

THE INTELLIGENCE QUOTIENT—ITS ACCURACY AS A MEANS OF CLASSIFYING AND GRADING HIGH SCHOOL STUDENTS

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I. GENERAL STATEMENT OF CONDITIONS

The Western Illinois State Teachers College has a small High School or Academy as a practice school for students who are preparing to teach in high school.

In the fall of 1921, sixty-nine eighth grade graduates presented themselves for entrance to the ninth grade in this high school. Less than sixty could be accommodated. All were given scale B, form 1, of the National Intelligence Test. The following chart gives the I. Q.'s (intelligence quotients) of the fifteen students who applied for admission, but for reasons stated below the charts are not now in school.

In the charts and discussion in this paper each of the sixty-nine students is given an identification number in lieu of his real name.

A chart showing the I. Q.'s of the students who took the examination and did not complete the work of a quarter, with reasons.

Identifica- tion No.	I. Q.	Identifica- tion No.	I. Q.	Identifica- tion No.	I. Q.	Identifica- tion No.	I. Q.	Identifica- tion No.	I. Q.
3	94	18	85.1	30	76	41	126.5	55	77.5
4	84.7	22	76	31	100.7	43	103.2	56	101.3
8	67.4	23	131.3	33	93.5	46	86.9	57	82.5
10	85.5	25	86.9	35	109.3	47	73	62	112.3
13	66.6	27	85	36	102	52	76	67	107

8, 13, 30, and 55 were not admitted.

4, 10, 18, 25, 31, 41, 46, 52, 56, 57, and 67 did not appear for entrance.

23 died.

22 dropped out because of 23's illness.

3, 27, and 47 dropped out because of failure to do the work.

36 became ill.

33, 35, 43, and 62 dropped out without definite reason.

The fifty-four who entered were divided into two sections of twenty-seven each. The students with the higher I. Q.'s were put in section one while the students with the lower I. Q.'s were put in section two. At the present time twenty-five students from the original sec-

tion one remain and nineteen students from section two are left.

These forty-four students have now been in school two quarters of twelve weeks each and have taken the same four subjects each quarter, except that during each quarter each section has had a few students who have taken biology instead of music or drawing, which the remainder of the sections took as their fourth subjects. Each student in the school is given a term credit for each subject which he takes each quarter. The passing grades beginning with the highest are A, A-, B, B-, and C, respectively. A grade of D is given for a term's work which is incomplete because of sickness or other valid excuse. E indicates failure.

The two charts which follow give each student in each section an identification number, state his I. Q. and show the grades he made in each subject each quarter.

A chart showing the I. Q.'s and Term Grades of Section One by subjects for the Fall and Winter Quarters.

Identification No.	I. Q.	Fall Quarter				Winter Quarter			
		Algebra	English	Geography	Drawing & Biology	Algebra	English	Geography	Music & Biology
1	109	B	B-	B	A	B-	B	B	B
2	102	C	C	C	A	E	B-	E	E
6	106	B-	B	B	B-	C	C	B	B
7	105	C	B	B	A-	C	B	A-	B
9	121	B	A-	B	A-	A-	B	B	A-
12	105.6	B	C	B	B	B-	C	B-	B
14	128	A	A-	A	A-	A	A-	A-	B
15	116	A-	A-	A	A	A	C	A	A-
19	119	B	C	B	A-	C	B	B-	B-
20	115	B-	B	A-	E	C	B	A-	E
21	141	A	A-	A	A-	A-	A	A	A-
26	103.2	B	B	B	B	D	E	B-	B
28	105	C	C	E	B	B	E	C	B-
29	116	B-	B-	C	B	B	B-	B	B
32	132	A	A-	A	A	A	A-	A-	A-
34	103	B	B	B	A-	B	A-	B	B
38	119	A	A-	A-	A-	A-	A-	D	B
44	109	B	B-	B	A-	C	B-	B	B
48	117.7	B-	C	C	B	B	C	B-	B
49	116.3	A-	B-	B	B	B	B	B	B
54	114	A-	B	B	A-	B	B	B	B
60	122	A-	B	A-	A	B	B	B	A-
63	129.8	A-	B	B	B	A-	B	A	B
64	121	B	B	A	A-	B-	A	A-	B
65	111.7	B	B-	B	B	B	B-	B	B

A chart showing the I. Q.'s and Term Grades of Section Two by subjects for the Fall and Winter Quarters.

