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Vocational aptitude tests as an instrument in predicting success in shopwork

Amater Z. Traylor
Atlanta University

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VOCATIONAL APTITUDE TESTS AS AN INSTRUMENT IN PREDICTING SUCCESS IN SHOPWORK

A THESIS
SUBMITTED TO THE FACULTY OF ATLANTA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS

BY
AMATER Z. TRAYLOR

DEPARTMENT OF EDUCATION

ATLANTA, GEORGIA
JUNE 1939
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<td>V</td>
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</tbody>
</table>

I  The Number of Boys, Their Ages, Grade Level, and Intelligence Quotient

II The Reading Test, the Arithmetic Test, the Mechanical Aptitude Test, and Shop Grade Raw Scores for Each Pupil

III The Mean, Standard Deviation, and Variability for Scores of the Intelligence Test, the Reading Test, the Arithmetic Test, the Mechanical Aptitude Test, and the Shop Grades

IV The Standard Scores Derived from the Raw Scores of the Intelligence Test, the Mechanical Aptitude Test, the Reading Test, and the Arithmetic Test, Combined, and the Standard Scores Derived from the Shopwork Grades for the Study Period in Terms of Sigma-Values

V The Individual Ranks of the 17 Boys on the Combined Tests and Their Shop Grades for the Study Period

VI Correlation of the Intelligence Test, Reading Test, Arithmetic Test, Mechanical Aptitude Test, Combined Test Scores, and Their Shop Grades
CHAPTER I

INTRODUCTION

A. Problem

In this study an attempt was made to determine to what extent aptitude tests are reliable in predicting success in shopwork in the Cedar Hill High School for Negro boys in Cedartown, Georgia.

From this study information was obtained on the following questions:

1. What is the relationship between achievement in arithmetic and reading and shopwork?

2. Is there a significant relationship between intelligence and shopwork?

B. Previous Studies

Edna Willis McElwee,\(^1\) using a form of the Stenquist Mechanical Assembling Test, studied 400 boys whose ages ranged from 6 to 9 years. The result of this study revealed little relationship between intelligence and mechanical ability since the correlations ranged from \(0.058\) to \(0.064\).

\(^2\)L. Harvey\(^2\) reported a study made by Cox in which the latter drew the following conclusions concerning mechanical aptitude:


\[^2\]O. L. Harvey, "Mechanical 'Aptitude' or Mechanical 'Ability'? - A Study in Method," Journal of Educational Psychology, XXII, (October, 1931), pp. 517-522.
1. That innate mechanical aptitude exists;
2. That there is a unique relationship between this factor and general intelligence;
3. That this aptitude is a single group factor;
4. That this aptitude is not the same as motor ability.

A study by D. G. Paterson supported Cox's conclusions with the exception that aptitude does not involve any single group factor. He also found low intercorrelations between different measures of mechanical ability which suggested that specific factors play a major role in mechanical ability.

Charles L. Cooper, using a form of the Stenquist Mechanical Aptitude Picture Tests, Numbers I and II, and a record of achievement in shopwork, studied 92 Negro high school boys. Their ages ranged from 12 to 19 years and represented each of the four classes in the high school.

Six conclusions were drawn from this study, five of which are as follows:

1. That academic achievement has little prognostic value in predicting mechanical aptitude as found by the Stenquist Mechanical Aptitude Picture Tests, I and II and/or by the shopwork grades;
2. Neither high academic achievement nor inability to do well in academic work should be interpreted as an indication of mechanical aptitude;
3. That low correlation between tests and academic work seems to indicate that the tests measure other than intelligence;

1Ibid., pp. 518-519.
2Charles L. Cooper, "Mechanical Aptitude and School Achievement of Negro Boys," Journal of Educational Psychology, XX. (December, 1936), pp. 751-760.
4. That mechanical aptitude and academic achievement seem to demand different types of ability which are related only to the degree to which there are similar elements in them;

5. That these tests seem to measure to some degree mechanical aptitude, but there seems to be no reason to believe these tests will reveal the way in which the pupil will react to all mechanical situations.

C. Procedure

a. Subjects. - The subjects in this study were 17 Negro boys whose ages ranged from 14 years and 2 months to 17 years and 11 months and whose I.Q.'s ranged from 60 to 119, all of whom were pupils in the Cedar Hill High School. See Table I, page 4.

b. Materials Used and Brief Description of Shop. -

1. Tests Used. - The following tests were used in this study:

New Stanford Reading Test - Test: Form V - Grades 2-9 - by Truman L. Kelley, Giles M. Ruch, and Lewis M. Terman.


Intelligence Test - Form I - Grades 3-9 - by William A. McCall.

Stenquist Mechanical Aptitude Test - Form I - by J. L. Stenquist.

A special rating sheet provided by Mr. J. L. Whiting was used to evaluate the pupils' work. A copy of the rating sheet and each of the tests may be found in Appendix A.

2. Description of Shop. - The size of the shop which is located in the basement of the Cedar Hill High School is 9' x 25' x 45'. The equipment consists of 12 workbenches, each of which is equipped with certain tools. In addition to the tools for the benches there are other tools for general use.
<table>
<thead>
<tr>
<th>Pupil No.</th>
<th>Age Years</th>
<th>Age Months</th>
<th>Grade Level</th>
<th>Intelligence Quotient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>1</td>
<td>8</td>
<td>94</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>2</td>
<td>8</td>
<td>94</td>
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<td>6</td>
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<td>72</td>
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<td>4</td>
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<td>7</td>
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<td>92</td>
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<td>8</td>
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<tr>
<td>7</td>
<td>16</td>
<td>2</td>
<td>8</td>
<td>87</td>
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<td>8</td>
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<td>8</td>
<td>61</td>
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<td>60</td>
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<tr>
<td>14</td>
<td>17</td>
<td>10</td>
<td>11</td>
<td>80</td>
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<td>15</td>
<td>17</td>
<td>9</td>
<td>11</td>
<td>107</td>
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<td>16</td>
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<td>11</td>
<td>11</td>
<td>103</td>
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<tr>
<td>17</td>
<td>17</td>
<td>7</td>
<td>11</td>
<td>100</td>
</tr>
</tbody>
</table>
Each bench is equipped with the following tools:

- saw
- hammer
- try-square
- marking gauge
- jack plane
- block plane

The tools for general use are as follows:

- framing squares
- level
- miter box
- back saw
- clamps
- draw knife
- ax
- hatchet
- screw drivers
- braces
- nail punches
- assorted bits

- vise
- 1/4" chisel
- 1/2" chisel
- 3/4" chisel
- foot rule
- bench hook
- key hole saws
- wrecking bars
- bevel squares
- hand scrapes
- paint brushes
- mason's hammers
- plumb bob
- picks
- shovels
- hoes
- trowels
- floats

**c. Description of Study.**—The study extended over a period of four months beginning November 1, 1938 and ending March 10, 1938. At the beginning of the study the following tests were administered to all of the pupils:

1. The Stenquist Mechanical Aptitude Test
2. New Stanford Reading Test
3. New Stanford Arithmetic
4. McCall Intelligence Test
After the administering of these tests, the boys began work in the shop. The first year group consisting of eighth grade boys was instructed in the fundamentals of the handling and use of tools. They learned these fundamentals through working on various projects such as taborets, match boxes, foot stools, broom holders, sewing trays, magazine racks, book stands, and very simple repair work, etc. The boys worked a minimum of one hour for the beginners to four hours per day for the more experienced.

