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A Study of The Relation of Achievement In Particular Fields In High School To Achievement In Particular Fields In College: Being A Study of 280 Freshmen Who Entered The Fort Hays Kansas State College In September, 1930

Ellsworth Dodrill

Fort Hays Kansas State College

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A Study of the Relation of Achievement in
Particular Fields in High School to Achievement
in Particular Fields in College.

Being a Study of 280 Freshmen Who Entered
the Fort Hays Kansas State College in September,
1930.

by

Ellsworth Dodrill

A Thesis

Presented to the Graduate Council in
Partial Fulfillment of the Requirements for the
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Approved by

Harmer B. Reed.
Major Professor

Date

April 7, 1932



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Acknowledgment

Author

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I

INTRODUCTION

This study has two purposes. The first one is to determine the high school achievement of the Freshmen class which entered the Fort Hays Kansas State College in September, 1930. The second purpose is to determine to what extent college success in the various fields, English, Mathematics, Natural Science, and Social Science, can be predicted from success in the corresponding fields in high school.

The findings are based on the results of the following tests¹ given to the Freshmen of the college in December, 1930, by the Department of Psychology: the Sonen-Harry High School Achievement Test, the Hudelson Typical Composition Ability Scale, The Thorndike Test of Word Knowledge, the Thorndike-McCall Reading Scale, and the Sixteen Spelling Scales, List XIII. The High School and College Marks used were taken from the official transcripts in the registrar's office.

The tests were given under the usual conditions and were graded and scaled under the direct supervision of the Department of Psychology. For this reason it is believed that the test scores are reliable. All calculations were carefully checked and are believed to be accurate.

1. See Bibliography, Numbers 8, 9, 11, 12, and 13.

II.

Summary of Related Studies.

Professor Mark May¹ of Syracuse University made a study of 450 Freshmen of that institution to determine what factors most influence "academic success." He defined "academic success" as intellectual achievement as measured by college marks or honor points. He also included the hours spent in study. The honor points were based on the following scheme of grading: an A grade carried 3 honor points, a B 2 honor points, a C grade one honor point, and a D grade, the passing mark, none. It was thus possible for a student to earn 48 honor points in one semester. This study was based on the honor points earned during the students' first semester in college.

General intelligence was measured by a combination of the Miller Mental Test, and the Dartmouth Completion of Definitions Test. The distribution of the scores showed a fairly normal curve. As a measure of industry and application, it was decided to take the number of hours per week spent, on the average, in study. In order to get this average, information as to study habits was obtained by means of a questionnaire given at the beginning of the semester and again at the middle. The self-correlation between the two statements-number of hours

1. See Bibliography, Number 10.

spent in study-on the first and second questionnaires was .86. Since this was indicative of a satisfactory degree of reliability, the second questionnaire was used in the study as it was considered to be the best estimate of the two. As the students grew more accustomed to college life, their study habits were likely to be more settled.

As a measure of high school success, the number of units presented for graduation and the average grade obtained were taken. This gave a problem of five variables.

The correlation between Honor points and high school units was .22. The Units curve was greatly skewed which accounts for this low r . The mean was around 14 to 15 with a range of 14 to 23. The correlation between Honor points and high school average was .405. The correlation between Hours of Study and Honor points was .32. The correlation between Honor points and Intelligence was .60. The correlation between Honor points and Intelligence with Hours of Study partialled out was .805. Intelligence and Hours of Study gave an r of $-.35$. This points to the common "tendency to least effort" so often found among high school and college students. The brighter ones study less while the less bright ones must spend much time in study in order to get their work and hence are more likely to go above the average.

A study of the regression equation throws light on the values or weights of the various factors of prediction.
 Honor points² $.58 \times$ Intelligence score plus $.14 \times$ average high school grades plus $1.10 \times$ Time Spent minus $1.03 \times$ high school units minus 62.

Leaving out the number of units gives: Honor points = $.55 \times$ Intelligence plus $1.06 \times$ Time Spent plus $.083 \times$ High school average minus 70. Since the weight of high school average is small, we can leave it out and get: Honor points = $.62 \times$ Intelligence plus $1.2 \times$ Time Spent minus 70. Thus predictions can be made nearly as well by leaving out average grades and units. The R is $.64$ while the r between Intelligence and Honor points is $.60$. This shows that Intelligence alone would be about as valuable for prediction as using the whole number of variables. Honor points and Units with Intelligence held constant is $.071$; with Time Spent held constant is $.143$; and with all three held constant is negative $.218$. Thus industry and Intelligence are the things that count provided the student has the average number of units of high school work. A student presenting 14 or 15 units has as good a chance of college success as has a student with 20 units. According to these findings, a student who has had ten units or even eight units has a 50-50 chance to succeed in college.

High school averages and Honor points with Intelligence held constant is $.246$; with Time Spent held constant is $.388$; with units held constant is $.348$; with Time Spent and Intelligence held constant is $.318$. Thus it is evident that high school averages are a factor in prediction, but a minor one. Honor points and Intelligence with Time Spent held constant is $.805$; with high school averages held constant is $.532$; with units held constant is $.59$. Remember that Intelligence and Time Spent is negative $.35$.

Apparently the most reliable means of prediction are the factors of Intelligence and Time Spent. By means of a regression equation, it would be possible to show a student who has a certain score in Intelligence just how many hours of study per week he would need to spend in order to make a certain number of Honor points. As yet we do not have a measure with an r of .90. This is necessary before we can get a probable error of three. We must have a $PE_{est.}$ that low to be at all reliable in our predictions. Professor May believes that we must first be able to measure such human traits as efficiency, character, personality, health, and environmental influences, all of which have to do with academic success, before we can accomplish this.

Some interesting conclusions may be drawn from a report, "The Relationship of Intelligence and Achievement Test Scores To Mortality and Scholastic Ratings¹", a Study of 559 Freshmen at Colorado State Teachers' College. The class entered in September, 1927. The study was published a year later. The three variables used were: College ratings, the Elementary Section of the Achievement Test known as the Entrance and Classification Examination for Teachers' Colleges compiled by Whitney, Hallman, and Woody of Colorado State Teachers' College, and the Thurstone Intelligence Test.

1. See Bibliography, Number 2.

Scholastic ratings were based on the following plan: an "A" grade equals 5, a "B" equals 4, a "C" equals 3, a "D" equals 2, and an "F" equals 1. Of the 559 students who took the classification examination, 129, or 23% failed to complete one year's work. Of these 129 who failed to complete a year's work, 40% were in the lowest fifth in the intelligence ratings; 68% were in the lower half; and but 9% were in the highest fifth in intelligence. There was a loss of 76 students during the winter quarter; three times as large a loss as for either fall or spring quarters. Complete data on the reasons for mortality were available for only half of the 129 cases. Only 16% of the total students fell in the same decile in scholastic ratings and intelligence scores. Forty-six percent of them failed to make as high a scholastic rating as their intelligence score warranted, while 38% exceeded expectations in this respect. Achievement scores and intelligence scores have a correlation of .73. The average or median of scholastic ratings were slightly raised from quarter to quarter being: 3.00 in the fall, 3.07 in the winter, and 3.14 in the spring with an average of 3.05 for the year. The approximate average scholastic ratings for each quarter increased quite regularly from low to high intelligence scores with the exception of the second decile of intelligence where

scholarship was lower for each quarter and for the year. On the whole, the achievement test and Thurstone test appear to have nearly equal reliability in predicting scholastic success. A combination of both tests does not prove of any more value than either taken separately. Average scholarship correlates with intelligence with an (r) of .4543 plus or minus .0232 and with achievement scores with an (r) of .4979 plus or minus .0221. It is possible to predict scholastic ratings of college success with a probable error of .3296. Actual predictions on 50 cases yielded average errors of prediction of .34.

This study is continued through the Sophomore year¹. A few of its conclusions will be of interest. The average scholastic achievement was 3.24 at the end of the second year. This is higher than the average of 3.05 made by the class the first year. High standing in the Thurstone test predicts high achievement scholastically. There is much displacement, however. The classification test appears to predict scholastic achievement with slightly more accuracy than does the Thurstone test scores, and classification test scores were much smaller for the sophomore year than they

1. See Bibliography, Number 6.

were for the freshman year. Mortality over the two years was very high .54.2%.

Another report from the Colorado State Teachers' College ¹ is of interest. Of these 438 Freshmen who entered in September, 1928, 109 or 24.9% failed to complete the year's work. The loss for the class which entered in the fall of 1927 was 23%, while the loss for the class entering in the fall of 1926 was 30%. Of this group of 109 who failed, 27.64% were in the lowest fifth and 21.59% were in the highest fifth of intelligence. No satisfactory explanation for this can be made. The largest mortality, 14.2% occurred in the winter quarter. The median scholastic rating raised from quarter to quarter, reaching an average of 3.09 for the year. The achievement test shows indications of being of more value in predicting scholastic achievement than does the Thurstone test. Intelligence and achievement tests correlated .7224 plus or minus .0154. Average scholarship correlated .4935 plus or minus .0262 with the Thurstone test and .5522 plus or minus .0422 with the classification test scores. A fourth report from the Colorado State Teachers' College ² shows that of the 626 Freshmen registering in September, 1926, 439 received credit for one year's work, making a mortality of 30%. Of these, only 231 finished the second year. The median intelligence score of this group increased 6.10 points during

1. See Bibliography, Number 7.
2. See Bibliography, Number 1.

the Freshman year, indicating elimination of students of low scores. Tabulation of scholastic ratings for each quarter of 1927-28 and an average for the year show an increase in median achievement each succeeding quarter and greater homogeneity for the entire group. Of those dropping out of school during the two years, approximately 60% were in the lower half of the intelligence distribution and 40% were in the lower fifth. About 20% were in the upper fifth of the intelligence scores.

F. B. Dilley, registrar of the Ohio State University, has made a study ¹ of the university's Freshman testing program which was started in 1926. In April, 1922, the Ohio State Assembly passed a law requiring all students entering the state's training schools for teachers to take an English test and a general intelligence test, approved by the State Director of Education. Professor Dilley points out that psychologists have found that an intelligence test is as useful as high school marks in predicting college success. The Ohio State University as first used a battery of tests, but he found that one general intelligence test was as good, so they have been using only one since the first year. The tests used are the Ohio State Psychological Tests commonly known as the Ohio College Association tests. They have required all Freshmen to take the tests beginning with the 1926 class. The college has a probation system whereby a student who makes at

1. See Bibliography, Number 5.

least eight points--an A grade is 2 points, a B is 2 points, a C is 1 point and a D is 0 points--for the first year is allowed to go ahead for the second year. Then, if he makes points for the second year equal to two-thirds of the hours carried, he is allowed to continue, otherwise he is automatically dropped. The State Department set the passing score in 1926 at a point which was expected to eliminate or fail about 10%, gradually raising it until it reached 26% in 1930. The most important results are as follows:

| | | | | |
|---|------|-------|-------|-------|
| Year----- | 1926 | 1927 | 1928 | 1929 |
| Number entering--- | 881 | 906 | 928 | 921 |
| Withdraw during--- | | | | |
| 1st Semester----- | 9.4% | 10.4% | 11% | 6.4% |
| Per cent failed--- | 3.6% | 12.8% | 11.5% | 18.7% |
| Completed year--- | 76% | 76% | 75% | 80% |
| Of those who completed first year, per cent who made a C grade----- | 32% | 20% | 32% | 26% |

The general conclusions are: No student failing in the tests ever made an A grade; a few made a B grade; and 20 to 32 per cent made C's. The general intelligence test is fairly accurate in finding the students who will not be found in the higher ranks of the college work, and the tests are not accurate enough to be used as a sole means of exclusion because many who rank low can and do make satisfactory college records.



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Using the high school and college transcripts from the registrar's office, the number of high school semesters of work taken by each student in each of the four departments, English, Mathematics, Natural Science, and Social Science, was determined. If a student had taken work in the college in one of these departments during the first semester, it was counted as an extra semester in high school. Twelve week's work in college would about equal a semester in high school. This expediency gave greater accuracy in determining the achievement as based on the norms given in the Sones-Harry manual (Table I). The degree of achievement according to the standard norms in the Rudelson Composition test, the Thorndike Word Knowledge test, and the Thorndike-McCall Reading test, and the Sixteen Spelling Scales, was also determined. The results of this part of the study, given in a later section, show the standard of achievement reached by this particular group of students in each of the four particular fields.

The average grade for the four years of high school and for the Freshman college year in each of the four particular fields was calculated. An A grade carried 5 Honor Points, a B grade 4 Honor Points, a C grade 3 Honor Points, a D grade 2 Honor Points, and an F grade 1 Honor Point. For example, an A grade in a two-hour course earns 10 Honor Points. The total Honor Points divided by the hours taken for the semester gives the grade index.

The next step in the procedure was to translate the scores made in the various tests and the high school and college averages into T-scores. The writer made the T-scales for each of the four departments in the high school and college records, eight sets in all. The T-scores for the tests were made by Dean Floyd B. Lee of the college who is making a study pertaining to the prediction of college success and mortality. This device makes the scores from the various tests and the high school and college averages directly comparable. Furthermore, it facilitates making the correlation charts, since the same range and step intervals can be used on each chart.

The following nineteen items were tabulated in a convenient form. (See Appendix A). The numbers refer to the number of the columns. Sones-Harry School Achievement test: (1) English, Part I; (2) Mathematics, Part II; (3) Natural Science, Part III; (4) Social Science, Part IV; (5) Total test score; College Record: (6) average of semester final grade in all subjects; (7) in Rhetoric; (8) in Mathematics; (9) in Natural Science; (10) in Social Science; High School average for four years: (11) in English; (12) in Mathematics; (13) in Natural Science; (14) in Social Science; (15) in all subjects together; (16) Hudelson Composition test, (17) Thorndike Word Knowledge Test; (18) Thorndike-McCall Reading Test; (19) the Sixteen Spelling Scales.

The next step was to calculate the simple, multiple, and partial correlations needed in the study. Kelley's charts were

used. Then, by means of the Regression Equation, Score Form, college success in each of the four fields was predicted and tables constructed. In the field of English, predictions were made using six variables as indicated in Table VIII for 100 cases taken alternately from an alphabetical list. A correlation was then obtained between actual scores and the predicted scores for the 100 cases. A second prediction was made for 50 of these same cases, taken alternately, using only the scores made in the Sones-Harry Achievement Test, Part I, and the high school averages in English. Table VIII shows these results in detail. Multiple R'S and Probable Errors were calculated and are worthy of study. The predictions, ten cases each, in the other three fields, were made from three variables in each case, as cited below.