Identifica- tion No.	I. Q.	Fall Quarter				Winter Quarter			
		Algebra	English	Geography	Drawing & Biology	Algebra	English	Geography	Music & Biology
5	98	B-	C	C	B	C	C	C	B-
11	98	C	B-	B	A-	C	C	B-	C
16	93.2	B-	B-	C	B	B-	B-	B	B-
17	89.8	B	B-	B-	B-	B-	C	B-	B-
24	91.9	C	B	B	B	C	B-	B-	B
37	89	A-	B	A	B	A-	B-	A	A
39	100.9	B	B-	B	B-	B	B-	B	B-
40	87.6	C	B	B-	B	C	B-	C	B-
42	98.5	B-	B-	B-	C	C	C	C	B-
45	78	C	E	B	B	C	C	C	B
50	89	C	E	B	A-	E	C	B-	B
51	99	C	B-	C	A-	C	B-	B	B
53	101.4	A-	A	A	B	A	A-	A	A
58	91.2	A-	B	A	A-	A	B	A-	B
59	89	C	B	B	A-	C	B-	B-	E
61	97.1	E	B-	B-	B-	E	C	B	C
66	90	E	B-	B-	B-	E	C	B	C
68	88.4	C	B-	B-	B-	C	C	B-	B-
69	100.7	A	B	A	A-	A	B-	A	A-

The grades made by each section in each subject each quarter have been compiled so as to show the number of A grades made in Algebra in section one. Likewise the number of other grades in other subjects have been collected. The following chart shows the number of each of these grades as they have been collected.

A compilation of the various grades made in the four subjects in each section in the Fall and Winter Quarters.

FALL QUARTER

SECTION 1 (Class of 25)

Algebra	4 A's	5 A-'s	9 B's	4 B-'s	3 C's		
English	0 A's	6 A-'s	9 B's	5 B-'s	5 C's		
Geography	5 A's	3 A-'s	13 B's	0 B-'s	3 C's	1 E	
Drawing and Biology	5 A's	10 A-'s	8 B's	1 B-	0 C's	1 E	

SECTION 2 (Class of 19)

Algebra	1 A	3 A-'s	2 B's	3 B-'s	8 C's	2 E's	
English	1 A	0 A-'s	5 B's	9 B-'s	2 C's	2 E's	
Geography	4 A's	0 A-'s	6 B's	6 B-'s	3 C's		
Drawing and Biology	0 A's	6 A-'s	7 B's	5 B-'s	1 C		

WINTER QUARTER

SECTION 1

Algebra	3 A's	4 A-'s	7 B's	4 B-'s	5 C's	1 E	1 D
English	2 A's	5 A-'s	9 B's	4 B-'s	4 C's	1 E	
Geography	3 A's	5 A-'s	10 B's	4 B-'s	1 C	1 E	1 D
Drawing and Biology	1 A	4 A-'s	16 B's	2 B-'s	0 C's	2 E's	

SECTION 2

Algebra	2 A's	1 A-	2 B's	2 B-'s	9 C's	3 E's
English	0 A's	1 A-	1 B	8 B-'s	9 C's	
Geography	3 A's	1 A-	5 B's	6 B-'s	4 C's	
Drawing and Biology	2 A's	1 A-	5 B's	7 B-'s	3 C's	1 E

II. RELATION OF GRADES MADE BY SECTIONS

By observing the above chart it is quite apparent that section one, which is the section with the higher I. Q.'s, has a much larger percentage of high grades and therefore a much smaller percentage of low grades than section two.

The same fact may be made much more striking by making a chart so that a graph showing the percentage of the various grades made by section one in Algebra in the Fall Quarter (or Term) may be set alongside a graph of the same thing for section two. In the following charts this has been arranged for all the subjects for each section for each Quarter.

