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A STUDY OF THE PSYCHO-GRAPHS OF FIFTY-FIVE HIGH SCHOOL STUDENTS TO DETERMINE THE RELATIONSHIP BETWEEN MUSICAL TALENT AND VARIOUS DEGREES OF INTELLIGENCE

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A STUDY OF THE PSYCHO-GRAPHS OF FIFTY-FIVE HIGH SCHOOL STUDENTS TO DETERMINE THE RELATIONSHIP BETWEEN MUSICAL TALENT AND VARIOUS DEGREES OF INTELLIGENCE

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By

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INTRODUCTION

Introduction

From time immemorial music has played an important part in the life of the race; but it has been incidental rather than purposive. This incidental process meant that only those persons who had extreme talent and the inner urge became musicians. Frequently, these persons were either highly intellectual or at the other extremity of mentality, so the belief arose that musical talent was associated with great intelligence and to be a successful musician one must have wide experience, a liberal education, broad purpose and high ideals; or that a musician was among the most un-intelligent of men, sometimes near the border of idiocy.

Recently, the purposive element has entered the field of music. The word purposive means that we deliberately hunt for talent, and encourage the individual having it, and endeavor to discourage the one who does not have it. At the present time a real interest is being shown by educators and teachers of music in scientifically predicting some degree of success to thousands who essay to study music, whether vocal or instrumental; and also to save time, money and effort to other thousands who would not be

successful because of lack of talent.

Origin of the Problem

In the ten years teaching experience of the writer it was found that the policy of most school systems regarding music in high schools, was that only those students who made good marks in academic subjects were allowed to take part in the musical activities of the school, and music had to be dropped if marks were not kept up to standard. The alternative to drop some other subject never entered into the situation. Other subjects were considered fundamental and necessary for social living after school was over, but music was only a past-time, a diversion or a hobby if persisted in.

In one of the school systems in which the writer taught music such a policy existed. Only those pupils who were making good marks in academic subjects were allowed to take music. It was not taken into account that there were some very intellectual children who had very little capacity for music. It was believed that these students could excel in any line. Often they were urged to be in the musical organizations and were either " carried along" by the teacher, or were dropped only when it was found they could not succeed. Some students of ordinary or even low intelligence who were not making satisfactory marks in academic subjects were left out of the music groups

entirely. These children might have shown musical ability if given a chance to develop the capacities which they possessed. The writer believed that music should be given to all children regardless of degree of intelligence, if they had any capacity for it, and that music should be a regular school subject open to those who elected it because of talent as shown by tests; and that continuance in musical organizations depended only on making good in them and not upon their marks in school.

To determine the relationship between musical talent and various degrees of intelligence the writer decided to test a group of high school students. If it were found that there is little correlation between musical talent and intelligence, then only those having musical talent should enter the musical organizations.

The interest of the writer in the problem was such that she desired also to find what other schools were doing to determine the relation of musical talent with intelligence.

Statement and Definition of the Problem

In the statement of this thesis, intelligence may be defined as :

"Is the capacity to learn." R. B. Buckingham[1]

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[1] "Intelligence and Its Measurements.", Journal of Educational Psychology, XII, (May, 1921) 272.

"Is mental alertness." Lewis Terman[2]

"Is judgment or common sense, initative, the ability to adapt oneself." Alfred Binet[3]

"Is the ability to react to symbols of various kinds, such as words, numbers, letters and the like." E. E. Thorndike[4]

The above definitions and many others prepared by psychologists vary greatly, but are not necessarily contradictory.

Musical talent as defined by Seashore is :

"Musical talent is not a single talent; it is a hierarchy of talents; many of which are entirely independent of one another, having different relative prominence or latency. The talents naturally group themselves so that we have for example, the tonal group, the rhythmic group, the motor group and the intellectual group, and within each we may trace much detail."[5]

Mursell brings out the idea that musical talent is the ability to react to rhythm, melody and harmony.[6]

Talent is a term which has reference to the inborn or native powers. It is a gift bestowed very unequally upon individuals. Not only is the gift of music itself inborn, but it is inborn in specific types which can be detected early in life. The individual with the average musical

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2 Ibid, (March, 1921) 129.

3 Rudolph Pintner, Intelligence Testing, p.47.

4 Ibid, p.55.

5 Carl E. Seashore, Psychology of Musical Talent, p.6.

6 James L. Mursell, Principles of Musical Education, pp. 13-60.

musical talent is one who ranks high in some talents and low in others. One with an inferior ear for pitch may serve well for music in which rhythm is the dominating feature. Just what the music should be depends upon what the prominent talents are, their relationship and the facilities available. Each case is one of its own kind. The musical outlet of one child is not the musical outlet of another."[7]

By relationship we mean connection between two or more things. In the solution of the problem the writer hopes to find what connection there is between musical talent and intelligence by the means of tests, the results of which will be presented through psycho-graphs and by coefficients of correlation. This definite knowledge may be used to classify pupils so that each may be given an opportunity commensurate with his actual capacity and aptitudes.

A psycho-graph is a graph which indicates the relative position of an individual in each of several traits or abilities.

The above definitions, the writer believes, will make clearer the meaning of the thesis as stated, "A study of the psycho-graphs of fifty-five high school students to determine the relationship between musical talent and various degrees of intelligence."

Need for the Study

Musically considered, people fall into three groups.

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[7] Carl E. Seashore, Psychology of Musical Talent, pp. 6-65.

The first group is composed of creators or composers who form only a small part of the mass of people. Being gifted, only the mechanics of musical form can be taught to them in our schools. Second, is the participating group. This is a large one and is made of persons who study music in our public schools, and take part in musical organizations in the school and community. The third group is made up of listeners.

In our school systems there are many students in the above groups who are not properly placed, but who, if rightly guided, would be personally benefited and increase the efficiency of the system.

At present, very little prognostic work, scientific or otherwise, is being done in school music. A child often is not tested in any way to see if he has any talent for music before he is admitted to the activities. Kwalwasser states:

> "Surveys of public schools show clearly that very little connection exists between the possession of musical talent and the selection of children for musical education; and records of the extent of children's musical education show no close relationship to the possession of talent."[8]

Many communities believe that only the intellectual are talented, so they are the ones who are admitted to the

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[8] "Tests Foretell Your Probable Success or Failure in Music." Musician, XXXII, (July, 1927) 9.

musical groups; or the doors are open to all regardless of intelligence and ability. As a result of either method there are many failures and much lost time.

There should be a more scientific way of managing our music departments. We should know as a result of experiments what association there is between intelligence and musical talent and govern our actions accordingly. If we find there is no definite relation, then admission to music must not depend on the known I.Q. or the rating in other subjects, but on the musical capacity of the child, but, if it is found that a certain degree of intelligence is necessary to be talented in music, then both should be considered before a child is placed in a definite group. We must save the time and energy of the pupils and the teachers as well as the expense to the school system by definite knowledge of the best procedure.

In many schools only a cursory examination of the musical knowledge of the child is made by the teacher as a prerequisite to entrance in the music groups. A teacher's judgment is often faulty and she cannot always be sure she is giving the child a fair chance. Seashore says, "Tests used for discovery of musical talent show magnitudes of individual differences in one group. They reveal differences not even suspected."[9] Ruch and Stoddard

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[9] Psychology of Musical Talent. p.69.

also state, "The music teacher must take into account no less than the class-room teacher differences in capacity and accomplishment."[10] Peter Dykema, leading music educator of Columbia University says, "Probably in no subject is there greater need of investigation by means of tests which shall determine the particular treatment necessary for the best development of differing individuals, than in music."[11] If objective measurement were given the child, to augment the judgment of the teacher, the likelihood of proper musical guidance would be increased.

Another definite need for this study is the educational advantage of impartial and objective records of accomplishment which the teacher may use as a basis for her marks instead of depending entirely on what she thinks the child is capable of doing. It is not fair for a teacher who knows a child is slow in some subjects, or has a low I.Q. to grade him accordingly in music, without definite proof that he has no talent. Neither is justice being given the child of a high I.Q. who gets a good mark in music because the instructor thinks he is bright enough to deserve it, unless she is certain that his capacity depends on his mental status. Kuch and Stoddard say, "Teachers are likely to place too

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[10] Tests and Measurements in High School Instruction, p. 197.

[11] Class Room Teacher, Vol XI, p.570.

much dependence upon intelligence tests for rating pupils in all subjects and in meeting the difficult problem of guidance."[12] If we find as a result of this study aptitude tests must be supplemented by intelligence tests to get the best prediction of talent of the child, then teachers will have a criterion to follow.

The objective method of finding a child's talent through music tests gives a more secure position to the teacher when she deals with the parents of a child who are disinclined to believe their child is not musical when he makes splendid marks in other school subjects but not in music. If a teacher has impartial judgment of tests to show the relation of intelligence and talent, prejudice cannot prevent fair judgment.

The belief presists that if a bright child would just get down to work he could learn music. Many children remain in music classes because they are told if they stay long enough they will learn eventually. If we prove high intelligence is not necessarily an index to musical capacity such children can be saved endless time and discouragement through the use of musical aptitude tests.

Also, if we find that a child does not need to rank

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[12] G. M. Ruch and George Stoddard, op.cit., p.222 .

high in intelligence to be musical we may be able to save many children whose interests lag in academic subjects and who are regarded as failures, and keep them in school by developing their interest in music regardless of rating in other scholastic work.

Praise is a great incentive for work. The results of tests can be used to urge or deter. A pupil should be given correct judgment so that he may be encouraged if he has talent and spurred on to do work worthy of his talents; or allowed to do something more profitable if he does not have the capacity. If a certain amount of intellectual ability is necessary to succeed in music it would be well for the child to be made aware of that so that he will not be desirous of doing something which he cannot accomplish.

Hazel M. Stanton, of the Eastman School of Music writes,

"It should be the aim of any school to prevent and reduce the percent of fluctuation in the enrollment of music to the lowest possible degree, both for the sake of the student and for the school. Those who have talent should be encouraged during their public school age when so many drop by the way-side musically. The time is not far distant when the music world will rally to the need of seeking out those that are talented, not by chance, but by a systematic, scientific procedure and make every effort possible to help these continue their musical interests over a period of time. This will give us a true musical pedagogy."13

If we find as a result of this study there is no

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13 "Psychological Tests of Musical Talent." Monograph Eastman School of Music, (1927)

definite association between musical talent and intelligence, teachers should make it possible for all students with talent to be in the musical organizations. Or, if intelligence and talent go together the teacher must encourage only those pupils who possess both to take music. We will thus give the student every possible chance to succeed, our schools will be more efficient, there will be a more careful marking in the music department and the school can guarantee more enjoyment to the children concerned.

On the strength of the above it seems that the investigation answers a real need in the field of education.

Work in Related Fields

Examination of the literature describing the work done in related fields shows the following:

Howard S. Savage tested one hundred children in the Hudelson English Composition Test, Seashore Test, Kwalwasser-Ruch Accomplishment Tests and Otis Intelligence Test and found a correlation of .39 between music and intelligence.[14]

George C. Fracker and Virgie Howard made a study of 250 students, freshmen, sophomores and juniors at the University of Arkansas, and found the correlation .34, seemed to confirm the position of Seashore that the tests are not significant of intelligence. The average rating on all the

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[14] "A Study of the Correlations Existing Between Musical Ability and Achievement and Intelligence." New York University, (1929)

tests gave a moderate degree of relation between teachers' judgment and musical talent.[15]

Raymond M. Mosher gave music achievement tests to 723 children from the fifth to the eighth grades inclusive. Four hundred-sixty of these were correlated with the scores on the Seashore tests. The correlation was .439 with pitch, .435 with intensity, .358 with time, .129 with consonance and .438 with tonal memory.[16]

Seashore says in reply to the criticism of his tests by Henlein,

" A snapshot test of memory span of natural capacities which is equally fair to musical and unmusical persons for diagnostic purposes, is practical. The most recent experiments of these tests find them satisfactorily reliable and point to a servicable validity. The test depend very much on the tester. Even if the consonance test is weak, when used in a battery to produce a general profile, it does contribute to some extent toward an index of the capacity for success in higher music."[17]

Frank S. Salisbury made a prognostic study of sight singing ability with normal school students and found that

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[15] "Correlation between Intelligence and Musical Talent Among University Students, Freshmen, Sophomores and Juniors", Psychological Monograph, XXXIX, (1928)

[16] "A Study of the Group Method of Measuring Sight Singing", Contributions to Education, No. 194, Teachers College, Columbia University, (1925)

[17] Carl E. Seashore, "Measures of Musical Talent", Psychological Review, XXXVII, (March, 1930), 178-183.

there was a correlation between scores on the Seashore tests and grades in sight singing of .60 By the use of the pitch test, the tonal memory test and some achievement tests, they were able to predict sight singing ability sufficiently well to allow students who made certain scores on these tests to omit the first terms work in sight singing and take the second.[18]

Lowell Mason Tilson in his masters thesis suggests,

"There is need for a study to show what might be expected of students with various degrees of musical talent and intelligence. It should now be possible to set a standard in musical talent and intelligence below which success in the special music course will be practically impossible .... This should be done by giving the student a thorough test for musical talent and intelligence. If his scores in these two qualities fall in the lowest quarter, it would seem wise to suggest that he enroll in some other course than music. ... Previous studies made of the predictive value of music talent tests seem to show in a general way that the tests can be depended upon in the matter of selecting talented students."[19]

A summary of the study of musical ability in the sixth grade in Minneapolis, Minnesota, schools by the superintendent to the Board, November, 1931, says,

"The Seashore Tests of Musical Talent have been standardized by experimentation with several thousand children and adults. The results from these tests disclosed many weak

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[18] "Prognosis of Sight Singing Ability of Normal School Students", Journal of Applied Psychology, XIII, (October, 1929) 425-439.

[19] "A Study of the Predictive Value of Music Talent Tests for Teacher-Training Purposes", University of Cincinnati, (June, 1931) 125-127

places in the music instruction in our school system, which we expect to correct through remedial work. The diagnostic value of the tests is apparent."[20]

Dr. Howard Hanson of the Eastman School of Music has so much faith in the Seashore tests that they are used as a part of the examination for admitting students to the college. Dr. Hanson says,

"My own belief in their efficiency is indicated by our use of the tests at the present time in this institution. They indicate a student's capacities which before could have been obtained only after months of study under careful and observing teachers. They have been the means of discouraging students where lack of fundamental musical capacity would have been a constant, and in some cases, insurmountable handicap. Above all, they have tended to promote honesty in the extimate of the ability of the students and have prevented, in many cases, serious mistakes in the choice of a profession."[21]

During the year 1930-1931 a new set of music talent tests has been placed upon the market. These tests are known as the Kwalwasser-Dykema Music Tests and measure ten traits of musical talent, five of them the same as those measured by the Seashore test. In addition, new tests attempt to measure tone quality, tonal movement, musical taste, pitch imagery and rhythm imagery. The tests are given by means of phonograph records. Their reliability was determined at the Indiana

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[20] Summary of a Report of the Superintendent of Schools of Minneapolis to the Board of Education, (November, 1931)

[21] "Psychological Tests of Musical Talent", Monograph Eastman School of Music, (1927)

State Teachers College on eighty-five special music students who had previously taken the Seashore tests. The results obtained showed that the Kwalwasser-Dykema tests are not very dependable, as the means are so high and the standard deviations so small that the tests do not measure the varying capacities of the students.[22]

Hazel M. Stanton in a monograph on the Seashore tests says,

"The great value of the Seashore tests is two-fold:- First, they are analytical. He attempts to deal with musical elementary, sensory and motor abilities on which the power deal with musical materials depends. We can measure such a capacity as that of pitch very accurately indeed. Second, Seashore has been able to standardize materials, and establish norms for guidance of teachers and advisors because he has been in a position to try his tests out on large numbers of children. These tests are the only ones in the field of music that have been adequately standardized so that we can predict just how well the normal child ought to do. All that he attempts to do is to grade people into the unmusical, the moderately musical and the very musical."[23]

While the above mentioned literature bears some on the problem of this thesis, the specific problem as we see it, is open for investigation.

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[22] Lowell Mason Tilson. "A Study of the Predictive Value of Musical Talent Tests for Teacher-Training Purposes", The Teachers College Journal, (November, 1931), 110-117.

[23] "Critical Review of the Seashore Tests of Musical Talent", The Eastman School of Music, Psychological Monograph, XXXIX, (1928)

CHAPTER II

TECHNIQUES AND PROCEDURES USED

Measurement

The kind of instruments used in an investigation is determined by the nature of the problem. In this thesis the technique of measurement was used, and, as the study was to determine the relationship between musical talent and various degrees of intelligence, tests were used for the measurement of intelligence and musical talent.

As many factors are contributory to the development of intelligence and musical talent, information blanks were also used to collect data of such factors.

Since tests were the chief sources of information it is advisable to discuss and describe them. Tests of all kinds should be regarded as a means to an end and not the end in themselves. Intelligence tests are so numerous and so generally used that they require no defense. The standardized tests selected are well known. The following tests were used;-

A. Standard Tests
   1. Otis Group Intelligence Scale, Advanced Examination Form A and Form B
   2. Seashore Measures of Musical Talent

B. Informal Test
   1. Special Tests of Musical Ability devised by the writer.

Otis Group Intelligence Scale

The Otis Group Intelligence Scale, Advanced Examination, is in two forms, A and B, different in substance but similar

in structure. "The method of examining pupils in groups", says Otis, "is subject to certain limitations, so no score should be considered absolute."[1] However, Otis claims that the ability to make good scores on his tests is native since it measures the ability to learn, profit by past experience, reason, and make new adaptations. The Otis group test consists of a battery of ten tests:

1. Following directions - 20 points - time 5 minutes
2. Opposites - 25 points - time 1 and ½ minutes
3. Disarranged sentences - 25 points - time 1 ½ minutes
4. Proverbs - 20 points - time 6 minutes
5. Arithmetic - 20 points - time 6 minutes
6. Geometric figures - 20 points - time 6 minutes
7. Analogies - 25 points - time 3 minutes
8. Similarities - 20 points - time 4 minutes
9. Narration completion - 25 points - time 6 minutes
10. Memory - 30 points - time 3 minutes

The above test yields 230 points and takes about one hour to administer, counting the actual time of writing and time for passing and collecting material and rests in between batteries. Since few class periods are of this length it is advisable to give the test in two separate class periods thus avoiding fatigue. This the writer did, giving both forms of the Otis scale to fifty-five high school students under as controlled conditions as possible each time.

In the manual which accompanies the tests, directions

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[1] Arthur S. Otis, "Manual of Directions for the Otis Advanced Examination". (1929) p.1.

are given for scoring and for finding the intelligence quotients, which are the best criteria for judging intelligence, as they consider the age of the one taking the test along with the scores made. The results of the above tests were checked by others besides the writer, and again rechecked, so that they are acceptable material for this study. Only the data for Form B, however, are used.

Seashore Measures of Musical Talent

Dr. Carl E. Seashore, Head of the Department of Philosophy and Psychology of the University of Iowa, by means of tests extending over fifteen years, has worked out a series of measurements whereby the musical talent of an individual may be determined. He has found that musical talent is surprisingly concrete; that it is elemental, and can be evaluated more accurately than any other talent, hence the tests are both diagnostic and prognostic. We call the talent elemental when it is so simple and natural that it does not vary with training, intelligence or age.

Seashore's principal testing materials, the tests for measuring the sense of pitch, intensity, time, consonance and tonal memory, have been recorded on Columbia phonograph records. Dr. Seashore says,

"The striking results of these tests show that the capacities - pitch, time, intensity, rhythm and memory are quite independent of each other in some persons and quite dependent in others. One may have a keen sense of pitch and no sense of time or vice versa. One may have a mathematical sense of time and yet have no sense of rhythm. The

same principle applies throughout the list. On the other hand these may be interrelated. Perhaps no two persons who are said to be musical possess all these listed above in equal amounts. 2

The term talent or capacity has reference to the inborn or native powers; the term ability is used to designate acquired skill in the use of the talents or capacities.

There are five tests (there are now six). These measures do not constitute a complete survey of musical talents; but they are specific measures of the basic capacities, viz., pitch, intensity, time, consonance and tonal memory. Each block of trials consists of the playing of the two sides of the record, one for practice and one for the test, and takes twenty minutes, so the whole series requires nearly two hours.

The first test is for pitch. In this test the listener is told that he will hear two tones which differ in pitch. He is to judge if the second tone is higher or lower than the first and record "H" for higher and "L" for lower. Pitch depends upon the frequency of vibrations per second. Seashore says, "Pitch discrimination cannot be used as a measure of intelligence, for the physical basis of pitch, the ear, does not vary with intelligence

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2 Carl E. Seashore, Psychology of Musical Talent, pp. 14-16.

or change with years."[3]

The second test is for intensity. The listener is told that he will hear two tones which differ in loudness or strength. He is to judge whether the second is weaker or stronger than the first. If the second is stronger, record "S", if it is weaker record "W".

"Intensity is the ability or acuity of hearing measured in terms of the faintest auditory sound. The physiological basis of intensity is located in the ear and depends on normality and physical capacity of that organ."[4]

The third test is for time. In testing groups, two time intervals are marked off by sounding of three clicks. The listener is told to record whether the second time interval is longer by "L", or shorter than the first by "S". Seashore says:

"The sense of time is the natural capacity for precision in hearing of the duration of tones or short intervals. It does not lie in the ear or its mechanism as in the case of pitch and intensity. It is a balancing of movements in ourselves, real or imagined. These movements may be actually executed, as in humming; but ordinarily they do not result in sound, but in movements of the throat or speech organs, or movements of the arms or feet."[5]

The fourth test is for consonance. The listener is told that he will hear two combinations of two tones each;

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[3] Carl E. Seashore, op.cit., p.56.

[4] Ibid., p.79.

[5] Ibid., p.105.

one combination is better or worse than the other in consonance. He is to judge which combination sounds better. If the second is better than the first, he is to record "B", if worse, "W". Again we quote from Seashore.

"The sense of consonance is the natural capacity for hearing two tones sounded at one time, that give either satisfaction or dissatisfaction. Agreeableness or disagreeableness depends on the fusion of two or more tones. The sense of consonance reveals itself quite early in childhood." 6

The fifth test is for tonal memory. In this test a series of tones is played twice. In the second playing one note is changed. The listener must record by number which note is changed. Memory is not a single capacity, it differs as to content and the things that are best retained.

Since measurement depends upon the care and exactness with which tests are administered, great care was taken in giving the tests to the fifty-five students of this study. A preliminary practice test was given by using the "A" side of each disc, and the pupils were asked to give the answers aloud until the nature of each test was understood. Printed test blanks were given to the pupils on which to record the answers. Since the whole series takes nearly two hours, the writer found it advisable to give the tests in two separate periods. As many users of the Seashore tests believe that one testing does not give the child an opportunity to reach

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6 Ibid., p.158.

his physiological limit, the writer gave the entire series again at a later date and used the results, as verified by rechecking, of the latter for this study.

Informal Test

The Seashore tests of Musical Talent measure specific and fundamental traits, but they do not measure the accomplishment of a child in music. The writer realized that other tests used in connection with musical talent tests would aid in placing pupils in musical organizations, so, each of the fifty-five students was given an individual test devised by the writer.

The material used in the tests is scaled somewhat on the basis of difficulty, in order to judge the best effort of the child. The test was divided into four parts. It was hecta-graphed so the student's response could be marked on the prepared sheets.

The first part of the test is a measure of the pupils ability with symbols rather than music itself and was arranged in single answer or multiple choice type, containing the following items:

1. Knowledge of note values, rest values and key signatures.
2. Knowledge of time signatures.
3. Knowledge of musical symbols and terms.

In the second part of the test a piano was used to play melodies and rhythmic figures for:

1. Correction of pitch in melodies played
2. Correction of time in melodies played.

In the third part of the test the child was judged on his ability to :

1. Sing intervals
2. Sing melodies by syllable, or by a neutral syllable
3. Tap melodies from the page giving value of notes.

The fourth part was a performance test on the chosen instrument of the student.

From the results of this test and the Seashore measures, the writer felt she would be able to encourage each student along the line of his best achievement, as each good score meant some type of capacity. Since some of the material used depended on factual knowledge of music, a child who did not excel in that part of the tests was not discouraged if he had other marks of talent.

Information Blanks

Since the social status of the home and the musical environment and the training of the child might be contributory factors to the students mental and musical development, information was obtained about these factors through the following;- Age of the student; his school classification; the social status of the home as shown by education, occupation and nationality of parents; and the musical environment, attitude and previous training of the child.

Information blanks were sent to a number of schools where music was being offered, to find what they were doing to determine the relation of musical talent with intelligence for the purpose of classification of music

students. The following was used:

Information Blank to Music Supervisors

Date
Place
Name of school
1. Do you use intelligence tests to find the mental status of students?
2. Do you use any tests to discover musical talent?
3. May any student having musical ability be in your musical organizations?
4. Is high intelligence a prerequisite for music classes?
5. Are good marks required in academic subjects in order to stay in music classes?
6. Do you give credit for musical activities?
7. Give the number of seniors who expect to continue music after graduation.
8. Do you use a follow-up of music students after graduation?

A third information blank was sent recently to the fifty-five students of this study. This was to determine what use was being made of music after graduation, and see if music talent as recognized in school had functioned in later life.

Information Blank to Graduates

Name
Date
Place
Did you attend college after high school graduation?
Were you in the college - glee club ( ), orchestra ( ), band ( ), chorus ( )
Did you study music in college?
What is your occupation now?
Do you take part in the musical activities of the community as; band ( ), chorus ( ), orchestra ( ), church choir ( )
Have you ever earned money from your musical ability?

CHAPTER III

DESCRIPTION OF THE SUBJECTS

In order to find if the results of this study are valid, it is necessary to show that the subjects were an unselected cross section of the school and thus fairly representative. A brief survey showing this, follows:-

The town in which this study was carried out is a typical mid-western one, of about three thousand inhabitants, surrounded by a farming community that recently changed its character somewhat when gas and oil were discovered in paying quantities. The students came from average small town homes and the surrounding rural community, where there are no great extremes in wealth and poverty.

The school system was progressive and had a standard high school, so, many boys and girls attended it for the advantages which were offered there. The superintendent was in sympathy with the problem of young people and kept them in school as long as possible. The policy of the school was, however, to allow only those to be in the musical organizations who were making good grades in regular school subjects. When the writer suggested the plan to test for musical talent with a view of giving all boys and girls who had any capacity a chance for music, the superintendent became interested immediately.

To obtain the data for this problem the writer, accordingly, tested fifty-five pupils who elected orchestra,

glee club or chorus, from a high school enrollment of three hundred. Most of these students had received some elementary training in sight singing and the fundamentals of music, and some had taken private lessons on instruments and in voice.

To show that they were an unselected group in the school the following data are given:-

Sex - boys - 32, girls - 23

Classification in school - freshmen 10, sophomores 15, juniors 16, seniors 14

Age range for group - 19 years 1 month to 12 years 3 months
Age range for boys - 19 years 1 month to 12 years 3 months
Age range girls - 17 years 4 months to 12 years 4 months

Otis intelligence scores - 202 to 88
Range 114 points

I. Q. scores - 126 to 88
Range - 38

Being a mid-western community it is not surprising to find that all of the subjects of this study were American born, although they were not all natives of the state of Kansas. Other birth states were Iowa, Missouri, Ohio, Oklahoma and Washington.

The nativity of the parents shows a number of them were foreign, as well as American born. There were 40 families in which both parents were Americans. In 5 families only the fathers, and in 7 only the mothers were born in America. Their native states were: Kansas, Iowa, Kentucky, Illinois, Ohio, Pennsylvania, Indiana, Missouri,

Arkansas and Wisconsin. In 3 families both the father and the mother were foreign born. These foreign born represented the countries of France, Germany, Sweden and the British Isles.

Quite often the social status of the home depends on the occupation and education of the parents. Children coming from homes where there is little educational background and rather meager surroundings vary from those who have homes with cultural and recreational advantages. A glance at the tables following will give an idea of the difference in such opportunities offered to the students chosen for this study.

TABLE I

OCCUPATION OF PARENTS

Occupation	Father	Mother	Total
Farmer	15		15
Banker	2		2
Merchant	10		10
Mechanic	10		10
Oil and Gas worker	6		6
Chore worker	2		2
Doctor	2		2
Clerk	3	2	5
Teacher	2	1	3
Preacher	1		1
Tailor	1		1
Dressmaker	0	2	2
Music teacher	1	1	2
Baker	0	1	1

TABLE II

EDUCATION OF PARENTS

	Father	Mother	Total
College attendance	10	10	20
High school	20	15	35
Eighth grade or less	25	30	55

TABLE III

MUSICAL INSTRUMENTS IN HOMES

Pianos	20	Woodwinds	6
Organs	2	Victrolas	15
Strings	18	Radios	9
Brass	10	Percussion	3

Students in an unselected group probably would not be interested in the same subjects in high school. Such was the case with the students tested. Table IV shows the preference for certain subjects.

TABLE IV

PREFERENCE FOR SUBJECTS - MUSIC NOT INCLUDED IN THE CHOICE

Boys		Girls	
Social Science	4	Social science	2
Science	6	Science	1
Mathematics	5	Mathematics	1
Commerce	5	Commerce	2
Manual training	6	Domestic science	5
Physical education	3	Physical education	2
English	2	English	6
Languages	1	Languages	4

From the above tables it will be seen that this group of fifty-five students, who formed the source of material for this study was most thoroughly representative, and a good cross section of the school.

CHAPTER IV

PRESENTATION AND INTERPRETATION OF DATA

The purpose of this study, as stated, is to determine the relationship between musical talent and various degrees of intelligence. The results of the tests from which conclusions will be drawn, are presented statistically and graphically in the following order:-

1. (A) A study and explanation of tables summarizing the Otis scores and intelligence quotients with the mean, standard deviation, and probable error of each; surface diagrams showing the overlapping of intelligence quotients, and overlapping of scores of the fifty-five students of this study.

2. (B) A somewhat similar presentation of the measures of musical talent scores and the composite score of the same.

(A) A special study of typical students through their psycho-graphs.

(B) A study of each student by means of a psycho-graph plotting his (a) Otis scores, intelligence quotient, age, norm and comparison of his mean with the mean of the entire group. (b) a psycho-graph showing by means of sigmas the relation between intelligence and musical talent.

(C) Tables of students whose music scores should

encourage or discourage them from music study, and data of representative cases showing definite relationship between intelligence and talent.

3.

(A) A summary and discussion of the correlation of Otis scores and intelligence quotients with the five measures and composite scores of the Seashore tests.

(B) Scatter diagrams explaining the above correlations.

4.

(A) Tables summarizing the findings of the information blanks sent to graduates and music supervisors.

Terms

Certain terms and their abbreviations as used in this study are here defined.

Mean or M. - The arithmetical average of all the measures in a distribution shows the central tendency of the group.

Intelligence Quotient or I.Q. - The intelligence quotient of the Otis test is found by computing how much above or below the norm for the age is the score made by the subject.

Range. - The distance on a scale between the largest and the smallest measure.

Standard Deviation or S. D. - Is a measure of the dispersion or scattering of the measures from the mean so that approximately 68% of the measures fall between 1 σ above or 1 σ below the mean.

Probable Error or P.E. - A numerical indication of the extent

to which a statistical measure may be in error.

Correlation or r. - Is the degree of relationship between two traits.

Scatter Diagram. - A graph which indicates paired measures in two abilities.

Data of the Otis Intelligence Scale

In accordance with the above outline we now present material and its interpretation.

The summary of the Otis intelligence tests will be presented first in table form.

TABLE V

SUMMARY OF THE OTIS INTELLIGENCE SCALE RESULTS

	High	Low	Range	Mean	S. D.	P.E.m
Scores	202	88	114	142.5	34	3.1
I.Q's	126	88	38	110	12	1.07
Scores -Boys	202	88	114	141.5	38	4.2
Scores -Girls	187	92	95	143.6	34	4.0
I.Q's - Boys	126	88	38	108.3	29	2.7
I.Q's - Girls	121	93	28	112.5	27	2.1

Table V summarizes the scores and I.Q's of the students taking the Otis intelligence test, and also the same separately for the boys and girls.

In the group scores it will be seen that the highest score made was 202 and the lowest 88, which gives a rather large range of 114 points. The mean is fairly high at

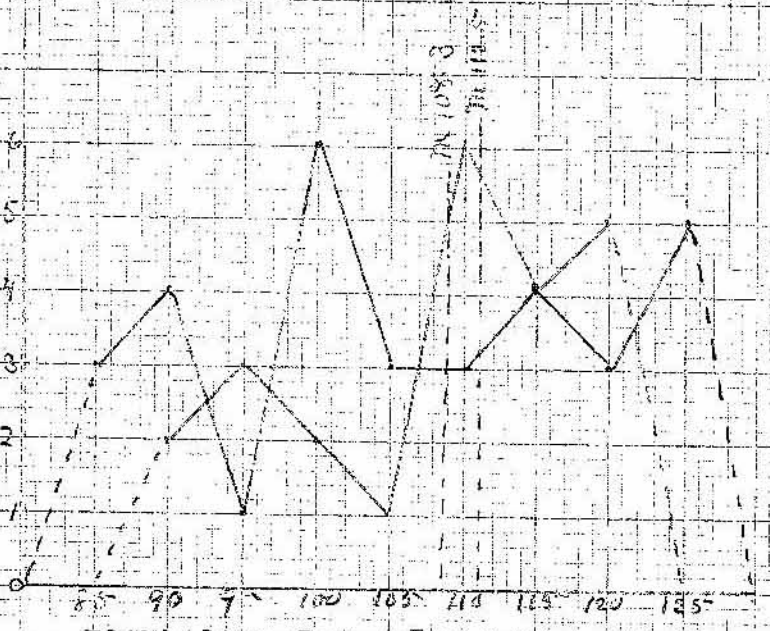
142.5. The S. D. is large, but is reliable because the P.E., 3.1 is small. The I. Q's which are a result of the scores in relation to the ages, are from 126 to 88, with a range of 38. The mean of the I.Q's is 110, which is a good average for high school students.

The I.Q's for the boys, 126, runs slightly higher than those for the girls, 121, and also lower, making their range 38 while that of the girls is 28. The mean for the girls is thus 112.5 while that of the boys in only 108.3.

The above data prove this to be a heterogeneous group and composed of different degrees of intelligence.

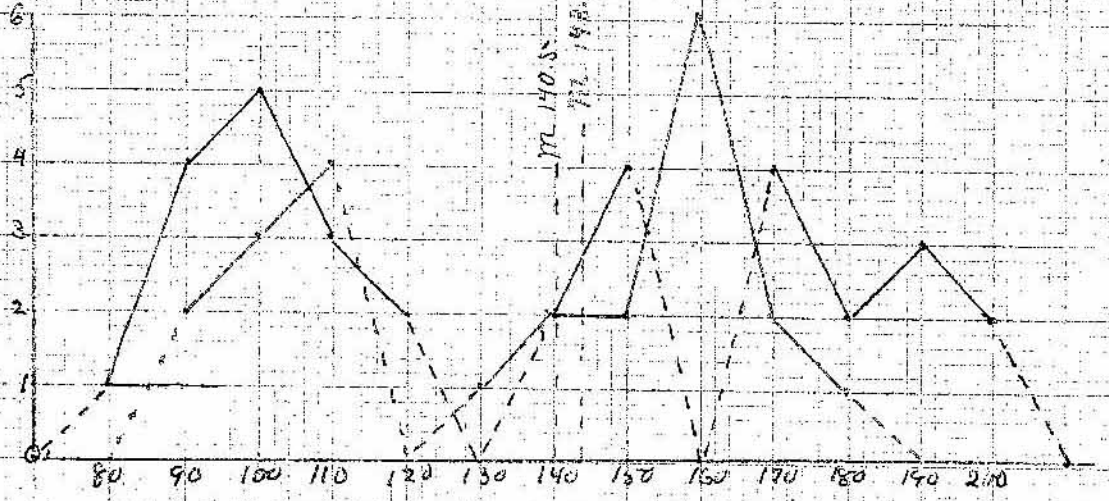
Figure 1 illustrates the overlapping of the I.Q's of the boys and girls. Three boys are in the lowest interval of 85 to 90, while the two lowest I. Q's for girls are in the 90 to 95 interval. There were six boys also in the interval of 100 to 105, while the same number of girls is in the higher, 110 interval. The highest I.Q's made by girls were in the interval 120-125, but there were five boys who placed in the 125 and above interval. As a whole the girls were slightly above the boys in intelligence as their mean is 112.5 and that for the boys is only 108.3.

In Figure 2 the overlapping scores of boys and girls correspond to the variance shown in Figure 1, with the boys having lower and higher scores and a slightly lower mean than that of the girls.



Black line-Boys Red line - Girls

Fig.1.- Overlapping of the I.Q's of Boys and Girls



Black line- Boys Red line- Girls

Fig.2.- Overlapping of scores of Boys and Girls

Data of the Seashore Measures of Musical Talent

Following the outline as given in the beginning of Chapter IV, we will next present a summary of the Seashore measures of musical talent.

The raw scores from the measures of the Seashore tests are not comparable since they are not based on the same unit value, but, if they are converted into percentile ranks they become so. Seashore gives tables for this conversion in the Manual of Instructions. The writer thus converted the raw scores of the students in this study into percentile units. A summary of the results of the percentile scores of each of these measures, namely, pitch, intensity, time, memory and consonance and the composite score of all of the measures is contained in the table below.

TABLE VI

SUMMARY OF THE SEASHORE MEASURES OF MUSICAL TALENT

Scores	High	Low	Range	Mean	S.D.	P.E.m
Pitch	99	5	94	71	27	2.1
Intensity	92	3	89	58	34	3.1
Time	96	15	81	60	36	3.2
Consonance	92	39	51	71	14	1.2
Tonal Memory	98	30	68	76	18	1.6
Composite	85	23	62	68	16	1.3
Boy's Composite	87	23	64	67	13	1.5
Girl's Composite	81	40	41	69	11	1.5

Commenting on the above data, we find a greater variation in pitch than in any other measure, the range

being 94. The mean is fairly high, but the standard deviation, 27, is marked, so that the spread of the scores away from the mean shows it to be an ill-balanced group in respect to pitch.

The lowest score of the entire tests is made in intensity. The student who made this score of 3, had the lowest score in pitch, 5, and likewise the lowest one in the composite score. The range of 89 in intensity is wide, and with a standard deviation of 34 shows that the group is widely scattered in the ability to discriminate in intensity.

Intensity and time are the two most erratic measures. Time has the highest standard deviation and the highest probable error, and indicates a great variation in the capacity of the students in this talent.

Consonance seems to test higher than the other measures, since its lowest score is much higher than that for the other measures, it has a small standard deviation and probable error, and the next to the highest mean. Since it is the most compact and least variable measure it denotes that the students are more homogeneous in this measure than any of the others.

Memory is the next highest measure with a high score of 98, the highest mean, a low score of only 30 and next to the lowest range.

As the composite score is made up of the findings from

the five measures of musical talent it indicates the general tendency of the entire group without calling attention to the high or low points. We observe therefore, that the group as a whole is quite varied in the talents of music as measured by these tests.

As separate results for boys and girls in the Otis intelligence scale were given, the writer will do the same for the measures of musical talent. There were seven boys in the highest score interval and one in the lowest, while two girls were in the highest and none in the lowest. The mean of the boys is 67.5 with a standard deviation of 13. The mean of the girls is 69 with a standard deviation of 11. The girls, as before, vary less than the boys.

In addition to the interpretation of the table the following general comments of the musical measures may make the results of the tests somewhat clearer.

Pitch does not vary with age or sex. As many ages and both sexes are included in the summary, this statement holds true.

The capacity of intensity is not closely related to intelligence as it has a physical basis in the ear. The relation to intelligence is not shown in this table except as the reader will recall that the results of the Otis test showed the group to be as varied in intelligence as it is varied in this measure of musical talent.

Time develops early in childhood and shows very little gain in training. Since this group of students had different degrees of training and the results of the test in time were greatly varied we would conclude that training had little effect on this capacity.

The sense of consonance is quite elemental and apart from education or intelligence. It is a feeling of like or dislike and develops early in childhood. The scores in consonance made by these students were so high that we conclude they ranked high in this elemental measure. They should do well in ensemble music groups where this talent is so necessary.

Tonal memory improves some with training. We should expect since most of the members of this group had received some training in sight singing that the results would be rather high in this measure, which they were.

Description of Psycho-Graphs

To show the relationship of musical talent and various degrees of intelligence we present psycho-graphs of each of the fifty-five students of this study.

The intelligence of a student, as measured by the Otis scale, and his musical talent, as measured by the Seashore test, are depicted graphically and statistically for a clear understanding of his intellectual and musical make-up. In order that the psycho-graphs may be easily

interpreted, some explanation will be given. Table VII found on the opposite page, is a sample graph.

Test I, at the top of the page is the graph of the Otis intelligence results. Test II, at the bottom is the graph of the Seashore measures of musical talent.

The graph on which the intelligence results are plotted is laid out on a basis of a hundred, from left to right. On the left are the ten separate batteries of the test with their prescribed values, which total 230 points. On the opposite side in the first column are the scores made by the individual on each of the tests. The sum of this column gives his total score. Below this is the norm for his age, as given by Otis. According to the manual, if his score is above or below the norm for his age his I.Q. will be accordingly above or below 100. The I.Q. is found on the graph below the chronological age. The second column on the right contains the per cent values of the raw scores in relation to their prescribed values. These per cents are plotted on the graph and thus show the intelligence profile of the student. The average of the per cent column is the standing of the student in relation to the group. This average when compared with the mean of the group, as indicated by the red line on the graph, will give the students intelligence standing in the group.

The lower graph represents the musical talents of the

individual. It shows the relationship that exists between intelligence and the composite score for music, and between intelligence and each of the five measures of musical talent. The relationship that these measures bear among themselves may also be seen at a glance. In order to compare the various scores of the student, the writer found it necessary to have some common unit of measurement. Rudolph Pintner and Carl Holzinger, measurement experts and statisticians, find that the standard deviation is one of the most stable measures we have, so the mean and standard deviation were found for each measure, and the graph was plotted on sigmas from a common mean. To see if intelligence is associated with musical talent the I. Q. had to be considered. The I. Q. and pitch, intensity, time, consonance and tonal memory are found on the left of the graph. On the right are found the score, mean, S. D. and sigma deviation for each of the seven measures in the order mentioned. The sigma deviation for each measure is plotted on the graph, thus presenting the musical psycho-graph of the student in relation to his I. Q.

Special Studies of Psycho-Graphs

In order to prove that intelligence and musical talent are associated with various degrees of intelligence, the writer selected from the fifty-five psycho-graphs of the subjects tested, certain typical types that show the various combinations that were made between intelligence

and musical talent. The presentation of these are merely examples for illustration, and an examination of the other psycho-graphs shows many other combinations of the relationship of musical talent and intelligence.

The initials instead of the full names of the students are used.

Example of High Intelligence Associated with High Musical Tale

F. E. is a boy - age 16 years 11 months

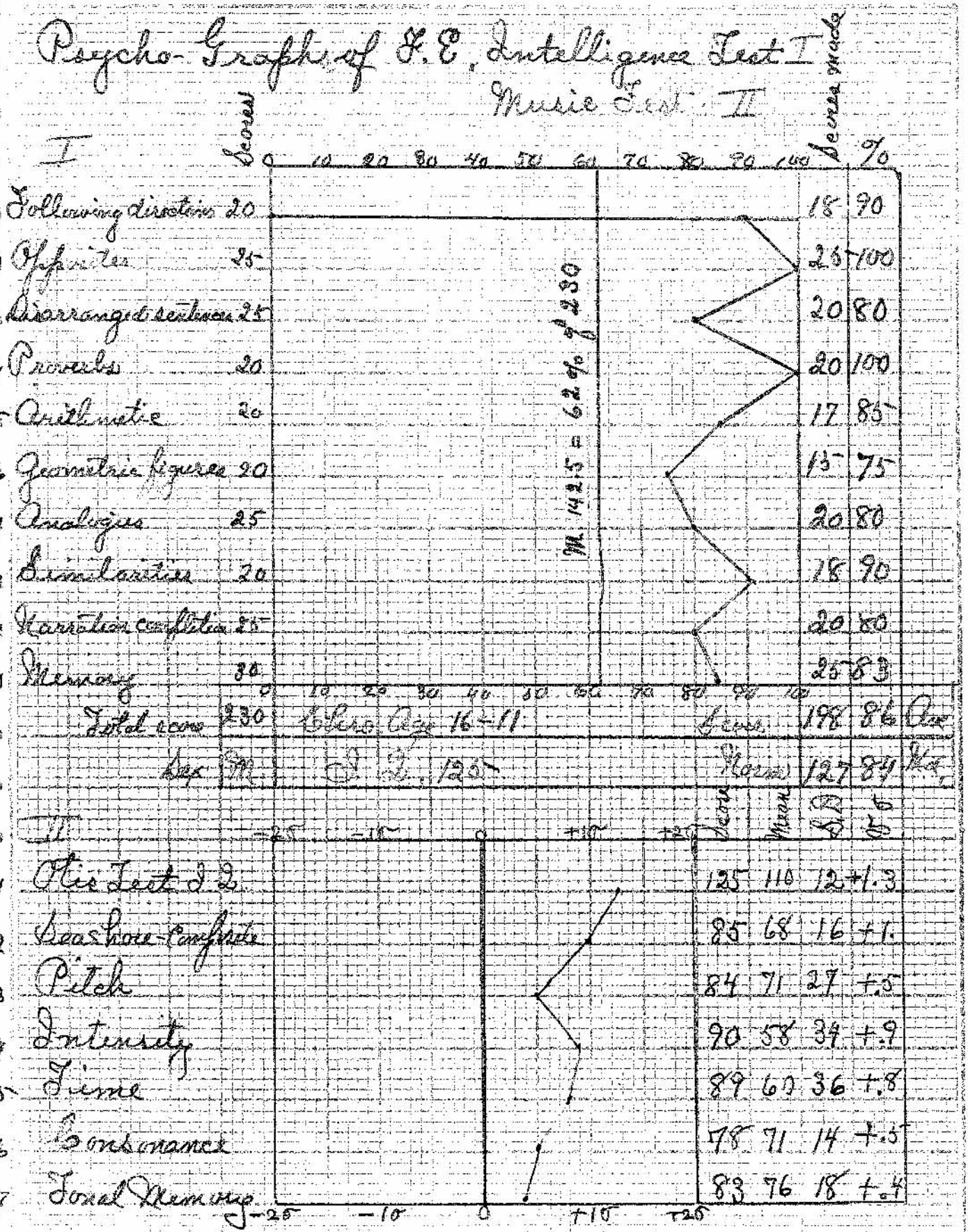
In the graph of the Otis intelligence, it may be seen all of his per cent scores are above the mean of the group, with two scores of 100 each, in opposites and proverbs. His lowest score is 75 in geometric figures. This makes his mean 86, while that of the group is 62, so he is 24 above. His raw score is 198 while the norm for his age is 127 and this gives him an I.Q. of 125. He has good scores in all of the batteries and these place him much above the average student in intelligence.

