The University of the State of New York
245th High School Examination

ELEMENTARY ALGEBRA
Monday, June 17, 1929 — 9.15 a. m. to 12.15 p. m., only

Instructions

Do not open this sheet until the signal is given.

Answer all questions in part I and five questions from part II.

Part I is to be done first and the maximum time to be allowed for this part is one and one half hours. Merely place the answer to each question in the space provided; no work need be shown.

If you finish part I before the signal to stop is given you may begin part II. However, it is advisable to look your work over carefully before proceeding to part II, since no credit will be given any answer in part I which is not correct and reduced to its simplest form.

When the signal to stop is given at the close of the one and one half hour period, work on part I must cease and this sheet of the question paper must be detached. The sheets will then be collected and you should continue with the remainder of the examination.
Write at top of first page of answer paper to part II (a) name of school where you have studied, (b) number of weeks and recitations a week in elementary algebra. The minimum time requirement is five recitations a week for a school year.

Part II

Answer five questions from this part. Full credit will not be granted unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each answer should be reduced to its simplest form.

21 Solve the following set of equations for $x$ and $y$ and check:
   \[ 2x + 3y = 6 \]
   \[ 3x + 5y = 15 \]
   \[[7, 3]\]

22 In a foul-shooting contest the points made by Howard and Kenneth were in the ratio 8:11. Kenneth made 12 more points than Howard. Find the number of points made by each. \[[8, 2]\]

23 If 3 is subtracted from the numerator of a certain fraction, the value becomes \(\frac{3}{5}\). If 10 is added to the denominator of the original fraction, the value becomes \(\frac{1}{5}\). Find the original fraction. \[[5, 5]\]

24 If one side of a square is increased by 2 and an adjacent side is decreased by 2, the area of the resulting rectangle is 32. Find one side of the square. \[[6, 4]\]

25 Indicate whether each of the following is true or false: [Write the letters \(a\) to \(j\) in a column and then write the word true or false after each letter.]
   \(a\) \(3a^2 \times 2a^3 = 6a^6\) \[[1]\]
   \(b\) If \(\frac{2}{x} = 6\), then \(x = 3\) \[[1]\]
   \(c\) If \(A = 45^\circ\), then \(\sin A = \cos A\) \[[1]\]
   \(d\) If \(ax = b\), then \(x = b - a\) \[[1]\]
   \(e\) The common factor of \(a^2 - b^2\) and \(a^2 - ab\) is \(a - b\). \[[1]\]
   \(f\) If an even integer is represented by \(2n\), then the next larger even integer is represented by \(2n + 2\). \[[1]\]
   \(g\) \(\frac{ab + c}{a} = b + c\) \[[1]\]
   \(h\) \(\sqrt{a^2 + b^2} = a + b\) \[[1]\]
   \(i\) \(\sqrt{\frac{1}{2}} = \frac{1}{2} \sqrt{2}\) \[[1]\]
   \(j\) \(\frac{a}{a - 1} = \frac{a}{a + 1}\) \[[1]\]

26 \(K = \frac{1}{2}h(b_1 + b_2)\) is the formula for the area of a trapezoid, \(h\) representing the altitude and \(b_1\) and \(b_2\) the bases. If \(K = 252\), \(b_1 = 18\) and \(b_2 = 24\), find \(h\). \[[10]\]

27 A boy selling newspapers earns on 5 consecutive days the following amounts: 10\(\phi\), 3\(\phi\), 17\(\phi\), 25\(\phi\), 20\(\phi\).
   \(a\) Represent this information by a bar graph. \[[5]\]
   \(b\) Represent by a sixth bar his average daily earnings. \[[5]\]

The following question is based on one of the optional topics in the syllabus and may be substituted for any other question in part II.

28 Solve for \(x\) to the nearest tenth:
   \(x^2 - 2x = 23\) \[[10]\]
16 In a certain freshman class there are $a$ boys and $b$ girls. Express the ratio of the number of girls to the total number of pupils.

17 The cosine of a certain acute angle is .8712; find the angle to the nearest degree.

18 Using the tables, find to the nearest tenth the value of $a$ in the right triangle $ABC$.

19–20 a On the diagram below represent by a graph the equation $y = 2x$

b On the graph plotted in answer to $a$, mark with the letter $P$ the point for which $x = 4$
Fill in the following lines:

Name of school........................................Name of pupil........................................

Detach this sheet and hand it in at the close of the one and one half hour period.

Part I

Answer all questions in this part. Each question has 2½ credits assigned to it; no partial credit should be allowed. Each answer must be reduced to its simplest form.

1. A customer purchases \( n \) pounds of sugar at \( c \) cents a pound and gives in payment a one-dollar bill; express in cents the change he should receive.  
   Ans........................................

2. From the sum of \( 2a - 10b \) and \( 3a + 14b \) subtract \( 3a - 2b \).  
   Ans........................................

3. In the formula \( 2\pi r = C \), if \( C = 88 \) and \( \pi = \frac{3}{2} \), find \( r \).  
   Ans........................................

4. Solve the following equation for \( y \):
   \[ 5y - 2(y - 5) = 17 \]
   Ans........................................

5. Solve the following set of equations for \( x \):
   \[ x - 3y = 8 \]
   \[ 2x + 3y = 7 \]
   Ans........................................

6. Solve the following equation for \( x \) in terms of \( a \) and \( b \):
   \[ ax - a^2 = bx - b^2 \]
   Ans........................................

7. The formula \( B = 2A \) is obtained by inspection from the table at the right.
   
   \[ \begin{array}{c|ccc}
   & A & 1 & 2 & 3 \\
   \hline
   B & 2 & 4 & 6 & \ldots
   \end{array} \]
   What formula is obtained from the table given at the right of this question?  
   Ans........................................

8. Factor \( P + Prt \).
   Ans........................................

9. Solve the following equation for \( d \):
   \[ \frac{d}{2} - \frac{d}{5} = 6 \]
   Ans........................................

10. Express as a single fraction in its lowest terms
    \[ \frac{a + b}{2} - \frac{2a - b}{6} \]
    Ans........................................

11. Express as a single term
    \[ 2\sqrt{32} - 3\sqrt{2} \]
    Ans........................................

12. The parcel-post rate for a certain zone is expressed by the formula 
    \[ c = 2w + 6 \]; solve this formula for \( w \).  
    Ans........................................

13. If \( x \) and \( y \) are positive and \( y = \frac{3}{x} \), does \( y \) increase or decrease as \( x \) increases?  
    Ans........................................

14. Find \( \sqrt{68} \) to the nearest tenth.  
    Ans........................................

15. Simplify \( (-\frac{1}{2} ab^2)^3 \)  
    Ans........................................