Most of the more experienced boys in the upper grades were able to do work of a more advanced type. They built laboratory tables, screen doors, a small house, cabinets, laid concrete walks, and did all the repair work in the school building. They also worked on jobs at their homes and other homes in the community.

Each pupil was under careful and constant observation, especially in light of what the aptitude test revealed. Those who did not show a definite inclination toward this type of work were drilled in the simple fundamentals. Some pupils whose ability was not evident at the beginning of the study, but developed later, were permitted to advance as rapidly as possible.

The rating sheets were used to check the various traits which were desirable in pupils working in the shop. These sheets were checked from day to day and rechecked and summarized at the end of the study to obtain the shop grades. These sheets were then checked against what the test revealed.
CHAPTER II
RESULTS

A. Treatment of Data

The data from the rating scale and the four tests were treated statistically to obtain the following results:

1. The intelligence quotient
2. The standard scores in terms of sigma-values
3. The coefficient of relative variability
4. The coefficient of correlation by the rank-difference method between the aptitude test and the other three tests and the rating scale
5. The coefficient of correlation by the rank-difference method between the rating scale and the combined scores for the four tests.

B. Results

a. The Intelligence Test.- The I.Q.'s for the subjects ranged from 60 to 119 and are given in Table I, page 4. The mean was found to be 90.75, the standard deviation 15.7, and coefficient of relative variability 17. See Table III, page 10. The subjects were found to be 65.5 per cent as variable in the intelligence test as in the mechanical aptitude test. See Diagram I, page 17. The standard scores ranged from -1.80 to 1.80 and are given in Table IV, page 13. The coefficient of correlation with the mechanical aptitude test was found to be \( r = 0.36 \) and for the shop grades \( r = 0.30 \) and is given in Table VI, page 19.

b. The Reading Test.- The scores for the subjects ranged from 64 to 119.5, and are given in Table II, page 8. The mean was found to be
TABLE II

The Reading Test, Arithmetic Test, Mechanical Aptitude Test, and Shop Grade Raw Scores for Each Pupil

<table>
<thead>
<tr>
<th>Pupil No.</th>
<th>Arithmetic Test</th>
<th>Reading Test</th>
<th>Mechanical Apt. Test</th>
<th>Shop Grade</th>
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<tbody>
<tr>
<td>1</td>
<td>85.5</td>
<td>91.5</td>
<td>52</td>
<td>14.2</td>
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<tr>
<td>2</td>
<td>86.0</td>
<td>79.5</td>
<td>29</td>
<td>15.1</td>
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<td>79.5</td>
<td>64.0</td>
<td>45</td>
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<td>4</td>
<td>87.0</td>
<td>85.0</td>
<td>50</td>
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<td>88.5</td>
<td>51</td>
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<td>75.0</td>
<td>45</td>
<td>15.0</td>
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<td>7</td>
<td>64.0</td>
<td>82.0</td>
<td>46</td>
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<td>68.5</td>
<td>12</td>
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<td>89.0</td>
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<td>56</td>
<td>13.7</td>
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<td>72.0</td>
<td>72.0</td>
<td>52</td>
<td>12.8</td>
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<td>11</td>
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<td>85.5</td>
<td>47</td>
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86.09, the standard deviation 12.25, and the coefficient of relative variability 14. See Table III, page 10. The boys were 53.8 per cent as variable in the reading test as in the mechanical aptitude test. See Diagram 1, page 17. The standard scores ranged from -1.80 to 1.70, and are given in Table IV, page 13. The coefficient of correlation with the mechanical aptitude test was found to be \( r = .64 \) and for the shop grades \( r = .32 \). See Table VI, page 19.

c. **The Arithmetic Test.**—The scores for the subjects ranged from 64 to 108 and are given in Table II, page 8. The mean was found to be 84.15, the standard deviation 12.69, and the coefficient of relative variability 15. See Table III, page 10. The boys were 57.6 per cent as variable in the arithmetic test as in the mechanical aptitude test. See Diagram 1, page 17. The standard scores ranged from -1.60 to 1.90 and are found in Table IV, page 13. The coefficient of correlation with the mechanical aptitude test was found to be \( r = .37 \) and for the shop grades \( r = .49 \). See Table VI, page 19.

d. **The Mechanical Aptitude Test.**—The scores for the subjects ranged from 12 to 66 and are given in Table II, page 8. The mean was found to be 50.74, the standard deviation, 13.50, and the coefficient of relative variability 26. See Table III, page 10. The intelligence test varies 65.4 per cent, the arithmetic test 57.6 per cent, the reading test 53.8 per cent, and the shop grades 61.5 per cent as much this test does. See Diagram 1, page 17. The standard scores ranged from -2.80 to 1.10 and are given in Table IV, page 13. The coefficient of correlation with the intelligence test was found to be \( r = .36 \), the reading test \( r = .64 \), the arithmetic test \( r = .37 \), and the shop grades \( r = .41 \). See Table VI, page 19.

e. **The Shop Grades.**—The shop grades ranged from 10.7 to 19.0 and are given in Table II, page 8. The mean was found to be 14.91,
### TABLE III

The Mean, Standard Deviation, and Variability for Scores of the Intelligence Test, the Reading Test, the Arithmetic Test, the Mechanical Aptitude Test, and the Shop Grades.

<table>
<thead>
<tr>
<th></th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
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<tr>
<td>Mean</td>
<td>90.75</td>
<td>86.09</td>
<td>84.15</td>
<td>50.74</td>
<td>14.91</td>
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<td>SD</td>
<td>15.70</td>
<td>12.25</td>
<td>12.69</td>
<td>13.50</td>
<td>2.37</td>
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<tr>
<td>CV</td>
<td>17</td>
<td>14</td>
<td>15</td>
<td>26</td>
<td>16</td>
</tr>
</tbody>
</table>
standard deviation 2.37, and the coefficient of relative variability 16. See Table III, page 10. The shop grades varied 61.5 per cent as much as the mechanical aptitude test. See Diagram 1, page 17. The standard scores ranged from -1.73 to 1.68 and are given in Table IV, page 13. The coefficient of correlation with the intelligence test was found to be .30, the reading test .32, the arithmetic test .49, mechanical aptitude test .41, and the combined tests .39. See Table VI, page 19.

f. The Combined Tests.- The combined standard scores for the group ranged from -7.47 to 5.80 and are given in Table IV, page 13. The coefficient of correlation with the shop grades was found to be .38. See Table VI, page 19.

<table>
<thead>
<tr>
<th>No.</th>
<th>Pupil R.M.P.</th>
<th>Age 17 yrs., 7 mos.</th>
<th>I.Q. 100</th>
<th>Standard Score</th>
<th>Rank</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mechanical Aptitude Test</td>
<td>0.27</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intelligence Quotient</td>
<td>0.52</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Combined Tests</td>
<td>1.17</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shop Grade</td>
<td>1.68</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This is a very peculiar case. This boy is now working his third year in the shop. His aptitude rank is very low, yet his shop work entitles him to first rank. He leaves no doubt as to his ability and aptitude in this work. His raw score for the trait of interest is 20 which is the highest possible score obtainable for any trait listed on the rating sheet. His raw score for aptitude is 19, confidence 17, knowledge of stock 20, initiative 17, accuracy 16, and speed 15. Possession of these desirable traits to such a high degree leaves no doubt as to what he will accomplish in the way of shopwork. Last summer this boy and Pupil Number 11 used the school shop for doing cabinet and repair work. The manner in which they did
their work and the method in which they kept a record of the work was very surprising for its high degree of efficiency. He delights in working on projects that tax his ingenuity. He very readily and efficiently directs jobs with other pupils working under him. He is planning to follow cabinet-making as an occupation.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age</th>
<th>I.Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>15 yrs., 10 mos.</td>
<td>61</td>
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<table>
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<tr>
<th>Standard Score</th>
<th>Rank</th>
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</thead>
<tbody>
<tr>
<td>Mechanical Aptitude Test</td>
<td>-2.80</td>
</tr>
<tr>
<td>Intelligence Quotient</td>
<td>-1.80</td>
</tr>
<tr>
<td>Combined Tests</td>
<td>-7.47</td>
</tr>
<tr>
<td>Shop Grade</td>
<td>-1.10</td>
</tr>
</tbody>
</table>

