22 23 24 25

NOTE. *This Answer Sheet is not intended for machine scoring.* [2]

1. The opposite of hate is —
   ① enemy ② fear ③ love ④ friend ⑤ joy

2. If 2 pencils cost 5 cents, how many pencils can be bought for 50 cents?
   ⑥ 100 ⑦ 10 ⑧ 20 ⑨ 25 ⑩ 5

3. A dog does not always have —
   ⑪ eyes ⑫ bones ⑬ a nose ⑭ a collar ⑮ lungs

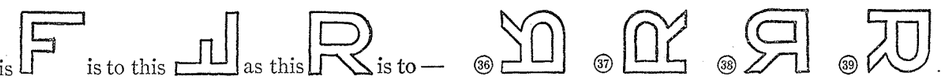
4. A recollection that is indefinite and uncertain may be said to be —
   ⑯ forgotten ⑰ secure ⑱ vague ⑲ imminent ⑳ fond

5. Which of these words would come first in the dictionary?
   ㉑ more ㉒ pile ㉓ mist ㉔ pick ㉕ mine

6. A fox most resembles a —
   ㉖ pig ㉗ goat ㉘ wolf ㉙ tiger ㉚ cat

7. Gold is more costly than silver because it is —
   ㉛ heavier ㉜ scarcer ㉝ yellower ㉞ harder ㉟ prettier

8. The first drawing below is related to the second in the same way that the third one is to one of the remaining four. Which one?



9. A radio is related to a telephone in the same way that (?) is to a railroad train.
   ㊶ a highway ㊷ an airplane ㊸ gasoline ㊹ speed ㊺ noise

10. The opposite of wasteful is —
    ㊻ wealthy ㊼ quiet ㊽ stingy ㊾ economical ㊿ extravagant

11. A debate always involves —
    (51) an audience (52) judges (53) a prize (54) a controversy (55) an auditorium

12. A party consisted of a man and his wife, his two sons and their wives, and four children in each son's family. How many were there in the party?
    (56) 7 (57) 8 (58) 12 (59) 13 (60) 14

13. One number is wrong in the following series.
    1 5 2 6 3 7 4 9 5 9
    What should that number be?
    (61) 9 (62) 7 (63) 8 (64) 10 (65) 5

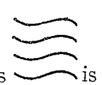
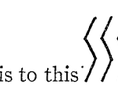
14. A school is most likely to have —
    (66) maps (67) books (68) a janitor (69) a teacher (70) a blackboard

15. What letter in the word WASHINGTON is the same number in the word (counting from the beginning) as it is in the alphabet?
    (71) A (72) N (73) G (74) T (75) O

16. Which word makes the truest sentence? Fathers are (?) wiser than their sons.
    (76) always (77) usually (78) much (79) rarely (80) never

17. Four of these five things are alike in some way. Which one is not like the other four?
    ① nut ② turnip ③ rose ④ apple ⑤ potatoes

18. The opposite of frequently is —
    ⑥ occasionally ⑦ seldom ⑧ never ⑨ periodically ⑩ often

19. This  is to this  as this  is to — ⑪  ⑫  ⑬  ⑭ 

20. At a dinner there is always —
    ⑯ soup ⑰ wine ⑱ food ⑲ waiters ⑳ dishes

21. If 10 boxes full of apples weigh 400 pounds, and each box when empty weighs 4 pounds, how many pounds do all the apples weigh?
    ㉑ 40 ㉒ 360 ㉓ 396 ㉔ 400 ㉕ 404

(Go right on to the next page.)

22. If a boy can run at the rate of 5 feet in $\frac{1}{5}$ of a second, how many feet can he run in 10 seconds? (26) 1 (27) 50 (28) 250 (29) 2 (30) 25

23. A thermometer is related to temperature as a speedometer is to —
    (31) fast (32) automobile (33) velocity (34) time (35) heat

24. "State of changing place" is a good definition for —
    (36) advancement (37) retardation (38) rotation (39) motion (40) revision

25. If the first two statements following are true, the third is (?).
    All residents in this block are Republicans.
    Smith is not a Republican. Smith resides in this block.
    (41) true (42) false (43) not certain

26. If the words below were arranged to make a good sentence, with what letter would the second word of the sentence begin?
    same means big large the as
    (46) a (47) b (48) m (49) s (50) t

27. Sunlight is to darkness as (?) is to stillness.
    (51) quiet (52) sound (53) dark (54) loud (55) moonlight

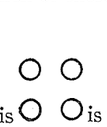
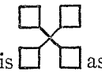
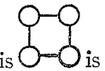
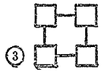
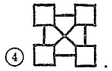
28. A grandmother is always (?) than her granddaughter.
    (56) smarter (57) more quiet (58) older (59) smaller (60) slower

29. Such things as looks, dress, likes, and dislikes indicate one's —
    (61) character (62) wisdom (63) personality (64) gossip (65) reputation

30. A tree always has —
    (66) leaves (67) fruit (68) buds (69) roots (70) a shadow

31. In general it is safest to judge a man's character by his —
    (71) voice (72) clothes (73) deeds (74) wealth (75) face

32. Which of these words is related to many as exceptional is to ordinary?
    (76) none (77) each (78) more (79) much (80) few

33. This  is to this  as this  is to — ①  ②  ③  ④ 

34. What is related to a cube in the same way that a circle is related to a square?
    ⑥ circumference ⑦ corners ⑧ sphere ⑨ solid ⑩ thickness

35. Which one of these pairs of words is most unlike the other three?
    ⑪ run — fast ⑫ large — big ⑬ loan — lend ⑭ buy — purchase

36. The opposite of awkward is —
    ⑯ strong ⑰ pretty ⑱ graceful ⑲ short ⑳ swift

37. The two words superfluous and requisite mean —
    ㉑ the same ㉒ the opposite ㉓ neither same nor opposite

38. Of the five words below, four are alike in a certain way. Which one is not like these four?
    ㉖ push ㉗ hold ㉘ lift ㉙ drag ㉚ pull

39. The idea that the earth is flat is —
    ㉛ absurd ㉜ misleading ㉝ improbable ㉞ unfair ㉟ wicked

40. The opposite of loyal is —
    ㊱ treacherous ㊲ enemy ㊳ thief ㊴ coward ㊵ jealous

41. The moon is related to the earth as the earth is to —
    ㊶ Mars ㊷ the sun ㊸ clouds ㊹ stars ㊺ the universe

42. The opposite of sorrow is —
    ㊻ fun ㊼ success ㊽ joy ㊾ prosperity ㊿ hope

43. If the first two statements are true, the third is (?).
    Frank is older than George. James is older than Frank.
    George is younger than James.
    (51) true (52) false (53) not certain

44. If $2\frac{1}{2}$ yards of cloth cost 30 cents, what will 10 yards cost?
    (56) $1.20 (57) 75¢ (58) 40¢ (59) $3.00 (60) $37\frac{1}{2}$¢

45. Congest means to bring together, condole means to grieve together.
    Therefore con means — (61) to bring (62) together (63) to grieve (64) to bring or grieve together

(Go right on to the next page.)

46. The law of gravitation is —
(66) obsolete (67) absolute (68) approximate (69) conditional (70) constitutional

47. Oil is to toil as (?) is to hate.
(71) love (72) work (73) boil (74) ate (75) hat

48. If $4\frac{1}{2}$ yards of cloth cost 90 cents, what will $3\frac{1}{2}$ yards cost?
(76) \$3.15 (77) $86\frac{1}{2}¢$ (78) 70¢ (79) 89¢ (80) 35¢

49. Which number in this series appears a second time nearest the beginning?
6 4 5 3 7 8 0 9 5 9 8 8 6 5 4 7 3 0 8 9 1
(81) 9 (82) 0 (83) 8 (84) 6 (85) 5

50. This  is to this  as this  is to — (86)  (87)  (88)  (89) 

51. If the first two statements following are true, the third is (?).
Some of our citizens are Methodists. Some of our citizens are doctors.
Some of our citizens are Methodist doctors.
(1) true (2) false (3) not certain

52. Which one of the five words below is most unlike the other four?
(6) fast (7) agile (8) run (9) quick (10) speedy

53. One who says things he knows to be wrong is said to be —
(11) careless (12) misled (13) conceited (14) untruthful (15) prejudiced

54. If the words below were arranged to make the *best* sentence,
with what letter would the last word of the sentence end?
sincerity traits courtesy character of desirable and are
(16) r (17) y (18) s (19) e (20) d

55. If a strip of cloth 36 inches long will shrink to 33 inches when washed,
how many inches long will a 48-inch strip be after shrinking?
(21) 47 (22) 44 (23) 45 (24) 46 (25) $45\frac{1}{2}$

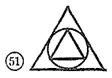
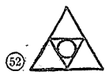
56. Which of these expressions is most unlike the other three?
(26) draw pictures (27) clean house (28) come home (29) work problems

57. If the following words were seen on a wall by looking at a mirror on the opposite wall,
which word would appear exactly the same as if seen directly?
(31) MEET (32) ROTOR (33) MAMA (34) DEED (35) TOOT

58. Find the two letters in the word ACTOR which have just as many letters between them in
the word as in the alphabet. Which one of these two letters comes first in the alphabet?
(36) A (37) C (38) T (39) O (40) R

59. A surface is related to a line as a line is to a —
(41) solid (42) plane (43) curve (44) point (45) string

60. One number is wrong in the following series.
1 2 4 7 11 16 23
What should that number be?
(46) 3 (47) 6 (48) 10 (49) 16 (50) 22

61. This  is to this  as this  is to — (51)  (52)  (53)  (54) 

62. How many of the following words can be made from the letters in the word
STRANGLE, using any letter any number of times?
greatest, tangle, garage, stresses, related, grease, nearest, reeling
(56) 7 (57) 6 (58) 3 (59) 4 (60) 5

63. Which of the following is a trait of character?
(61) reputation (62) wealth (63) influence (64) fickleness (65) strength

(Go right on to the next page.)

64. A statement the meaning of which is not definite is said to be —
(66) erroneous (67) doubtful (68) ambiguous (69) distorted (70) hypothetical

65. Evolution is to revolution as crawl is to —
(71) baby (72) floor (73) stand (74) run (75) hands and knees

66. Coming is to came as now is to —
(76) today (77) some time (78) tomorrow (79) before now (80) hereafter

67. One number is wrong in the following series.
1 2 4 8 16 32 64 96
What should that number be?
(1) 3 (2) 6 (3) 12 (4) 48 (5) 128

68. If George can ride a bicycle 60 feet while Frank runs 40 feet, how many feet can
George ride while Frank runs 30 feet?
(6) 50 (7) 10 (8) 45 (9) 20 (10) 70

69. What letter is the fourth letter to the left of the letter which is midway
between D and I in the word REPRODUCTION?
(11) C (12) R (13) O (14) N (15) D

70. Which of the five things following is most like these three: ivory, snow, and milk?
(16) butter (17) rain (18) cold (19) cotton (20) water

71. A hotel serves a mixture of 2 parts cream and 3 parts milk.
How many pints of milk will it take to make 25 pints of the mixture?
(21) 25 (22) $16\frac{2}{3}$ (23) 15 (24) $12\frac{1}{2}$ (25) 10

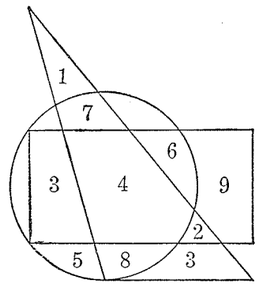
72. A man who spends his money lavishly for non-essentials is considered to be —
(26) fortunate (27) thrifty (28) extravagant (29) generous (30) economical

73. This  is to this  as this  is to — (31)  (32)  (33)  (34) 

74. If the first two statements following are true, the third is (?).
One cannot become a good violinist without much practice.
Charles practices much on the violin. Charles will become a good violinist.
(36) true (37) false (38) not certain

75. Which of these expressions is most unlike the other three?
(41) small to tiny (42) pretty to beautiful (43) warm to hot (44) excellent to go

76. If the words below were rearranged to make a good sentence,
the *fifth* word in the sentence would begin with what letter?
life friends valuable to The make asset in a is ability
(46) l (47) f (48) v (49) t (50) a



77. What number is in the space that is in the rectangle and in the triangle
but not in the circle?
(51) 1 (52) 2 (53) 3 (54) 4 (55) 5

78. What number is in the same geometrical figure or figures (and no others)
as the number 6?
(56) 1 (57) 2 (58) 3 (59) 4 (60) 5

79. How many numbers are there each of which is in two geometrical figures
but only two?
(61) 1 (62) 2 (63) 3 (64) 4 (65) 5

80. If a wire 40 inches long is to be cut so that one piece is $\frac{2}{3}$ as long as the other piece,
how long must the shorter piece be?
(66) $26\frac{2}{3}$ in. (67) $39\frac{1}{3}$ in. (68) 18 in. (69) 24 in. (70) 16 in.