If the charts for section one are compared with the charts for section two by subjects and the percentage of A's, A-'s, and B's is determined in each subject, it is observed that,—

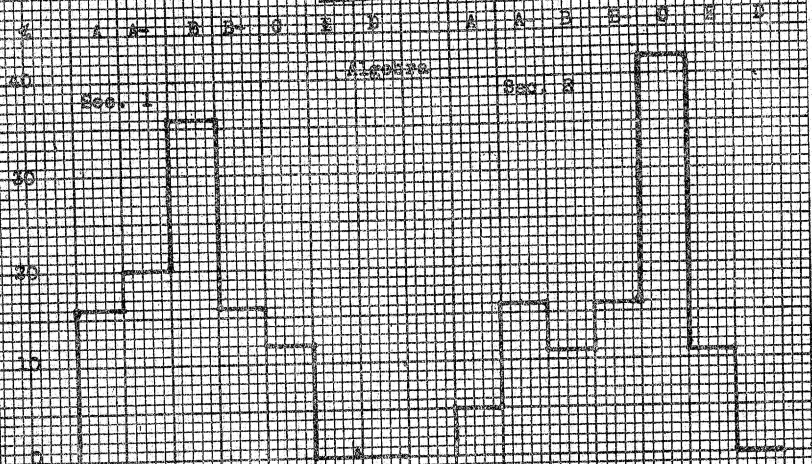
1. In section one 72% of the Algebra grades, 70% of the English grades, 84% of the Geography grades, and 92% of the grades in Drawing and Biology fall in this group of grades in the Fall Quarter, while in section two 32% of the Algebra grades, 31% of the English grades, 53% of the Geography grades and 69% of the Drawing and Biology grades fall in this group.

2. In section one 56% of the Algebra grades, 66% of the English grades, 72% of the Geography grades and 84% of the grades in Music and Biology fall in this group of the grades in the Winter Quarter while in section two only 27% of the Algebra grades, 52% of the English grades, 47% of the Geography grades and 42% of the Music and Biology grades fall in this group.

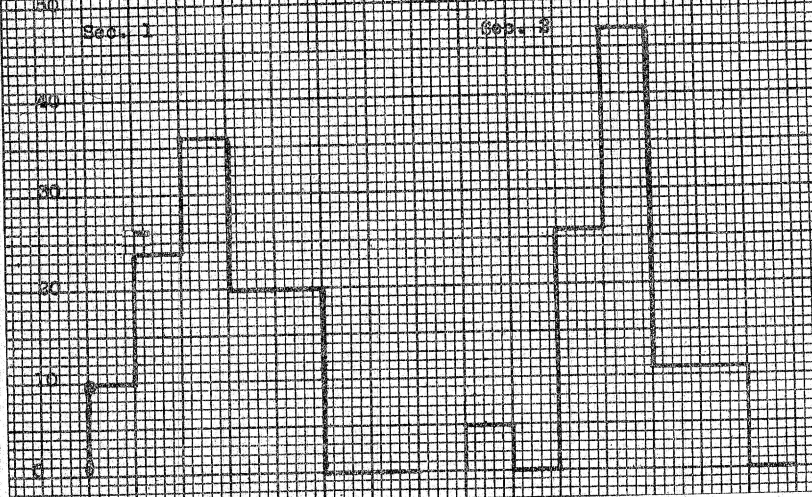
3. Section one has most of its grades in all subjects congested with B's and A-'s in both terms, while section two has most of its grades congested with B-'s and C's.