On the music graph is plotted the I.Q. in relation to the musical talent scores. F. E. has an I. Q. of 125 and the mean for the group is 110 which makes him 15 above the group with a sigma placement of + 1.3 on the graph. Each of his sigmas for the musical talent tests is high, with the best in intensity and the lowest in tonal memory. All of his capacities are so outstanding that he would do well in any line of musical endeavor.

In the informal test which the writer gave, F. E. was superior to most students. He had a good singing voice, marked rhythm, good knowledge of symbols and played violin well. He had many musical and educational advantages at home and his parents gave him private lessons in music.

From the information blank it was found that F. E. went to college, sang and played in the organizations there and made excellent grades in academic subjects.

Psycho-Graph of E. E. Intelligence Test I
Music Test II



High Intelligence Associated with Average Musical Talent

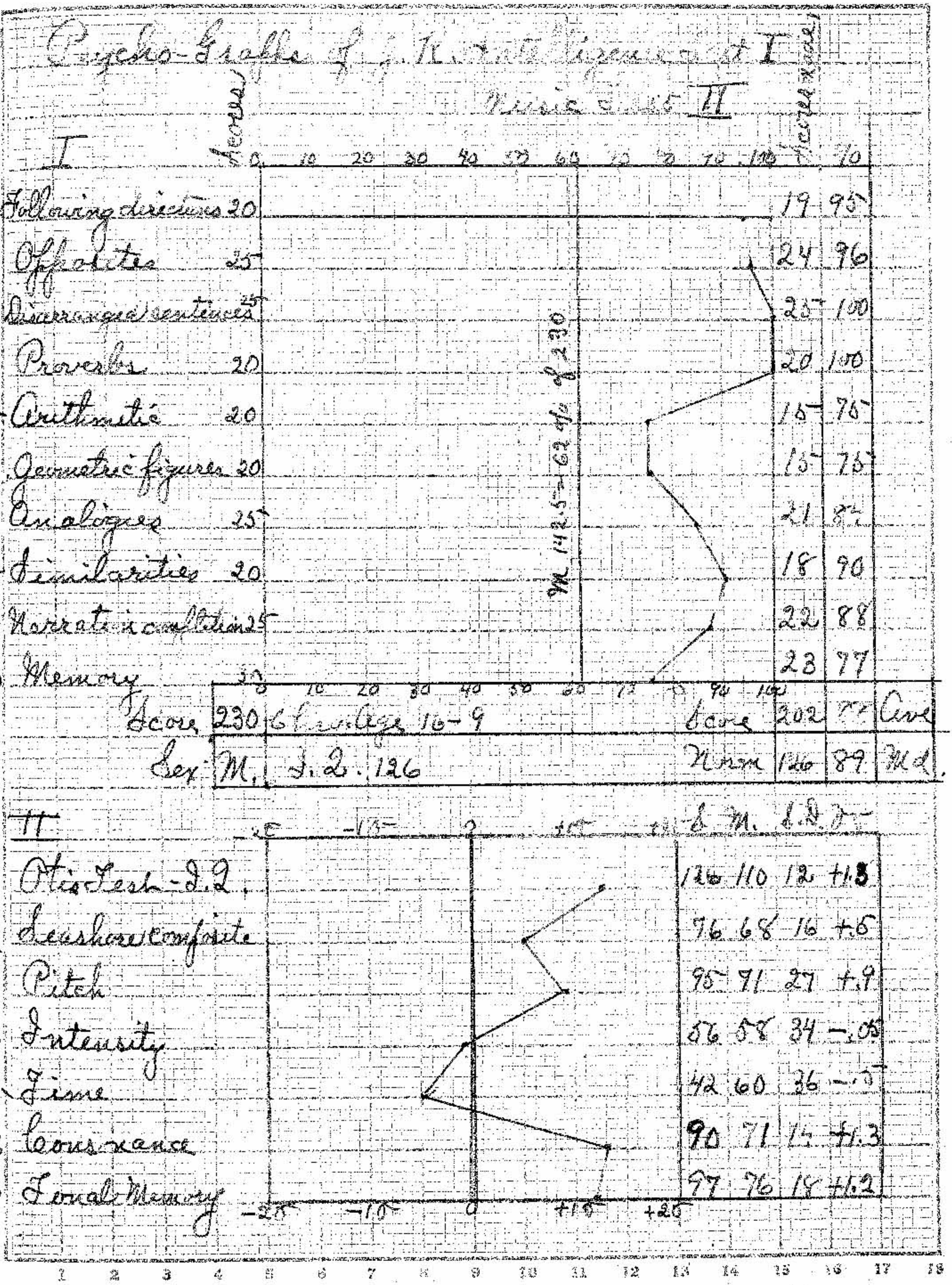
J. K. is a boy - Age 16 years 9 months

In the Otis intelligence results this boy is one of two persons who made the highest score and the highest I.Q. in the group. He has perfect scores in disarranged sentences and proverbs, and his lowest scores are in geometric figures and arithmetic. His mean is 26 above that of the group. His total score is 202 which gives him an I. Q. of 126. Intellectually, he is superior.

On the music graph the I. Q. sigma may be compared with the musical talent sigmas. J. K. is 16 points above the mean in intelligence which is shown by his sigma + 1.3 on the graph. The results of the consonance and tonal memory tests are good, but he scored below the mean in intensity and some below in time, which gives him an average composite score of 76.

As a result of the informal test it was found that J. K. had a good singing voice, played piano well, had good knowledge of the fundamentals of music, but responded less accurately to the tapping test. He came from a poor home, but his parents managed to give him piano lessons. He was very perservering in his study.

From the information blank used for follow-up of musical ability we learned that J. K. is graduating from the law course of a college with excellent scholastic records. He still plays piano.


Psycho-Grafhs of J. K.
Music II
I
Scores
0 10 20 30 40 50 60 70 80 90 100
1 Following directions 20 — 19 95
2 Opposites 25 — 24 96
3 Disarranged sentences 25 — 25 100
4 Proverbs 20 — 20 100
5 Arithmetic 20 — 15 75
6 Geometric figures 20 — 15 75
7 Analogies 25 — 21 84
8 Similarities 20 — 18 90
9 Narrative completion 25 — 22 88
10 Memory 30 — 23 77
M 142.5 = 62 % of 230
Score 230 Chron. Age 16-9 Score 202 Ave
Sex M. I. Q. 126 Norm 126 89 Md.
II
-20 -10 0 +10 +20 S M. S.D.
1 Otis Test - I.Q. 126 110 12 +1.3
2 Seashore composite 76 68 16 +.5
3 Pitch 95 71 27 +.9
4 Intensity 56 58 34 -.05
5 Time 42 60 36 -.5
6 Consonance 90 71 14 +1.3
7 Tonal Memory 97 76 18 +1.2
-20 -10 0 +10 +20

High Intelligence Associated with Low Musical Talent

E. D. is a boy - Age 16 years 10 months

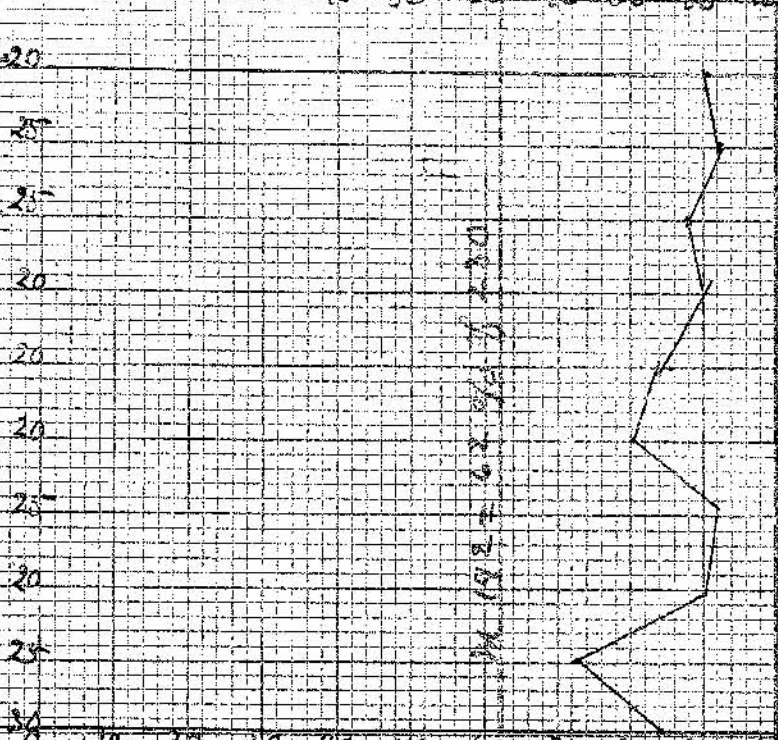
In the intelligence test, E. D. made a score of 198. The norm for his age is 126 which accordingly gives him an I. Q. of 125. He made two high per cent scores of 92, in opposites and analogies. His lowest per cent score is in narration completion. All of his scores are so good that his average is 85 as compared with 62 for the group, or 23 above. His test results are among the most uniform in the group and show a fine, well-balanced, abstract intelligence.

The I. Q. of E. D. is brought down in the lower graph and compared with the mean of the group and is given a sigma standing of + 1.3. His composite score is 50, and he is below the mean in all of the measures of talent, being especially lacking in the sense of pitch. His scores place him in the class of students with poor musical talent. The tests discovered no musical aptitude, and he should be discouraged in active participation of music.

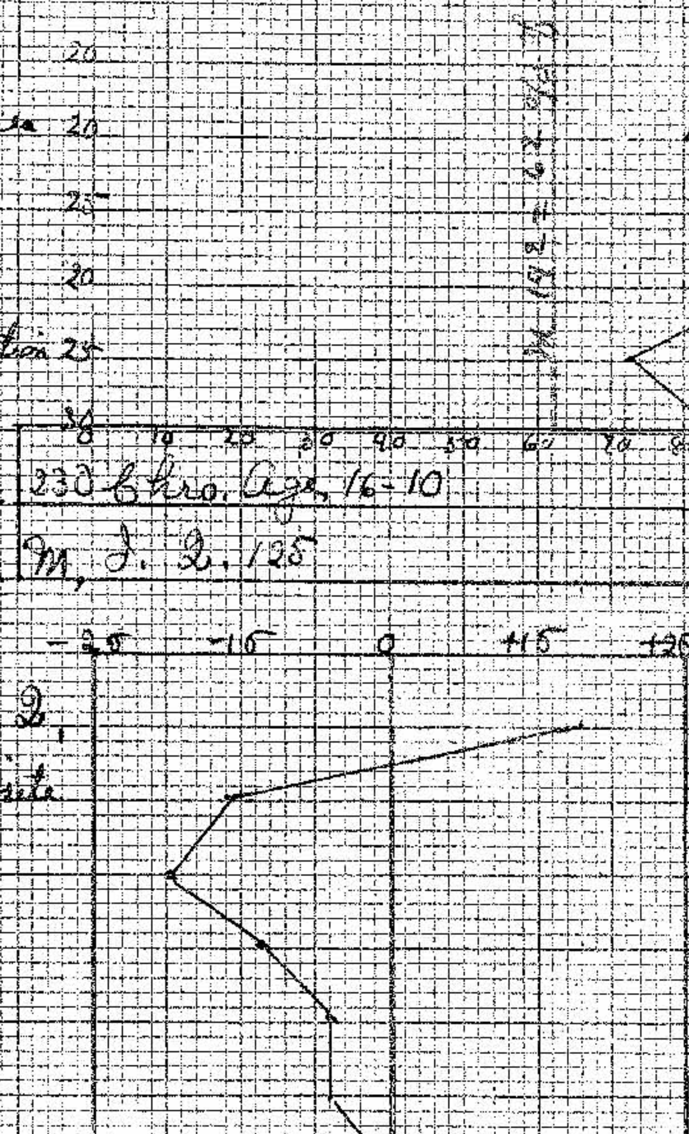
The informal test brought out the fact that E. D. had a good knowledge of musical symbols, but he had no musical ability in any line. He came from a cultured home and had many interests other than music.

Psycho-Graphs of E. D. Intelligence Test I

Music Test II



	I	Scores	Score made	%
1	Following directions	20	18	90
2	Opposites	25	23	92
3	Disarranged sentences	25	22	88
4	Proverbs	20	18	90
5	Arithmetic	20	17	85
6	Geometric figures	20	16	80
7	Analogies	25	23	92
8	Similarities	20	18	90
9	Narration completion	25	18	72
10	Memory	30	25	83
	Total	230 Chro. Age 16-10	Score 198	85 Av.
	Sex	M. I. Q. 125	Norm 126	89 Ma.



	II	S.	M.	S.D.	[illegible]
1	Otis Test I. Q.	125	110	12	+1.3
2	Seashore-composite	50	68	16	-1.1
3	Pitch	30	71	27	-1.5
4	Intensity	31	58	34	-.8
5	Time	46	60	36	-.4
6	Consonance	65	71	14	-.4
7	Tonal memory	75	76	18	-.06

Average Intelligence with High Musical Talent

C. G. is a boy - Age 17 years 2 months

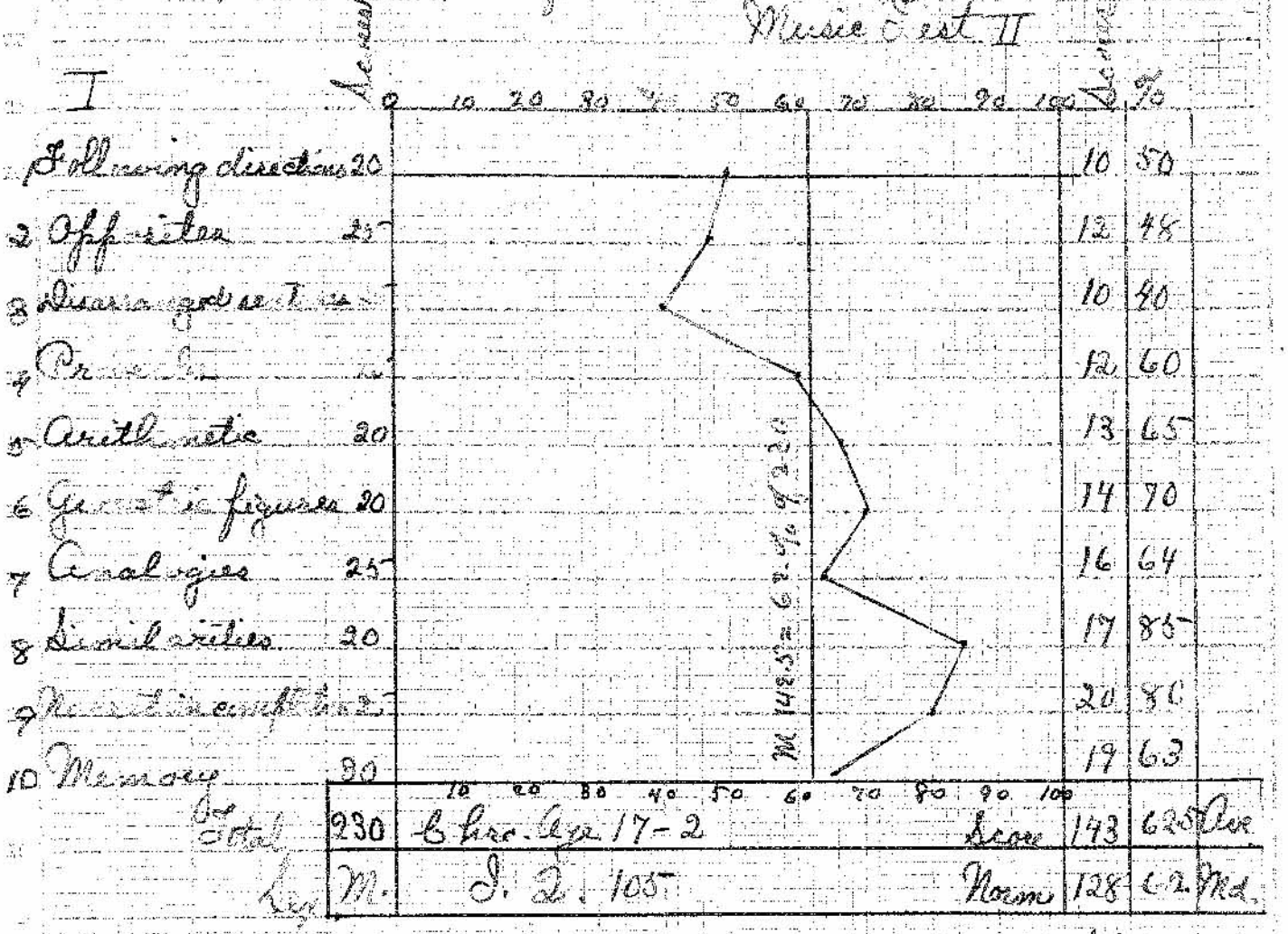
The profile of the intelligence test of C. G. is unusual in that his lowest per cent score of 40 and his highest one of 85, gives a range of 45 which is the greatest of any student in the study. These extremes are balanced, however, by other scores so that his average is the same as that of the group. His total raw score is 143. The norm for his age is 128 so his I. Q. is 105. His intelligence places him near the average of the group.

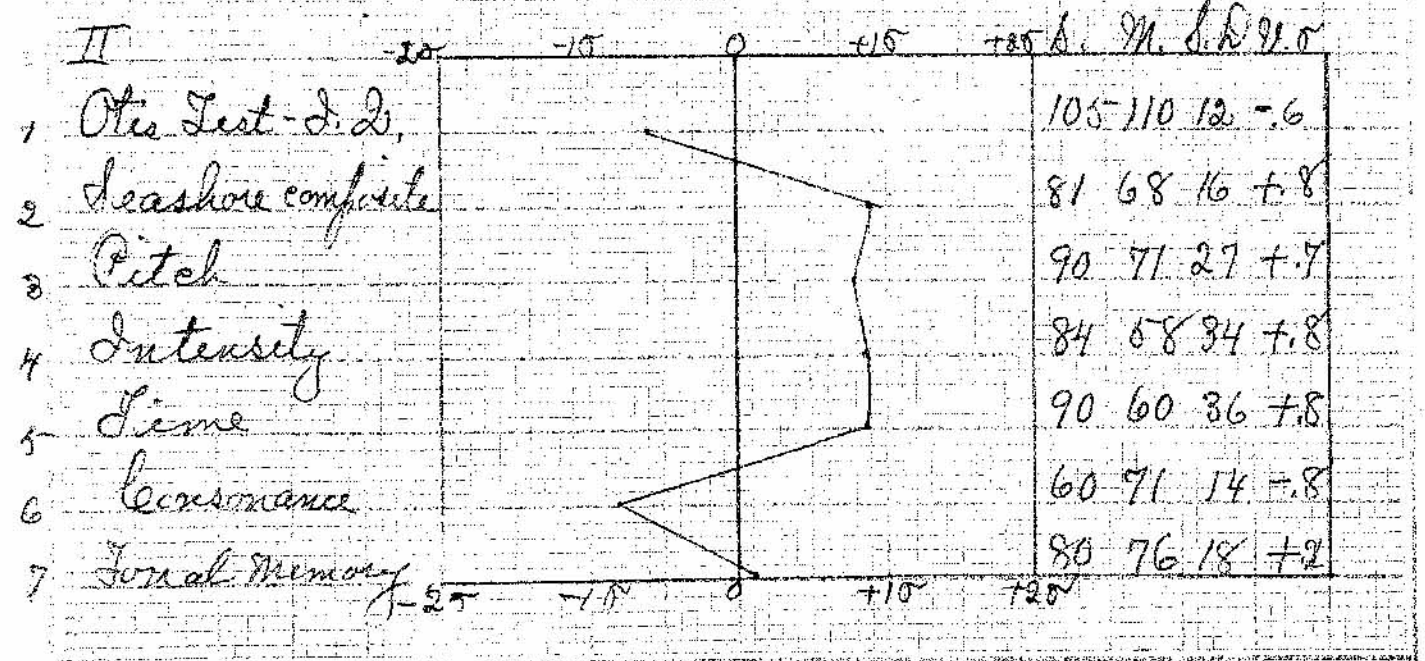
In the music graph the I. Q. sigma of C. G. is located slightly below the mean of 110. In the music batteries we again find erratic performance, as the consonance is well below the mean and the other measures are well above. The Seashore composite of 81 is among the highest scores made in the talent tests. This boy is an example of one who has good musical capacity and should be encouraged to further his musical interests.

C. G. has exceptional musical advantages and encouragement in his home. His mother is musical and taught C. G. to play the piano when he was young. He has grown up in a musical atmosphere. The informal test given by the writer confirmed the talent test that he was above average.

Through the use of the information blank it was learned that C. G. is playing with a musical organization for broadcasting purposes.

Psycho-Graphs of C. G. Intelligence Test I & Music Test II





Average Intelligence with Average Musical Talent

E. P. is a girl - Age 16 years 3 months

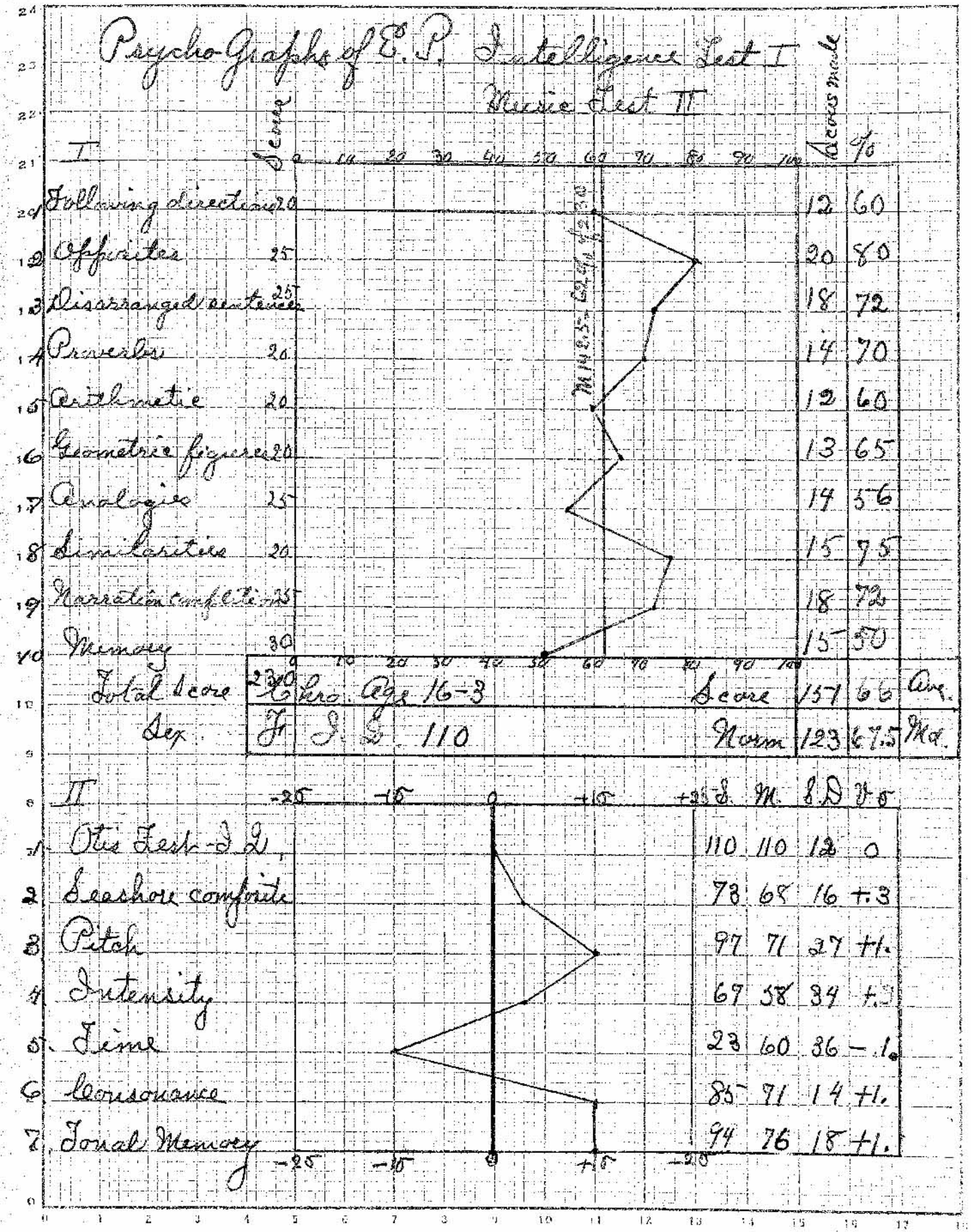
The psycho-graph of E. P. shows that most of her reactions to the Otis intelligence test are very good. She has a total score of 151 which gives her an I. Q. of 110 according to the norm for her age. Her per cent average is 66, which is 4 points above the mean for the group. Intellectually she is quite normal.

On the lower graph the I. Q. is plotted in relation to the musical talents. The I. Q. for E. P. is the same as the average for the group and this places her sigma on the M line. She has a good composite score in the Seashore test with all of the measures above the mean except that of time. Being good in consonance, pitch and tonal memory she should be encouraged to be interested in music.

E. P. came from an average home where no particular musical advantages had been given her. In the informal test she showed a good sense of pitch, both in execution and in discrimination.

In the follow-up blank it is found that she is married and is a member of a musical organization in her community.

Psycho-Graphs of E. P. Intelligence Test I
Music Test II



Average Intelligence with Low Musical Talent

H. C. is a girl - Age 15 years 4 months

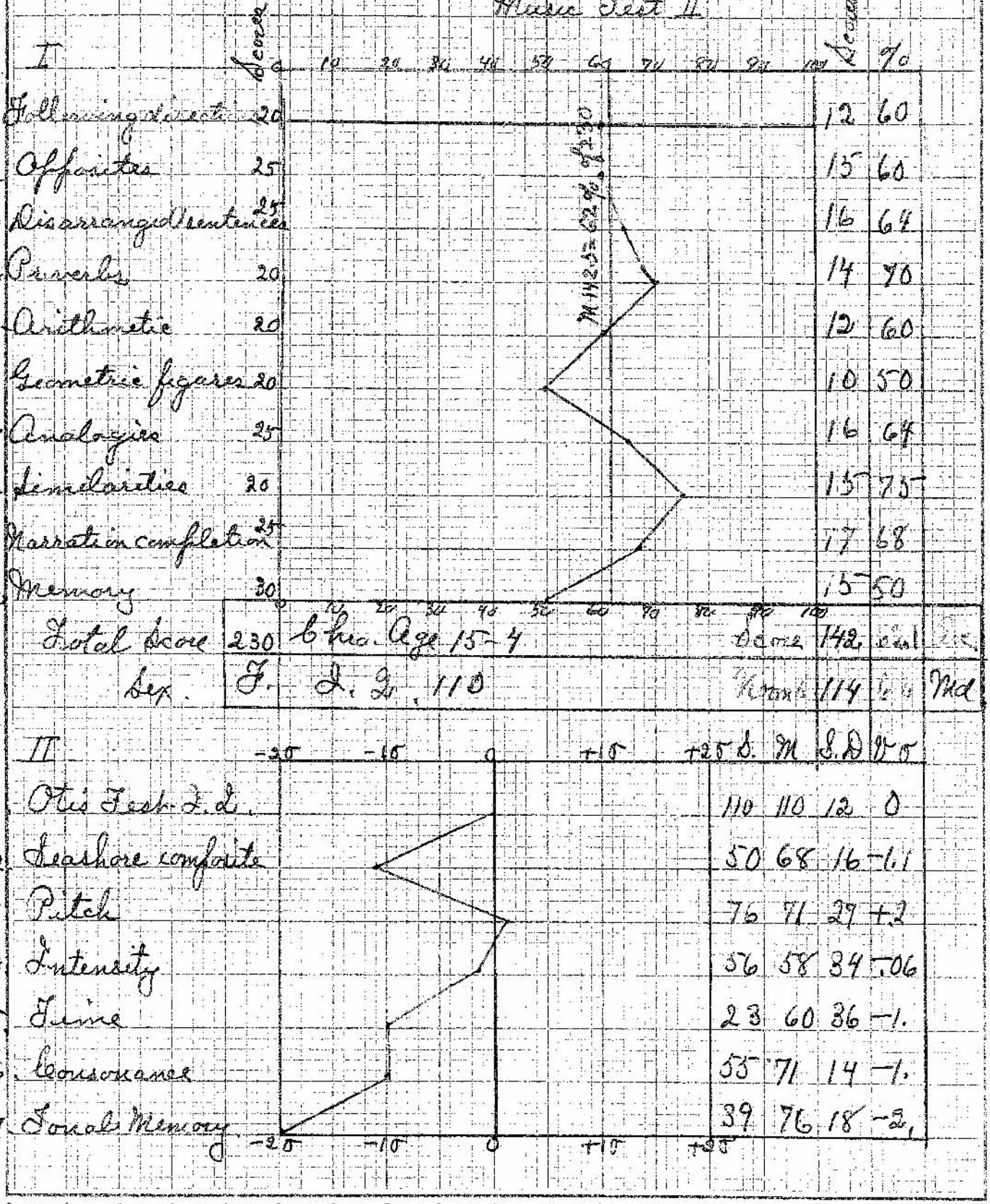
In the Otis intelligence scale she has a total score of 142 and the norm for her age is 114 which gives her an I. Q. of 110. The profile stays around the mean in all of the tests which is what should be expected when we see that her per cent average is 62, the same as the mean for the group. Her highest per cent score is in similarities and the two lowest are 50 each, in geometric figures and memory. Taken as a whole she does not stand out above the average of the group.

The I. Q. when transferred to the music talent graph is found to be the same as the mean for the group. The scores made in the music test are all below the mean except pitch which is only slightly above. Time and consonance are poor and tonal memory is very low. The composite score of 50 places her in the rank of students who should be discouraged from entering musical organizations The informal test bore out the findings of this test in a marked degree.

This girl came from an average home, but one which had no musical advantages except a victrola. She became interested in musical organizations in school because her friends were members of them.

Psycho-Grafh of H. b. Intelligence Test I

Music Test II



Low Intelligence with High Musical Talent

J. J. is a boy - Age 17 years 3 months

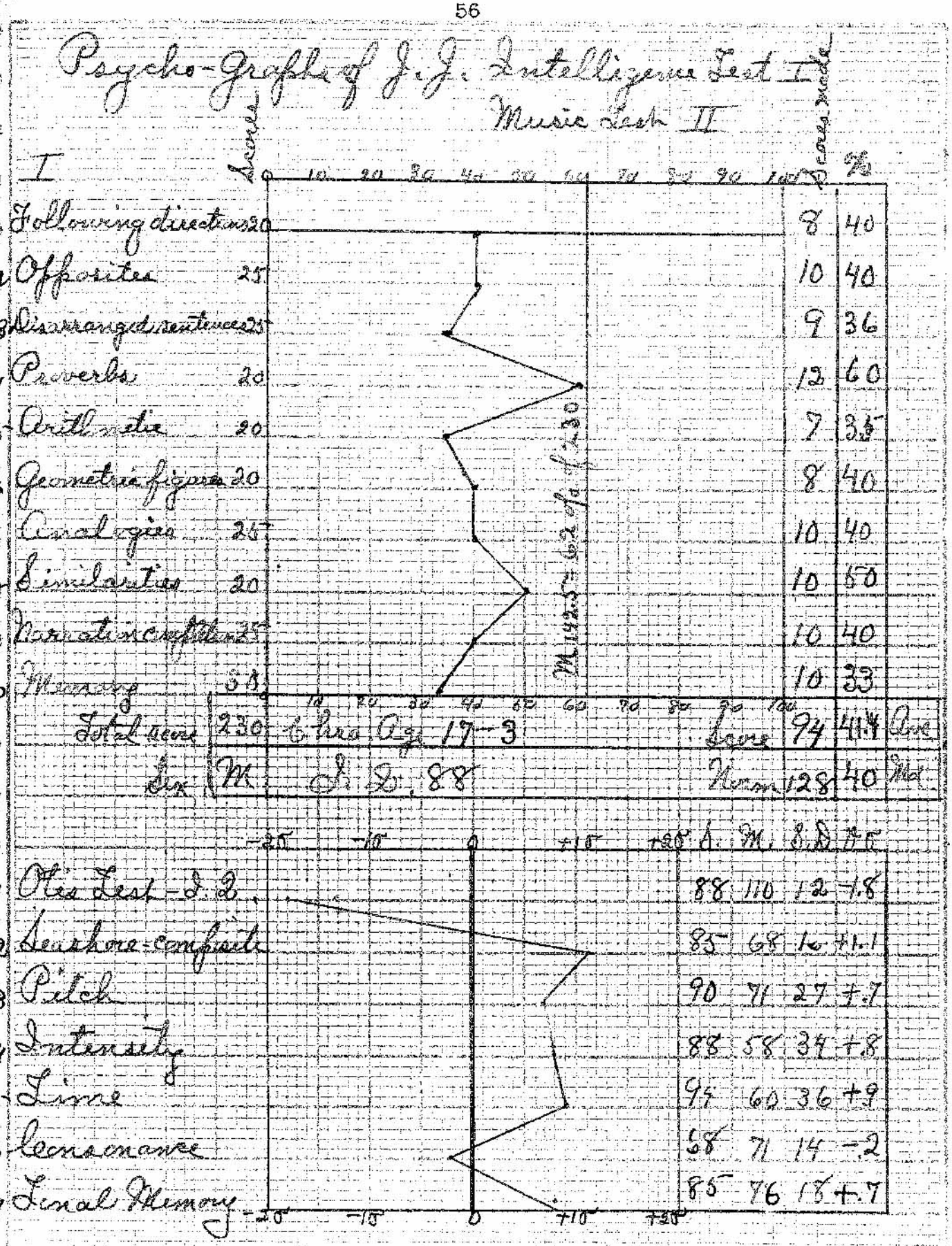
In the Otis intelligence test all of the reactions of J. J. are below the norm for the class. He made a total score of 94 and the norm for his age is 128, so he is 34 points below his norm. This gives him an I. Q. of 88. His best per cent score, 60 is in proverbs, and the lowest is 33 in memory. He is in the lowest intelligence group of this study with an average 21 below the class

In the lower graph the most striking thing is the low sigma placement of the I. Q. which is -1.8 sigma. In contrast to this are the scores which J. J. made in the music test. His total composite score of 85 is next to the highest score in the group. In all of the measures of music he is well above the mean, except in consonance, in which he is slightly below. A student with this musical talent should be encouraged freely to pursue musical studies.

J. J. comes from a comfortable country home. His father has 'fiddled' all of his life and the boy learned early to play with him. His parents did not realize that the boy had talent, but were glad to give him an opportunity to develop it when their attention was called to the fact. His informal test ranking was also high.

From the information blank we learned that J. J. is a leader of a small town band, in addition to his occupation.

Psycho-Grafh of J. J. Intelligence Test I
Music Test II



Low Intelligence with Average Musical Talent

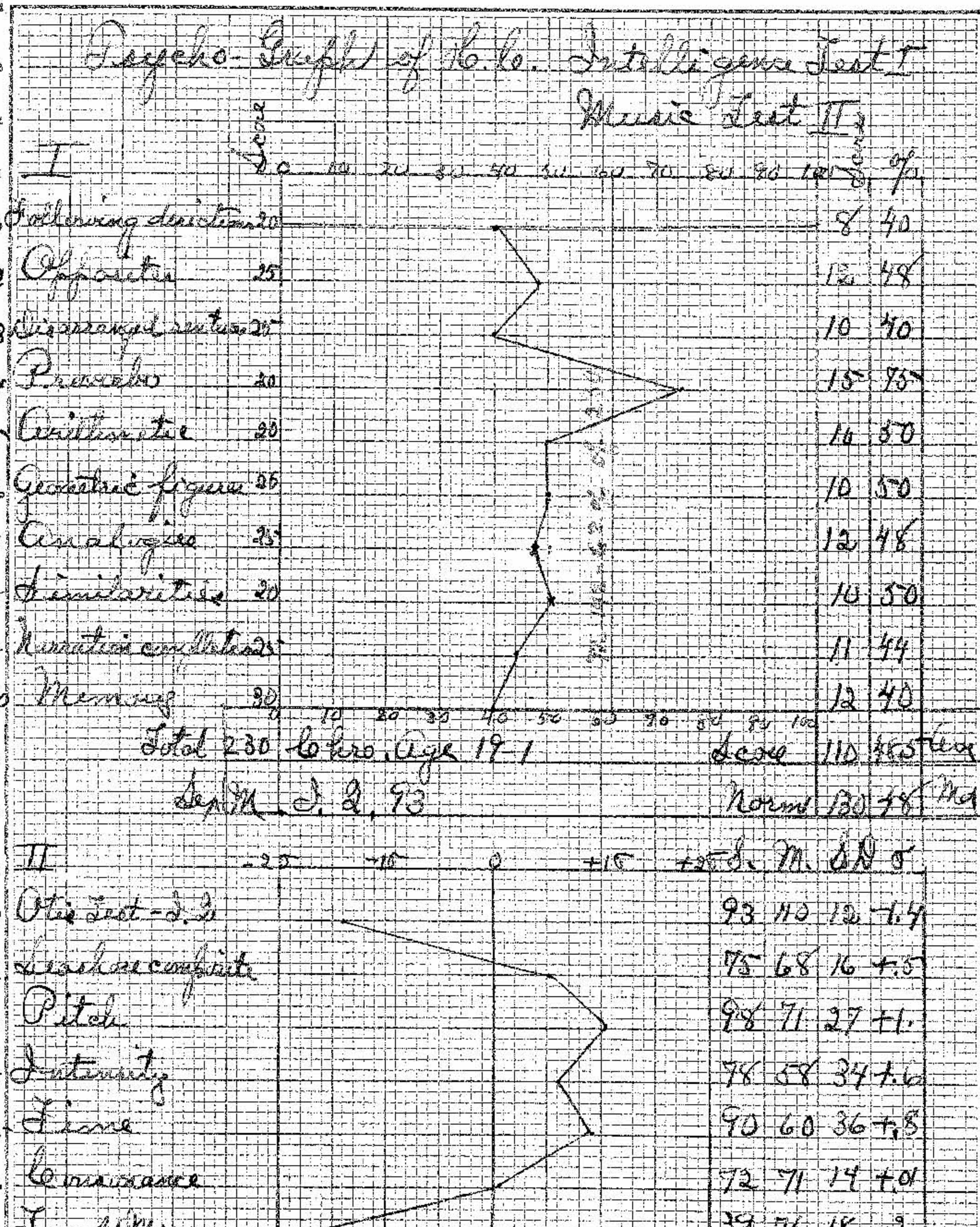
H. C. is a boy - Age 19 years and 1 month.

The total score of H. C. is 110, but the norm for his age is 130 so he has an I. Q. of 93. He is one of the three oldest boys of this study. He is consistently low in the intelligence batteries, with the exception of proverbs which has a per cent score of 75, with the result that his average per cent is only 48.

In considering the music graph, note that it presents a peculiar appearance in that the I. Q. and tonal memory are very low and the other talent results are all above the mean. The scores in pitch, intensity and time are all good, so that his composite score is quite fair.

In the informal test given by the writer H. C. had no knowledge of musical terms or symbols and had little training in school music. He possessed a lovely natural voice, and an unusual sense of pitch discrimination. This boy had lived in the country most of his life and had few musical advantages.

In reply to the information blank sent out by the writer, H. C. who is married, writes that he intends to give his child the musical advantages which he feels he missed.


Psycho-Graph of H. Co. Intelligence Test I
Music Test II
I
Following directions 20
Opposites 25
Disarranged sentences 25
Proverbs 20
Arithmetic 20
Geometric figures 25
Analogies 25
Similarities 20
Narrative completion 25
Memory 30
Total 230
Score
Norm
II
Otis Test - I.Q.
Pitch
Intensity
Time
Consonance
Tonal Memory

Low Intelligence with Low Musical Talent

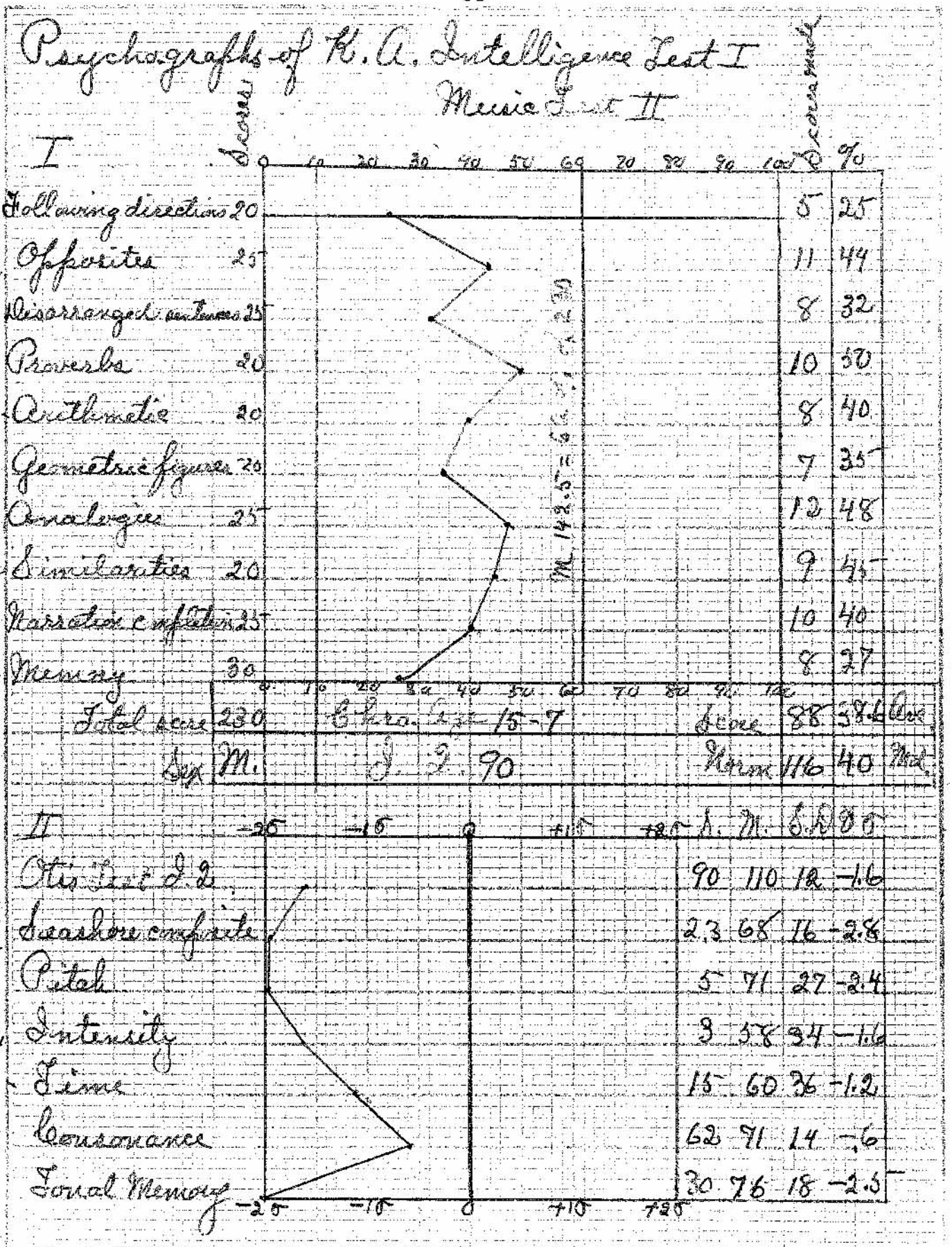
K. A. is a boy - Age 15 years 7 months

The intelligence graph of K. A. is consistently below the norm. His total score is 88 as against the norm for his age, 116, which gives him an I. Q. of 90. By comparing his average per cent with that of the group it is found that he is 24 points below. In following directions and memory he is unusually low. He has no outstanding intellectual traits that this test revealed, so he may be considered as intellectually inferior.

The music graph of K. A. is the poorest of the entire group. The Seashore composite score is 23 which is below the plotting of the graph. This is also true of pitch and tonal memory. His performance on the consonance test, although the best of his traits, is too much below the mean to be worth while.

As a result of the informal test the writer felt she was justified in excluding him from the participating organizations of the school.

Psychographs of K. A. Intelligence Test I
Music Test II



The psycho-graphs just presented lead us to believe that musical talent is not in itself significant of intelligence, nor is intelligence in itself significant of musical talent, because we found the following combinations:-

High intelligence with high musical talent
High intelligence with average musical talent
High intelligence with low musical talent

Average intelligence with high musical talent
Average intelligence with average musical talent
Average intelligence with low musical talent

Low intelligence with high musical talent
Low intelligence with average musical talent
Low intelligence with low musical talent

In addition to the nine typical students whose psychographs we have analyzed, we are presenting two widely different groups of students which illustrate the varied relationships between intelligence and musical talent. Table VIII contains the students with the highest music scores, and Table IX those with the lowest.

TABLE VIII

STUDENTS WITH MUSICAL TALENT TO BE ENCOURAGED FREELY

Initial	Music Score	I. Q.	Sex
A. K.	87	93	Boy
J. J.	85	88	Boy
F. E.	85	125	Boy
L. S.	81	121	Girl
C. G.	81	105	Boy
C. N.	80	98	Boy
L. G.	80	122	Girl
N. Z.	80	105	Boy
K. E.	80	117	Boy

The two outstanding cases of the preceding table are F. E. and J. J. Each scored the same high composite music scores of 85, but had extreme I. Q's of 125 and 88. A.K. made the highest composite score of any student tested, but his I. Q. of 93, is below average. All of these students should be freely encouraged to take a serious interest in music because of their outstanding musical talent.