Cooperative School and College Ability Tests

School Ability Test

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

Form 3A

General Directions

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

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

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

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

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

DIRECTIONS FOR PART I

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

Sample Question

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

A small B tired C old
D untrained E intelligent

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

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

PART I / TIME: 15 MINUTES

1 A disease does not just happen; there is always a ( ) for it.

A victim B defense C cause
D doctor E cure

2 Pheasants ( ) so perfectly with the ground and the dead plants that you rarely see them until they rise.

F thrive G nest H belong
J agree K blend

3 Determined not to let anything bother her, she ( ) his remarks.

A resented B understood C ignored
D attacked E overheard

4 The general was suddenly as eager as an old war horse that has heard the strains of a ( ) song.

F funeral G hillbilly H love
J marching K childhood

5 With his long ( ), Jameson could set a pace which left most of us far behind.

A start B stride C memory
D activity E distance

6 In contrast to the busy life of oasis towns are the numerous ( ) of once thriving settlements now abandoned.

F ruins G people H activities
J deserts K problems

7 Since our food supply is at stake, the question of how agriculture fares is ( ) to us, whether we live in the city or on the farm.

A known B open C vital
D distasteful E foreign

8 Eugene Debs had asked the strikers to refrain from violence, but their anger was such that they could not be ( ).

F disturbed G restrained H violent
J satisfied K frightened

9 Such courageous ( ) as the President showed would have been called obstinacy in a lesser man.

A cheerfulness B reverence C impatience
D justification E determination

10 Wars have often had ( ) causes; one was begun merely because a sailor's ear had been slashed!

F primary G hidden H insignificant
J unavoidable K multiple

11 Although the first battle of the war was won on the other side of the globe, Cuba was the ( ) field of military operations.

A only B chief C complete
D open E opposite

12 If there are too many people in any area for the available natural resources to ( ), there will be suffering and hardship.

F exist G contain H operate
J employ K support

13 Soil conservation is not entirely ( ), for the Romans and Inca Indians both made some use of contouring and crop rotation.

A satisfactory B scientific C exhausted
D new E needed

14 To the pioneer, forests were a ( ), for they hid his enemies and prevented his use of the land.

F menace G necessity H mystery
J resource K surprise

15 It would have been different perhaps if the dog had ever started fights or looked for trouble; but he had a ( ) disposition.

A stubborn B suitable C gentle
D gloomy E strange

16 If you had told the artist Matisse that he drew and painted like a child, he would have felt ( ), for he greatly admired the fresh and unsophisticated qualities of children's work.

F complimented G insulted H startled
J convulsed K concerned

17 The greatest disadvantage was the loss of my personal ( ); when I was in high school I did not have to get permission to go to a show or a dance.

A liberty B friends C opinion
D income E beliefs

18 Since the problem facing milk and grain cooperatives is one of ( ), a new outlet must be found or a new demand must be developed.

F scarcity G supply H labor
J agriculture K surplus

19 Jarvis did not please the critics, but he received many ( ) from the public for his fine performance.

A commendations B resolutions
C admonitions D consolations E inquiries

Go on to the next page.

20 The leaders of the nation were so divided in their opinions that agreement on a united program of action seemed ( ).

F useless G apparent H near
J unlikely K unusual

21 Primitive man felt a need for ( ) that could not always be attained by voice or gesture.

A possessions B security C speech
D notice E communication

22 The country soon learned that the President did not make ( ) threats, for he was quick to act when his warnings were ignored.

F many G real H secret
J empty K open

23 It must have taken great ( ) for early sailors to venture out on the sea, constantly fearing that they might sail off the edge of the earth.

A ships B skill C daring
D understanding E planning

24 Far from being the original home of life, the deep sea has probably been ( ) for a relatively short time.

F active G explored H deserted
J created K inhabited

25 Lacking the ( ) of wit, his lectures were more nourishing than appetizing.

A wisdom B flavoring C smoothness
D elegance E simplicity

26 Early calendar makers knew the appearance of the heavens, for they spent much time ( ).

F awake G experimenting H calculating
J outdoors K flying

27 ( ) countries have special trade problems, since they must either exchange products with their neighbors or move their goods across the lands of other nations to the outside world.

A Foreign B Agricultural C Backward
D Landlocked E Small

28 With the air of a ( ) tied to the stake, Mr. Blandings extended a limp hand to the first guest.

F dog G cannibal H knight
J ship K martyr

29 So common had the automobile become by 1928 that the middle-class American family without one became almost a ( ).

A disgrace B curiosity C fact
D fantasy E hardship

30 For me, wanting to be happy is a ( ) ambition, for I find it very difficult to be unhappy.

F superfluous G permanent H primary
J dangerous K futile

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

DIRECTIONS FOR PART II

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

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

Sample Problem

$$\begin{array}{r} 5413 \\ -4827 \\ \hline \end{array}$$

F 586 G 596 H 696
J 1586 K None of these

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

PART II / TIME: 20 MINUTES

1 $\frac{1}{2} + \frac{3}{4}$

A $\frac{3}{8}$
B $\frac{7}{8}$
C 1
D $1\frac{1}{8}$
E None of these

2 $\frac{3}{8} \times \frac{12}{10} = (?)$

F $\frac{1}{20}$
G $\frac{5}{16}$
H $\frac{9}{20}$
J $\frac{5}{6}$
K $3\frac{1}{5}$

3 $6 \times 10 = 12 \times (?)$

A $\frac{1}{2}$
B $\frac{3}{5}$
C 2
D $\frac{6}{5}$
E 5

4 $1.25 \times 250 = (?)$

F 3.125
G 20
H 31.25
J 200
K 312.5

5 $2000 - 299 = (?)$

A 1701
B 1711
C 1799
D 1801
E None of these

6 $5555 \times 505 = (?)$

F 305,275
G 305,525
H 2,780,275
J 2,805,275
K None of these

7 $1 \div 1\frac{1}{2} = (?)$

A $\frac{1}{2}$
B $\frac{2}{3}$
C 1
D $1\frac{1}{2}$
E 2

8 $\frac{12}{48} = \frac{4}{?}$

F 1
G 12
H 16
J 40
K None of these

9 $12 + 1.2 + 0.012 = (?)$

A 12.132
B 12.24
C 13.212
D 13.32
E None of these

10 What is the remainder when 612 is divided by 16?

F 0
G 1
H 3
J 4
K 12

11 $\frac{7}{8} + \frac{5}{12} + \frac{1}{6} = (?)$

A $\frac{13}{48}$
B $\frac{1}{2}$
C $1\frac{11}{24}$
D $1\frac{11}{12}$
E None of these

12 What per cent of 60 is 57?

F 15
G 19
H 85
J 90
K 95

13 $3\frac{3}{8} - 2\frac{2}{5} = (?)$

A $\frac{19}{20}$
B $\frac{39}{40}$
C $1\frac{1}{40}$
D $1\frac{1}{3}$
E $1\frac{39}{40}$

14 $2.3 - 0.434 = (?)$

F 1.866
G 1.876
H 1.966
J 2.866
K None of these

15 5 million divided by 25 hundred equals

A 2
B 200
C 2000
D 20,000
E 200,000

16 $6.875 \times 1.6 = (?)$

F 10.99
G 11
H 11.99
J 23.6
K None of these

17 Reduce $\frac{210}{462}$ to lowest terms.

A $\frac{3}{7}$
B $\frac{3}{8}$
C $\frac{4}{9}$
D $\frac{5}{11}$
E $\frac{5}{12}$

18 $1350 \div 0.09 = (?)$

F 1.5
G 15
H 150
J 1500
K 15,000

19 What fraction of $\frac{2}{3}$ is $\frac{1}{2}$?

A $\frac{2}{3}$
B $\frac{3}{4}$
C $\frac{2}{5}$
D $\frac{3}{7}$
E $\frac{4}{7}$

20 Change $\frac{9}{40}$ to a per cent.

F $2\frac{1}{4}\%$
G $12\frac{1}{2}\%$
H $22\frac{1}{2}\%$
J $44\frac{4}{9}\%$
K None of these

Go on to the next page.

21 $2\overline{)5 \text{ years } 6 \text{ months}}$

A 2 years 3 months
B 2 years 6 months
C 2 years 8 months
D 2 years 9 months
E None of these

22 88 is 110 per cent of what number?

F 78
G 79.2
H 80
J 96.8
K 98

23 $87\frac{1}{2} \div 16\frac{2}{3} = (?)$

A 5
B $5\frac{1}{4}$
C $5\frac{1}{2}$
D 6
E None of these

24 Change .3125 to a common fraction.

F $\frac{1}{32}$
G $\frac{5}{16}$
H $\frac{13}{40}$
J $\frac{3}{8}$
K $\frac{25}{8}$

25 $\frac{5}{8}\% \times 47{,}360 = (?)$

A 296
B 757.76
C 2960
D 29,600
E 75,776

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

DIRECTIONS FOR PART III

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

Example Question

CHILLY

A tired B nice C dry
D cold E sunny

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

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

PART III / TIME: 10 MINUTES

1 allow
- A descend
- B repeal
- C permit
- D trust
- E pretend

2 triple
- F genuine
- G bound
- H rapid
- J threefold
- K stumbling

3 symbol
- A reason
- B gong
- C charm
- D quality
- E sign

4 absurd
- F foolish
- G hard
- H uneven
- J childlike
- K witty

5 reinforce
- A speak loudly
- B come again to
- C revise
- D apply again
- E make stronger

6 allegiance
- F reading
- G legibility
- H protection
- J loyalty
- K fighting unit

7 necessitate
- A make essential
- B continue indefinitely
- C vibrate
- D compete
- E barely survive

8 adequate
- F too much
- G very old
- H half right
- J enough
- K very able

9 specify
- A sort out
- B examine
- C state in detail
- D promise
- E be an authority

10 obsolete
- F out of date
- G expressive
- H unpleasant
- J deserted
- K lacking sunlight

11 tolerable
- A free
- B flexible
- C bearable
- D open-minded
- E inferior

12 hilarity
- F drunkenness
- G shortsightedness
- H altitude
- J mockery
- K great amusement

13 baffle
- A thrash
- B perplex
- C lock up
- D fill to the top
- E laugh at

14 controversy
- F dispute
- G investigation
- H fullness
- J proof
- K quiet talk

15 clarify
- A free from an accusation
- B alarm
- C explain
- D discover
- E divide into similar groups

16 integrity
- F rough surface
- G honesty
- H quantity more than zero
- J inequality
- K inherited wealth

17 sever
- A tie
- B twist
- C cut
- D endure
- E scold

18 protrude
- F insult
- G support
- H grow large
- J stick out
- K butt into

19 futile
- A childish
- B breakable
- C useless
- D productive
- E evasive

20 pendulum
- F swinging body
- G weight
- H clock
- J dungeon
- K five-sided figure

21 status
- A law
- B monument
- C union of states
- D dependability
- E condition

Go on to the next page.

22 solicit

F ask for
G make legal
H illuminate
J grant
K deserve

23 optimism

A best condition
B favorable view
C carelessness
D study of vision
E taking advantage

24 immaculate

F fashionable
G distinguished
H tardy
J powerless
K spotless

25 homage

A baseness
B reverence
C food
D abode
E manhood

26 stimulate

F deceive
G recover
H spur on
J imitate
K copy

27 shortcoming

A brief space of time
B lack of money
C lack of breath
D a sharp blow
E fault

28 tendency

F attention
G trend
H sensitivity
J intention
K weakness

29 quell

A make trouble
B ring
C tremble
D overpower
E displace

30 qualm

F duty
G feeling of shame
H state of rest
J misgiving
K shudder

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

DIRECTIONS FOR PART IV

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

Sample Problem

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

F 20 G 10 H 8
J 40 K 2

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

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

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

PART IV / TIME: 25 MINUTES

1 In preparing for a banquet, if 3 women shared equally the task of peeling 4 baskets of potatoes containing 60 potatoes each, how many potatoes did each woman peel?

A 15
B 20
C 45
D 80
E 720

2 At the beginning of a certain month a man's bank balance was $315. If he deposited $75 and withdrew $15 during the month, what was his bank balance at the end of the month?

F $255
G $365
H $370
J $375
K $385

3 Three dinner checks came to $2.40, $2.70, and $3.20. If one man paid for all three, how much change did he get from a $10 bill?

A $1.30
B $1.70
C $2.30
D $2.70
E $8.30

4 A girl gets paid 75 cents an hour for baby sitting. How many hours of baby sitting will it take her to earn $12?

F 8
G 9
H 15
J 16
K 21

5 A dealer bought baseballs for $10.80 per dozen and sold them for $1.25 each. What was his profit per dozen?

A $1.70
B $3.50
C $4.20
D $5.20
E $5.40

6 A child drank $1\frac{1}{2}$ cups of milk. If 2 cups equal 1 pint, what fraction of a pint of milk did he drink?

F $\frac{1}{3}$
G $\frac{3}{8}$
H $\frac{5}{8}$
J $\frac{2}{3}$
K $\frac{3}{4}$

7 How much would a pair of skates marked $8.50 cost after a 10 per cent discount?

A $0.85
B $7.65
C $7.75
D $8.40
E $8.65

8 A man borrows $60 from a friend for one year. If he has to pay $5\frac{1}{2}$ per cent interest, how much must he pay back at the end of the year?