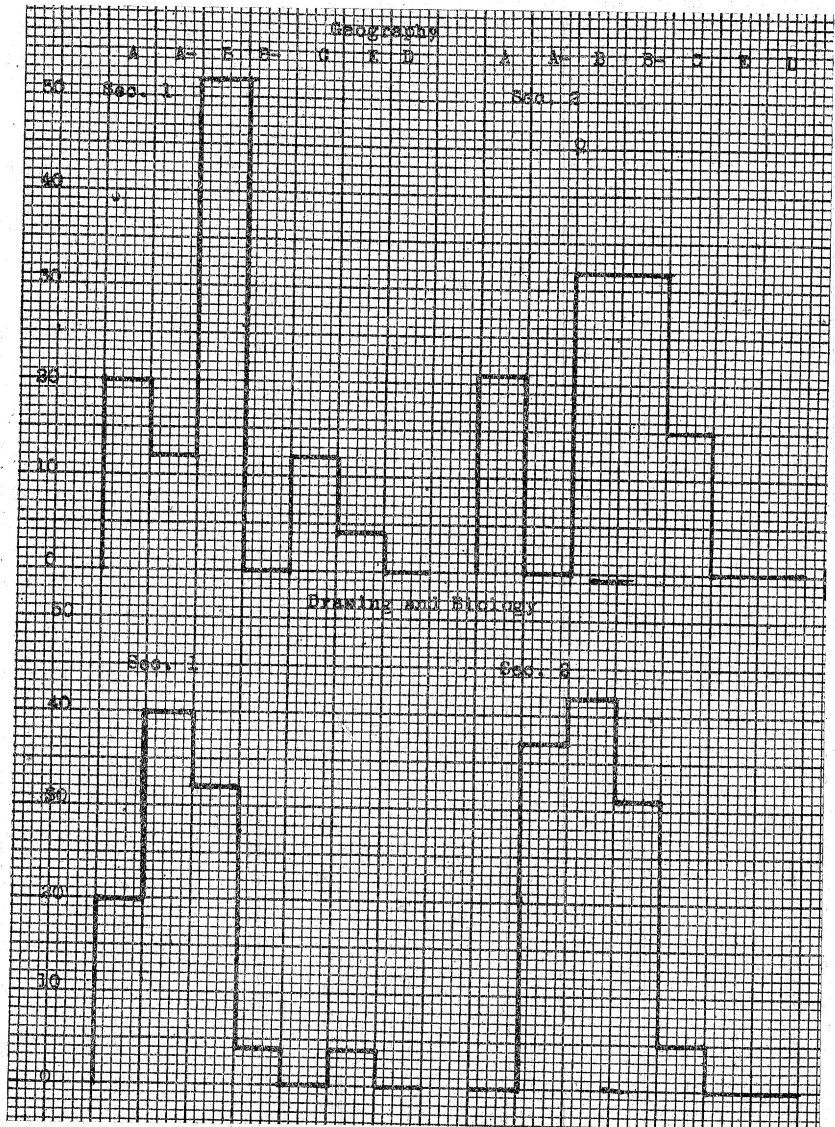
Graphs showing the relative percentages of grades in each subject for the two sections for both quarters