TABLE IX

STUDENTS WITH NEGLIGIBLE MUSICAL TALENT TO BE DISCOURAGED

Initial	Music Score	I. Q.	Sex
E. D.	50	125	Boy
H. C.	50	110	Girl
O. H.	50	88	Boy
C. P.	47	90	Boy
C. F.	43	119	Boy
M. B.	41	96	Girl
L. S.	40	100	Girl
K. A.	23	90	Boy

Two interesting cases in this table are O. H. and E. D. who made the same score of 50 in music, but whose I. Q's are very far apart. O. H. with an I. Q. of 88 has the lowest intelligence rating in the group, and E. D. who has 125 is one of the highest. K. A. made the lowest composite score of any student taking the music tests and he also has a low I. Q. All of the students of this table whose I. Q's range from 125 to 88, should not be

encouraged in music as their talent results are so low.

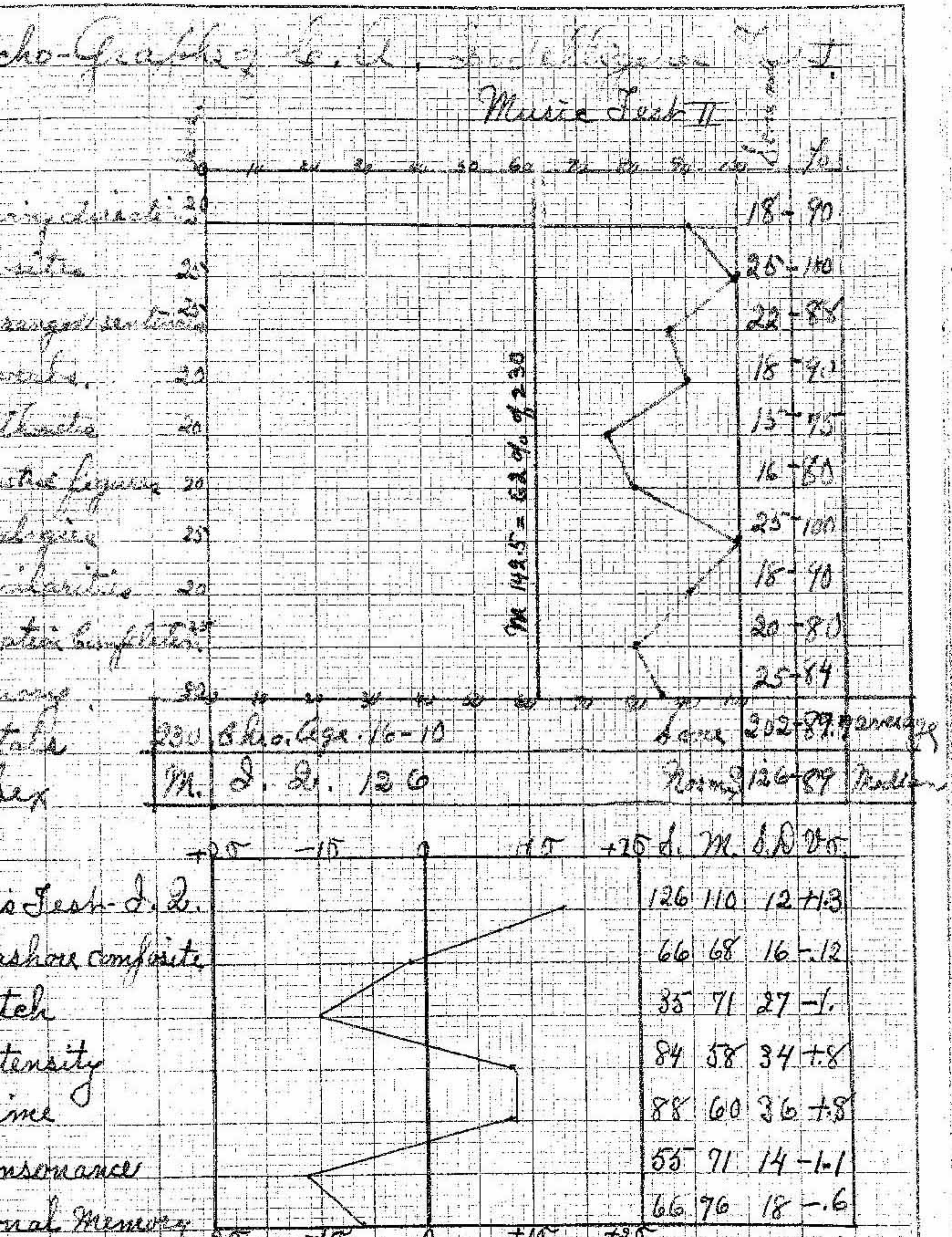
Table X gives the musical composite scores and I. Q's of the fifty-five students of this study. Many combinations showing the varied relations of the two traits may be seen.

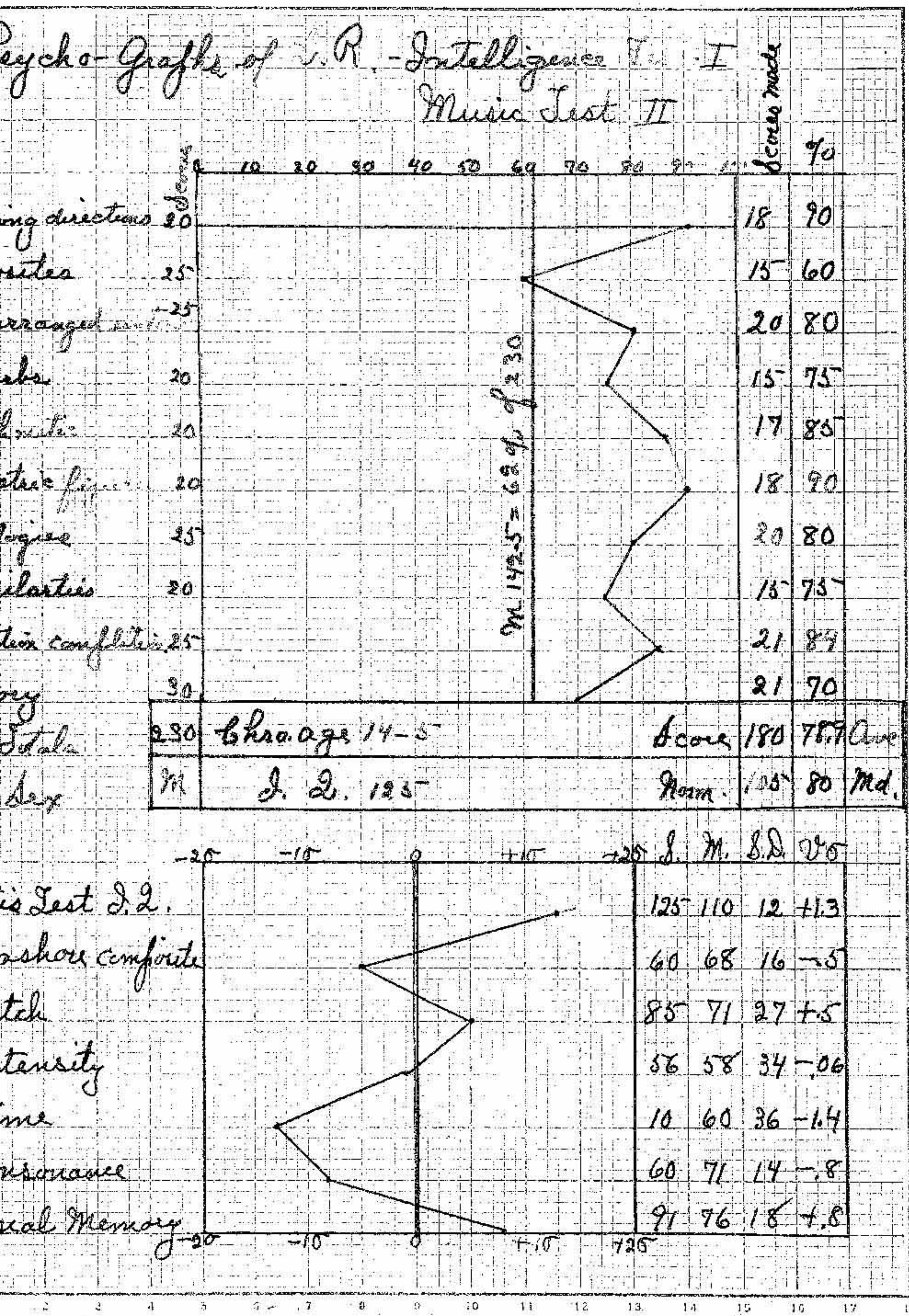
TABLE X

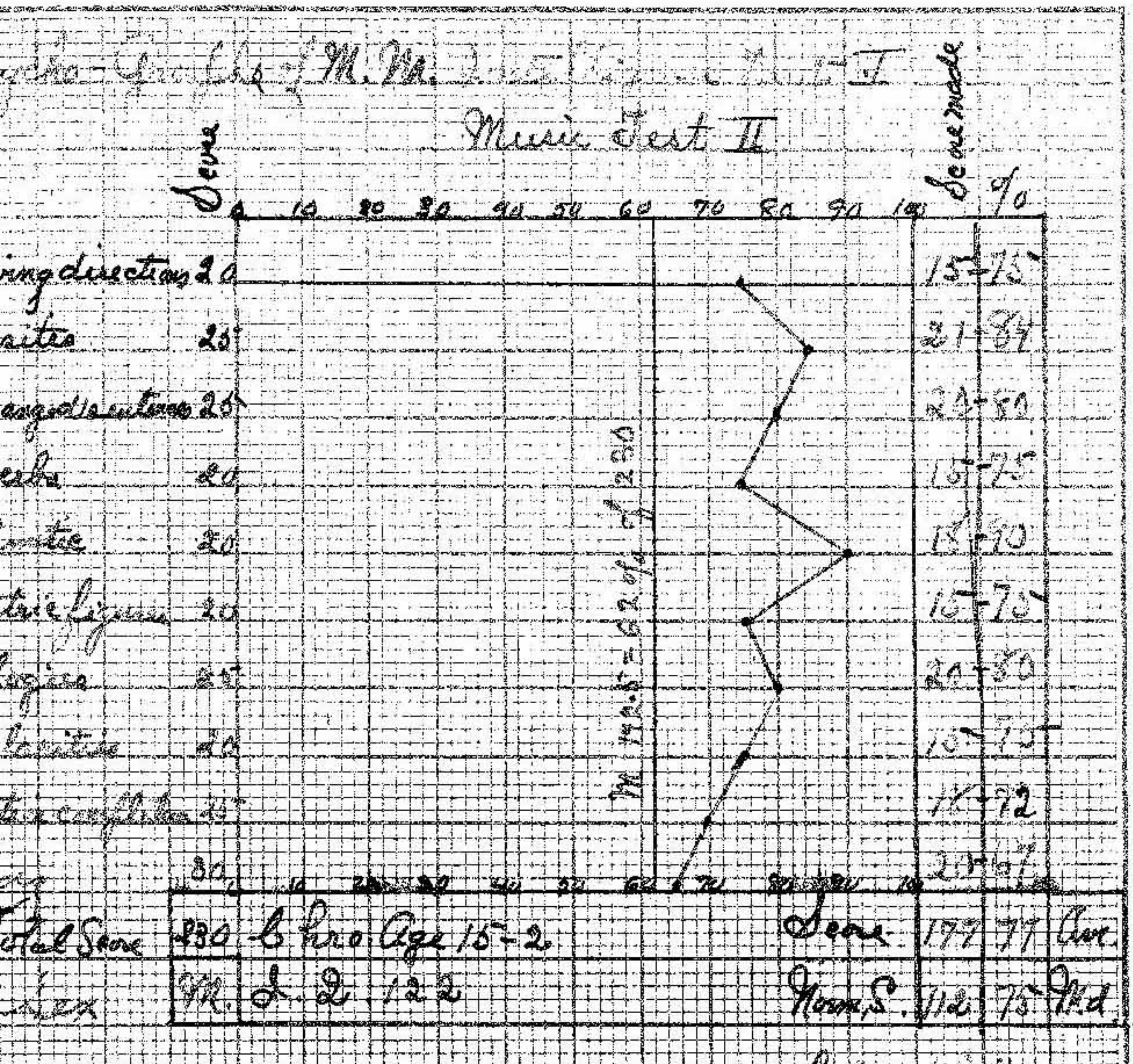
COMPOSITE MUSIC SCORES AND I.Q'S OF THE FIFTY-FIVE STUDENTS

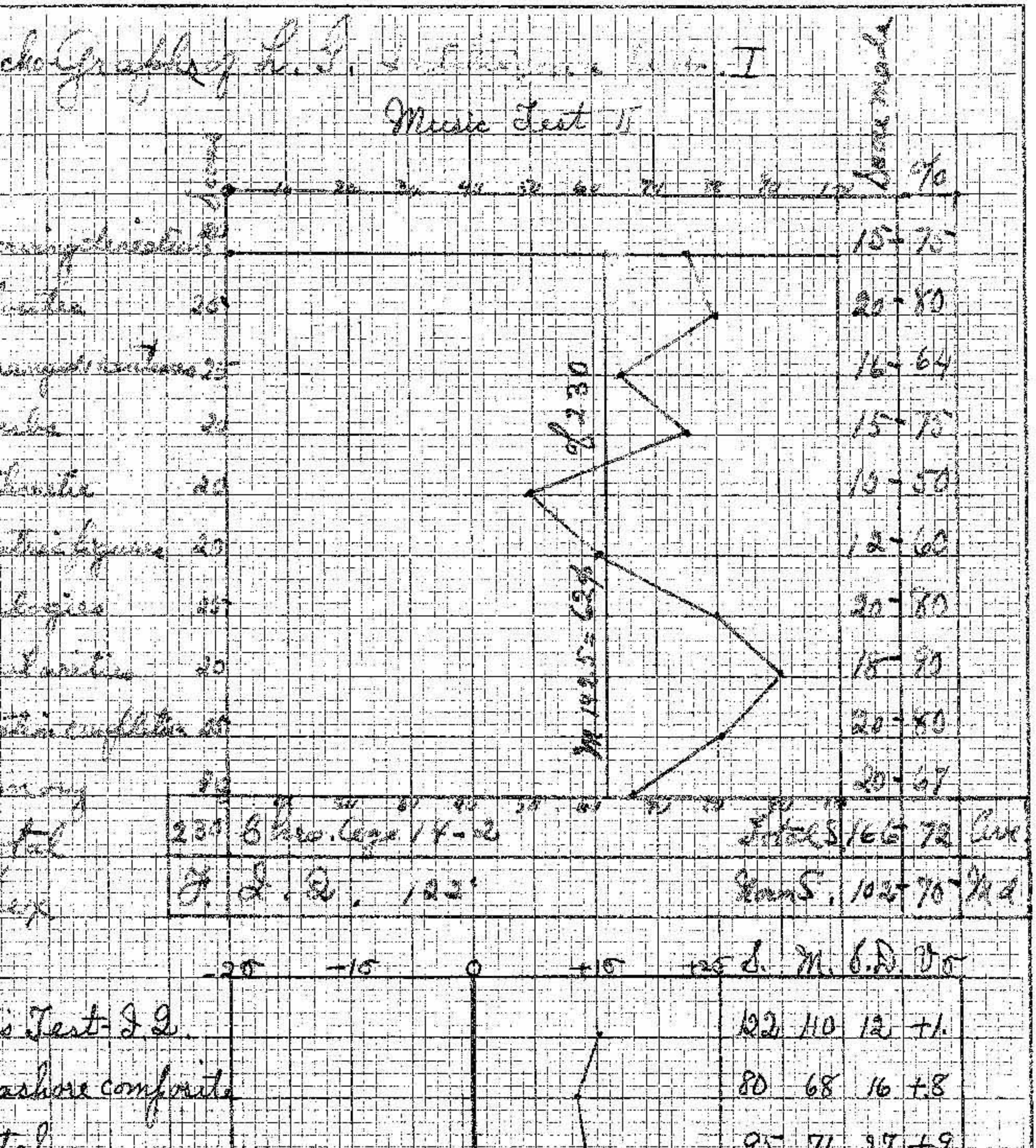
Initial	Music	I.Q.	Initial	Music	I.Q.	Initial	Music	I.Q.
A. K.	87	93	G. S.	72	122	P. C.	64	105
J. J.	85	88	A. C.	72	117	W. P.	63	93
F. E.	85	125	R. H.	71	121	P. W.	62	113
L. S.	81	121	L. W.	71	102	D. F.	62	98
C. G.	81	105	R. G.	70	121	H. M.	61	101
C. N.	80	98	C. A.	70	117	L. R.	60	125
N. Z.	80	105	R. H.	70	105	M. M.	58	122
K. E.	80	117	M. W.	70	94	R. B.	56	110
L. G.	80	122	B. P.	69	113	J. F.	56	102
W. S.	77	113	W. D.	68	122	I. P.	56	88
P. H.	76	100	L. C.	68	117	O. H.	50	88
J. K.	76	126	G. C.	68	110	E. D.	50	125
A. S.	76	120	M. W.	68	100	H. C.	50	110
W. B.	76	113	F. C.	67	118	C. P.	47	90
C. H.	76	117	T. W.	67	100	C. F.	43	119
L. G.	75	118	C. A.	66	126	M. B.	41	96
H. C.	75	93	R. K.	66	100	L. S.	40	100
E. P.	73	110	L. S.	65	98	K. A.	23	90
F. H.	73	113						

The psycho-graphs which follow depict graphically the relationship of musical talent and intelligence as shown in the table above. We find that musical talent is associated with various degrees of intelligence and there is no definite relationship between the two.

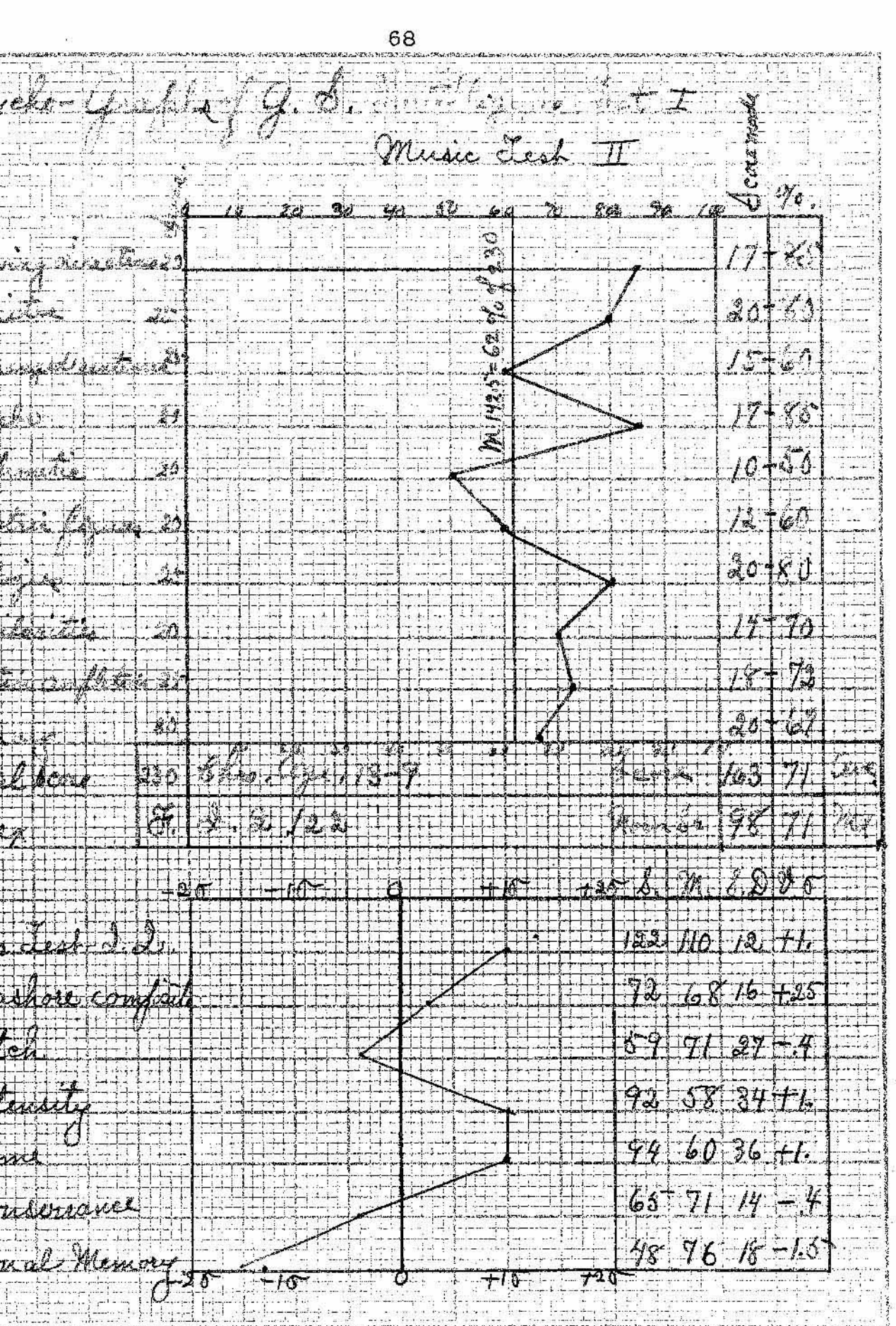

Music Test II
18 - 90
25 - 100
22 - 88
18 - 90
15 - 75
16 - 80
25 - 100
18 - 90
20 - 80
25 - 84
M 149.5 = 62 % of 230
230 Chro. Age 16-10
M. I. Q. 126
202-87.9 average
126-87
I. M. S.D. V.S.
126 110 12 +1.3
Seashore composite 66 68 16 -.12
Pitch 35 71 27 -1.
Intensity 84 58 34 +.8
Time 88 60 36 +.8
Consonance 55 71 14 -1.1
Tonal Memory 66 76 18 -.6


Psycho-Graphs of .R. - Intelligence T. I
Music Test II
Scores made
%
0 10 20 30 40 50 60 70 80 90 100
Scores
ing directions 20 18 90
osites 25 15 60
rranged 25 20 80
ebs 20 15 75
20 17 85
etic figures 20 18 90
logies 25 20 80
ilarities 20 15 75
tion completion 25 21 84
ory 30 21 70
Totals 230 Chro. age 14-5 Score 180 78.7 Ave
Sex M I. Q. 125 Norm. 105 80 Md.
M 142.5 = 62 % of 230
-20 -10 0 +10 +20 S. M. S.D. Vo
is Test I.Q. 125 110 12 +1.3
ashore composite 60 68 16 -.5
tch 85 71 27 +.5
tensity 56 58 34 -.06
ime 10 60 36 -1.4
nsonance 60 71 14 -.8
ical Memory 91 76 18 +.8


Music Test II
Score
Score made
%
Total Score
Age 15-2
Score
177
77
Ave.
Norm S.
112
75
Md
Test I. Q.
122 110 12 +1
58 68 16 -6
76 71 27 +2
45 58 34 -4
25 60 36 -1
64 71 14 -.5
79 76 18 +17

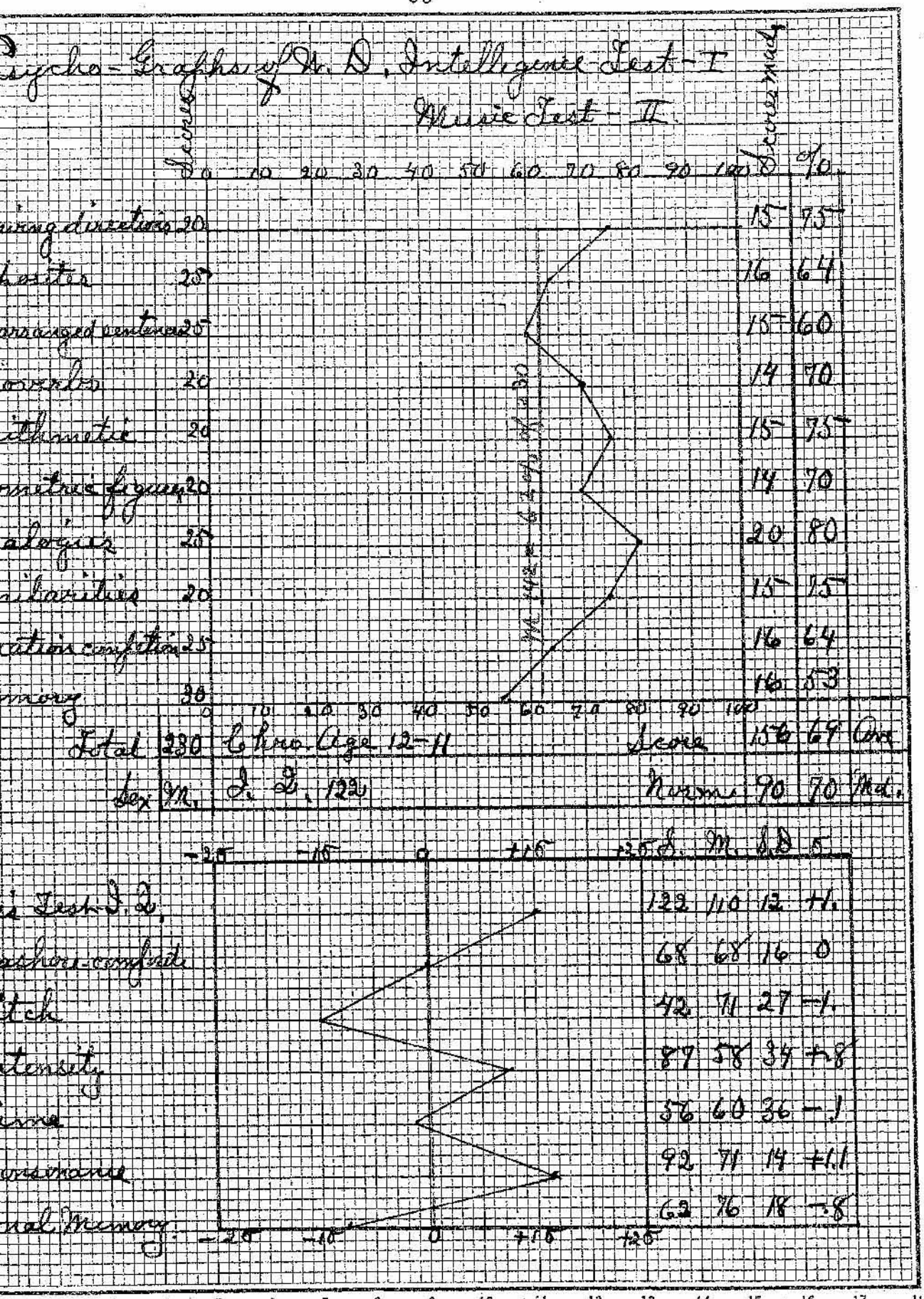

Music Test II
%
15 - 75
20 - 80
16 - 64
15 - 75
10 - 50
12 - 60
20 - 80
18 - 90
20 - 80
20 - 67
L 230
M 1025 C 26
230
I. Q. 122
166 72
102 70
-20 -15 0 +10 +20
S. M. S.D. Vc
Test I. Q. 122 110 12 +1.
Seashore composite 80 68 16 +.8
Pitch 95 71 27 +.9
Intensity 73 58 34 +.4
Time 75 60 36 +.4
Consonance 65 71 14 -.4
Tonal Memory 91 76 18 +.8
-20 -10 0 +10 +20

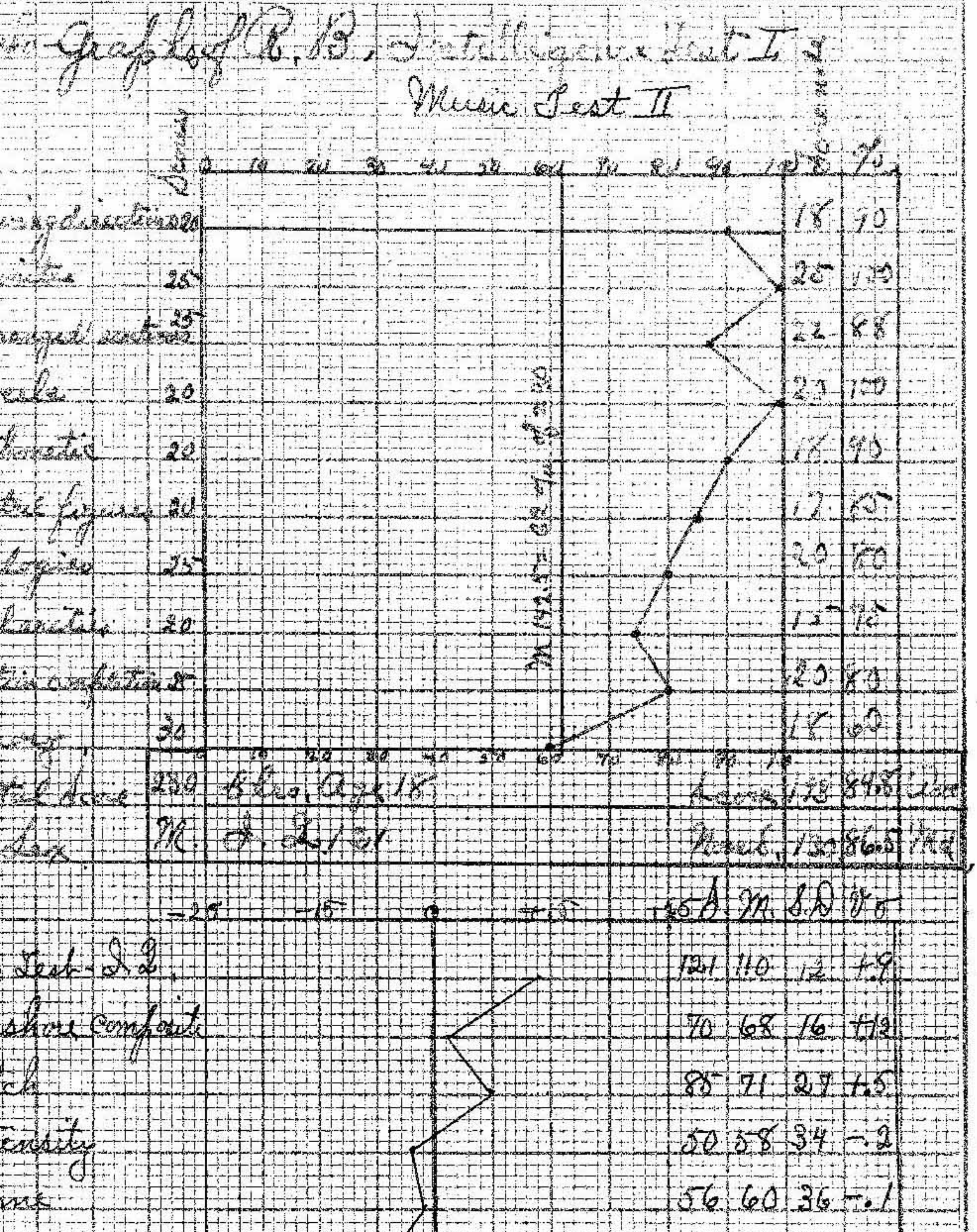
Music Test II



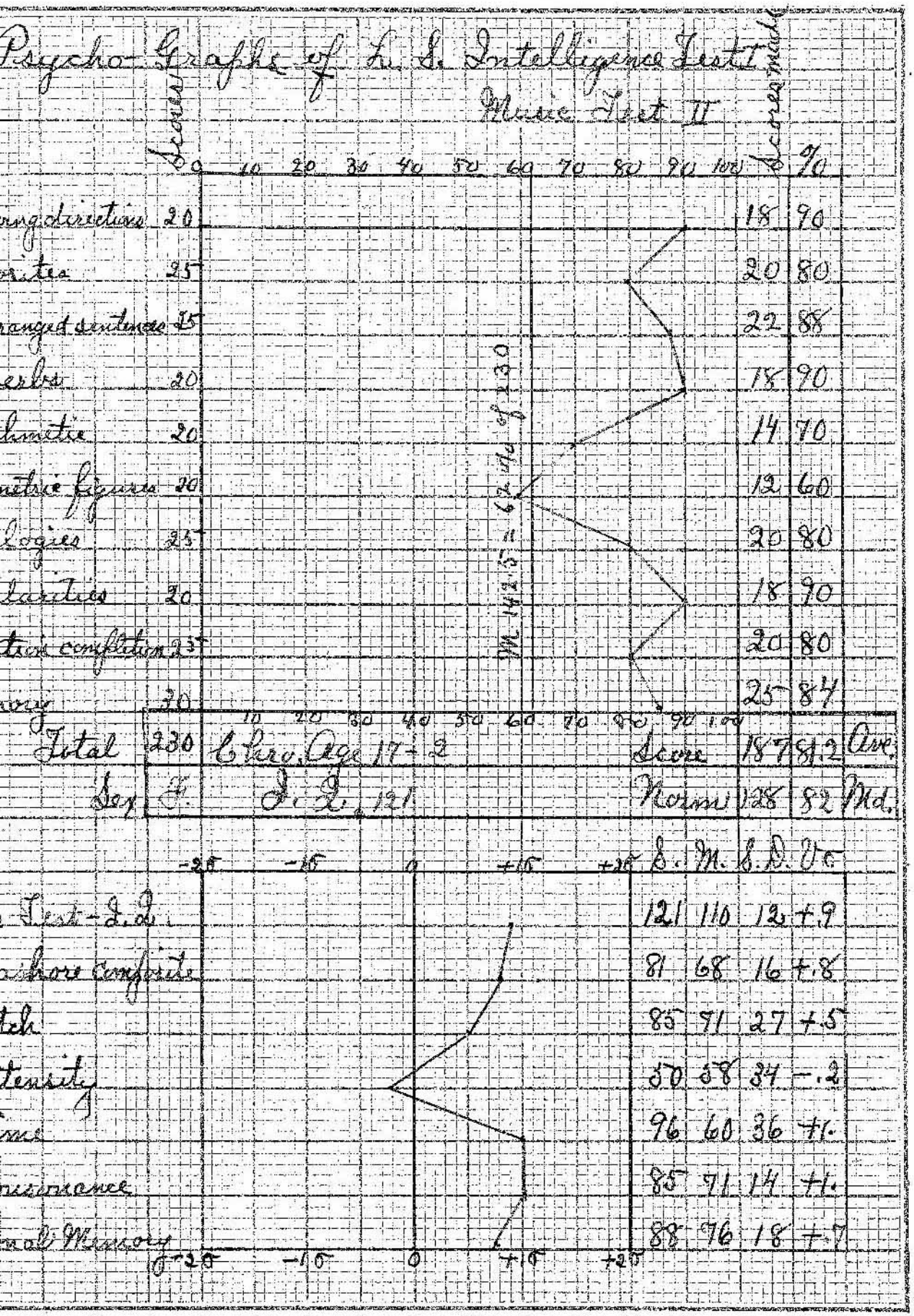
Psycho-Graphs of N. D. Intelligence Test - I

Music Test - II

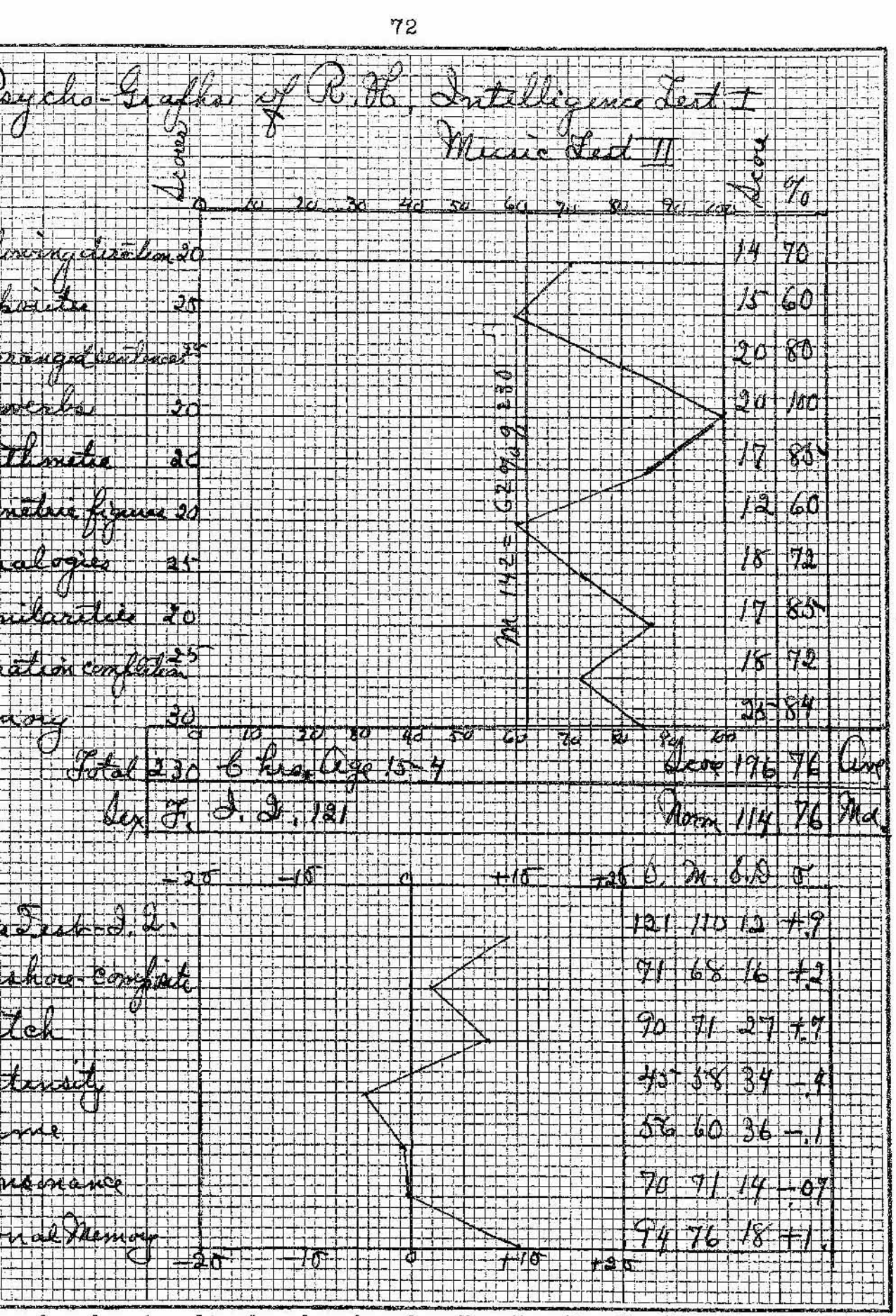



Graphs of R. B. Intelligence Test I 2
Music Test II
0 10 20 30 40 50 60 70 80 90 100
18 90
25 100
22 88
20 100
18 90
12 65
20 100
12 75
20 80
18 60
M 142.5 - 62 Per cent
Total Score 250
Sex M
Score 173 84.8
Med. 130 86.5
-20 -15 0 +10 +20
S M SD Vs
Test I 2 121 110 12 +.9
Seashore Composite 70 68 16 +.12
Pitch 85 71 27 +.5
Intensity 50 58 34 -.2
Time 56 60 36 -.1
Consonance 64 71 14 -.5
Tonal Memory 94 76 18 +1.