F $54.50
G $56.70
H $63.30
J $65.50
K $66.60

9 A man works 40 hours a week for the 52 weeks in a year. His salary is $2600 a year. What is his hourly rate of pay?

A $1.25
B $1.33
C $1.35
D $1.50
E $1.85

10 Apples were selling at 4 for a quarter. If a boy bought 10 dozen and sold all of them for 10 cents each, what was his profit?

F $0.37
G $0.45
H $1.50
J $2.50
K $4.50

11 A man drove through town X at 3:15 p.m. and through town Y at 4:30 p.m. His average speed was 40 miles per hour. How many miles is it from X to Y?

A 30
B 32
C 50
D 70
E 75

Go on to the next page.

12 For how many days will 80 tons of coal heat a large office building if 1250 pounds are used each day? (1 ton = 2000 lb.)

F $15\frac{5}{8}$
G $31\frac{1}{4}$
H 50
J 128
K $156\frac{1}{4}$

13 A printer charges \$5.00 for printing the first 100 invitations and \$2.00 for each additional 100. How many invitations can be obtained for \$15.00?

A 300
B 400
C 500
D 600
E 750

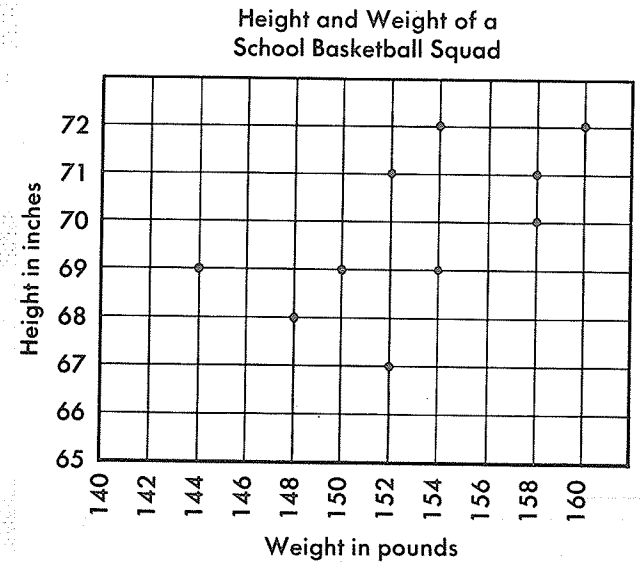
14 If $2\frac{3}{4}$ pounds of candy cost \$1.32, what is the price per pound?

F \$0.33
G \$0.36
H \$0.48
J \$0.99
K \$3.63

15 A teacher who has pupils from 2 p.m. to 4:30 p.m. divides her time into 6 equal periods. How many minutes long is each period?

A 15
B 24
C 25
D 30
E $41\frac{2}{3}$

Questions **16–19** are based on the following chart.



16 The heaviest boy on the squad weighed how many pounds more than the lightest boy on the squad?

F 5
G 8
H 10
J 14
K 16

17 Find the average weight, in pounds, of the 4 tallest boys on the squad.

A 156
B 156.5
C 157
D 157.5
E 158

18 What fraction of the boys on the squad weighed *more* than 150 pounds?

F $\frac{3}{10}$
G $\frac{1}{2}$
H $\frac{3}{5}$
J $\frac{7}{10}$
K $\frac{4}{5}$

19 In one game the five tallest boys played for the first half hour and the five heaviest boys played for the second half hour. How many boys played a whole hour?

A 1
B 2
C 3
D 4
E 5

---

20 It took a salesman 15 hours to drive 300 miles. If his average speed had been 5 miles per hour faster, how many hours would it have taken him?

F 10
G 12
H 15
J 20
K 25

21 The blueprint of a house is drawn to the scale of 1 inch = 6 feet. How many square feet are there in a room which measures $1\frac{1}{2}$ inches by $2\frac{1}{2}$ inches on the blueprint?

A $22\frac{1}{2}$
B 24
C 45
D 48
E 135

Go on to the next page.

22 In twelve years Frank will be 3 times as old as he is now. How old is he now?

F 3
G 4
H 6
J 12
K 18

23 One student measured the distance between two towns on a map as $1\frac{7}{8}$ inches. A second student measured the same distance as $1\frac{13}{16}$ inches. What was the average, in inches, of these two measurements?

A $1\frac{3}{4}$
B $1\frac{5}{6}$
C $1\frac{5}{8}$
D $1\frac{11}{16}$
E $1\frac{27}{32}$

24 A firm shares the cost of group insurance with its employees, paying 75 cents per month for each employee. If each employee pays $1.80 per month, approximately what per cent of the total cost of this insurance is the firm paying?

F 29%
G 42%
H 58%
J 71%
K 240%

25 A length is given as n feet y inches. How many inches is this?

A $12n + 12y$
B $12n + y$
C $n + 12y$
D $n + y$
E $n + \frac{y}{12}$

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

Name of Inspector.....

Name of Student.....
(Surname) (First name) (Middle name)

School.....
(Name of School) (P.O. Address of School)

Room Number.....

DEPARTMENT OF EDUCATION

MANITOBA

EXAMINATIONS, JUNE, 1964

GRADE IX LANGUAGE

Thursday, June 18th, 9.00 to 11.00 a.m.

Examiners: Mrs. E. A. Howatson, Mrs. A. Rae

Note to students: Proper punctuation, correct spelling, legible handwriting, and neatness will be taken into consideration in the marking of this paper.

Values

$10 \times \frac{1}{2}$ 1. Choose ANY FIVE of the following English words. In the spaces below

(*a*) write the words chosen.

(*b*) state the root from which each word is derived and

(*c*) give the meaning of the root.

visible, phobia, paternal, deity, junction, ignition, mortal

English Word	Root	Meaning of Root
1.		
2.		
3.		
4.		
5.		

$5 \times \frac{1}{2}$ 2. Underline the word or expression in parenthesis that has a similar meaning to the given word:

Given Word	
defective:	(faulty, well-made, shiny, dull)
subside:	(surrender, upset, increase, abate)
miscellaneous:	(untidy, small, of various kinds, of the same kind)
colossal:	(clumsy, huge, small, ordinary)
insignificant:	(sickly, simple, important, unimportant)

$5 \times \frac{1}{2}$ 3. Fill in the blanks with a suitable word from the list below:

(1) Velvet is a ..... with a fine, soft .....

(2) Milk is given as an ..... for this poison.

(3) The news did not ..... us, but it had a serious ..... on some people.

affect effect textile antidote anecdote texture

$12 \times \frac{1}{2}$ 4. From the following sentences select twelve examples as directed in (*a*) to (*l*). Place your answer in the spaces provided.

(1) Approaching the village, he met a crowd of strange men and women, none of whom he knew.

(2) Christopher, an eminent officer, stood quietly at attention.

(3) A massive cloud of dust completely hid the mountain from Ernest's eyes, as the horses, with a clattering of hoofs, galloped along the road.

(4) The exceedingly bright light was providing him with a better chance to see more clearly.

(*a*) A collective noun.....

(*b*) A subordinate conjunction.....

(*c*) An indefinite article.....

(*d*) A gerund used as object of a preposition.....

(*e*) A noun in apposition.....

(*f*) A noun in the possessive case.....

(*g*) A proper noun.....

(*h*) Adverb modifying an adjective.....

(*i*) The comparative degree of an adjective.....

(*j*) A relative pronoun.....

(*k*) A verb phrase.....

(*l*) A negative word.....

$10 \times \frac{1}{2}$ 5. Express the meaning of the following words by using each correctly in a separate sentence: stationary, their, breathe, receipt, lose, certain, peace, laid, ladies', healthful

$20 \times \frac{1}{2}$ 6. State the part of speech and the use of each italicized word in the sentence. An example is given.

(1) *We* know *that* (*a*) *two* (*b*) of the answers are *correct.* (*c*)

(2) The hills *seem* (*d*) *very* (*e*) green, *but* (*f*) they are not different *from* (*g*) *those* (*h*) at home.

(3) Dogs *that* (*i*) guide the *blind* (*j*) must know when to obey the signals.

Word	Part of Speech	Use in the Sentence
We	Pronoun	Subject of the verb "know"
(*a*) *that*		
(*b*) *two*		
(*c*) *correct*		
(*d*) *seem*		
(*e*) *very*		
(*f*) *but*		
(*g*) *from*		
(*h*) *those*		
(*i*) *that*		
(*j*) *blind*		

$6 \times 1\frac{1}{2}$ 7. Select all the subordinate clauses in the following sentences. Write them in the form provided and give the kind and relation of each clause.

(1) He is the boy who sits in the front seat.

(2) It is true that the earth turns on its axis.

(3) Wherever they went, they saw lakes swarming with fish which were a delight to catch.

(4) The students described all that they had accomplished during the summer months.

(5) When John arrived, his first remark was that he had completed the difficult task.

Clause	Kind	Relation
Who sits in the front seat	adjective	modifies the noun "boy"

$2 \times 1\frac{1}{2}$ 8. Select TWO prepositional phrases in the following sentences and state the kind and relation of each phrase.

(1) The trees on the campus were beginning to bloom.

(2) The water, running over the stones, made a gurgling sound.

Phrase	Kind	Relation

$4 \times 1\frac{1}{2}$ 9. List the verbals in the following sentences. Give their kind and use. Write in the form provided.

Verbal	Kind	Use

(1) Knitting a sweater requires time and patience.

(2) Seeking our way through the jungle, we came upon a native trail.

(3) He is eager to learn mechanics.

(4) The light of the sun seemed to embrace the world.

$20 \times \frac{1}{2}$ 10. Rewrite the following sentences correctly. State in a complete sentence, the reason for the correction in each case.

(1) Joan hadn't ought to spread so much gossip.

Correct sentence: .....

.....

Reason: .....

(2) We must keep off of the grass if we expect it to grow.

Correct sentence: .....

.....

Reason: .....

(3) Neither of the girls are going to the party.

Correct sentence: .....

.....

Reason: .....

(4) You never thought of me being able to do this job, did you?

Correct sentence: .....

.....

Reason: .....

(5) Having passed the motion, the matter was closed.

Correct sentence: .....

.....

Reason: .....

(6) Scarcely no one was able to go.

Correct sentence: .....

.....

Reason: .....

(7) Are you sure it is me?

Correct sentence: .....

.....

Reason: .....

(8) The other contestants, who we knew, were Bill and Jack.

Correct sentence: .....

.....

Reason: .....

(9) Everyone should do their work carefully.

Correct sentence: .....

.....

Reason: .....

(10) Do you want to really stay with us overnight?

Correct sentence: .....

.....

Reason: .....

5 11. Rewrite in correct form, putting in capitals and punctuation marks.

Do you sing it he asked smiling and sure of her answer marian nodded too excited for speech but her face grew radiant good shall we finish the programme together then suggested roland hayes and earned a very young singers heartfelt gratitude.

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COMPOSITION

Students note: For questions 12 and 13, do rough draft on the left hand side and the finished product on the right hand side.

10 12. Write a carefully worded *descriptive* paragraph of five or six sentences on ONE of the following:

A Beautiful Vase	An Old House
Evening Sunset	A Hair Style
A Masterpiece	Father's New Car

26 13. Write a composition of at least three paragraphs on ONE of the following topics:

Hibernation	An Exciting Day
A Historical Character	Forest Conservation
Marooned	An Unwelcome Visitor
Solving a Mystery	

Do work for questions 12 and 13 on the following pages.

(Over)

(Space for rough draft of question 12—Paragraph)

(Space for finished product of question 12—Paragraph)

(Over)

(Space for rough draft of question 13—Composition)

(Space for finished product of question 13—Composition)

(Over)

(Space for rough draft of question 13—Composition)

(Space for finished product of question 13—Composition)

DEPARTMENT OF EDUCATION

MANITOBA

EXAMINATIONS, JUNE, 1964

GRADE IX MATHEMATICS

Friday, June 19th, 9.00 to 11.00 a.m.

Examiners: G. Krahn, B. Loewen

DO NOT OPEN THIS PAPER OR TURN IT OVER UNTIL YOU ARE TOLD TO DO SO

This is a test to measure your knowledge of Mathematics. It is made up of 80 questions. For each question five different answers are suggested. In each question you must decide which is the right answer among the five answers suggested.

DIRECTIONS—Read each question and its lettered answers. When you have decided which answer is correct, blacken the corresponding space on this sheet with the special pencil. Make your mark as long as the pair of lines, and move the pencil point up and down firmly to make a heavy black line. If you change your mind, erase your first mark *completely*. Make no stray marks; they may count against you.

SAMPLES

1. Chicago is (A) a country (B) a mountain (C) an island (D) a city (E) a state	A	B	C	D	E
	||	||	||	▓	||
2. One thing a republic never has is a (F) Dictator (G) Democratic government (H) King (I) Fascist government (J) Communist government	F	G	H	I	J
	||	||	||	||	||
3. The capital of Czechoslovakia is (K) Budapest (L) Vienna (M) Belgrade (N) Odessa (O) Prague	K	L	M	N	O
	||	||	||	||	||

NOTE

Be sure to make good heavy black marks. Erase completely any answers which you wish to change, and, except for recording your answers, do not make any marks either on the answer sheet or on the test itself. Do any necessary figuring on a separate sheet of paper.