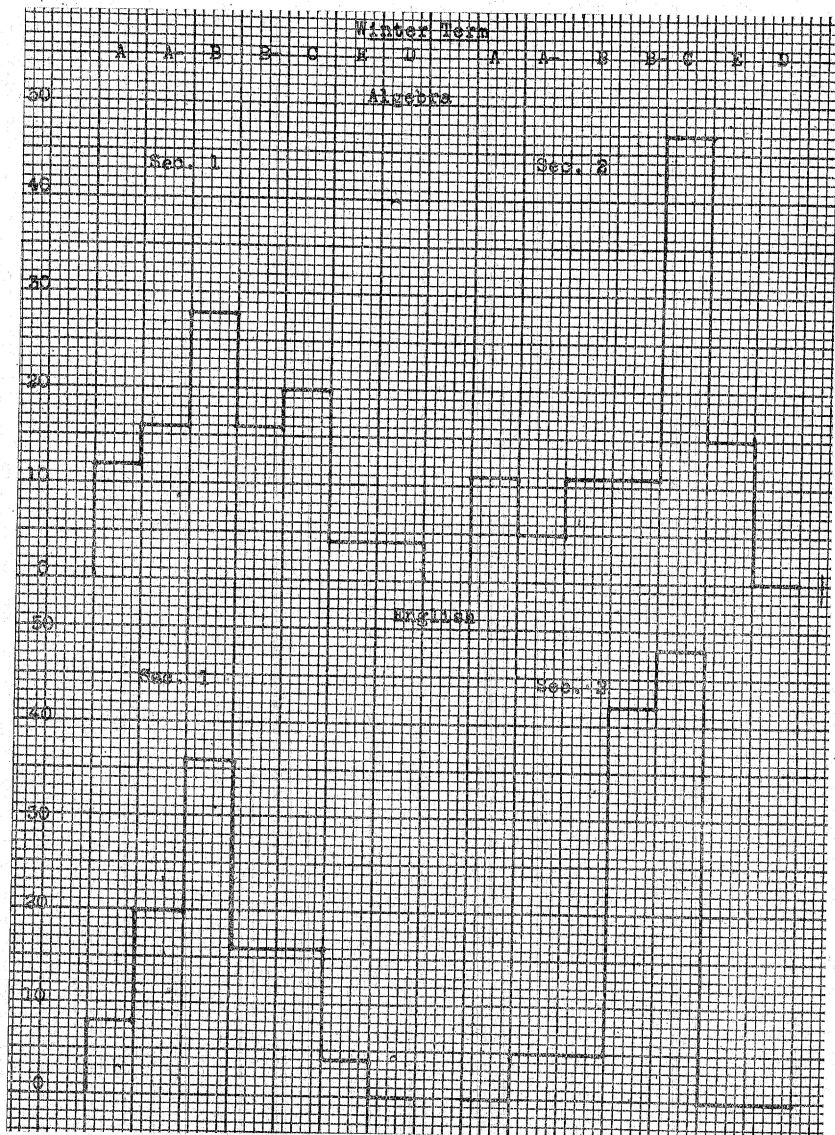
Math Tests

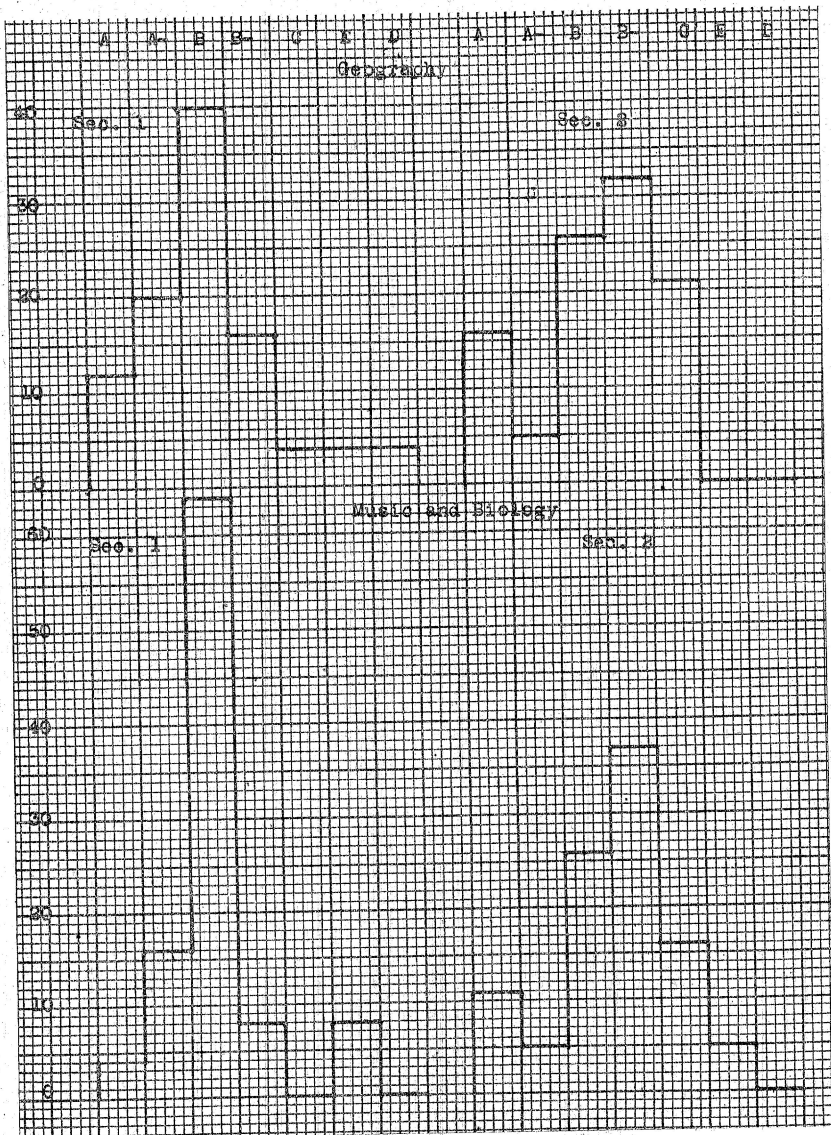


English









4. Section one evidently is quite superior to section two.

III. CORRELATION OF I. Q.'S AND TERM GRADES

To determine the degree of correlation between the I. Q.'s and term grades of the pupils, each section is divided into quintiles on basis of the I. Q.'s of the students in it. These quintiles are marked 1, 2, 3, 4, and 5 beginning with the quintile composed of pupils with the higher I. Q.'s. Likewise the grades of the pupils in each section in each subject are divided into quintiles and are marked 1, 2, 3, 4, and 5 beginning with the quintile composed of the higher grades in each subject. The two charts which follow show the two sections with the identification number of each student in each section, the I. Q. of each student, the I. Q. quintile and each subject quintile in which the student's grades fall for both terms.