Psycho-Graphs of L. S. Intelligence Test I

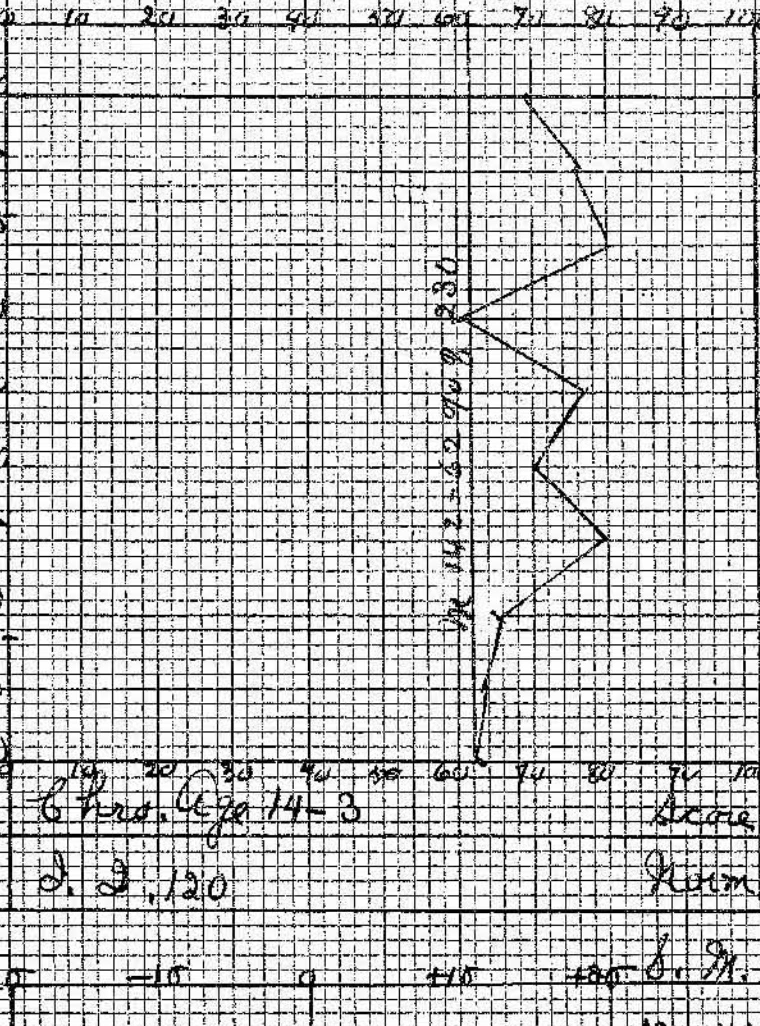


Psycho-Grafka of R. H., Intelligence Test I, Music Test II



Psycho-Graphs of A. S., Intelligence Test I, Music Test II

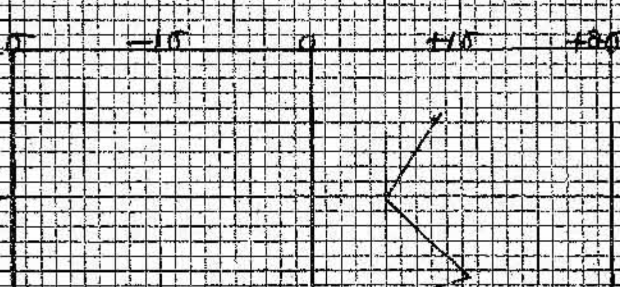
	Scores	Score	%
[...]oving directions	20	14	70
[...]bodies	25	19	76
[...]rranged sentences	25	20	80
[...]overbs	20	12	60
[...]ithmetic	20	15	75
[...]metric figures	20	14	70
[...]alogies	25	20	80
[...]milarities	20	13	65
[...]ration completion	25	17	64
[...]mory	30	19	63
Total	230	Score 163	70.3
Sex	F	Norm 163	70



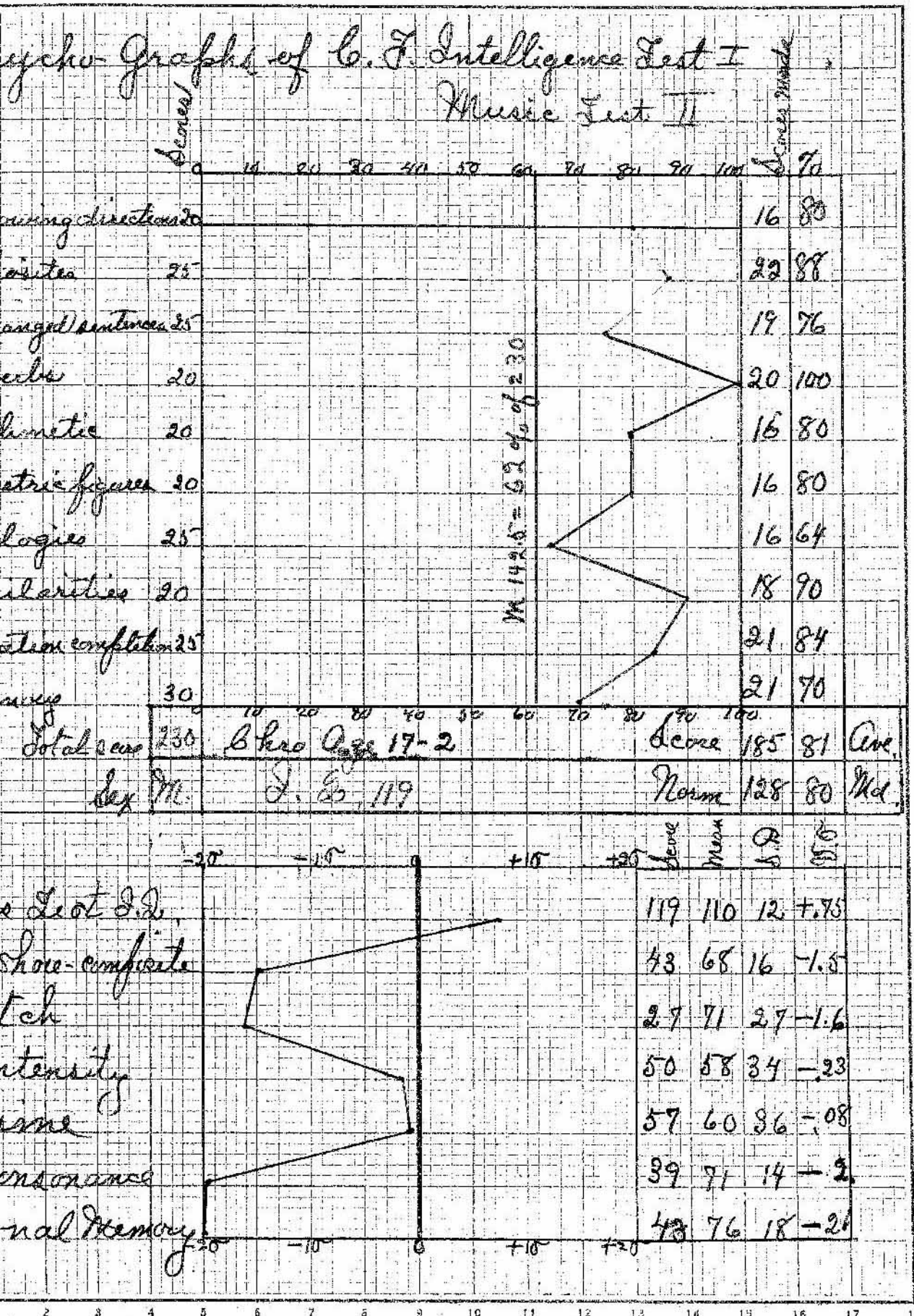
Chro. Age 14-3

I. Q. 120

	S.	M.	S.D.	σ
[...]s Test I. Q.	124	110	12	+.83
[...]shore-Composite	76	68	16	+.5
[...]tch	99	71	27	+1.
[...]tensity	45	58	34	-.4
[...]ime	93	60	36	+.9
[...]onsonance	63	71	14	-.6
[...]nal Memory	82	76	18	+.3

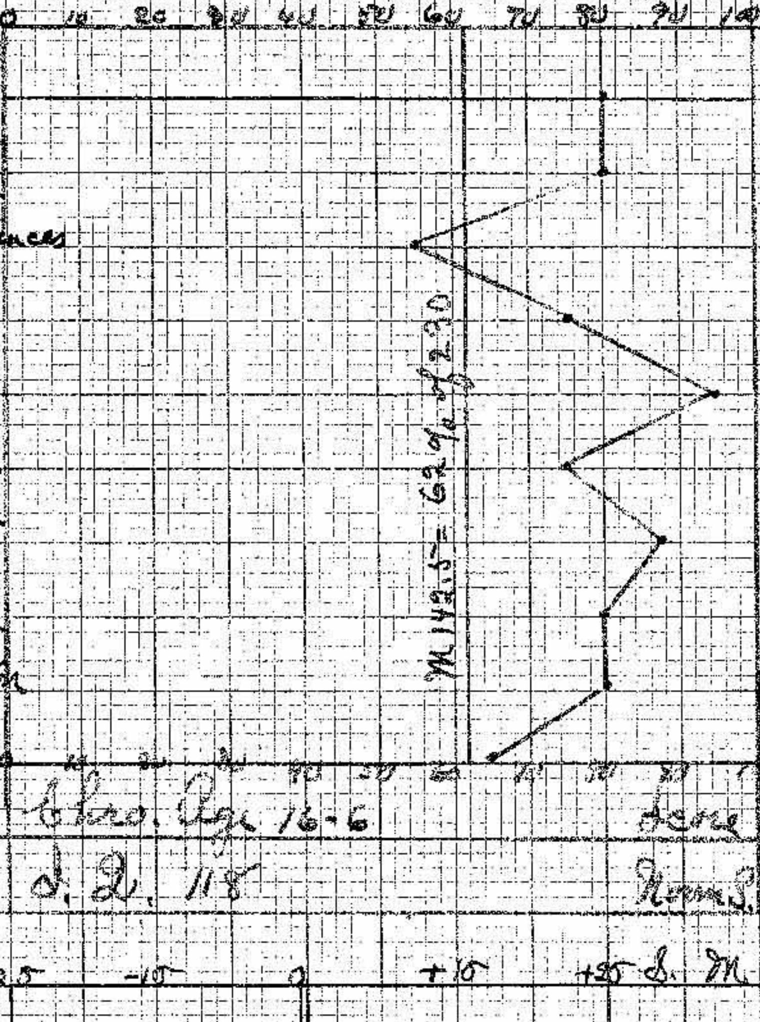


Psycho-Grafhs of C. J. Intelligence Test I, Music Test II

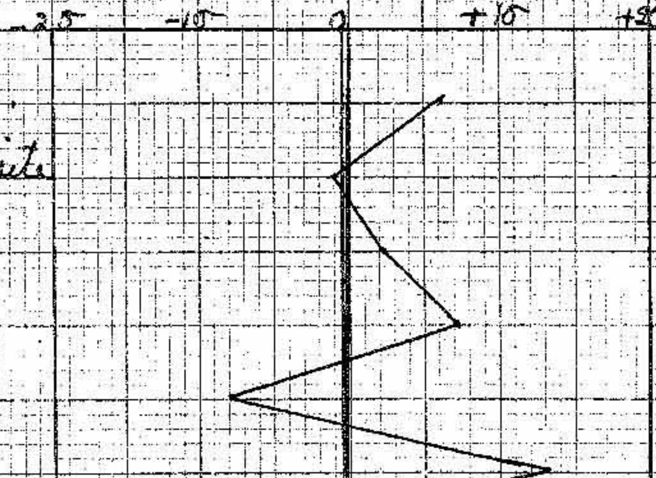


[illegible] Test I

Music Test II



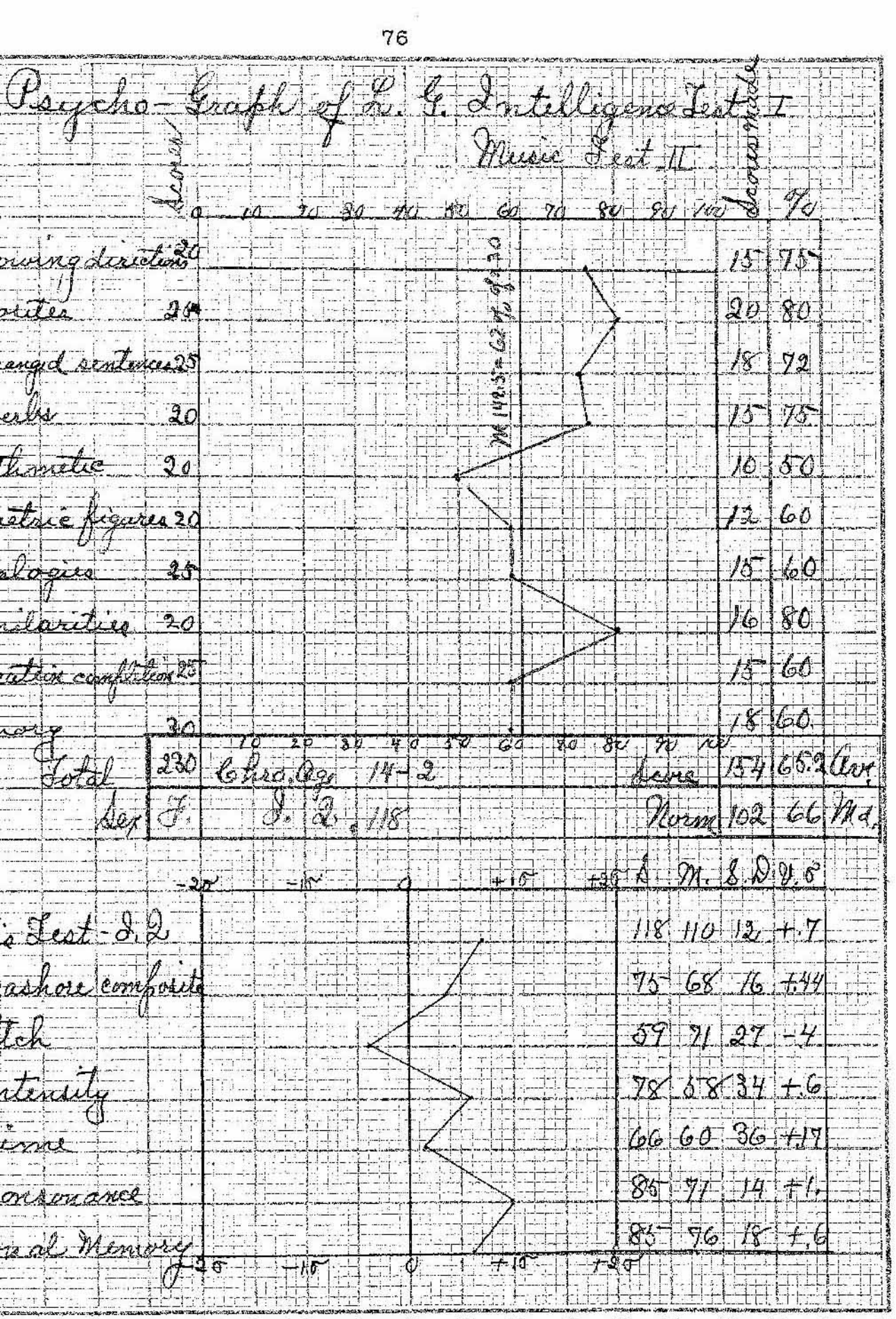
	Scores	Scores made	%
...wing directions	20	16	80
...ritten	25	20	80
...arranged sentences	25	14	56
...verbs	20	15	75
...thmetic	20	19	95
...metric figures	20	15	75
...alogies	25	22	88
...ilarities	20	16	80
...ative completion	25	20	80
...mory	30	20	67
Total Score	230	Theo. Age 16-6 Score 177	77.6 Ave.
Sex M.	I. Q. 118	Norm S. 124	80 Ma.



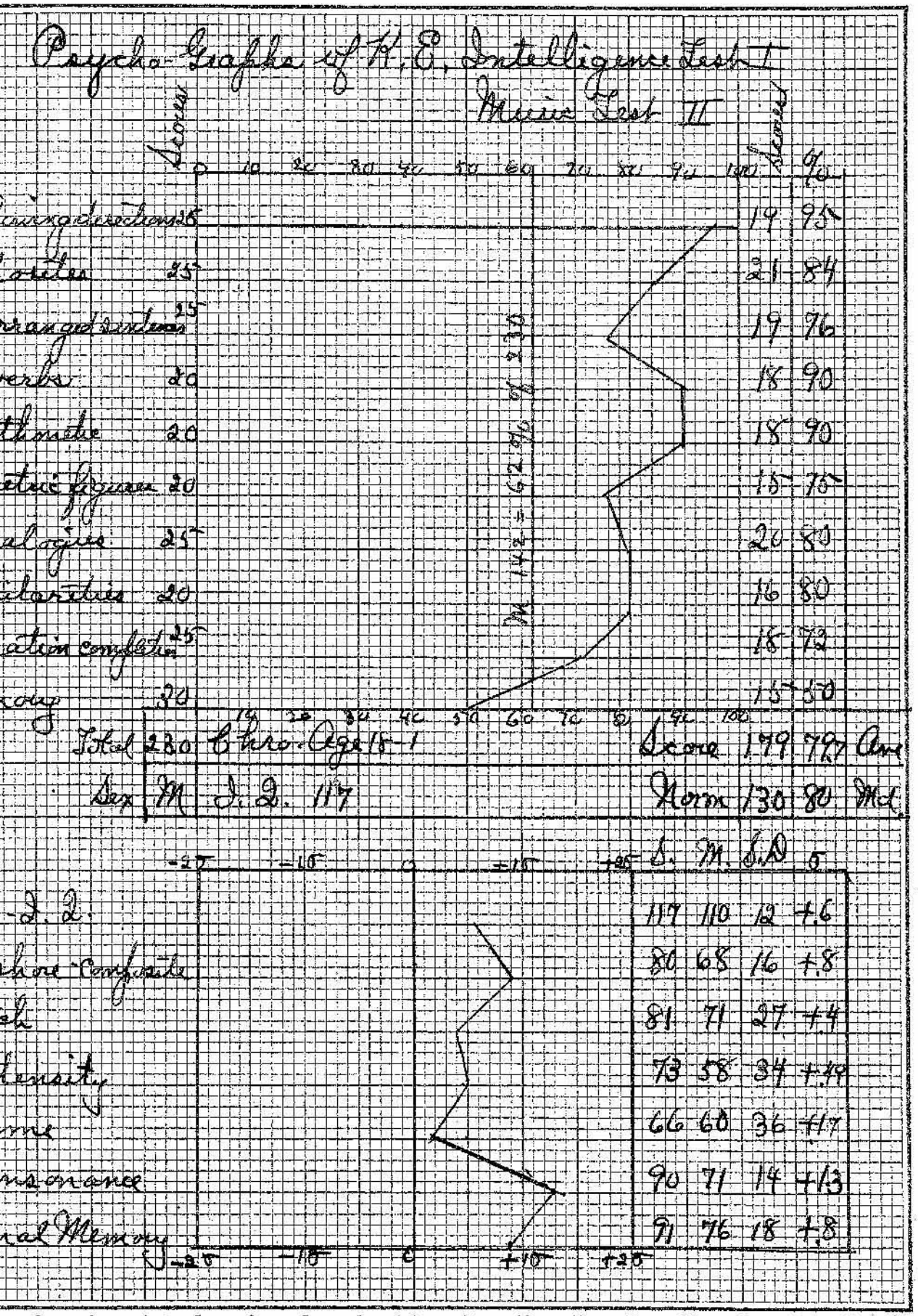
	S.	M.	S.D.	D6
...s Test-I.Q.	118	110	12	+.6
...ashore composite	67	68	16	-.06
...tch	76	71	27	+.2
...tensity	79	58	34	+.7
...me	33	60	36	-.8
...nsonance	90	71	14	+1.3
...al Memory	59	76	18	-.9

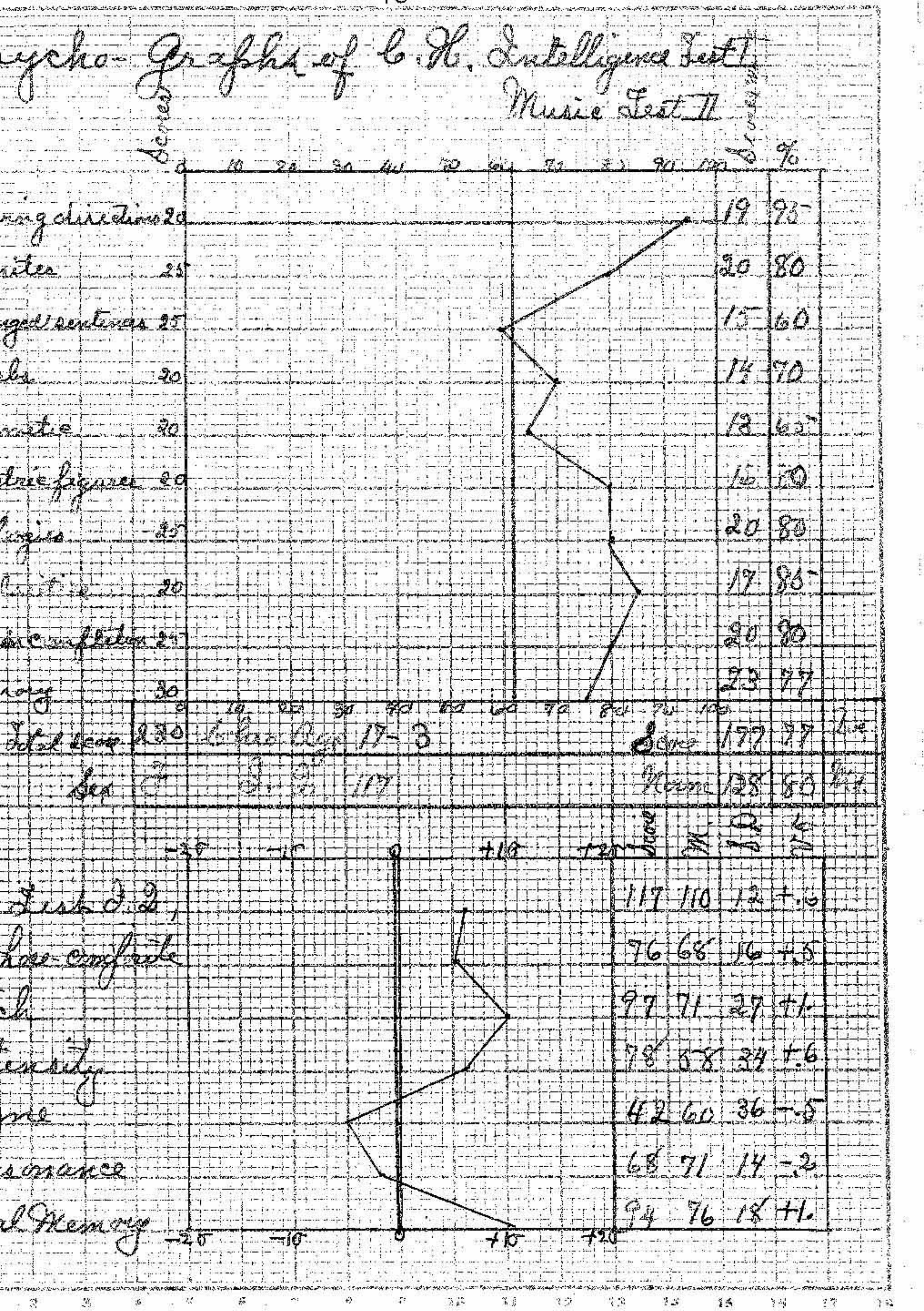
Psycho-Graph of L. G. Intelligence Test I

Music Test II

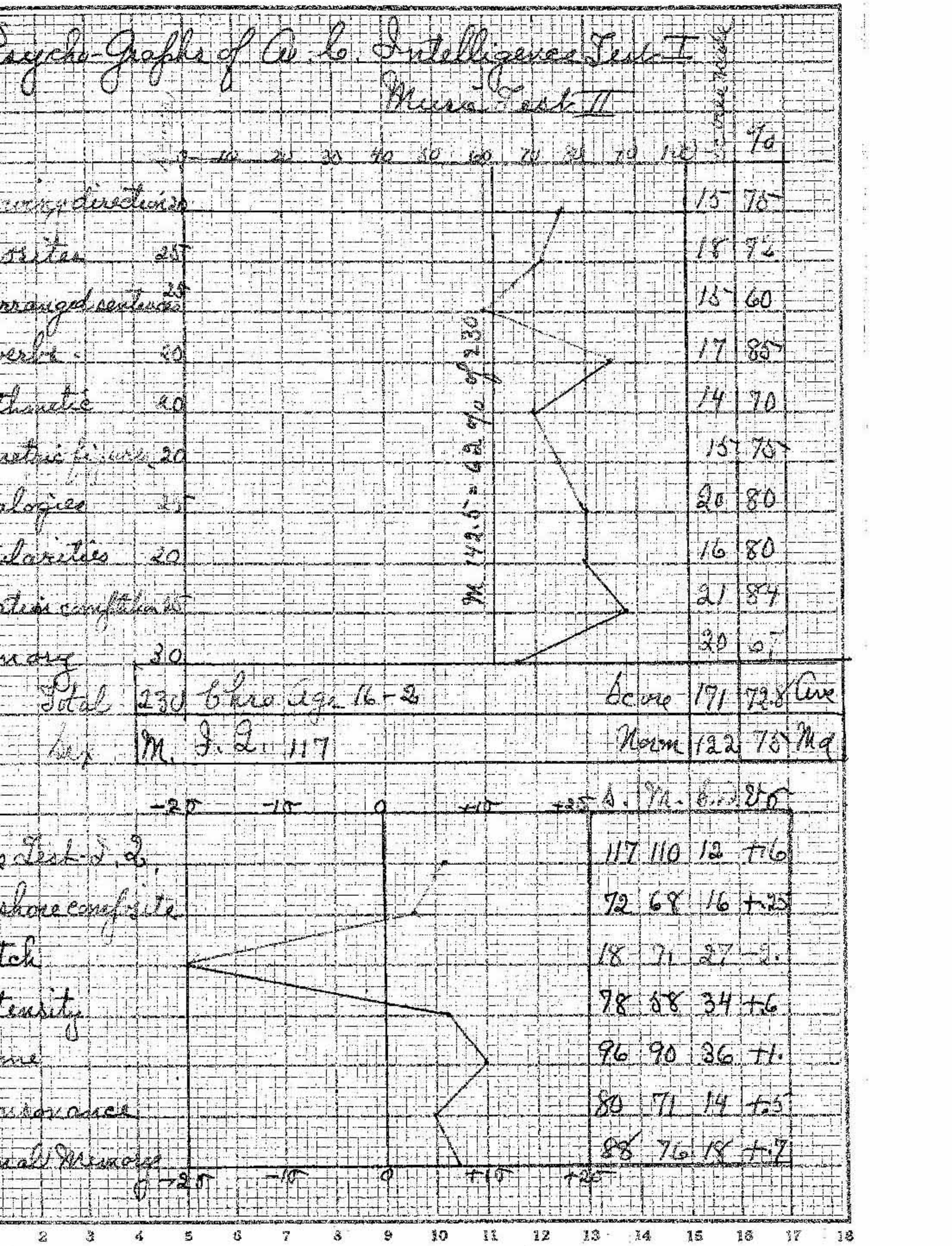


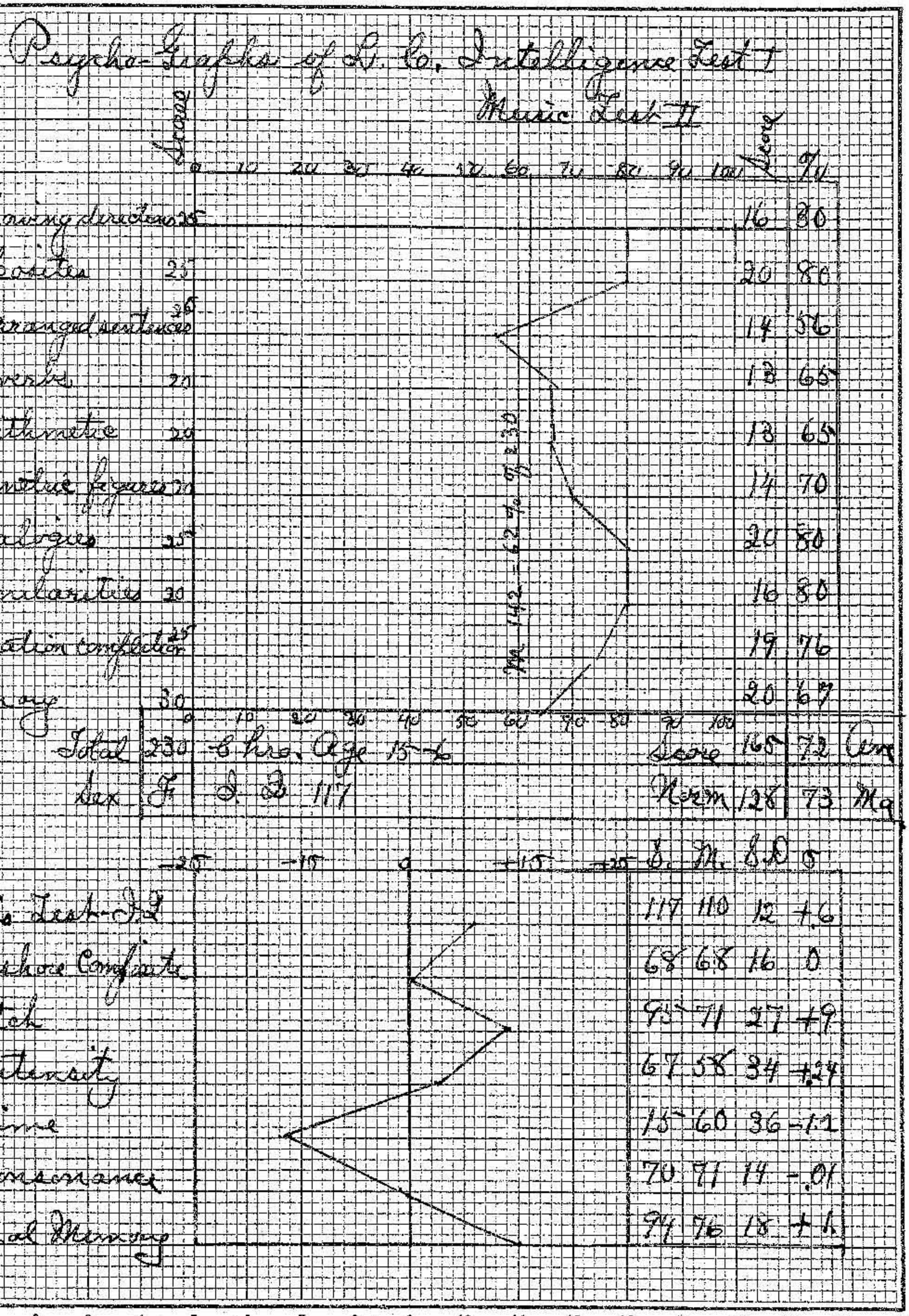
Psycho-Graphs of K. E. Intelligence Test I
Music Test II

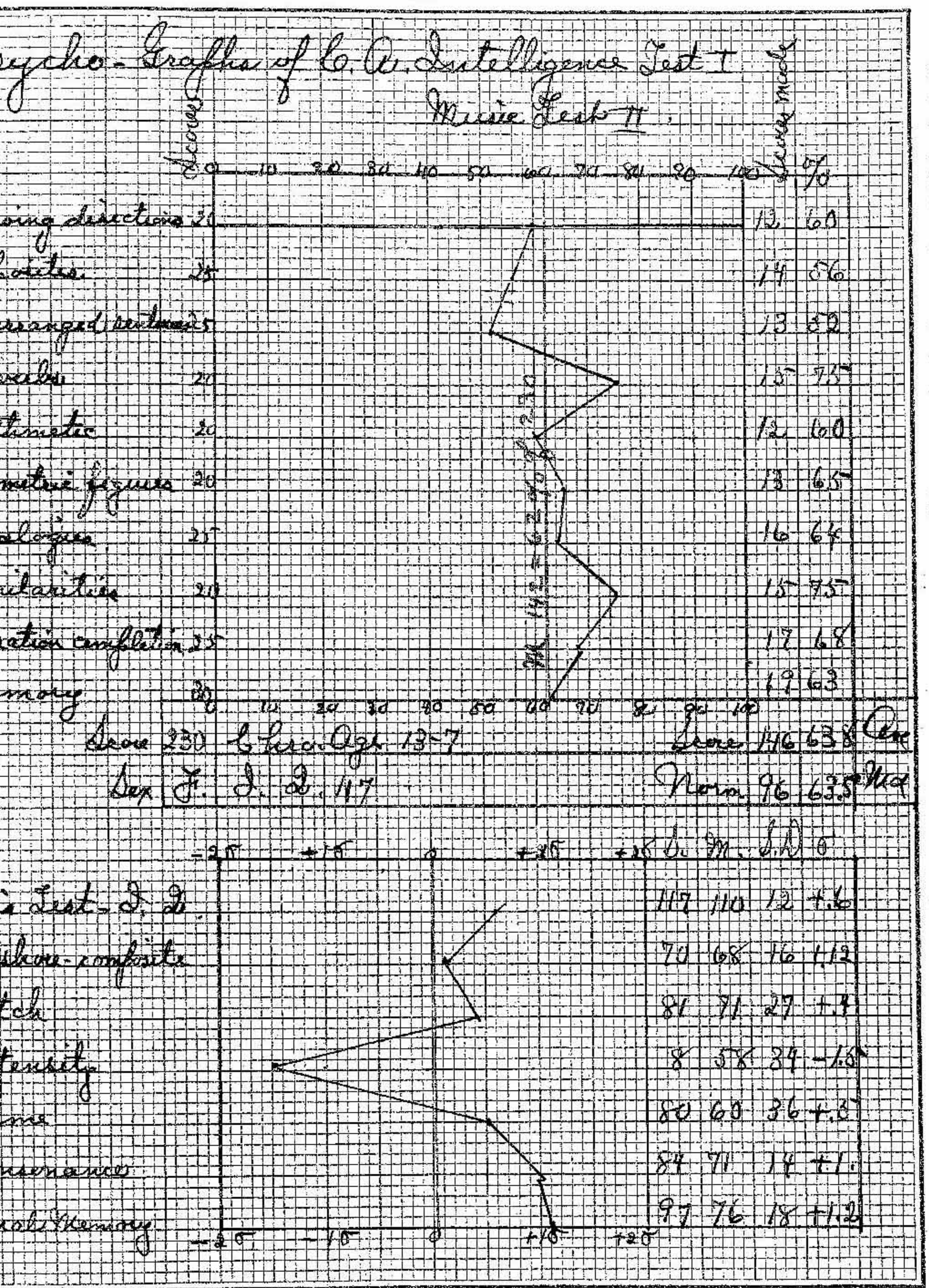




ycho-Graphs of C. H. Intelligence Test I
Music Test II
Scores
%
0 10 20 30 40 50 60 70 80 90 100
19 95
20 80
15 60
14 70
13 65
16 80
20 80
17 85
20 80
23 77
Score 177 77
Sex
117
Norm 138 80
-20 -10 0 +10 +20
Score
M
S.D.
117 110 12 +.5
76 68 16 +.5
97 71 27 +1.
78 68 24 +.6
42 60 36 -.5
68 71 14 -.2
94 76 18 +1.

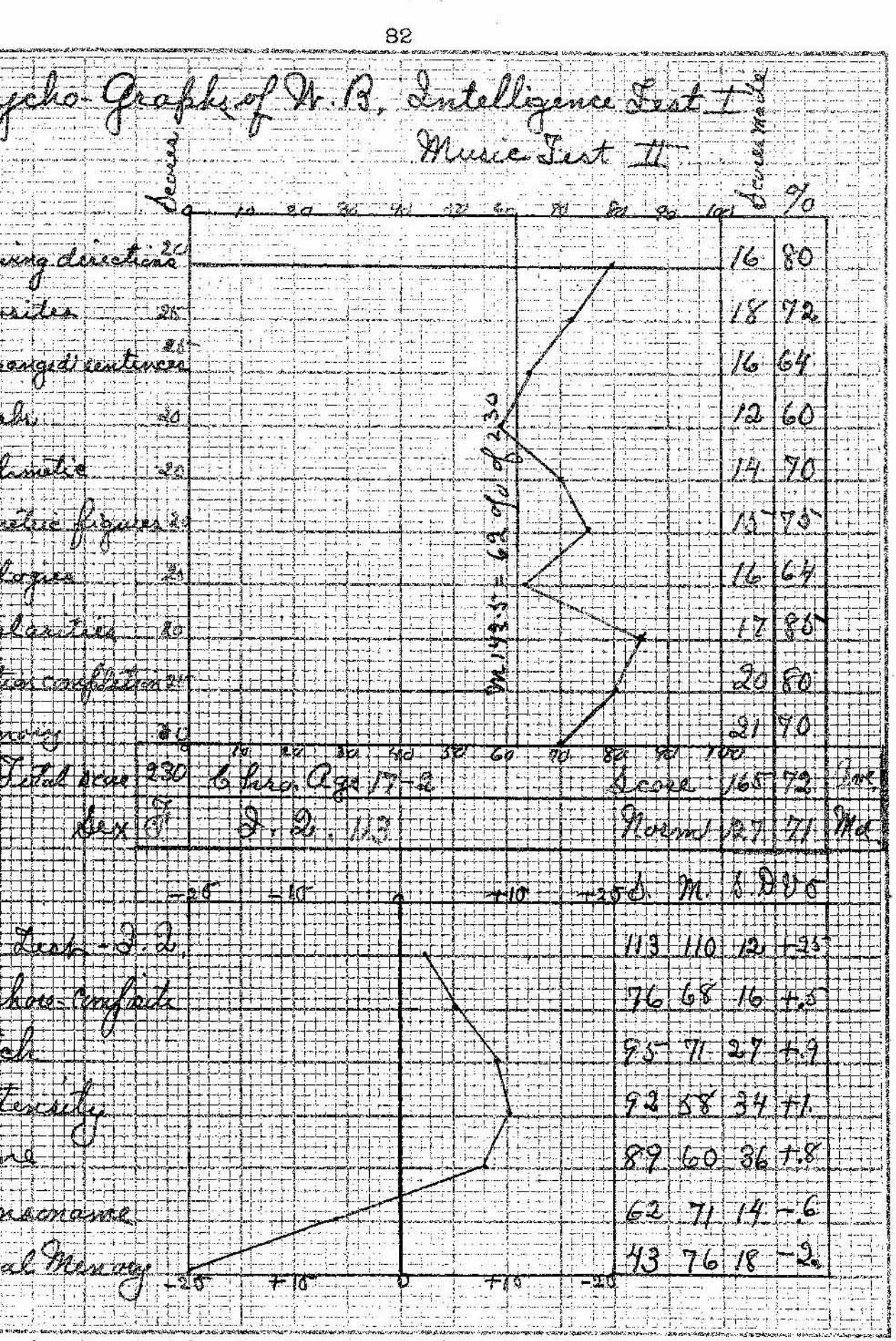

Psycho-Graphs of A. C. Intelligence Test I
Miner Test II
0 10 20 30 40 50 60 70 80 90 100
%
directions 20
15 75
25
18 72
arranged sentences 25
15 60
20
17 85
arithmetic 20
14 70
20
15 75
analogies 25
20 80
similarities 20
16 80
completion 25
21 84
30
20 67
M 142.5 = 62% of 230
Total 230 Chro Age 16-2
Score 171 72.8 Ave
M. I. Q. 117
Norm 122 75 Mq
S. M.
-25 -10 0 +10 +25
Test I. Q.
117 110 12 +6
composite
72 68 16 +.25
18 71 27 -2.
78 58 34 +.6
96 90 36 +1.
80 71 14 +.5
88 76 18 +.7
-25 -10 0 +10 +20
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18


Psycho-Graphs of L. Co. Intelligence Test I
Music Test II
Score
0 10 20 30 40 50 60 70 80 90 100
Score
%
…owing directions 25
16 80
…posites 25
20 80
…rranged sentences 25
14 56
…verbs 20
13 65
…ithmetic 20
13 65
…metric figures 20
14 70
…alogies 25
20 80
…milarities 20
16 80
…ation completion 25
19 76
…ory 30
20 67
M. 142 - 62% D. 30
Total 230
C. hr. Age 15-6
Score 168 72
Sex F.
I. Q. 117
Norm 128 73
-20 -10 0 +10 +20
S. M. S.D. σ
… Test I.Q.
117 110 12 +.6
…hoice Completion
68 68 16 0
…tch
93 71 27 +.9
…tensity
67 58 34 +.24
…ime
15 60 36 -1.1
…onsonance
70 71 14 -.01
…al Memory
94 76 18 +1


Psycho-Graphs of C. A. Intelligence Test I
Music Test II
Scores
0 10 20 30 40 50 60 70 80 90 100
Scores made
%
Arithmetic 20
Analogies 25
Similarities 20
Memory
Score 230 Chron. Age 13-7
Sex F. I. Q. 117
Score 146 63.8 Ave
Norm 96 63.5 Med
12 60
14 56
13 52
15 75
12 60
13 65
16 64
15 75
17 68
19 63
-25 -15 0 +15 +25
Test - I. Q.
Pitch
Intensity
Consonance
117 110 12 +.6
70 68 46 1.12
81 71 27 +.4
8 58 34 -1.5
80 60 36 +.3
84 71 14 +1.
97 76 18 +1.2
-25 -15 0 +15 +20

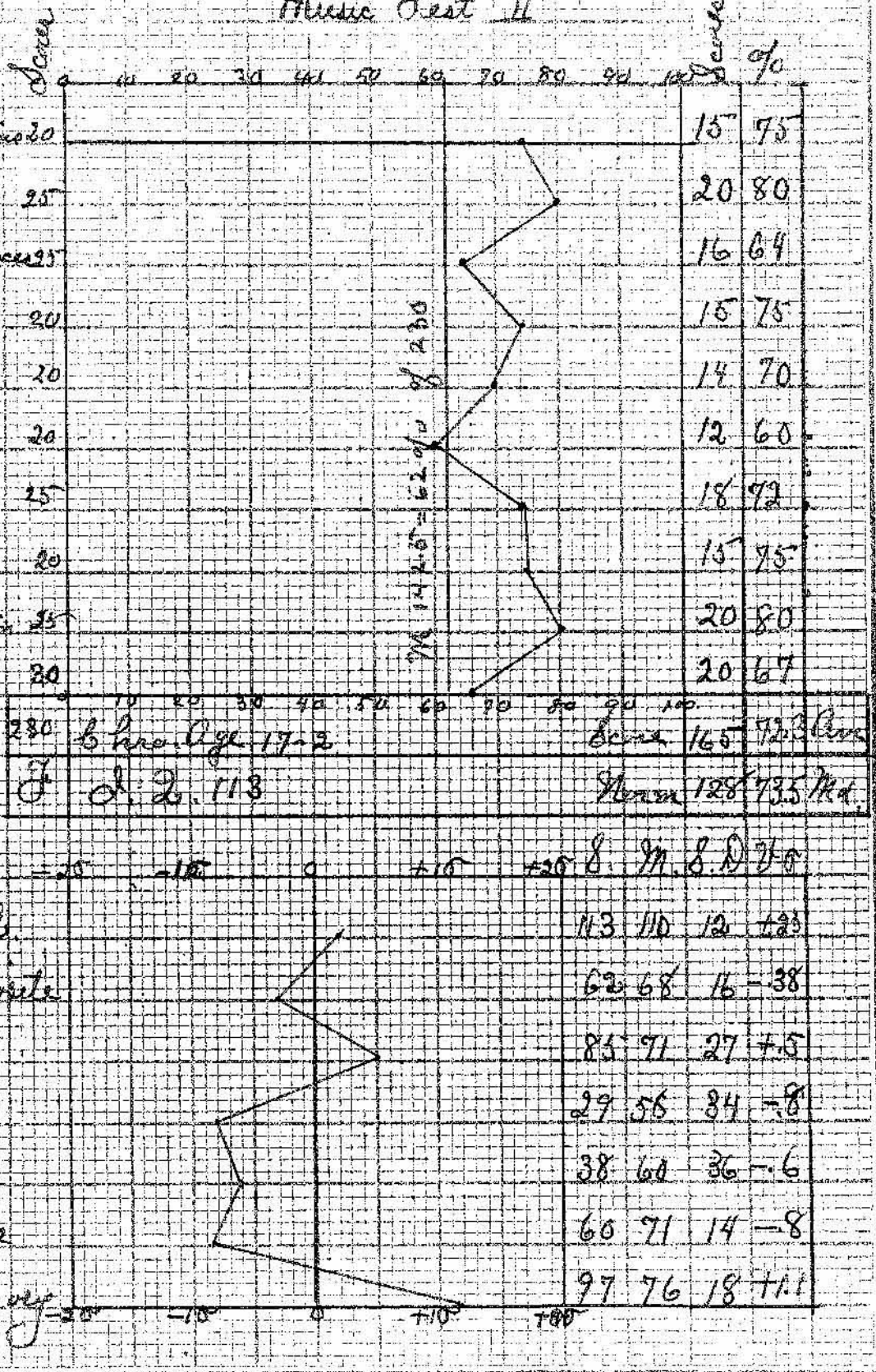
Psycho-Graphs of N. B. Intelligence Test I

Music Test II



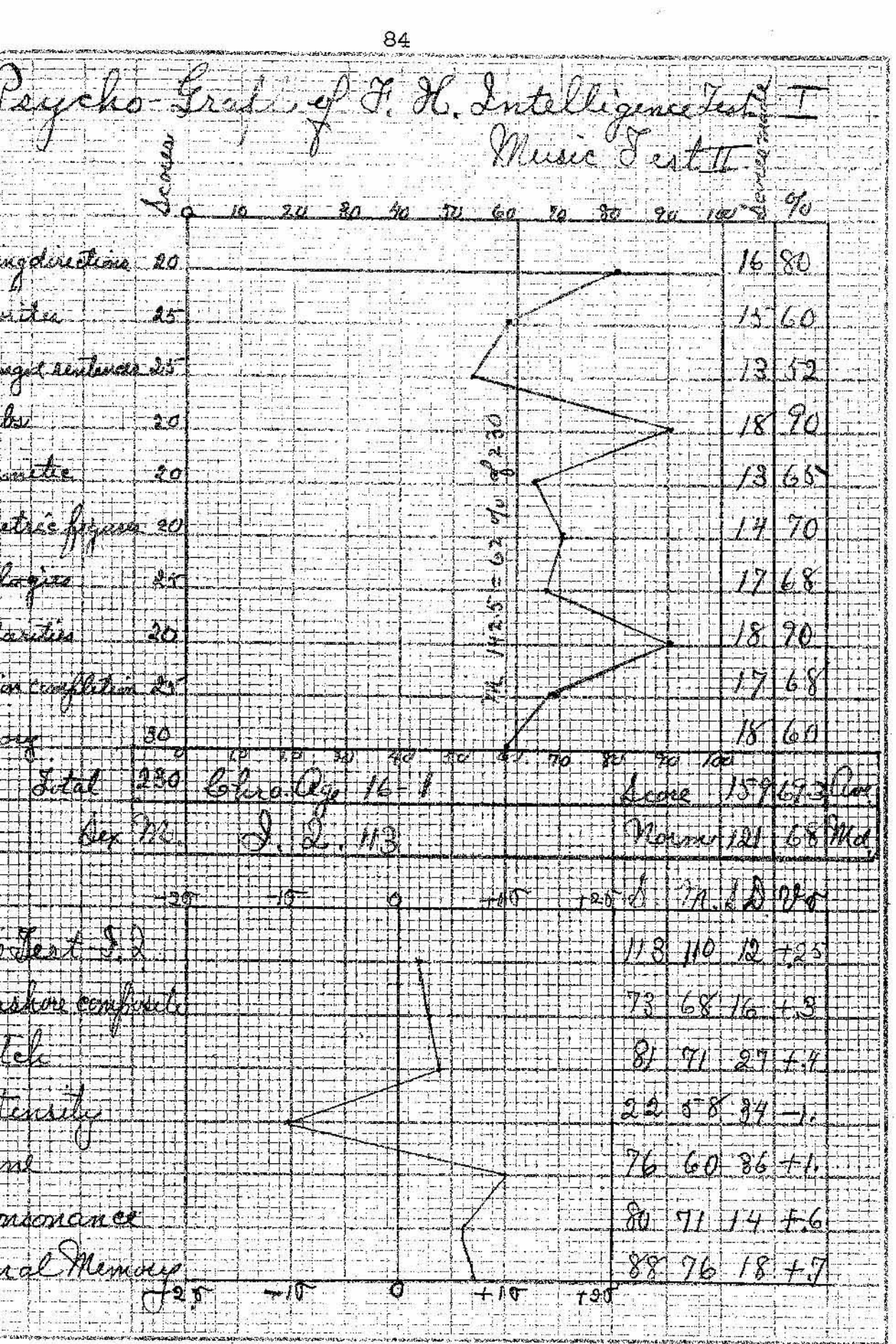
Psycho-grafks of P. H. Intelligence Test I

Music Test II



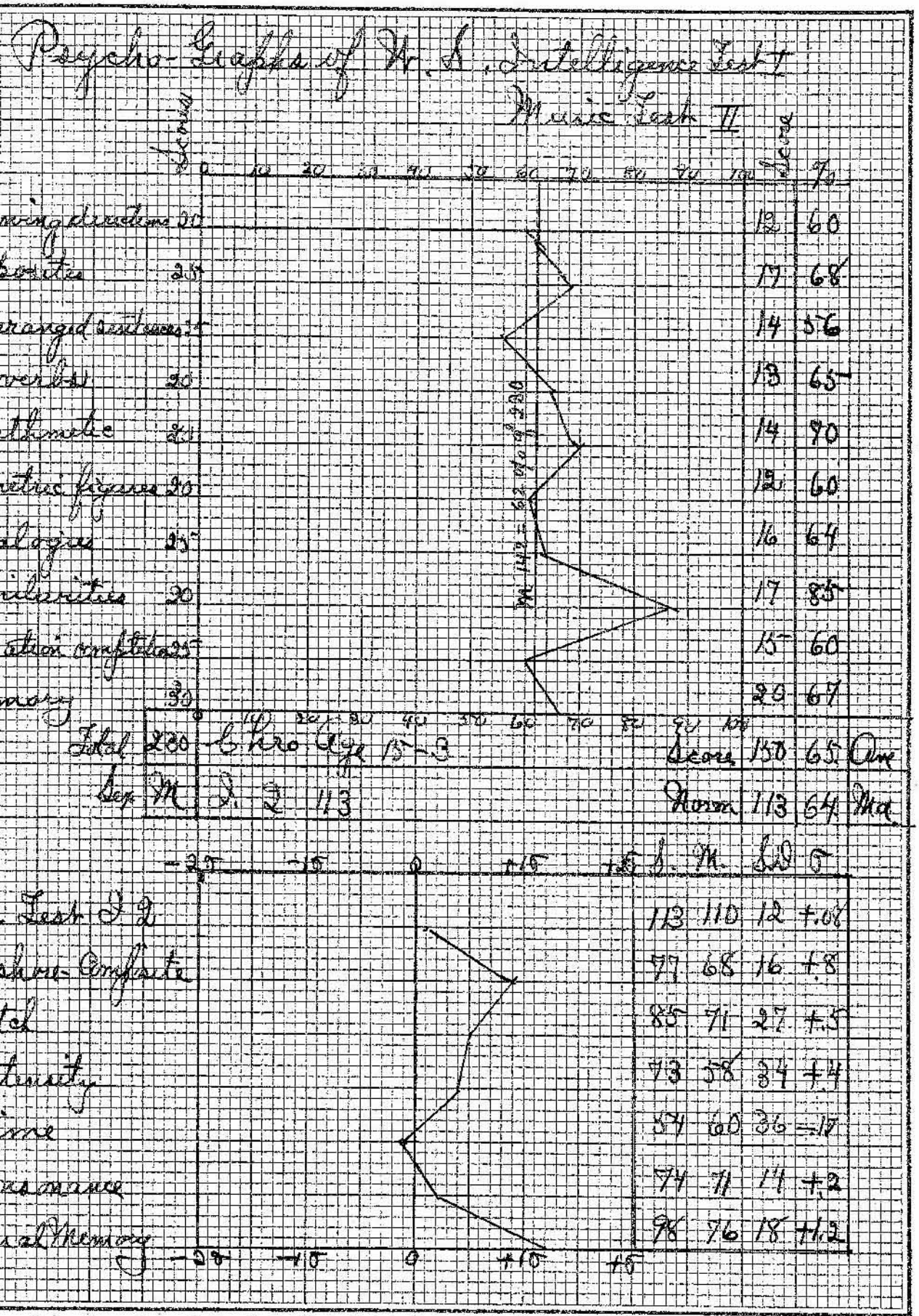
Psycho-Grad. of F. H. Intelligence Test I