The study in English was based on Part I of the Sones-Harry Test, the college and high school marks in English, the Hurdelson Composition Test, the Thorndike Word Knowledge Test, and the Thorndike-McCall Reading Test. The study in Mathematics was based on Part II of the Sones-Harry Test, and the college and high school marks in Mathematics. The study in Natural Sciences was based on Part III of the Sones-Harry Test and the college and high school marks in Natural Sciences. The study in Social Sciences was based on the Sones-Harry Test, Part IV, and the college and high school marks in Social Sciences.

IV

Standards Attained in Various Achievement Tests
by the Freshman Class Entering the Fort Hays Kansas
State College in September, 1930.

The standards attained in the Sones-Harry High School Achievement Test, (Table XII) the Hudson Typical Composition Ability Scale, the Thorndike Test of Word Knowledge, the Thorndike-McCall Reading Scale, and the Sixteen Spelling Scales by this group of high school Seniors are herewith compared with the norms for those tests.

Of the 280 Freshmen, only 245 took the first three parts of the Sones-Harry Test and 235 took the fourth part. Two-hundred-forty-five students took the other four tests. These figures represent the minimum numbers who took the tests. Differences in these numbers are due to absences because of sickness and withdrawals. In the correlations, adjustments were made to give the proper number of cases for use in the charts.

In the English test, Part I, (see Tables I and II) the 50th percentile norm for all high school students, regardless of the number of semesters of English taken, as given in the established standards is 39. Only 53 of the 245 or 21.6 per cent fell below this norm. Taking into consideration the number of semesters of English taken and the norm for each, of the 245 students, 142 or 58 per cent fell below their respective norms. Of the 155 students who had taken seven semesters of English

Table I

The 50th Percentile Norms for the Separate Tests of the Sones-Harry High School Achievement Tests for the Number of Half Years of Each Subject Taken and for all Students Taking the Subject are as Follows:

| | 1 Semester | | | | 2 Semester | | | | 3 Semester | | | | 4 Semester | | | |
|-------|------------|----|-----|----|------------|----|-----|----|------------|----|-----|----|------------|----|-----|-------|
| Part: | I | II | III | IV | I | II | III | IV | I | II | III | IV | I | II | III | IV |
| Norm: | 27 | 12 | 16 | 17 | 28 | 13 | 19 | 20 | 30 | 18 | 21 | 19 | 38 | 22 | 26 | 25 |
| | 5 Semester | | | | 6 Semester | | | | 7 Semester | | | | 8 Semester | | | |
| Part: | I | II | III | IV | I | II | III | IV | I | II | III | IV | I | II | III | IV |
| Norm: | 42 | 25 | 27 | 28 | 43 | 29 | 34 | 30 | 55 | 32 | 39 | 36 | 61 | 41 | 44 | none. |

Norm for all Students Regardless of the Number of Semesters.
 Part: I II III IV (#). Part I is Language and Literature; Part II is Mathematics; Part III is Natural Science; Part IV is Soc.Sc.

Table II
 Results of the Sones-Harry High School Achievement Test, Part I.

| | Entire group based on 6 semester norm. | Entire group based on 7 semester norm. | Students having 7 semesters of English | Students having 9 semesters of English. | Total number of students regardless of number of sem. | Based on the respective norm of each group. |
|----------------------------------|--|--|--|---|---|---|
| Norm, see table 1. | 43 | 55 | 55 | 65 | 39 | See Table 1. |
| Number of students counted | 245 | 245 | 155 | 90 | 245 | 245 |
| Number students below norm. | 69 | 132 | 38 | 52 | 53 | 142 |
| Per cent of students below norm. | 24 | 54 | 57 | 58 | 21.6 | 58. |

- (1) This percentage was obtained by taking the number of students in each semester who were below their norm and comparing them with the entire group.

Table III

The Type of Content and the Number of Items in Each Section of the Sones-Harry High School Achievement Test are Given in the Following Chart.

Part I. Language and Literature (140 items).

| Section | Number of Items | Section | Number of Items |
|------------------------------|-----------------|---------------------------|-----------------|
| A. Language Meaning----- | 10 | I. Character Sketches---- | 5 |
| B. Word Meaning ----- | 10 | J. Literary Passages---- | 5 |
| C. Abbrev. & Prefixes----- | 10 | K. Literary Themes----- | 10 |
| D. Gram. Principles----- | 5 | L. Tech. Lang. Vocab.---- | 10 |
| E. Foreign Phrases----- | 10 | M. Gram. & Rhet. Forms-- | 10 |
| F. Literary Forms----- | 5 | N. Literary Characters-- | 15 |
| G. Reading Comprehension--- | 8 | O. Am. & Eng. Authors--- | 15 |
| H. Internat'n'l Authorship-- | 10 | P. Literary Interests--- | 7 |

Part II. Mathematics (80 items).

| | | | |
|------------------------------|----|----------------------------|----|
| A. Fundamentals of Math---- | 30 | E. Geometric Figures---- | 5 |
| B. Mathematical Concepts--- | 10 | F. Geometric Formulas--- | 5 |
| C. Interpretat'n of Graphs-- | 5 | G. Geometry Theorems---- | 10 |
| D. Funct'n'l Relationship-- | 10 | H. Mathematical Formulas-- | 5 |

Part III. Natural Sciences (80 items).

| | | | |
|----------------------------|----|------------------------------|----|
| A. Natural Sciences----- | 5 | F. Extremes in Nature----- | 5 |
| B. Science Processes----- | 10 | G. Transformat'n of Energy-- | 10 |
| C. Classification----- | 5 | H. Science Stories----- | 15 |
| D. Science Principles----- | 10 | I. Science Instruments---- | 5 |
| E. Numeral Values----- | 5 | J. Scientists----- | 10 |

Part IV. Social Studies (115 items).

| | | | |
|-----------------------------|----|----------------------------|----|
| A. Civic Information----- | 10 | F. Character of History-- | 10 |
| B. Civic Information----- | 20 | G. International Affairs-- | 10 |
| C. Famous Americans----- | 10 | H. Place Geography----- | 10 |
| D. Background of Civ.----- | 15 | I. Economists----- | 5 |
| E. Events in Am. Hist.----- | 15 | J. Economic Vocabulary-- | 10 |

in high school, 88 or 57 per cent fell below the norm of 55. Of the 90 who had taken nine semesters of English, 52 or 58 per cent fell below the required norm of 65. The three months spent in college Rhetoric classes was counted as an added semester in high school English. As to whether this is justifiable or not, is a debatable question. The college English might not be of advantage in answering questions in a high school achievement test. The group might have done just as well in September as in December. The norm for nine semesters was reached by interpolation and may not be the true one. Considering the entire group as having had six semesters of English, 69 or 24 per cent fell below the norm of 43. Using the norm of 55 for those who had taken seven semesters of English, 132 or 54 per cent fell below the norm. In this study of English, it should be borne in mind that not all of the high schools require eight semesters of English. In view of this, it would seem just to expect the group to at least attain the seven semester standard. If this is done, this group is very near the norm, as almost 50 percent reached it. This group seems to be normal in all types of English except the Composition, as will be pointed out near the close of this section.

In Mathematics (Table IV), the achievement is much better than in the English 50th percentile. The norm for the entire group regardless of the number of semesters of Mathematics taken is 18. Of the 245 students who took the test, only 29 or 12 per cent fell below the norm. Taking into consideration the number of semesters taken and the norm for each, 73 or 30 per

cent fall below their respective norms. Of the 98 who had taken four semesters of Mathematics, 23 or 23 per cent were below the required norm which is 22. Of the 89 who had taken five semesters, 27 or 30 per cent were below the norm of 25. Of the 58 who had taken six semesters, 13 or 22 per cent were below the norm of 29. It is interesting to note that of the 245 students who took the test, only nine had had less than four semesters of Mathematics in high school. Some schools offer five or six semesters. Using the norm of 25, the standard for those having five semesters, 73 or 30 per cent were below. This would indicate that the group is above the standard. Evidently Mathematics is being required in most of our high schools and is being well taught. This is of interest in face of the fact that about six years ago the State Department of Education took Mathematics from the required list. Evidently the students in this college are not much interested in Mathematics, as only 62 of the 245 took any Mathematics, at least for the first year.

In Natural Science, see Table V, the norm for the entire group regardless of the number of semesters taken is 19. Seventeen of the 245 or seven per cent were below the norm. Taking into consideration the number of semesters taken and the required norm for each, 110 or 45 per cent of the 245 were below their respective norms. Of the 67 who had taken four semesters of Natural Science, 16 or 24 per cent were below the norm of 26. Of the 47 who had taken five semesters, 15 or 32 per cent were below the norm of 27. Of the 56 who had taken six semesters, 31 or 55.5 per cent were below the norm of 34.

Results of the Sones-Harry High School Achievement Test, Part II.

| | Students having 4 sem. of Math. | Entire number based on 5 Sem. standard | Students having 5 semesters or more of Math. | Students having 6 or more sem. of Math. | Total no. of Students regardless of no. sem. | Based on the respective norm of each group |
|------------------------------|---------------------------------|--|--|---|--|--|
| Norm, See Table I | 22 | 25 | 25 | 29 | 18 | See Table I |
| Number of students counted | 98 | 245 | 89 | 58 | 245 | 245 |
| No. students below the norm. | 33 | 73 | 27 | 13 | 29 | 73 |
| Per cent of students below | 33 | 30 | 30 | 22 | 12 | 30 (1) |

Table V

Results of the Sones-Harry High School Achievement Test, Part III.

| | Students having 4 semesters of Natural Science | Students having 5 semesters of Natural Science | Students having 6 sem. of H. Sc. | Students having 7 sem. | Students having 8 sem. | Total no. of students regardless of no. of sem. | Based on the respective mean of each group |
|----------------------------|--|--|----------------------------------|------------------------|------------------------|---|--|
| Norm see Table I | 26 | 27 | 34 | 39 | 44 | 19 | See Table I |
| Number of students counted | 67 | 47 | 56 | 43 | 32 | 245 | 245 |
| No. students below norm. | 16 | 15 | 31 | 27 | 23 | 17 | 110 |
| Per cent of students below | 24 | 32 | 55.5 | 63 | 70 | 7 | 45 (1) |

- (1) This percentage was obtained by taking the number of students in each semester who were below their norm and comparing them with the entire group.

Of the 43 who had taken seven semesters, 27 or 63 per cent were below the norm of 39. Of the 32 who had taken eight semesters, or more, 23 or 70 per cent were below the norm of 44. This study shows that those in the upper levels or those who have taken the most work failed to reach the required norms. When the whole group is thrown together and the percentages below considered, the standards are exceeded.

The showing in Social Science given in (Table VI) is best of all. The 50th percentile norm for the entire group regardless of the number of semesters taken is 25. Considering the entire group of 235 who took this part of the test, 40 or 17 per cent were below the standard. Taking into consideration the number of semesters taken and the norm for each, of the 235 students, 64 or 27 per cent were below their respective norms. Of the 31 who had taken four semesters or less, 5 or 16.5 per cent were below the norm of 25. Of the 42 who had taken five semesters, 11 or 26 per cent were below the norm of 28. Of the 46 who had taken six semesters, 9 or 20 per cent were below the norm of 30. Of the 116 who had taken seven semesters, 39 or 34 per cent were below the norm of 36. It is very evident that this group is considerably above the standards in every case.

In the Rudelson Typical Composition Ability Scale, the standard mean for high school Seniors is 6.7. This group had a mean of 4.25, which is the standard of achievement for the sixth grade. Such a showing does not speak very well for the composition ability of the group.

Table VI

Results of the Sones-Harry High School Achievement Test, Part IV.

| | Students having 4 semesters of Social Science | Students having 5 semesters of Social Science | Students having 6 semesters of Social Science | Students having 7 semesters of Social Science | Total no. of students regardless of sem. | Based on the respective norm of each group. |
|----------------------------------|---|---|---|---|--|---|
| See Table I Norm. | 25 | 28 | 30 | 36 | 25 | See Table I |
| Number of students counted | 31 | 42 | 46 | 116 | 235 | 235 |
| Number of students below norm. | 5 | 11 | 9 | 39 | 40 | 64 |
| Per cent of students below norm. | 16.5 | 26 | 20 | 34 | 17 | 27 (1) |

(1) This percentage was obtained by taking the number of students in each semester who were below their norm and comparing them with the entire group.

The mean of this group in the Thorndike Test of Word Knowledge is 73. The mean for ninth grade high school students is 64 and the mean for able college students is 88. A score of 73 is almost midway between these two scores and would warrant the conclusion that this group of students were up to standard in respect to word knowledge.

In the Sixteen Spelling Scales, List XIII, the mean of a standard twelfth grade group is 73 per cent. This group made a mean score of 80 per cent, which shows that they are considerably above normal in spelling ability.

Summary: The group is about normal in English, Part I, of the Sones-Harry High School Achievement Test; in Mathematics, Part II, 70 per cent are equal to or above normal; in Natural Science, Part III, about normal; in Social Science, Part IV, 73 per cent are equal to or above the standard; in the Hurdson Typical Composition Ability Scale only sixth grade ability is shown; in the Thorndike-McCall Reading Scale, the group is normal; in the Thorndike Test of Word Knowledge, about normal; and in the Sixteen Spelling Scales, the group is above normal. The mean is 72 per cent and this group made a mean score of 80 per cent. It seems safe to conclude that this group is up to standard in high school achievement in these four fields except in English Composition. This shows only sixth grade ability. In view of this study, this group of college Freshmen should do average college work.

V

Correlations Based on the Results of Various English Tests and High School and College Marks and the Prediction of College Success in English.

The Correlation Table, Table VII, shows the simple correlations between each of the six variables, namely, (X_1), Record in College Rhetoric; (X_2), Sones-Harry High School Achievement Test, Part I; (X_3), High School Record in English; (X_4), Hudelson Typical Composition Ability Scale; (X_5), The Thorndike Test of Word Knowledge; and (X_6), The Thorndike-McCall Reading Scale. Also the results of the partial correlations between each two variables, in turn, with the other four held constant.

