ELEMENTARY ALGEBRA

Monday, January 16, 1928 — 9.15 a. m. to 12.15 p. m., only

Fill in the following lines:

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

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 write the answer to each question in the space at the right; 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.

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Part I

Answer all questions in this part. Each question has $2\frac{1}{2}$ credits assigned to it. Each answer must be reduced to its simplest form.

1 Find the value of $a^3 + 4b^2 - 7c + 4$ when $a = 1$, $b = 2$, $c = 3$ Ans.............

2 Divide $6x^3 + 11x^2 - 1$ by $3x + 1$ Ans.............

3 Find the dividend when the quotient is $x - 1$, the remainder 2 and the divisor $3x - 1$ Ans. ....

4 A ship sails r miles the first day, s miles the second day and t miles the third day; express the average daily rate.   Ans.............

5 Factor $2x^2 - 18$ Ans. ....

6 Factor $16a^2 - 2.4a + .09$ Ans......... .....

7 Reduce to lowest terms

$$\frac{a^2 - 6a}{a^2 - 7a + 6}$$

   Ans.............

8 If y and x are positive and $y = \frac{1}{x}$, does y become larger or smaller as x becomes larger?   Ans.............

9 Divide $\left(1 + \frac{1}{x-1}\right)$ by $\frac{2}{x-1}$ and express the resulting fraction in its lowest terms.   Ans. ....

10 Solve the following equation for v:

$$\frac{5v}{3} - 6 = \frac{7v}{9} + 2$$

   Ans.............

11 Find the square root of 68.89   Ans.............

12 Simplify $14\sqrt{\frac{2}{7}}$ Ans...... ......

13 Simplify *each* term of the following expression and combine the results into a single term: $b\sqrt{27a} - 6\sqrt{3ab^2}$ Ans.............

14 Find the two roots of the equation $x^2 - 7x = -12$ Ans.............

15 Solve for h the formula $k(h - 1) = R$ Ans.............

16 If t tons of coal cost s dollars, indicate the cost of m tons.   Ans.............

17 If 19 is subtracted from 3 times a certain number, the remainder is 110; find the number.   Ans.............

18 Indicate which one of the following, 1, 0, $\frac{a-b}{a+b}$, $\frac{a+b}{a-b}$, is the correct answer for $\frac{a(a-b)^2}{4b} \times \frac{4b}{a(a^2 - b^2)}$ Ans.............

19 If X and Y are positive, indicate which is the greater, a or b:
   a The square of the sum of X and Y.
   b The sum of the squares of X and Y.   Ans.............

20 In the following table for a graph determine the value of y corresponding to the value $x = 4$:

x	1	2	3	4	. . .
y	2	4	6	?	. . .

   Ans. ....

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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 Two motor boats start at the same time and place and travel in opposite directions. The ratio of their rates is 2:3. In 5 hours they are 100 miles apart. Find the rate of each. [6, 4]

22 A man invests $\frac{2}{5}$ of his property at 4%, $\frac{1}{3}$ at 5% and the remainder at 3%. If his resulting annual income is $610, find the value of his property. [6, 4]

23 In a mixture of water and turpentine containing 21 ounces, there are 7 ounces of turpentine. How many ounces of turpentine must be added to make a new mixture that shall be 75% turpentine? [7, 3]

24 Solve for x and y and check your answers:

$$x - y = 5$$
$$xy = 24 \qquad [8, 2]$$

25 Copy and complete *each* of the following statements:

 a $x^2 - \ldots + 4$ is a perfect square.   [2]
 b If x is a positive fraction less than 1, then x^2 is . . . than x.   [2]
 c One root of $x^2 - 4x = 8$, correct to the *nearest tenth*, is . . . .   [2]
 d In s hours an airplane going at the rate of r miles per hour can fly . . . miles.   [2]
 e A quadratic equation in one unknown is an equation of the . . . degree and has . . . roots.   [2]

26 State whether *each* of the following statements is true or false: [Write the letters *a*, *b*, *c*, *d*, *e* in a column and then write the word *true* or *false* after each letter.]

 a $(-\sqrt{2})^2 = 4$ [2]
 b To solve the equation $x^2 + px = q$ by " completing the square " add p^2 to both members of the equation.   [2]
 c One root of the equation $x^2 - 3x - 10 = 0$ is -2.   [2]
 d If the base of a rectangle is doubled, the area of the rectangle is doubled.   [2]
 e $\dfrac{a}{b-c} = -\dfrac{a}{c-b}$ [2]

27 A rectangle is m feet longer than it is wide. Its perimeter is p feet. Find its length and width in terms of m and p. [10]

28 The brake-testing table given below shows the distances in which automobiles traveling at different rates should be able to stop.

Speed of car	Distance in which it should stop
15 miles an hour	21 feet
20 miles an hour	37 feet
25 miles an hour	58 feet
30 miles an hour	83 feet
35 miles an hour	114 feet

 a Construct a curve (graph) representing this information.   [8]
 b From the graph determine the speed of a car that stops in 70 feet.   [2]