Music Test II

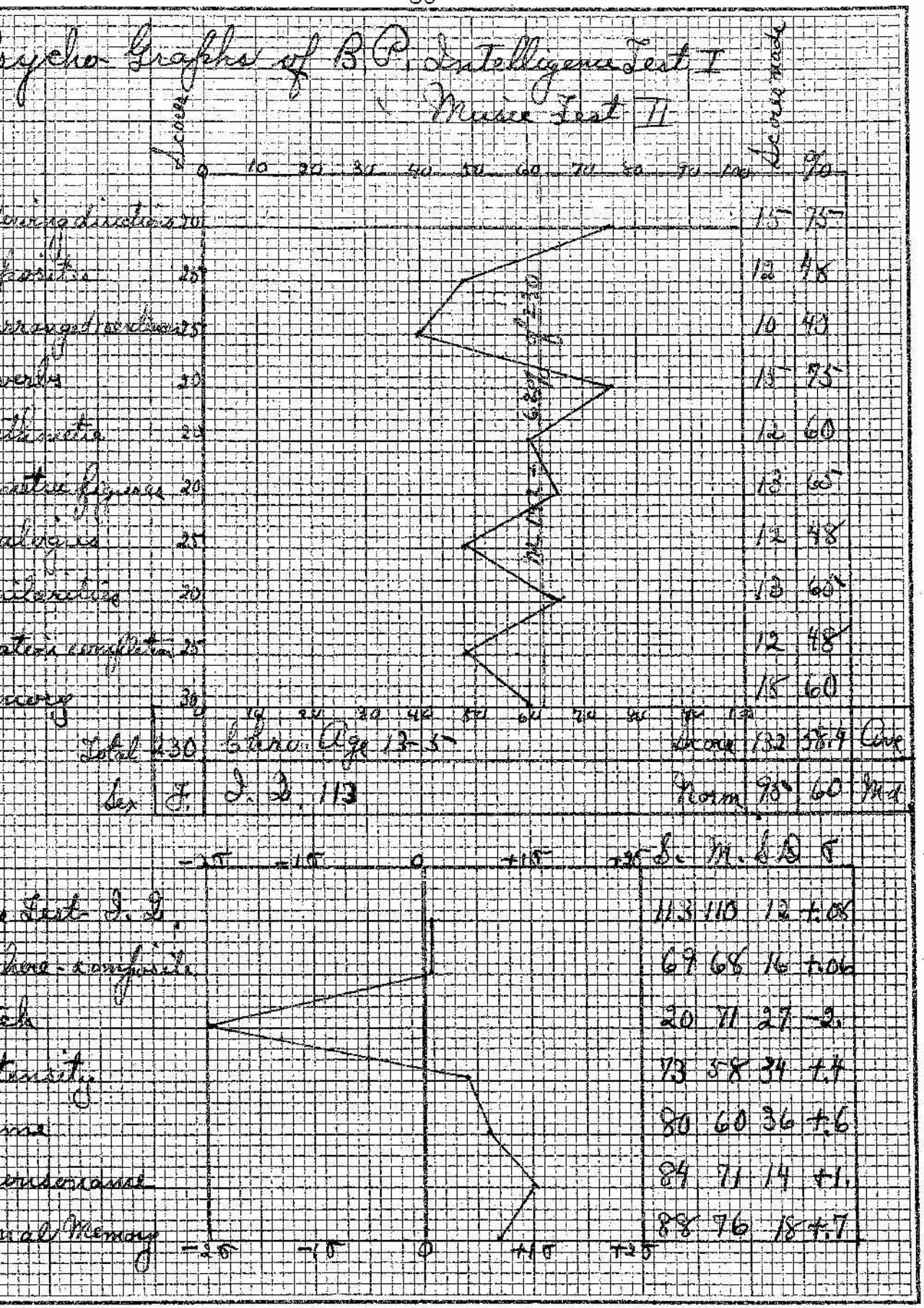


Psycho-Graphs of Mr. A. Intelligence Test I

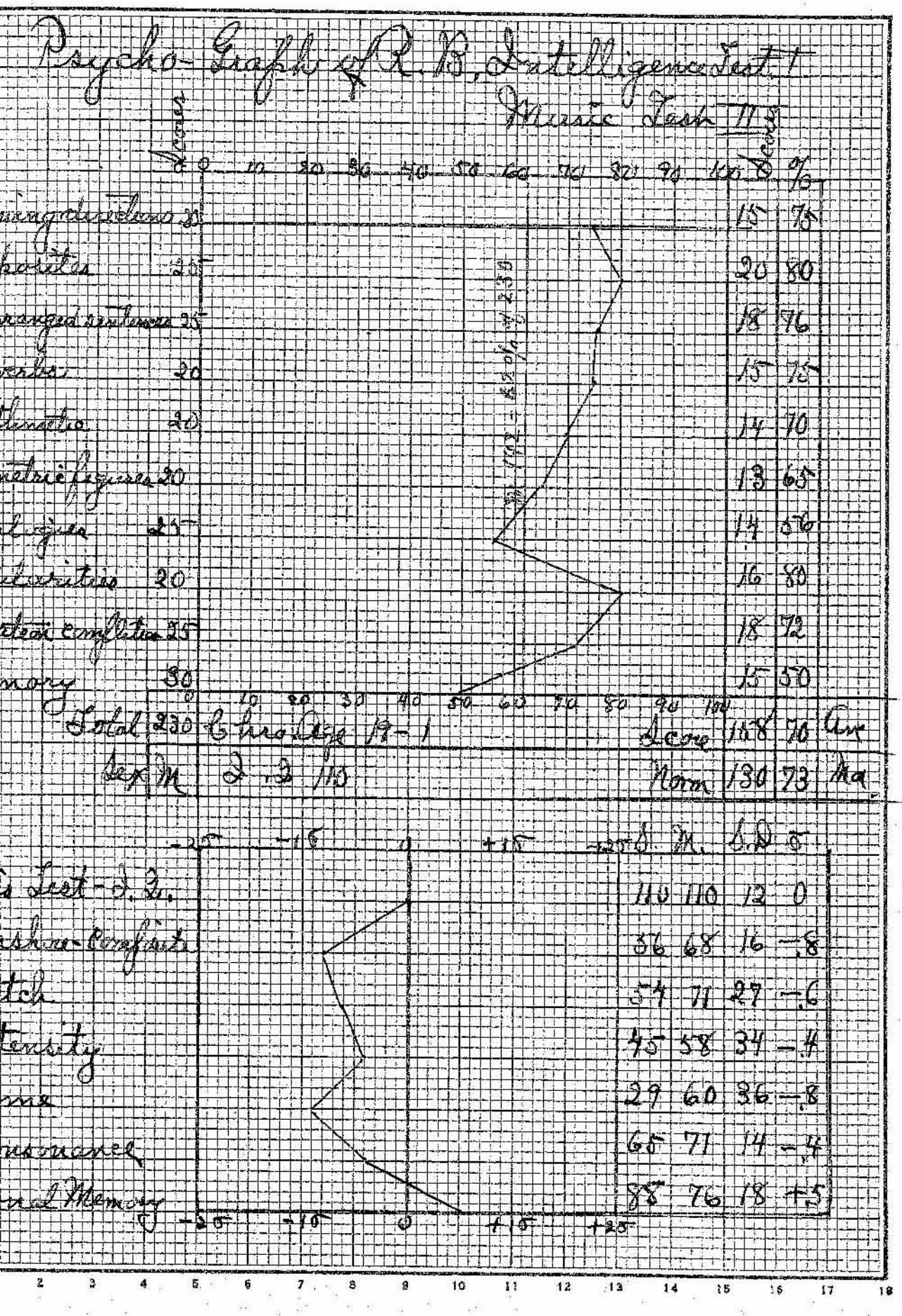
Music Test II



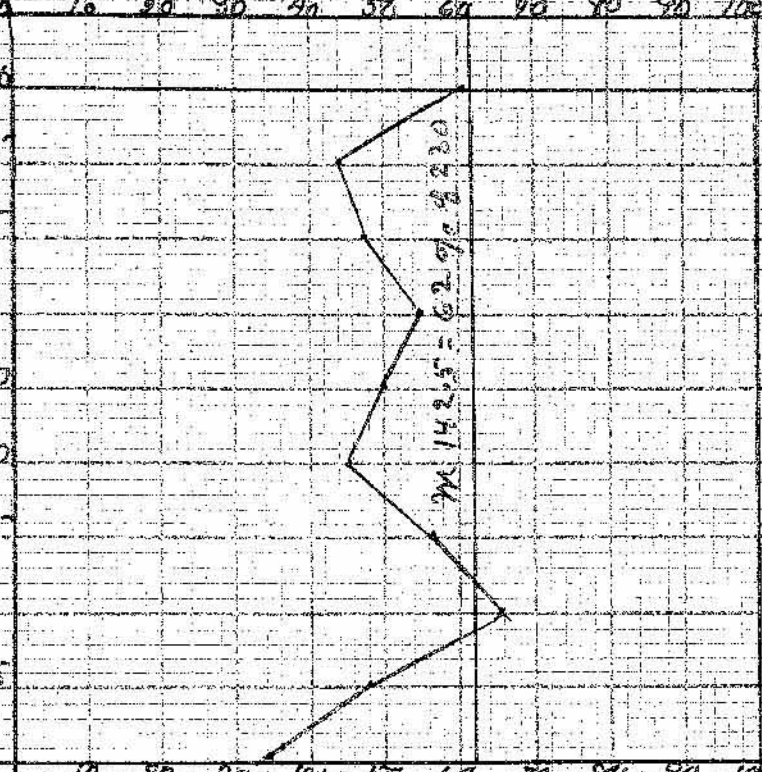
Psycho-Graphs of B.P. Intelligence Test I
Mixed Test II



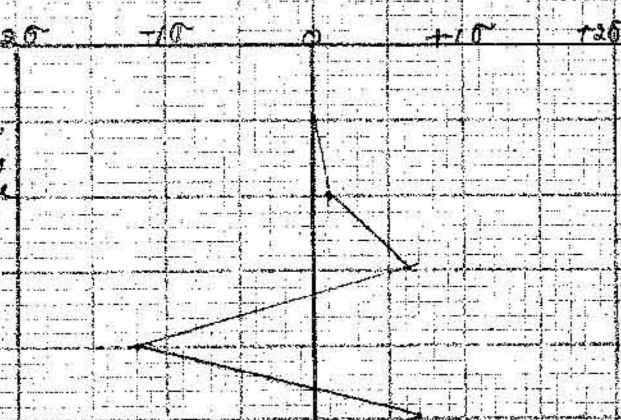
Psycho-Graph of R. B. Intelligence Test I



Psycho-Graph of G. C. Intelligence Test I
Music Test II

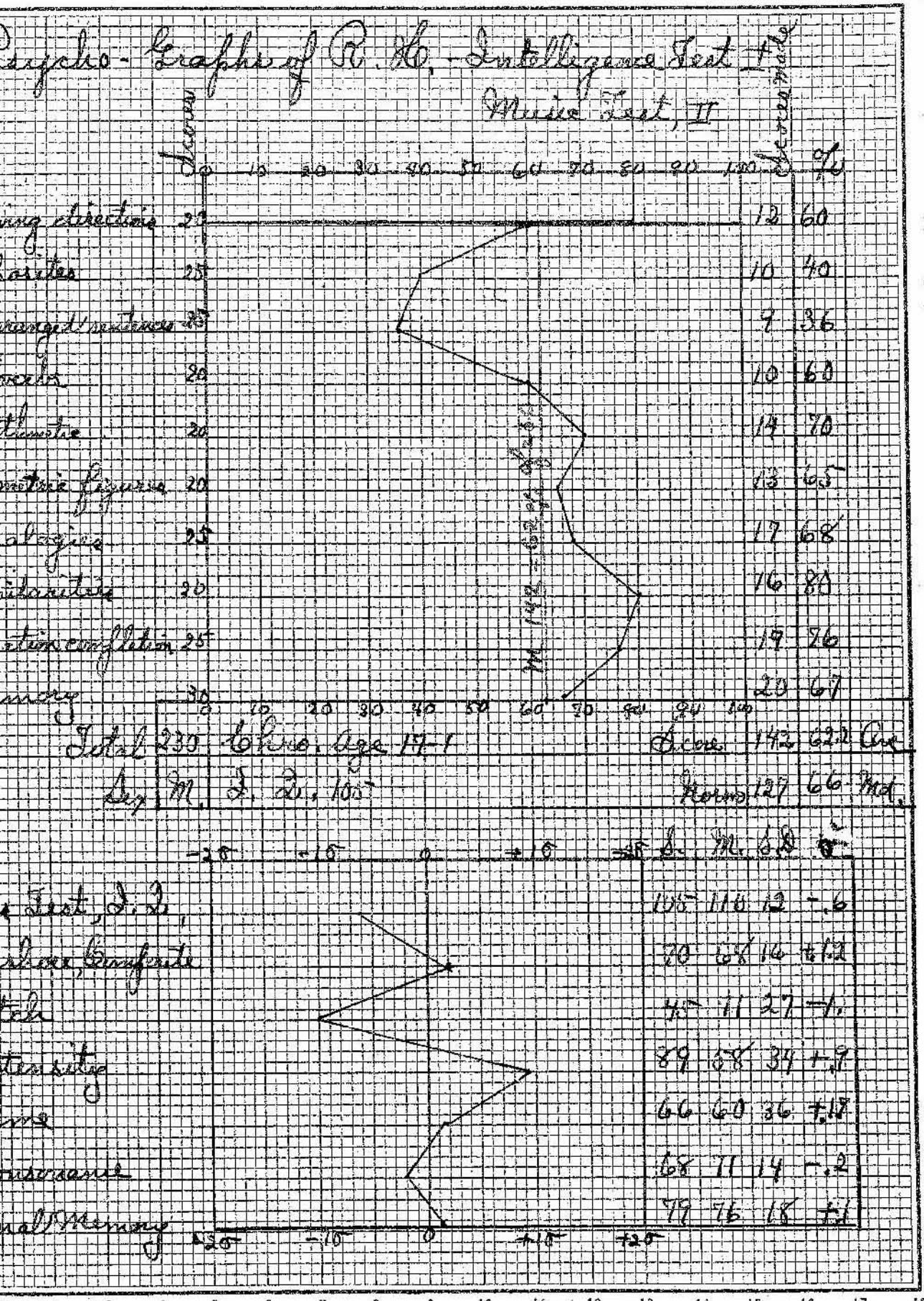


	Scores	Score	%
[...]wing directions	20	12	60
[...]sities	25	11	44
[...]ranged sentences	25	12	48
[...]verbs	20	11	55
[...]ithmetic	20	10	50
[...]metric figures	20	9	45
[...]alogies	25	14	56
[...]milarities	20	13	65
[...]ration completion	25	12	48
[...]ory	30	10	33
Total	230	Chro Age 12-4 — Score 114	50.4 Ave
Sex	F.	I. Q. 110 — Norm 84	49 Md.

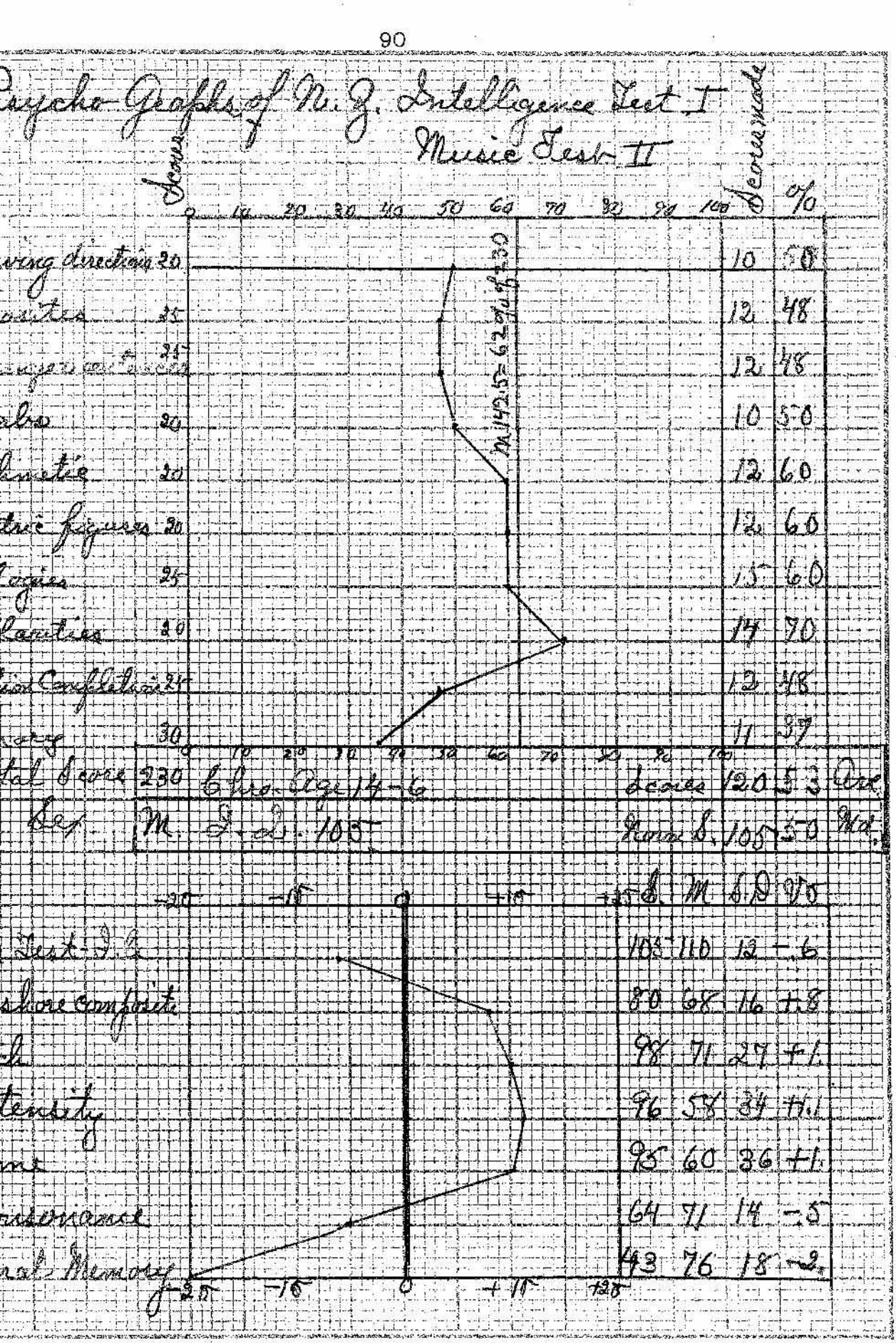


	S.	M.	S.D	D.C
[...]t's Test-I.Q.	110	110	12	0
[...]ashore composite	68.4	68	16	+.02
[...]tch	86	71	27	+.6
[...]ntensity	17	58	34	-1.2
[...]ime	84	60	36	+.7
[...]onsonance	65	71	14	-.4
[...]nal Memory	88	76	18	+.7

Psycho-Graphic of R. H. – Intelligence Test + Music Test, II

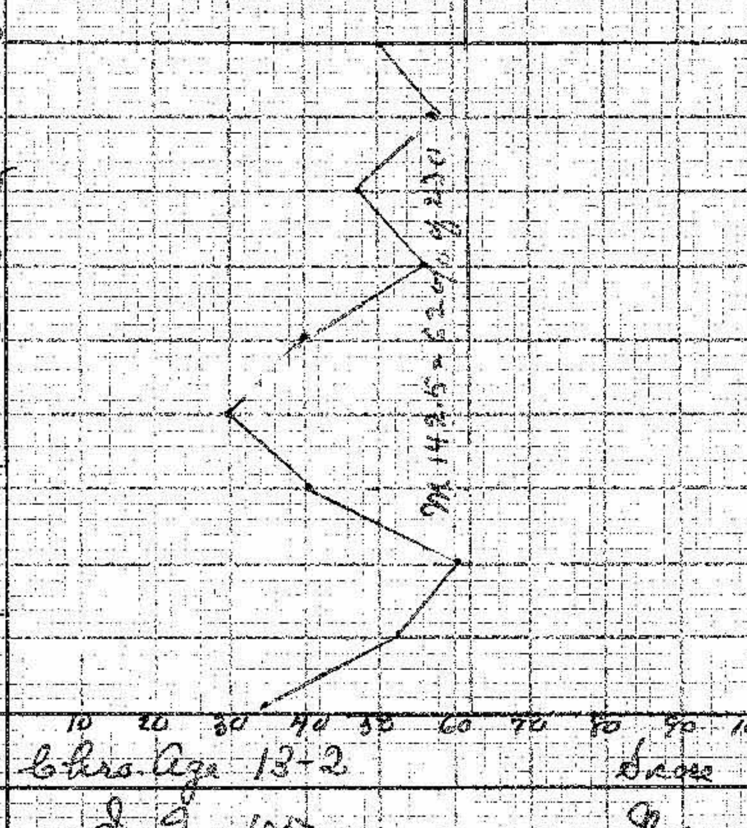


Psycho-Graphs of N. J. Intelligence Test I
Music Test II

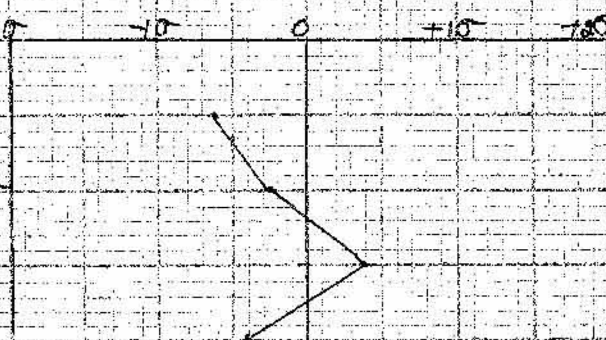


Psycho-Graph of P. C. Intelligence Test 13
Music Test II

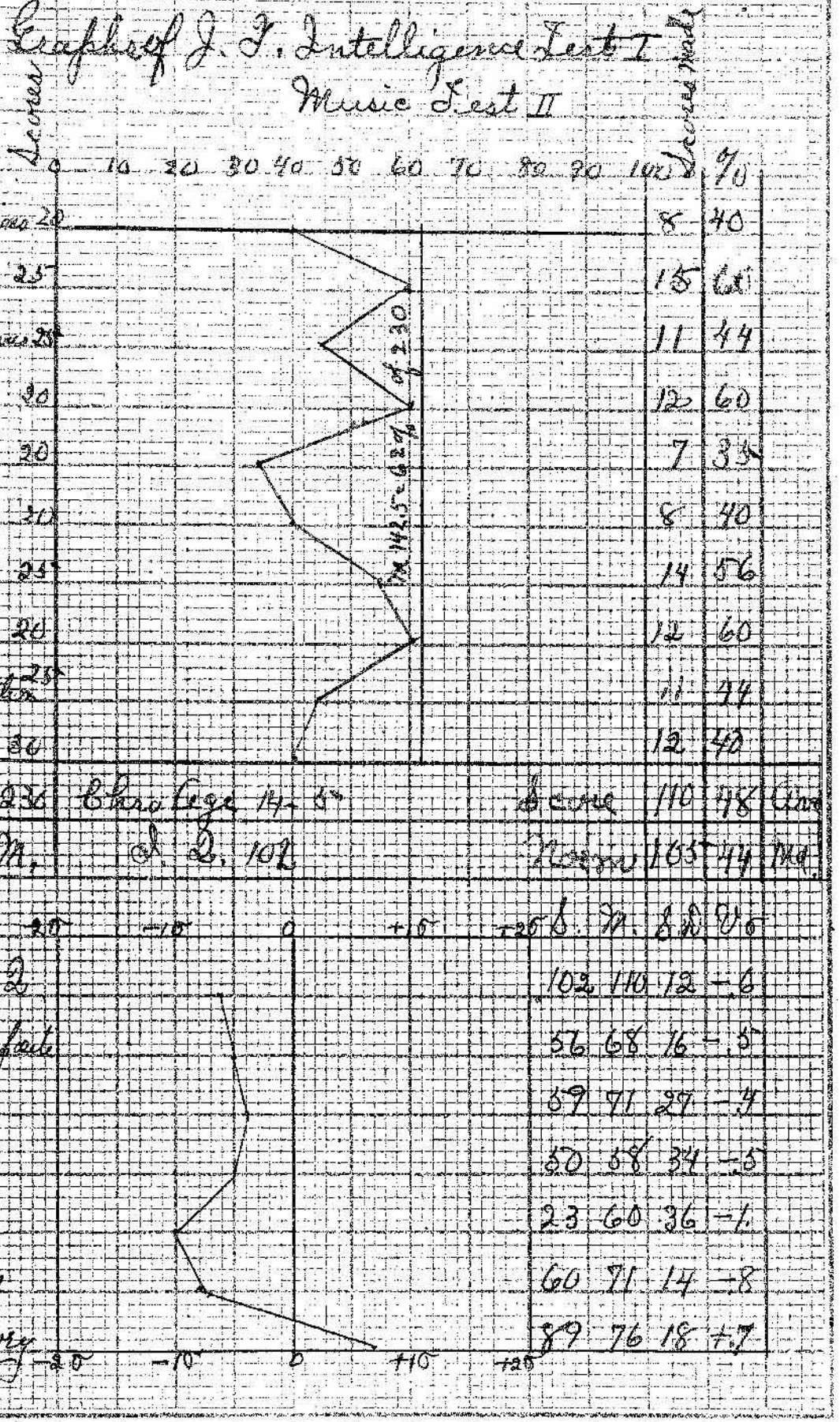
Test	Score	Score	%
...ing directions	20	10	50
...posites	25	14	56
...ranged sentences	25	12	48
...verbs	20	11	55
...thmetic	20	8	40
...metric figures	20	6	30
...alogies	25	10	40
...ilarities	20	12	60
...tion completion	25	13	52
...mory	30	10	33
Total	230	Chrono Age 13-2 — Score 106	46.4 Av.
Sep	F.	I. Q. 105 — Norm 92	49 Md.

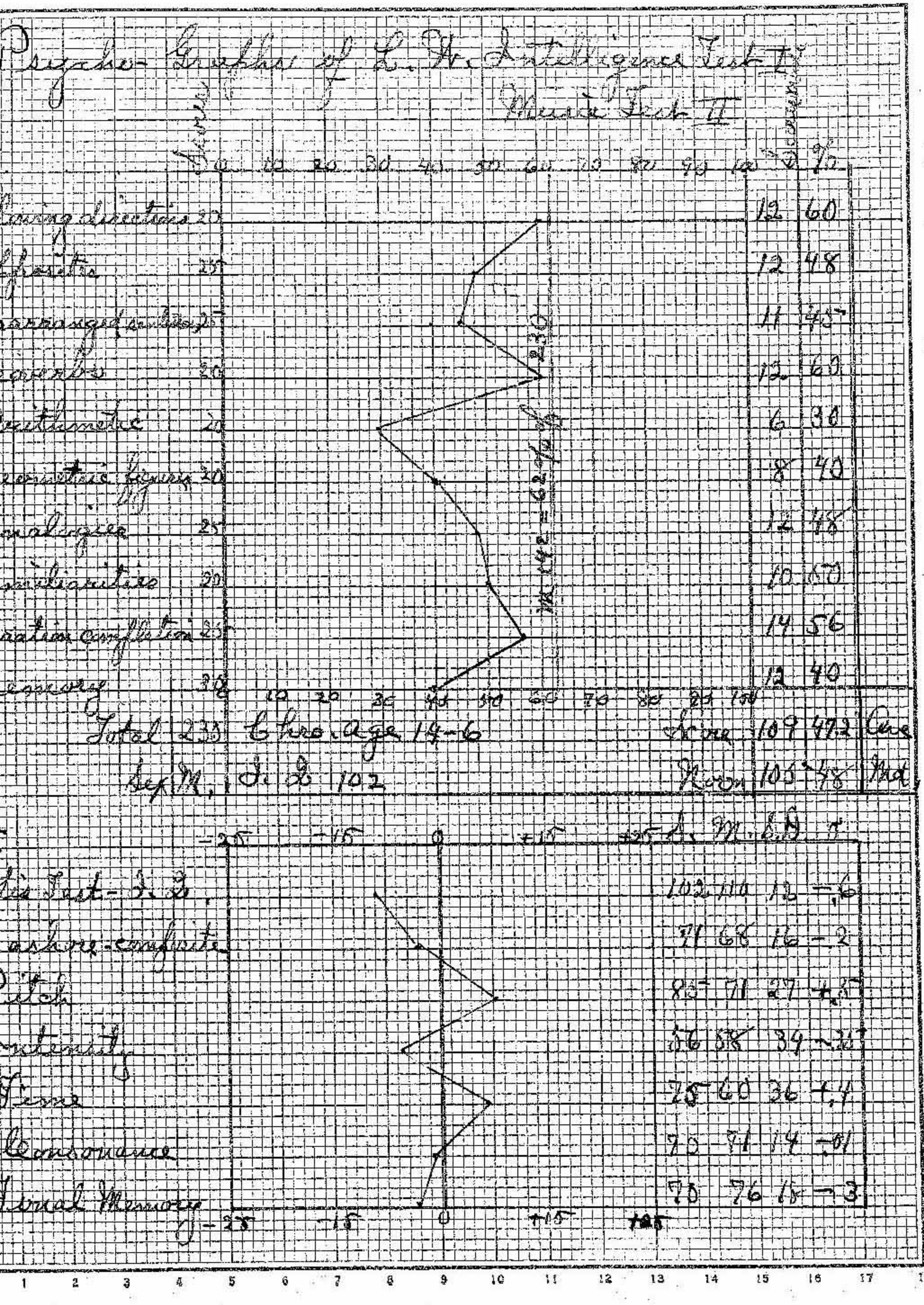


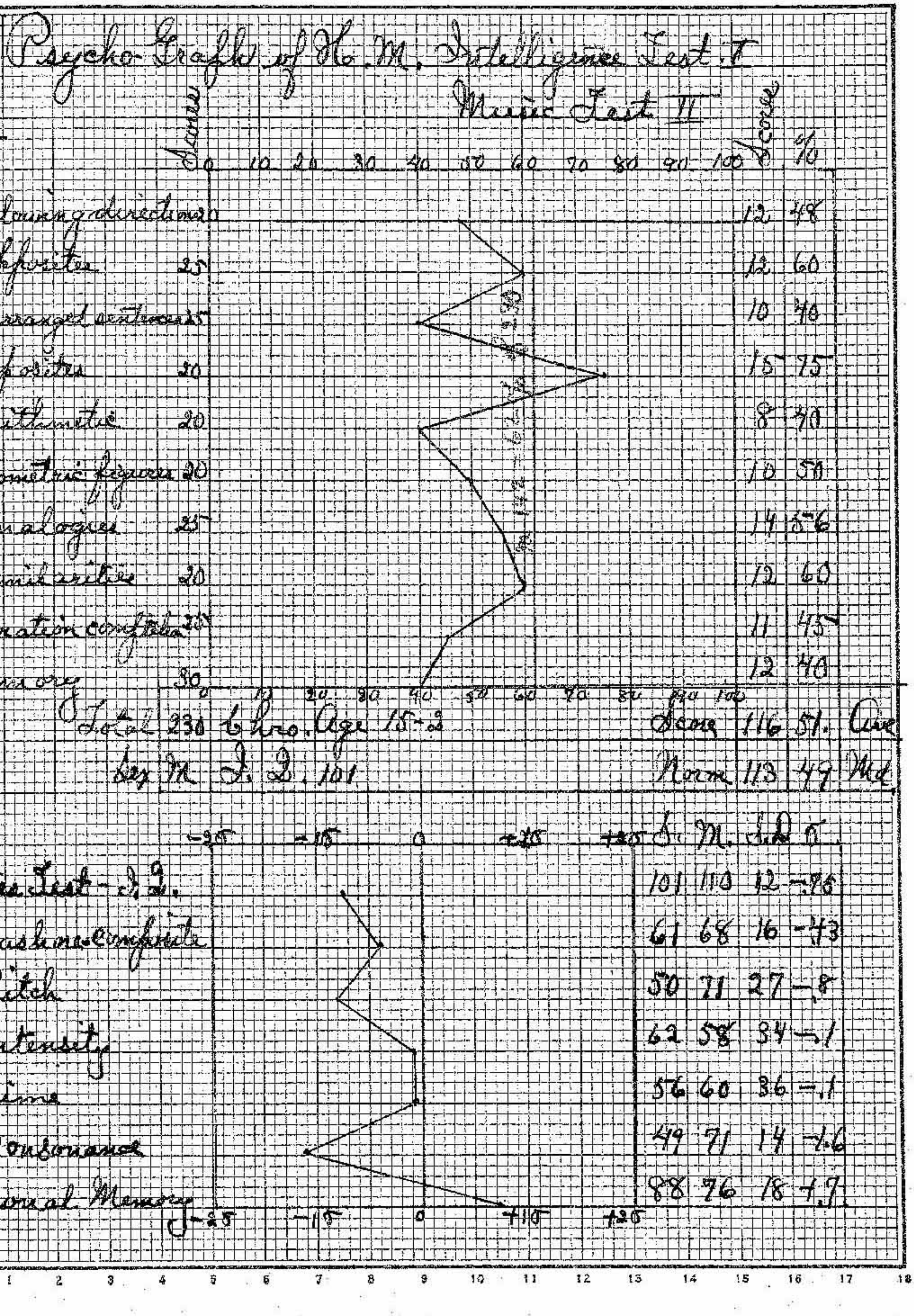
	S.	M.	S.D.	D.S
...s Test - I. Q.	105	110	12	-.6
Seashore composite	64	68	16	-.25
Pitch	81	71	27	+.4
Intensity	45	58	34	-.4
Time	33	60	36	-.6
Consonance	84	71	14	+1.
Tonal Memory	79	76	18	+.1



Psycho-Graph of J. J. Intelligence Test I
Music Test II

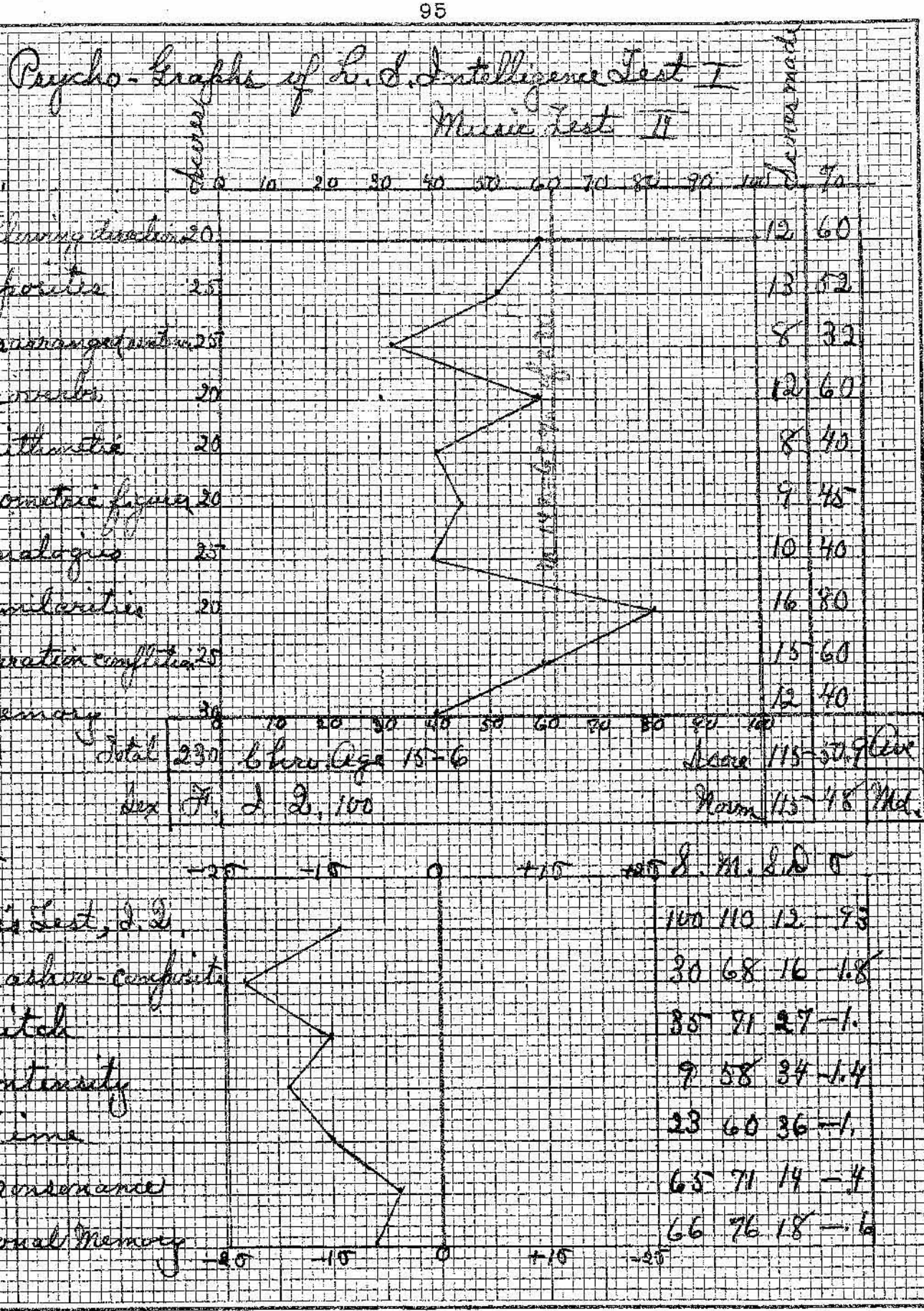



Psycho-Graphs of L. H. Intelligence Test IV
Music Test II
Following directions 20 | 12 | 60
Opposites 25 | 12 | 48
Disarranged sentences 25 | 11 | 45
Proverbs 20 | 12 | 60
Arithmetic 20 | 6 | 30
Geometric figures 20 | 8 | 40
Analogies 25 | 12 | 48
Similarities 20 | 10 | 50
Narration completion 25 | 14 | 56
Memory 30 | 12 | 40
Total 230 Chro. Age 14-6
Sex M., I. Q. 102
Score 109 472 Ave
Norm 105 48 Md
A. M. E. D
Music Test - I. Q. 102 110 12 -.6
Pitch 85 71 27 +.5
Intensity 56 58 34 -.21
Time 75 60 36 +.4
Consonance 70 71 14 -.01
Tonal Memory 70 76 15 -.3


Psycho-Graph of H. M. Intelligence Test I
Music Test II
Score
Score %
0 10 20 30 40 50 60 70 80 90 100
...lowing directions 20 12 48
...pposites 25 12 60
...rranged sentences 25 10 40
...posites 20 15 75
...rithmetic 20 8 40
...metric figures 20 10 50
...nalogies 25 14 56
...milarities 20 12 60
...ration completion 25 11 45
...emory 30 12 40
Total 230 Chro. Age 15-2
Sex M I. Q. 101
Score 116 51. Ave
Norm 113 49 Md.
-25 -15 0 +10 +25
S. M. S.D. σ
...ce Test - I. Q. 101 110 12 -.75
...ashion completion 61 68 16 -.43
Pitch 50 71 27 -.8
Intensity 62 58 34 -.1
Time 56 60 36 -.1
Consonance 49 71 14 -1.6
Tonal Memory 88 76 18 +.7

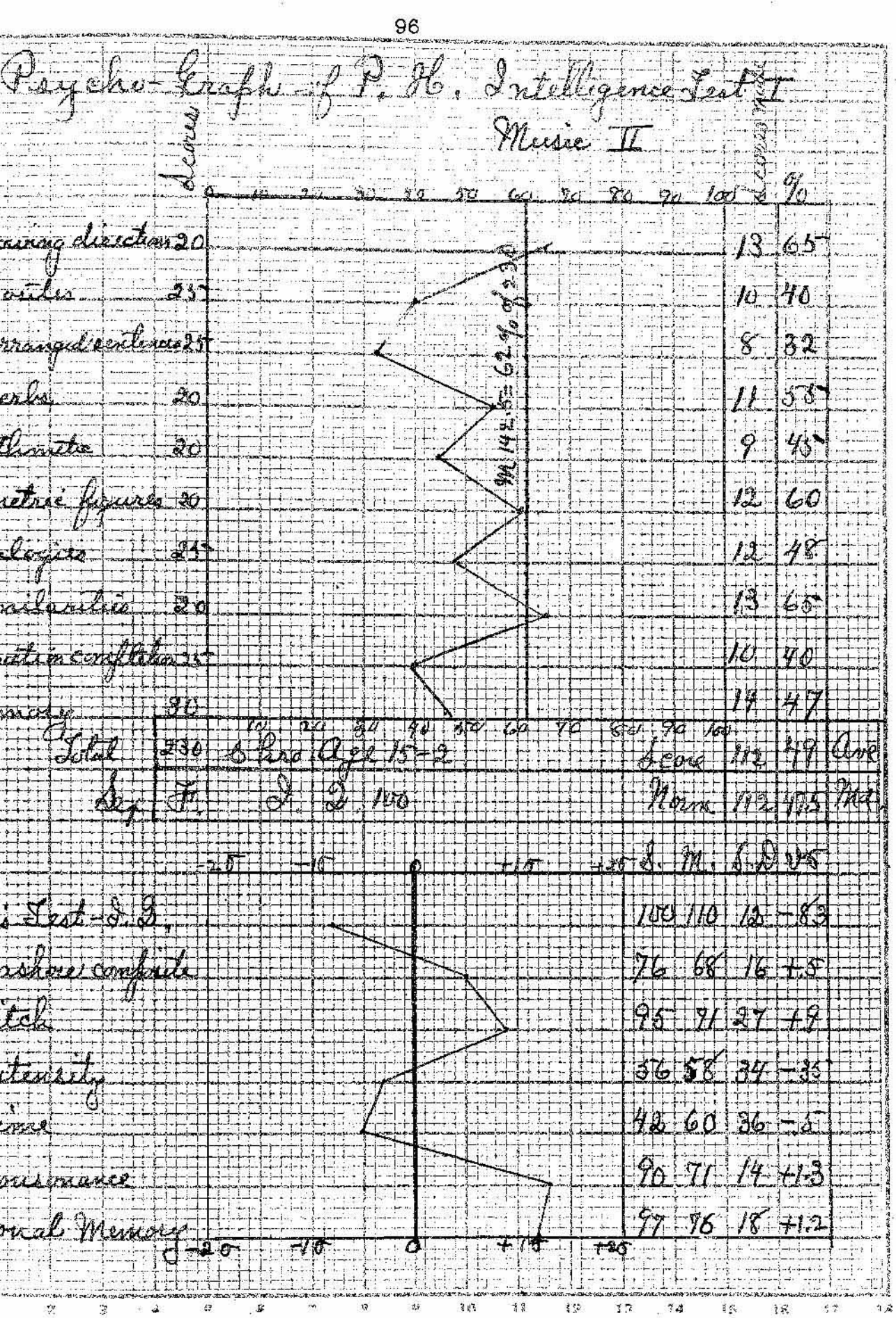
Psycho-Graphs of L. S. Intelligence Test I