This boy appears to be very much retarded. He is a new pupil and formerly attended a county school which had a seven-months term. He appears to enjoy good health and is very quiet in manner. He is continually alone and, efforts to rid him of this state have attained only a small degree of success. He seems to be interested in shopwork, but has accomplished very little. He has very little confidence and initiative in manner of going about his work. He appears to be conscious of his inefficiency. Until he can be studied further, the author doesn't think it would be wise to draw any conclusions about him in the shop nor in his other academic work.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age</th>
<th>I.Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>14 yrs., 2 mos.</td>
<td>94</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Aptitude Test</td>
<td>$1.10</td>
</tr>
<tr>
<td>Intelligence Test</td>
<td>$1.80</td>
</tr>
<tr>
<td>Combined Tests</td>
<td>$5.85</td>
</tr>
<tr>
<td>Shop Grades</td>
<td>$0.94</td>
</tr>
</tbody>
</table>
TABLE IV

The Standard Scores Derived from the Raw Scores of the Intelligence Test, the Mechanical Aptitude Test, the Reading Test, and the Arithmetic Test, Combined, and the Standard Scores Derived from the Shopwork Grades for the Study Period - in Terms of Sigma-Values.

<table>
<thead>
<tr>
<th>Pupil No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.20</td>
<td>0.09</td>
<td>0.11</td>
<td>0.44</td>
<td>0.84</td>
<td>-0.29</td>
</tr>
<tr>
<td>2</td>
<td>0.20</td>
<td>-1.54</td>
<td>0.14</td>
<td>-0.54</td>
<td>-1.74</td>
<td>0.08</td>
</tr>
<tr>
<td>3</td>
<td>-1.19</td>
<td>-0.41</td>
<td>-0.36</td>
<td>-1.80</td>
<td>-3.76</td>
<td>-1.73</td>
</tr>
<tr>
<td>4</td>
<td>0.07</td>
<td>-0.05</td>
<td>0.22</td>
<td>-0.09</td>
<td>0.15</td>
<td>0.08</td>
</tr>
<tr>
<td>5</td>
<td>0.27</td>
<td>0.02</td>
<td>-0.05</td>
<td>0.11</td>
<td>0.35</td>
<td>0.53</td>
</tr>
<tr>
<td>6</td>
<td>-0.49</td>
<td>-0.41</td>
<td>-0.99</td>
<td>-0.90</td>
<td>-2.79</td>
<td>0.04</td>
</tr>
<tr>
<td>7</td>
<td>-0.23</td>
<td>-0.34</td>
<td>-1.60</td>
<td>-0.33</td>
<td>-2.50</td>
<td>-0.92</td>
</tr>
<tr>
<td>8</td>
<td>-1.80</td>
<td>-2.80</td>
<td>-1.47</td>
<td>-1.40</td>
<td>-7.47</td>
<td>-1.10</td>
</tr>
<tr>
<td>9</td>
<td>0.20</td>
<td>0.38</td>
<td>0.39</td>
<td>0.03</td>
<td>1.00</td>
<td>-0.50</td>
</tr>
<tr>
<td>10</td>
<td>-1.80</td>
<td>0.09</td>
<td>-0.96</td>
<td>-1.10</td>
<td>-3.77</td>
<td>-0.87</td>
</tr>
<tr>
<td>11</td>
<td>1.80</td>
<td>1.10</td>
<td>1.90</td>
<td>1.05</td>
<td>5.85</td>
<td>0.94</td>
</tr>
<tr>
<td>12</td>
<td>-0.81</td>
<td>0.09</td>
<td>0.89</td>
<td>0.03</td>
<td>-1.58</td>
<td>0.94</td>
</tr>
<tr>
<td>13</td>
<td>1.70</td>
<td>-0.34</td>
<td>0.89</td>
<td>0.97</td>
<td>3.22</td>
<td>-0.99</td>
</tr>
<tr>
<td>14</td>
<td>-0.68</td>
<td>1.10</td>
<td>-0.40</td>
<td>0.17</td>
<td>0.19</td>
<td>-1.51</td>
</tr>
<tr>
<td>15</td>
<td>1.03</td>
<td>0.68</td>
<td>-1.40</td>
<td>2.70</td>
<td>3.01</td>
<td>-0.13</td>
</tr>
<tr>
<td>16</td>
<td>0.78</td>
<td>1.05</td>
<td>1.17</td>
<td>0.74</td>
<td>3.74</td>
<td>-0.25</td>
</tr>
<tr>
<td>17</td>
<td>0.52</td>
<td>-0.27</td>
<td>0.97</td>
<td>-0.05</td>
<td>1.17</td>
<td>1.68</td>
</tr>
</tbody>
</table>
This boy seems to be a very serious pupil. He is very interested in shopwork. He is also a very good worker and is somewhat confident as he goes about his work. He has done quite a number of odd jobs in carpentry in the neighborhood where he lives. He has found a source of income, from these jobs, which has enabled him to buy some of the small items so necessary to school life. I think that he will accomplish very much in shopwork.

<table>
<thead>
<tr>
<th>Pupil No.</th>
<th>Age</th>
<th>I.Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.B. 11</td>
<td>16 yrs., 7 mos.</td>
<td>119</td>
</tr>
</tbody>
</table>

Standard Score Rank

- Mechanical Aptitude Test $\sim 1.10$ 1.5
- Intelligence Test $\sim 1.80$ 1
- Combined Tests $\sim 5.85$ 1
- Shop Grades $\sim 0.94$ 3.5

This boy is a very good worker in shopwork as well as a good pupil in academic work. He is in his third year in the shop. His work is of a very high type. Some of the desirable traits that he possesses are self reliance, very good initiative, accuracy, and a very good knowledge of stock. He worked last summer doing cabinet work and repair jobs in the community. He is very ambitious and seems to have an inventive mind. He is somewhat slow but he is steadily improving in this trait. There is quite a contrast in his speed now and when he first began to work in the shop.
TABLE V

The Individual Ranks of the 17 Boys on the Combined Tests and Their Shop Grades for the Study Period.

<table>
<thead>
<tr>
<th>Pupil No.</th>
<th>Test Scores (Combined) Rank</th>
<th>Shop Scores (Earned) Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>2.</td>
<td>12</td>
<td>6.5</td>
</tr>
<tr>
<td>3.</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>4.</td>
<td>10</td>
<td>6.5</td>
</tr>
<tr>
<td>5.</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>7.</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>8.</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>9.</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>10.</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>11.</td>
<td>1</td>
<td>3.5</td>
</tr>
<tr>
<td>12.</td>
<td>11</td>
<td>3.5</td>
</tr>
<tr>
<td>13.</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>14.</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>15.</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>16.</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>17.</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

(Note: The rank-difference coefficient of correlation computed from the above data is \( r = .38 \). This coefficient of correlation suggests a moderate degree of relationship between the combined tests and the shop grades.)
CHAPTER III
INTERPRETATION OF DATA

A. Variability

The boys varied more in the mechanical aptitude test than they did in any of the other tests and the shop grades. The coefficient of variability for this test was found to be 26. See Table III, page 10. Diagram 1, page 17, represents the percentage of variability of the other tests and shop grades as compared with the aptitude test. The variability of this test is at the peak of the curve.