None of the correlations are high. The correlation between (X_1) College Rhetoric Record and (X_2) Sones-Harry High School Achievement Test, Part I, is .5 with PE_p of .032. The correlation between the College Record in Rhetoric and each of the other variables is below this figure. The Coefficient of Partial Correlation between variables X_1 and X_2 with the other four held constant is .27 with a PE_p of .04; between X_1 and X_3 with the other four held constant, .22 with a PE_p of .04; the other correlations range from 0.06 to .04. They are too low to be of value. Thus, it is evident that the variables, X_2 and X_3 , will have the most value in prediction. A study of the regression equation warrants the same conclusion. The regression equation used in prediction is as follows: $X_1 = .30X_2 + .21X_3 + .04X_4 + .07X_5 + .05X_6 + 17.$

Table VII

Table of Coefficients of Correlation Based on the Results of Various English Tests and High School and College Marks in English.

| | Freshman College English Record X_1 | High School Achievement Test, Part I X_2 | High School Record in English X_3 | Hudelson Composi- tion, Test X_4 | Thorn- dike Word Test X_5 | Thorndike- McCall Reading Test. X_6 |
|---|---|--|--|---|--------------------------------------|---|
| Freshman College Eng- lish Record X_1 | 1.00 | .50 | .42 | .342 | .428 | .326 |
| High School Achievement Test, Pt. I X_2 | .50 | 1.00 | .43 | .46 | .658 | .454 |
| High School Record in English X_3 | .42 | .43 | 1.00 | .403 | .393 | .29 |
| Hudelson Composition Test, X_4 | .342 | .46 | .403 | 1.00 | .514 | .426 |
| Thorndike Word Test X_5 | .428 | .658 | .393 | .514 | 1.00 | .544 |

Coefficients of Partial Correlation between X_1 and each of the other variables, in turn, with the other four held constant.

X_{12} . 3456 equals .27 X_{13} . 2456 equals .22 X_{14} . 2356 equals .04.
 X_{15} . 2346 equals .06 X_{16} . 2345 equals .055.

The Sones-Harry High School Achievement Test, Part I, has seven and one-half times the weight of the Hudson Test; over four times the value of the Thorndike Word Test; and six times the value of the Thorndike-McCall Reading Scale. In this equation the High School Record in English has from three to five times the value of the last three variables named above. Table VIII shows the results of an attempt to predict success in Freshman College English by applying the above regression equation to one hundred cases selected almost alternately from an alphabetical list of those students who took the tests. Notice that the PE(est. X_1) is plus or minus 5.3 while the actual average error is plus or minus 6.24. This difference is likely due to poor sampling. The Coefficient of Multiple Correlation of the above six variables is .57 while the (r) between the actual and predicted scores of the 100 cases in Freshman College Rhetoric is .554. This is evidence of the accuracy of the calculations and of the value of the predictions.

Since the value of the Sones-Harry High School Achievement Test, Part I, and of the High School English Record was so much greater than that of the other tests, it was deemed advisable to get a regression equation using only the two above named variables. This equation follows:

$$X_1 = .38X_2 \text{ plus } .24X_3 \text{ plus } 19.$$

Fifty of the 100 cases (Table VIII) used in the first prediction were selected almost alternately. The PE(est. X_1) is plus or minus 5.34 while the actual average error is plus or

Table VIII
 Predicted Scores in College English Based on Six Variables
 and Three Variables: 100 Cases and 50 Cases, Respectively.

| Student Number | English Test Part I | H. S. English Record | Madison Comp. | Thorn-dike Word Test | Thorn-dike Reading Test | College Eng. Actual Sc. | Predicted Scores | | | |
|----------------|---------------------|----------------------|---------------|----------------------|-------------------------|-------------------------|------------------|-------|-----------------|-------|
| | | | | | | | Six Variables | Error | Three Variables | Error |
| 7 | 58 | 53 | 45 | 55 | 43 | 57 | 53 | -4(a) | 54 | -3(b) |
| 9 | 28 | 42 | 55 | 39 | 36 | 45 | 45 | 0 | | |
| 11 | 42 | 38 | 48 | 29 | 27 | 30 | 43 | 13 | 45 | 15 |
| 13 | 52 | 28 | 41 | 39 | 33 | 50 | 46 | -4 | | |
| 15 | 38 | 46 | 55 | 42 | 40 | 50 | 45 | -5 | 44 | -6 |
| 17 | 50 | 46 | 48 | 46 | 55 | 45 | 48 | 3 | | |
| 19 | 56 | 46 | 37 | 46 | 43 | 57 | 50 | -7 | 51 | -6 |
| 21 | 38 | 52 | 45 | 42 | 55 | 50 | 47 | -3 | | |
| 22 | 54 | 34 | 29 | 35 | 42 | 36 | 46 | 10 | 48 | 12 |
| 25 | 45 | 61 | 48 | 55 | 50 | 50 | 51 | 1 | | |
| 27 | 38 | 42 | 55 | 42 | 42 | 45 | 45 | 0 | 44 | -1 |
| 29 | 50 | 61 | 52 | 42 | 61 | 57 | 52 | -4 | | |
| 31 | 50 | 42 | 60 | 79 | 67 | 64 | 52 | -12 | 48 | -16 |
| 34 | 45 | 57 | 41 | 60 | 61 | 57 | 51 | -6 | | |
| 35 | 56 | 49 | 48 | 66 | 72 | 64 | 54 | -10 | 52 | -12 |
| 37 | 50 | 40 | 55 | 55 | 72 | 40 | 48 | 8 | | |
| 39 | 47 | 49 | 60 | 46 | 50 | 47 | 50 | 3 | 49 | 2 |
| 41 | 42 | 42 | 52 | 46 | 50 | 30 | 46 | 16 | | |
| 44 | 58 | 42 | 45 | 42 | 50 | 50 | 50 | 0 | 51 | 1 |
| 47 | 50 | 38 | 37 | 42 | 55 | 50 | 47 | -3 | | |
| 50 | 62 | 56 | 60 | 60 | 50 | 64 | 56 | -8 | 56 | -8 |
| 51 | 42 | 38 | 41 | 51 | 55 | 50 | 45 | -5 | | |
| 52 | 52 | 52 | 48 | 42 | 50 | 64 | 51 | -13 | 51 | -13 |
| 53 | 54 | 38 | 55 | 51 | 61 | 45 | 50 | 5 | | |
| 58 | 65 | 61 | 48 | 60 | 55 | 57 | 58 | 1 | 58 | 1 |
| 60 | 34 | 38 | 45 | 35 | 33 | 36 | 41 | 5 | | |
| 63 | 42 | 42 | 48 | 29 | 40 | 45 | 45 | 0 | 45 | 0 |
| 65 | 47 | 42 | 48 | 55 | 50 | 40 | 48 | 8 | | |
| 67 | 67 | 47 | 52 | 55 | 37 | 45 | 55 | 10 | 56 | 11 |
| 71 | 52 | 52 | 52 | 46 | 46 | 57 | 51 | -6 | | |
| 72 | 52 | 32 | 41 | 35 | 42 | 36 | 46 | 10 | 47 | 11 |
| 76 | 58 | 61 | 72 | 72 | 72 | 57 | 59 | 2 | | |
| 78 | 38 | 51 | 52 | 29 | 40 | 36 | 46 | 10 | 46 | 10 |
| 80 | 52 | 68 | 48 | 46 | 50 | 30 | 55 | 5 | | |
| 82 | 45 | 52 | 48 | 42 | 50 | 57 | 60 | 3 | 61 | 4 |
| 84 | 47 | 62 | 48 | 51 | 61 | 50 | 52 | 2 | | |
| 86 | 52 | 52 | 52 | 42 | 40 | 57 | 52 | -5 | 52 | -5 |
| 88 | 45 | 42 | 52 | 42 | 37 | 50 | 46 | -4 | | |
| 90 | 50 | 49 | 52 | 55 | 50 | 40 | 51 | 11 | 50 | 10 |
| 92 | 47 | 49 | 45 | 30 | 27 | 50 | 47 | -3 | | |
| 94 | 52 | 49 | 52 | 46 | 46 | 50 | 50 | 0 | 50 | 0 |
| 96 | 47 | 56 | 45 | 46 | 46 | 50 | 50 | 0 | | |

Table VIII continued.

| | | | | | | | | | | |
|-----|----|----|----|----|----|----|----|-----|----|-----|
| 98 | 56 | 49 | 55 | 39 | 37 | 40 | 51 | 11 | 52 | 12 |
| 100 | 42 | 38 | 41 | 43 | 37 | 36 | 44 | 8 | | |
| 102 | 50 | 61 | 37 | 51 | 46 | 57 | 52 | -5 | 45 | -5 |
| 104 | 42 | 43 | 37 | 51 | 55 | 50 | 47 | -3 | | |
| 107 | 66 | 68 | 62 | 60 | 43 | 50 | 60 | 10 | | |
| 109 | 50 | 23 | 48 | 43 | 55 | 50 | 45 | -5 | 43 | -7 |
| 111 | 50 | 43 | 55 | 51 | 43 | 50 | 49 | -1 | | |
| 113 | 42 | 49 | 45 | 35 | 50 | 50 | 47 | -3 | | |
| 117 | 47 | 51 | 41 | 46 | 46 | 36 | 49 | 13 | 48 | 12 |
| 119 | 42 | 53 | 41 | 20 | 50 | 45 | 47 | 2 | | |
| 122 | 68 | 61 | 65 | 66 | 50 | 64 | 60 | -4 | 60 | -4 |
| 125 | 47 | 51 | 48 | 21 | 37 | 41 | 47 | 6 | | |
| 127 | 52 | 53 | 52 | 51 | 40 | 50 | 51 | 1 | 51 | 1 |
| 129 | 66 | 61 | 79 | 66 | 76 | 57 | 61 | 4 | | |
| 131 | 58 | 50 | 55 | 43 | 55 | 45 | 53 | 8 | 52 | 7 |
| 133 | 38 | 46 | 34 | 39 | 37 | 33 | 44 | 11 | 44 | 11 |
| 135 | 42 | 46 | 55 | 43 | 46 | 30 | 47 | 17 | | |
| 141 | 61 | 50 | 45 | 35 | 50 | 64 | 54 | -10 | 54 | -10 |
| 142 | 38 | 49 | 48 | 20 | 50 | 20 | 45 | 15 | | |
| 145 | 50 | 53 | 48 | 51 | 55 | 45 | 52 | 7 | 51 | 6 |
| 147 | 28 | 32 | 45 | 39 | 43 | 50 | 39 | -11 | | |
| 149 | 62 | 57 | 72 | 55 | 50 | 57 | 56 | -1 | 56 | -1 |
| 152 | 34 | 38 | 42 | 35 | 37 | 36 | 41 | 5 | | |
| 153 | 58 | 38 | 37 | 46 | 40 | 33 | 49 | 16 | 51 | 18 |
| 155 | 42 | 52 | 55 | 60 | 50 | 45 | 48 | -3 | | |
| 157 | 54 | 54 | 68 | 55 | 61 | 64 | 54 | -10 | 52 | -8 |
| 159 | 45 | 46 | 37 | 51 | 55 | 50 | 48 | -2 | | |
| 162 | 24 | 38 | 37 | 46 | 50 | 45 | 42 | -3 | 41 | -4 |
| 164 | 52 | 51 | 37 | 55 | 42 | 45 | 51 | 6 | | |
| 166 | 68 | 54 | 60 | 55 | 72 | 57 | 58 | 1 | 58 | 1 |
| 169 | 47 | 56 | 48 | 51 | 67 | 57 | 52 | -5 | | |
| 171 | 63 | 56 | 65 | 66 | 61 | 71 | 58 | -13 | 55 | -16 |
| 172 | 73 | 53 | 60 | 66 | 79 | 45 | 60 | 15 | | |
| 174 | 47 | 68 | 45 | 51 | 46 | 71 | 53 | -18 | 53 | -18 |
| 176 | 42 | 49 | 37 | 20 | 67 | 40 | 47 | 7 | | |
| 178 | 50 | 56 | 65 | 51 | 46 | 50 | 52 | 2 | 51 | 1 |
| 184 | 34 | 40 | 41 | 35 | 55 | 40 | 42 | 2 | 41 | 1 |
| 186 | 50 | 68 | 55 | 51 | 61 | 47 | 55 | 8 | | |
| 188 | 42 | 46 | 45 | 51 | 40 | 40 | 47 | 7 | 46 | 6 |
| 192 | 65 | 61 | 60 | 66 | 61 | 57 | 59 | 2 | | |
| 194 | 58 | 46 | 65 | 66 | 61 | 50 | 54 | 4 | 51 | 1 |
| 196 | 34 | 33 | 32 | 39 | 32 | 45 | 40 | -5 | | |
| 198 | 42 | 34 | 45 | 39 | 37 | 45 | 43 | -2 | 45 | 0 |
| 201 | 79 | 68 | 62 | 73 | 67 | 64 | 66 | 2 | | |
| 204 | 62 | 53 | 60 | 55 | 50 | 57 | 55 | -2 | 55 | -2 |
| 206 | 45 | 53 | 45 | 43 | 61 | 45 | 49 | 4 | | |
| 208 | 42 | 51 | 75 | 51 | 72 | 64 | 51 | -13 | 47 | -17 |
| 210 | 61 | 57 | 62 | 66 | 61 | 45 | 56 | 11 | | |
| 219 | 61 | 51 | 60 | 60 | 50 | 50 | 55 | 5 | 54 | 4 |
| 223 | 54 | 61 | 52 | 60 | 61 | 64 | 55 | -9 | | |

Table VIII continued. ✓

| | | | | | | | | | | |
|----------------------|----|----|----|----|----|----|----|------|------|-----|
| 227 | 47 | 61 | 62 | 60 | 67 | 64 | 54 | -10 | 52 | -12 |
| 230 | 58 | 56 | 55 | 55 | 61 | 57 | 55 | -2 | | |
| 232 | 42 | 43 | 60 | 55 | 37 | 40 | 47 | 7 | | |
| 239 | 58 | 47 | 55 | 51 | 50 | 50 | 52 | 2 | 51 | 1 |
| 243 | 50 | 57 | 62 | 60 | 43 | 26 | 50 | 17 | | |
| 245 | 45 | 33 | 45 | 35 | 55 | 33 | 42 | 9 | 44 | 11 |
| 250 | 54 | 46 | 52 | 55 | 46 | 50 | 51 | 1 | | |
| 252 | 42 | 44 | 52 | 43 | 33 | 36 | 45 | 9 | 45 | 9 |
| Actual average error | | | | | | | | 6.24 | 7.00 | |
| FE(est X_1) | | | | | | | | 5.3 | 5.24 | |

The Multiple R is .57. The Coefficient of Correlation between the actual and predicted scores of the 100 cases is .554.

