A COMPARISON OF SCHOLASTIC ACHIEVEMENTS OF HIGH SCHOOL ATHLETES AND NON-ATHLETES OF GREENE COUNTY, INDIANA

By

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Contributions of the Graduate School
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The thesis of Marvin L. Snoddy,
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A Comparison of Scholastic Achievements
of High School Athletes and Non-Athletes
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J. A. Mannery, Chairman

Date of Acceptance June 27, 1938
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CHAPTER I

INTRODUCTION

There has been much controversy on the question as to whether or not the pursuit of athletics is harmful to academic work of high school pupils. The discussions of the comparative abilities of the athlete and non-athlete in regard to both native intelligence and scholastic achievement have been common and heated from street corner to college classroom. However, most of the argument as far as the writer has been able to learn is without a substantial basis. If an athletically inclined pupil fails in one of his studies during the season in which he is engaged in a sport, the game is blamed by many for the failure. On the other hand if the pupil does especially brilliant work during this same period, some ardent advocates of athletics insist that his athletic activity is the reason for his academic success. There are those who are skeptical of the athletic picture fitting into the educational frame. Such statements as, "athletes are brawn and not brain," have led to aroused emotions, spirited debate, and some productive controversy.

I. PREVIOUS STUDIES

Although a few studies have been made at the present the issue is not clean-cut because of such factors as a lack of a
definition of what constitutes an "athlete" and "non-athlete," and disagreement over the validity of using teachers' marks to determine scholastic ability. The smallness of the number of cases in many studies makes the result of doubtful value for forming any well grounded conclusions.

Definitions of "athlete" and "non-athlete" used in previous studies. Dobberstien defines an athlete as a member of the squad for the period whether they made letters or not.¹

In order to establish some basis for the study, Jones² states that an athlete is interpreted as to mean any student who has been on an interscholastic athletic team and qualified for an award. All other students were classified as non-athletes. Only the boys who had had four years in which to qualify as athletes were included. Girls were omitted largely because interscholastic athletics are limited largely to boys.

Corman³ states:

An "athlete" is defined as any male pupil in grades ten, eleven, or twelve who was a regular participant in practice with the regular football or basketball squads, or both throughout the season. Who after all is the participant in athletic contests? A member of the football or basketball


is obviously a participant. A regular member of the squad is certainly a participant, although he may not enter a single contest. Is the "fan" a participant? If time is an element, perhaps the pupil who watches practice every day, is a spectator at all games, and devotes a great deal of time in reading the sports and "playing the game over" is also a participant.

The term "athlete" as used by Eaton and Shannon indicated those boys who had won letters in any of the major sports engaged in by high schools.

The writer gives the following definitions to be used in this study. The athletes are the junior and senior boys who have been awarded a school letter in one or more sports. The non-athletes are the junior and senior boys who have not been awarded a letter in any high school sport. The sports in which letters were awarded by the school included in this study were football and basketball.

Teachers' marks as a measure of success. Where teachers' marks were used as a criterion to measure success in previous studies it is hard to subtract the personal element from teachers' estimates. A teacher may be wholly out of sympathy with athletics, and may let this feeling consciously or unconsciously affect the pupils' standings. However, the reverse of this is sometimes the case, particularly when the school and town spirit demand victory "at any price" and grades are raised to allow some valuable player to remain eligible. It

is more than mere suspicion that cases do occur when a well-
mannered, popular player is shoved over the passing line by 
the force of personality rather than actual knowledge.

Therefore, the problem of the scholarship of athletes 
offers a direct challenge to the academic teacher as well as 
the athletic coach. In relation to this problem, Beavier has made the following statement: "It has been clearly shown 
that under-graduate scholarship is an indication of the qual-
ities than on the average make for success in later life."

A review of studies made after 1932. The studies made 
prior to, and including 1932 were reviewed very thoroughly by 
the study of Eaton and Shannon. This study continues the re-
view to the year 1938.

In 1934 E. C. Davis and J. A. Cooper wrote an article 
in which the following statements appeared:

About thirty years ago, the first studies 
devoted to discovering the facts related to this 
problem were conducted at Amherst College. In 
this instance, the athletes appeared less favor-
able. Since that time over forty similar studies 
have been pursued with conflicting results. 
However, it seems that in the majority of studies 
the athlete is favored.

Garner and Smith made a recent study of the scholastic 
success of athletes in which they found that athletes do better

5 L. Beavier, "Student Activities and Success in Life." 

6 Eaton and Shannon, op. cit.

7 E. C. Davis, and J. A. Cooper, "Athletic Ability and 
Scholarship," American Physical Education Research Quarterly. 
34:67-78, December, 1934.

8 E. C. Garner, and T. B. Smith, "Scholastic Success of 
the Athlete," School Executive. 54:18, September, 1934.
work during the athletic season than after it closes. This may show that it is not fatigue that lowers the grade, but a letdown when requirements are removed. The scholarship requirements do more to raise marks than fatigue does to lower them. However, the administrative emphasis, student body, and pressure of the community upon the situation will have their effects.

Harmon S. Jones⁹ found in his study conducted in Union High School, Grand Rapids, Michigan, that athletes rated slightly better than non-athletes scholastically, though again the difference was very slight. Jones also reported the findings of a study made by Hindmarsh on "Scholarship and Athletics," which points out that men who hold scholarship must have an outstanding record. Athletes were found to comprise a fair portion of scholarships. Those who had scholarships remained high in rank throughout their college careers. More than half graduated with honors, which would show that athletes are of at least average in mental ability.

Eaton and Shannon¹⁰ conducted a study in Indiana State Teachers College, Terre Haute, Indiana. In this study 291 high school letter men were compared with 388 non-letter men. These 679 students comprised the enrollment of male students for the winter quarter, 1933. Intelligence scores were secured for

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each person from the school record. The school marks from the records were also secured. The following results were reported:

1. Letter men were of lower intelligence than non-letter men.

2. Athletes were less successful than non-athletes in college scholarship, but their scholarship was higher in proportion to their intelligence than that of non-athletes.

R. H. Jones made a study at Washington High School of Indianapolis in which he gave intelligence examination to 500 boys. He then compared their academic marks. The following is a summary of his findings. 11

1. High school athletes are more intelligent than non-athletes.

2. There is a smaller percentage of athletes in the lower percentage levels.

3. A larger percentage of athletes than of non-athletes were in the normal and superior groups of intelligence.

4. In the very superior and near genus groups the percentage of athletes and non-athletes is approximately the same.

Cormany 12 compared athletes with non-athletes scholastically by objective achievement tests in Raleigh County, West Virginia. One hundred seventy-four boys were used in the test. Athletes were paired with non-athletes of equal ability to

11 R. H. Jones, loc. cit.

12 W. J. Cormany, loc. cit.
eliminate the difference in ability to achieve. His findings were slightly in favor of the athlete, however the difference was insignificant.

E. C. Greenblatt, in his study in Knoxville High School, found that athletes as a group make as high marks with relation to their intelligence as non-athletes do with relation to their intelligence.\(^\text{13}\)

W. F. Dobberstien\(^\text{14}\) made a study comparing the academic achievements of athletes and non-athletes of Elmira High School, Elmira, New York, and Ithoca Senior High School, Ithoca, New York. A summary of his findings is as follows:

1. Each study shows within its limitations the conditions prevailing in the situation for the period covered by the data.