The boys were next most variable in the intelligence test. The coefficient of variability for this test was 17. See Table III, page 10. They were more homogeneous in this trait than in aptitude, but to a small degree a little less homogeneous than in the arithmetic test, the reading test, and shop grades. They were 65.4 per cent as variable in the intelligence test as in the aptitude test. See Diagram 1, page 17.

In the shop grades the boys had a coefficient of variability of 16. See Table III, page 10. They were 61.5 per cent as variable in their shop grades as in the aptitude test. They vary less in the shop grades than in the intelligence test and the aptitude test. See Diagram 1, page 17 for the comparison of the shop grades with the aptitude test and the other tests.

The coefficient of variability for the arithmetic test was found to be 15. See Table III, page 10. They were 57.6 per cent as variable in the arithmetic test as in the aptitude test. See Diagram 1, page 17.
Diagram 1.- The Relative Variability of Four Measured Traits of Seventeen Vocational Shop Pupils with Their Mean Scores on the Stenquist Mechanical Aptitude Test.
In the reading test the boys were more homogeneous than in any of the other tests and the shop grades. The coefficient of variability for the reading test was found to be 14. See Table III, page 10. They were 53.8 per cent as variable in the reading test as in the aptitude test. See Diagram 1, page 17.

B. Correlation

According to Garrett, the coefficient of correlation, for fewer than 25 cases is reliable only to the extent of suggesting a possible existence of relationship. The following interpretations are based upon this statement.

The coefficient of correlation between the intelligence test and the aptitude test was found to be .36, and for the intelligence test and the shop grades .30. See Table VI, page 19.

The coefficient of correlation for the reading test and the aptitude test was found to be .64. This was the highest coefficient of correlation for any of the other tests and the aptitude test, or any of the tests and the shop grades. The coefficient of correlation between the reading test and the shop grades was found to be .32. See Table VI, page 19.

The coefficient of correlation between the arithmetic test and the aptitude test was found to be .37. But the coefficient of correlation for the arithmetic and the shop grades was found to be .49. This suggests a higher degree of relationship. See Table VI, page 19.

The coefficient of correlation between the aptitude test and the shop grades was found to be .41. See Table VI, page 19.

The coefficient of correlation between the shop grades and the four tests combined are found to be 4.36. The evidence here presents only a low degree of positive relationship. The coefficient of correlation of correlation of the Intelligence Test, Reading Test, Arithmetic Test, Mechanical Aptitude Test, Combined Test Scores, and Their Shop Grades shop grades.  

<table>
<thead>
<tr>
<th>Test</th>
<th>Mechanical Aptitude Test</th>
<th>Shop Grades</th>
<th>Combined Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence Test</td>
<td>4.36</td>
<td>4.30</td>
<td></td>
</tr>
<tr>
<td>Reading Test</td>
<td>4.64</td>
<td>4.32</td>
<td></td>
</tr>
<tr>
<td>Arithmetic Test</td>
<td>4.37</td>
<td>4.49</td>
<td></td>
</tr>
<tr>
<td>Mechanical Aptitude Test</td>
<td>4.41</td>
<td>4.38</td>
<td></td>
</tr>
<tr>
<td>Combined Test</td>
<td>4.41</td>
<td>4.38</td>
<td></td>
</tr>
<tr>
<td>Shop Grades</td>
<td>4.41</td>
<td>4.38</td>
<td></td>
</tr>
</tbody>
</table>
The coefficient of correlation between the shop grades and the four tests combined was found to be \( r = 0.38 \). The evidence here suggests only a low degree of possible relationship. The coefficient of correlation of the arithmetic test and the shop grades as well as the coefficient of correlation and the aptitude test exceed that of the combined tests and the shop grades.
CHAPTER IV

SUMMARY AND CONCLUSIONS

A. Summary

The purpose of this study was to determine the possibilities of predicting success in shopwork in the Cedar Hill High School of Cedartown, Georgia.

Seventeen boys whose ages ranged from 14 to 17 years were included in this study. All were pupils in each of the four classes of the high school. The study was conducted over a period of four months. The Stenquist Mechanical Aptitude Test, the McCall Intelligence Test, the New Stanford Reading Test, and the New Stanford Arithmetic Test were given to the boys at the beginning of the study. The boys then began their work in the shop. The nature of the work was woodwork, masonry, and painting. The first year boys began learning the fundamentals while the more experienced boys did work of a more advanced type. The boys were rated according to a specially prepared rating sheet in obtaining the shop grades. The results were then interpreted in the light of what the tests and the shop grades revealed.

B. Conclusions

The following conclusions are drawn from this study:

1. That there is evidence to a small degree of relationship between intelligence and mechanical aptitude. McElwee, using a Stenquist Mechanical Assembling Test, found much lower coefficients of correlation than found in this study. Her conclusions emphasized this low relationship.
2. That there is evidence to even a smaller degree of relationship between intelligence and the shop grades.

3. That there is substantial evidence of relationship between achievement in reading and mechanical aptitude.

4. That there is small degree of relationship between achievement in reading and shop grades.

5. That the relationship between arithmetic and mechanical aptitude is low.

6. That there is a moderate degree of relationship between arithmetic and shop grades.

7. That there is a moderate degree of relationship between mechanical aptitude and shop grades. The correlation for the aptitude test and shop grades was exceeded only by the arithmetic test and the shop grades.

8. That there is evidence to a small degree of relationship between the combined tests and the shop grades. The low relationship also suggests that very little emphasis can be placed upon the use of the combined tests as a basis for predicting success.

9. That the moderate relationship of the Stenquist Mechanical Aptitude Test offers to a moderate degree a basis for predicting success in shopwork in the Cedar Hill High School as revealed at the time of the study.
APPENDIX A

1. Pupil Rating Sheet. This rating sheet was to obtain the pupil's shop grades throughout the study.
2. Stenquist Mechanical Aptitude Test.
3. Intelligence Test
4. New Stanford Reading Test
5. New Stanford Arithmetic Test
STENQUIST MECHANICAL APTITUDE TESTS

By J. L. Stenquist

Director of Research, Baltimore, Maryland

TEST 1

DIRECTIONS

Look at the pictures below. Each thing in Part 1 belongs with, is used with, or is a part of one particular thing in Part 2. Thus, No. 1 in Part 1 belongs with Letter H in Part 2; so H is written beside 1 in the list of answers. No. 2 belongs with Letter D; so D is written beside 2 in the list of answers. No. 3 belongs with Letter A; so A is written beside 3 in the list of answers. No. 4 belongs with Letter C; so C is written beside 4 in the list of answers. No. 5 belongs with Letter P; so P is written beside 5 in the list of answers. Do the same for all the exercises in this booklet. If you are not sure, guess. Try all of them. Write some letter beside each number.

SAMPLE EXERCISE

Published by World Book Company, Yonkers-on-Hudson, New York, and 2126 Prairie Avenue, Chicago

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EXERCISE 1

Part 1

1. 
2. 
3. 
4. 
5. 