Minus 7.00. It is worthy of notice that the Probable Error of the estimates in both cases, predictions from both regression equations, is almost the same, plus or minus 5.3 and plus or minus 5.34.

Since this is the case, the Sones-Harry High School Achievement Test, Part I, and the High School Record in English are just as valuable in prediction of Freshman College Rhetoric as is the use of the other three tests. In either case it is certain that the chances are even that the actual score will not vary over plus or minus 5.3 from the predicted scores.

VI

Correlations Based on the Results of the Sones-Harry High School Achievement Test, Part II, and High School and College Marks in Mathematics and the Predictions of College Success in Mathematics.

The Sones-Harry High School Achievement Test, Part II, which deals with Mathematics, and College Ratings in Mathematics have a Coefficient of Correlation of .335 with a P.E._p of plus or minus .076. Although this coefficient is not large, it does indicate a relationship between achievement as measured by the test and the scholastic ratings in College Mathematics. The Probable Error is large, which is likely due to the small number of cases, sixty-two. Only sixty-two students of this Freshman class elected any Mathematics for the first year.

The High School average in Mathematics and the ratings in

College Mathematics have a Coefficient of Correlation of .28 with a PE_r of plus or minus .079. This coefficient is also low, but indicates some relationship between achievement in high school and achievement in college in Mathematics. The Probable Error is also large.

The scores of the Achievement Test and the High School averages in Mathematics have a Coefficient of Correlation of .096 with a PE_r of plus or minus .0848, which is almost as large as the coefficient. This coefficient is too small to be of any value in prediction.

By means of Partial Correlation we find the Coefficient of Correlation between the Achievement Test scores and College Ratings in Mathematics, with High School averages held constant, to be .328 with a PE_r of plus or minus .076, while that between High School averages and College Ratings, with Achievement Test scores held constant, is .264 with a PE_r of 1.079. Thus the Achievement Test scores and High School averages in Mathematics appear to have about equal value in prediction.

Utilizing the Score Form of the Regression Equation, we have: Freshman College Record in Mathematics (X_1), High School Achievement Test, Part II, (X_2), and High School averages in Mathematics (X_3); $X_1 = .31X_2 + .28X_3 + 19$. The Regression Equation also indicates that these last two variables have about equal weight. The Coefficient of Multiple R is .42 which is not indicative of great predictive value. Table IX shows the predictions made on ten cases selected at random, except that they were selected from

cases where no scores were less than 40 nor more than 60. The PE(est. \bar{X}_1) is plus or minus 5.8 while the actual average error is plus or minus 3.3. This difference is undoubtedly due to poor selection and the use of so few cases. Apparently the most we can say of the value of this Regression Equation is that there are 9930 chances in 10,000 that the predicted scores of around 50 in College success in Mathematics will fall between 27 and 73 or plus or minus (4×5.8) added to 50. A score of 27 would be about an F grade while a 73 would be near an A grade. The chances are even that a predicted score of 50 would fall between 44.2 and 55.8. The Multiple R of .42 indicates that there will be enough scores at the upper and lower ends of the curve to produce a low correlation between actual and predicted scores.

VII

Correlations Based on Part III of the Sones-Harry High School Achievement Test and High School and College Marks in Natural Science and the Prediction of College Success in Natural Science.

The Sones-Harry High School Achievement Test scores, Part III, in Natural Science, and College Ratings in Natural Science have a Coefficient of Correlation of .35 with a PE of plus or minus .04. This error is about one-ninth of the correlation indicating that the correlation is large enough to show some relation between these two variables.

The High school averages in Natural Science and the College Ratings in Natural Science have a Coefficient of Correlation

Table IX

Predicted Scores in College Mathematics Based on Three Variables, namely College Scores in Mathematics, High School Averages in Mathematics, and the Sones-Harry High School Achievement Test, Part II.

| High School Achievement Test, Part II Scores | High School Averages in Mathematics | Actual Scores in College Mathematics | Predicted Scores in College Mathematics | Error (a) |
|--|-------------------------------------|--------------------------------------|---|-----------|
| 53 | 50 | 50 | 50 | 0 |
| 59 | 41 | 42 | 49 | 7 |
| 46 | 53 | 59 | 48 | -11 |
| 53 | 55 | 50 | 51 | 1 |
| 56 | 50 | 53 | 52 | -1 |
| 56 | 41 | 55 | 51 | -4 |
| 65 | 53 | 53 | 52 | -4 |
| 56 | 58 | 55 | 51 | -1 |
| 49 | 58 | 47 | 50 | 3 |
| 45 | 40 | 45 | 44 | -1 |

(a) The PE(est. X_1) is plus or minus 5.6. The average error is plus or minus 3.3. The Multiple R is .42.

of .285 with a PE of plus or minus .035. This correlation is over eight times its PE. While it is not high, it indicates some degree of relation between these two variables.

The Sones-Harry High School Achievement Test scores, Part III, and high school averages in Natural Science have a coefficient of correlation of .205 with a PE of plus or minus .043. This correlation is almost five times the PE. This is not high, but it is high enough to indicate some degree of relation between the two variables.

The coefficient of correlation between the Achievement Test scores and College Ratings in Natural Science with high school averages held constant is .31 while that between College Ratings in Natural Science and high school averages with Achievement Test scores held constant is .232. The Regression Equation, Score Form, is as follows: $\text{College Ratings}(X_1) \text{ equals } .30 \times \text{Achievement Test Scores}(X_2) \text{ plus } .224 \times \text{High school averages}(X_3) \text{ plus } 26.5$.

Table X gives the results of predictions on ten cases selected almost at random except that no cases were taken where scores were below 40 or above 60. The PE(est. X_1) is plus or minus 6.06 while the actual average error is plus or minus 5.00. This difference is due to the sampling in that only ten cases were taken and within the limits stated. The Multiple R is .40. The chances are 9930 in 10,000 that the predicted scores of around 50 would give actual scores between 25.64 and 74.24. A score of 25 would give an F grade while a score of 74 would come very close to an A

Table X

Predicted Scores in College Natural Science Based on Three Variables, namely, College Scores in Natural Science, High School Averages in Natural Science, and the Sones-Harry High School Achievement Test, Part III.

| High School Achievement Test, Part III, Scores | High School Averages in Natural Science | Actual Scores in College Natural Science | Predicted Scores in College Natural Science | Error (A) |
|--|---|--|---|-----------|
| 57 | 42 | 57 | 53 | -4 |
| 63 | 46 | 46 | 56 | 10 |
| 53 | 53 | 50 | 55 | 5 |
| 51 | 42 | 44 | 52 | 8 |
| 45 | 45 | 41 | 50 | 9 |
| 57 | 45 | 54 | 53 | -1 |
| 53 | 57 | 57 | 55 | -2 |
| 48 | 69 | 54 | 56 | 2 |
| 57 | 54 | 57 | 56 | -1 |
| 48 | 58 | 46 | 54 | 8 |

(s) The PE(est.X_i) is plus or minus 6.06. The actual average error is plus or minus 5.00. The Multiple R is .40.

grade. While an F grade is not a failure, a student could not hope to graduate from college with very many F grades. A predicted score of 50 would at least not mean a possibility of a complete failure in a subject.

VIII

Correlations Based on Part IV of the Sones-Harry High School Achievement Test and High School and College Ratings in Social Science and the Prediction of College Success in Social Science.

The Sones-Harry High School Achievement Test Scores, Part IV, in Social Science and College Ratings in Social Science have a Coefficient of Correlation of .317 with a PE_r of plus or minus .046. This correlation is about seven times the PE and may be considered as showing some relation between these two variables.

The high school averages in Social Science and the College Ratings in Social Science have a Coefficient of Correlation of .50 with a PE_r of plus or minus .0385. This correlation is thirteen times the PE which indicates considerable relation between these two variables.

The Sones-Harry High School Achievement Test Scores, Part IV, and the high school averages in Social Science have a Coefficient of Correlation of .27 with a PE_r of plus or minus .047. This PE is about one-sixth of the correlation, showing that these two variables have some relation.

The Coefficient of Correlation between the Achievement

Table XI
 Predicted Scores in College Social Science Based on Three Variables, namely, College Scores in Social Science, High School Averages in Social Science, and the Sones-Harry High School Achievement Test, Part IV.

| High School Achievement Test, Part IV Scores. | High School Averages in Social Science | Actual Scores in College Social Science | Predicted Scores in College Social Science | Error (a) |
|---|--|---|--|-----------|
| 55 | 52 | 53 | 50 | -3 |
| 45 | 58 | 53 | 54 | 1 |
| 55 | 63 | 61 | 58 | -3 |
| 60 | 42 | 53 | 50 | -3 |
| 71 | 58 | 59 | 59 | 0 |
| 55 | 52 | 48 | 54 | 6 |
| 58 | 48 | 59 | 53 | -6 |
| 52 | 42 | 46 | 49 | 3 |
| 42 | 46 | 47 | 49 | 2 |
| 45 | 58 | 53 | 54 | 1 |

(a) The PE(est. X_1) is plus or minus 5.12. The actual average error is plus or minus 2.8. The Multiple R is .55.

Test Scores and College Ratings in Social Science with the high school averages held constant is .217, while that between College Ratings and high school averages in Social Science with the Achievement Test Scores held constant is .449. The Regression Equation, Score Form, is as follows: College Ratings (X_1) equals $.18 \times$ Achievement Test Scores (X_2) plus $.4 \times$ high school averages (X_3) plus 23.

Table XI gives the results of prediction from ten cases selected almost at random except that no cases were used where any of the scores were below 40 or above 60. The $FE(est)$ is plus or minus 5.12 while the actual average error is plus or minus 2.8 for these ten cases. This difference would likely have been less if all of the cases had been used instead of just ten. The Multiple R is .53. The chances are even that a predicted score of 50 will give an actual score of 50 plus or minus 5.12 while there are 9920 chances in 10,000 that a predicted score of 50 will give an actual score that will not vary over 50 plus or minus 20.48 or between 29.52 and 70.48. A score of 29 is a D grade while a score of 70 is an A grade. While a D grade is not a failure, a student could not graduate from college and make many D's. A predicted score of 50 would at least mean a possibility of an F grade.

IX

CONCLUSIONS

The following conclusions may be drawn from this study:

1. In general ability in English (Table II) the group may be considered as average as measured by the Sones-Harry High School Achievement Test, Part I. Considering the fact that some schools offer eight semesters of English while some others offer only six, and using the seven semester norm as a standard, 54 per cent are below this norm. Of those who have had only six semesters of English, 24 per cent are below the norm. Of those who have had only seven semesters of English, 57 per cent are below the norm.

2. In the field of high school Mathematics as measured by the Achievement Test, Part II, the entire group may be considered as above average. Considering the respective norm of each group, only 30 per cent are below their norms. Of those who have had four semesters, only 33 per cent are below the norm, and of those who have had six semesters, only 22 per cent are below the norm (Table IV). It is evident that this group made a much better showing in Mathematics than in English. Presumably they have had superior instruction in Mathematics, but no explanation is apparent as to why this should be.

3. In the field of Natural Science (Table V), the showing is about like that in English. An average of the findings would indicate average achievement. Students who had taken six, seven, or eight semesters of Natural Science failed to reach their norms, while those who had taken four or five semesters

went far beyond their norms. Evidently it is difficult to teach and to master.

4. In the field of Social Science there is a somewhat better showing than in Mathematics (Table VI). The achievement varies from 16 per cent below the norm for those who had taken four semesters of Social Science to 34 per cent for those who had taken only seven semesters. It is rather difficult to offer a reason for the difference in this showing. Social Science is possibly more definite and easier to teach than is English. Natural Science is a laboratory subject, but it is not taught as such as much as it should be, hence the achievement in that field is comparable to the achievement in English, even though it is more definite and tangible than is English.

5. The results of the Hudson Typical Composition Ability Scale show only sixth grade ability.

6. The results of the Thorndike-McCall Reading Scale show a mean of 20, which is the standard mean.

7. Average achievement is shown by the results of the Thorndike Test of Word Knowledge.

8. The results of the Sixteen Spelling Scales, List XIII, show achievement of 80 per cent. The standard for a 12th grade is 73 per cent.

9. The Simple and Partial Correlations based on the various English tests and high school and college ratings in English (Table VII) show considerable value for the prediction of college success in English. The regression equation used is as follows: $X_1 = .30X_2 + .21X_3 + .04X_4 + .07X_5 + .05X_6 + 17.$

The High School Achievement Test, Part I, and the high school averages in English gave just as good a prediction (Table VIII) as did all five of the variables. The regression equation follows: $X_1 = .38X_2 + .24X_3 + 19$. The $PE(est.X_1)$ is plus or minus 5.3. The Multiple R for the six variables is .57, while the correlation between the actual and predicted scores in College English for the 100 cases is .55. The Multiple R for the three variables is .56. These Multiple R's of 57 and 56 show that many factors are lacking. Had more of the vital factors been included, the R would be much higher. Since the $PE(est.X_1)$ is plus or minus 5.3, a student with a predicted score of 50 would have an even chance to make an actual score of between 45 and 55. This would mean a grade between a C and a B.

10. The Simple and Partial Correlations based on the college ratings (X_1), the Sones-Harry High School Achievement Test, Part II, (X_2) and the high school ratings (X_3) in Mathematics show some relation among these variables. The regression equation follows: $X_1 = .31X_2 + .28X_3 + 19$. A Multiple R of .42 shows some value in prediction in that there will be some relation between the actual and predicted scores in college Mathematics. The $PE(est.X_1)$ is plus or minus 5.8 and the chances are even that a predicted score of 50 will give an actual score of 44 to 56. This would mean a grade between a C and a B in college Mathematics (Table IX).

11. The Simple and Partial Correlations among the variables: the college ratings (X_1), the Sones-Harry High School Achievement Test, Part III, (X_2), and the high school ratings (X_3) in Natural Science show some relation among these

variables. The regression equation follows: $X_1 = .30X_2 + .224X_3 + 26.5$. The Multiple R is .40 which would indicate some relation between actual and predicted scores in college Natural Science. The PE(est. X_1) is plus or minus 6.06 and the chances are even that a predicted score of 50 in Natural Science would give an actual score of between 44 and 56. This would give a grade between a C and a B (Table X).