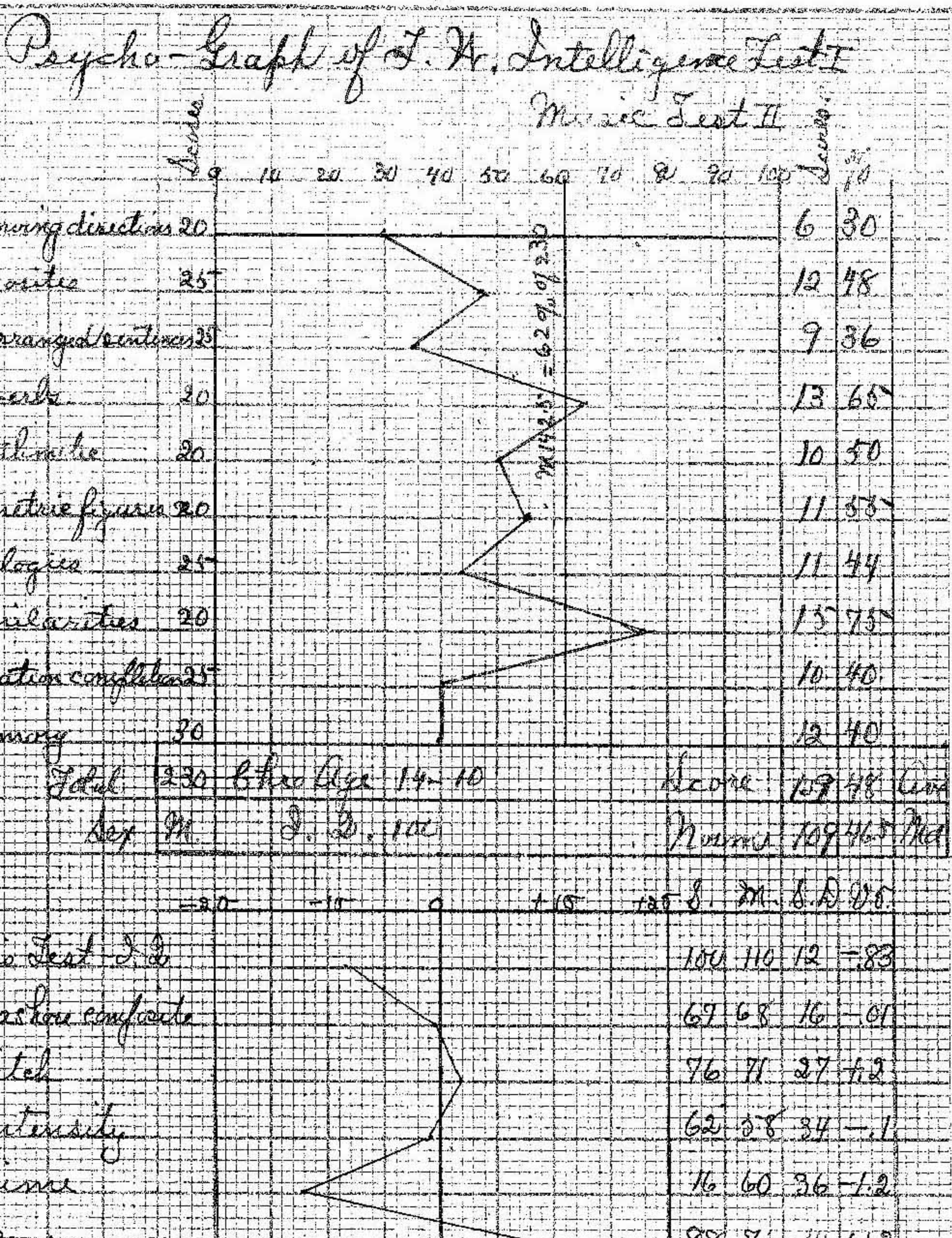
Music Test II

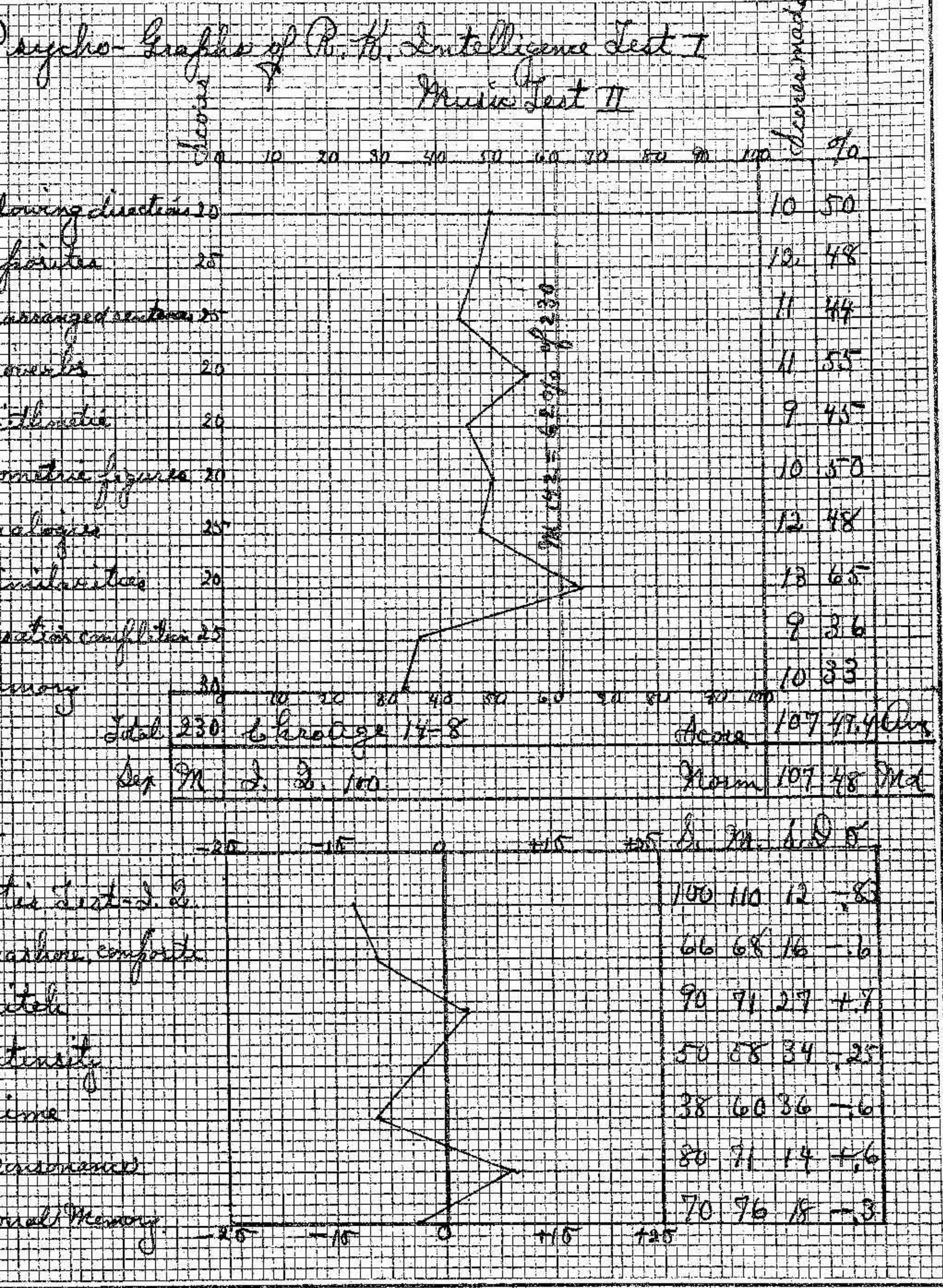


Psycho-Graph of P. H. Intelligence Test I

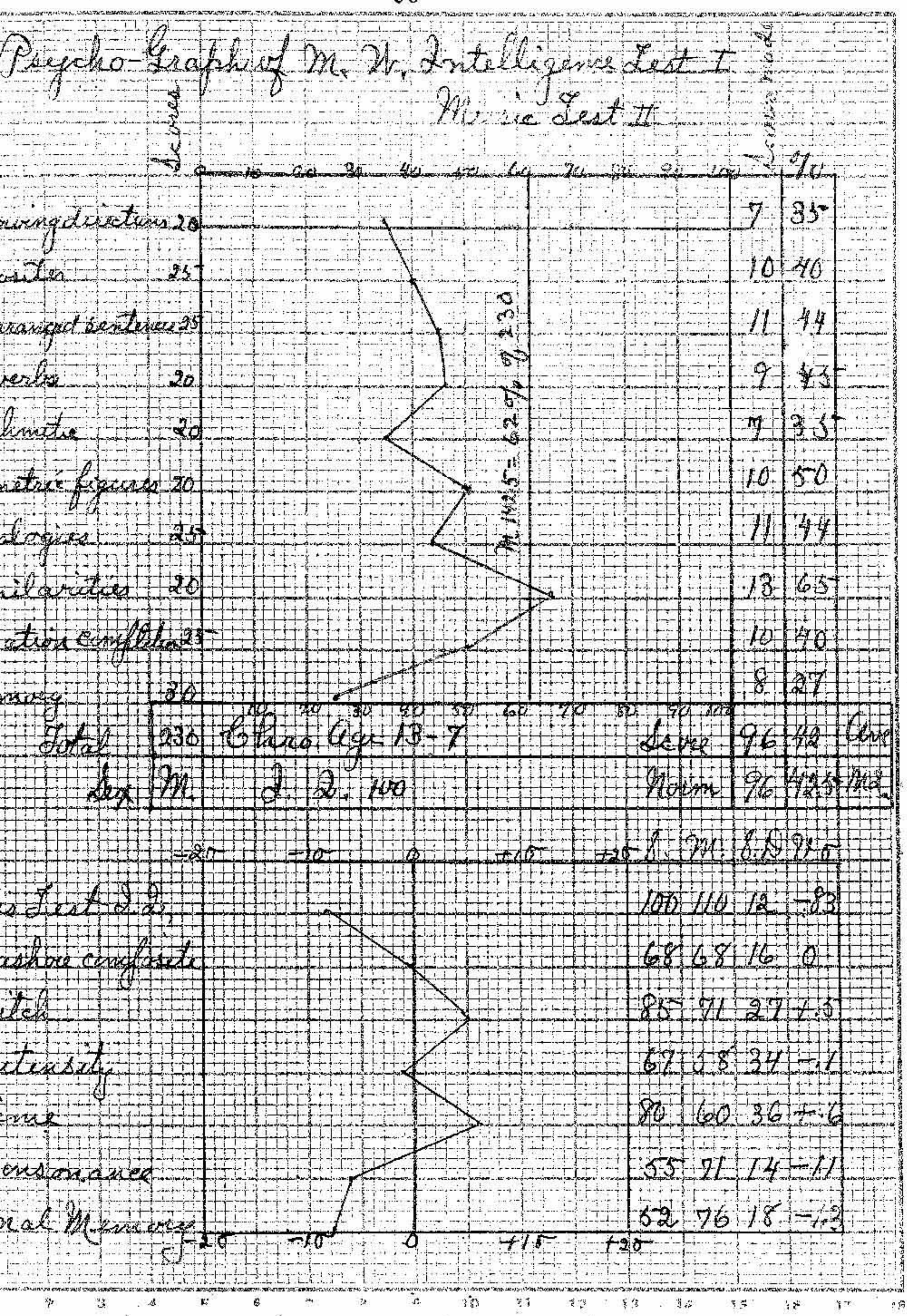
Music II




Psycho-Graph of J. W. Intelligence Test I
Music Test II
Scores
0 10 20 30 40 50 60 70 80 90 100
Scores %
rving directions 20 6 30
osites 25 12 48
rranged sentences 25 9 36
erbs 20 13 65
thmetic 20 10 50
metric figures 20 11 55
logies 25 11 44
ilarities 20 15 75
ation completion 25 10 40
mory 30 12 40
M.A. 14.5 = 62% of 230
Total 230 Chro Age 14-10 Score 137 48 Av
Sex M. I. Q. 100 Norms 109 46.5 Md
-2σ -1σ 0 +1σ +2σ S. M. S.D. Dev.
c Test I.Q. 100 110 12 -.83
ashore composite 67 68 16 -.01
tch 76 71 27 +.2
tensity 62 58 34 -.1
ime 46 60 36 -1.2
Consonance 88 71 14 +1.2
nal Memory 94 76 18 +.9
σ -2σ -1σ 0 +1σ +2σ

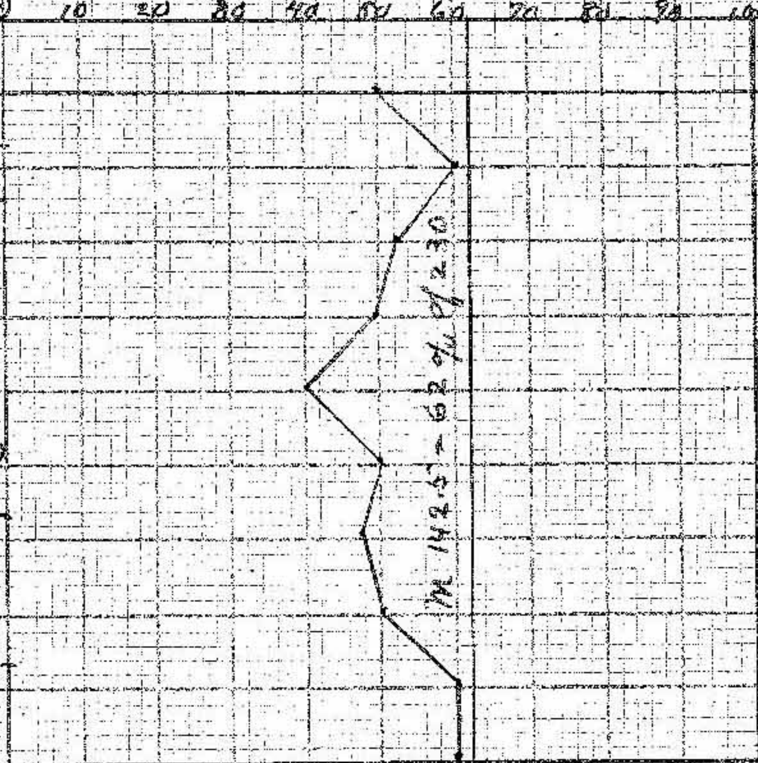


Psycho-Graphs of R. K. Intelligence Test I
Music Test II
Scores
Scores made
%
0 10 20 30 40 50 60 70 80 90 100
...lowing directions 20 10 50
...opposites 25 12 48
...arranged sentences 25 11 44
...owels 20 11 55
...Illustrations 20 9 45
...ometric figures 20 10 50
...nalogies 25 12 48
...imilarities 20 13 65
...ation completion 25 9 36
...mory 30 10 33
M. 48 = 48% of 230
Total 230 Chrono Age 14-8
Score 107 47.4 Av.
Dep M. I. Q. 100
Norm 107 48 Md.
-25 -15 0 +15 +25
S. M. S.D. D.
...tic Test - I. Q. 100 110 12 -.83
...ashions composite 66 68 16 -.1
...itch 90 71 27 +.7
...tensity 50 58 34 -.25
...ime 38 60 36 -.6
...onsonance 80 71 14 +.6
...nal Memory 70 76 18 -.3

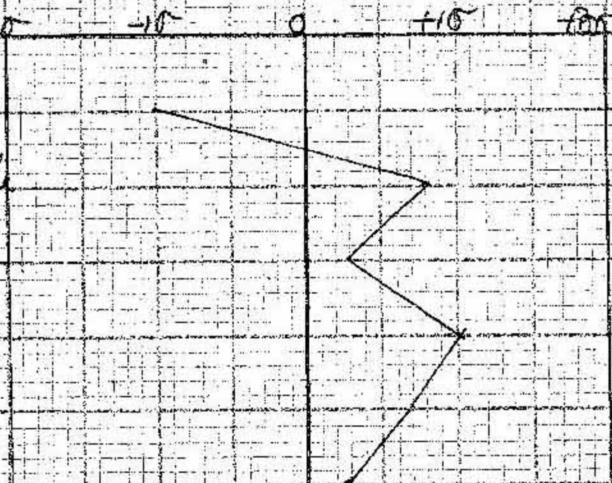

Psycho-Graph of M. W. Intelligence Test I
Music Test II
Scores
0 10 20 30 40 50 60 70 80 90 100
%
7 35
10 40
11 44
9 45
7 35
10 50
11 44
13 65
10 40
8 27
Total 230 Chron Age 13-7
Score 96 42 Ave
Sex M. I. Q. 100
Norm 96 42.5 Ma.
-20 -10 0 +10 +20
M. S.D
100 110 12 -8.3
68 68 16 0
85 71 27 +.5
67 58 34 -.1
80 60 36 +.6
55 71 14 -1.1
52 76 18 -1.2
-20 -10 0 +15 +20

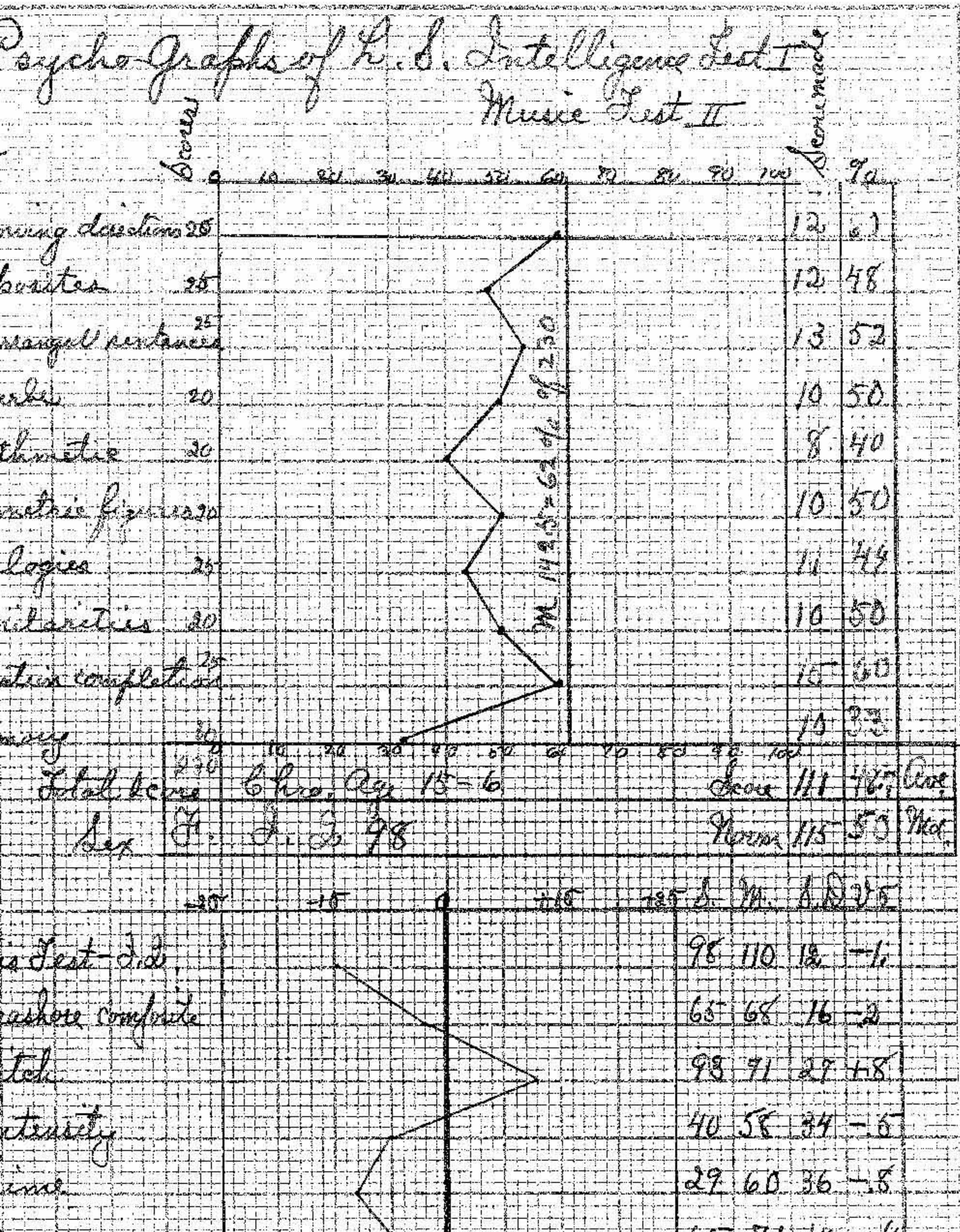
Psycho-Graphs of C. N. Intelligence Test I
Music Test II

I	Scores	Score	%
Following directions	20	10	50
Opposites	25	15	60
Disarranged sentences	25	13	52
Proverbs	20	10	50
Arithmetic	20	8	40
Geometric figures	20	10	50
Analogies	25	12	48
Similarities	20	10	50
Narrative completion	25	15	60
Memory	30	18	60
Total	230	Score 121	52 Ave.
Sex M.	Chro. Age 17-1; I. Q. 98	Norm 127	50 M.A.

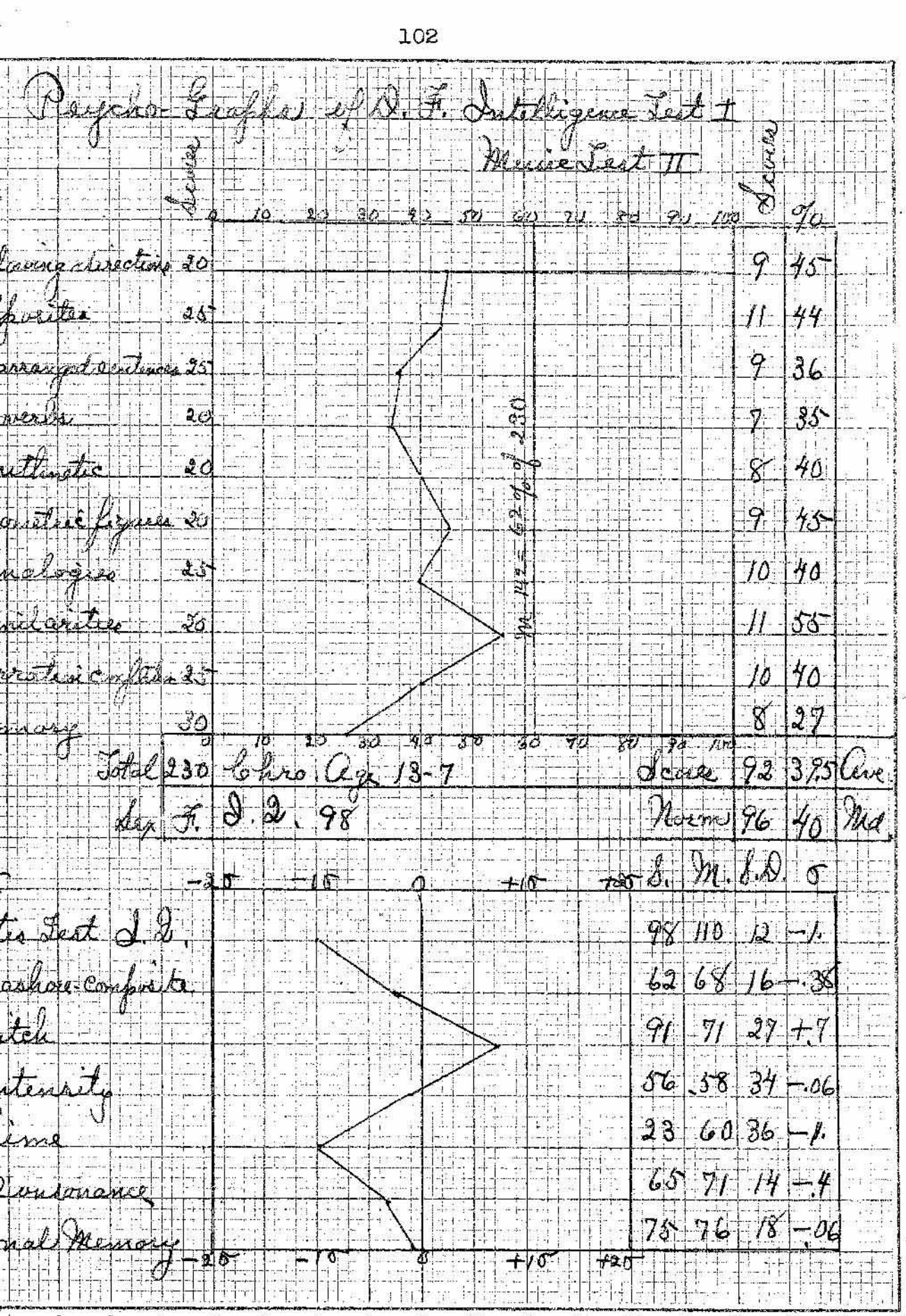


II	S.	M.	SD	D.S
Otis Test-I.Q.	98	110	12	-1.
Seashore composite	80	68	16	+.8
Pitch	80	71	27	+.3
Intensity	90	58	34	+1.
Time	85	60	36	+.7
Consonance	75	71	14	+.3
Tonal Memory	66	76	18	-.5



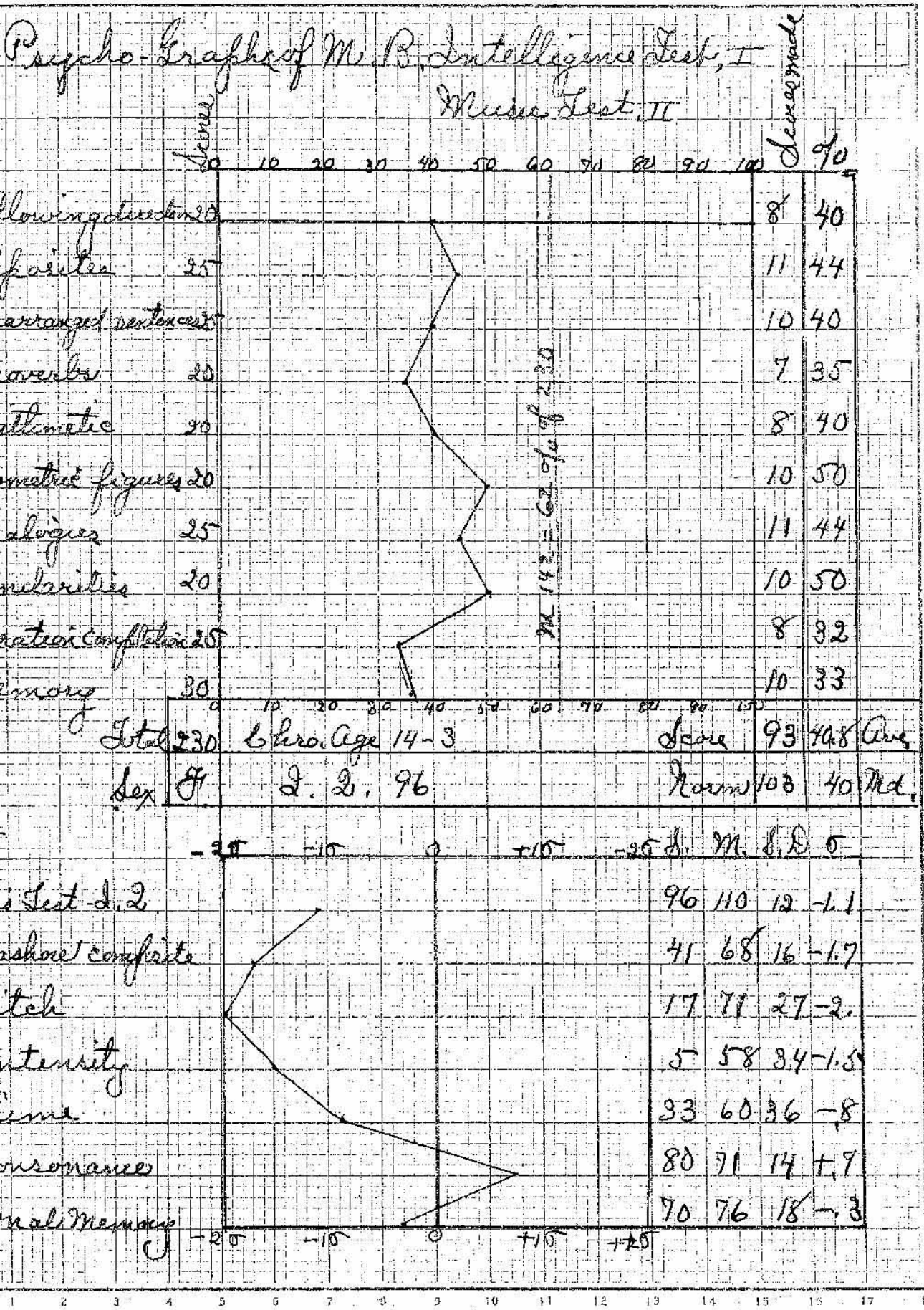

Psycho-Graphs of H. S. Intelligence Test I
Music Test II
Scores
Score made
%
0 10 20 30 40 50 60 70 80 90 100
...owing directions 20 12 60
...posites 25 12 48
...arranged sentences 25 13 52
...rbs 20 10 50
...ithmetic 20 8 40
...metric figures 20 10 50
...logies 25 11 44
...ilarities 20 10 50
...ation completion 25 15 60
...mory 30 10 33
M 111 250 = 62% of 250
Total Score 250 Chro. Age 15-6 Score 111 46% Ave.
Sex F. I. Q. 98 Norm 115 50 Med.
-20 -15 0 +10 +25 S. M. S.D. V.S
...s Test - I.Q. 98 110 12 -1
...ashore composite 65 68 16 -.2
...tch 93 71 27 +.8
...ntensity 40 58 34 -.5
...ime 29 60 36 -.8
...onsonance 65 71 14 -.4
...onal Memory 98 76 18 +1.2
-20 -10 0 +10 +25

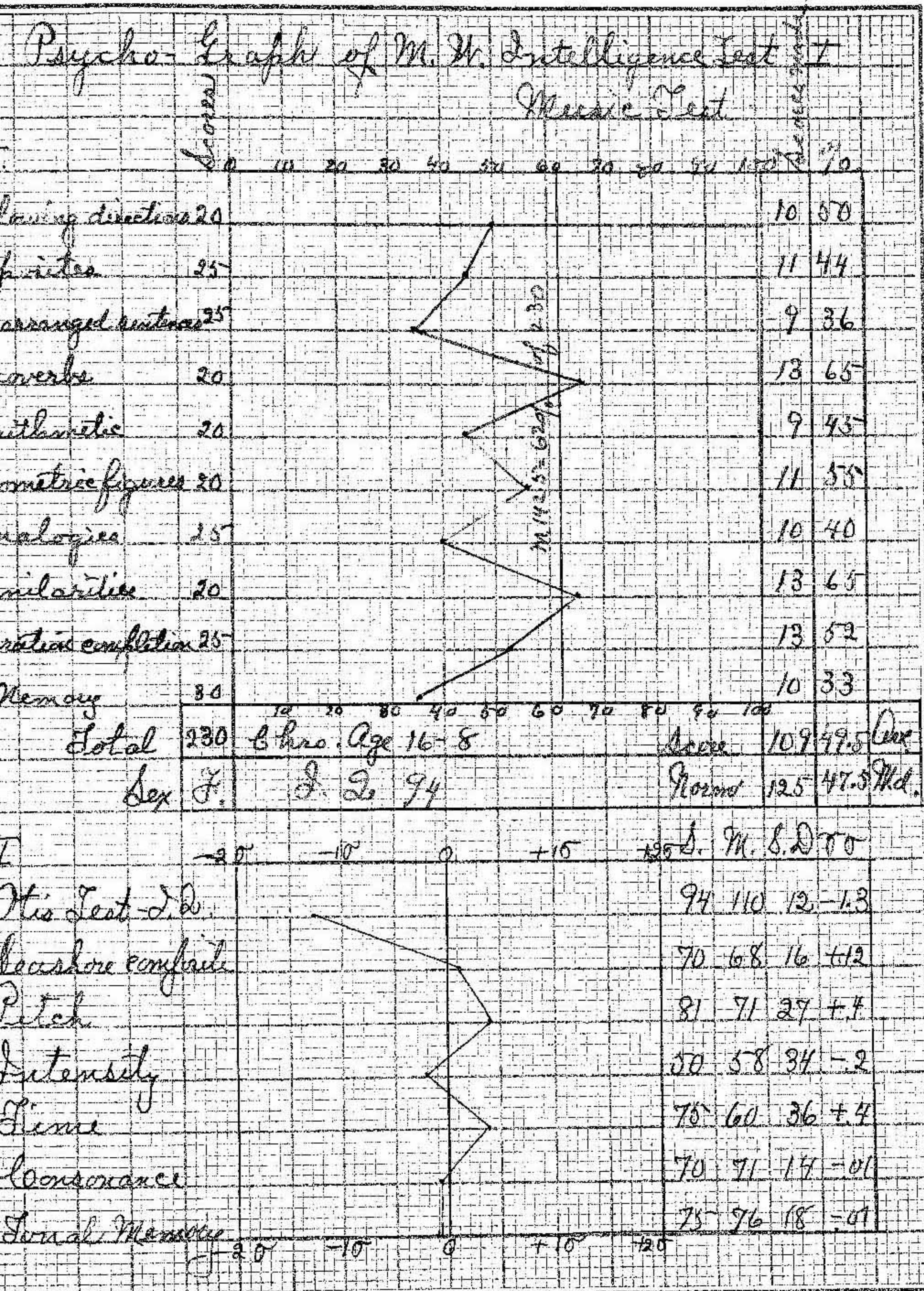
Psycho-Graphic of D. F. Intelligence Test II
Memory Test II

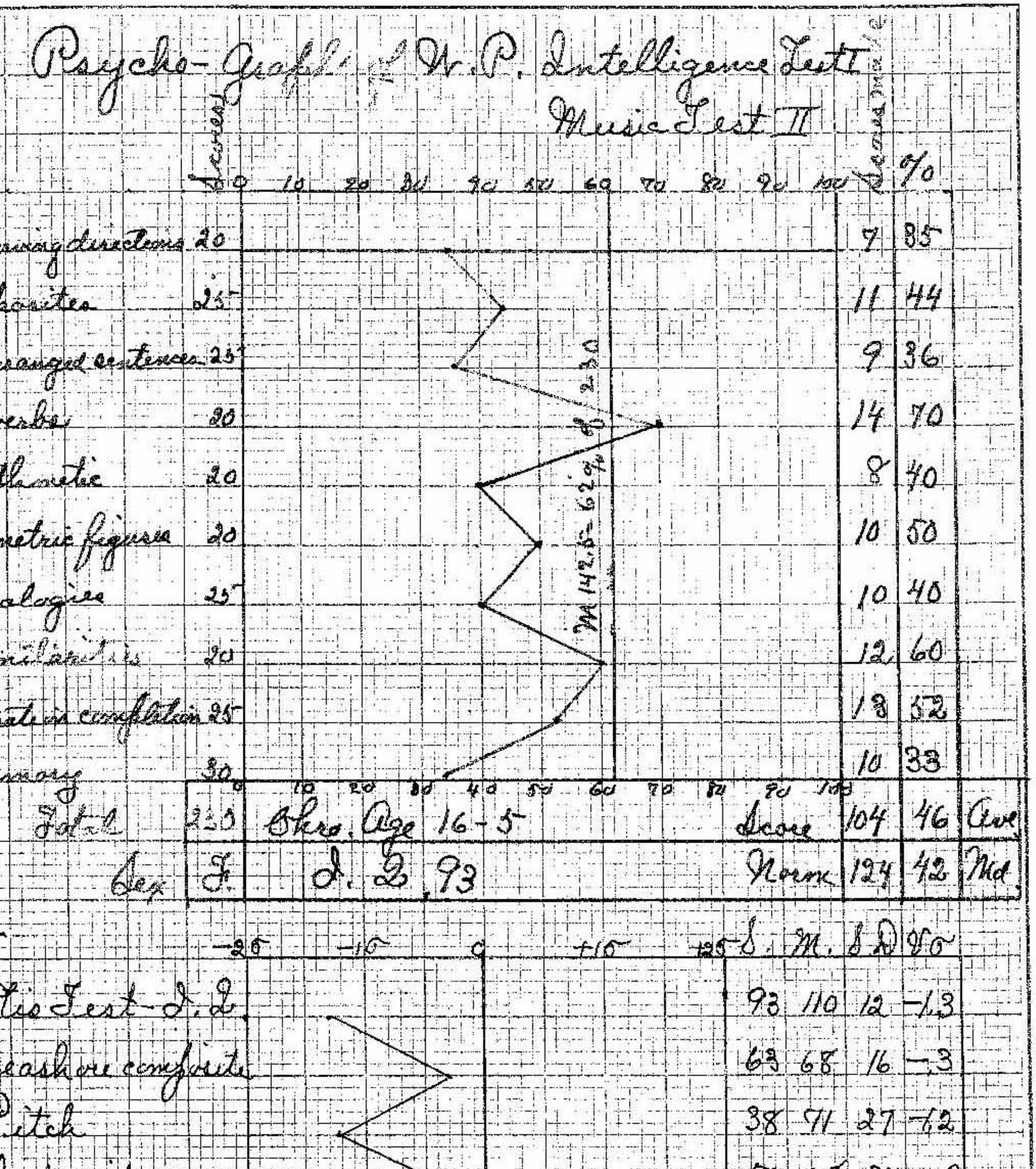


Psycho-Graphs of M.B. Intelligence Test, I

Music Test, II

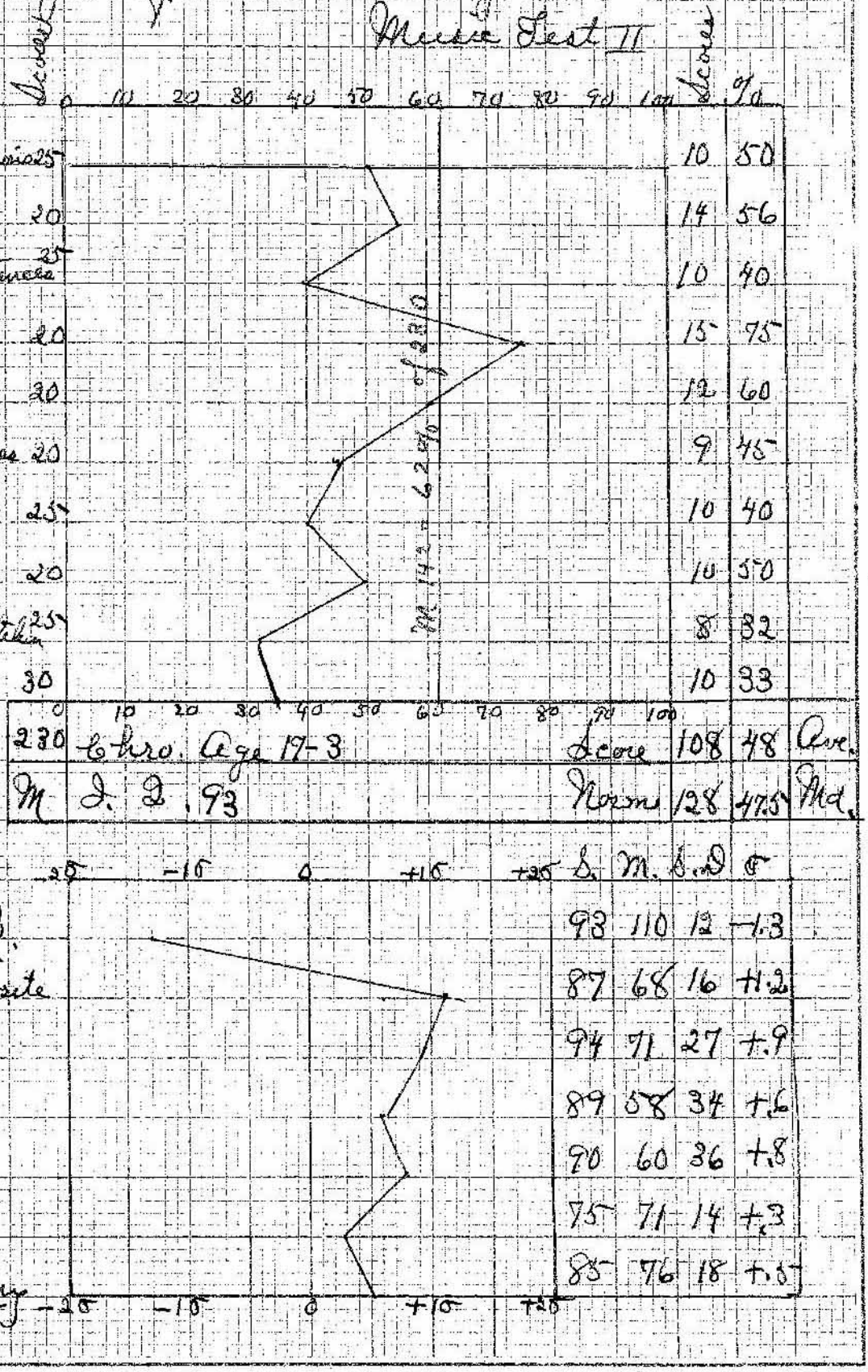


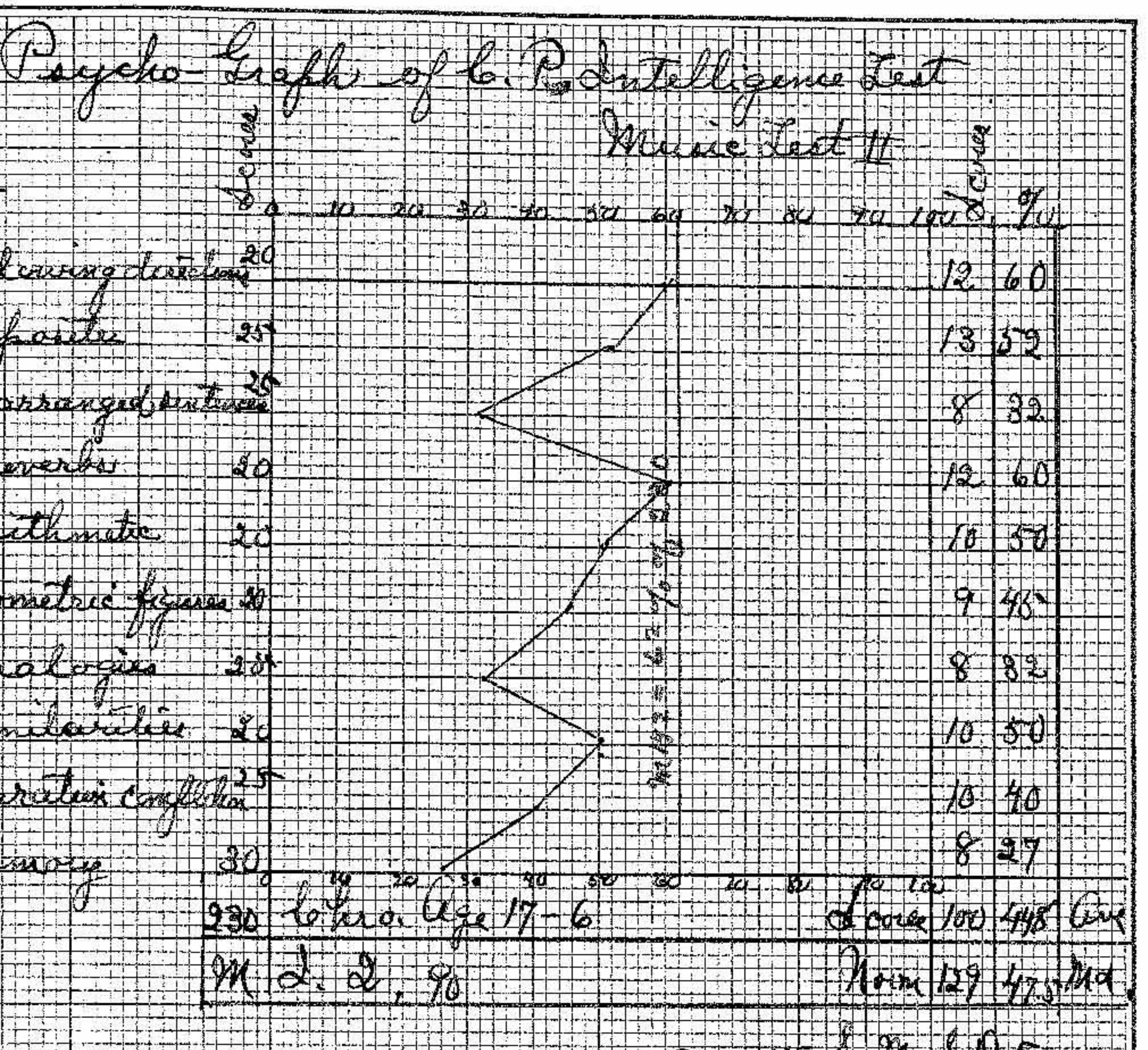

Psycho-Graph of M. W. Intelligence Test I
Music Test
Scores
0 10 20 30 40 50 60 70 80 90 100
Score
%
…lowing directions 20 10 50
…finites 25 11 44
…arranged sentences 25 9 36
…overbs 20 13 65
…ithmetic 20 9 45
…ometric figures 20 11 55
…alogies 25 10 40
…milarities 20 13 65
…rative completion 25 13 52
Memory 30 10 33
M 112.5 = 62% ± 3 SD
Total 230 Chro. Age 16-8 Score 109 49.5 Av.
Sex F. I. Q. 94 Norms 125 47.5 Md.
-20 -10 0 +10 +20 S. M. S.D. %
M. W. Test I.Q. 94 110 12 -1.3
Seashore composite 70 68 16 +.12
Pitch 81 71 27 +.4
Intensity 50 58 34 -.2
Time 75 60 36 +.4
Consonance 70 71 14 -.01
Tonal Memory 75 76 18 -.01
-20 -10 0 +10 +20


Psycho-Graph of W. P. Intelligence Test
Music Test II
Scores
0 10 20 30 40 50 60 70 80 90 100
Scores made
%
..wing directions 20 7 35
..posites 25 11 44
..ranged sentences 25 9 36
..erbs 20 14 70
..thmetic 20 8 40
..metric figures 20 10 50
..alogies 20 10 40
..milarities 20 12 60
..ate in completion 25 13 52
..mory 30 10 33
M 142.5 = 62% of 230
Total 230 Chro. Age 16-5 Score 104 46 Ave
Sex F. I. Q. 93 Norm 124 42 Md
-20 -10 0 +10 +20 S. M. S.D. V.S.
..tis Test I.Q. 93 110 12 -1.3
..eashore composite 63 68 16 -.3
Pitch 38 71 27 -1.2
Intensity 50 58 34 -.2
Time 90 60 36 +.8
Consonance 66 71 14 -.35
..onal Memory 70 76 18 -.3
-20 -10 0 +10 +20