GRADE IX MATHEMATICS

1. If $a=3$, $b=4$, the value of $3a^2+(2b)^2+a$ is: (A) 68 (B) 29 (C) 63 (D) 148 (E) 94.

2. Which of the following expresses that y is to be subtracted from twice the sum of a, b, and c:
(F) $y-2\times a+b+c$ (G) $y-2(a+b+c)$ (H) $2\times a+b+c-y$ (I) $2(a+b+c)-y$ (J) $2abc-y$.

3. 128 as a power of 2 is expressed by: (K) 2^7 (L) 64 (M) 2^6 (N) 2^{64} (O) 2^8

4. If $n=14$, evaluate $\dfrac{n(n+1)}{2}$.
(P) 14.5 (Q) 196.5 (R) 98.5 (S) 105 (T) 98.

5. A girl is m years old. How old will the girl be when she is 5 years more than twice her present age?
(U) $m+5$ (V) $2m-5$ (W) $m+10$ (X) $2m+5$ (Y) $5-2m$.

6. If $x=6$, $y=8$, evaluate $45-2(x+y)$.
(A) 17 (B) 47 (C) 41 (D) 43 (E) 27.

7. Jim has \$40.00 more than Bill, and Bill has \$25.00 more than Charles. If Charles has x dollars, then Jim has:
(F) \$15+x dollars (G) $x+65$ dollars (H) $65-x$ dollars (I) $65x$ dollars (J) $1000x$ dollars.

8. If $x=3$, $y=6$, evaluate $2x^2+\dfrac{x}{y}+\dfrac{x^2}{y^2}$.
(K) $36\frac{3}{4}$ (L) $18\frac{3}{4}$ (M) 19 (N) $19\frac{1}{2}$ (O) 38.

9. Evaluate, if $x=7$, $y=4$, $z=3$
$$\frac{x-y}{z}+\frac{x+z}{y}$$
(P) $1\frac{6}{7}$ (Q) $2\frac{1}{2}$ (R) $5\frac{3}{4}$ (S) $2\frac{3}{7}$ (T) $3\frac{1}{2}$.

10. Collect like terms. $5a^2-2a+3a^2+4a$.
(U) $10a^2$ (V) $10a^3$ (W) $10a$ (X) $8a^2+2a$ (Y) $6a^2+4a$.

11. The sum of two numbers with unlike signs is found by subtracting their absolute values and prefixing the sign of the:
(A) smaller number (B) positive number (C) greater number (D) negative number
(E) neutral number.

12. If $x=3$, $y=4$ find the value of: $(x-4y)-(6x+2y)+(-x+2y)$.
(F) 37 (G) 34 (H) -18 (I) -34 (J) -37.

13. Simplify: $3a^3+2a+5-a^3+a^2-3+6a-2a^3-2$.
(K) $6a^3+a^2+8a-10$ (L) $2a^3+8a$ (M) $3a^2+8a-5$ (N) a^2+8a-5 (O) a^2+8a.

14. Find the average of: $3a$, $-4a$, $+8a$, $-3a$, $+6a$.
(P) $3\frac{2}{5}a$ (Q) $2a$ (R) $17a$ (S) $10a$ (T) $-7a$.

15. What must be added to $7a-2b+4c$ to give zero?
(U) $-7a+2b-4c$ (V) 0 (W) $7a-2b+4c$ (X) $13abc$ (Y) none of these.

16. Find the sum of: $2a^3-3a^2+a-1$, $2a^3-4a+2$, $-5a^3+3a^2-4$.
(A) $9a^3-6a^2-5a-7$ (B) $4a^3-3a-3$ (C) a^3+3a-3 (D) $-a^3+3a-3$ (E) none of these.

17. If $b=-2$, evaluate: $6b^2-2b+4-6b^3$.
(F) 0 (G) 80 (H) -36 (I) $+2$ (J) -48.

18. Each side of an equation can be divided by the same number without destroying the:
(K) algebra (L) axiom (M) equality (N) method (O) addition.

19. By solving $5x=48-3x$ the value for x is: (P) 24 (Q) 9 (R) 8 (S) 6 (T) -6.

20. Solve: $2c-13+9c=20$. (U) 3 (V) $\frac{7}{11}$ (W) 1 (X) $4\frac{5}{7}$ (Y) -3.

21. Solve: $2a+2=5-(a+3)$. (A) 2 (B) 1 (C) 0 (D) $3\frac{1}{3}$ (E) 6.

22. If x represents the unknown number, which of the given equations expresses correctly the following statement? Eighteen less than 6 times a certain number is forty-eight.
(F) $6x=48-18$ (G) $18-6x=48$ (H) $-18+6x=48$ (I) $6x-18=48$ (J) $48-18=6x$.

23. The product of $.4x\times\frac{3}{4}y$ is: (K) $30xy$ (L) $.03xy$ (M) $3xy$ (N) $1.2xy$ (O) $.3xy$.

24. Find the value of: $(-2a)^3\,(6a)\,(-3a)$.
(P) $108a^5$ (Q) $144a^5$ (R) $108a$ (S) $144a$ (T) $-144a^5$.

25. Find the value of b in the equation: $-b-2-(2b-3)=7$.
(U) -2 (V) -12 (W) 0 (X) 4 (Y) 2.

26. The area of a classroom floor is $28x^3y^2z$. If the width is $7x^2y$ ft., what is the length?
(A) $4x^2y$ (B) $4x^3yz$ (C) $196x^5y^3z$ (D) $4xyz$ (E) $4xy$.

27. When dividing powers of the same base, the index of the quotient is found by subtracting the index of the divisor from the index of the:
(F) difference (G) equation (H) product (I) dividend (J) factor.

28. Divide $30x^5y^3$ by $-6x^3y^2$.
(K) $24x^2y^2$ (L) $5x^2y$ (M) $-180x^8y^5$ (N) $-5x^2y$ (O) $-5x^8y^5$.

29. To rent an electronic computer for one day costs $63m^4n^5o^2$ cents. If it solves 9 mn^2o^2 problems in a day, how much does it cost to solve one problem?
(P) $54m^3n^3o$ cents (Q) $7m^4n^5o^2$ cents (R) $567m^5n^7o^4$ cents (S) $7m^3n^3$ cents
(T) $7(6+21m^2+n+o)$ cents.

30. When a^2+12b^2+7ab is divided by $a+4b$ the answer is
(U) $a+8b$ (V) $a+8b+7ab$ (W) $a-3b$ (X) $3b-a$ (Y) none of these.

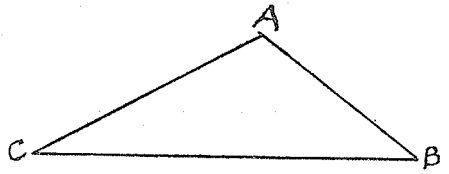
31. Simplify: $\dfrac{4x^2+6x}{2x}$.
(A) $2x^2+3x$ (B) $2x+3x$ (C) $2x+3$ (D) $8x^2+12x^2$ (E) $2x^2+4x$.

32. The line joining any two points on the circumference of the circle is called a:
(F) segment (G) sector (H) chord (I) radius (J) semicircle

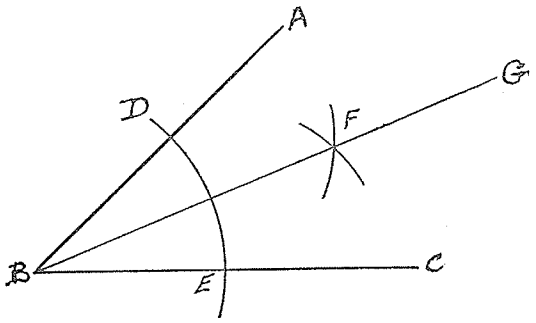
33. An angle that is greater than 90° and less than 180° is called:
(K) a right angle (L) a straight angle (M) an acute angle (N) an obtuse angle
(O) none of these

34. Any closed four sided figure is called a:
(P) quadrilateral (Q) rectangle (R) square (S) trapezium (T) rhombus

35. Triangle ABC is
(U) an isosceles triangle
(V) an equilateral triangle
(W) a scalene triangle
(X) a right-angled triangle
(Y) an obtuse-angled triangle

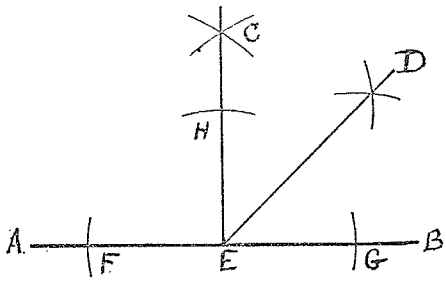


36. In the diagram illustrated the construction shows how to:



(A) bisect a given angle
(B) bisect two given lines
(C) letter a given diagram
(D) extend a line through a given point
(E) draw an acute angle

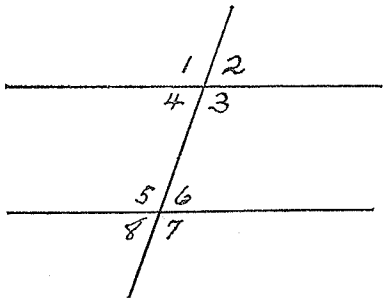
37. AB is a straight line in the illustrated diagram. What will be the measure of ∠DEA?



(F) 120° (G) 125° (H) 225° (I) 45° (J) 135°

38. A straight line that is drawn to cross two straight lines is called a
(K) median (L) intersector (M) bisector (N) transversal (O) right bisector

39. In the diagram, which pair of angles are interior angles on the same side of the transversal?

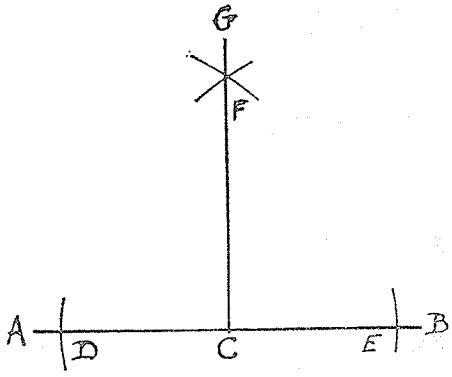


(P) 4,2 (Q) 2,3 (R) 3,6 (S) 5,8 (T) 2,7

40. Given: A line AB and a point C on the line.

Construction: With centre C and a suitable radius, draw an arc to cut AB at D and E.

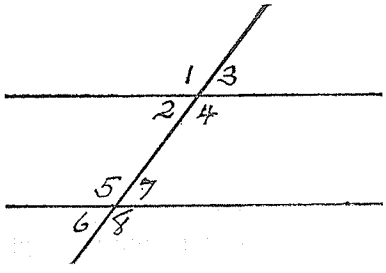
With D and E as centres and equal radii draw arcs to intersect at F. Join CF and produce to G.



By measurement, GCA = GCB; then CG is the
(U) bisector (V) right angle (W) transversal
(X) perpendicular (Y) median

41. The sum of the angles of any triangle amount to:
(A) 90° (B) 180° (C) 270° (D) 360° (E) a different amount for each triangle

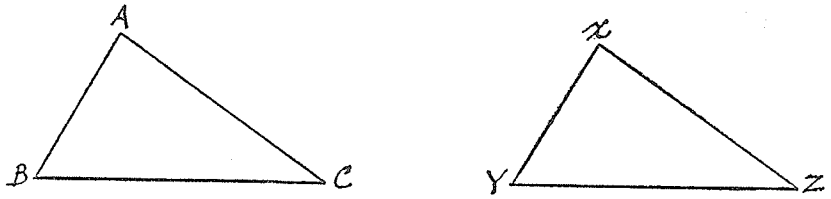
42. Angles 4 and 7 of the accompanying diagram are:



(F) vertically opposite angles
(G) corresponding angles
(H) complementary angles
(I) alternate angles
(J) interior angles

43. A quadrilateral with four equal sides but without a right angle is a:
(K) rectangle (L) rhombus (M) square (N) parallelogram (O) triangle

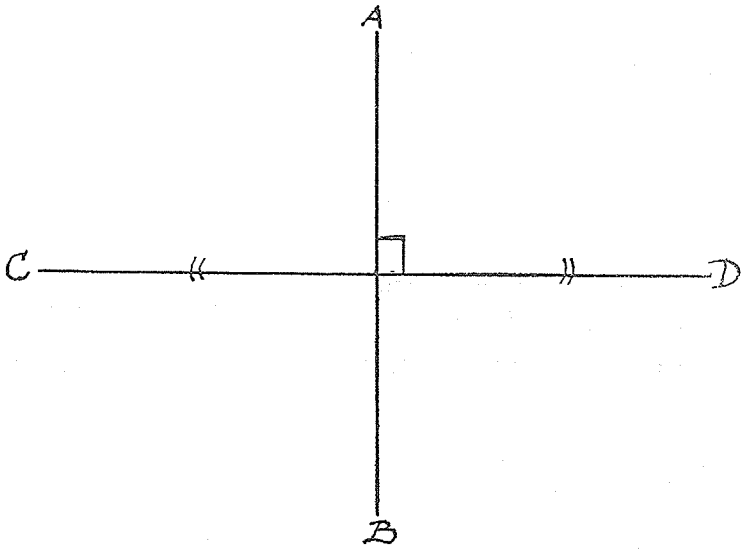
44.