12. The Simple and Partial Correlations among the variables; the college ratings (X_1), the Sones-Harry High School Achievement Test, Part IV, (X_2) and the high school ratings (X_3) in Social Science, are high enough to indicate some relation. The regression equation follows: $X_1 = .16X_2 + .4X_3 + 23$. The Multiple R is .53 which shows a higher predictive value than was evident in Mathematics and Natural Science. This R is almost equal to the R found in the field of English. The PE(est. X_1) is plus or minus 5.12 which would make the chances even that a predicted score of 50 in College Social Science would give an actual score ranging between 45 and 55. This would give a grade between a C and a B in College Social Science. (Table XI)

13. Too much reliance should not be placed on the predictions made in these various fields. For example, in College English (Table VII), student Number 136 has an actual score of 30 while the predicted score is 47, a difference of 17. Student Number 174 has an actual score of 71 while the predicted score is 53, a difference of 18. The actual scores vary from 20 to 80. Twenty would represent failure while 80 would represent an A grade. A variation of 17 above and 18 below the mean would be more than half of the range, 35 as compared with 60. From

these cases it is evident that the variation from the predicted scores might be great enough to lead to a wrong conclusion. If a student's scores in these tests in the field of English have an average below 50, an instructor might, with a reasonable degree of accuracy, predict a score below 50 in the college English. This is particularly true when only Part I of the High School Achievement Test is used as a basis of prediction.

The Multiple R of .57 would indicate that many important factors are lacking in this study in the field of English. These must be determined and evaluated before more reliable predictions can be made. The above conclusions may be drawn in the other three fields studied.

14. Justification for the use of these tests might be found in their diagnostic value alone. For example, a Freshman college student who makes a score of 60 in English fundamentals and spelling might be excused from Rhetoric I in college. A student who makes a score of 60 in the fundamentals in any of these fields studied could well be excused from the first semester college courses which are a repetition of these fundamentals. This would save the student one semester of time in his field of excellence and save the college expense as well. On the other hand the tests will show a student where his weaknesses are in each field and in some particular part of certain fields. He can then concentrate on his weak points.

If the tests show a general weakness in some field, the college could get this information to the high schools, so measures for better teaching could be instituted.

X

RECOMMENDATIONS

After making this study and perusing related studies, the following recommendations are submitted. The English Department of the Fort Hays Kansas State College should pass the findings of this study in the field of English on to the supervisors and English teachers of the high schools in the college's territory. The results of other English tests given by the college during recent years should also be made available. This information with suggestions for better teaching in the weak spots should be beneficial to English teachers. Apparently the greatest weakness is in English Composition and sentence sense. The English Department of the college might make good use of such findings in the preparation of prospective English teachers so that such teachers might avoid the short-comings of those now in the field.

A second suggestion is that, when such achievement and diagnostic tests are given, care should be taken that the students are gotten into the proper frame of mind before the tests are given. An explanation of the reasons for giving the tests would help in this. There would be less resentment and the students would be more likely to come up to the standard of their actual ability. A suitable time for giving the tests should be chosen so as not to inconvenience the students. It would seem that the best plan would be to use a regular class period or else give the tests during the first days of the term before the regular class schedule has started. The

writer's experience in giving tests in high school leads him to believe that the attitude of the students has much to do with the results obtained. If those giving the tests will take the students into their confidence and explain why the tests are being given and choose a suitable time for them, the students will respond and do their best to make good scores. Freshmen students from two colleges have expressed themselves as not in complete sympathy with the tests. This attitude, even on the part of a few students, is not conducive to the best results. Possibly such an attitude is due to the above points and can be avoided.

A third suggestion is that there should be a plan worked out for concerted action among the colleges in the matter of a testing program. There is undoubtedly some value in a testing program where it is well worked out and followed up. The findings could be used in guiding students into the proper courses. For example, most students who stand in the lower quartile in standard intelligence and achievement tests will not succeed in the usual academic courses. They might do well in the Manual Arts and in Music and Drawing. Aptitude tests might be a helpful addition to the above tests. Nearly all of the colleges are doing something in the way of testing, but there is no definite plan and no concerted action. At present there is no plan for making available the findings of the testing that is being done. Furthermore, the testing is done after the students have entered school and have planned their courses. The following plan is suggested as a line of action

for at least our five State schools. The Departments of Psychology of the schools should get together and select a suitable intelligence test, an achievement test such as the Sonce-Harry test, an English Composition test, and an Aptitude test. A central clearing house should then be established at one of the schools so that tests could be purchased in quantities and sent out to the high schools of the state. Most of the schools now compile lists of the graduating classes in their territory. A duplication of effort and expense would be avoided by having a central headquarters do this.

The principals of the high schools could be depended on to give these tests under proper supervision and return them to the headquarters. The tests could be graded and results tabulated on a uniform blank. Reports could be sent back to each principal to be attached to the high school Senior's transcript. Then when he enters college, this report could be sent with the transcript to the college in which he matriculates. These tests would need to be sent out early enough in the year to be given and graded so the reports could be sent to the high schools before they close in the spring. A critic might say that this could not be done through failure of the high school authorities to cooperate, but it could be made a requirement for matriculation just as a transcript is required. Today most of the testing is done independently and as a project of the various Psychology Departments. As a result, we are not really getting anywhere on the matter of testing in Kansas. There is room for some pioneering along this line.

Another suggestion, which is really a part of the above one, is for the colleges to adopt a uniform system of grading and Honor Points. The plan used by the Fort Hays Kansas State College, which is given earlier in this study, is one of the best. It would facilitate follow-up studies, if all of the high schools would also adopt a uniform system of grading so that transcripts would be uniform. Dean Lee's investigations as well as those of the writer were made much more laborious because of this lack of uniformity. The Passing Grade varies from 70 to 80 per cent. Some high schools use the Absolute Scale while others use the Normal Curve plan. Some schools use the letters, A, B, C, D, and F; some use the terms, Excellent, Good, Fair, Poor, and Failure; some use the numbers 1, 2, 3, 4, and 5; and others use percentages. These four systems all mean about the same thing, but the actual value of each term depends on the number of steps covered by each and on where the Passing Grade is set. By concerted action, our State Colleges, through the office of the State Superintendent of Public Instruction, might be able to get the high schools to adopt a uniform system of records and grading. It would greatly facilitate the recording of the high school transcripts at the colleges as well as save labor in statistical investigations.

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The following matter is a T-scores instead of the actual scores. The first test refers to Sones-Harry H. S. Achievement test of 4 parts. The tests were given about Dec. 8, 1930. Records from H. S. and College Transcripts.