2. The Elmira study shows superiority of the non-participating group over the players.

3. Although no generalized statement regarding differences in achievement of athletes and non-athletes can be made from these data, one must conclude that during the periods studied the players tended to fall below the non-participants in academic achievement.

Kissel\(^\text{15}\) finds that there is little difference in I. Q. of athletes and non-athletes; that in colleges and universities

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\(^{14}\) William F. Dobberstien, loc. cit.

there is little difference in scholarship of athletes and non-athletes, although there is a slight advantage in favor of the non-athletes, while in the secondary school athletics have very little effect upon scholarship of athletes. He also finds that there is little difference in one-, two-, and three-sport athletes.

Price\textsuperscript{16} finds little difference in the achievement of athletes and non-athletes in secondary schools. He states that both received lower marks in the required subjects than they did in variables and electives, and that the athletic program of the schools studied are functioning without detriment to the academic success of the students.

Brandon\textsuperscript{17} studied marks of high school boys in eight secondary schools located in Davidson County, Tennessee. A comparison of the marks of athletic participants and non-participants shows that the athletic participants had the higher scholastic marks.

In a study conducted by J. R. Shannon\textsuperscript{18} at Indiana State Teachers College the scores made in English by 144 high school


athletes and 211 high school non-athletes were compared. It was found that the athletes tend to make higher achievement records in English in proportion to their intelligence than non-athletes. In this study the athletes were slightly behind in intelligence but noticeably ahead in achievement.

A special press article to the New York Times as of March 17, 1934 states that twelve of the nineteen men at Amherst College this winter elected to Phi Beta Kappa were athletes.

II. THE PROBLEM

Statement of the problem. The purpose of this study is to determine whether participation in organized, interscholastic athletics had any effect on academic achievement as measured by standardized achievement tests in the twelve high schools of Greene County, Indiana.

Studies made in this field have been open to criticism because in practically every case teachers' marks have been used as a measure of achievement. In the few studies that have used standardized achievement tests such a few cases were used that the results are of doubtful value. In many cases the failure to establish the intelligence scores of the boys participating have made the results of negligible value, since their ability to achieve has not been correctly determined. In this study objective measurement has been used to determine both mental ability and achievement of the participants. Three
hundred twenty-two cases were afforded for this study which is a sufficient number to render the findings of the study worthwhile.
CHAPTER II

METHOD AND PROCEDURE

In choosing Greene County for this study, a representative cross section of the state of Indiana was afforded. Every high school in the county has a basketball team and four of the twelve school have football teams. Many of these teams have had better than average success and have created a strong, favorable feeling for athletics. The desire to take part in competitive games is very general and very strong among all the high school boys.

The writer, with the agreement of Dr. J. R. Shannon, decided to use only junior and senior boys in this study. In choosing boys from the eleventh and twelfth grade a better classification was afforded. These boys have had two years in which to qualify as athletes and they have taken all of the core subjects which were included in the Myers-Ruch High School Progress Test. The Myers-Ruch High School Progress Test, which was used to compare scholastic achievement includes the following core subjects: English, social studies, mathematics, and science.

I. COLLECTION OF DATA

The data upon which the findings of this thesis are based were established by giving standardized tests to the

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1 A copy of this test will be found in the Appendix.
junior and senior boys who were enrolled during the 1937-38
school year in the Greene County High Schools.

Data were secured for comparing the intelligence of
athletes and non-athletes by giving the Otis Self-Administering
Tests of Mental Ability, Higher Examination: Form D, for
College and High School to each pupil participating in the
study.\(^2\)

The data for comparison of scholastic achievement of
athletes and non-athletes were secured by giving the Myers-
Ruch High School Progress Test, Form A: for Senior High Schools
to each pupil participating in the study.

II. ORGANIZATION OF DATA

The scores of the athletes and non-athletes were tab-
ulated and arranged in tables showing the range of the two
groups on both the intelligence and achievement tests. There
were 116 junior and senior athletes and 206 junior and senior
non-athletes who took both of the tests used in this study.

III. STATISTICAL CALCULATIONS

The arithmetic mean and the standard deviation were used
as the measures of central tendency and dispersion in comparing
the scores of the athletes and non-athletes on both the mental
ability test and the achievement test.

\(^2\) A copy of this test will be found in the Appendix.
Many authorities differ in their use of signs and symbols in statistical procedure, and because of this, it seems fitting that some explanation be given of the statistical measures used in this study.

The arithmetic mean was computed by the use of the following formula: True mean = assumed mean + $\frac{\sum f d}{N} \times$ (size of interval). Sigma, or the standard deviation, was computed from the formula: S. D. = $\left[\frac{\sum f d^2}{N} - \left(\frac{\sum f d}{N}\right)^2\right]$ (size of the interval). The probable error of the mean, being the most common measure of the reliability of the measure of central tendency, was found in each case by the formula: P. E. m = $0.6745 \frac{\sigma}{\sqrt{N}}$. The formula, P. E. $\sigma = 0.7071 \ P. E. m$ was used to determine the probable error of the standard deviation, which is the measure of the reliability of the measure of dispersion.

In determining the reliability of the difference of the means the formula: $P. E. m_1 - m_2 = \sqrt{(P. E. m_1)^2 + (P. E. m_2)^2}$, was used, which is the probable error of the difference between two uncorrelated means. This statistical procedure is set forth by Tiegs. ¹

In ascertaining whether or not a difference between means was significant, the difference between means was divided by the probable error of the difference. ² Whenever the difference


between the means divided by the probable error of the difference if four or more the difference is said to be significant. The higher the number over four, the more reliable the difference.

III. PRESENTATION OF DATA

Comparison of scores made by athletes and non-athletes on mental ability test. The raw scores made by the athletes and non-athletes on the mental ability test show practically the same range, that of the athletes being from 10 to 74. The range of the scores made by the non-athletes was from 10 to 69. The highest possible score on this test was 75. The highest score actually made by an athlete was 70 and the lowest was 15. The figures 10 to 74 are the limits of the intervals. The highest score made by the non-athletes was 69 and the lowest score made by the non-athletes was 14. The mean of the scores of the athletes on the mental ability test was 38.65, while the mean of the non-athletes on the same test was 39.00. The complete picture of the range of these scores is shown in Tables I and II.