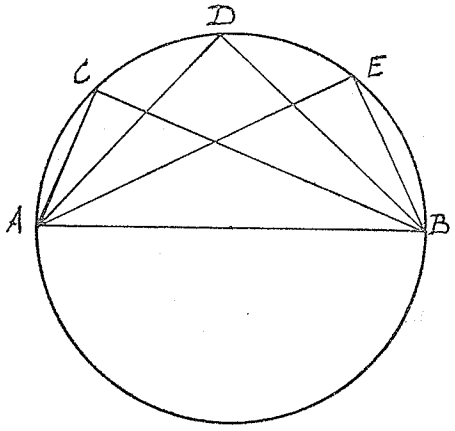
If the above triangles are congruent, then:
(P) AB = XZ (Q) BC = XY (R) AC = XY (S) YZ = BC (T) YZ = AC

45. In the figure at right, line AB is known as a(n):

(U) transversal
(V) hypotenuse
(W) diagonal
(X) right bisector
(Y) median

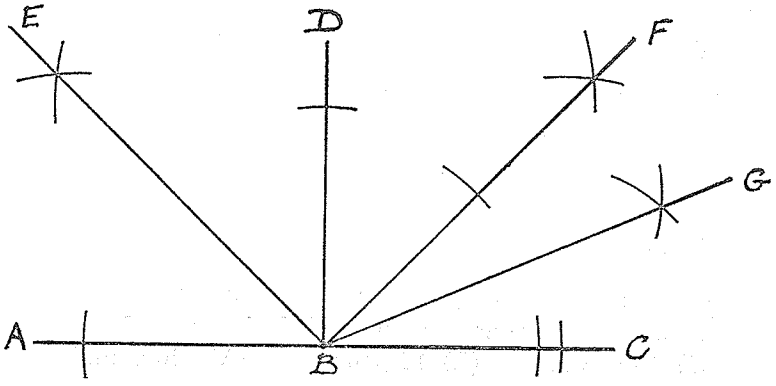


46. In the diagram at right the probable conclusion is that:
(A) AB = BC (B) AC = AD (C) AD = AE
(D) Angle C, Angle D, and Angle E are equal
(E) Angle C, Angle D and Angle E are not equal.



47. In the accompanying diagram, Angle ABD = 90°, Angle ABD has been bisected, Angle DBC has been bisected, and Angle FBC has been bisected. The number of degrees in Angle EBG is:

(F) 135° (G) 90° (H) 177.5°
(I) 77.5° (J) 112.5°



48. The value of $.0725 \times 1500$ is equal to:
(K) none of these (L) 10.875 (M) 108.75 (N) 1087.5 (O) 1.0875.

49. 19% of what number is equal to 76?
(P) 400 (Q) 4000 (R) 40 (S) 4 (T) none of these

50. $\sqrt{.0064}$ is equal to: (U) none of these (V) .8 (W) 8 (X) 80 (Y) 1008.

51. The square of 16 is equal to: (A) 16×16 (B) 16×2 (C) $\frac{16}{4}$ (D) $\frac{16}{2}$ (E) 16×4

52. $3\frac{3}{4}+4\frac{4}{5}+5\frac{2}{3}$ is equal to: (F) $13\frac{13}{60}$ (G) $14\frac{13}{60}$ (H) $14\frac{13}{80}$ (I) $14\frac{1}{4}$ (J) $14\frac{23}{60}$

53. If the perimeter of a square is 40 feet, the area in square feet would be:
(K) 400 (L) 1600 (M) 160 (N) 1000 (O) 100

54. $2\frac{3}{4}$ miles expressed to the nearest hundred yards is equal to:
(P) 5000 (Q) 4900 (R) 4800 (S) 4895 (T) 4890

55. 32 is what percent of 72? (U) $22\frac{1}{2}\%$ (V) 25% (W) 40% (X) $44\frac{4}{9}\%$ (Y) $44\frac{1}{2}\%$.

56. In decimal form, 5% of 5 is equal to:
(A) .025 (B) .25 (C) 2.5 (D) 25 (E) .0025.

57. $\frac{1}{16}$ expressed as a decimal fraction equals:
(F) $.16\frac{2}{3}$ (G) .625 (H) $6\frac{1}{4}$ (I) .16 (J) .0625

58. The ratio of 16 to 84 is the same as the ratio of 4 to:
(K) 7 (L) 21 (M) 72 (N) 96 (O) 336

59. If the numerator and denominator of a fraction are each multiplied by 2, the value of the fraction is:
(P) unchanged (Q) increased by 2 (R) multiplied by 2 (S) decreased (T) multiplied by 4.

60. $2 \div \frac{1}{2} \times \frac{1}{4}+2$ is equal to: (U) 2 (V) 3 (W) 6 (X) 8 (Y) 18

61. $\dfrac{3-\frac{1}{4}}{3 \div \frac{3}{8}}$ is equal to: (A) 22 (B) $\frac{11}{32}$ (C) 11 (D) $\frac{11}{64}$ (E) none of these

62. If the radius of a circle is 6 inches, half of the diameter of the circle is:
(F) 18 inches (G) 9 inches (H) 3 inches (I) 12 inches (J) 6 inches

63. The term circumference is most clearly related to:
(K) area (L) angle (M) volume (N) perimeter (O) range

64. Difference is to minus as sum is to:
(P) divide (Q) plus (R) addition (S) remainder (T) quotient

The following statement refers to questions 65 and 66:
A square field has an area of 1936 sq. rods.

65. The length of one side of the field is:
(U) 484 rods (V) 44 rods (W) 22 rods (X) 242 rods (Y) 46 rods

66. The perimeter of the field, in rods, is:
(A) 92 (B) 1936 (C) 88 (D) 176 (E) 352

67. A baseball team won 54 games and lost 46 games. What percent of the games played did the team win?
(F) 54% (G) 58% (H) 80% (I) $83\frac{1}{3}\%$ (J) 92%

68. A certain solder is made of tin and lead. How many pounds of tin are needed to make 60 pounds of solder, if there are 2 pounds of tin for every 5 pounds of the solder?
(K) 10 pounds (L) 12 pounds (M) 20 pounds (N) 24 pounds (O) 40 pounds

69. The members of an organization were asked for a donation of \$1.00 each. Sixty percent contributed, making \$72.00 collected in all. How many members did not contribute?
(P) 48 (Q) 43 (R) 40 (S) 29 (T) 12

70. If a man spends 12% of his salary on bonds, and buys a \$37.50 bond each month, what is his monthly salary?
(U) \$312.50 (V) \$312.60 (W) \$350 (X) \$376.20 (Y) \$450.00

71. A department store ran a sale marking the price of every article down 30%. What was the sale price of an article originally marked \$15.00?
(A) \$14.70 (B) \$12.00 (C) \$10.50 (D) \$10.00 (E) \$5.00

72. A man who earned \$210 per month received a 10% increase in salary. If 18% of his salary was deducted for income tax, how much tax did he pay per month?
(F) \$18.00 (G) \$21.00 (H) \$23.10 (I) \$37.80 (J) \$41.58

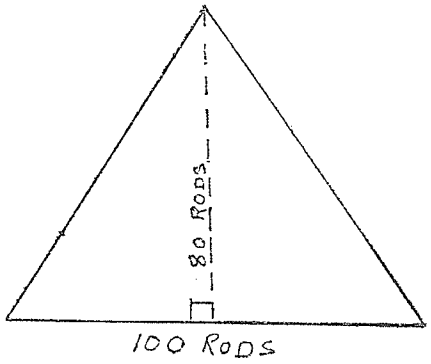
73. If an article costing a dealer \$10.00 is sold for \$25.00, the dealer's profit as a percentage of the cost is:
(K) 40% (L) 60% (M) $66\frac{2}{3}\%$ (N) 150% (O) $166\frac{2}{3}\%$

74. A retail merchant bought stoves listed at \$300.00 each and with discounts of 20% and 10%. The net cost of each stove is:
(P) \$200 (Q) \$270 (R) \$216 (S) \$210 (T) \$240

75. The selling price per stove of question 75, in order that the dealer makes 25% of the net cost is:
(U) \$375 (V) \$270 (W) \$354 (X) \$225 (Y) \$315

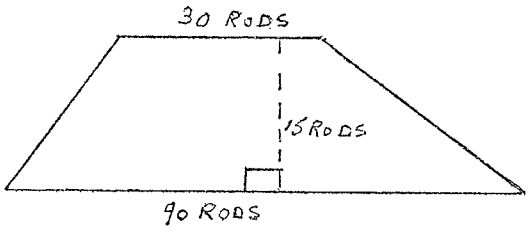
The following statement and drawing refers to questions 76 and 77:
A triangular field is 100 rods along one side and the opposite corner is 80 rods distant.

76. The area of the field is:
(A) 16,000 sq. rods (B) 8,000 sq. rods
(C) 4,000 sq. rods (D) 2,000 sq. rods
(E) 400 sq. rods



77. The area of the field in acres is
(F) 100 (G) 50 (H) 25 (I) $12\frac{1}{2}$ (J) $2\frac{1}{2}$

78. The cross section of a dam, as shown, is a trapezium.
The area of the cross section will be:
(K) 900 sq. rods (L) 40,500 sq. rods
(M) 2,700 sq. rods (N) 450 sq. rods
(O) 1,350 sq. rods



79. Using $\pi = \frac{22}{7}$, the area of the base of a cylinder with a diameter of 7 inches and a height of 14 inches is:
(P) $38\frac{1}{2}$ sq. in. (Q) 154 sq. in. (R) 539 sq. in. (S) 2,156 sq. in. (T) none of these

80. The interest on \$275.00 at 4% per annum for 73 days is:
(U) \$288.25 (V) \$13.25 (W) \$22.00 (X) \$11.00 (Y) \$2.20

Name of Student.....
(Surname) (First name) (Middle name)

School.....
(Name of School) (P.O. Address of School)

Name of Social Studies Teacher.....

Name of Inspector.....

DEPARTMENT OF EDUCATION
MANITOBA

EXAMINATIONS, JUNE, 1964

GRADE IX SOCIAL STUDIES

Wednesday, June 17th, 9.00 to 11.00 a.m.

Examiners: J. Brook, G. Lacroix

DO NOT OPEN THIS PAPER OR TURN IT OVER UNTIL YOU ARE TOLD TO DO SO

This is a test to measure your knowledge of Social Studies. It is made up of short answer questions worth 70 marks, and essay questions worth 30 marks. You are to answer the 70 questions on the answer sheet provided, and the essay questions in the spaces provided in this question booklet.

When you have done all the short questions you can go on to do the essay questions in Sections B, C, and D.

READ ALL DIRECTIONS CAREFULLY

DIRECTIONS FOR SECTION A

For each of the 70 questions five different answers are suggested. In each question you must decide which is the right answer.

Read each question and its lettered answers. When you have decided which answer is correct, blacken the corresponding space on the special answer sheet with the special pencil. Make your mark as long as the pair of lines, and move the pencil point up and down firmly to make a heavy black line. If you change your mind, erase your first mark *completely*. Make no stray marks; they may count against you. Use the answer sheet on a hard surface.

SAMPLES

1. Chicago is
   (A) a country, (B) a mountain, (C) an island, (D) a city, (E) a state.....

A	B	C	D	E
||	||	||	▮	||

2. One thing a republic never has is a
   (F) Dictator, (G) Democratic government, (H) King, (I) Fascist government, (J) Communist government.....

F	G	H	I	J
||	||	||	||	||

3. The capital of Czechoslovakia is
   (K) Budapest, (L) Vienna, (M) Belgrade, (N) Odessa, (O) Prague.....

K	L	M	N	O
||	||	||	||	||

NOTE

Be sure to make good heavy black marks. Erase completely any answers which you wish to change, and, except for recording your answers, do not make any marks either on the answer sheet or on the test itself. Do any necessary figuring on a separate sheet of paper.