| Student Number | Test, Pt. 1, Eng. | Test, Pt. 2, Math. | Test, Pt. 3, Nat. Sc. | Test, Pt. 4, Soc. Sc. | Test, Total Score. | Col. Record, 1st Sem. | Col. Record, Rheo. 1st | Col. Record, Math. 1st | Col. Record, Nat. Sc. 1st | Col. Record, Soc. Sc. 1st | H.S. Rec. Eng. 4 yrs. | H.S. Rec. Math. 4yrs | H.S. Rec. Nat. Sc. 4yrs | H.S. Rec. Soc. Sc. 4yrs | H.S. Av. All Sub. 4yrs | Test, Huddleson Comp. | Test, Thornayne Word | Test, Thornayne Read | Test, Spelling |
|-----------------|-------------------|--------------------|-----------------------|-----------------------|--------------------|-----------------------|------------------------|------------------------|---------------------------|---------------------------|-----------------------|----------------------|-------------------------|-------------------------|------------------------|-----------------------|----------------------|----------------------|----------------|
| 1 | 52 | 43 | 51 | 52 | 51 | 60 | 57 | - | 67 | 65 | 66 | 53 | 53 | 56 | 55 | 55 | 55 | 55 | 54 |
| 2 | 56 | 36 | 57 | 34 | 48 | 64 | 57 | - | 57 | - | 63 | 33 | 42 | 55 | 47 | 52 | 46 | 46 | 59 |
| 3 | 62 | 49 | 51 | 58 | 57 | 60 | 71 | - | 50 | 53 | 25 | 35 | 28 | 26 | 61 | 55 | 60 | 67 | 76 |
| 4 ^a | | | | | | | | | | | | | | | | | | | |
| 5 | 58 | 49 | 48 | 49 | 54 | 48 | 50 | - | 41 | 41 | 61 | 47 | 58 | 63 | 60 | 45 | 45 | 50 | 59 |
| 6 | 55 | 59 | 57 | 66 | 64 | 74 | 71 | - | 71 | 65 | 68 | 58 | 33 | 70 | 64 | 60 | 66 | 72 | 59 |
| 7 | 58 | 46 | 41 | 55 | 54 | 57 | 57 | - | 54 | 53 | 53 | 47 | 49 | 52 | 53 | 45 | 55 | 43 | 64 |
| 8 | 54 | 49 | 63 | 58 | 57 | 53 | 50 | - | 46 | 41 | 53 | 47 | 45 | 43 | 47 | 72 | 55 | 76 | 60 |
| 9 | 38 | 36 | 53 | 34 | 35 | 44 | 45 | - | 44 | 74 | 43 | 47 | 49 | 48 | 47 | 55 | 39 | 46 | 35 |
| 10 | 52 | 53 | 57 | 49 | 53 | 53 | 57 | - | 54 | 53 | 49 | 41 | 45 | 48 | 44 | 58 | 51 | 55 | 64 |
| 11 | 42 | 59 | 51 | 52 | 48 | 24 | 30 | - | 32 | - | 38 | 50 | 45 | 48 | 44 | 48 | 39 | 27 | 35 |
| 12 ^a | | | | | | | | | | | | | | | | | | | |
| 13 | 52 | 53 | 41 | 45 | 48 | 48 | 50 | - | 41 | 41 | 38 | 37 | 42 | 48 | 39 | 41 | 39 | 33 | 49 |
| 14 | 47 | 43 | 57 | 55 | 51 | 38 | 45 | - | 44 | 46 | 46 | 33 | 58 | 26 | 39 | 45 | 51 | 46 | 54 |
| 15 | 38 | 40 | 57 | 45 | 43 | 48 | 50 | 68 | 57 | - | 46 | 44 | 53 | 48 | 49 | 55 | 43 | 40 | 47 |
| 16 | 28 | 40 | 45 | 38 | 35 | 53 | 50 | - | 62 | 74 | 49 | 50 | 49 | 58 | 51 | 62 | 46 | 37 | 41 |
| 17 | 50 | 73 | 53 | 58 | 60 | 57 | 45 | 59 | 50 | - | 46 | 53 | 53 | 48 | 49 | 48 | 46 | 55 | 54 |
| 18 | 50 | 46 | 51 | 60 | 54 | 57 | 64 | 53 | 62 | - | 61 | 62 | 58 | 52 | 57 | 68 | 66 | 61 | 64 |
| 19 | 56 | 40 | 51 | 34 | 43 | 53 | 57 | - | 57 | - | 46 | 50 | 37 | 34 | 44 | 37 | 46 | 43 | 54 |
| 20 | 34 | 40 | 34 | 49 | 35 | 44 | 45 | 68 | 41 | - | 49 | 50 | 42 | 43 | 44 | 21 | 25 | 33 | 41 |
| 21 | 38 | 46 | 57 | 45 | 43 | 64 | 50 | - | 50 | 53 | 53 | 62 | 58 | 58 | 47 | 45 | 43 | 55 | 35 |
| 22 ^b | | | | | | | | | | | | | | | | | | | |
| 23 | 54 | 36 | 34 | 34 | 39 | 32 | 36 | - | 28 | 27 | 34 | 35 | 32 | 33 | 32 | 29 | 35 | 48 | 43 |
| 24 | 56 | 43 | 60 | 60 | 57 | 48 | 45 | - | 50 | 53 | 49 | 37 | 42 | 46 | 47 | 37 | 51 | 41 | 59 |
| 25 | 45 | 43 | 48 | 45 | 43 | 53 | 50 | - | 57 | 53 | 61 | 53 | 68 | 55 | 60 | 48 | 55 | 50 | 54 |
| 26 | 34 | 46 | 60 | 34 | 39 | 57 | 40 | - | 57 | 53 | 51 | 48 | 54 | 55 | 53 | 45 | 39 | 33 | 37 |
| 27 | 38 | 53 | 51 | 55 | 48 | 44 | 45 | 50 | 44 | 53 | 43 | 50 | 42 | 43 | 44 | 55 | 45 | 43 | 41 |
| 28 | 58 | 49 | 37 | 52 | 51 | 44 | 50 | - | 50 | 41 | 61 | 62 | - | 52 | 55 | 58 | 46 | 43 | 49 |
| 29 | 50 | 59 | 51 | 38 | 48 | 57 | 57 | - | 57 | 53 | 61 | 58 | 68 | 63 | 59 | 52 | 43 | 61 | 45 |
| 30 | 42 | 36 | 45 | 48 | 39 | 48 | 45 | - | 41 | 41 | 49 | 37 | 45 | 48 | 46 | 45 | 55 | 43 | 49 |
| 31 | 71 | 73 | 76 | 68 | 76 | 53 | 64 | 47 | 71 | - | 43 | 41 | 58 | 43 | 53 | 60 | 79 | 67 | 64 |
| 32 | 63 | 63 | 65 | 68 | 67 | 64 | 57 | - | 71 | 53 | 38 | 44 | 33 | 38 | 36 | 41 | 51 | 55 | 51 |
| 33 ^b | | | | | | | | | | | | | | | | | | | |
| 34 | 45 | 46 | 48 | 55 | 48 | 53 | 57 | - | 62 | 61 | 57 | 47 | 49 | 63 | 55 | 41 | 60 | 61 | 47 |
| 35 | 56 | 36 | 63 | 60 | 51 | 53 | 64 | - | 50 | 74 | 49 | 53 | 53 | 52 | 52 | 48 | 66 | 72 | 59 |
| 36 ^a | | | | | | | | | | | | | | | | | | | |
| 37 | 50 | 46 | 57 | 60 | 54 | 48 | 40 | - | 41 | 53 | 40 | 45 | 47 | 42 | 45 | 55 | 55 | 72 | 59 |
| 38 | 34 | 59 | 53 | 38 | 43 | 55 | 36 | 43 | 37 | 32 | 28 | 41 | 37 | 26 | 28 | 29 | 46 | 50 | 39 |
| 39 | 47 | 56 | 65 | 49 | 54 | 57 | 57 | - | 57 | - | 49 | 62 | 68 | 63 | 60 | 60 | 46 | 50 | 76 |
| 40 | 42 | 53 | 57 | 49 | 48 | 48 | 57 | - | 44 | 53 | 51 | 35 | 49 | 42 | 45 | 41 | 46 | 40 | 59 |
| 41 | 42 | 56 | 41 | 42 | 43 | 34 | 30 | 33 | 28 | - | 42 | 45 | 40 | 42 | 36 | 52 | 46 | 50 | 47 |
| 42 | 50 | 53 | 53 | 42 | 48 | 64 | 64 | - | 57 | - | 61 | 53 | 68 | 63 | 60 | 60 | 55 | 61 | 51 |
| 43 | - | - | - | - | - | - | 36 | - | 28 | 27 | 40 | 35 | 43 | 38 | 33 | - | - | - | - |
| 44 | 58 | 53 | 57 | 63 | 60 | 53 | 50 | - | 50 | 53 | 43 | 50 | 49 | 48 | 47 | 45 | 43 | 50 | 49 |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| 45 ^o | | | | | | | | | | | | | | | | | | | | |
| 46 ^o | | | | | | | | | | | | | | | | | | | | |
| 47 | 50 | 46 | 51 | 38 | 43 | 37 | 50 | - | 50 | 41 | 38 | 47 | 42 | 48 | 44 | 37 | 43 | 55 | 39 | |
| 48 ^o | | | | | | | | | | | | | | | | | | | | |
| 49 | - | - | - | - | - | 56 | 50 | - | 50 | 53 | 68 | 68 | 62 | 70 | 66 | 58 | 60 | 76 | 50 | |
| 50 | 62 | 65 | 53 | 63 | 64 | 60 | 64 | 69 | 67 | 65 | 56 | 55 | 61 | 49 | 57 | 60 | 60 | 50 | 76 | |
| 51 | 42 | 56 | 37 | 49 | 43 | 38 | 50 | 33 | 50 | 41 | 38 | 44 | 37 | 48 | 47 | 41 | 51 | 55 | 48 | |
| 52 | 47 | 40 | 32 | 31 | 35 | 48 | 57 | - | 41 | 53 | 68 | 52 | 54 | 68 | 66 | 52 | 46 | 43 | 49 | |
| 53 | 52 | 43 | 53 | 49 | 51 | 53 | 64 | 42 | 50 | - | 53 | 58 | 58 | 52 | 53 | 48 | 43 | 50 | 49 | |
| 54 | 66 | 53 | 34 | 71 | 64 | 53 | 50 | - | 50 | 59 | 61 | 58 | 53 | 58 | 57 | 58 | 66 | 43 | 54 | |
| 55 | 54 | 56 | 41 | 58 | 54 | 48 | 45 | 50 | 50 | 61 | 38 | 53 | 42 | 48 | 41 | 56 | 51 | 61 | 39 | |
| 56 | 52 | 49 | 63 | 60 | 57 | 57 | 57 | - | 71 | 53 | 57 | 58 | 59 | 63 | 60 | 45 | 51 | 46 | 47 | |
| 57 | 52 | 43 | 48 | 38 | 43 | 50 | 50 | - | 50 | 56 | 53 | 53 | 62 | 58 | 51 | - | - | - | - | |
| 58 | 65 | 58 | 53 | 55 | 62 | 64 | 57 | - | 57 | 53 | 61 | 58 | 62 | 63 | 64 | 48 | 60 | 55 | 59 | |
| 59 ^o | | | | | | | | | | | | | | | | | | | | |
| 60 | 34 | 33 | 37 | 31 | 29 | 35 | 36 | - | 34 | 41 | 38 | 41 | 33 | 43 | 34 | 45 | 35 | 33 | 35 | |
| 61 | 45 | 46 | 41 | 38 | 39 | 57 | 57 | 59 | 54 | - | 46 | 53 | 58 | 55 | 53 | 41 | 46 | 27 | 23 | |
| 62 | 50 | 53 | 51 | 58 | 54 | 48 | 45 | - | 50 | 41 | 46 | 50 | 42 | 52 | 47 | 52 | 46 | 61 | 39 | |
| 63 | 42 | 40 | 53 | 49 | 43 | 41 | 45 | - | 44 | 53 | 43 | 37 | 29 | 43 | 32 | 48 | 39 | 40 | 43 | |
| 64 | 47 | 53 | 45 | 55 | 51 | 53 | 50 | - | 50 | 48 | 49 | 50 | 53 | 52 | 53 | 48 | 60 | 43 | 54 | |
| 65 | 47 | 43 | 37 | 34 | 39 | 38 | 40 | - | 54 | 41 | 43 | 44 | 39 | 43 | 44 | 48 | 55 | 50 | 59 | |
| 66 | - | - | - | - | - | 44 | 57 | - | 50 | 41 | 57 | 68 | 58 | 43 | 47 | 58 | 51 | 55 | 51 | |
| 67 | 52 | 30 | 48 | 49 | 43 | 44 | 45 | - | 71 | 41 | 47 | 41 | 49 | 39 | 47 | 52 | 55 | 37 | 54 | |
| 68 | 50 | 53 | 53 | 66 | 57 | 48 | 40 | - | 57 | 53 | 44 | 35 | 40 | 42 | 40 | 62 | 51 | 46 | 64 | |
| 69 ^o | | | | | | | | | | | | | | | | | | | | |
| 70 ^o | | | | | | | | | | | | | | | | | | | | |
| 71 | 52 | 40 | 51 | 58 | 54 | 57 | 57 | - | 62 | 59 | 53 | 37 | 45 | 48 | 49 | 52 | 46 | 48 | 49 | |
| 72 | 47 | 53 | 51 | 38 | 48 | 48 | 40 | 50 | 44 | - | 44 | 55 | 54 | 42 | 47 | 45 | 55 | 61 | 49 | |
| 73 | 52 | 67 | 48 | 45 | 54 | 44 | 36 | 50 | 50 | - | 33 | 58 | 22 | 24 | 39 | 41 | 35 | 43 | 38 | |
| 74 | 71 | 62 | 65 | 49 | 64 | 74 | 71 | - | 66 | - | 49 | 53 | 53 | 52 | 51 | 65 | 66 | 55 | 54 | |
| 75 ^o | | | | | | | | | | | | | | | | | | | | |
| 76 | 58 | 67 | 60 | 60 | 62 | 60 | 57 | - | 50 | - | 61 | 62 | 62 | 63 | 67 | 72 | 73 | 72 | 59 | |
| 77 | 56 | 56 | 57 | 55 | 57 | 60 | 50 | - | 57 | 53 | 46 | 58 | 49 | 52 | 49 | 52 | 43 | 50 | 43 | |
| 78 | 38 | 43 | 41 | 42 | 39 | 38 | 36 | - | 41 | 41 | 51 | 55 | 43 | 46 | 50 | 52 | 39 | 40 | 49 | |
| 79 ^o | | | | | | | | | | | | | | | | | | | | |
| 80 | 52 | 46 | 48 | 55 | 51 | 64 | 50 | - | 54 | 65 | 68 | 68 | 68 | 70 | 72 | 48 | 46 | 50 | 59 | |
| 81 | 52 | 46 | 41 | 42 | 48 | 64 | 57 | - | 54 | 65 | 68 | 50 | 49 | 48 | 53 | 55 | 55 | 46 | 54 | |
| 82 | 45 | 56 | 60 | 52 | 54 | 53 | 57 | 53 | 50 | - | 53 | 50 | 53 | 52 | 53 | 48 | 43 | 50 | 32 | |
| 83 | 45 | 40 | 47 | 48 | 51 | 35 | 45 | - | - | 53 | 38 | 37 | 29 | 43 | 36 | 41 | 55 | 55 | 35 | |
| 84 | 47 | 43 | 48 | 45 | 43 | 53 | 50 | - | 62 | 53 | 61 | 50 | 54 | 55 | 55 | 48 | 51 | 61 | 54 | |
| 85 | 38 | 56 | 51 | 52 | 48 | 38 | 30 | - | 37 | 46 | 44 | 55 | 47 | 42 | 50 | 52 | 43 | 55 | 39 | |
| 86 | 45 | 43 | 64 | 45 | 39 | 48 | 57 | - | 50 | 53 | 53 | 58 | 58 | 55 | 53 | 52 | 43 | 40 | 59 | |
| 87 | 38 | 33 | 34 | 38 | 32 | 48 | 45 | - | 50 | 41 | 57 | 50 | 49 | 48 | 49 | 52 | 46 | 33 | 39 | |
| 88 | 45 | 49 | 53 | 52 | 48 | 47 | 50 | - | 50 | 53 | 43 | 44 | 37 | 38 | 39 | 52 | 43 | 37 | 51 | |
| 89 | 61 | 59 | 69 | 79 | 72 | 41 | 45 | - | 37 | 47 | 47 | 42 | 54 | 46 | 50 | 45 | 66 | 55 | 51 | |
| 90 | 50 | 56 | 60 | 49 | 54 | 41 | 40 | 55 | 41 | - | 49 | 41 | 45 | 38 | 47 | 52 | 55 | 50 | 51 | |