Comparison of scores made by athletes and non-athletes on achievement test. A comparison of the range and means of the athletes and non-athletes on the achievement test shows that again the two groups are practically the same. The range of the athletes on this test is from 25 to 89, with a mean of 54.25, and that of the non-athletes on the same test was from 25 to 104, with a mean of 54.70. The highest possible

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3 Tieg's, *loc. cit.*
TABLE I
SCORES MADE BY JUNIOR AND SENIOR BOY ATHLETES AND NON-ATHLETES OF GREENE COUNTY ON THE MENTAL ABILITY TEST

<table>
<thead>
<tr>
<th>Score</th>
<th>Athletes</th>
<th>Non-Athletes</th>
</tr>
</thead>
<tbody>
<tr>
<td>75-79</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>70-74</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>65-69</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>60-64</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>55-59</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>50-54</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>45-49</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>40-44</td>
<td>17</td>
<td>40</td>
</tr>
<tr>
<td>35-39</td>
<td>19</td>
<td>32</td>
</tr>
<tr>
<td>30-34</td>
<td>13</td>
<td>31</td>
</tr>
<tr>
<td>25-29</td>
<td>20</td>
<td>27</td>
</tr>
<tr>
<td>20-24</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>15-19</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>10-14</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>116</strong></td>
<td><strong>206</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Athletes</th>
<th>Non-Athletes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>38.65</td>
<td>39.00</td>
</tr>
<tr>
<td><strong>Standard Deviation</strong></td>
<td><strong>11.10</strong></td>
<td><strong>10.80</strong></td>
</tr>
<tr>
<td>P. E. &amp;n</td>
<td>.695</td>
<td>.508</td>
</tr>
<tr>
<td>P. E.</td>
<td>.491</td>
<td>.359</td>
</tr>
</tbody>
</table>
### TABLE II

**SCORES MADE BY JUNIOR AND SENIOR BOY ATHLETES AND NON ATHLETES OF GREENE COUNTY ON THE ACHIEVEMENT TEST**

<table>
<thead>
<tr>
<th>Score</th>
<th>Athletes</th>
<th>Non-Athletes</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-104</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>95-99</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>90-94</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>85-89</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>80-84</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>75-79</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>70-74</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>65-69</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>60-64</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>55-59</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>50-54</td>
<td>14</td>
<td>38</td>
</tr>
<tr>
<td>45-49</td>
<td>19</td>
<td>32</td>
</tr>
<tr>
<td>40-44</td>
<td>16</td>
<td>23</td>
</tr>
<tr>
<td>35-39</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>30-34</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>25-29</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>20-24</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15-19</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10-14</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>116</td>
<td><strong>206</strong></td>
</tr>
</tbody>
</table>

**Mean**
- **Athletes**: 54.25
- **Non-Athletes**: 54.70

**Standard deviation**
- **Athletes**: 13.60
- **Non-Athletes**: 14.25

**P. E. m**
- **Athletes**: 0.852
- **Non-Athletes**: 0.670

**P. E.**
- **Athletes**: 0.602
- **Non-Athletes**: 0.474
score on this test was 120. The highest score made by the athletes on this test was 89 and the lowest score made by the athletes was 29. The highest score made by the non-athletes was 101 and the lowest score made by the non-athletes was 25. This information is also shown in Tables I and II.

The probable error and difference between the means of the two groups. The probable error of the mean of the athletes on the mental ability test was .695. The probable error of the mean of the non-athletes on the same test was .508. The difference between the means is .35 and the probable error of the difference is .86. The critical ratio is .407. A critical ratio of four or more indicates complete reliability. Therefore, it is safe to conclude that neither group is superior in mental ability in light of the facts just presented. Table III shows the reliability of the difference between the mental ability of athletes and non-athletes.

**TABLE III**

<table>
<thead>
<tr>
<th>Mean Athletes</th>
<th>Mean Non-Athletes</th>
<th>Diff.</th>
<th>Favor</th>
<th>P. E.</th>
<th>Critical diff.</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.65 ± .695</td>
<td>39.00 ± .508</td>
<td>.35</td>
<td>NA</td>
<td>.86</td>
<td>.407</td>
<td></td>
</tr>
</tbody>
</table>

Table IV shows the reliability of the difference between the achievement of athletes and non-athletes. The mean of the

---

TABLE IV

RELIABILITY OF THE DIFFERENCE BETWEEN THE ACHIEVEMENT OF ATHLETES AND NON-ATHLETES

<table>
<thead>
<tr>
<th>Mean Athletes</th>
<th>Mean Non-Athletes</th>
<th>Diff.</th>
<th>Favor</th>
<th>P. E.</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>54.25 ± .852</td>
<td>54.70 ± .670</td>
<td>.45</td>
<td>NA</td>
<td>1.08</td>
<td>.416</td>
</tr>
</tbody>
</table>

athletes is 54.25, with a probable error of .852, while the mean of the non-athletes is 54.70, with a probable error of .670. The difference of the means of the two groups is 1.08 and the critical ratio is .416. The critical ratio indicates that neither group is superior in achievement.

Comparison of dispersion of the two groups on the mental ability and achievement tests. Table V shows the means and standard deviations of each group on the mental ability and achievement tests.

The standard deviation of the athletes on the mental ability test is 11.10 with a probable error of .491. The standard deviation of the non-athletes on the same test is 10.80 with a probable error of .359. These facts indicate that the middle 68.26 per cent of the athletic group lie between the limits of 27.55 and 49.75 and the middle 68.26 per cent of the non-athletic group lie between 28.20 and 49.80. There is very little difference in dispersion of the two groups on the mental ability test.
TABLE V
MEANS AND STANDARD DEVIATIONS OF ATHLETES AND NON ATHLETES ON MENTAL ABILITY AND ACHIEVEMENT TESTS

<table>
<thead>
<tr>
<th></th>
<th>Mental ability</th>
<th>Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athletes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean &amp; P. E.</td>
<td>38.65 ± .695</td>
<td>54.25 ± .85</td>
</tr>
<tr>
<td>S. D. &amp; P. E.</td>
<td>11.10 ± .491</td>
<td>13.60 ± .602</td>
</tr>
<tr>
<td>Non-Athletes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean &amp; P. E.</td>
<td>39.00 ± .508</td>
<td>54.70 ± .670</td>
</tr>
<tr>
<td>S. D. &amp; P. E.</td>
<td>10.80 ± .359</td>
<td>14.25 ± .474</td>
</tr>
</tbody>
</table>

The standard deviation of the athletes on the achievement test is 13.60, which means that the middle 68.26 per cent of the group lie between the limits of 40.65 and 67.85. The standard deviation of the non-athletes on the same test is 14.25, which indicates that the middle 68.26 per cent of this group lie between 40.45 and 68.95. There is very little difference in dispersion of the two groups on this test.

Comparison of coefficient of correlation of mental ability and achievement of both groups. The coefficient of correlation of mental ability and achievement of the athletes is .81 with a probable error of .023. The coefficient of correlation of mental ability and achievement of the non-athletes is .68 with a probable error of .026. The true
coefficient of correlation lies somewhere between the limits of the obtained coefficient plus four times its probable error and the obtained coefficient minus four times its probable error. The true coefficient of the athletic group is between .718 (.81 - .092) and .902 (.81 + .092). The true coefficient in the case of the non-athletic group is between .578 (.68 - .102) and .782 (.68 + .102). The coefficients of correlation for both groups are shown in Table VI.