SECTION A

1. Which is NOT a cause of World War II?
   (A) the imperialistic ambition of Germany
   (B) the assassination of Archduke Ferdinand
   (C) the rush for foreign markets
   (D) the formation of international alliances
   (E) the fact that Germany was surrounded by an "iron ring" of unfriendly powers

2. The capital of Denmark is:
   (F) Copenhagen (G) Stockholm (H) Oslo (I) Helsinki (J) Narvik

3. Buffer States usually:
   (K) have a long peaceful period because the great powers protect them
   (L) are small because the people are backward and ignorant
   (M) join together against a common enemy
   (N) exist as a vacuum between larger powers and are repeatedly overrun
   (O) don't have an outlet to the sea

4. A well-known cheese produced in the Low Countries is named for the town of:
   (P) Haarlem (Q) Boskoop (R) Maastricht (S) Utrecht (T) Gouda

5. State which man is NOT an inventor:
   (U) Diesel (V) Galileo (W) Freud (X) Volta (Y) Marconi

6. Joan of Arc was executed by the English in the city of:
   (A) Reims (B) Rouen (C) Vichy (D) Calais (E) London

7. The Palace of Versailles was built by:
   (F) Louis XVI (G) Napoleon Bonaparte (H) Charlemagne (I) Louis XIV (J) none of these

8. If you were to discuss the "Unification of Germany," the correct order of time, starting with the earliest, for a—Bismarck; b—Frederick William; c—William I; d—Frederick the Great; e—Metternich, would be:
   (K) b, d, e, a, c (L) e, c, d, a, b (M) d, b, e, c, a (N) d, b, e, a, c (O) e, d, b, a, c

9. Which of the following men did NOT help Hitler at any time?
   (P) Goering (Q) Ludendorff (R) Goebbels (S) Ebert (T) Hess

10. Which ruler did NOT claim that he ruled by "divine right"?
    (U) Alfonso XIII (V) Louis XIV (W) Louis XV (X) Frederick the Great (Y) Louis XVI

11. Which region has been called the "Powder Keg" of Europe?
    (A) Finland, Estonia, Latvia, Lithuania
    (B) Poland, Czechoslovakia, Hungary
    (C) Romania, Bulgaria, Yugoslavia, Turkey, Greece, Albania
    (D) Germany and Italy
    (E) Norway, Sweden, and Denmark

12. Which of the following explorers was the first man whose ship sailed round the globe?
    (F) Diaz (G) Vasco da Gama (H) Prince Henry the Navigator (I) Cabral (J) Magellan

13. The Moors were defeated by Charles Martel at the Battle of Tours in the year:
    (K) 1066 (L) 1144 (M) 1492 (N) 410 (O) 732

14. Which of the following geographical features of China has been called "China's Sorrow"?
    (P) Gobi Desert (Q) Yangtze River (R) Yellow River (S) Si River (T) none of these

15. The leader of the Fascist Party in Italy was:
    (U) Giuseppe Garibaldi (V) Giuseppe Mazzini (W) Cavour (X) Mussolini (Y) none of these

16. The founder of socialism was:
(A) Hitler (B) Rousseau (C) Lenin (D) Machiavelli (E) Marx

17. Which of the following Russian composers conducted his own composition in Carnegie Hall in New York?
(F) Tchaikovsky (G) Rachmaninoff (H) Rimski-Korsakov (I) Prokofieff (J) Shostakovich

18. During the first "Five-Year Plan," Russia:
(K) built a rail connection to Manchuria
(L) built up her heavy industry and established collective farms
(M) tried to raise the low standard of living of the Russian people
(N) eliminated the pre-revolutionary upper class of Russian society
(O) executed a number of high placed military and government leaders

19. Which of the following cities is NOT in China Proper?
(P) Mukden (Q) Shanghai (R) Canton (S) Chungking (T) Nanking

20. "Stakhanovites" are:
(U) suicide pilots of World War II
(V) a Slavic tribe that came to Russia before the Northmen
(W) members of the junior Communist Party in Russia
(X) workers who produce more than their quota
(Y) none of these

21. State which of the following rulers set out to Europeanize Russia:
(A) Ivan III (B) Duke of Moscow (C) Ivan the Terrible (D) Lenin (E) Peter the Great

22. Denmark is noted for:
(F) its many fiords (G) its grain farms (H) its co-operatives (I) its woodlands
(J) its great reserve of iron ore

23. "Mein Kampf" is a book about which:
(K) all of the following answers are correct
(L) can be called a blueprint for war
(M) states that a leader must lie to his people
(N) means "My Battle"
(O) tells of Hitler's plans to make Germany all-powerful

24. After the Battle of Waterloo, Napoleon was exiled to:
(P) Corsica (Q) Elba (R) England (S) Russia (T) St. Helena

25. The "Council of Blood" was set up by:
(U) Stalin (V) Alexander Farnese (W) Hitler (X) William of Orange (Y) Duke of Alva

26. The figure that most nearly represents the population of China is:
(A) 190,000,000 (B) 72,000,000 (C) 450,000,000 (D) 45,000,000 (E) 40,000,000

27. In the 17th century the Dutch won their independence from:
(F) Britain (G) Brandenburg (H) France (I) Austria (J) Spain

28. Which of the following languages is NOT of the German "family"?
(K) Swedish (L) Italian (M) Danish (N) Icelandic (O) Dutch

29. The composer who wrote such operas as "Lohengrin," "Siegfried" and "Tristan and Isolde" based on the heroes of old German legends was:
(P) Bach (Q) Beethoven (R) Wagner (S) Brahms (T) Mozart

30. The scientist who discovered a method of heating liquids to kill harmful bacteria was:
(U) Pasteur (V) Einstein (W) Torricelli (X) Metchnikoff (Y) none of these

31. Victor Hugo is famous for writing:
(A) all of the following
(B) "The Count of Monte Cristo"
(C) "Les Misérables"
(D) "Alexandre Dumas"
(E) "The Three Musketeers"

32. To which two countries did Ferdinand and Isabella belong? (1) Portugal (2) Castile (3) Aragon (4) Navarre
(F) 1 and 2 (G) 3 and 4 (H) 1 and 4 (I) 2 and 3 (J) 1 and 3

33. Which of the following was NOT Nazi policy?
(K) disapproval of the Versailles Treaty
(L) expansion of Germany
(M) persecution of Jews
(N) support of democracy
(O) belief in a master race

34. Which of the following nations is NOT one of the Balkans?
(P) Poland (Q) Romania (R) Albania (S) Yugoslavia (T) Greece

35. "Kremlin," "Czar," "Crimea" are words which suggest the country known as
(U) France (V) Netherlands (W) Spain (X) Italy (Y) Russia

36. "Fiords," "whaling and fishing industry," "land of the midnight sun" are terms which suggest:
(A) Italy (B) Spain (C) Japan (D) Norway (E) Greece

37. Which was NOT a result of World War II?
(F) Japan was defeated
(G) Franco takes power in Spain
(H) Germany was defeated
(I) Poland gained some lands in eastern Germany
(J) The United Nations was formed

38. The South American country with the largest area is:
(K) U.S.S.R. (L) Venezuela (M) Brazil (N) Argentina (O) Mexico

39. The ruling family of Austria was named:
(P) Habsburg (Q) Hohenzollern (R) Bourbon (S) Romanov (T) Ludendorff

40. World War I began in: (U) 1815 (V) 1848 (W) 1871 (X) 1914 (Y) 1939

41. Which is NOT one of the four main islands of Japan?
(A) Honshu (B) Hokkaido (C) Shikoku (D) Kyushu (E) Formosa

42. Which of these words suggests a type of government which allows many freedoms such as freedom of the press, freedom of speech, etc.?
(F) despotic (G) dictatorial (H) autocratic (I) authoritarian (J) none of these

43. Which item is NOT connected with *North* China?
(K) Yellow River (L) Great Wall (M) Loess (N) main food—rice (O) floods and famines

44. The main religion in Japan is:
(P) Hindu (Q) Muslim (R) Orthodox (S) Hebrew (T) Buddhist

45. The Spanish conqueror of Mexico was:
(U) Cortes (V) Pizarro (W) Balboa (X) Bolivar (Y) Juan de Fuca

46. The Latin American nation which has a border with the United States is:
(A) Brazil (B) Argentina (C) Mexico (D) Nicaragua (E) Costa Rica

47. Which of the following events happened in the 20th century?

(F) all of the following
(G) Mussolini captured Ethiopia
(H) The Spanish Civil War
(I) The Russian Revolution
(J) The Mexican Revolution

48. "Slavs," "Powder Keg of Europe," "Byzantium," "Magyars" are terms which suggest:

(K) Northern Europe (L) Western Europe (M) Eastern Europe (N) Germany only
(O) Spain only

49. The inventor of wireless telegraph was:

(P) Galvani (Q) Volta (R) Verdi (S) Marconi (T) none of these

50. The part of Italy which successfully collected all the other states to create the Kingdom of Italy was called:

(U) Papal States (V) Kingdom of Naples (W) Kingdom of Sicily (X) Kingdom of Sardinia
(Y) Grand Duchy of Tuscany

Questions 51 to 59 are based on the accompanying map of Europe.

51. The city marked on the map with a dot and the number **51** is:
(A) Barcelona (B) Lisbon (C) Rome (D) Madrid (E) Paris

52. The region marked by the number **52** is:
(F) Alsace (G) Lorraine (H) The Riviera (I) Brittany (J) Normandy

53. The country marked by the number **53** is:
(K) Norway (L) Finland (M) Denmark (N) Iceland (O) Sweden

54. The area represented by number **54** is famous for:
(P) flower bulbs, tree nurseries (Q) coal and heavy industry (R) dates, figs, tobacco
(S) aluminum and hydro-electric power (T) pork and dairy products

55. The area represented by number **55** is famous for:
(U) crafts, toys, musical instruments (V) silk worm culture, silk cloth
(W) diamond cutting, ceramics (X) cork, oranges, lemons (Y) none of these

56. The mountains marked **56** are the:
(A) Pyrenees (B) Caucasus (C) Apennines (D) Alps (E) Ardennes

57. The river marked **57** is the:
(F) Rhine (G) Seine (H) Loire (I) Dnieper (J) Danube

58. The city marked on the map with a dot and the number **58** is:
(K) Ankara (L) Sofia (M) Athens (N) Stockholm (O) Istanbul

59. In the region marked number **59,** the largest church denomination is the:
(P) Greek Orthodox (Q) Greek Catholic (R) Roman Catholic (S) Lutheran (T) Presbyterian

Questions 60 to 66 are based on the accompanying map of East Central Asia.

60. The geographical feature marked number **60** on the map of Asia is:
(U) Plateau of Tibet (V) Yunnan Plain (W) Gobi Desert (X) Himalayan Mountains
(Y) Red Basin

61. The river marked number **61** on the map of Asia is:
(A) Amur River (B) Si River (C) Yellow River (D) Yangtze River (E) Ganges River

62. The city marked with a dot and the number **62** on the map of Asia is:
(F) Nanking (G) Shanghai (H) Port Arthur (I) Tokyo (J) Nagasaki

63. The region marked number **63** on the map of Asia is:
(K) Indo-China (L) West China (M) South China (N) North China (O) Manchuria

64. The city marked with a dot and the number **64** on the map of Asia is:
(P) Mukden (Q) Shanghai (R) Peking (S) Tientsin (T) Seoul

65. The city marked with a dot and the number **65** on the map of Asia is:
(U) Chungking (V) Hiroshima (W) Hankow (X) Peking (Y) Hong Kong

66. The island marked number **66** on the map of Asia is:
(A) Honshu (B) Formosa (C) Hainan (D) Kyushu (E) Hokkaido

Europe


East Central
Asia
62
66
65
64
61
60
63

Questions 67, 68, 69 and 70 are based on the following article:

RICHELIEU AND THE THIRTY YEARS WAR

Richelieu was chief minister of Louis XIII of France from 1624 to 1642 and played a key role in the Thirty Years War of 1618 to 1648.

He was born to an ancient family of the lesser nobility. In his early twenties he was a bishop and later was made a cardinal. Though he took his church work seriously, he could not resist statecraft and became chief minister of the young king, Louis XIII. The great ability of Richelieu caused Louis to keep him in that job even though Louis did not like him!

Within France, Richelieu vigorously put down any and all rebellions. In 1626 he ordered the destruction of all nobles' castles which were not needed for the defense of the frontiers—and it was done.

Another problem was the Huguenots (French Protestants) who had special rights in France. They were almost a state within a state and their armies might be used against royal policies. The Huguenots were finally crushed in the famous siege of La Rochelle in 1629. No persecutions of Huguenots followed. Richelieu was a very tolerant man for the 17th century, and moreover, it was not religious reasons that had caused him to attack them.

Meanwhile, the Thirty Years War was being carried on between the Catholic Ferdinand II, emperor of the Holy Roman Empire (Germany) and the Protestant princes of Germany. The emperor did not really control all the states of Germany, (except his own state, Austria) but he *wanted* to! Furthermore, he was alarmed by the spread of Protestantism which would divide Germany still further.

The Spanish kings, Philip III and later Philip IV, were members of the Habsburg family and were pleased to aid the emperor. They had been engaged in a similar war in the Low Countries against the Protestant Dutch since the time of Philip II.

France seemed ringed by Habsburg territories. To the south was Spain, on the east a part of Burgundy and to the north, Luxembourg and the Low Countries. Suppose the emperor should gain all Germany!

While he was busy in France, Richelieu dared not fully enter the war. He contented himself with skillfully encouraging others to aid the Protestant princes. King Christian of Denmark entered the war but was defeated by the emperor's forces and withdrew. Next was Gustavus, king of Sweden who won some brilliant victories before he was killed. In 1636 to keep the Protestants from collapsing Richelieu finally entered the war. This new enemy was too much for the emperor, Spain and the Catholic nobles of south Germany whose power was exhausted by the long war. Portugal had already freed herself from Spain which was powerless to hold her.