| 91 | 71 | 59 | 72 | 70 | 72 | 64 | 57 | - | 37 | 41 | 51 | 39 | 53 | 52 | 49 | 53 | 66 | 67 | 54 | |
| 92 | 47 | 46 | 57 | 45 | 48 | 41 | 50 | 50 | 37 | 41 | 49 | 41 | 49 | 48 | 44 | 46 | 30 | 27 | 35 | |
| 93 | 34 | 40 | 48 | 42 | 35 | 41 | 30 | - | - | 27 | 34 | 35 | 38 | 37 | 32 | 58 | 46 | 55 | 49 | |
| 94 | 52 | 53 | 60 | 52 | 54 | 44 | 50 | 50 | 41 | - | 49 | 62 | 58 | 52 | 55 | 52 | 46 | 46 | 51 | |
| 95 | 68 | 49 | 37 | 55 | 60 | 57 | 57 | 46 | 50 | 53 | 24 | 70 | 54 | 59 | 66 | 55 | 73 | 61 | 64 | |
| 96 | 49 | 46 | 57 | 73 | 60 | 53 | 50 | - | 50 | 53 | 56 | 62 | 54 | 52 | 53 | 45 | 46 | 46 | 51 | |
| 97 | 42 | 65 | 60 | 58 | 54 | 57 | 45 | 54 | 50 | - | 61 | 62 | 62 | 55 | 61 | 48 | 55 | 46 | 49 | |
| 98 | 56 | 56 | 48 | 49 | 54 | 41 | 40 | - | 32 | 32 | 49 | 29 | 45 | 48 | 41 | 55 | 39 | 37 | 44 | |
| 99 | 56 | 56 | 37 | 52 | 54 | 41 | 45 | 42 | 44 | 41 | 46 | 50 | 37 | 34 | 41 | 58 | 60 | 50 | 44 | |
| 100 | 42 | 43 | 45 | 42 | 39 | 35 | 36 | - | 41 | 41 | 38 | 41 | 37 | 34 | 36 | 41 | 43 | 37 | 41 | |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | - | - | - | - | - | 48 | 45 | - | 37 | 47 | 38 | 44 | 49 | 43 | 39 | 34 | 39 | 55 | 54 |
| 102 | 50 | 49 | 51 | 52 | 51 | 48 | 45 | - | 50 | 41 | 61 | 45 | 38 | 55 | 53 | 37 | 51 | 46 | 54 |
| 103 | 56 | 49 | 37 | 45 | 48 | 57 | 50 | - | 37 | 61 | 53 | 44 | 53 | 58 | 53 | 52 | 51 | 55 | 64 |
| 104 | 42 | 49 | 60 | 49 | 48 | 53 | 50 | - | 50 | 41 | 45 | 33 | 45 | 63 | 41 | 37 | 51 | 55 | 49 |
| 105* | | | | | | | | | | | | | | | | | | | |
| 106* | | | | | | | | | | | | | | | | | | | |
| 107 | 66 | 67 | 57 | 60 | 67 | 64 | 57 | 59 | - | 61 | 68 | 68 | 58 | 63 | 67 | 62 | 60 | 43 | 59 |
| 108 | 42 | 43 | 57 | 52 | 48 | 41 | 57 | - | - | 46 | 38 | 41 | 33 | 38 | 39 | 52 | 48 | 46 | 47 |
| 109 | 50 | 36 | 49 | 49 | 48 | 57 | 50 | - | 54 | - | 23 | 37 | 37 | 26 | 22 | 48 | 43 | 55 | 43 |
| 110 | 42 | 49 | 41 | 55 | 48 | 48 | 57 | - | 50 | 53 | 46 | 38 | 38 | 46 | 40 | 48 | 68 | 61 | 41 |
| 111 | 50 | 49 | 45 | 52 | 48 | 48 | 50 | 47 | 44 | - | 43 | 58 | 53 | 43 | 47 | 55 | 51 | 43 | 39 |
| 112 | 45 | 56 | 53 | 45 | 48 | 44 | 36 | 50 | 50 | 46 | 43 | 41 | 42 | 43 | 49 | 34 | 39 | 40 | 43 |
| 113 | 42 | 49 | 48 | 49 | 43 | 53 | 50 | - | 46 | 53 | 49 | 53 | 58 | 58 | 55 | 45 | 35 | 50 | 49 |
| 114* | | | | | | | | | | | | | | | | | | | |
| 115 | - | - | - | - | - | 57 | 45 | 42 | 44 | - | 57 | 53 | 62 | 48 | 57 | 58 | 60 | 50 | 64 |
| 116* | | | | | | | | | | | | | | | | | | | |
| 117 | 47 | 46 | 65 | 49 | 51 | 48 | 36 | - | 57 | 53 | 51 | 55 | 54 | 49 | 53 | 41 | 46 | 46 | 47 |
| 118 | 47 | 53 | 51 | 38 | 43 | 48 | 57 | - | 50 | - | 49 | 47 | 49 | 43 | 47 | 32 | 46 | 50 | 44 |
| 119 | 42 | 43 | 37 | 63 | 48 | 48 | 45 | 50 | 50 | - | 53 | 58 | 58 | 52 | 53 | 41 | 30 | 50 | 45 |
| 120 | 34 | 49 | 48 | 38 | 39 | 41 | 50 | - | 41 | 41 | 38 | 41 | 37 | 38 | 36 | 32 | 30 | 21 | 32 |
| | | | | | | | | | | | | | | | | | | | |
| 121 | 47 | 53 | 51 | 58 | 51 | 48 | 50 | 38 | 50 | 47 | - | - | - | - | - | 45 | 46 | 46 | 49 |
| 122 | 68 | 40 | 37 | 52 | 57 | 53 | 64 | - | 32 | - | 61 | 37 | 49 | 52 | 51 | 65 | 66 | 50 | 76 |
| 123 | 34 | 62 | 48 | 42 | 43 | 53 | 45 | 53 | 57 | - | 33 | 33 | 49 | 43 | 39 | 68 | 39 | 46 | 37 |
| 124 | 56 | 68 | 53 | 52 | 60 | 53 | 50 | 59 | 54 | - | 57 | 68 | 49 | 43 | 51 | 68 | 51 | 61 | 44 |
| 125 | 47 | 49 | 45 | 45 | 43 | 44 | 41 | - | 34 | 53 | 51 | 55 | 49 | 49 | 50 | 48 | 21 | 37 | 39 |
| 126 | 61 | 73 | 67 | 55 | 64 | 60 | 41 | 65 | 62 | - | 43 | 62 | 45 | 43 | 60 | 34 | 51 | 55 | 37 |
| 127 | 52 | 53 | 45 | 49 | 48 | 48 | 50 | - | 50 | 65 | 53 | 47 | 49 | 52 | 57 | 52 | 51 | 40 | 49 |
| 128 | 45 | 36 | 45 | 52 | 43 | 44 | 57 | - | 41 | 47 | 38 | 29 | 37 | 48 | 32 | 37 | 39 | 55 | 41 |
| 129 | 66 | 63 | 51 | 63 | 64 | 57 | 57 | 42 | 68 | 59 | 61 | 53 | 53 | 63 | 50 | 79 | 66 | 76 | 60 |
| 130 | 75 | 65 | 57 | 63 | 70 | 65 | 57 | 59 | 54 | 53 | 49 | 50 | 53 | 55 | 51 | 48 | 60 | 55 | 49 |
| | | | | | | | | | | | | | | | | | | | |
| 131 | 58 | 56 | 37 | 42 | 51 | 48 | 45 | - | 50 | 53 | 50 | 50 | 50 | 50 | 44 | 55 | 43 | 55 | 64 |
| 132* | | | | | | | | | | | | | | | | | | | |
| 133 | 38 | 49 | 48 | 42 | 38 | 60 | 33 | - | - | 41 | 46 | 44 | 45 | 34 | 36 | 34 | 39 | 37 | 23 |
| 134 | 58 | 49 | 57 | 55 | 57 | 57 | 50 | - | 54 | 41 | 61 | 62 | 58 | 58 | 57 | 62 | 61 | 43 | 54 |
| 135 | 42 | 46 | 60 | 42 | 43 | 38 | 30 | - | 41 | - | 46 | 44 | 37 | 43 | 44 | 55 | 43 | 46 | 59 |
| 136 | 45 | 46 | 57 | 45 | 48 | 38 | 36 | - | 44 | 41 | 43 | 23 | 42 | 48 | 36 | 37 | 46 | 55 | 39 |
| 137* | | | | | | | | | | | | | | | | | | | |
| 138 | 50 | 49 | 45 | 45 | 48 | 57 | 50 | - | 54 | - | 61 | 58 | 49 | 58 | 57 | 55 | 53 | 67 | 59 |
| 139 | 65 | 65 | 65 | 71 | 70 | 74 | 50 | 59 | 71 | 55 | 61 | 62 | 58 | 63 | 64 | 68 | 55 | 55 | 51 |
| | | | | | | | | | | | | | | | | | | | |
| 140 | 45 | 36 | 41 | 49 | 43 | 48 | 45 | - | 44 | 53 | 40 | 45 | 43 | 49 | 40 | 41 | 51 | 46 | 51 |
| 141 | 61 | 46 | 60 | 52 | 57 | 60 | 64 | - | 54 | 53 | 50 | 70 | 66 | 70 | 55 | 45 | 55 | 50 | 54 |
| 142 | 38 | 49 | 45 | 42 | 39 | 41 | 30 | 42 | - | 47 | 49 | 53 | 53 | 52 | 49 | 48 | 30 | 50 | 47 |
| 143 | - | - | - | - | - | 32 | 40 | 42 | 44 | 33 | 38 | 37 | 42 | 34 | 39 | 45 | 46 | 55 | 59 |
| 144* | | | | | | | | | | | | | | | | | | | |
| 145 | 50 | 43 | 51 | 49 | 48 | 41 | 45 | - | 50 | 41 | 53 | 44 | 53 | 52 | 51 | 48 | 51 | 55 | 59 |
| 146* | | | | | | | | | | | | | | | | | | | |
| 147 | 28 | 43 | 37 | 38 | 32 | 53 | 50 | - | 50 | 59 | 32 | 35 | 38 | 39 | 36 | 45 | 39 | 43 | 35 |
| 148 | 58 | 62 | 51 | 49 | 57 | 53 | 45 | - | 54 | - | 49 | 58 | 53 | 48 | 49 | 41 | 46 | 61 | 59 |
| 149 | 62 | 65 | 57 | 58 | 62 | 48 | 57 | - | 54 | - | 57 | 58 | 45 | 58 | 57 | 72 | 55 | 50 | 64 |
| 150 | 56 | 56 | 41 | 34 | 48 | 44 | 57 | - | 37 | 41 | 51 | 47 | 49 | 43 | 40 | 45 | 35 | 33 | 43 |
| | | | | | | | | | | | | | | | | | | | |
| 151 | 42 | 33 | 26 | 27 | 29 | 44 | 50 | - | 50 | 41 | 33 | 47 | 37 | 38 | 41 | 29 | 43 | 32 | 45 |
| 152 | 34 | 36 | 53 | 52 | 39 | 35 | 36 | - | 28 | 41 | 38 | 53 | 49 | 43 | 44 | 45 | 35 | 37 | 35 |
| 153 | 58 | 49 | 41 | 45 | 51 | 41 | 33 | - | - | 41 | 38 | 37 | 42 | 43 | 34 | 37 | 46 | 40 | 40 |
| 154 | 52 | 56 | 48 | 52 | 54 | 64 | 57 | 59 | 62 | - | 57 | 68 | 62 | 58 | 34 | 72 | 46 | 50 | 45 |
| 155 | 42 | 62 | 48 | 45 | 44 | 60 | 45 | 47 | 62 | - | 53 | 47 | 58 | 52 | 53 | 55 | 60 | 50 | 47 |
| 156 | 45 | 49 | 63 | 55 | 51 | 35 | 40 | 37 | 44 | - | 44 | 50 | 45 | 55 | 46 | 37 | 75 | 55 | 50 |
| 157 | 54 | 49 | 45 | 55 | 51 | 44 | 64 | - | 46 | 53 | 54 | 59 | 49 | 49 | 57 | 68 | 55 | 61 | 45 |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 158 | - | - | - | - | - | 41 | 50 | - | 50 | 41 | 28 | 41 | 33 | 34 | 28 | 62 | 46 | 50 | 51 |
| 159 | 45 | 46 | 48 | 52 | 48 | 48 | 50 | - | 50 | 41 | 46 | 44 | 49 | 38 | 49 | 37 | 51 | 55 | 44 |
| 160 | 38 | 73 | 57 | 45 | 51 | 60 | 50 | 59 | 57 | - | 51 | 70 | 59 | 52 | 57 | 45 | 35 | 40 | 41 |
| 161 | 28 | 36 | 34 | 38 | 32 | 32 | 57 | - | 35 | 41 | 40 | 33 | 33 | 38 | 32 | 29 | 30 | 33 | 35 |
| 162 | 34 | 53 | 57 | 49 | 48 | 53 | 45 | 59 | 50 | 53 | 38 | 58 | 62 | 48 | 53 | 37 | 46 | 50 | 54 |
| 163* | | | | | | | | | | | | | | | | | | | |
| 164 | 52 | 62 | 41 | 42 | 48 | 48 | 45 | 50 | 44 | - | 51 | 53 | 59 | 64 | 57 | 37 | 55 | 43 | 45 |
| 165 | 42 | 30 | 41 | 42 | 35 | 41 | 45 | - | 44 | 47 | 51 | 46 | 43 | 46 | 45 | 39 | 35 | 43 | 54 |
| 166 | 68 | 62 | 60 | 45 | 62 | 38 | 57 | - | 37 | - | 54 | 65 | 47 | 55 | 50 | 60 | 55 | 72 | 64 |
| 167* | | | | | | | | | | | | | | | | | | | |
| 168* | | | | | | | | | | | | | | | | | | | |
| 169 | 47 | 56 | 51 | 45 | 48 | 57 | 57 | - | 57 | - | 56 | 62 | 45 | 55 | 53 | 48 | 51 | 67 | 54 |
| 170 | 52 | 43 | 63 | 58 | 54 | 64 | 57 | - | 59 | 53 | 44 | 50 | 43 | 49 | 45 | 58 | 51 | 55 | 49 |
| 171 | 63 | 59 | 48 | 60 | 60 | 64 | 71 | - | 62 | 65 | 56 | 45 | 40 | 42 | 45 | 65 | 66 | 61 | 76 |
| 172 | 73 | 53 | 48 | 63 | 64 | 44 | 45 | - | 34 | 41 | 53 | 29 | 49 | 43 | 44 | 60 | 66 | 79 | 59 |
| 173 | 38 | 46 | 41 | 42 | 39 | 48 | 57 | - | 50 | 41 | 34 | 39 | 32 | 37 | 32 | 29 | 35 | 46 | 51 |
| 174 | 47 | 33 | 41 | 49 | 43 | 70 | 71 | - | 57 | 65 | 68 | 62 | 66 | 70 | 75 | 45 | 51 | 46 | 43 |
| 175 | 58 | 56 | 57 | 52 | 57 | 53 | 45 | 50 | 57 | 41 | 53 | 53 | 42 | 55 | 60 | 62 | 66 | 76 | 47 |
| 176 | 42 | 56 | 41 | 38 | 39 | 28 | 40 | 33 | 32 | - | 49 | 47 | 45 | 48 | 47 | 37 | 30 | 67 | 44 |
| 177 | 47 | 65 | 45 | 50 | 35 | 57 | 40 | - | 50 | - | 44 | 55 | 66 | 49 | 53 | 60 | 60 | 61 | 59 |
| 178 | 50 | 49 | 51 | 49 | 51 | 53 | 50 | - | 50 | 41 | 56 | 50 | 42 | 48 | 50 | 65 | 51 | 46 | 51 |
| 179 | 42 | 56 | 45 | 49 | 48 | 32 | 30 | 42 | 37 | 40 | 33 | 53 | 37 | 48 | 44 | 52 | 55 | 55 | 41 |
| 180 | 65 | 65 | 51 | 68 | 67 | 64 | 71 | - | 66 | 65 | 68 | 62 | 68 | 70 | 72 | 62 | 60 | 61 | 76 |
| 181* | | | | | | | | | | | | | | | | | | | |
| 182 | - | - | - | - | - | 48 | 50 | - | 50 | 53 | 53 | 62 | 53 | 63 | 57 | 48 | 51 | 46 | 51 |
| 183* | | | | | | | | | | | | | | | | | | | |
| 184 | 34 | 21 | 45 | 42 | 32 | 38 | 40 | - | 34 | 41 | 40 | 35 | 35 | 33 | 32 | 41 | 35 | 55 | 37 |
| 185 | 50 | 36 | 41 | 45 | 43 | 57 | 57 | - | - | - | 49 | 47 | 49 | 52 | 50 | 41 | 51 | 50 | 51 |
| 186 | 50 | 59 | 57 | 52 | 54 | 48 | 47 | - | 50 | 48 | 68 | 55 | 54 | 55 | 55 | 55 | 51 | 61 | 59 |
| 187 | 42 | 62 | 48 | 63 | 54 | 53 | 50 | 53 | 57 | - | 49 | 62 | 53 | 52 | 51 | 52 | 60 | 55 | 28 |