**TABLE VI**

COEFFICIENTS OF CORRELATION BETWEEN MENTAL ABILITY AND ACHIEVEMENT OF ATHLETES AND NON-ATHLETES

<table>
<thead>
<tr>
<th></th>
<th>Athletes</th>
<th>Non-Athletes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of correlation</td>
<td>.81 ± .023</td>
<td>.68 ± .026</td>
</tr>
</tbody>
</table>

It will be observed from the above table that the coefficients of correlation of both the athletes and non-athletes are high, but that the athletes have a higher correlation than the non-athletes. This fact is in agreement with the findings of Eaton and Shannon\(^6\) in their study of the achievement of athletes and non-athletes of Indiana State Teachers College, and with the conclusion drawn by Shannon\(^7\) in his study of the

---


\(^{7}\) Shannon, *op. cit.*, pp. 128-130.
achievement of high school athletes and non-athletes in English.
CHAPTER III

CONCLUSIONS

The results of this investigation show that participation in athletics by high school students of Greene County, Indiana, has no detrimental effect upon their scholastic rating during their high school careers. There is some evidence that participation in athletics induces the athlete to do better work in school than he would if certain scholastic requirements were not placed upon him. The results of this study are stated as follows:

1. The raw scores made by the athletes and non-athletes on the mental ability and achievement tests show practically the same range.

2. Neither group is superior in either mental ability or achievement.

3. There is very little difference in the dispersion of the two groups on the mental ability and achievement tests.

4. There is a higher coefficient of correlation between mental ability and achievement of the athletes than the non-athletes.

All the benefits derived from athletic participation cannot be measured in terms of scholastic achievement. It is difficult to determine just how much the athlete has gained by his interest in athletics. It has been shown in this study that
the time the athlete has spent in this extra-curricular activity had not hindered his achievement, and if the school is to educate the child in the broadest sense, participation in some athletic program is of great importance to both the pupil and the community.
BIBLIOGRAPHY
BIBLIOGRAPHY


MacPhail, A. H. The Intelligence of College Students. (New York: Warwick and York, 1924).


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

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

Name ........................................ Age last birthday .............. years

First name, initial, and last name

Birthday ............................... Teacher .......................... Grade 9 10 11 12

Month Day Draw a circle around the grade you are in.

City ........................................ School .......................... Date ........

This test is to find out how much you know about certain high school subjects.

Each question has five answers numbered 1, 2, 3, 4, and 5. Only one answer is right. You are to find the right answer and underline it, as shown in the samples below.

Notice that the answer to the first sample is noun and that the word noun is underlined.

The answer to the second sample is No. 2, and it is underlined, and the answer to the third sample is underlined.

In some cases the numbers of the five answers have circles around them so that you will know they are not part of the answer.

Your teacher or the examiner will explain further how you are to answer the questions.

Sample: The word hat is a —

1 verb 2 pronoun 3 noun 4 adjective 5 adverb

Sample: The expression $a^2$ means —

1 $a + a$ 2 $a \times a$ 3 $a + 2$ 4 $a \times 2$ 5 $\frac{1}{2}$ of $a$

Sample: The President of the United States is elected for a term of —

1 one year 2 two years 3 three years 4 four years 5 five years

The test contains 120 questions. There are 30 on English, 30 on social studies, 30 on mathematics, and 30 on science. You will have an hour in which to answer them. If you have not finished the first 30 questions in 15 minutes, you will be told to start on the social science questions. If you have time later, you may answer any questions that you skipped. If you finish the questions in any subject in less than 15 minutes, go right on. Be careful not to go so fast that you make mistakes, but do not spend too much time on any one question. Do not ask any questions about the test after the work is begun. Lay your pencil down.

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

Patent No. 1,586,628

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PRINTED IN U.S.A. FERNS: A2

This test is copyrighted. The reproduction of any part of it by mimeograph, hectograph, or in any other way, whether the reproductions are sold or are furnished free for use, is a violation of the copyright law.
1. The Great Stone Face was on — 1 a hard-hearted landlord 2 a schoolmaster 3 a minister 4 a mountain 5 the front of a church .......................... 1
2. The friendship of David and Jonathan is told in — 1 the Bible 2 Rab and His Friends 3 Adventures in Friendship 4 The Prince of India 5 The Last Days of Pompeii 2
3. Which word forms the plural by adding es? 1 solo’ 2 potato 3 zero 4 dynamo 5 albino ............................ 3
4. The misspelled word is — 1 impel 2 arrainge 3 assault 4 slippery 5 obliging .............................. 4
5. The word homicide means — 1 disinfectant 2 in agreement 3 manslaughter 4 homelike 5 native ............................ 5
6. The misspelled word is — 1 sufficient 2 restrain 3 external 4 believe 5 entertain .............................. 6
7. A compound personal pronoun is — 1 anyone 2 another 3 someone 4 each other 5 ourselves ............................ 7
8. The word impertinent means — 1 impatient 2 evasive 3 unexpected 4 halting 5 saucy ............................ 8
9. An example of an adverb is — 1 great 2 truly 3 secure 4 holy 5 wide .............................. 9
10. The stories of Br'er Rabbit were told by — 1 grandmother 2 an old Negro man 3 a Negro mammy 4 a little boy 5 a big sister ............................ 10
11. Which of the following is an adjective? 1 beautifully 2 happy 3 nearly 4 chiefly 5 very much ........................... 11
12. The Jungle Books were written by — 1 Edgar Rice Burroughs 2 Theodore Roosevelt 3 Bret Harte 4 Rudyard Kipling 5 John Masefield ............................ 12
13. The misspelled word is — 1 conscious 2 receives 3 courteous 4 parasites 5 dispises ............................ 13
14. The popular historian of colonial New York was — 1 Cooper 2 Otis 3 Irving 4 Mark Twain 5 O. Henry ............................ 14
15. The Ancient Mariner was written by — 1 Addison 2 Scott 3 Coleridge 4 Byron 5 Macaulay ............................ 15
16. Mood is a property of — 1 nouns 2 pronouns 3 adjectives 4 verbs 5 adverbs ............................ 16
17. O Captain! My Captain! was written by — 1 Longfellow 2 Lowell 3 Poe 4 Whitman 5 Field ............................ 17
18. The river Styx symbolizes — 1 death 2 night 3 paganism 4 self-indulgence 5 poverty ............................ 18
19. An interrogative pronoun is — 1 which 2 where 3 how 4 when 5 why .............................. 19
20. The word homogeneous means — 1 home loving 2 manlike 3 of the same kind 4 simultaneous 5 nomadic ............................ 20
21. Nokomis was the — 1 mother of Uncas 2 wife of Hiawatha 3 sweetheart of John Smith 4 daughter of the moon 5 mother of Minnehaha ............................ 21
22. Which word is the antonym for spacious? 1 expansive 2 broad 3 crowded 4 thin 5 closed ............................ 22
23. Ichabod Crane came to grief through — 1 a woman 2 a bicycle 3 indigestion 4 laziness 5 a pumpkin ............................ 23
24. The Hoosier Poet was — 1 James Whitcomb Riley 2 Eugene Field 3 Edgar Allan Poe 4 James Russell Lowell 5 Edgar A. Guest ............................ 24
25. The Minotaur was a — 1 castle 2 half man, half beast 3 Bible character 4 Norse god 5 magic lake ............................ 25
26. Westward Ho! tells of the struggle for naval and colonial supremacy between England and Spain. The author was — 1 Molière 2 Victor Hugo 3 Thomas Hardy 4 Charles Kingsley 5 Lew Wallace ............................ 26
27. The word ludicrous means — 1 free flowing 2 noisy 3 oily 4 ridiculous 5 precarious ............................ 27
28. The word ingenious means — 1 unsophisticated 2 insincere 3 unreal 4 spurious 5 hesitant ............................ 28
29. Horatius at the Bridge was written by — 1 Holmes 2 Carlyle 3 Macaulay 4 Burns 5 Byron ............................ 29
30. The Four Horsemen of the Apocalypse was written by — 1 Ibsen 2 Ibanez 3 Cather 4 Rövaag 5 Sinclair ............................ 30