Identifica- tion No.	I. Q. Rank	SECTION ONE									
		Fall Quarter					Winter Quarter				
		Intell. Quintile	Algebra Quintile	English Quintile	Geos. Quintile	Draw. & Biol. Quintile	Intell. Quintile	Algebra Quintile	English Quintile	Geos. Quintile	Music & Biol. Quintile
1	18	4	3	4	4	1	4	4	4	4	
2	25	5	5	5	5	1	5	5	5	5	
6	19	4	4	3	4	5	4	5	4	4	
7	22	5	5	3	5	3	5	5	3	4	
9	7	2	2	2	2	2	2	2	2	1	
12	20	4	3	5	4	4	4	4	5	4	
14	4	1	1	1	1	1	1	1	1	4	
15	13	3	2	1	1	1	3	1	3	1	
19	8	2	3	5	2	2	2	4	5	5	
20	14	3	4	3	2	5	3	5	3	5	
21	1	1	1	1	1	2	1	1	1	1	
26	23	5	4	3	4	4	5	4	5	3	
28	21	5	5	5	5	5	5	5	5	5	
29	12	4	5	4	5	4	4	3	4	3	
32	2	1	1	1	1	1	1	1	1	1	
34	24	5	4	3	4	3	5	3	2	3	
38	9	2	1	1	2	2	2	2	1	2	
44	17	4	3	4	3	3	4	5	4	3	
48	10	2	5	5	5	3	2	2	5	5	
49	11	3	2	4	3	4	3	3	3	2	
54	15	3	2	2	3	3	3	2	3	3	
60	5	1	1	2	2	1	1	2	2	3	
63	3	1	2	2	3	5	1	1	2	2	
64	6	2	3	2	1	2	2	3	1	2	
65	16	4	4	4	3	5	4	3	3	5	

Identifica- tion No.	Intelligence Quotient Rank	SECTION TWO					SECTION TWO				
		Fall Quarter					Winter Quarter				
		Intelligence Quintile	Algebra Quintile	English Quintile	Geography Quintile	Drawing & Biol. Quintile	Intelligence Quintile	Algebra Quintile	English Quintile	Geography Quintile	Music & Biol. Quintile
5	7	2	2	5	5	2	2	3	3	3	
11	6	2	4	2	2	2	3	3	3	4	
16	9	3	2	3	5	3	3	2	3	3	
17	13	4	2	4	4	4	4	2	4	4	
24	10	3	4	2	3	3	3	3	3	2	
37	16	4	1	2	1	3	4	1	2	1	
39	2	1	2	3	2	4	1	1	2	3	
40	18	5	3	2	4	3	5	4	2	5	
42	5	2	3	4	3	5	2	3	4	3	
45	19	5	5	5	3	4	5	4	5	2	
50	15	4	3	5	2	2	4	5	4	2	
51	4	1	3	4	5	1	1	3	1	2	
53	1	1	1	1	1	2	1	2	1	1	
58	11	3	1	1	1	1	3	1	1	2	
59	14	4	4	1	2	1	4	4	2	3	
61	8	2	5	3	3	4	2	5	4	2	
66	12	3	5	3	4	5	3	5	5	3	
68	17	5	4	4	4	5	5	4	5	4	
69	3	1	1	1	1	1	1	1	2	1	

By a study of the last two charts it is easy to determine whether a student whose I. Q. placed him in quintile 1, was also placed in quintile 1 by his Algebra grade. If so, there is a total correlation between his I. Q. and his Algebra grade. If by his I. Q. he is in quintile 2 but by his English grade he is in quintile 3, there is a variation of one quintile. It is readily observed, therefore, that there may be a total correlation, or a variation of one, two, three, or even four quintiles.

Checking through the two charts the following correlations and variations are discovered,—

FALL TERM, SECTION ONE

ALGEBRA

1. Ten students had a total correlation of quintiles in their I. Q.'s and Algebra grades.
2. Fourteen students had a variation of but one quintile in their I. Q.'s and Algebra grades.
3. One student had a variation of three quintiles in his I. Q. and Algebra grade.