Part 2

H 
C 
D 
P 
A

1 2 3 4 5

Total number right Ex. 1
PART 1

1. [Image of a tool]
2. [Image of a tool]
3. [Image of a tool]
4. [Image of a tool]
5. [Image of a tool]

PART 2

6. [Image of a tool]
7. [Image of a tool]
8. [Image of a tool]
9. [Image of a tool]
10. [Image of a tool]

Total number right Ex. 2——
EXERCISE 4

Part 1

- I
- 2
- 3
- 4
- 5

Part 2

- C
- D
- P
- A
- H

Total number right Ex. 4...
INTELLIGENCE TEST
FOR GRADES 3 THROUGH 9—FORM I

By William A. McCall, Ph.D.
Teachers College, Columbia University

Number Right G Score MA IQ

Name _______________________________ Sex __________________________
Age: Yrs. ______ Mos. ______ Date ______ Teacher __________________________

School __________________________ City __________________________ State __________________________

Instructions. Write your name, grade, and so forth in the blanks above.

Look below at the first set of words: hat coat tree dress shoes. The word tree does not belong with the others. Is that right? The word tree is the third (3) word, so 3 is written in the space at the right.

Look at the next set of words: chair yes dog no pup. The word chair does not belong with the others because yes and no belong together and dog and pup belong together. Is that right? Since chair is the first (1) word, 1 is placed in the space at the right.

Look at the set of numbers. The fifth number, 19, does not belong with the others, so 5 is written in the space at the right. Is that right?

Look at the fourth set of words. The word pie does not belong with the others because these others make a sentence: This test is fun. Is that right? Since pie is the second word, 2 is placed in the space at the right.

Look at the next set of words. Put the right number in the space.

Look at the last set of words. Put the right number in the space.

1. hat coat tree dress shoes 3
2. chair yes dog no pup 1
3. 12 14 15 13 19 5
4. test pie fun is this 2
5. hard long soft eye short
6. star coat sheep wool cloth

Look at me when you finish (pause). What is the answer to Item 5? Why? To Item 6? Why? Do you understand?

On the following pages, do every item. Take them in order. Do not skip. Do not waste time on a hard item; do it the best you can quickly and go on to the next one. You will have plenty of time if you do not waste it. Your score will be the number you do correctly in the time allowed. When you are told to do so, turn this page and begin. You will be stopped exactly 40 minutes later.

To the Examiner: Read instructions aloud while the children read silently. Give no help after the test begins, beyond seeing that instructions are followed.
shoes  hat  coat  dress  car
3  11  6  66  33
fruit  cow  sun  tree  calf
fur  tail  eye  wheel  ear
has  his  hers  ours  its
rats  dogs  cats  run  mice
fly  ball  top  throw  spin
bad  good  kind  true  brave
1  16  13  11  6
he  to  of  her  him
lion  frog  tiger  dog  cow
feed  food  eat  fed  ate
go  get  give  come  send
tag  ball  easy  play  game
pen  hand  see  touch  eye
foot  leg  shoe  nail  toe
both  many  all  some  each
20  6  15  18  4
run  skip  hop  walk  crawl
book  me  story  a  tell
me  she  my  hers  you
call  loud  sing  talk  speak
fish  bird  crawl  hop  snake
which  what  that  when  this
she  boy  the  is  he
pond  lake  rain  river  ocean
up  from  down  to  around
sheep  milk  horse  cow  wool
water  ate  drank  egg  swim
21  3  18  9  15
fire  water  flame  smoke  heat
right  in  came  out  left
how  when  where  what  are
hat  cloth  dress  glove  shoe
please  tell  me  go  with
wrong  left  top  right  bottom
hammer  saw  nail  see  ax
woman  man  for  work  very
21  18  16  7  6
apple  peach  pear  beet  plum
see  sight  sat  saw  sit
4  8  4  1  3
yes  the  he  boy  is
will  could  can't  can  won't
dog  is  our  teeth  white
fat  slow  old  gray  fresh
which  why  high  down  under
cold  soup  burn  mouth  hot
3  13  8  15  18
worse  when  better  wrong  good

Go to the next page
| 101. frost | ice | snow | hail | dew | 126. Jim | Jane | Helen | Ruth | Bess |
| 102. we    | fun | like | hit  | good| 127.  19|  5  |  4   | 25   | 16  |
| 103. is    | were| are  | be   | was | 128. apple| grape| plum | cherry| pear |
| 104. they  | man | it   | he   | book| 129. above| over | around| under | below |
| 105. foot  | head| shoe | coat | hat | 130. money| play | rest  | work  | fun  |
| 106.  6    |  9  | 11   | 15   | 18  | 131. store| chalk| mother| teacher| child |
| 107. and   | it  | or   | but  | if  | 132. little| big  | tall  | large | small |
| 108. bread | sheep| fruit| meat | tree| 133. sleep | skate | run   | swim  | jump  |
| 109. gone  | start| go   | stop | come| 134. warm | dry | hot   | wet   | cold  |
| 110. this  | them | those| that | these| 135. milk | ice  | store | water | cream |
| 111. light | still| sound| dark | loud| 136. teeth| jaws | ear   | mouth | lips  |
| 112. get   | give | got  | gave | go  | 137.  29 |  27 |  14  | 30   | 23  |
| 113. his   | who | what | name | is  | 138. little| slow | easy  | short | same  |
| 114.  2    | 16  |  9   |  7   | 17  | 139. big | ever | never | little | often |
| 115. bark  | stars| tree | leaf | nuts| 140. game | ball | foot  | coat  | bat   |
| 116. above | off | under| on   | in  | 141. give| shoe | me   | gave  | your  |
| 117. as    | cloud| blue | such | green| 142. head | hand | hair | arm | finger |
| 118. come  | go  | stay | hop  | run | 143. ship | wave | sail | sea | cloud |
| 119. too   | that | a    | also | an  | 144.  19 |  9  |  14  |  8   | 11  |
| 120.  18   | 10  | 13   | 11   | 16  | 145. very | but  | some | more | any  |
| 121. you   | kiss | will | no   | me  | 146. moon | sun | night | dark | day  |
| 122. we    | can | you  | they | is  | 147. fast | noisy | still | slow | moving |
| 123. for   | from | here | there| to  | 148. sun | light | man  | tree | girl  |
| 124. help  | we  | them | chair | can | 149. where | why | down | above | below |
| 125. yes   | on  | own  | but  | want| 150. very | am  | he   | I   | bright |

Use all the time to improve your answers.
New Stanford Reading Test

By TRUMAN L. KELLEY, GILES M. RUCH, and LEWIS M. TERMAN

TEST: FORM V
FOR GRADES 2-9

Name............................................... Grade............ Boy or girl............

Age........... When is your next birthday? ............... How old will you be then? ..........

Name of school...................................... Date..............

<table>
<thead>
<tr>
<th>Score</th>
<th>Read. Age</th>
<th>School Score</th>
<th>Read. Age</th>
<th>School Score</th>
<th>Read. Age</th>
<th>School Score</th>
<th>Read. Age</th>
<th>School Score</th>
<th>Read. Age</th>
<th>School Score</th>
<th>Read. Age</th>
<th>School Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>19-2</td>
<td>100</td>
<td>15-8</td>
<td>9.7</td>
<td>80</td>
<td>12-6</td>
<td>6.7</td>
<td>60</td>
<td>10-8</td>
<td>4.7</td>
<td>40</td>
<td>9-3</td>
</tr>
<tr>
<td>119</td>
<td>18-11</td>
<td>99</td>
<td>15-6</td>
<td>9.5</td>
<td>79</td>
<td>12-4</td>
<td>6.6</td>
<td>59</td>
<td>10-7</td>
<td>4.6</td>
<td>39</td>
<td>9-2</td>
</tr>
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1 Grade defined as in the table in the Directions for Administering.
2 Reading ages above this point are extrapolated values.

NOTE. Turn the book over to find Test 1, which begins on the last page.