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(3)

(Insurance)

(Insurance)
SOCIAL STUDIES

1. The first permanent English settlement in America was —
   1 Boston 2 New York 3 Plymouth 4 Jamestown 5 Providence

2. Every President of the United States upon entering office chooses ten secretaries for his —
   1 Cabinet 2 Supreme Court 3 ambassadors 4 Shipping Board 5 Electoral College

3. The man who built the Ark was —
   1 Adam 2 Noah 3 Moses 4 Samson 5 Abraham

4. Christopher Columbus was born in the city of —
   1 Genoa 2 Naples 3 Lisbon 4 Venice 5 Constantinople

5. The powerful secret organization in the South during the Reconstruction Period was the —
   1 Ku Klux Klan 2 Masons 3 Mormons 4 Copperheads 5 Carpetbaggers

6. The first Pilgrims were brought to America in the ship —
   1 Santa Maria 2 Trent 3 Mayflower 4 Half Moon 5 Monitor

7. Although the Puritans had suffered much persecution, they would not tolerate those who differed in —
   1 politics 2 religion 3 education 4 wealth 5 race

8. The number of Senators from each state is —
   1 1 2 2 3 3 4 4 5 5

9. The commander of the first expedition to circumnavigate the globe was —
   1 Balboa 2 Drake 3 Columbus 4 Magellan 5 Hudson

10. The man who marched from Atlanta to the sea was —
    1 Sherman 2 Grant 3 Sheridan 4 Thomas 5 Lee

11. Of the five diseases following, the one which threatens modern civilization most is —
    1 cancer 2 diphtheria 3 scarlet fever 4 tuberculosis 5 smallpox

12. On New Year's, 1863, was published the —
    1 Declaration of War 2 Bill of Rights 3 Declaration of Independence 4 Monroe Doctrine 5 Emancipation Proclamation

13. The doctrine that the United States should avoid "entangling alliances" was enunciated by —
    1 Hamilton 2 Adams 3 Clay 4 Washington 5 Wilson

14. The practice of elected officials' rewarding supporters with positions is called the —
    1 patron system 2 franking system 3 spoils system 4 civil service 5 laissez-faire system

15. The chief American grain exchange is located in —
    1 New York 2 Duluth 3 Winnipeg 4 Chicago 5 Kansas City

16. A battle of the Revolutionary War was —
    1 Saratoga 2 Bull Run 3 San Juan Hill 4 Antietam 5 Fort Duquesne

17. The numerals 1, 2, 3, etc., originated in —
    1 Rome 2 Arabia 3 Greece 4 Egypt 5 Turkey

18. Germany’s first military move in 1914 was the invasion of —
    1 France 2 Italy 3 Belgium 4 Holland 5 Serbia

19. An early Bolsheviki leader was —
    1 D’Annunzio 2 Lenin 3 Viviani 4 Poincaré 5 Ebert

20. Martin Luther was a —
    1 missionary 2 scientist 3 philosopher 4 soldier 5 reformer

21. A naval commander of the Revolutionary War was —
    1 Farragut 2 Hobson 3 Dewey 4 Jones 5 Leigh

22. The doctrine of laissez-faire in business means most nearly —
    1 government regulation 2 government ownership 3 free competition 4 price fixing 5 monopoly

23. States authorize corporations to engage in business by —
    1 licenses 2 franchises 3 bylaws 4 charters 5 decrees

24. The fundamental unit of society is the —
    1 individual 2 community 3 state 4 family 5 nation

25. Four basic social institutions are the family, church, school, and —
    1 theater 2 press 3 state 4 railroads 5 labor unions

26. The Sherman Act was an attempt to regulate —
    1 railroads 2 banks 3 labor prices 4 unfair monopolies 5 the New York Stock Exchange

27. A country which has maintained a constitutional government since the World War is —
    1 Italy 2 Switzerland 3 Spain 4 Chile 5 Hungary

28. The United States, in contrast with European powers, favors —
    1 balance of power 2 covenants, openly arrived at 3 laissez-faire policy 4 protectorates for weak nations 5 secret diplomacy

29. A bank lists as liabilities its —
    1 loans and discounts 2 cash on hand 3 capital stock 4 real estate 5 stocks and bonds

30. The Disarmament Conference of 1921 met in —
    1 Washington 2 Geneva 3 The Hague 4 Paris 5 London
1. \[ 6r + r - 8r = \]
   \[ 1 \quad r \quad 3 \quad -2r \quad 5 \quad -r \quad 1 \quad -15r \quad 3 \quad 2r. \]

2. A plane figure bounded by three straight lines is a —

3. If \[ 5x - 2 = 13, \] then \[ x = \]
   1. 2.2 2. 5 3. 3 4. 11 5. 15.

4. Two lines lying in the same plane that will never meet however far produced are said to be —
   1. oblique 2. transversals 3. parallel 4. perpendicular 5. diagonal.

5. The number of days in \[ m \] weeks is —
   \[ 1 \quad m \quad 2 \quad 7m \quad 3 \quad \frac{m}{7} \quad 4 \quad \frac{7}{m} \quad 5 \quad m + 7. \]

6. The factors of \[ 9d^2 - 24d + 16 \] are
   \[ 1 \quad (3d + 4)(3d - 4) \quad 2 \quad (3d - 4)(3d - 4) \quad 3 \quad (3d + 4)(3d + 4) \quad 4 \quad (9d - 4)(9d - 4) \quad 5 \quad (9d - 16)(d - 1). \]

7. \[ 9m^2 - 4n^2 = \]
   \[ 1 \quad (3m - 2n)^2 \quad 2 \quad (9m - 4n)^2 \quad 3 \quad (3m + 2n)(3m - 2n) \quad 4 \quad (3m - 2n)(3m + 2n) \quad 5 \quad (3m - 2n)(3m - 2n). \]

8. The line joining two opposite vertices of a quadrilateral is the —
   1. altitude 2. transversal 3. diagonal 4. median 5. bisector.

9. Vertical angles are —
   1. supplementary 2. complementary 3. acute 4. equal 5. right angles.

10. \[ (2y - 2)^2 = \]
    \[ 1 \quad 4y^2 - 8y + 4 \quad 2 \quad 4y^2 - 4y + 4 \quad 3 \quad 4y^2 + 4y + 4 \quad 4 \quad 4y^2 - 4 \quad 5 \quad 4y^2 - 8y + 4. \]

11. Two circles having the same center are said to be —
    1. tangent 2. congruent 3. concentric 4. similar 5. proportional.

12. Two angles that have the same vertex and a common side between them are called —
    1. complementary 2. supplementary 3. vertical 4. adjacent 5. opposite.