| 188 | 42 | 53 | 48 | 45 | 43 | 44 | 40 | 42 | 50 | 41 | 46 | 44 | 37 | 34 | 39 | 45 | 51 | 40 | 28 |
| 189 | 38 | 40 | 51 | 42 | 39 | 48 | 45 | - | 57 | 53 | 49 | 53 | 62 | 48 | 53 | 48 | 43 | 50 | 49 |
| 190 | - | - | - | - | - | 48 | 57 | - | 57 | 53 | 38 | 44 | 42 | 43 | 39 | 48 | 55 | 46 | 54 |
| 191* | | | | | | | | | | | | | | | | | | | |
| 192 | 65 | 65 | 72 | 60 | 67 | 60 | 57 | 53 | 67 | - | 61 | 53 | 62 | 55 | 57 | 60 | 66 | 61 | 64 |
| 193 | 21 | 30 | 31 | 31 | 25 | 48 | 40 | - | 41 | 27 | 61 | 50 | 62 | 55 | 55 | 37 | 35 | 43 | 49 |
| 194 | 58 | 46 | 48 | 60 | 57 | 38 | 50 | - | 37 | 46 | 46 | 44 | 42 | 38 | 39 | 65 | 66 | 61 | 54 |
| 195 | 65 | 56 | 48 | 55 | 60 | 41 | 45 | - | 46 | 53 | 53 | 58 | 53 | 58 | 55 | 45 | 60 | 50 | 51 |
| 196 | 34 | 30 | 41 | 38 | 32 | 48 | 45 | - | 57 | 41 | 33 | 47 | 29 | 34 | 45 | 32 | 39 | 32 | 28 |
| 197* | | | | | | | | | | | | | | | | | | | |
| 198 | 38 | 43 | 30 | 31 | 32 | 44 | 45 | 50 | 37 | 53 | 34 | 41 | 47 | 33 | 40 | 45 | 39 | 43 | 44 |
| 199 | 42 | 36 | 48 | 47 | 43 | 48 | 45 | - | 50 | 41 | 34 | 37 | 45 | 38 | 49 | 45 | 39 | 37 | 45 |
| 200 | 61 | 65 | 69 | 58 | 64 | 57 | 57 | 59 | 57 | - | 43 | 47 | 53 | 52 | 47 | 52 | 60 | 50 | 64 |
| 201 | 79 | 53 | 57 | 75 | 76 | 60 | 64 | - | 62 | 59 | 68 | - | 62 | 70 | 67 | 62 | 73 | 67 | 51 |
| 202 | 38 | 40 | 41 | 49 | 39 | 32 | 45 | - | 44 | 32 | - | - | - | - | - | 45 | 43 | 55 | 41 |
| 203* | | | | | | | | | | | | | | | | | | | |
| 204 | 62 | 59 | 67 | 68 | 67 | 57 | 57 | - | 50 | 65 | 53 | 53 | 62 | 63 | 57 | 60 | 55 | 50 | 54 |
| 205* | | | | | | | | | | | | | | | | | | | |
| 206 | 45 | 56 | 48 | 42 | 43 | 44 | 45 | - | 41 | 41 | 53 | 68 | 68 | 55 | 64 | 45 | 43 | 61 | 43 |
| 207 | 56 | 59 | 37 | 49 | 51 | 57 | 50 | - | 46 | 53 | 61 | 53 | 49 | 58 | 61 | 62 | 55 | 55 | 49 |
| 208 | 42 | 49 | 48 | 42 | 43 | 64 | 64 | - | 46 | 65 | 61 | 58 | 58 | 63 | 64 | 78 | 51 | 72 | 54 |
| 209 | 42 | 43 | 34 | 66 | 42 | 35 | 36 | - | - | - | 53 | 41 | 37 | 43 | 44 | 55 | 46 | 55 | 49 |
| 210 | 61 | 49 | 37 | 66 | 57 | 48 | 45 | - | 37 | - | 57 | 58 | 53 | 52 | 54 | 62 | 66 | 61 | 51 |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 211 | 50 | 49 | 53 | 49 | 51 | 53 | 57 | - | 50 | - | - | - | - | - | 52 | 55 | 61 | 59 | |
| 212 | 45 | 56 | 45 | 54 | 35 | 48 | 57 | - | 44 | - | 61 | 47 | 49 | 52 | 53 | 48 | 46 | 40 | 45 |
| 213 | 38 | 43 | 45 | 34 | 35 | 48 | 40 | 53 | 41 | 41 | - | - | - | - | 45 | 30 | 43 | 41 | |
| 214 | - | - | - | - | - | 53 | 57 | - | 50 | 52 | 53 | 50 | 53 | 63 | 57 | 58 | 55 | 67 | 64 |
| 215 | 61 | 58 | 49 | 52 | 57 | 44 | 50 | - | 50 | 53 | 53 | 59 | 49 | 52 | 53 | 45 | 55 | 55 | 54 |
| 216 | 56 | 70 | 72 | 63 | 67 | 70 | 64 | - | 59 | 41 | 61 | 52 | 54 | 55 | 67 | 52 | 60 | 50 | 64 |
| 217 | 34 | 36 | 41 | 38 | 32 | 38 | 33 | - | 46 | 41 | 43 | 37 | 42 | 43 | 44 | 37 | 35 | 37 | 43 |
| 218 | 54 | 43 | 57 | 45 | 51 | 48 | 57 | - | 55 | - | - | - | - | - | 55 | 55 | 61 | 45 | |
| 219 | 61 | 59 | 53 | 52 | 60 | 48 | 50 | 42 | 62 | - | 51 | 50 | 54 | 49 | 36 | 60 | 60 | 50 | 59 |
| 220 | 58 | 43 | 37 | 55 | 54 | 48 | 45 | - | 50 | 65 | 53 | 44 | 53 | 55 | 49 | 52 | 55 | 55 | 54 |
| 221 | 56 | 53 | 48 | 45 | 48 | 57 | 50 | - | 41 | - | 49 | 47 | 53 | 43 | 49 | 62 | 55 | 61 | 54 |
| 222 ^a | | | | | | | | | | | | | | | | | | | |
| 223 | 54 | 49 | 53 | 55 | 54 | 57 | 64 | - | 62 | 53 | 61 | 58 | 58 | 58 | 64 | 52 | 60 | 61 | 59 |
| 224 | 58 | 62 | 57 | 58 | 60 | 60 | 71 | - | 37 | - | - | - | - | - | 58 | 60 | 61 | 64 | |
| 225 ^a | | | | | | | | | | | | | | | | | | | |
| 226 | 28 | 33 | 30 | 21 | 25 | 24 | 30 | 33 | 28 | - | - | - | - | - | 41 | 30 | 33 | 39 | |
| 227 | 47 | 40 | 57 | 45 | 43 | 57 | 64 | - | 62 | 53 | 61 | 45 | 47 | 55 | 53 | 62 | 60 | 67 | 54 |
| 228 | - | - | - | - | - | 44 | 40 | - | - | 53 | 51 | 45 | 54 | 55 | 47 | 45 | 55 | 40 | 47 |
| 229 | 58 | 53 | 53 | 58 | 57 | 74 | 64 | 59 | 71 | - | 68 | 50 | 58 | 70 | 67 | 48 | 55 | 61 | 50 |
| 230 | 58 | 73 | 53 | 63 | 60 | 64 | 57 | 59 | - | - | 56 | 52 | 47 | 52 | 50 | 55 | 55 | 61 | 59 |
| 231 | 52 | 70 | 60 | 55 | 60 | 48 | 57 | - | 62 | 46 | 46 | 68 | 68 | 58 | 57 | 48 | 46 | 46 | 47 |
| 232 | 42 | 56 | 63 | 45 | 48 | 53 | 40 | - | 50 | - | 43 | 44 | 42 | 48 | 44 | 60 | 55 | 37 | 47 |
| 233 ^a | | | | | | | | | | | | | | | | | | | |
| 234 | 56 | 46 | 41 | 34 | 48 | 53 | 57 | - | 54 | 41 | 53 | 53 | 58 | 55 | 57 | 45 | 46 | 61 | 47 |
| 235 | - | - | - | - | - | 74 | 50 | 59 | 62 | - | 53 | 53 | 68 | 63 | 60 | 60 | 55 | 55 | 47 |
| 236 | 63 | 46 | 65 | 63 | 62 | 64 | 50 | - | 62 | 53 | 68 | 62 | 68 | 59 | 66 | 55 | 60 | 40 | 64 |
| 237 | 68 | 58 | 45 | 63 | 62 | 53 | 64 | - | 44 | - | 61 | 58 | 45 | 63 | 60 | 65 | 66 | 50 | 76 |
| 238 | 50 | 49 | 45 | 49 | 48 | 35 | 45 | - | 28 | 41 | - | - | - | - | 48 | 51 | 43 | 59 | |
| 239 | 58 | 49 | 45 | 58 | 57 | 48 | 50 | - | 50 | 53 | 47 | 35 | 38 | 33 | 32 | 55 | 51 | 50 | 51 |
| 240 | 62 | 53 | 57 | 60 | 60 | 64 | 50 | - | 62 | 61 | 61 | 58 | 58 | 63 | 50 | 60 | 60 | 43 | 54 |
| 241 | 54 | 56 | 63 | 38 | 54 | 57 | 50 | 55 | 62 | - | 57 | 58 | 49 | 58 | 60 | 62 | 55 | 55 | 64 |
| 242 | 52 | 59 | 60 | 49 | 54 | 64 | 71 | - | 54 | 53 | 61 | 68 | 62 | 63 | 64 | 48 | 66 | 55 | 64 |
| 243 | 50 | 25 | 65 | 55 | 43 | 35 | 36 | - | 62 | 41 | 57 | 50 | 49 | 58 | 57 | 62 | 60 | 43 | 59 |
| 244 | - | - | - | - | - | 64 | 57 | - | 59 | 65 | 51 | 55 | 54 | 49 | 47 | 45 | 46 | 40 | 47 |
| 245 | 45 | 40 | 41 | 38 | 39 | 35 | 33 | 33 | - | 30 | 33 | 53 | 45 | 48 | 47 | 45 | 35 | 55 | 32 |
| 246 | 58 | 36 | 65 | 55 | 54 | 41 | 50 | - | 44 | - | 54 | 45 | 43 | 46 | 50 | 52 | 51 | 43 | 54 |
| 247 | 63 | 49 | 69 | 55 | 62 | 57 | 57 | - | 59 | 59 | 53 | 44 | 45 | 43 | 49 | 58 | 66 | 72 | 51 |
| 248 | 50 | 40 | 45 | 49 | 43 | 53 | 50 | - | 46 | 41 | 61 | 50 | 66 | 69 | 66 | 55 | 55 | 61 | 43 |
| 249 | 58 | 43 | 45 | 42 | 48 | 64 | 50 | - | 66 | 53 | 57 | 62 | 58 | 55 | 50 | 52 | 55 | 43 | 59 |
| 250 | 54 | 40 | 32 | 52 | 48 | 64 | 50 | - | 57 | 53 | 45 | 44 | 49 | 34 | 44 | 52 | 55 | 46 | 51 |
| 251 | 42 | 40 | 53 | 52 | 43 | 58 | 57 | - | 54 | 53 | 28 | 50 | 53 | 38 | 41 | 41 | 51 | 46 | 32 |
| 252 | 42 | 43 | 48 | 49 | 43 | 48 | 36 | - | 62 | 39 | 44 | 45 | 43 | 42 | 45 | 52 | 43 | 33 | 47 |
| 253 | 52 | 49 | 53 | 58 | 54 | 48 | 45 | - | - | - | 49 | 33 | 37 | 38 | 39 | 48 | 46 | 40 | 64 |
| 254 ^a | | | | | | | | | | | | | | | | | | | |
| 255 | 65 | 65 | 63 | 68 | 67 | 70 | 64 | - | 71 | 59 | 68 | 68 | 62 | 63 | 67 | 52 | 66 | 55 | 54 |
| 256 | - | - | - | - | - | 38 | 36 | - | 37 | 47 | 46 | 50 | 58 | 52 | 53 | 37 | 43 | 43 | 37 |
| 257 | 56 | 59 | 48 | 58 | 57 | 57 | 64 | - | 54 | 53 | 65 | 55 | 54 | 59 | 61 | 55 | 51 | 55 | 54 |
| 258 | 63 | 53 | 60 | 55 | 60 | 57 | 57 | - | 46 | 65 | 47 | 55 | 54 | 55 | 40 | 48 | 66 | 33 | 51 |
| 259 | 34 | 59 | 48 | 42 | 43 | 38 | 36 | 42 | 50 | 53 | 46 | 41 | 45 | 55 | 49 | 55 | 66 | 55 | 54 |
| 260 | 50 | 53 | 41 | 48 | 45 | 60 | 57 | - | 59 | 53 | 56 | 55 | 54 | 59 | 58 | 50 | 48 | 53 | 48 |
| 261 | 45 | 46 | 48 | 45 | 43 | 41 | - | - | - | - | 46 | 44 | 37 | 52 | 44 | 45 | 46 | 55 | 64 |
| 262 | 52 | 63 | 65 | 63 | 62 | 48 | 50 | 50 | 54 | - | 57 | 37 | 53 | 48 | 51 | 55 | 55 | 40 | 54 |
| 263 | 38 | 30 | 26 | 31 | 25 | 32 | 36 | 42 | 34 | 41 | 49 | 58 | 53 | 43 | 47 | 41 | 35 | 37 | 37 |
| 264 | 28 | 53 | 41 | 38 | 35 | 41 | 30 | - | 50 | - | 43 | 47 | 42 | 55 | 47 | 41 | 35 | 33 | 35 |
| 265 ^a | | | | | | | | | | | | | | | | | | | |
| 266 | 56 | 40 | 41 | 52 | 51 | 48 | 45 | - | 50 | - | 53 | 44 | 49 | 45 | 51 | 55 | 55 | 67 | 54 |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 267 | 56 | 68 | 51 | 58 | 57 | 64 | 64 | - | 54 | 65 | 68 | 62 | 58 | 78 | 64 | 55 | 63 | 55 | 59 |
| 268 | 52 | 54 | 48 | 42 | 43 | 53 | 57 | 0 | 50 | 65 | 53 | 41 | 49 | 52 | 49 | 45 | 55 | 55 | 54 |
| 269 | 38 | 40 | 60 | 52 | 43 | 44 | 50 | - | 44 | 53 | 43 | 29 | 54 | 43 | 36 | 45 | 46 | 43 | 49 |
| 270 ^a | | | | | | | | | | | | | | | | | | | |
| 271 | 50 | 53 | 53 | 50 | 57 | 53 | 45 | 57 | - | 61 | 40 | 48 | 54 | 59 | 50 | 37 | 55 | 50 | 41 |
| 272 | 50 | 43 | 41 | 66 | 48 | 57 | 57 | - | 44 | 61 | 43 | 50 | 49 | 48 | 47 | 45 | 46 | 43 | 49 |
| 273 | 58 | 53 | 51 | 45 | 51 | 60 | 57 | - | 62 | 53 | 68 | 68 | 68 | 63 | 72 | 60 | 55 | 50 | 64 |
| 274 | 45 | 53 | 65 | 55 | 54 | 48 | 45 | - | 46 | 47 | 47 | 50 | 47 | 42 | 47 | 48 | 55 | 61 | 59 |
| 275 | 61 | 49 | 53 | 49 | 54 | 53 | 50 | - | 50 | 53 | 56 | 50 | 66 | 59 | 57 | 45 | 60 | 50 | 54 |
| 276 | 52 | 53 | 65 | 66 | 60 | 35 | 45 | - | 31 | 41 | 33 | 37 | 29 | 34 | 28 | 58 | 60 | 55 | 59 |
| 277 | 50 | 53 | 65 | 58 | 59 | 60 | 57 | 68 | 66 | 53 | 61 | 62 | 61 | 64 | 66 | 58 | 51 | 50 | 45 |
| 278 | 47 | 49 | 45 | 55 | 51 | 53 | 50 | 42 | 50 | 53 | 65 | 59 | 66 | 64 | 66 | 48 | 55 | 50 | 59 |
| 279 | 47 | 53 | 45 | 52 | 48 | 60 | 71 | - | 62 | 53 | 44 | 55 | 49 | 49 | 53 | 52 | 51 | 46 | 54 |
| 280 ^b | | | | | | | | | | | | | | | | | | | |
| 281 ^c | | | | | | | | | | | | | | | | | | | |
| 282 | 52 | 40 | 26 | 49 | 39 | 48 | 50 | - | 50 | 53 | 47 | 41 | 43 | 46 | 40 | 41 | 43 | 46 | 41 |
| 283 | 52 | 62 | 76 | 63 | 64 | 53 | 40 | - | 50 | - | 51 | 55 | 54 | 49 | 57 | 45 | 60 | 55 | 32 |
| 284 | 38 | 53 | 41 | 27 | 32 | 35 | 30 | 50 | 37 | - | 51 | 65 | 66 | 52 | 61 | 32 | 39 | 37 | 45 |
| 285 | 42 | 43 | 34 | 38 | 35 | 24 | 57 | - | 41 | 41 | 43 | 47 | 42 | 34 | 41 | 52 | 66 | 50 | 47 |
| 286 | 50 | 49 | 41 | 49 | 48 | 57 | 57 | - | 54 | 53 | 68 | 62 | 61 | 64 | 61 | 52 | 60 | 61 | 64 |