TO THE EXAMINER. Do not administer this test without first reading carefully the Directions for Administering.

1 The Total Reading Score is the average of the scores on the two tests.

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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.
An old fairy tale tells of a little girl who was cured of telling falsehoods. A wise fairy clasped a diamond necklace about the little girl's throat. Whenever she said anything that was not true, the diamonds turned to coal until the truth was told. This so shamed the ......................that she finally learned to speak only the......................

Although Bert and John were brothers, they were not at all alike. John was big and strong and he had very few friends. On the other hand, ......................was small and weak but he was ......................by everyone.

The Eskimos sometimes live in homes made of blocks of ice. Since ice melts rapidly when exposed to a temperature above 32 degrees, it is necessary for the Eskimos to keep the temperature of the room below ...................... degrees to keep the house from ......................

All animals have some way of defending themselves from attack. The lion has sharp teeth, the rhinoceros has a hide so thick that scarcely anything can pierce it, while the deer can jump and run with great speed. If a single animal had the lion's ......................, the rhinoceros' thick ......................, and the deer's ability to ......................, it would be hard to conquer.

Dumped into Ernest's corner of the attic are a roller skate and a much-read storybook. "Ernest likes me better than he likes you," said the skate. "Why, you poor skate, how mistaken you are," said the book. At this moment they heard from outdoors, "Come on, Ernest, let's scoot." The word "scoot" set the book's leaves a-trembling and sent a thrill of joy through the iron heart of the skate. But just then it began to rain hard, "Pitter-patter, pitter-patter," on the attic roof. This sent a thrill to the heart of the......................, and a shudder to the heart of the...................... Soon Ernest came in and said, "Where is that old......................of mine?"

Trout cannot live in water which is warmer than that of their cold native mountain streams, and they prefer flowing water to still water. In the government fish hatcheries the baby trout are kept in special tanks in which the water is kept ......................and......................
Johnny was walking down the sidewalk in a very peculiar way. He was saying, "If I step on a crack, I will break my back; if I step in the middle, I will feel fit as a fiddle." Hiscoveries as a scientist. We do not often think of him as both
and
.

Similarly steel is commonly made from copper and zinc. This explains why we never hear of and
mines.

The Iroquois and many other tribes of Indians were very fond of war. However, the Papago Indians of Arizona prefer peace and quiet. The men sit lazily in the shade of their huts while the women weave baskets. It is hard to imagine the
Indians going to war or
hard.

Deciduous trees lose their leaves in winter, while evergreens, as their name implies, do not. Therefore, in forests composed of
trees the ground is less shaded in winter than is the case in forests whose trees are
.

There are many kinds or breeds of cattle, each one being of some special use to man. Jersey cows are not highly desirable for meat, but produce large quantities of rich milk. Hereford cattle have just the opposite characteristics. Consequently, if one wanted to produce beef, he would choose the rather than the
breed.

All things considered, water is the most important factor that determines success or failure in agriculture. Temperature is frequently a limiting factor, but
is much oftener than temperature the
factor.

Go right on to the next column.

When we hear of the Chinese wearing wooden shoes and eating with chopsticks, we think it very odd. A Chinaman would be just as surprised at our leather shoes and our table forks and spoons. The of any people appear to anyone not familiar with them.

A few yards away large birds were greedily feeding upon dead fish, regardless of our presence. They were buzzards, scavengers of our southern seacoasts. In spite of their being ugly and unmannered, we owe them a kind of respect, for we have learned to know they are among the best friends of dwellers in the tropic
, disposing as they do of decaying
which otherwise might be a menace to health.

Many gardeners plant perennial flowers in preference to annuals because the former will bloom for more than one season. Since nasturtium is an annual and hollyhock is a perennial, we can expect the
will live longer than the

If I were writing about the rich, I should be inclined to divide them, according to their attitude toward life, into workers and parasites. The motto of the worker is, "I owe the world a life," and the motto of the
is, "The
owes me a living."

Man will risk as much for notoriety as for money. If this were not true, why would anyone risk his life by going over Niagara Falls in a barrel? Such a feat, even if successful, may bring the "hero" no
, but it is certain to bring him much

Go right on to the next page.
59-60-61 We have all seen iron subjected to hot fires and yet it did not burn. However, iron does “burn up” and this fact is demanding the attention of some of our greatest engineers. Iron combines very readily with oxygen to form iron oxide, known as rust. Oxidation is only a form of slow combustion. Consequently, if it is not treated oxidation will soon...

62-63 A nation composed of good homes is a good nation. The best homes teach their children high ideals and good habits which tend to prevent sickness, poverty, vice, or crime. A nation...has few problems which would not be half cured if all...were good ones.

64-65 One of the fundamental aims of silent reading is that of training each child to attain his highest level of achievement in speed without lowering his accuracy of comprehension. Neither...nor should be developed at the expense of the other.

66-67 A membrane which permits the passage of water through it but which does not permit substances dissolved in water to pass is called a semi-permeable membrane. One which allows dissolved substances as well as...to pass is a...membrane.

68-69 We like to subdue. Boys like to go stamping through the woods, breaking their way through to new paths. Before this modern age, war and hunting offered opportunities for the fighting spirit. The lives of most of us today are more...Modern conditions make little demand on our...tendencies.

70-71 To pant for recognition, to yearn to impress one's personality upon one's fellow-men, is the essence of ambition. The ambitious person may think that he merely thirsts to “do something” or “be somebody,” but really what he craves is to figure potently in the minds of others, to be greatly loved, admired, or feared. To reap even a great success which no one...does not satisfy the yearnings of the...individual.

72-73 Among the most characteristic and amazing properties of bacteria is their ability for rapid multiplication. It has been estimated that the descendants of one bacterium under continued favorable conditions would in two days number 281,500,000,000 and in three days weigh about 7,000 tons. Fortunately, under ordinary conditions...does not proceed unchecked at such a...

74-75 “Naïve” and “unsophisticated” are frequently confused. The former suggests a type of behavior which is artless, spontaneous, and free from restraints of custom. The latter implies fully as great lack of knowledge of social usage, and, in addition, conduct which is primitive and perchance inelegant. Thus, the...youth was the first to enter the car, and his...little sister warmly kissed him in the presence of the king.

76-77 The production of bodily energy involves a chemical process. Animal energy is derived directly from food. All cell activity involves the expenditure of energy. Therefore all...have to be.

78 Fundamentally, education depends upon the capacity of a person to profit by past experiences. Past situations modify present and future adjustments. Education in its broadest sense means acquiring experiences that serve to...existing inherited or acquired tendencies of behavior.

79-80 Suppose that in a certain country the law provides that a will, to be a valid legal instrument, must be signed by the testator (maker) in the joint presence of at least two witnesses who must themselves sign the document in attestation of the testator's signature. Mr. Brown having drawn up a will in the morning calls in Mr. Smith to witness his signature and in the afternoon calls in Mr. Jones. Since Mr. Jones was not present in the morning, Mr. Brown again signs the will and Mr. Jones then signs it. This will is...because the two witnesses...witnessed the making of Mr. Brown's signature.
DIRECTIONS: Draw a line under the word that makes the sentence true, as shown in the samples.