In the six exercises following, choose the proper equation for use in solving the problem.

13. **Problem.** If a 35-foot rope is to be cut into two parts so that one part is 7 feet longer than the other, how long will the shorter piece be?
    \[ 1 \quad 35 + 7 = x \quad 2 \quad x + 7 = 35 \quad 3 \quad x + (x + 7) = 35 \quad 4 \quad 7x = 35. \]

14. **Problem.** A 20-foot ladder is leaning against a wall, with the bottom of the ladder 6 feet from the wall. How far above the ground is the top of the ladder?
    \[ 1 \quad x = 6 + 20 \quad 2 \quad x = 20 - 6 \quad 3 \quad x = 6^2 + 20^2 \quad 4 \quad x^2 = 6^2 + 20^2. \]

15. **Problem.** Frank has 100 yards of fencing with which to enclose a rectangular garden so that the length of the garden will be 10 yards more than the width. How wide should he make the garden?
    \[ 1 \quad x + 10 = 100 \quad 2 \quad x + (x + 10) = 100 \quad 3 \quad x + (x - 10) = 100 \quad 4 \quad 2x + 2(x + 10) = 100 \quad 5 \quad 2x - 2(x + 10) = 100. \]

16. **Problem.** A passenger automobile went as far in 8 hours as a truck moving 25 miles an hour more slowly did in 16 hours. How many miles an hour was the passenger auto going?
    \[ 1 \quad 8x = 16(x - 25) \quad 2 \quad 8x + 16x = 25 \quad 3 \quad 16x - 8x = 25 \quad 4 \quad 25x = 8 + 16 \quad 5 \quad 16x = \frac{25}{8}x. \]

17. **Problem.** The original price of a radio was reduced 20% and marked $144. What was the original price?
    \[ 1 \quad .20x = 144 \quad 2 \quad x - .20x = 144 \quad 3 \quad x + .20x = 144 \quad 4 \quad x = .20x \times 144 \quad 5 \quad x = .80x \times 144. \]

18. **Problem.** It is desired to cut out a rectangular sheet of paper that is 2 inches longer than it is wide and which has a total area of 80 square inches. How wide should the paper be?
    \[ 1 \quad x(x + 2) = 80 \quad 2 \quad x^2 = 80 + 2 \quad 3 \quad x^2 + 2 = 80 \quad 4 \quad 2x + 2 = 80 \quad 5 \quad x + (x + 2) = 80. \]
<table>
<thead>
<tr>
<th>Expression</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{a + b}{c} )</td>
<td>( \frac{a + b}{c} )</td>
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<td>( \frac{a + b}{c} )</td>
<td>( \frac{a + b}{c} )</td>
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<td>( \frac{a + b}{c + d} )</td>
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<tr>
<td>( \frac{a + b}{c + d} )</td>
<td>( \frac{a + b}{c + d} )</td>
</tr>
</tbody>
</table>

21. A plane figure bounded by four straight lines is always a —  
- square  
- trapezoid  
- rhomboid  
- quadrilateral  
- parallelogram

22. In the equation \( 3x = 12 \), \( x = \)  
\( 40 \)  
\( 36 \)  
\( 4 \)  
\( 3.6 \)  
\( 11.7 \)

23. The expression \( s - .8s = \)  
\( .2 \)  
\( .2s \)  
\( .2s \)  
\( .8s \)  
\( s - .8s \)

24. The term which, if added to \( m^2 + 4n^2 \), would make a perfect square is —  
\( 2mn \)  
\( -4mn \)  
\( -2mn \)  
\( 4m^2n^2 \)  
\( 2mn^2 \)

25. At two o’clock the hands of a clock form an angle of —  
\( 10^\circ \)  
\( 20^\circ \)  
\( 30^\circ \)  
\( 40^\circ \)  
\( 70^\circ \)

26. A sector of a circle is the portion between —  
1. two chords  
2. two radii and the intercepted arc  
3. two secants and the intercepted arc  
4. a chord and the diameter  
5. a chord and the circumference

27. If \( x^2 - 36 = 0 \), \( x = \)  
\( 6 \)  
\( 0 \)  
\( 36 \)  
\( 4 \)  
\( 6 \)  
\( \pm 6 \)

28. If the supplement of an angle is 130°, its complement is —  
1. 20°  
2. 60°  
3. 40°  
4. 90°  
5. 50°

29. The ratio of the hypotenuse is called the —  
1. cosine  
2. tangent  
3. sine  
4. cotangent  
5. secant

30. If a chord AB cuts off an arc of 100°, the angle that the perpendicular bisector of AB makes with the tangent at A is —  
1. 30°  
2. 45°  
3. 45°  
4. 60°  
5. 90°

---

**SCIENCE**

1. Milk is often treated by —  
1. electrolysis  
2. distillation  
3. calcination  
4. oxidation  
5. pasteurization

2. Tuberculosis is more often cured by —  
1. a complete change of climate  
2. rest, good food, and fresh air  
3. inoculation by vaccine  
4. living in a cold climate  
5. plenty of exercise taken regularly

3. Diphtheria can be prevented by —  
1. antitetanus vaccine  
2. toxin-antitoxin immunization  
3. eating proper foods in a balanced diet  
4. boiling all drinking water  
5. periodic examination by a physician

4. A gas which supports combustion is —  
1. oxygen  
2. hydrogen  
3. nitrogen  
4. carbon dioxide  
5. carbon monoxide

5. The green coloring matter of plants is called —  
1. stomata  
2. xanthophyll  
3. hemoglobin  
4. chromatin  
5. chlorophyll

6. Cracks are left between sections of a roadbed in concrete highways to allow for —  
1. erosion  
2. contraction  
3. evaporation  
4. expansion  
5. drainage

7. Pasteur discovered a specific treatment for —  
1. smallpox  
2. typhoid fever  
3. rabies  
4. cancer  
5. tuberculosis

8. The acid in vinegar is chiefly —  
1. lactic  
2. acetic  
3. butyric  
4. tartaric  
5. oxalic

9. An example of a vertebrate animal is the —  
1. amoeba  
2. oyster  
3. sponge  
4. earthworm  
5. frog

10. The law of universal gravitation is credited to —  
1. Einstein  
2. Galileo  
3. Newton  
4. Archimedes  
5. Bacon

11. The atomic weight of sulphur is —  
1. 32  
2. 40  
3. 55  
4. 80  
5. 108

12. The pitch of a tone depends on —  
1. Doppler’s Principle  
2. the amplitude of the vibration  
3. the velocity of sound  
4. the intensity of sound  
5. the frequency of vibration
13. The largest planet is — 1 Neptune 2 Earth 3 Saturn 4 Jupiter 5 Mars

14. Ink spreads in a blotter because of — 1 capillarity 2 osmosis 3 convection 4 diffusion 5 cohesion

15. The fuse in an electric circuit serves to —
1 increase the intensity of the current 2 stop an excessive flow of current by melting 3 make the current flow more readily 4 do away with the need of a switch 5 hold back the amount of current

