

ELEMENTARY ALGEBRA

Wednesday, June 18, 1924—9.15 a. m. to 12.15 p. m., only

Write at top of first page of answer paper (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.

Answer question 1 and four of the others. 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.

1 a Divide $a^3 - 6a^2 + 9a - 20$ by $a - 5$ and check your work, letting a equal 2. [4, 1]

b Simplify: $2x^2 - [3x^2 + (4x - 2x^3) - x^3 - 4x^2]$ [3]

c Find the prime factors of each of the following:

$$16x^2 - 24x^2y + 56xy^2 \quad [3]$$

$$x^2 - 5x - 6 \quad [3]$$

$$9x^2 - 24xy + 16y^2 \quad [3]$$

$$2x^2 + 7x + 3 \quad [3]$$

$$25x^2 - 20xy + 4y^2 - 9z^2 \quad [3]$$

d Solve for x and y :

$$\frac{x}{2} + \frac{y}{3} = 4$$

$$\frac{x}{3} + \frac{y}{2} = 4\frac{1}{3} \quad [8]$$

e Simplify and collect the results:

$$3\sqrt{5} - 10\sqrt{\frac{1}{5}} + 2\sqrt{45} - 5\sqrt{\frac{4}{5}} \quad [6]$$

f In the formula $S = \frac{1}{2}at^2 + vt$, find the values of t to the nearest tenth when $S = 80$, $a = 32$, $v = 32$ [10]

g Solve for x :

$$\frac{2x-1}{3} - \frac{3x+1}{2} + \frac{5(3x-4)}{6} = 4\frac{1}{6} \quad [5]$$

h Solve for x by any convenient method and check:

$$3x^2 - 2x = 8 \quad [6, 2]$$

2 The sum of two numbers is 47; if the greater is divided by the less the quotient will be 5 and the remainder will also be 5. Find the two numbers. [7, 3]

3 Find the square root of

$$\frac{x^4}{9} + \frac{4x^2y}{3} + 2x^2y^2 - 12xy^3 + 9y^4 \quad [10]$$

4 Solve for x and y :

$$\begin{aligned} ax + by &= 1 \\ cx - dy &= 1 \end{aligned} \quad [10]$$

5 Solve the following set of equations, correctly group your answers and check one set:

$$\begin{aligned} 2x - 5y &= 0 \\ x^2 - 3y^2 &= 13 \end{aligned} \quad [6, 2, 2]$$

6 a How many feet are there in the length of a stick that is q yards and s inches long? [3]

b To what sum will d dollars amount if placed at simple interest for n years at $4\frac{1}{2}\%$? [3]

c A pays for a bill of goods amounting to d dollars and c cents by giving a check for s dollars; if the amount of the check exceeds the amount of the bill, what change in cents is due A? [4]

7 A man walks at the rate of 4 miles an hour. How far can he walk into the country and ride back on a trolley that travels at the rate of 20 miles an hour, if he must be back home 3 hours from the time he started? [7, 3]

8 The following table gives the temperature readings at two hour intervals for a certain city from 5 a. m. to 5 p. m. as recorded one day at a local weather station:

Hour: 5 a. m. 7 a. m. 9 a. m. 11 a. m. 1 p. m. 3 p. m. 5 p. m.
Reading: -3° $+1^\circ$ $+6^\circ$ $+14^\circ$ $+17^\circ$ $+15^\circ$ $+10^\circ$

a Construct the curve (or broken line) to represent these changes. [7]

b From the graph determine approximately the hour when the temperature was 0° . [1]

c From the graph determine what two hour interval had the greatest change in temperature. How is this shown on the graph? [2]