Psycho-Graphs of A. K. Intelligence Test I

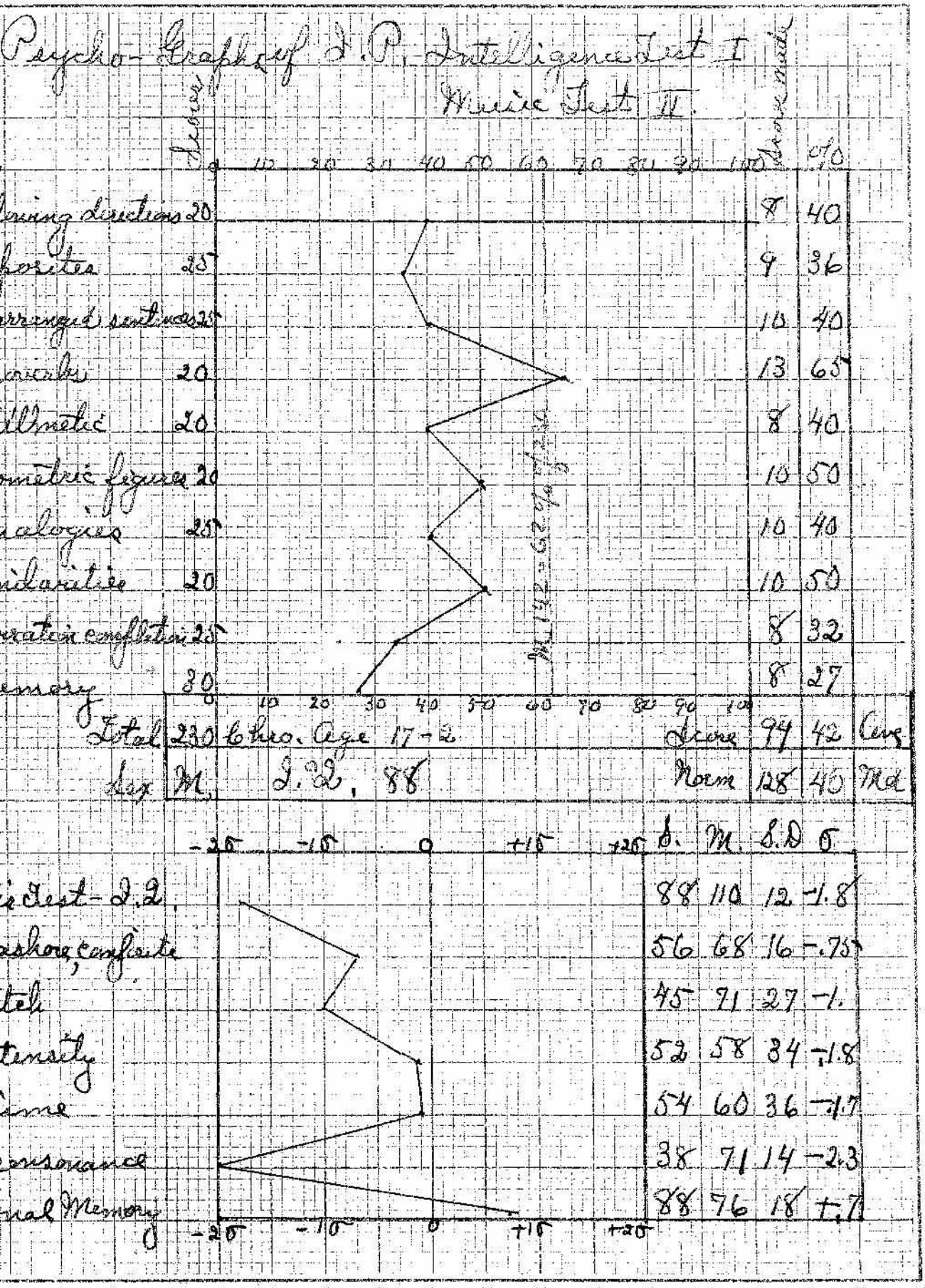
Medic Test II

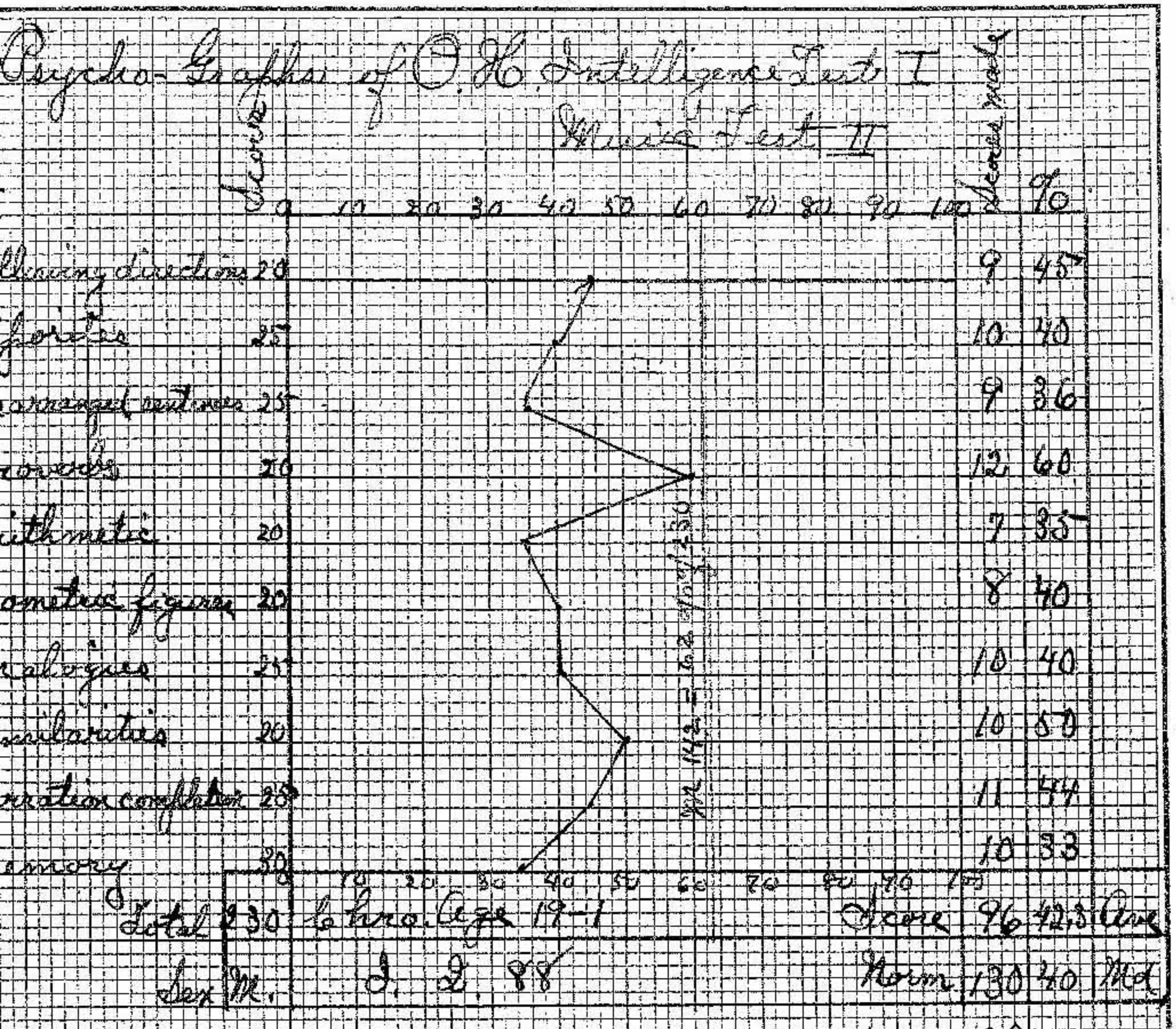



Psycho-Graph of C. P. Intelligence Test
Music Test II
0 10 20 30 40 50 60 70 80 90 100
12 60
13 52
8 32
12 60
10 50
9 45
8 32
10 50
10 40
8 27
Age 17-6
Score 100 44.8 Ave
Norm 129 47.5 Md
M. I. Q. 90
-25 -15 0 +15 +25
90 110 12 -1.6
47 68 16 -1.3
76 71 27 +.2
11 58 34 -1.4
29 60 36 -.8
60 71 14 -.8
57 76 18 -1.
-25 -15 0 +15 +25

Psycho-Graph of J. P. Intelligence Test I

Music Test II




Psycho-Graphs of O.H. Intelligence Test I
Illinois Test II
Score
0 10 20 30 40 50 60 70 80 90 100
Scores made
%
Following directions 20 9 45
Opposites 25 10 40
Disarranged sentences 25 9 36
Antonyms 20 12 60
Arithmetic 20 7 35
Geometric figures 20 8 40
Analogies 25 10 40
Similarities 20 10 50
Narration completion 25 11 44
Memory 30 10 33
Total 230 Chron. Age 19-1 Score 96 42.5 Ave
Sex M. I. Q. 88 Norm 130 40 Md
S. M. S.D. S
-25 -15 0 +15 +25
Illinois Test I2,
Seashore composite 88 110 12 -1.8
Pitch 50 68 16 -1.1
Intensity 23 71 27 -1.8
Time 73 58 34 +.4
Consonance 56 60 36 -.1
Tonal Memory 50 71 14 -1.5
48 76 18 -1.6
-25 -10 0 +15 +20

Correlations

Correlation is the degree of relationship between two traits. A numerical expression of relationship is called coefficient of correlation. Correlations were computed in this study in order to express in a simple way the numerical association of intelligence with the Seashore measures of musical talent and the composite music score. The Pearson Product Moment Method was the one used. One of the fundamental problems of this study is to present these correlations and evaluate them.

TABLE XI

CORRELATIONS OF MEASURES OF MUSICAL TALENT WITH I.Q'S

	r	P. E.
Pitch and I.Q's A low and sound correlation	.29	.07
Intensity and I.Q's A low and sound correlation	.24	.06
Time and I.Q's A low and unsound correlation	.18	.06
Consonance and IQ's A low and sound correlation	.30	.06
Tonal memory and I.Q's A low and unsound correlation	.20	.06
Composite and I.Q's A rather low and sound correlation	.36	.06

Taken as a whole the correlations are low and show that musical talent is associated with various degrees of intelligence.

A correlation of .28 with a P.E. of .06 was found

between tonal memory of the Seashore test and memory as measured by the Otis intelligence scale. This low correlation confirms the opinion that there are many kinds of memories, and a student with a good tonal memory might not have such a one for words.

Scatter Diagrams

The scatter diagrams which follow present graphically the correlations between the Seashore measures of musical talent and the IQ's. To make their meaning more clear a word of explanation is given.

Scatter diagrams are graphs which indicate paired measures in two abilities. On the following diagrams are plotted the I.Q's and the separate measures of the Seashore test to show their relationship. On the top line of the graph is the amount representing the I.Q's of the students. On the vertical line at the left are the amounts of the Seashore measure. The vertical line, perpendicular to the base line indicates the mean for the I. Q's. The horizontal line indicates the norm for the music measure. The standing of each individual in the two measures is indicated by a dot in the quadrant. Dots in quadrant A indicate the individuals are below the norm in I.Q. and above the norm in musical talent. In quadrant B are the individuals above the norm in both measures and in quadrant C are those below in both measures. In quadrant D are those above the norm in I.Q. but below in the musical talent measure.

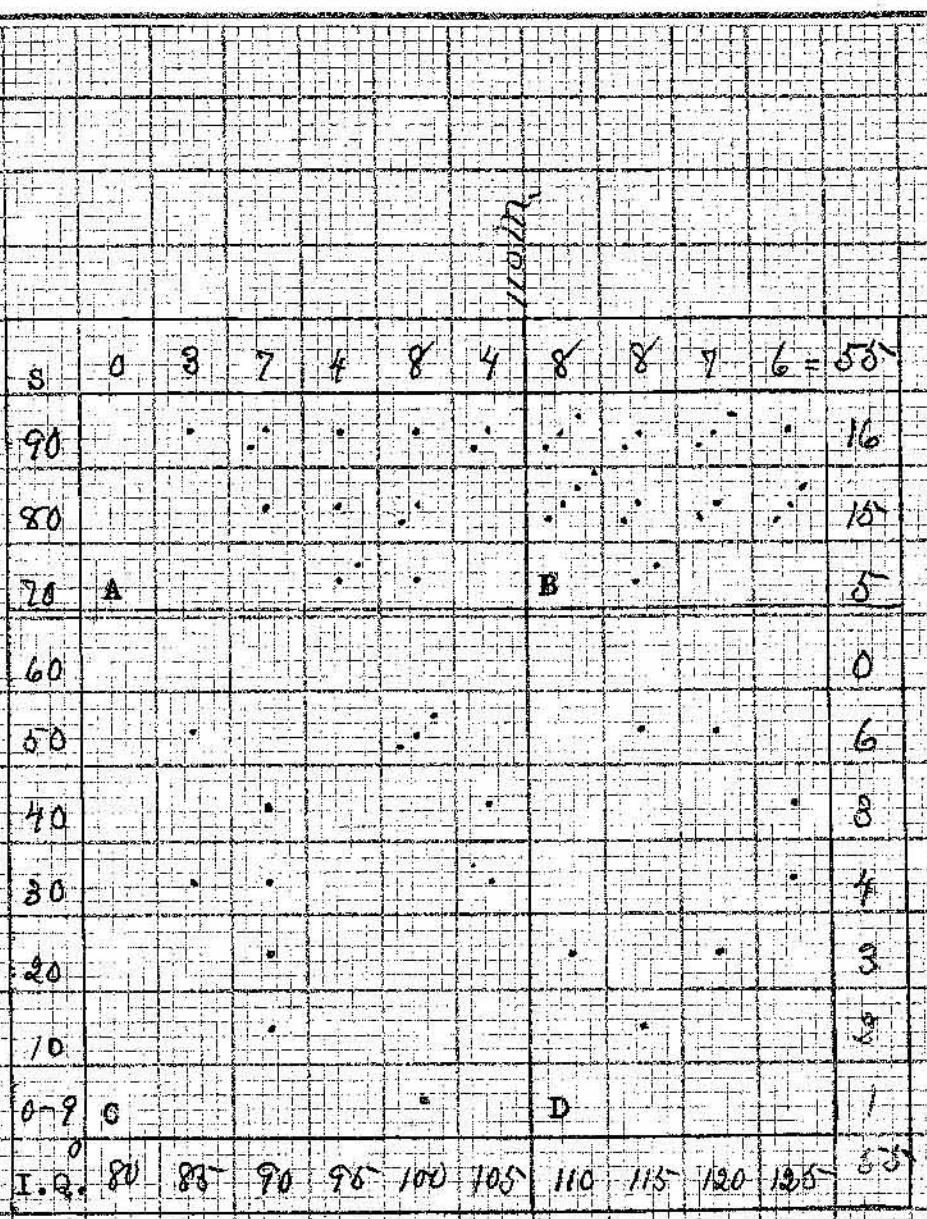


Fig. 3.-Diagram Indicating Relation between I.Q. and Scores in Pitch for 55 High School Students

A. 14 High in Pitch and Low in I.Q.
B. 22 High in Pitch and High in I.Q.
C. 12 Low in Pitch and Low in I.Q.
D. 7 Low in Pitch and High in I.Q.

r .29 P.E. $\pm$.07

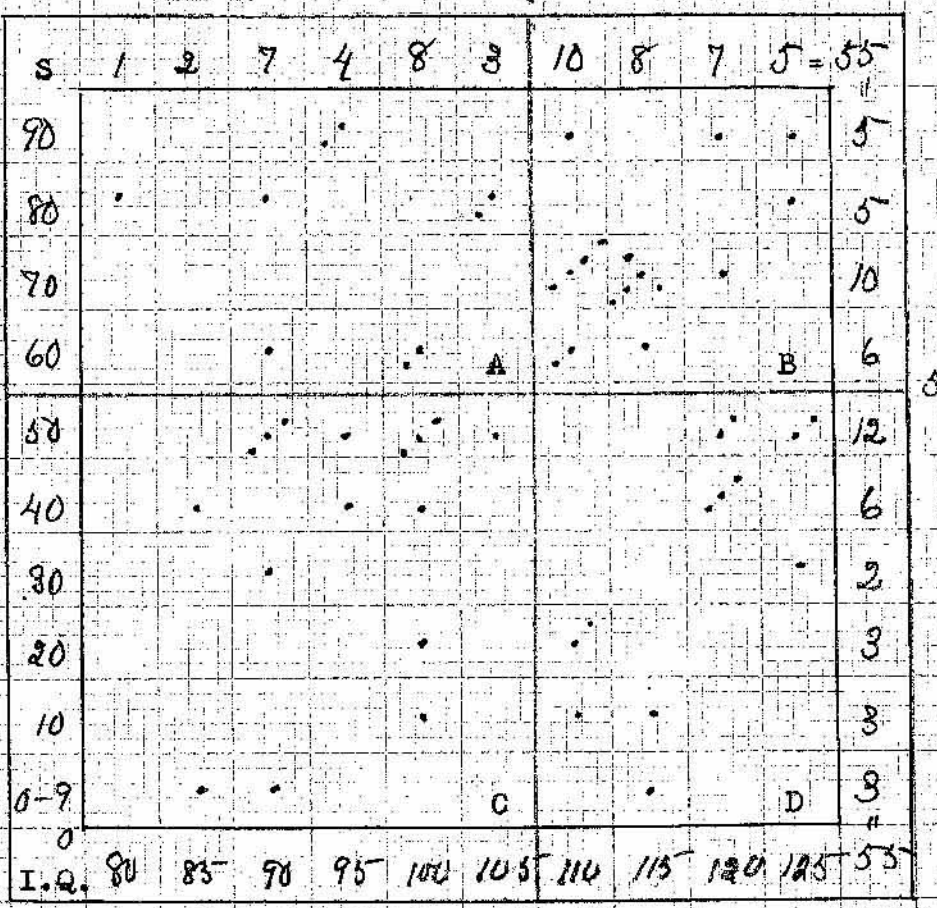


Fig.4.- Scatter Diagram Indicating Relation between I.Q. and Scores in Intensity for 55 High School Students

A. 9 High in Intensity and Low in I.Q.
B. 17 High in Intensity and High in I.Q.
C. 16 Low in Intensity and Low in I.Q.
D. 13 Low in Intensity and High in I.Q.

r .24 P.E. ±.06

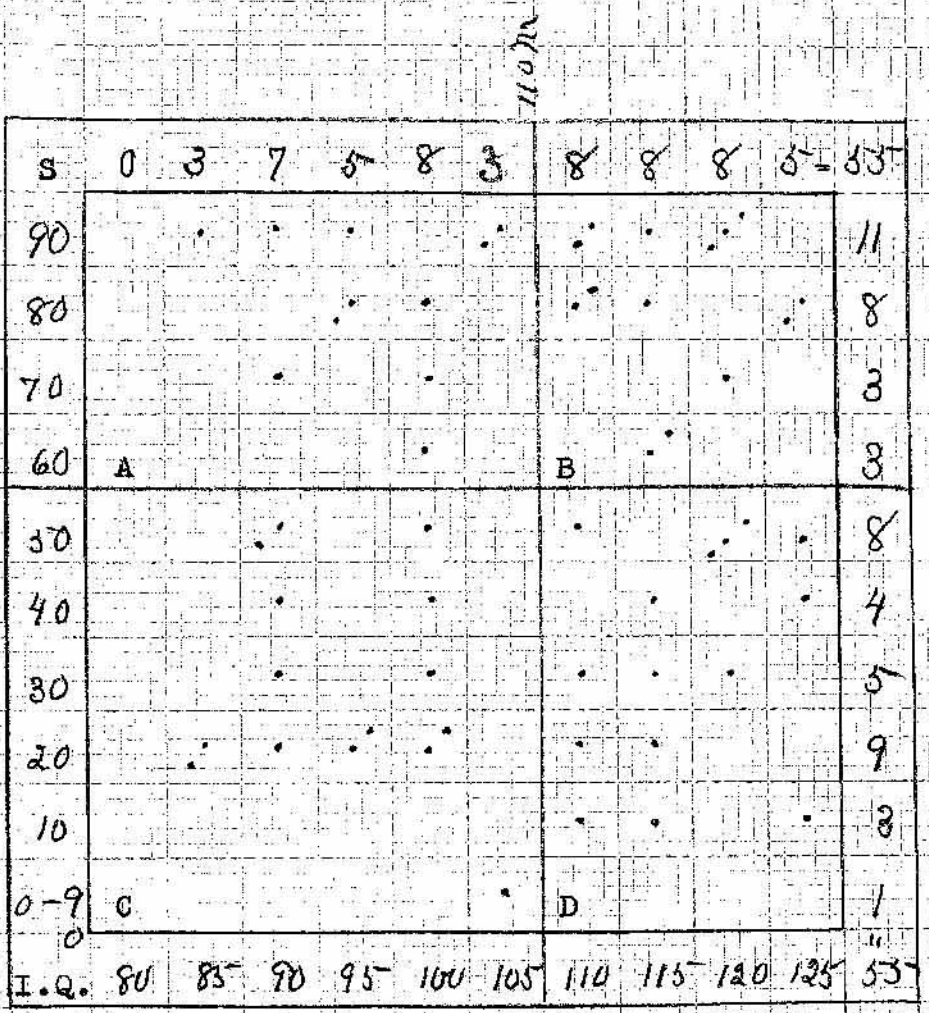


Fig.5.- Scatter Diagram Indicating Relation between I.Q. and Scores in Time for 55 High School Students

A. 11 High in Time and Low in I.Q.
B. 14 High in Time and High in I.Q.
C. 15 Low in Time and Low in I.Q.
D. 15 Low in Time and High in I.Q.

r .18 P.E. ± .06

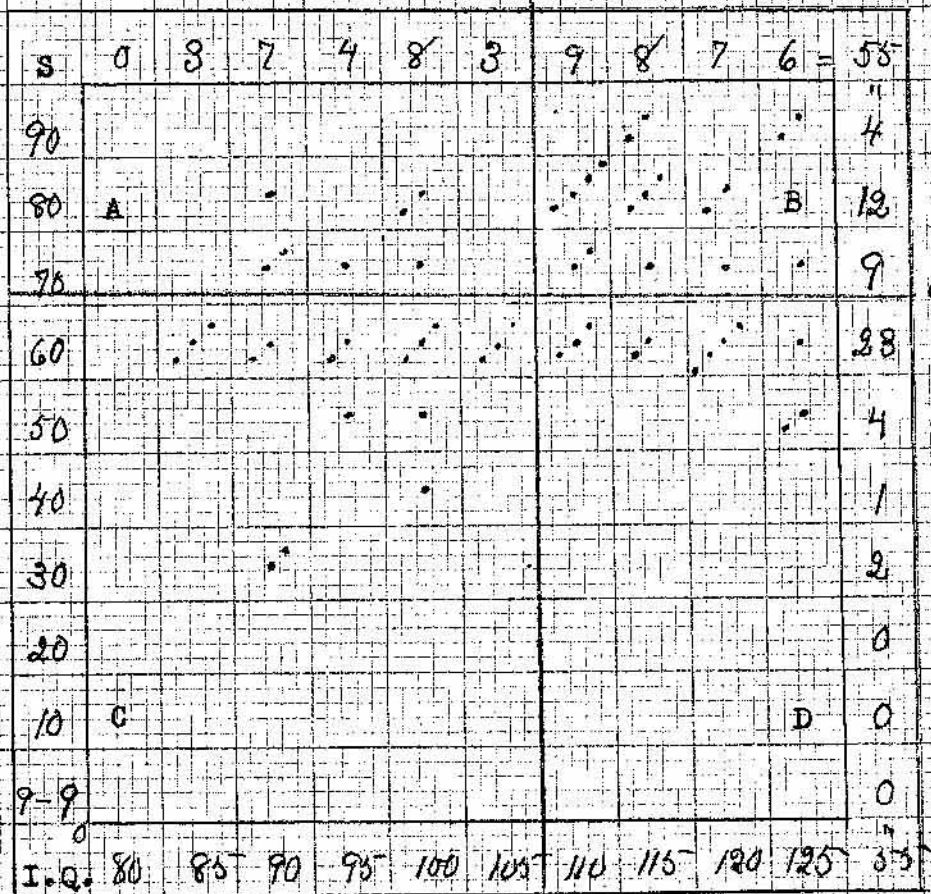


Fig.6.- Scatter Diagram Indicating Relation between I.Q. and Scores in Consonance for 55 High School Students

A. 7 High in Consonance and Low in I.Q.
B. 18 High in Consonance and High in I.Q.
C. 18 Low in Consonance and Low in I.Q.
D. 12 Low in Consonance and High in I.Q.

r .30 P.E. ±.06

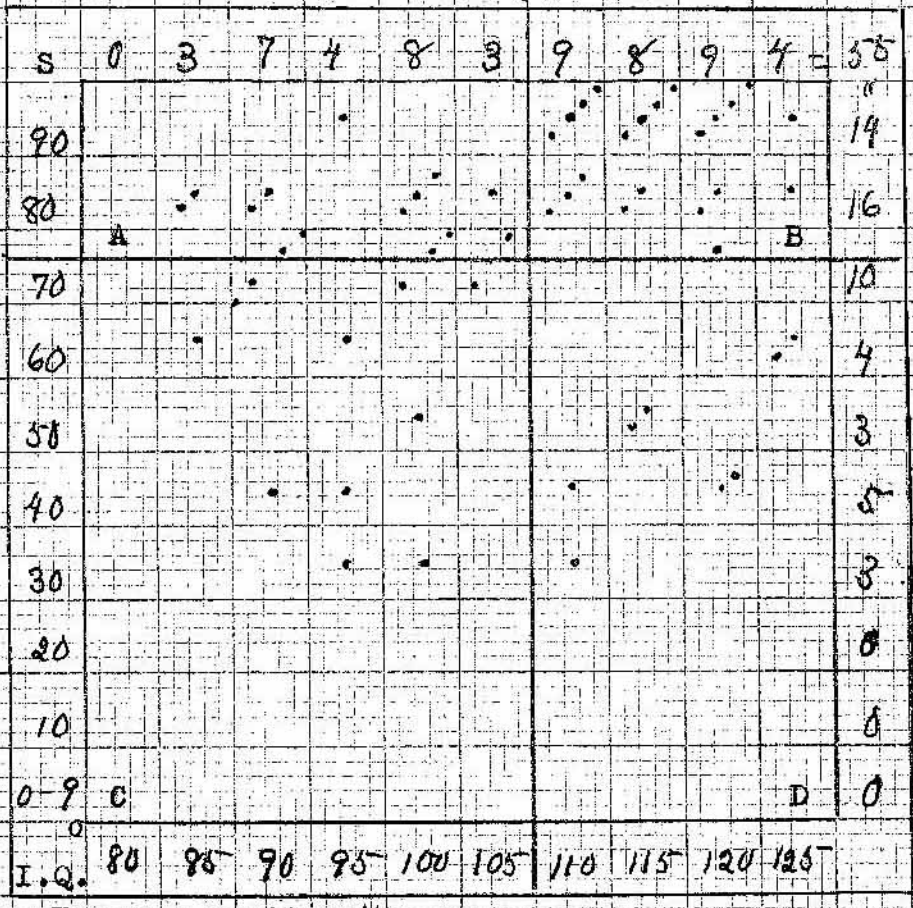


Fig. 7.- Scatter Diagram Indicating Relation between I.Q. and Scores in Tonal Memory for 55 High School Students

A. 14 High in Memory and Low in I.Q.
B. 22 High in Memory and High in I.Q.
C. 11 Low in Memory and Low in I.Q.
D. 8 Low in Memory and High in I.Q.

r .20 P.E. ±.06

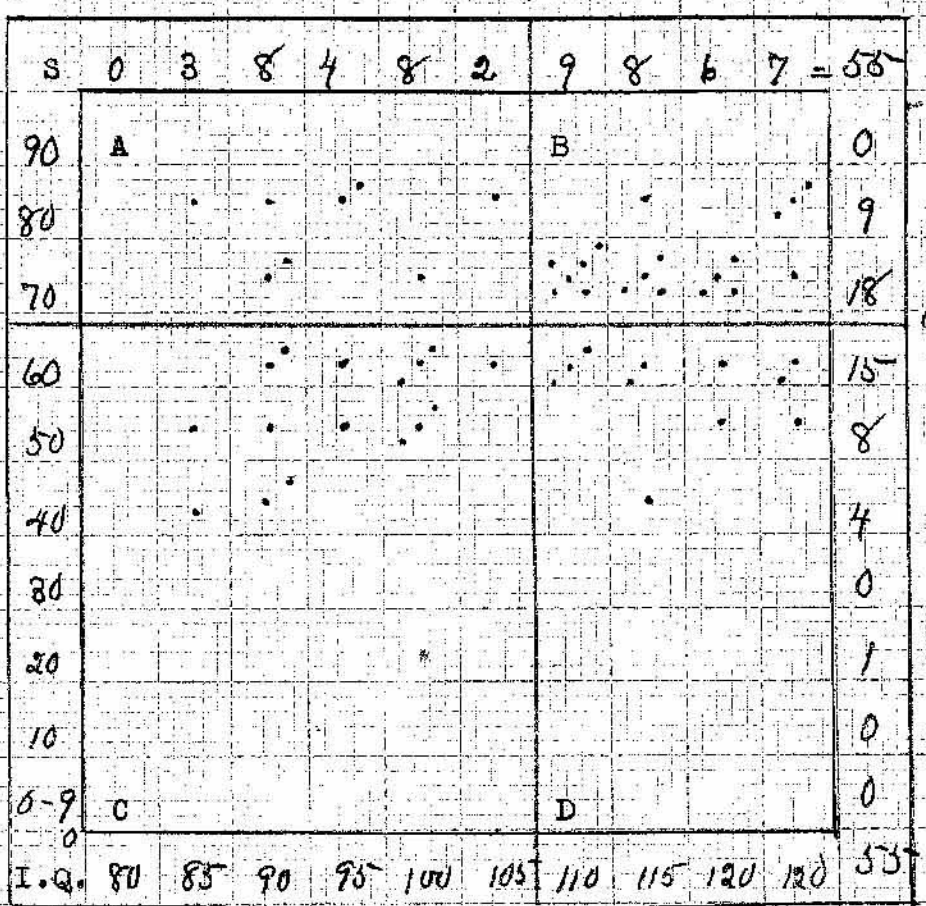


Fig.8.- Scatter diagram Indicating Relation between I.Q. and Scores in Composite for 55 High School Students

A. 8 High in Composite and Low in I.Q.
B. 19 High in Composite and High in I.Q.
C. 17 Low in Composite and Low in I.Q.
D. 11 Low in Composite and High in I.Q.

r .36 P.E. ±.06

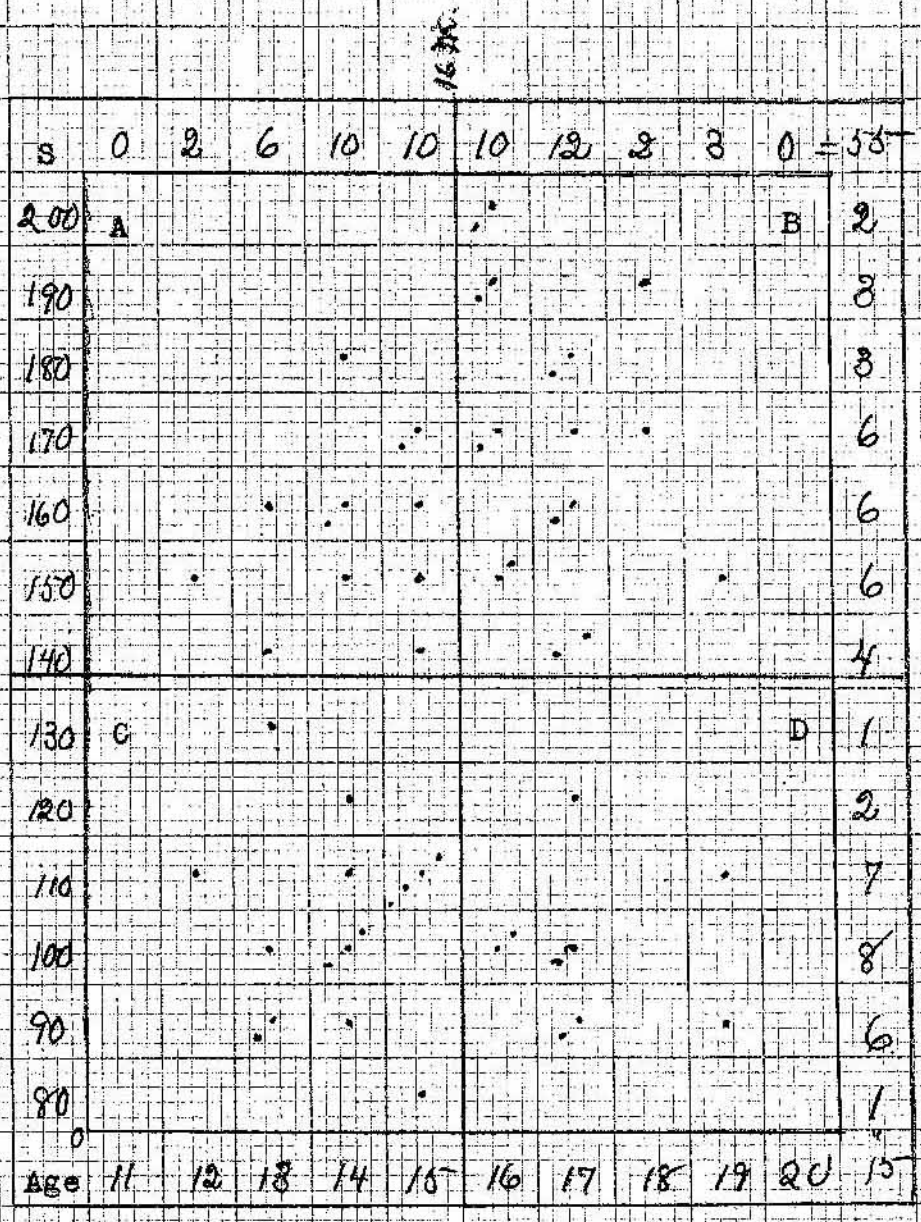


Fig. 9.- Scatter Diagram Indicating Relation between Otis Scores and Ages for 55 High School Students

A. 12 High Scores and Low Ages
B. 18 High Scores and High Ages
C. 16 Low Scores and Low Ages
D. 9 Low Scores and High Ages

r .24 P.E.$_r$.07

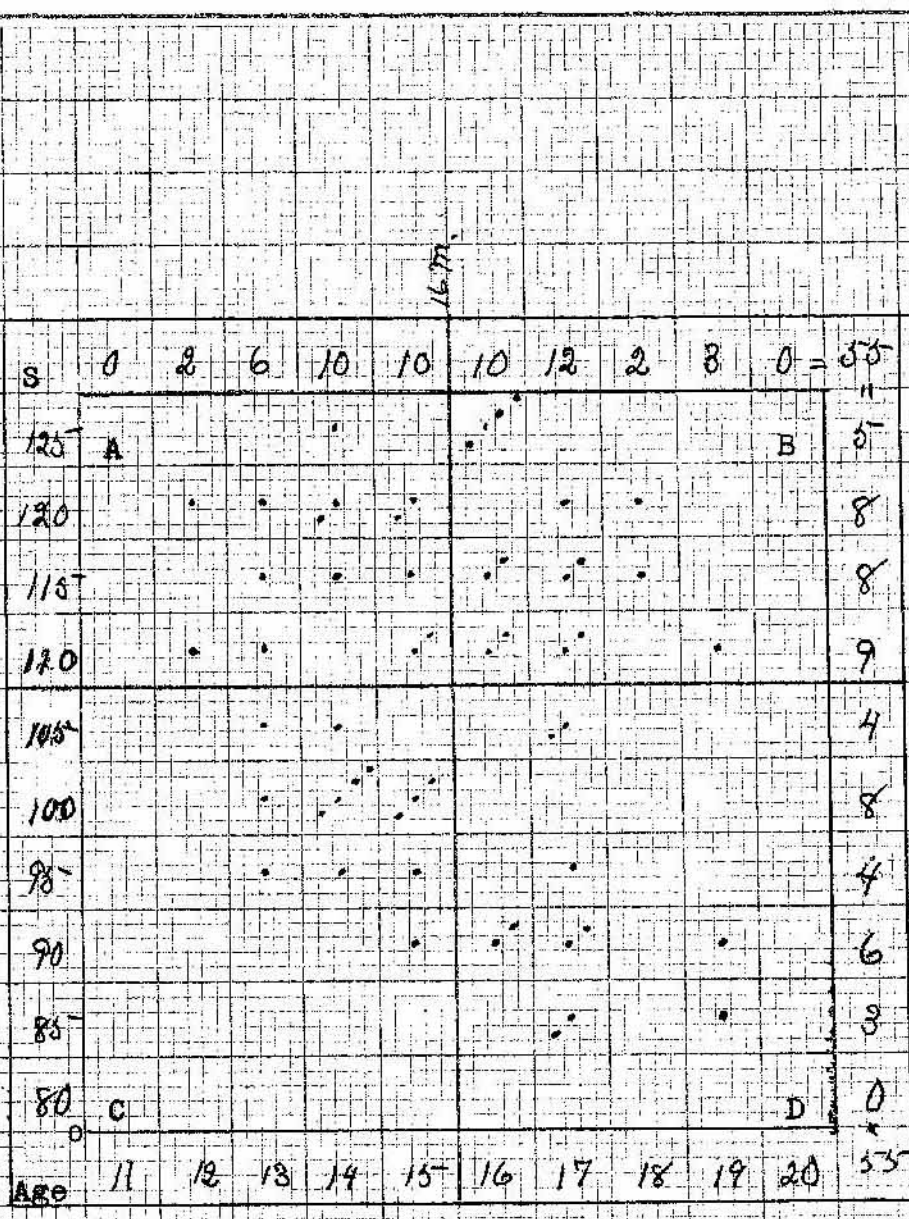


Fig. 10.-Scatter Diagram Indicating Relation between I.Q. and Ages for 55 High School Students

A. 14 High I.Q. and Low Ages
B. 16 High I.Q. and High Ages
C. 14 Low I.Q. and Low Ages
D. 11 Low I.Q. and High Ages

r .014 P.E.r .013

Summary of the Findings of the Scatter Diagrams

Scatter diagram of pitch scores and I.Q's
- A. 14 high in pitch scores and low in I.Q
- B. 22 high in pitch scores and high in I.Q
- C. 12 low in pitch scores and low in I.Q
- D. 7 low in pitch scores and high in I.Q

Mean of pitch scores - 71
Mean of I.Q's -110
r .29 P.E. .07

Scatter diagram of intensity scores and I.Q's
- A. 9 high in intensity scores and low in I.Q
- B. 17 high in intensity scores and high in I.Q
- C. 16 low in intensity scores and low in I.Q
- D. 13 low in intensity scores and high in I.Q

Mean of intensity scores - 58
Mean of I.Q's - 110
r. 24 P.E. .06

Scatter diagram of time scores and I.Q's
- A. 11 high in time scores and low in I.Q
- B. 14 high in time scores and high in I.Q
- C. 15 low in time scores and low in I.Q
- D. 15 low in time scores and high in I.Q

Mean of time scores - 60
Mean of I.Q's - 110
r .18 P.E. .06

Scatter diagram of consonance scores and I.Q's
- A. 7 high in consonance scores and low in I.Q
- B. 18 high in consonance scores and high in I.Q
- C. 18 low in consonance scores and low in I.Q.
- D. 12 low in consonance scores and high in I.Q

Mean of consonance scores - 71
Mean of I.Q's - 110
r .30 P.E. .06

Scatter diagram of tonal memory scores and I.Q's
- A. 14 high in memory scores and low in I.Q
- B. 22 high in memory scores and high in I.Q
- C. 11 low in memory scores and low in I.Q
- D. 8 low in memory scores and high in I.Q

Mean of memory scores - 76
Mean of I.Q's - 110
r .20 P.E. .06

Scatter diagram of composite scores and I.Q's
- A. 8 high in composite scores and low in I.Q
- B. 19 high in composite scores and high in I.Q
- C. 17 low in composite scores and low I.Q
- D. 11 low in composite scores and high in I.Q

Mean of composite scores - 68
Mean of I.Q's - 110
r .36 P.E. .06

The follow-up blank which was sent recently to the subjects of this study resulted in the information which is summed up in Table XII

TABLE XII

SUMMARY OF FOLLOW-UP OF SUBJECTS

College attendance	Boys	- 16
	Girls	- 14
	Total	- 30
Participation in musical activities in college and community		
	Church choir	- 11
	Orchestra	- 11
	Chorus	- 8
	In homes	- 8
	Bands	- 8
Have earned some money by music		- 10
Occupations represented by the Subjects		
	Homemakers and miscellaneous	--16
	In college	- 10
	Teachers	- 5
	Farmers	- 4
	Merchants	- 4
	Musicians	- 4
	Mechanics	- 3
	Office help	- 3
	No occupation	- 2
	Preacher	- 1
	Doctor	- 1
	Lawyer	- 1
	Dentist	- 1

It may be seen from this data that music has functioned considerably in the college and community life of the subjects of this study.

When the writer first became interested in the problem of this thesis, she sent inquiries to a number of school systems to find what they were doing to classify and interest students in music. The information blanks sent to thirty-five supervisors and principals were answered by twenty-nine with the results as given in Table XIII.

TABLE XIII

SUMMARY OF INFORMATION BLANKS TO SCHOOL SYSTEMS

25 per cent	made music elective
75 per cent	made music extra-curricular, open to good academic students
40 per cent	used intelligence tests for all pupils
60 per cent	used no intelligence tests
10 per cent	used tests to discover musical talent
90 per cent	used no tests, but noted interest in music
70 per cent	gave some credit for musical activities
5 per cent	used some sort of follow-up of music interest
20 per cent	of students expected to carry on music after graduation.

The credit offered varied from one-fourth to two units for graduation.

The number of pupils who expected to carry on music after graduation was mere guess work by the supervisor or principal.

It may be seen that few schools offer music to all students who are talented in music without taking into consideration the academic standing. Also, the use of tests to discover musical talent is not common.

CHAPTER V

CONCLUSIONS

Conclusions

As a result of the findings of this problem we conclude that musical talent is not associated with any one level of intelligence, either the high or the low, as is generally thought, but is found with various degrees of intelligence. This conclusion is drawn from a study of the psycho-graphs of the fifty-five students, and of the correlations of their measures of musical talent with their I.Q's.

The psycho-graphs proved very definitely that musical talent is associated with various degrees of intelligence when the following combinations, and many others were revealed:

High intelligence with high musical talent
High intelligence with average musical talent
High intelligence with low musical talent
Average intelligence with high musical talent
Average intelligence with average musical talent
Average intelligence with low musical talent
Low intelligence with high musical talent
Low intelligence with average musical talent
Low intelligence with low musical talent

From the correlations between the Seashore measures and the I.Q's we found that musical talent and intelligence have no well marked relation. All of the correlations may be considered low, or moderate, if we use the opinions of the following experts:- Crawford says, "For practical purposes correlations below .20 are ordinarily considered

negligible, .20 to .40 are low."[1] Rugg says,"A correlation is negligible or indifferent when r is less than .15 to .20, present but low when .15, .20 or .35 or .40."[2] The highest correlation found in this study was .36 between the composite music scores and the I.Q's, which is a moderate or even low one. Low correlations were also found between each of the separate measures of musical talent and intelligence as follows: pitch .29, intensity .24, time .18, consonance .30 and tonal memory .20. These correlations confirm the conclusion that musical talent and intelligence are not closely associated.

The widely scattered relationships between musical talent and intelligence was further illustrated by the scatter diagrams which showed that musical capacity and intelligence are variously associated.

Otis says, "One of the chief purposes of correlation is for use as a measure of the degree to which one trait can be predicted from another."[3] Since we found that the

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1 Claude C. Crawford, The Technique of Research in Education, p.229.

2 H. O. Rugg, Statistical Methods Applied to Education, p.25.

3 Arthur A Otis, Statistical Methods in Educational Measurements, p.217.

degree of correlation of intelligence and talent is so slight we conclude that intelligence may not be used as a basis of prediction for musical talent. This low correlation proves that high standing in one measure will not necessarily indicate high standing in the other. The individual who ranks just above or below the mean in intelligence may not therefore rank in the same way in musical capacity.

In the study of the psycho-graphs it was discovered that there are some students who should be discouraged from musical participation no matter what their intelligence, as their talent scores are so low their failure in music would be almost certain. Others should be encouraged regardless of intelligence since their scores are high.

It was found as a result of this study that the talent of a child in this group does not depend on his age; that talent does not depend on classification in school; that there are some very intellectual children who have very little capacity for music; that some students of ordinary or even low intelligence have musical talent; that a child with average musical talent is one who may rank high in some talents and low in others; and "that talent is a gift bestowed very unequally upon individuals."[4]

---

[4] C. E. Seashore, Psychology of Musical Talent, p.8.

We further conclude from the findings of this study that children coming from homes with few educational and musical advantages have less chance to develop their talents than those from better homes, but the talent does not depend on the social status of the parents. The occupation of the parents also does not affect the musical talents of the children but it may affect the chances for accomplishment.

As a result of the measures of musical talent tests we found that the group tested is about average in musical talent. They were rather widely scattered in the ability to discriminate in intensity, and time, and were ill-balanced in the sense of pitch, but were quite homogeneous in the consonance and memory tests.

The intelligence test showed also that they were of average high school intelligence.

A check of the informal test with the Seashore test results, indicates that the Seashore tests have considerable predictive value and could be used as a means of deciding which students should be permitted to enter music courses.

From the above conclusions we believe that we have determined there is no definite relationship between musical talent and various degrees of intelligence.

Educational implications

Since the results of this study have shown that musical talent may be associated with various degrees of intelligence, it is hoped that the knowledge may be used with some benefit by schools, teachers and pupils.

It should discourage the practice that only those students who make good grades in academic subjects be permitted to take music. A pupil should be admitted to musical organizations on his musical capacity and not on his I. Q or rating in other subjects. Teachers should make it possible for all students with talent to be in the musical organizations regardless of intelligence and give them every chance to succeed.

The classification of students should depend on talent and ability tests given by teachers, and should be used to place children in organizations most suited to their talent.

Schools should discover the talented child by scientific and not by the 'hit and miss' or 'trial and error' methods. Many exceptional children are given their first chance to demonstrate their musical ability after being discovered through tests.

Students of average or even low intelligence who have been denied musical expression should be admitted to organizations if they have musical talent. At present, schools are not alive to their obligations to the school-

dull child who is music-bright.

The result of this study showed that high intelligence is not necessarily an index to musical capacity, so the bright child should not be urged to take music if he has no capacity for it. On the other hand a child who is highly intelligent must be encouraged if he has musical talent.

All pupils with low musical talent should be discouraged from being in musical organizations, but should be given other means of musical experience.

The results of tests should be made the basis for assignment of students to parts in glee clubs and orchestras. The test results may be used also, to predict the degree of proficiency to be expected from each.

Other subjects are depending on objective measures and scientific treatment, why not music? Music should be made purposive to save time and effort of students and teachers. Through tests a school may reduce the amount of changes in enrollment by discovering the unmusical, the moderately musical and the very musical and give each the musical activity to fit his capacity. Testing should help predict success and advancement and indicate probable musical careers. Tests can help teachers keep the child always at his level of achievement. Tests can supplement teachers judgment and give each child a fair

chance. The impartial objective records of accomplishment may be used as a basis of marks instead of depending on what we think the child is capable of doing. So, we may use talent and ability tests for guidance, encouragement and classification of all children in music.

Through data obtained for this study it was found that music does function in later life. Schools must recognize and encourage the various capacities of children in music and give each child some opportunity to develop along the line best suited to his ability, so that it will carry over into life after school days and be of value for leisure time, vocational purposes or social service and participation. Few schools are making any effort to find or follow-up musical talent of students, although educators feel the need for it as is shown by excerpts and quotations in this thesis.

It is hoped that music will be made a regular school subject open to those who elect it because of talent as shown by tests; and that continuance in organizations will depend only on making good in them; and that all children will be given music commensurate with their talents.

SUMMARY

"A Study of the Psycho-graphs of Fifty-five High School Students to Determine the Relationship between Musical Talent and Various Degrees of Intelligence".

Music has always played an important part in the life of the race, but it has been incidental rather than purposive. This incidental process meant that only those persons who had extreme talent became musicians. Frequently these persons were either highly intellectual or at the other extremity of mentality, so the belief arose that musical talent was associated with great intelligence or that a musician was among the most un-intelligent of men.

Recently, the purposive element has entered the field of music and educators and teachers are becoming interested in scientifically predicting success to those who study music, and save time and effort for others who would not be successful because of lack of talent.