16. The enzyme of the saliva is — 1 ptyalin 2 pepsin 3 trypsin 4 lipase 5 emylopsin

17. The negative plate of an electrolysis apparatus is called the —
1 anode 2 cathode 3 anion 4 grid 5 cation

18. The number of calories required to raise the temperature of a gram of a substance one degree centigrade is called its —
1 melting point 2 specific heat 3 heat of fusion 4 vapor tension 5 heat of vaporization

19. The velocity of sound in air in feet per second is about —
1 30 2 3000 3 11,000 4 186,000 5 1100

20. Momentum is measured by the product of mass and —
1 distance 2 time 3 force 4 velocity 5 acceleration

21. A chemical element found in all proteins but not in carbohydrates or fats is —
1 oxygen 2 carbon 3 hydrogen 4 nitrogen 5 helium

22. The atomic weight of sodium is — 1 17 2 23 3 35 4 40 5 55

23. The measure of the quantity of matter a given body contains is called its —
1 density 2 weight 3 energy 4 mass 5 momentum

24. If 273 cc. of a gas at 0° C. is heated to 10° C., its resulting volume will be —
1 273 cc. 2 283 cc. 3 263 cc. 4 27.3 cc. 5 2730 cc

25. A centimeter equals about — 1 0.04 in. 2 0.25 in. 3 0.4 in. 4 4 in. 5 1.1 yd.

26. A disease known to be caused by a protozoan is —
1 diphtheria 2 tuberculosis 3 pneumonia 4 malaria 5 cancer

27. Silvered glass is used on thermos bottles to —
1 check convection 2 check evaporation 3 close the pores 4 decrease radiation 5 make glass stronger

28. The greatest mechanical advantage to be had by the use of two movable pulleys is —
1 1 2 3 4 4 5

29. An example of a dicotyledonous plant is the — 1 lily 2 iris 3 pansy 4 daffodil 5 tulip

30. Relative humidity is often measured by means of — 1 hydraulic presses 2 barometers 3 rain gauges 4 calorimeters 5 hygrometers

STOP!

If you have detached the title page-Answer Sheet from this test booklet, fill in the information asked for below:

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

Birthday ........................................ Teacher ........................................ Grade 9 10 11 12

Month Day ........................................ Draw a circle around the grade you are in.

City ........................................ School ........................................ Date 19
Nomograph for computing total score (right - \frac{1}{4} wrong) from number right and number omitted or number right and number wrong.
OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

By Arthur S. Otis, Ph.D.
and Thomas N. Barrows, A.B.

HIGHER EXAMINATION: FORM D
For High Schools and Colleges

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

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

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

Birthday...................................................Teacher..............Date..............192.
Month Day
Grade.......................School.......................City

This is a test to see how well you can think. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered:

Sample: Which one of the five words below tells what an apple is?
1 flower, 2 tree, 3 vegetable, 4 fruit, 5 animal.........................( 4 )

The right answer, of course, is "fruit"; so the word "fruit" is underlined. And the word "fruit" is No. 4; so a figure 4 is placed in the parentheses at the end of the dotted line. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer; just draw a line under it and then put its number in the parentheses:

Sample: Which one of the five things below is round?
1 a book, 2 a brick, 3 a ball, 4 a house, 5 a box......................(   )

The answer, of course, is "a ball"; so you should have drawn a line under the words "a ball" and put a figure 3 in the parentheses. Try this one:

Sample: A foot is to a man and a paw is to a cat the same as a hoof is to a — what?
1 dog, 2 horse, 3 shoe, 4 blacksmith, 5 saddle...........................(   )

The answer, of course, is "horse"; so you should have drawn a line under the word "horse" and put a figure 2 in the parentheses. Try this one:

Sample: At four cents each, how many cents will 6 pencils cost?..................(   )

The answer, of course, is 24, and there is nothing to underline; so just put the 24 in the parentheses.

If the answer to any question is a number or a letter, put the number or letter in the parentheses without underlining anything. Make all letters like printed capitals.

The test contains 75 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this page until you are told to begin.
EXAMINATION BEGINS HERE.

1. The opposite of familiar is (?)
   1 friendly, 2 old, 3 strange, 4 aloof, 5 different ........................................ ( )

2. If 4 pencils cost 10 cents, how many pencils can be bought for 50 cents? .................. ( )

3. A man does not always have (?)
   1 arteries, 2 hair, 3 muscle, 4 skin, 5 blood .................................................. ( )

4. What letter in the word WASHINGTON is the same number in the word (counting from the beginning) as it is in the alphabet? ......................................................... ( )

5. If the following words were arranged to make the best sentence, the last word of the sentence would begin with what letter? Make it like a printed capital.
   tests children intelligence hundreds have of taken ........................................... ( )

6. A word meaning the same as change is (?)
   1 endure, 2 cause, 3 result, 4 alter, 5 anticipate ............................................. ( )

7. Copper is cheaper than gold because it is (?)
   1 duller, 2 more plentiful, 3 harder, 4 uglier, 5 less useful ................................ ( )

8. An egg is related to a bird in the same way that a (?) is related to a plant.
   1 shell, 2 leaf, 3 root, 4 feather, 5 seed ......................................................... ( )

9. If 10 boxes full of oranges weigh 600 pounds, and each box when empty weighs 6 pounds, how many pounds do all the oranges weigh? ...................................................... ( )

10. The opposite of skillful is (?)
    1 lazy, 2 clumsy, 3 weak, 4 slow, 5 novice ..................................................... ( )

11. Which one of the six statements below explains the following proverb? “Kill not the goose that lays the golden eggs.”

    1. A conscientious worker needs no prodding.
    2. Geese that lay golden eggs are too tough to eat.
    3. In dire distress, any aid is acceptable.
    4. Don’t destroy the things that do you good.
    5. A willing horse should be whipped lightly.
    6. Ships should not venture out to sea in stormy weather. ................................. ( )

12. Which statement above explains this proverb? “Any port in a storm.” ....................... ( )

13. Which statement above explains this proverb? “Don’t spur a willing horse.” ................. ( )

14. In general it is safer to judge a woman’s character by her (?)
    1 face, 2 cooking, 3 clothes, 4 deeds, 5 speeches ........................................... ( )

15. An ellipse is related to a circle as a diamond is to a (?)
    1 ring, 2 square, 3 rectangle, 4 oval, 5 cube .................................................. ( )

16. A mare is always (?) than her colt.
    1 faster, 2 sleeker, 3 bigger, 4 older, 5 stronger ............................................. ( )

17. The opposite of wasteful is (?)
    1 wealthy, 2 quiet, 3 stingy, 4 economical, 5 extravagant ................................ ( )

18. One number is wrong in this series. What should that number be?
    1 5 2 6 3 7 4 9 5 9 ......................................................................................... ( )

19. Such things as looks, dress, likes, and dislikes indicate one’s (?)
    1 character, 2 wisdom, 3 personality, 4 gossip, 5 reputation ............................... ( )

20. A picnic consisted of a minister, six deacons and their wives, and three children in each of the deacons’ families. How many were there at the picnic? ................................................................. ( )

21. At a dinner there is always (?)
    1 soup, 2 wine, 3 food, 4 waiters, 5 dishes ......................................................... ( )

22. The idea that the earth is flat is (?)
    1 absurd, 2 misleading, 3 improbable, 4 unfair, 5 wicked ....................................... ( )

23. Which word is needed to begin the following sentence?
   — a geometrical figure has three straight sides, it is a triangle.
   1 Although, 2 If, 3 Since, 4 Now that, 5 Because ................................................ ( )

24. If the first two statements following are true, the third is (?)
   All residents in this block are Republicans. Smith is not a Republican. Smith resides in this block.
   1 true, 2 false, 3 not certain .................................................................................... ( )

25. The opposite of seldom is (?)
    1 never, 2 many, 3 invariably, 4 always, 5 frequently ........................................... ( )

Do not stop. Go on with the next page.  