A series of treaties in 1648 brought the war to a close. Switzerland and the northern Netherlands were recognized as independent. France gained part of Alsace. Sweden gained a large province of Germany along the Baltic. A very important result is that a man would no longer be persecuted because of his religion. Also of great importance was the strengthening of the power of the nobles and the weakening of the emperor. This resulted in a long delay in the unification of Germany.

Richelieu died before the war ended but his policies had laid the foundation for the greatness of Louis XIV, "the Sun King."

67. The idea behind all of Richelieu's policies is his belief in:
    (F) Separation of church and state (G) Liberalism (H) Nationalism (I) Confederation
    (J) none of these

68. Richelieu's reason for aiding the Protestant German princes was:
    (K) he wanted to convince the Huguenots that he was tolerant
    (L) he didn't like Germans and thought that Protestantism was suitable for them
    (M) to prevent the Habsburgs from becoming more powerful
    (N) he wanted the princes to aid him against the Huguenots in France or at least persuade them to accept his authority
    (O) none of these

69. Which was NOT a Habsburg policy?
    (P) to suppress Protestantism
    (Q) to increase the power of the emperor
    (R) to fight the Dutch rebellion
    (S) to centralize and unite Germany
    (T) to give Portugal its independence

70. Which was NOT a result of the Thirty Years War?
    (U) Belgium added to the Netherlands
    (V) Protestantism firmly established in parts of Germany
    (W) Portugal freed from Spain
    (X) Princes of Germany gained power
    (Y) Germany remained a collection of many small independent states for a long time

SECTION B

(Do only ONE question from this section)

Values

1. Discuss the Unification of Italy dealing specifically with:

3 (*a*) Government of the region from 1848 to 1859.

9 (*b*) The work of Mazzini, Cavour and Garibaldi.

3 (*c*) The final events of unification to 1870.

2. Discuss Nazism in Germany, using the following headings as guides:

9 (*a*) Conditions favouring the rise of Nazism (from 1918 to 1933)

3 (*b*) Hitler comes to power in Germany (1933, 1934)

3 (*c*) Germany's relations with the democracies under the Nazis from 1933 to 1939

15 3. Compare North and South China, dealing specifically with soil, climate, crops, topography, rivers and attitudes of the people.

SECTION C

(Do any THREE questions from this section)

3×3 4. Tell what you know about the "Forty Miles of Romance"—what it is, where it is and legends connected with it.

5. France is said to have six sides, only one of which is unprotected. Which side of France is unprotected and what is the nature of the land at that side? What are the natural protections for the other sides?

6. Explain the term, "one-crop" country. Why is this condition a disadvantage to a country?

7. What important contributions did the gaucho make to Argentina?

8. Mountainous terrain has helped and hindered Spain. Explain.

9. Does Russia have the natural resources a modern nation needs? Prove your opinion.

SECTION D

(Do only ONE question from this section)

Values

1×6 10. Unifying a country costs many lives. Perhaps it is worthwhile if one could say that:

(A) foreign rulers speaking another language have been expelled;

(B) a liberal government has replaced kings and princes who ruled without consulting the people.

From this point of view, which unification was more worthwhile, that of Bismarck in Germany or of Cavour in Italy? Remember to prove your argument with facts.

11. Machiavellian methods of rule are clever and unscrupulous. Lying and trickery are examples of such unethical and underhanded methods. The following five rulers or countries are involved in seven separate incidents where they used Machiavellian methods. In each case tell the incident *and* explain why it is unethical or underhanded. For full marks you must do *at least four* incidents.

Alfonso XIII (2 incidents)
Japan in Manchuria (2 incidents)
Frederick William, the Great Elector
Pizarro
Cavour

12. Describe the *similarities and differences* in ruling between Louis XIV of France and Frederick the Great of Prussia. The words "in ruling" are meant to include such things as the rights, duties, methods, objectives, etc., of the two kings.

DEPARTMENT OF EDUCATION

MANITOBA

EXAMINATIONS, JUNE, 1964

GRADE IX SCIENCE

Tuesday, June 16th, 9.00 to 11.00 a.m.

Examiners: T. Boyanisky, D. A. Schmidt

DO NOT OPEN THIS PAPER OR TURN IT OVER UNTIL YOU ARE TOLD TO DO SO

This is a test to measure your knowledge of Science. It is made up of 100 questions. For each question five different answers are suggested. In each question you must decide which is the right answer among the five answers suggested.

DIRECTIONS—Read each question and its lettered answers. When you have decided which answer is correct, blacken the corresponding space on this sheet with the special pencil. Make your mark as long as the pair of lines, and move the pencil point up and down firmly to make a heavy black line. If you change your mind, erase your first mark *completely*. Make no stray marks; they may count against you.

SAMPLES

1. Chicago is (A) a country, (B) a mountain, (C) an island, (D) a city, (E) a state.....	A ||	B ||	C ||	D ▓	E ||
2. One thing a republic never has is a (F) Dictator, (G) Democratic government, (H) King, (I) Fascist government, (J) Communist government.....	F ||	G ||	H ||	I ||	J ||
3. The capital of Czechoslovakia is (K) Budapest, (L) Vienna, (M) Belgrade, (N) Odessa, (O) Prague.....	K ||	L ||	M ||	N ||	O ||

NOTE

Be sure to make good heavy black marks. Erase completely any answers which you wish to change, and, except for recording your answers, do not make any marks either on the answer sheet or on the test itself. Do any necessary figuring on a separate sheet of paper.

1. A feathery stigma is a characteristic of a part of a flower belonging to a family of plants called:
   (A) Mustard (B) Grain (C) Squash (D) Sunflower (E) Pea

2. A family of plants which has a number of flowers on the flattened end of a stem is called:
   (F) Grain (G) Mustard (H) Sunflower (I) Carrot (J) Pea

3. The flower in which the calyx of the little flowers has changed into fine bristles is:
   (K) Rose (L) Nasturtium (M) Geranium (N) Candytuft (O) Dandelion

4. $Ca^4\ Co^4\ S^{2+4}\ P^2$ is the floral formula for the:
   (P) Mustard family (Q) Sunflower family (R) Carrot family (S) Pea family (T) Grain family

5. A cross-shaped corolla suggests a member of a family of plants called:
   (U) Graminae (V) Leguminosae (W) Compositae (X) Cruciferae (Y) None of the above.

6. Scientific names in Latin are given to all plants
   (A) to distinguish them from other plants
   (B) to be universally understood
   (C) to distinguish them from animals
   (D) to help students study them
   (E) to ease identification

7. The part of a plant which best helps to find the family to which it belongs is:
   (F) the stem (G) the root (H) the flower (I) the petiole (J) the leaves

8. One of these plants belongs to the composite family:
   (K) Alfalfa (L) Marigold (M) Sweet Pea (N) Corn (O) Single stock

9. A pod which has two compartments is called a(an)
   (P) grain (Q) achene (R) legume (S) hybrid (T) silique

10. Corn differs from other members of the grain family in that
    (U) it is much taller
    (V) it has parallel-veined leaves
    (W) it has two different kinds of flowers
    (X) the roots are fibrous
    (Y) the stem has nodes and internodes

11. One of these is not a characteristic of the mustards:
    (A) a sharp taste (B) nodules on roots (C) rosette (D) cross-shaped corolla
    (E) indeterminate flowering

12. A plant which does not depend upon insects at all for pollination is:
    (F) rose (G) red clover (H) barley (I) dahlia (J) daisy

13. Which one of the following plants is *not* a dicotyledon?
    (K) lily (L) bean (M) sunflower (N) geranium (O) peanut

14. The Carboniferous Period belongs to the age of
    (P) seaweeds (Q) modern seed plants (R) spore-bearing plants (S) ancient seed plants
    (T) all of the above

15. Plant and animal fossils are *not* found in one of these
    (U) coal (V) limestone (W) sandstone (X) shale (Y) granite

16. The oldest and simplest of all the kinds of showy flowers is the
    (A) Buttercup (B) Lily (C) Geranium (D) Rose (E) Sweet Pea

17. The seed plants are considered to be the most useful of plant life because they supply,
(F) food for man (G) food for animals (H) building materials (I) shelter and beauty
(J) all of the above

18. Which of the following statements is *not* true?
(K) algae and fungi have no roots
(L) algae and fungi have no fruits or seeds
(M) algae and fungi have no leaves
(N) algae and fungi have no flowers
(O) none of the above

19. A plant with an underground stem which sends up in separate places two very different kinds of branches is called a
(P) club moss (Q) fern (R) liverwort (S) horsetail (T) conifer

20. Seeds differ from spores in that:
(U) seeds contain a tiny little plant
(V) seeds contain a store of food
(W) seeds are many-celled in structure
(X) all of the above
(Y) none of the above

21. We know that Greenland once had a warm moist climate because:
(A) the Vikings had been there
(B) fern fossils were found there
(C) people live there today
(D) it is still in the Glacial Period
(E) none of the above

22. A group of cells of the same kind joined together forms:
(F) protoplasm (G) an organ (H) a tissue (I) chromosomes (J) protococci

23. In hay infusion:
(K) ciliates live upon flagellates
(L) flagellates live upon bacteria
(M) bacteria live upon plants
(N) plants manufacture their own food
(O) all of the above

24. One-celled animals are given the group name:
(P) protococcus (Q) protozoa (R) volvox (S) determiners (T) none of the above

25. A one-celled animal which closes up to a sphere and coils its stalk when frightened is known as the
(U) rotifer (V) paramoecium (W) amoeba (X) vorticella (Y) euglena

26. The simplest of all animals is the:
(A) paramoecium (B) euglena (C) amoeba (D) vorticella (E) stentor

27. Living bodies use their food in two different ways:
(F) assimilation and respiration
(G) absorption and assimilation
(H) assimilation and excretion
(I) digestion and absorption
(J) respiration and digestion

28. The union of a sperm cell and an egg cell is called:
(K) reproduction (L) assimilation (M) absorption (N) determination (O) fertilization

29. Which one of the following is *not* necessarily inherited from ancestors?
(P) blue eyes (Q) personality (R) curly hair (S) pointed ears (T) big feet

30. From our observations upon embryos we may conclude:
(U) they must be related to one another
(V) they have descended from the same ancestors in the distant past
(W) they go through the same stages of development
(X) each higher animal seems to repeat the history of the changes through which the lower animals pass
(Y) all of the above

31. Of the following the earliest to appear on earth were the
(A) club mosses (B) liverworts (C) spirogyra (D) ferns (E) conifers

32. A narrow cup-bodied animal which travels with a somersaulting motion is the:
(F) hydra (G) euglena (H) volvox (I) mona (J) stentor

33. The main purpose of the ray florets of the sunflower is to:
(K) protect the flower (L) produce seeds (M) attract insects (N) manufacture food
(O) supply the nectar

34. A cow is:
(P) a mammal (Q) an ungulate (R) a ruminant (S) a vertebrate (T) all of the above

35. The flowers on the cob of the corn plant are called:
(U) corolla (V) staminate (W) ray florets (X) pistillate (Y) bracts

36. An interesting adaptation of a crayfish which enables it to protect and take care of its young is (are) the
(A) tail fin (B) swimmerets (C) balancers (D) stomach teeth (E) feathery gills

37. Which of the following may be termed a protective adaptation?
(F) speckled feathers of a grouse
(G) large ears of a deer
(H) scales of a fish
(I) repulsive smell
(J) all of the above

38. A protective ring situated where the blade joins the sheath of a plant is called a:
(K) ligule (L) a stipule (M) petiole (N) nodule (O) peduncle

39. The process of changing non-living food into living protoplasm is called:
(P) absorption (Q) assimilation (R) adaptation (S) digestion (T) respiration

40. Fossils show us:
(U) the order in which strata of sedimentary rocks were laid down
(V) the lengths of the time gaps between successive strata
(W) that climates have changed
(X) that plants and animals have developed gradually to their present forms
(Y) all of the above

41. Clover is planted chiefly:
(A) to provide a home for bacteria
(B) to remove excess carbon dioxide from the air
(C) to provide nectar for bees
(D) to enrich land with nitrates
(E) to provide people with carbohydrates

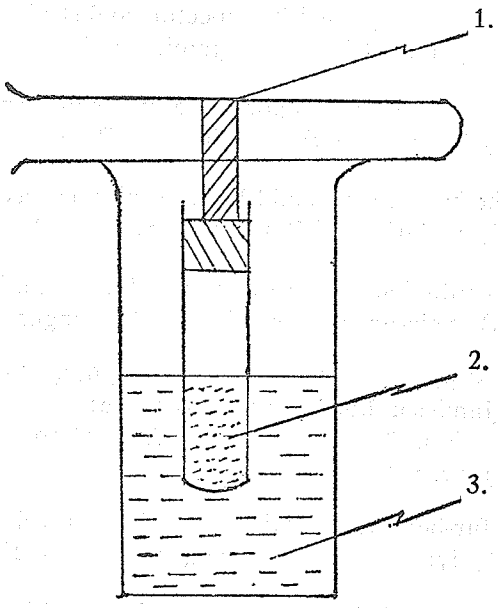
Experiment

Apparatus:

(1) Scotch tape and test tube used to hold up collodion tube.