SAMPLES:
A rose is a box flower home month river
A roof is found on a book person rock house word

1. New York is the name of a city person ride river school
2. A shining thing is dull high bright warm wide
3. Silk is for books dresses gardens horses letters
4. Joyful means even great happy short slow
5. Tears come usually when we drink eat talk walk cry
6. A horn makes pictures plans suits music tears
7. A limb is a part of a story table tree wall window
8. To stitch is to reward sew starve suggest tempt
9. The ocean is fire land paper water wood
10. To lift means to raise begin drive laugh watch
11. Cotton is used for baskets clothes dinners notes wheels
12. An American is a ball house person place table
13. A farmer works chiefly with fish coal plants rocks wood
14. Beaches are found on a barn coast cloak horse roof
15. A vessel is a boat bow cloth forest lady
16. To pronounce is to sail show speak stand watch
17. A couch is a kind of bed captain offer pick wall
18. To be free is to have liberty patience religion revenge

19. Frightful means discreet precise enthusiastic terrifying vigorous
20. Clever means bright neat peculiar stern upright
21. A snake is a foreigner gallery geography mold serpent
22. To inquire is to appear rest ask sleep watch
23. A remark is something that is destroyed slow held kept said
24. To despise is to bind effect hate obey observe
25. A parson is a minister pond porch prison robin
26. A monstrous thing is enormous modest musical useful torn
27. An argument is a discussion gully gymnasium penance perjury
28. Injury means charm experience haste harm limit
29. A misunderstanding is a kind of diadem disagreement disk magnet monastery
30. To scare is to sympathize tackle taunt terrify loan
31. A worshiper is fearful gracious religious steady
32. To sneer is to scoff scorch scratch scream scrub
33. To be brave is to be humble courageous frightful honorable ignoble
34. Contentment means notion provision rainbow satisfaction trifle
35. Unarmed means advantageous beggarly defenseless verbal wasteful
36. A purchaser is a flatterer buyer flirt hearer voter
37. A sawmill produces candy brides dew wire lumber
38. Commerce means speed station trade uncle weather
39. To grant means to get give see step wish

Go right on to the next column.
TEST 2. READING: WORD MEANING—Continued

40 Violence usually causes benefit
happiness harm knowledge respect

41 A literary person is a champion
driver robber founder writer

42 A cave is a
ballad dresser frontier grotto plea

43 An occupation is a kind of
bath luxury activity relative vein

44 Thou means her him me they you

45 To reveal is to
abuse disclose mess motor seek

46 Solemnity means
legibility magic neutrality seriousness untidiness

47 A ballot is used in
freezing grinding voting wrapping

48 Ambition means
aspiration frivolity loitering remorse slothful

49 To heed is to
escape fancy hurry notice prove

50 Lifeless means inanimate
indefinite infamous undecided untidy

51 Dignified means lonely
monstrous prominent spiritual stately

52 An opponent is an
owl antagonist officer outlaw inlet

53 Tumultuous is boisterous
hapless jocund lowly massy

54 Constancy means grudge
morsel rainfall steadfastness warfare

55 Eternally means already
always completely entirely squarely

56 Liberality means promotion
robbery reproof scandal generosity

57 A legacy is an
inheritance inscription ox ankle elf

58 A frenzy is a county
growth majority robber rage

59 To forbear means to
abstain knead ladle loan mimic

60 To be prompt is to be formal
frightful hospitable punctual purified

61 Capacity refers to
authority bloom climate habit volume

62 Shameful means dispassionate
immaterial naïve scandalous tractable

63 Romantic means perverse
sentimental shabby shameless spry

64 Meager means exceptional
scant suspicious trivial vertical

65 Indefinite means congenial
indebted lawless workmanship vague

66 To be elaborate is to be artless
complicated headstrong plain ignored

67 Ceaseless means boisterous
diminished discontented ended incessant

68 Unscrupulous means dishonest
vagrant voluntary willful zigzag

69 To sever is to
cut hurt jump tie twist

70 To quail is to
attack cower expand hunt retreat

71 Submissiveness means daring
cute heaviness wise meekness

72 Doleful means
molten nameless oriental vague rueful

73 An associate is an adversary
antagonist emigrant ensign ally

74 Covetous means avaricious
bountiful gaudy gray-headed harassed

75 A reprobate is one who is very ugly
cowardly wealthy wicked youthful

76 To impair is to
brand commend damage mingle scrape

77 Sluggish means cadaverous
inert loquacious spectral vertiginous

78 An insurrection is a fugitive
rebellion publication punishment hermit

79 Quiescent means inactive
angry perfect quick troublesome

80 Audacious means absurd
adverse casual daring hapless

End of Test 2. Look over your work.
New Stanford Arithmetic Test

By Truman L. Kelley, Giles M. Ruch, and Lewis M. Terman

TEST: FORM V

FOR GRADES 2-9

Name ........................................ Grade .............. Boy or girl .........

Age .................. When is your next birthday? .......... How old will you be then? ..........

Name of school ...................... Date ..................

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<td>11-3</td>
<td>5.4</td>
<td>9-9</td>
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1 Grade defined as in the table in the Directions for Administering.
2 Arithmetic ages above this point are extrapolated values.

To the Examiner. Do not administer this test without first reading carefully the Directions for Administering.

<table>
<thead>
<tr>
<th>Test</th>
<th>Score</th>
<th>Arith. Age</th>
<th>School #1</th>
</tr>
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<td>Score</td>
<td>Arith. Age</td>
<td>School #1</td>
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<tr>
<td>Arith. Comp.</td>
<td>Total (Average) Arith.</td>
<td>Score</td>
<td>Arith. Age</td>
</tr>
</tbody>
</table>

1 The Total Arithmetic Score is the average of the scores on the two tests.

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[ ]

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DIRECTIONS: Find all the answers as quickly as you can. Write the answers on the dotted lines. Use the margins to figure on.

1. Charles has 6 brown rabbits and 5 white ones. How many rabbits has he?
   Answer:...

2. At a school picnic 9 boys and 15 girls went swimming. How many went swimming?
   Answer:...

3. Jim has 3 marbles, John has 8, and Bill has 9. If they put them all together, how many will there be?
   Answer:...

4. A hen had 9 chicks but 3 of them died. How many were left?
   Answer:...

5. Alice gathered 18 roses and took a dozen of them to a friend. How many did she keep?
   Answer:...

6. What is the cost of 3 boxes of dates at 21 cents a box?
   Answer:...

7. A freight train had 16 cars. Seven of them were box cars. The others were flat cars. How many flat cars were there?
   Answer:...

8. There were 100 people at a school play in the afternoon and 150 in the evening. How many people went to the two performances?
   Answer:...

9. Three boys together gathered 21 bushels of walnuts. If they shared them equally, how many bushels did each boy get?
   Answer:...

10. Bob bought a dozen handkerchiefs at the rate of 3 for $1. How much did he pay for them?
    Answer:...

11. Mr. Jones bought a new car for $975. The dealer allowed him $325 for his old car. How much did he have to pay in addition to the allowance for the old car?
    Answer:...

12. Sarah sleeps ten hours every night. If she goes to sleep at nine o'clock, when does she wake up?
    Answer:...

13. A man paid the street-car fare for himself and two friends. If the fare is 7 cents, how much change should he receive from a half dollar?
    Answer:...

14. How many pounds of popcorn will be needed to plant a 30-acre field if 6 lb. are needed for one acre?
    Answer:...

15. Jack had no marbles so he bought as many 3-cent marbles as he could get for 15 cents and then Tom gave him 2 more. How many did Jack have then?
    Answer:...

16. Mrs. Fox started a savings account by depositing $85. The next month she deposited $75. A few days later she drew out $40. What was her balance in the bank?
    Answer:...

17. A class gave a candy sale and made $23 with which they wish to buy a picture. The picture costs $30 and the 20 pupils in the class decide to share the rest of the cost equally. How much will it cost each?
    Answer:...