ENGLISH

1. Twelve students had a total correlation.
2. Seven students had a variation of one quintile.
3. Four students had a variation of two quintiles.
4. Two students had a variation of three quintiles.

GEOGRAPHY

1. Fourteen students had a total correlation.
2. Eight students had a variation of one quintile.
3. Two students had a variation of two quintiles.
4. One student had a variation of three quintiles.

DRAWING AND BIOLOGY

1. Eleven students had a total correlation.
2. Seven students had a variation of one quintile.
3. Four students had a variation of two quintiles.
4. One student had a variation of three quintiles.
5. Two students had a variation of four quintiles.

FALL TERM, SECTION TWO

ALGEBRA

1. Five students had a total correlation.
2. Six students had a variation of one quintile.
3. Six students had a variation of two quintiles.
4. Two students had a variation of three quintiles.

ENGLISH

1. Seven students had a total correlation.
2. Four students had a variation of one quintile.
3. Four students had a variation of two quintiles.
4. Four students had a variation of three quintiles.

GEOGRAPHY

1. Five students had a total correlation.
2. Six students had a variation of one quintile.
3. Five students had a variation of two quintiles.
4. Two students had a variation of three quintiles.
5. One student had a variation of four quintiles.

DRAWING AND BIOLOGY

1. Eight students had a total correlation.
2. Three students had a variation of one quintile.
3. Five students had a variation of two quintiles.
4. Three students had a variation of three quintiles.

WINTER TERM, SECTION ONE

ALGEBRA

1. Fourteen students had a total correlation.
2. Seven students had a variation of one quintile.
3. Four students had a variation of two quintiles.

ENGLISH

1. Thirteen students had a total correlation.
2. Seven students had a variation of one quintile.
3. One student had a variation of two quintiles.
4. Four students had a variation of three quintiles.

GEOGRAPHY

1. Sixteen students had a total correlation.
2. Four students had a variation of one quintile.
3. Two students had a variation of two quintiles.
4. Three students had a variation of three quintiles.

MUSIC AND BIOLOGY

1. Twelve students had a total correlation.
2. Seven students had a variation of one quintile.
3. Four students had a variation of two quintiles.
4. Two students had a variation of three quintiles.

WINTER TERM, SECTION TWO

ALGEBRA

1. Five students had a total correlation.
2. Eight students had a variation of one quintile.
3. Four students had a variation of two quintiles.
4. Two students had a variation of three quintiles.

ENGLISH

1. Nine students had a total correlation.
2. Three students had a variation of one quintile.
3. Six students had a variation of two quintiles.
4. One student had a variation of three quintiles.

GEOGRAPHY

1. Nine students had a total correlation.
2. Six students had a variation of one quintile.
3. Two students had a variation of two quintiles.
4. Two students had a variation of three quintiles.

MUSIC AND BIOLOGY

1. Five students had a total correlation.
2. Seven students had a variation of one quintile.
3. Four students had a variation of two quintiles.
4. Three students had a variation of three quintiles.

If we consider total correlation as 100% correlation; variation of one quintile as 75% correlation; variation of two quintiles as 50% correlation; variation of three quintiles as 25% correlation; and variation of four quintiles as 0% correlation, the following statements are true,—

1. In the Fall Quarter section one had 84% correlation in Algebra; 79% correlation in English; 85% correlation in Geography; and 74% correlation in Drawing and Biology.

2. In the Fall Quarter section two had 68.4% correlation in Algebra; 68.4% correlation in English; 65.8% correlation in Geography; and 71% correlation in Drawing and Biology.

3. In the Winter Quarter section one had 85% correlation in Algebra; 79% correlation in English; 83% correlation in Geography; and 79% correlation in Music and Biology.

4. In the Winter Quarter section two had 71% correlation in Algebra; 76.3% correlation in English; 79% correlation in Geography; and 68.4% correlation in Music and Biology.

5. In all subjects in the Fall Quarter section one had 80.5% of correlation and section two had 68.4% of correlation.

6. In all subjects in the Winter Quarter section one had 81.5% of correlation and section two had 73.7% of correlation.

7. In all subjects in both quarters both sections had 76.7% of correlation.

From the above it seems probable that the I. Q.'s of students will give a teacher rather reliable evidence as to what may be expected of these students in high school subjects in the ninth grade.