In many school systems, however, entrance to musical organizations depends on the academic standing or the I. Q. of the students instead of the musical ability. It is believed that these students can excel in any line. Because of this, many musical students of low or average intelligence are excluded from musical organizations.

The writer believed there was need of a study to

determine what relation exists between musical talent and various degrees of intelligence, so that teachers might have some standard to follow in determining the qualifications for entrance to musical organizations. A group of unselected mid-western high school students were used as subjects of a study to determine this relationship.

Since previous studies made of the predictive value of the Seashore talent tests seemed to show they could be depended upon in the matter of selecting musical talent, they were given to the students. A musical ability test devised by the writer was also used to further seek the talented individuals. The Otis intelligence scale was administered to test their mental ability. In addition to these tests, information blanks were used to find the social status and educational and musical advantages of each student.

The I.Q's of the students were found to range from 126 to 88 with a mean at 110 and a S. D. of 12. These results indicated that the group was of average high school intelligence.

The findings of the Seashore tests indicated that the students were widely scattered in the measures of intensity and time, were ill-balanced in pitch, but were quite homogeneous in the consonance and memory tests. A composite score of all of the measures of musical talent had a high score of 87 and a low one of 23, with

the mean at 68. These results showed that the students were also average in musical capacity.

The Seashore measures were correlated with the I.Q's and showed the following relationship:- pitch r .29, P. E. .07; intensity r .24, P. E. .06; time r .18, P. E. .06; consonance r .30, P. E. .06; tonal memory r .20, P. E. .06 and composite r .36, P. E. .06. These low, or average correlations proved that musical talent and intelligence are not closely related.

Scatter diagrams showing these results, graphically proved the same.

A psycho-graph was made for each of the students on which his musical talent scores and I. Q. were plotted in terms of the S. D. The conclusions drawn as a result of the study of the psycho-graphs was that musical talent is not associated with any one level of intelligence, either the high or the low, but is found with various degrees of intelligence.

The writer concluded that academic standing or the I. Q. of a student should not be used as an index to his musical capacity, but admittance to musical organizations should depend on musical talent as judged by musical talent and ability tests, and music should be given to all children regardless of degree of intelligence if they had any capacity for it.

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INFORMATION BLANK TO PUPIL

Name -------
Date -------
Classification in school -------
Date of birth -------
Place of birth -------
Nationality of father -------
Nationality of mother -------
Occupation of parents -------
Did your father attend high school? ------- Graduate? ------
Did your mother attend high school? ------- Graduate? ------
Did your father attend college? ------- Graduate? ------
Did your mother attend college? ------- Graduate? ------
Name the musical instruments in your home -------
Who play these instruments -------
Whom in your family sings -------
Do you sing or play together in your home? -------
At what place do you hear good music? -------
Number of years study on piano -------
Number of years study on any other instrument or voice ------
What musical instrument do you like best? -------
What school subject do you like besides music? -------

INFORMATION BLANK TO MUSIC SUPERVISOR

Name of school -------
Place -------
Date -------

1. Do you use intelligence tests to find the mental status of students -------
2. Do you use any tests to discover musical talent -------
3. May anyone having musical ability be in your musical organizations -------
4. Is high intelligence a prerequisite for music classes --
5. Are good marks required in academic subjects in order to stay in music classes --------
6. Do you give credit for musical activities -------
7. Give the number of seniors who expect to continue music after graduation -------
8. Do you use a follow-up of music students after graduation-

Manual *of* Instructions *and* Interpretations *for* Measures *of* Musical Talent

By C. E. SEASHORE

State University *of* Iowa
Standard Tests

C. H. STOELTING CO.
MANUFACTURERS-PUBLISHERS-IMPORTERS-EXPORTERS
PSYCHOLOGICAL AND PHYSIOLOGICAL
APPARATUS AND SUPPLIES
454 NORTH HOWARD AVENUE
CHICAGO, ILL., U. S. A.

NATURE AND USE OF THE MEASURES OF MUSICAL TALENT

Just as the great musicians live before us now in the wonderful reproduction of the modern phonograph, so the intricate experiments of the psychological laboratory may now be popularized by the faithful reproduction of the sounds of laboratory instruments and their scientific presentation. As we may hear the prima donna sing in school and home, so we can command the scientific means for aid in the detection, analysis and rating of musical talents.

Musical talents vary enormously both in degree and kind. Many of these capacities can be measured before musical education has been begun. It is of inestimable value for the art of music that these capacities and traits should be discovered early and be analyzed for the purpose of guidance in musical education. The material presented in these records furnishes measures for six of the most fundamental and essential capacities for the hearing of music.

These measures of musical talent comply with the following conditions: they are based on a thorough analysis of musical talent; they are standardized for content that does not need to be changed; they give quantitative results which may be verified to a high degree of certainty; they are simple and as nearly self-operating as possible; they are adapted for group measurements; they take into account practice, training, age, and intelligence; they have a two-fold value in the concrete information furnished, and in the training and pleasure gained from the critical hearing of musical elements.

These measures are adapted primarily for use in the regular music course and for special surveys in the public schools. They should be used first in the fifth grade, because this is the earliest age at which group measurements can be made satisfactorily, and it is early enough to make serious arrangements for a musical education. They should then be repeated in the eighth grade, just before the great sorting of children into the vocations of practical life and elective courses in the high school.

They furnish also material for scientific entertainment in the home. Taking one test each evening, this outfit provides material for six evenings of delightful entertainment in the form of a competitive game.

For teaching purposes the tests furnish excellent class experiments in elementary psychology. If the performance of each of these tests is linked with the corresponding chapter of reading in the "Psychology of Musical Talent," this will furnish six days of intensive training in the measurement of individual differences. These class experiments, with required readings, will also fill a great need in the theoretical instruction in the music school. Such use of them will not conflict with the previous use in the entrance examinations.

The instructions herewith furnished are stated with reference to the school room. They may be readily adapted to other situations.

The Material Needed

All the test material for this series is contained on the six double-disc records. The measures are so adjusted as to be easy enough in parts for the poorest listener, and difficult enough in parts for the best listener. A measure consists in the playing of both sides of a disc. The playing of one side takes from four to five minutes. The material is so ordered as to regulate natural periods for the flow of attention.

The discs may be played on any good standard phonograph, provided the instrument is in good, smooth-running condition, properly set, balanced, and lubricated. A first-class phonograph, well regulated, runs with an error of less than one-thousandth of a second per revolution. Care about winding is necessary; it is well to give the crank a few turns during the interruption at the middle of the record. The instrument should be set for seventy-eight revolutions per minute for all the records except that of the sense of time; for that it should be set at sixty or sixty-five. Loudness appropriate to the room may be varied by proper selection of metal needles.

The pupils should be supplied with test blanks, which may be secured in quantities from the publishers of this manual, or may be mimeographed or printed from the model here given.

Name.....Test.....

Date..... Hour.....

School.....Grade.....Age.....yrs.....mos.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Remarks:

The material in this manual is limited to the barest directions for the giving of the tests.

Before using these measures and interpreting them on any considerable scale, the experimenter should be thoroughly familiar with the setting and psychological interpretation of such measures as given in the author's "Psychology of Musical Talent."

For a critical evaluation of these measures and technical guide for their use, the experimenter will follow Larson's **Studies on Seashore's "Measures of Musical Talent,"** which contains a review of the various uses to which the measures have been put, new norms, full data on reliability and validity, and directions for procedure. The revised norms contained in the present manual are taken from Dr. Larson's monograph.

These six measures do not constitute a complete survey of musical talent, as may be seen in the analysis of a musical mind and inventory of talents in the text book, but they are specific measures of these six basic capacities. That is what makes them scientific. They do not measure the musical mind as a whole, but they do measure specific and fundamental traits of musical hearing. Corresponding measures of the capacity for the motor aspects of these factors in singing and playing are available in any laboratory, as are also measures of capacities at the levels of memory, imagination, thinking, complex motor skills, feeling and the expression of feeling. But these six measures are basic and most readily available and should be the first in any series of measures of musical talent.

Computation and Interpretation of the Results

A key giving the right answer for each trial is furnished for each measure. These should be read in the order in which trials are recorded on the blank; namely, first ten trials in column A, then ten trials in column B, etc.

The degree of difficulty is indicated at the head of each column of the key. For pitch, it is given in terms of vibrations, one vibration being equivalent to one fifty-fourth of a tone. For intensity, it is given in terms of units of loudness on the original instrument, which is called an audiometer. For time,

the difference between two time intervals is given in terms of hundredths of a second. For consonance each step is different. For memory the difficulty is given in terms of number of notes in the span. The listener, however, need not concern himself about these technical items.

If the class is reliable and can be trusted, the key may be read aloud slowly, allowing each one to check mistakes by drawing a bold line through all wrong answers. Teachers may devise various substitutes for this method to meet local needs. Should the teacher wish to check all the records herself, this can be done most expeditiously by making a key, with a hole for each square, to lay over the records.

All the records are interpreted in terms of rank, which is a serviceable unit that may be easily understood. It simply denotes the rank that the person holds in a community of his kind on a scale of 100, in which 100 represents the highest possible rank, 1 the lowest possible, and 50 the average. These norms of rank were made by taking very large numbers of cases and arranging the actual records in the order of excellence, and finding what rank in a normal community each per cent right will yield.

The original footings, i. e., % right, are converted into rank in the tables of rank, for each measure. Thus, in pitch, 75% right for the adult yields a centile rank of 25; for the eighth grade, 40+; and for the fifth grade, 70. The average age for fifth grade children is between ten and eleven years; and for eighth grade children about fourteen. In dealing with children we find that the grade is more significant than the age.

The distribution of % right gains significance when interpreted quantitatively in terms of the smallest difference that can be perceived, as is done in the fuller discussions of this subject. Thus, a person who ranks near the centile 100 may hear a difference of one two-hundredths of a tone, whereas a person who ranks 1 can not hear a difference of less than a half tone. The former is more than a hundred times as keen as the latter. The person who ranks 50, and therefore average, can hear a difference of 2.7 vibrations; i. e., five-hundredths of a tone.

GENERAL DIRECTIONS

1. Give specific instructions to the listener as directed for each measure and explain the method of recording.

2. Give preliminary practice, using the A-side of the disc, and allowing the listeners to speak the answers together in competition, until the nature of the test is thoroughly understood. If necessary, play the entire one side of the record, stopping as often as necessary to discuss and explain procedure clearly.

3. Guard against the memorizing of the order, either from seeing the key or from hearing frequent repetitions of the record. No one who knows the order can participate in the test.

4. Take rigid precautions against copying from neighbors, or being influenced by the sound of the writing movements.

5. Direct the listener to take a position of muscular tension, leaning forward with muscles firm in the most favorable position for writing, in an attitude of attention, eyes closed while listening.

6. If the listener can not hear the effect called for, he must guess, as the results are computed on the theory of chance. Require a prompt record for all trials. There is always a difference!

7. After the preliminary trials and the full explanation, charge the listeners by firm command, to give their attention in maximum effort without interruption throughout the playing. This charge is important, as those who are not accustomed to psychological measurements often do not realize the necessity of concentrated and uninterrupted effort. Impress the fact that every trial counts.

8. Treat the result of the test as private, personal, and confidential, except where by common consent the test is taken as a game, a contest, or a demonstration.

9. One block of trials consists of the playing of the two sides of one disc. If not more than twenty minutes are available with the children, take only one block; if thirty-five minutes, take two blocks.

10. Check the result by the key as directed above. Count the number of mistakes in the entire record and subtract this from the total number of trials. This will give the number of right answers. Reduce this to per cent right by dividing the number of correct answers by the total number of trials.

11. Transform the per cent right into centile rank as directed above. The norms for the 7th and 8th grades are interpolations from the 5th and the 8th. High school students may be rated as adults.

12. A good record is usually reliable, both for theoretical and practical use. Recording falling below average should be verified by retesting.

THE SENSE OF PITCH

To the Listener: You will hear two tones which differ in pitch. You are to judge whether the second is higher or lower than the first. If the second is higher record H; if lower, record L.

Pitch Key

	A 30	B 23	C 17	D 12	E 8	F ½	G 1	H 2	I 3	J 5
1.	H	H	L	H	L	L	L	H	L	H
2.	H	L	H	H	H	H	L	L	H	H
3.	L	L	L	L	H	L	H	L	L	L
4.	H	L	L	L	L	L	L	H	H	H
5.	L	H	L	H	H	H	H	L	H	L
6.	L	H	H	L	H	H	L	H	H	L
7.	H	L	H	L	L	L	L	L	L	H
8.	H	L	L	H	H	L	L	L	H	L
9.	L	L	L	L	L	H	H	L	L	L
10.	L	H	L	H	H	H	L	H	L	H

Norms

	Percent Right				
Centile	Grade 5	Grade 6	Grade 7	Grade 8	Adult
99	89	90	91	91	93
95	85	87	88	89	90
90	82	84	86	87	88
85	80	82	84	85	87
80	79	81	83	84	86
75	77	79	81	83	86
70	75	78	80	82	85
65	74	77	79	81	84
60	72	75	78	80	83
55	70	73	76	79	82
50	67	71	75	78	81
45	65	69	73	76	80
40	63	67	71	74	79
35	61	65	69	73	78
30	59	63	67	70	77
25	57	61	64	67	75
20	55	58	61	64	72
15	53	56	58	60	70
10	51	53	55	57	66
5			51	52	61

THE SENSE OF INTENSITY

To the Listener: You will hear two tones which differ in loudness, or strength. You are to judge whether the second is weaker or stronger than the first. If the second is stronger, record S; if the second is weaker, record W.

Intensity Key

	A 5	B 4	C 3	D 2	E 1	F 5	G 4	H 3	I 2	J 1
1.	W	S	S	W	S	S	S	S	S	S
2.	S	S	S	S	W	S	W	S	W	W
3.	W	W	W	S	S	W	W	W	W	W
4.	S	W	W	W	S	W	W	S	S	W
5.	S	S	W	W	W	S	S	W	W	S
6.	S	W	S	W	S	W	S	W	S	S
7.	W	S	S	S	W	W	W	S	S	W
8.	W	S	S	W	W	S	W	W	W	W
9.	W	S	W	S	S	W	W	W	S	S
10.	S	W	W	S	S	S	S	S	W	S

Norms

	Percent Right				
Centile	Grade 5	Grade 6	Grade 7	Grade 8	Adult
99	93	94	95	96	98
95	89	91	92	93	97
90	86	88	90	91	95
85	85	87	89	90	95
80	83	85	87	89	94
75	82	84	86	88	93
70	80	83	85	87	93
65	79	82	84	86	92
60	78	81	84	86	91
55	76	79	82	85	91
50	75	78	81	84	90
45	73	77	80	83	89
40	72	76	79	82	88
35	70	74	78	81	87
30	68	72	76	79	86
25	66	70	74	78	85
20	64	68	72	76	84
15	62	66	70	74	82
10	58	63	67	71	79
5	53	57	61	65	75

THE SENSE OF TIME

(For this test the instrument should be set at sixty or sixty-five revolutions per minute.)

To the Listener: You will hear three clicks marking off two intervals of time. If the second interval (that is, the time between the second and third clicks) is longer than the first interval, record L; if it is shorter, record S. (60 revolutions per minute.)

Time Key

	A 20	B 20	C 14	D 14	E 9	F 2	G 2	H 5	I 5	J 9
1.	L	L	L	S	L	L	S	L	S	S
2.	S	S	S	L	S	L	L	S	L	L
3.	L	L	S	S	S	S	S	L	L	L
4.	S	L	L	S	L	L	L	L	S	S
5.	S	L	L	L	L	L	S	S	S	S
6.	S	S	S	L	S	S	S	L	L	S
7.	L	L	S	L	S	S	L	S	S	L
8.	L	L	L	S	S	L	S	S	L	S
9.	S	S	S	L	L	S	L	L	L	L
10.	S	S	L	L	L	L	L	L	L	L

Norms

Centile	Percent Right: Grade 5	Grade 6	Grade 7	Grade 8	Adult
99	82	83	84	86	91
95	80	81	82	82	88
90	76	78	79	80	86
85	74	76	78	79	85
80	72	74	76	77	84
75	71	73	75	76	83
70	69	71	73	75	82
65	68	70	72	74	81
60	67	69	71	73	80
55	66	68	70	72	79
50	65	67	69	71	78
45	63	66	68	70	77
40	62	65	67	69	76
35	61	64	66	68	75
30	60	63	65	67	74
25	58	61	63	65	73
20	56	59	62	64	72
15	55	58	60	62	70
10	53	56	58	60	68
5	50	53	55	57	64

THE SENSE OF CONSONANCE

To the Listener: You will hear two combinations of two tones each; one combination is better or worse than the other in consonance (harmony). A good combination is one in which the two tones are smooth, and blend, tending to fuse together into one. A bad combination is just the opposite. If the second combination is better, record B; if worse, W.

Consonance Key

	A	B	C	D	E
1.	W	W	B	W	W
2.	W	W	W	B	B
3.	B	B	B	B	W
4.	B	W	W	W	B
5.	B	W	B	B	W
6.	W	B	B	W	B
7.	B	B	B	W	B
8.	W	B	W	W	W
9.	W	W	B	B	W
10.	B	W	B	B	W

Norms

Centile	Percent Right: Grade 5	Grade 6	Grade 7	Grade 8	Adult
99	83	83	83	83	83
95	77	77	78	79	79
90	74	75	76	77	77
85	71	73	74	75	76
80	69	71	72	73	75
75	68	70	71	72	73
70	67	69	70	71	72
65	65	67	69	70	71
60	64	66	68	69	71
55	63	65	67	69	70
50	62	64	66	67	69
45	61	63	64	65	68
40	59	61	63	65	67
35	58	60	62	63	66
30	57	59	60	62	65
25	55	57	59	61	63
20	54	56	58	59	62
15	52	54	56	57	61
10	50	52	54	55	59
5		50	52	53	55

TONAL MEMORY

To the Listener: In each trial you will hear a series of tones played twice. In the second playing, one note is changed. You are to record, by number, which one was changed. In listening count mentally; for example, 1, 2, in the first playing, and then likewise in the second playing, so you may identify the one that is changed without error.

Memory Key

	A 2	B 3	C 4	D 5	E 6
1.	1	2	4	3	2
2.	1	1	2	5	4
3.	1	1	1	2	6
4.	2	1	2	1	1
5.	2	2	3	4	5
6.	1	3	4	3	3
7.	2	2	1	2	4
8.	2	3	3	5	2
9.	1	1	2	1	3
10.	1	3	2	4	1

Norms

	Percent Right				
Centile	Grade 5	Grade 6	Grade 7	Grade 8	Adult
99	90	92	94	95	98
95	81	84	87	89	95
90	76	79	82	84	91
85	73	76	78	80	89
80	69	72	74	78	86
75	65	68	71	74	84
70	62	65	68	71	82
65	59	63	66	69	80
60	55	59	63	67	78
55	53	57	61	65	76
50	50	55	59	63	74
45	48	53	57	61	72
40	46	51	55	59	70
35	43	48	52	56	67
30	41	46	50	54	64
25	39	43	47	51	61
20	36	41	45	49	59
15	34	38	42	45	55
10	32	36	39	42	51
5	29	32	35	37	45

THE SENSE OF RHYTHM

To the Listener: You will hear in rapid succession two rhythmic patterns; the second is either the same as the first or different. Listen and record either S, for same, or D, for different. (The examiner will illustrate what is meant by rhythm.)

Rhythm Key

1.	S	S	S	D	D
2.	S	S	S	S	D
3.	S	D	S	D	D
4.	D	D	D	D	S
5.	S	D	D	S	D
6.	D	S	S	D	D
7.	S	S	S	S	D
8.	S	S	D	D	S
9.	D	D	S	S	D
10.	D	D	S	S	S

Norms

	Percent Right				
Centile	Grade 5	Grade 6	Grade 7	Grade 8	Adult
99	82	84	86	88	90
95	76	79	81	83	86
90	74	76	78	80	83
85	72	74	76	78	81
80	71	73	75	76	79
75	69	71	73	74	78
70	68	70	72	73	77
65	67	69	71	72	75
60	66	68	70	71	74
55	65	67	69	70	73
50	64	66	68	69	72
45	63	65	67	68	71
40	62	64	66	67	70
35	61	63	65	66	69
30	60	62	64	65	68
25	59	61	63	64	67
20	58	60	62	63	66
15	56	58	60	61	64
10	54	56	58	59	62
5	52	54	55	56	59

Directions, Keys and Norms for

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OTIS GROUP INTELLIGENCE SCALE

Devised by ARTHUR S. OTIS

ADVANCED EXAMINATION: FORM B

Examination Number..... Name.....
(First name, initial, and last name)

Age last birthday.....years. Birthday.....
(Tell in figures) (Month, day)

School..... Grade.....

City..... Date.....19....
(Month, day, year)

(Do not write below this line.)

Remarks or Further Data

1 .....

2 .....

3 .....

4 .....

5 .....

6 .....

7 .....

8 .....

9 .....

10 .....

11 .....

12 .....

13 .....

14 .....

15 .....

TEST	SCORE
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Score	
Norm	
IB	
PR	

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 OGIS: ADV: B–17

To the Examiner: Do not administer this test without first reading carefully the Manual of Directions. The Manual must be ordered extra.

TEST 1

Following Directions

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Sample problem. Write the fifth letter of the alphabet.....(E)

Begin here:

1. Do you understand that each letter is to be a capital made like printing and put in the parenthesis after the problem? If so, write P in the parenthesis.....( ) 1
2. Will you remember not to ask any questions during the examination? If so, write N.....( ) 2
3. Will you remember not to look toward the paper of any other pupil during the examination? If so, write R.....( ) 3
4. Will you remember not to turn over your booklet or any page of it at any time unless you are told to? If so, write T, if not, write N.....( ) 4
5. Write the letter A.....( ) 5
6. Write the seventh letter of the alphabet.....( ) 6
7. Write the same letter that you were told to write in the fifth problem.....( ) 7
8. Write the letter which follows the fourth letter of the alphabet.....( ) 8
9. Write the letter which the letter M follows in the alphabet.....( ) 9
10. If L comes after S in the alphabet, write L; if not, write S.....( ) 10
11. Suppose all the odd numbered letters in the alphabet (that is, the 1st, 3d, 5th, etc.) were crossed out. The fourth letter left, not crossed out, would be what letter?( ) 11
12. Write the letter which follows the letter which comes next after C in the alphabet.( ) 12
13. If G and H appear together in the alphabet, write H, unless S and Y also appear together in the alphabet, in which case write S instead.....( ) 13
14. Write the letter which is the third letter to the right of the letter which is midway between M and Q.....( ) 14
15. Suppose that the first and second letters of the alphabet were interchanged, also the third and fourth, the fifth and sixth, etc. Write the letter which would then be the 15th letter in the alphabet.....( ) 15
16. A certain letter is the second letter to the right of another letter. This other letter is the fifth letter to the left of R. What is the "certain letter" first mentioned?( ) 16
17. A certain letter is the fourth letter to the left of another letter. This other letter is midway between two other letters. One of these last two letters is next after F in the alphabet and the other is just before L in the alphabet. What is the "certain letter" first mentioned?.....( ) 17
18. If the letters in the word SO appear in the same order that they do in the alphabet and if the same is true of the letters in the word BY, write the letter Z. But if this is true of only one of these words, write the last letter of that word.....( ) 18
19. Find a certain letter which, in this sentence, appears a second time nearest the beginning. Write it, using a capital.....( ) 19
20. Find the two letters in the word SYRUP which have just as many letters between them in the word as in the alphabet. Write the one of these two letters that comes first in the alphabet.....( ) 20

Score.....

TEST 2

Opposites

Samples: up .....(short, down, small, low, young)
hot.....(warm, ice, dark, cold, fire)

DIRECTIONS. Look at the first word on each line, think what word means exactly the opposite of it, find that word among the five words in parenthesis on that line and draw a line under it.

Begin here:

1. north.....(pole, south, west, east, equator) 1
2. no .....(right, sure, yes, nothing, maybe)..... 2
3. bottom .....(top, side, cover, middle, over)..... 3
4. after .....(early, now, soon, follow, before) 4
5. easy.....(long, quick, slow, difficult, common) 5
6. enemy.....(fight, neighbor, friend, stranger, foe) 6
7. fail.....(pail, try, good, succeed, win) 7
8. strong .....(man, weak, small, short, thin)..... 8
9. pretty .....(good, ugly, bad, crooked, nice) 9
10. obey .....(order, officer, command, lead, soldier) 10
11. sorrow.....(sickness, health, good, joy, pride) 11
12. contract .....(small, shrink, expand, stay, explode) 12
13. truth.....(tell, no, liar, ignorance, falsehood) 13
14. hate.....(enemy, fear, love, friend, joy) 14
15. accept.....(receive, percept, deny, reject, spend) 15
16. economical.....(cheap, stingy, extravagant, value, rich)..... 16
17. destroy .....(abolish, change, continue, restore, alter) 17
18. never.....(often, sometimes, occasionally, always, frequently) 18
19. treacherous.....(friendly, brave, wise, cowardly, loyal) 19
20. honor.....(glory, shame, cowardice, fear, defeat)..... 20
21. constant .....(always, fickle, stationary, seldom, movable) 21
22. hope.....(faith, misery, sorrow, despair, hate) 22
23. because.....(although, cause, maybe, since, therefore)..... 23
24. but.....(and, nevertheless, whether, even, never) 24
25. if .....(however, unless, also, therefore, and)..... 25

Score .....

TEST 3

Disarranged Sentences

Samples:
- men money for work ..... (true false)
- uphill rivers flow all ..... (true false)
- ocean waves the has ..... (true false)

DIRECTIONS. The words on each line below make one sentence if put in order. If the sentence the words would make is *true*, underline the word *true* at the side of the page. If the sentence they would make is *false*, underline the word *false*.

Begin here:

1. give milk cows ..... (true false) 1
2. sun night the shines at ..... (true false) 2
3. cannons loud make noise a ..... (true false) 3
4. months warmest are summer the ..... (true false) 4
5. of cups all made are cotton ..... (true false) 5
6. pens for used are writing ink and ..... (true false) 6
7. are and apples long thin ..... (true false) 7
8. wood eat and good to are coal ..... (true false) 8
9. months there twelve year are a in ..... (true false) 9
10. made chairs wood are of usually ..... (true false) 10
11. tails have all short very monkeys ..... (true false) 11
12. people are many candy of fond ..... (true false) 12
13. and cows from honey come bread ..... (true false) 13
14. comes sky salt down the from ..... (true false) 14
15. earth and are the close moon very together ..... (true false) 15
16. water cork on float will and wood ..... (true false) 16
17. safer are at when lighted night streets ..... (true false) 17
18. run than some can boys faster others ..... (true false) 18
19. boots for used and are shoes food ..... (true false) 19
20. very the is a ground after rain dry ..... (true false) 20
21. get grow they as children shorter older ..... (true false) 21
22. and keep feathers the warm fur animals ..... (true false) 22
23. wind when the the all blows fall trees ..... (true false) 23
24. bushes trees roots have and their ground the in ..... (true false) 24
25. instruments typewriters musical are telephones and ..... (true false) 25

Right..... *Wrong*..... *Score*.....

TEST 4

Proverbs

DIRECTIONS. Read each proverb, find the statement that explains it, and put the number of that statement in the parenthesis before the proverb.

Proverbs (Group 1)

( ) The early bird catches the worm.
( ) Don't cross a bridge till you get to it.
( ) Don't cry over spilt milk.
( ) Birds of a feather flock together.
( ) Don't judge a book by its cover.
( ) Paddle your own canoe.
( ) A watched pot never boils.
( ) Cut your coat according to the cloth.
( ) Empty vessels make the most sound.
( ) Figs do not grow on thistles.

Statements to Explain Proverbs in Group 1

1. It is foolish to worry about things we can't help.
2. People seek the company of those who are like them.
3. If you would succeed, be on time.
4. Depend on yourself.
5. Impatience makes the time seem longer.
6. Don't worry over troubles before they come.
7. Good does not come from evil.
8. There is no one so wise that he is not sometimes a fool.
9. Don't believe everything you hear.
10. External appearances may be deceiving.
11. Those who are the most boastful are the least important.
12. Make your plans to fit the possibilities.

Proverbs (Group 2)

( ) The burnt child dreads the fire.
( ) Rome was not built in a day.
( ) He who is in the mud likes to pull another into it.
( ) Plants oft removed never thrive.
( ) Great ships require deep waters.
( ) When the cat is away the mice will play.
( ) Half a loaf is better than none.
( ) The proof of the pudding is in the eating.
( ) A mill does not grind with water that has passed by.
( ) Every path has its puddle.

Statements to Explain Proverbs in Group 2

1. Time is required to produce anything of value.
2. Failure follows frequent change of plan.
3. If we can't have all we want, we should take what we can get.
4. Unhappy experiences teach us to be careful.
5. We should take advantage of opportunities as they come.
6. When authority is absent, evil flourishes.
7. We desire most that which we do not have.
8. A thing must be tried before we know its value.
9. Every occupation involves some work that is not pleasant.
10. Those in disgrace always want to disgrace others.
11. What has been done can be done again.
12. Important work can be done only by able men.

Score.....

TEST 5

Arithmetic

DIRECTIONS. Place the answer to each problem in the parenthesis after the problem. Do any figuring you wish on the margin of the page.

1. If a boy had 15 cents and earned 10 cents, how much money did he have then? ( ) cents 1
2. At 3 cents each, how much will 12 pencils cost? ( ) cents 2
3. If a man had $25 and spent $15, how much money did he have left? ( ) dollars 3
4. At 4 cents each, how many pencils can be bought for 36 cents? ( ) pencils 4
5. A boy spent 30 cents and then earned 40 cents. How much more money did he have than at first? ( ) cents 5
6. How far can a train go in 6 hours at the rate of 30 miles per hour? ( ) miles 6
7. How long will it take a glacier to move 2000 feet at the rate of 200 feet a year? ( ) years 7
8. If $2\frac{1}{2}$ yards of cloth cost 30 cents, what will 10 yards cost? ( ) cents 8
9. If 3 pencils cost 5 cents, how many pencils can be bought for 50 cents? ( ) pencils 9
10. If a man walks west from his home 8 blocks and then walks east 3 blocks, how far is he from his home? ( ) blocks 10
11. If a boy can run at the rate of 6 feet in $\frac{1}{4}$ of a second, how far can he run in 10 seconds? ( ) feet 11
12. A ship has provisions enough to last a crew of 15 men 40 days. How long would they last a crew of 30 men? ( ) days 12
13. One schoolroom has 8 rows of seats with 8 seats in each row, and another schoolroom has 7 rows of seats with 9 seats in each row. How many more seats does one room have than the other? ( ) seats 13
14. If 10 boxes full of apples weigh 400 pounds, and each box when empty weighs 4 pounds, how much do all the apples weigh? ( ) pounds 14
15. If Town X is 15 miles south of Town Y, and Town Y is 30 miles south of Town Z, how far is Town X from Town Z? ( ) miles 15
16. If a strip of cloth 24 inches long will shrink to 22 inches when washed, how long will a 36-inch strip be after shrinking? ( ) inches 16
17. If Frank can ride a bicycle 30 feet while George runs 20 feet, how far can Frank ride while George runs 30 feet? ( ) feet 17
18. A hotel serves a mixture of 2 parts cream and 3 parts milk. How many pints of cream will it take to make 15 pints of the mixture? ( ) pints 18
19. If $4\frac{1}{2}$ yards of cloth cost 90 cents, what will $2\frac{1}{2}$ yards cost? ( ) cents 19
20. If a wire 20 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? ( ) inches 20

Score.....

TEST 6

Geometric Figures

DIRECTIONS. Each problem asks a question that is answered by a number. Write the answer to each problem in the parenthesis after the statement of the problem.

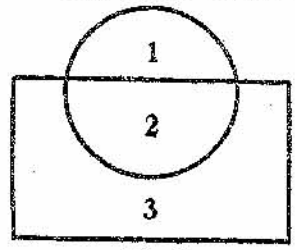

Fig. I

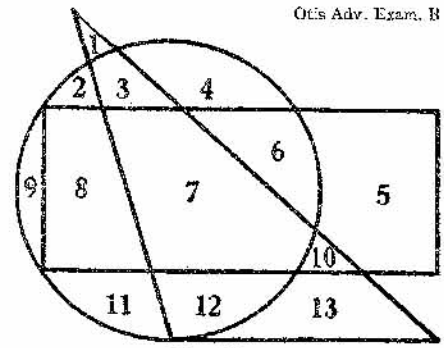

Fig. II

Sample problem :

Look at Fig. I. What number is in the circle but not in the rectangle?.....(1)

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1. What number in Fig. I is in the rectangle but not in the circle?.....( ) 1
2. What number in Fig. I is in both the rectangle and the circle?.....( ) 2
3. Look at Fig. II (at the right). What number is in the rectangle but not in the circle nor in the triangle?.....( ) 3
4. What number in Fig. II is in the rectangle and in the triangle but not in the circle? ( ) 4

(The remaining questions all refer to Fig. II.)

5. What number is in the circle and in the rectangle and in the triangle?.....( ) 5
6. What is the smallest number that is in the triangle but not in the circle nor in the rectangle?.....( ) 6
7. What is the largest number that is in the circle but not in the triangle nor in the rectangle?.....( ) 7
8. Write the number that is in the lowest space that is in the triangle and in the circle but not in the rectangle.....( ) 8
9. Find the geometrical figure (circle, triangle, or rectangle) that has the least number of spaces in it. Write that number of spaces.....( ) 9
10. How many spaces are there each of which is in all three geometric figures?.....( ) 10
11. How many spaces are there each of which is in one and only one geometric figure?..( ) 11
12. How many spaces are there each of which is in two and only two geometric figures?( ) 12
13. We may say that space 12 is *like* space 3 because they are *both* in the circle and triangle but not in the rectangle. Any space is *like* another which is in exactly the same geometrical figures. Write the number of the space which is like space 6.....( ) 13
14. Write the number of the space which is like space 1.....( ) 14
15. How many other spaces are there like space 9?.....( ) 15
16. There is no other space like space 5, so we may call space 5 *unique* (yūneek). Any space is unique which has no other space like it. Examine spaces 8, 9, 10, 11, 12, and 13 in order until you find another unique space. Write its number.....( ) 16
17. How many unique spaces are there in Fig. II?.....( ) 17
18. What is the greatest number of unique spaces which it is possible to make by overlapping a circle, triangle, and rectangle? (You may draw any figures you wish on the margin of this page).....( ) 18
19. Also what is the least number of unique spaces possible?.....( ) 19
20. What is the greatest number of spaces which it is possible to make by overlapping a circle, triangle, and rectangle?.....( ) 20

Score.....

TEST 7

Analogies

Samples:
- finger : hand — toe : (?) . . . . foot, knee, arm, shoe, nail
- clothes : man — fur : (?) . . . . coat, animal, hair, skin, cloth
- tall : short — fat : (?) . . . . . man, wide, thin, boy, heavy

DIRECTIONS. The first sample means: Finger is to hand as toe is to what? Underline the word on each line that should go in the parenthesis in place of the question mark.

Begin here:

1. foot : man — hoof : (?) . . . . . leg, dog, horse, boy, shoe 1
2. John : boy — Mary : (?) . . . . . Bessie, James, son, girl, mother 2
3. book : author — statue : (?) . . . . . sculptor, marble, model, magazine, man 3
4. boy : man — (?) : sheep . . . . . wool, lamb, goat, shepherd, dog 4
5. wood : table — (?) : knife . . . . . cutting, chair, fork, steel, handle 5
6. elbow : arm — (?) : leg . . . . . foot, knee, stocking, toe, heel 6
7. uncle : aunt — son : (?) . . . . . brother, daughter, sister, father, girl 7
8. clock : time — thermometer : (?) . . . watch, warm, bulb, mercury, temperature 8
9. electric light : candle — automobile : (?) . . carriage, electricity, tire, speed, glow . . 9
10. pitcher : milk — (?) : flowers . . . . . stem, leaves, water, vase, roots 10
11. order : confusion — (?) : war . . . . . guns, peace, powder, thunder, army 11
12. ice : water — water : (?) . . . . . land, steam, cold, river, thirst 12
13. moon : earth — earth : (?) . . . . . Mars, sun, clouds, stars, universe 13
14. food : body — (?) : engine . . . . . wheels, fuel, smoke, motion, fire 14
15. wire : electricity : (?) : gas . . . . . flame, spark, hot, pipe, stove 15
16. book : knowledge — (?) money . . . . paper, dollars, bank, work, gold 16
17. telephone system : city — (?) : body . . arteries, nerves, arms, clothes, skeleton 17
18. Congress : United States — (?) : city . . mayor, council, city attorney, committee, citizens 18
19. oil : toil — (?) : hate . . . . . love, work, boil, ate, hat 19
20. sewing machine : needle — typewriter : (?) . . pin, cloth, ink, pen, page 20
21. beautiful : appearance — sweet : (?) taste, beauty, sour, ugly, nice 21
22. sorrow : misfortune — joy : (?) . . . . grief, happiness, hatred, success, pride 22
23. fear : anticipation — regret : (?) . . . . memory, hope, sorrow, hate, forget 23
24. physics : motion — (?) : blood . . . . . temperature, body, veins, physiology, geography 24
25. Wilson : democracy — Kaiser : (?) . . Germany, surrender, military, expansion, imperialism 25

Score . . . . . .

Similarities Test

Samples:
hat, collar, glove.....hand, cane, head, shoe, house
rose, daisy, violet.....bush, red, plant, bed, pansy
desk, bed, chair.....book, table, floor, pencil, coat

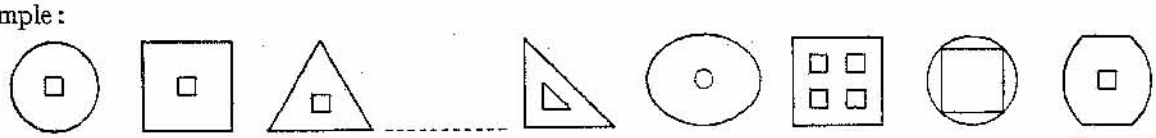
DIRECTIONS. Find the way in which the first three things on a line are alike. Then look at the five other things on the same line and draw a line under the one that is *most* like the first three.

Begin here:

1. blue, yellow, black.....sky, red, ocean, dark, flower..... 1
2. plum, apricot, apple.....tree, seed, peach, juice, ripe..... 2
3. cup, plate, saucer.....fork, table, eat, bowl, spoon..... 3
4. horse, pigeon, cricket.....stall, saddle, eat, goat, chirp..... 4
5. boat, horse, train.....sail, row, motorcycle, move, track.... 5
6. fall, walk, turn.....down, stand, street, around, ride..... 6
7. shave, chop, whittle.....razor, beard, knife, shear, wood..... 7
8. stocking, flag, sail.....shoe, ship, staff, towel, wash..... 8
9. circle, triangle, square.....round, draw, ellipse, cube, lines..... 9
10. Roy, boy, toy.....name, play, girl, doll, joy..... 10
11. large, red, good.....heavy, size, color, apple, very..... 11
12. speech, messenger, telephone.....street, mail, send, pole, hurry..... 12
13. smuggle, steal, bribe.....mean, take, beg, lie, bad..... 13
14. pride, fear, sorrow.....habit, love, memory, life, thought.... 14
15. loyal, brave, sympathetic.....generous, rich, wise, strong, well..... 15

(Go on with problems 16, 17, 18, 19, and 20, in exactly the same way.)

Sample:



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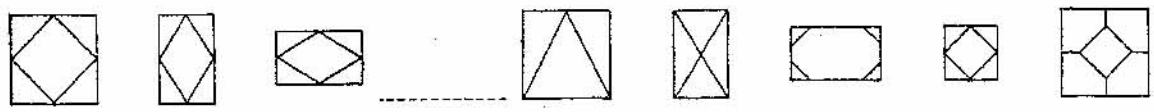

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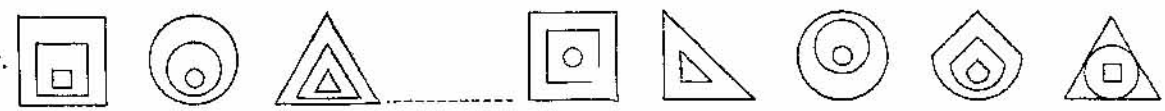

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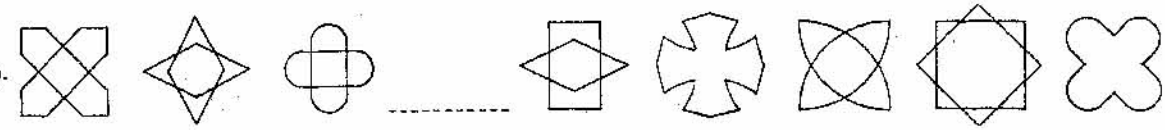

20.


Score .....

Narrative Completion

DIRECTIONS. For each numbered blank in the story, choose the best word of the three in the list having the same number as the blank. Underline the word you choose. You may write these words in the blank spaces if you wish, but only the underlining counts. Do nothing about the blanks that are not numbered.

The Wonderful Little Bag

Once upon a .....(1)..... there was a young .....(2)..... who was very .....(3)..... He went from ..... to .....(4)..... trying to find ..... But he was hardly able to .....(5)..... enough ..... to buy .....(6)..... One day he sat by the side of the road, ... to ..... what he would do next.

"..... ..... almost starved," he said. "Soon I shall not be .....(8)..... to .....(9)....." Just then he ..... around and ..... a ..... standing beside him.

"I have ..... what you .....(10)....." said the dwarf. "Here is a ..... In it you will find .....(11)..... You will .....(12)..... find it empty. But if any one ever .....(13)..... you for a ..... of your .....(14)....., do not fail to give some to him." The young man took the bag, ... it and .....(15)..... till he was no .... After this he was .... of enough to ..... and .....(16)..... an idle .....(17)..... .....(18).....

One day as he was ..... from the.....(19)....., a..... ....(20)..... .....(21).....asked him for a share of his food.

"I have .....(22)..... to ..... you," the .... said and went on ..... At once the feeble old man began to grow smaller and smaller until he ..... the .....

"You are a .....(23)..... man," said the dwarf, who ..... the .....(24)..... and vanished.(25)

Have you heard this story before?.....

Score.....

Underline words here

1.	time	place	tree	1
2.	bird	man	woman	2
3.	rich	strong	poor	3
4.	place	there	come	4
5.	him	money	work	5
6.	think	earn	have	6
7.	remember	think	forget	7
8.	He	We	I	8
9.	able	strong	here	9
10.	man	dwarf	tree	10
11.	said	can	are	11
12.	box	purse	bag	12
13.	money	matches	food	13
14.	never	always	not	14
15.	dollar	some	share	15
16.	thought	ate	drank	16
17.	without	glad	sure	17
18.	became	grew	made	18
19.	eating	walking	coming	19
20.	box	bag	purse	20
21.	friend	farmer	feeble	21
22.	nothing	food	something	22
23.	man	beg	dwarf	23
24.	strong	selfish	generous	24
25.	gave	seized	was	25

TEST 10

Memory

DIRECTIONS. Read each question and if the right answer, according to the story, is *yes*, draw a line under the word *yes*. If the right answer is *no*, draw a line under the word *no*. But if you do not know the right answer, because the story didn't say, draw a line under the words *didn't say*.

Samples:
Was the story about two shepherds? (yes no didn't say)
Were they both honest? (yes no didn't say)
Were they brothers? (yes no didn't say)

Begin here:

1. Did the first shepherd have a large flock of sheep? (yes no didn't say) 1
2. Did his sheep have fine white wool? (yes no didn't say) 2
3. Did he have a shepherd's staff? (yes no didn't say) 3
4. Did he have a dog to tend his sheep? (yes no didn't say) 4
5. Were there any lambs in the flock? (yes no didn't say) 5
6. Did he go to sleep one day under a tree? (yes no didn't say) 6
7. Did he sleep until late in the afternoon? (yes no didn't say) 7
8. When he awoke did he see his sheep far in the distance? (yes no didn't say) 8
9. Did he follow their tracks all the rest of the day trying to find them? (yes no didn't say) 9
10. Did he sit down when night came and weep over the loss of his sheep? (yes no didn't say) 10
11. Did Mercury come up and say to him, "Why do you weep, my good shepherd?" (yes no didn't say) 11
12. Did the shepherd say, "Someone has stolen my sheep"? (yes no didn't say) 12
13. Did Mercury then lead the shepherd to some sheep that were feeding in a forest? (yes no didn't say) 13
14. Did the first sheep they found have silver fleece? (yes no didn't say) 14
15. Did the shepherd wish he had the sheep with the silver fleece? (yes no didn't say) 15
16. Did they come next to the sheep that belonged to the shepherd? (yes no didn't say) 16
17. When they found the shepherd's sheep, did Mercury say, "Are these your sheep?" (yes no didn't say) 17
18. Did Mercury give the shepherd two flocks of sheep? (yes no didn't say) 18
19. Did the shepherd thank Mercury? (yes no didn't say) 19
20. Did the shepherd tell his wife the story of how Mercury had given him some sheep with gold and silver fleece? (yes no didn't say) 20
21. When he told the other shepherd his story, did the other shepherd immediately resolve to try to get some sheep with gold and silver fleece? (yes no didn't say) 21
22. Did he tie up his dog, take his sheep to pasture, go to sleep, and let his sheep stray away? (yes no didn't say) 22
23. When he awoke did he hunt for his sheep? (yes no didn't say) 23
24. Did Mercury hear him sob and come up and ask him the same question he had asked the first shepherd? (yes no didn't say) 24
25. Did the shepherd say, "I have lost my sheep with gold and silver fleece"? (yes no didn't say) 25
26. Did Mercury lead this shepherd to the same pasture to which he had led the first shepherd? (yes no didn't say) 26
27. When the shepherd saw the sheep with the silver fleece, did he exclaim, "Ah, these are my sheep; I know them every one"? (yes no didn't say) 27
28. Did Mercury say, "You are a dishonest man. These are not your sheep. Now I will take away your own sheep"? (yes no didn't say) 28
29. Did the shepherd beg Mercury to forgive him? (yes no didn't say) 29
30. Did the shepherd ever find his sheep? (yes no didn't say) 30

Have you heard this story before? (yes no)

Score.....