18. In each 21 pounds of milk there is a pound of milk sugar. How many pounds of milk sugar are there in 1806 lb. of milk?
    Answer:...

19. A camping party took 12½ lb. of bacon for a 5-day trip. How much did that allow for each day?
    Answer:...

20. Jim has 20 cents to spend for marbles. He is going to buy 2 at 3 cents each and spend the remainder for 2-cent marbles. How many will he get altogether?
    Answer:...
21 When oranges are 2 for 5 cents, how many can I buy for 60 cents?  
Answer

22 Milk sells at 12 cents a quart. At this rate, how much will 12 gallons cost?  
Answer

23 When $1.50 will buy 5 lb. of mixed nuts, how much will $2.40 buy at the same rate?  
Answer

24 Tom has just 4 weeks of vacation and wishes to spend it in a city which it takes two days to reach by train. How many days can he spend in the city?  
Answer

25 Frank gets 30 cents for every $1.50 magazine subscription that he sells. What per cent is his commission?  
Answer

26 A recipe for lobster salad read, “with two cups of lobster meat use ¼ cup of chopped celery.” How much chopped celery should be added to 5 cups of lobster meat?  
Answer

27 A box of 12 dozen oranges cost a dealer $4.80. He sold them at 50 cents a dozen. How much gross profit did he make on each dozen oranges?  
Answer

28 A dealer profits 6 cents on a half-dozen buttons. How many dozen must he sell to make $12?  
Answer

29 Jack pays 3 cents for a paper and sells it for 5 cents. What per cent of the selling price is his profit?  
Answer

30 A man dug 60 bu. of potatoes from .3 of an acre of ground. At this rate, how many bushels should he get from 4 acres?  
Answer

31 A boy bought 300 oranges at $2.75 per hundred and sold all of them at the rate of 3 for 10 cents. How much did he make if we ignore the cost of doing business?  
Answer

End of Test 1. Look over your work.
DIRECTIONS: Get the answers to these examples as quickly as you can without making mistakes. Look carefully at each example to see what you are to do.

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<td>Subtract</td>
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<td>Add</td>
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<td>Multiply</td>
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<td>10 ÷ 2 =</td>
<td>remainders</td>
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<td>8 ) 59</td>
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<td>(19)</td>
<td>(20)</td>
<td>(21)</td>
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<td>Add</td>
<td>Subtract</td>
<td>9 ) 58</td>
<td>2 ) 15.8</td>
</tr>
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<td>24</td>
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<td>12%</td>
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<td>(22)</td>
<td>(23)</td>
<td>(24)</td>
<td>(25)</td>
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<td>% of 156 =</td>
<td>Multiply</td>
<td>Subtract</td>
<td>% × % =</td>
</tr>
<tr>
<td>4789</td>
<td>62%</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>76</td>
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</tbody>
</table>

Go right on to the next page.
(26) \( \frac{3}{4} \times \frac{5}{6} = \)
Add \( \% \)
\( \frac{1}{4} \)
\( \frac{2}{3} \)
\( \frac{2}{7} \)
\( \frac{5}{10} \)

(30) Subtract 
\( \frac{3}{4} \)
Add 
\( 3.6 \frac{1}{2} \)
\( 3.2 \frac{3}{10} \)

(34) Subtract 
\( 66 \frac{3}{8} \)
\( 58 \% \)
\( 29 \frac{4}{6} 5 \frac{4}{5} \)
\( \% \times \frac{1}{1} = \)
\( 5.8 \frac{2}{5} - 2.9 = \)

(38) Multiply 
\( 65.84 \)
\( 5.06 \)
\( 25 \frac{1}{1} \)

(39) \( 1 \frac{1}{2} + \% + \% = \)
Add \( \% \)
\( \% \)
\( \% \)

(42) Subtract 
\( 205 \frac{3}{4} \)
\( 85 \% \)
\( 85 \% \)

(43) \( \% \times \% = \)

(46) 50 is what per cent of 200?

Answer =

(47) Find the total roof surface of this building.

Answer =

(48) Add 
\( 2.2 \frac{3}{10} \)
\( 2.7 \% \)
The graph below shows, year by year, the amount of $1.00 invested at 4% interest compounded annually.

What is a dollar worth at the end of the 12th year?

Answer =

\[
\begin{align*}
(51) & \quad \text{Multiply} \\
2 & \quad 3 \text{ yd. 2 ft. 4 in.} \\
& \quad 6794 \\
& \quad 4008 \\
\end{align*}
\]

\[
\begin{align*}
(52) & \quad \text{Multiply} \\
& \quad -6 \\
& \quad +4 \\
\end{align*}
\]

\[
\begin{align*}
(53) & \quad (4)^2 = \\
\end{align*}
\]

\[
\begin{align*}
(54) & \quad \text{Principal} = $150 \\
& \quad \text{Rate} = 7\% \\
& \quad \text{Time} 1 \text{ yr. 6 mo.} \\
& \quad \text{Find amount due at maturity.} \\
\end{align*}
\]

\[
\begin{align*}
(55) & \quad \text{Add} \\
7 & \quad x^2 \\
-4 & \quad x^2 \\
\end{align*}
\]

\[
\begin{align*}
(56) & \quad \text{Find the volume of this cylinder.} \\
& \quad \text{Volume} = \\
\end{align*}
\]

\[
\begin{align*}
(57) & \quad \text{Principal} = $150 \\
& \quad \text{Rate} = 7\% \\
& \quad \text{Time} 1 \text{ yr. 6 mo.} \\
& \quad \text{Find amount due at maturity.} \\
\end{align*}
\]

\[
\begin{align*}
(58) & \quad \text{Find the length of side } MN. \\
\end{align*}
\]

\[
\begin{align*}
(59) & \quad \text{Write this simplest expression in the form:} \\
& \quad -30y + (-6y) \\
\end{align*}
\]

\[
\begin{align*}
(60) & \quad \text{If } V = \frac{\pi r^2 h}{3}\text{, write the formula for } h. \\
& \quad h = \\
\end{align*}
\]

End of Test 2. Look over your work.
<table>
<thead>
<tr>
<th>GRADE</th>
<th>A 90-100</th>
<th>B 80-90</th>
<th>C 70-80</th>
<th>D 60-70</th>
<th>E Below 60</th>
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<td>Disinterested ( )</td>
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<tr>
<td>APPLICATION</td>
<td>Very Industrious ( )</td>
<td>Good Worker ( )</td>
<td>Steady ( )</td>
<td>Fair ( )</td>
<td>Lazy ( )</td>
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<tr>
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<td>Very Quick to Learn ( )</td>
<td>Apts ( )</td>
<td>Learns Readily ( )</td>
<td>Slow to Learn ( )</td>
<td>Dense ( )</td>
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<td>Reliable ( )</td>
<td>Satisfactory ( )</td>
<td>Irregular ( )</td>
<td>Unreliable ( )</td>
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<td>Self Reliant ( )</td>
<td>Confident ( )</td>
<td>Lacks Confidence ( )</td>
<td>Timid ( )</td>
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<tr>
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<td>Exceptional ( )</td>
<td>Very Gentlemanly ( )</td>
<td>Well Behaved ( )</td>
<td>Trouble-some ( )</td>
<td>Unsatisfactory ( )</td>
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<td>Exceptionally Accurate ( )</td>
<td>Accurate ( )</td>
<td>Average ( )</td>
<td>Inaccurate ( )</td>
<td>Careless ( )</td>
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<td>Rapid ( )</td>
<td>Good ( )</td>
<td>Slow ( )</td>
<td>Very Slow ( )</td>
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