(2) Collodion tube containing molasses.

(3) Tall beaker containing milk.



The diagram above illustrates the apparatus used in an experiment on one of the life processes described in the text.

Questions 42, 43, 44, 45, 46 and 47 pertain to the above diagram.

42. The object of the above experiment is to show a life process called:
(F) digestion (G) absorption (H) respiration (I) fertilization (J) assimilation

43. The collodion tube represents very well a part of a cell called the:
(K) nucleus (L) protoplasm (M) cell wall (N) chromosomes (O) chloroplasts

44. The life process which must take place immediately before the process shown in the above experiment is:
(P) excretion (Q) respiration (R) absorption (S) digestion (T) fertilization

45. The milk in the above experiment represents the:
(U) protoplasm (V) liquid food (W) sap (X) solid food (Y) ether

46. The molasses in the above experiment represents the:
(A) protoplasm (B) liquid food (C) sap (D) solid food (E) cell wall

47. On observing the above experiment after some hours it was found that the level of the molasses in the collodion tube:
(F) dropped (G) rose (H) remained the same (I) rose then dropped (J) dropped then rose

48. Microscopic algae whose glass-like skeletons are formed of silica are called:
(K) cilia (L) diatoms (M) desmids (N) laminaria (O) spirogyra

49. Plants which use the energy of sunlight to manufacture sugar from soil water and carbon dioxide must possess:
(P) nitrogen (Q) spores (R) mycelium (S) chlorophyll (T) holdfasts

50. One of the greatest sources of food for marine life is:
(U) algae (V) fungi (W) shrimp (X) small fish (Y) sea lettuce

51. Scientists discovered that White Pine forests can be saved if they destroy the:
(A) cherry tree (B) currant bushes (C) wild plum (D) barberry (E) hawthorn

52. The bubbles which are formed in fermented fruit juices are:
(F) nitrogen gas (G) sulphur gas (H) alcohol (I) oxygen gas (J) carbon dioxide gas

53. A kit used by Health Inspectors and students at school to make invisible bacteria visible is known as:
(K) Jenner Kit (L) Jamieson Kit (M) X-ray Kit (N) Turtox Kit (O) Bacteria Kit

54. One of the most important animals of Northern Canada that changes "grass into flesh" is the:
(P) lemur (Q) lemming (R) Arctic fox (S) hamster (T) chinchilla

55. The brown rat should be exterminated because it is a carrier of a most deadly disease named:
(U) malaria (V) tropical fever (W) ringworm (X) bubonic plague (Y) yellow jaundice

56. A contagious disease known as "athlete's foot" is caused by:
(A) moisture on the skin (B) fungus (C) bacteria (D) over-exercise (E) virus

57. Sanitarians would rate one of the following specimens as "poor" because the number of colonies in a Jamieson bottle was found to be:
(F) from 0 to 50 (G) from 51 to 100 (H) from 100 to 150 (I) from 150 to 200
(J) over 200

58. A fur-bearing animal whose pelage is white in winter is the:
(K) lynx (L) badger (M) vole (N) otter (O) weasel

59. A mammal that grows green algae on his shaggy hair as camouflage is the:
(P) duck bill (Q) spiny anteater (R) three-toed sloth (S) water shrew (T) marmoset

60. A pouched animal found in North America is the:
(U) wallaby (V) opossum (W) armadillo (X) pygmy shrew (Y) duck bill

61. One of the following does not possess a diaphragm:
(A) snake (B) turtle (C) toad (D) man (E) skunk

62. The largest and strongest chest or shoulder girdle (in proportion to its size) is possessed by:
(F) salamanders (G) horses (H) frogs (I) man (J) birds

63. The sperm cells produced by the male fish are known as:
(K) gymnosperm (L) milt (M) eggs (N) spermatophytes (O) ovules

64. The ant-eater could not survive in Canada because:
(P) the climate is too cold in summer
(Q) ants are not as plentiful as in tropical lands
(R) ants in Canada are too small
(S) the trees are not the right type
(T) there are too many carnivorous animals

65. One of these is *not* a fish:
(U) pickerel (V) perch (W) goldeye (X) grampus (Y) guppy

66. Nettles found in Manitoba cause severe itching and blisters on the skin due to their:
(A) sharp edges (B) fine hairs (C) oil secretions (D) sharp needles (E) rough epidermis

67. A troublesome insect-like pest that requires at least one gorging of mammal blood if its eggs are to hatch is the:
(F) deer fly (G) "Bull-dog" horse fly (H) wood tick (I) larch sawfly (J) black widow spider

68. Smut disease on grain is easier to defeat than stem rust because:
(K) smut spores are killed by cold
(L) barberry plants are becoming scarce
(M) infected seeds are easily disinfected with copper sulphate or other chemicals
(N) scientists at the University of Manitoba have developed a smut resistant plant
(O) crops can be "dusted" by aeroplanes

69. Sometimes people use a cement to fill holes in the trees in their yards in order to:
(P) prevent woodpeckers from enlarging it
(Q) to improve the appearance of the tree
(R) keep small birds from nesting in it
(S) lessen the chance of infection by windborne fungus spores
(T) prevent the trees from splitting in cold weather

70. Some insect pests are difficult to control because they live under the ground as they damage useful plants. One of these is:
(U) potato beetles (V) nymph (W) cabbage butterfly (X) coddling moth (Y) cutworm

71. A plant, common in Africa, is noted for its important source of fats and oils for human consumption. This is the:
(A) cacao plant (B) bean plant (C) rice plant (D) peanut (E) maize plant

72. An animal whose ancestors have passed on certain desirable characteristics, generation after generation (such as fine wool) can be called a:
(F) thoroughbred (G) pure bred (H) mutation (I) pedigree (J) cross bred

73. The characteristics of the mother and father are transmitted to their children by means of:
(K) protoplasm (L) nuclei (M) plasma (N) ectoplasm (O) genes

74. Through the use of Laws of Heredity, scientists are able to plan experiments in cross-breeding. These laws were first formulated by;
(P) Galileo (Q) Robert Brown (R) Hugo de Vries (S) Gregor Mendel (T) Robert Hooke

75. Scientists discovered that they are able to change the determiners of living cells artifically by means of a drug called:
(U) colchicine (V) nicotine (W) ether (X) opium (Y) bufferin

76. Sometimes gardeners join a young branch of a tree to an older sturdier branch of the same family of tree so it can become a living part of it. This process is known as:
(A) cutting (B) grafting (C) pruning (D) bracing (E) cross-breeding

77. It is not wise to wrap a piece of wire tightly around a young tree trunk for support as:
(F) the wire prevents the trunk from growing larger
(G) the wire will rust and injure the bark
(H) the wire will crush the sap tubes in the bark, thus starving the tree
(I) the wire may cut the tree in half
(J) the wire may pull the tree too far out of line

78. Manitoba has attempted to introduce a new upland game bird into the province. It was the:
(K) whooping crane (L) passenger pigeon (M) pinnated grouse (N) mallard
(O) Chukar partridge

79. Young fish transplanted into Manitoba lakes from the fish hatchery are known as:
(P) spawn (Q) milt (R) fingerlings (S) amphibians (T) sport fish

80. Since alcohol requires no digestion, it is quickly absorbed into the blood where it acts as a(an):
(U) stimulant (V) anaesthetic (W) vitamin (X) energizer (Y) food

81. A recent medical report indicates that there is some relationship between cigarette smoking and:
(A) pneumonia (B) pleurisy (C) bronchitis (D) lung cancer (E) lung tuberculosis

82. Cows, sheep and deer have similar dental formulas. How many incisors have they in the upper jaw?
(F) one (G) two (H) three (I) four (J) none

83. The order of mammals whose teeth grow continuously throughout life is:
(K) Carnivora (L) Rodentia (M) Edentata (N) Ungulata (O) Cetacea

84. How many teeth has a mammal with the following dental formula $\frac{2123}{2123}$?
(P) 16 (Q) 48 (R) 20 (S) 32 (T) 24

85. Which of the following hibernates during the winter?
(U) lemming (V) rabbit (W) ermine (X) mink (Y) bat

86. One kind of decay bacteria that does not produce an evil-smelling gas to warn people that the food is spoiled is:
(A) botulism (B) ptomaine (C) bacillus (D) undulant (E) parasitic

87. In order to assist them to digest the food upon which they grow, decay bacteria will produce:
(F) tannin (G) ammate (H) enzymes (I) fungus (J) condiments

88. When bread dough containing yeast stands in a warm place for several hours, the loaf becomes light with air spaces in it due to the formation of:
(K) lactic acid (L) alcohol (M) starch (N) oxygen (O) carbon dioxide

Questions 89, 90, 91, 92 and 93 are based on the following article:

CANCER LINK

Found: A possible physical link between cigarettes smoking and lung cancer.

Researchers at the Harvard School of Public Health think they may have found the culprit: radiation emitted by radioactive polonium, a metallic element that occurs naturally in almost all green plants, including tobacco. Drs. Edward P. Radford and Vilma R. Hunt have traced the element in its deadly journey from cigarettes to the lungs—in sufficient quantity to trigger the abnormal cell growth we call cancer.

The Harvard scientists used machines to "chain smoke" thousands of cigarettes of four different brands, two of them filtered. They discovered that most of the polonium in the tobacco leaf was vaporized by the heat of the burning cigarettes and then absorbed by smoke particles. This would explain how the polonium found its way into the lungs.

Then the researcher autopsied both smokers and non-smokers and studied lung tissue from each group. Smokers had far higher concentrations of radio-active polonium.

Conclusion: A two-pack-a-day smoker might expose his lungs to as much as 20-200 times the radiation that is normally present in our environment, so-called "background" radiation.
Next step: An attempt to grow polonium-free tobacco.

89. Researchers have found that lung cancer can be avoided completely if smokers used:
(P) pipes (Q) filtered cigarettes (R) unfiltered cigarettes (S) cigars (T) none of the above

90. A radioactive metallic element thought to be a possible cause of lung cancer and occurring naturally in most green plants including tobacco is called:
(U) plutonium (V) radium (W) polonium (X) potassium (Y) platinum

91. Before this radioactive substance can enter the lungs of a smoker it must first be:
(A) absorbed (B) vaporized (C) assimilated (D) filtered (E) digested

92. This exhaustive research was aided by:
(F) cigarette smoking machines
(G) performing autopsies on smokers
(H) performing autopsies on non-smokers
(I) studying lung tissue of smokers and non-smokers
(J) all of the above

93. Up to the present day researchers have found that cancer is a disease caused by:
(K) an abnormal cell growth due to many factors
(L) the nicotine present in tobacco
(M) the tars present in tobacco
(N) a radioactive substance found in green plants
(O) "background" radiation

Questions 94, 95, 96, 97, 98, 99 and 100 are based on the following article:

Recently an unusual experiment was conducted by microbiologists for the Boeing Airplane Company in Seattle. The company is searching for an oxygen system which will support human space travelers.

A biologist named Joe D. McClure was enclosed in a tank nine feet by five feet. Along the sides of the tank were tall plastic pipes containing several billion or trillion single-celled algae (Chlorella) growing in water. Under the fluorescent lamps, millions of bubbles climbed up the pipes—and it was those bubbles enriched with oxygen produced by the algae, which kept Joe alive for twenty-six hours.

In principle, algae are ideal, requiring nothing but the sunlight coming through the space-ship's windows to regenerate oxygen and dispose of carbon dioxide. It is estimated that a 115 quart suspension of algae could maintain a spaceman indefinitely with oxygen. Also, as the algae multiply, the excess could be used as a nutritious, though perhaps dull, foodstuff.

Problems yet to overcome are that algae are quite delicate; they sometimes sicken, turn yellow and then die. Also they may fall prey to other microscopic enemies. They may even poison themselves with their own wastes.

94. Future air space travelers may get their oxygen supply from:
(P) green plants (Q) compressed oxygen tanks (R) green algae (S) chemical reactions
(T) purifying air through charcoal

95. Algae would be ideal for spaceships because:
(U) they are light in weight
(V) they are small so take up little space
(W) they are easily found in nature
(X) they only require sunlight to produce oxygen
(Y) they have no enemies

96. Scientists have already been kept alive by algae for periods of:
(A) over 24 hours (B) several days (C) less than a day (D) a week (E) none of the above

97. In space travel algae may play a very important role because:
(F) it can supply the necessary oxygen
(G) it can process the wastes
(H) it can supply the food requirement
(I) it does not take up too much space
(J) all of the above

98. Algae may become a primary food of the future because:
(K) of the rapid increase of the population
(L) a shortage of arable land
(M) of its high content of protein
(N) it contains most of the daily needs of man
(O) all of the above

99. A substance used to test for starch in algae is:
(P) limewater (Q) Fehling's Solution (R) nitric acid (S) iodine (T) none of the above

100. The scientist who specializes in the study of algae is called a:
(U) botanist (V) zoologist (W) geologist (X) microbiologist (Y) ornithologist