[ 2 ]
26. Which one of these things is most unlike the other four?
   1. bean,  2. cherry,  3. pea,  4. carrot,  5. beet.

27. A sewing machine is related to a needle as a typewriter is to (?)
   1. a pin,  2. a cloth,  3. ink,  4. a pen,  5. a page.

28. The two words repentant and reluctant mean (?)
   1. the same,  2. the opposite,  3. neither same nor opposite.

29. The opposite of brave is (?)
   1. intrepid,  2. weak,  3. treacherous,  4. cowardly,  5. fragile.

30. Count each Z in this series that is followed by an F next to it if the F is not followed by an S next to it. Tell how many Z's you count.
   Z F Z S E Y Z F S Y Z F S Y Z F S Y Z F Z Y F Z F Y.

31. If a boy can run 2 feet in $\frac{1}{10}$ of a second, how many feet can he run in 10 seconds?

32. Which one of the six statements below explains the following saying? “Curiosity killed the cat.”
   1. Chickens are easier to count than eggs.
   2. People tend to associate with others like themselves.
   3. Prying into the affairs of others may bring trouble.
   5. Don’t rely too much on your anticipations.
   6. Cats are often too curious.

33. Which statement above explains this proverb? “Don’t count your chickens before they are hatched.”

34. Which statement above explains this proverb? “Birds of a feather flock together.”

35. If the words below were arranged to make a good sentence, the fourth word of the sentence would begin with what letter?
   best hard road the work success to is.

36. If the first two statements are true, the third is (?)
   Frank is older than George, James is older than Frank. George is younger than James.
   1. true,  2. false,  3. not certain.

37. One who says things he knows to be wrong is said to be (?)
   1. careless,  2. misled,  3. conceived,  4. untruthful,  5. prejudiced.

38. The opposite of create is (?)
   1. sustain,  2. evolution,  3. transform,  4. explode,  5. abolish.

39. If $\frac{3}{4}$ yards of cloth cost $90$, how many dollars will 7 yards cost?

40. Which of the five things following is most unlike the other four?
   1. nail,  2. hammer,  3. screw,  4. bolt,  5. tack.

41. Darkness is to sunlight as (?) is to sound.
   1. noise,  2. brightness,  3. air,  4. echo,  5. quiet.

42. The opposite of gentle is (?)
   1. strong,  2. careless,  3. humane,  4. thoughtless,  5. rough.

43. If the first two statements following are true, the third is (?)
   Some members of this club are Baptists. Some members of this club are lawyers. Some members of this club are Baptist lawyers.
   1. true,  2. false,  3. not certain.

44. If $\frac{4}{1}$ yards of cloth cost 90 cents, how many cents will $\frac{3}{4}$ yards cost?

45. A line is to a point as a surface is to (?)
   1. flat,  2. line,  3. solid,  4. square,  5. plane.

46. The two words precise and indefinite mean (?)
   1. the same,  2. the opposite,  3. neither same nor opposite.

47. When two windows have the same shape, the dimensions of one are (?) the dimensions of the other.
   1. equal to,  2. greater than,  3. less than,  4. proportional to,  5. double.

48. Suppose that the first and second letters of the alphabet were interchanged, also the third and fourth, the fifth and sixth, etc. Write the letter which would then be the sixteenth letter of the series.

49. If a strip of cloth 32 inches long will shrink to 28 inches when washed, how many inches long will a 48-inch strip be after shrinking?

50. Which one of the five words following is most unlike the other four?
   1. was,  2. came,  3. have,  4. stay,  5. here.

51. A city always has (?)
   1. street cars,  2. mayor,  3. traffic officers,  4. residents,  5. churches.

Do not stop. Go on with the next page.
52. A word meaning the same as congratulate is (?)
1 felicitate, 2 commemorate, 3 reward, 4 console, 5 promote

53. Find the two letters in the word CANAL which have just as many letters between them in the word as in the alphabet. Write the one of these two letters that comes first in the alphabet.

54. The mandates of a dictator are (?)
1 obsolete, 2 arbitrary, 3 omnipotent, 4 conditional, 5 optional

55. Which one of the five words below is most like these three: love, hate, joy?
1 memory, 2 taste, 3 anger, 4 health, 5 life

56. A gulf is to the ocean as a (?) is to a continent.
1 mountain, 2 river, 3 land, 4 peninsula, 5 island

57. If all the even-numbered letters in the alphabet were crossed out, the twelfth letter left not crossed out would be what letter? Do not mark the alphabet.
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

58. Write the letter of the alphabet which is the third to the right of the letter which is midway between O and S.

59. A hotel serves a mixture of 2 parts cream and 3 parts milk. How many pints of milk will it take to make 15 pints of the mixture?

60. Which of the following is a trait of character?
1 reputation, 2 wealth, 3 influence, 4 fickleness, 5 strength

61. A man who spends his money lavishly for non-essentials is considered to be (?)
1 fortunate, 2 thrifty, 3 extravagant, 4 generous, 5 economical

62. One number is wrong in the following series. What should that number be?
1 4 9 16 25 36 45 64

63. Democracy is to monarchy as corporation is to (?)
1 board of directors, 2 stockholders, 3 partnership, 4 general manager, 5 individual enterprise

64. How many of the following words can be made of the letters in the word CELEBRATE, using any letter twice?
create better traceable erect tattle rabble crated prattle barter

65. If George can ride a bicycle 60 feet while Frank runs 40 feet, how many feet can George ride while Frank runs 60 feet?

66. If the words below were arranged to make a good sentence, the fifth word in the sentence would begin with what letter?
choose care man A friends should with his

67. If the first two statements following are true, the third is (?) It takes a good sense of balance to become a tight-rope walker. John has a good sense of balance. John will become a tight-rope walker.
1 true, 2 false, 3 not certain

68. If a wire 40 inches long is to be cut so that one piece is \( \frac{3}{4} \) as long as the other piece, how many inches must the longer piece be?

69. Find the letter which in this sentence itself appears a third time nearest the beginning.

70. Which of the five things following is most like these three: cotton, snow, ivory?
1 soot, 2 milk, 3 ice, 4 ebony, 5 water

71. One number is wrong in the following series. What should that number be?
1 2 4 7 11 16 22 28

72. What number is in the space which is in the rectangle but not in the triangle or in the circle?

73. What number is in the same geometrical figure or figures (and no others) as the number 12?

74. How many spaces are there which are in any one but only one geometrical figure?

75. The opposite of because is (?)
1 but, 2 since, 3 hence, 4 for, 5 and

If you finish before the time is up, go back and make sure that every answer is right.