

## ELEMENTARY ALGEBRA

Tuesday, June 20, 1916—1.15 to 4.15 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 the first six questions and four of the others. 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 Add  $5a - (3b - 2c)$  and  $-(3b - 6a) - 10a$ ; from the sum subtract  $-4a - (3c + b)$

2 Factor  $a^2 - a - 12$   
 $6a^2 + 7a + 2$   
 $8 - 18m^2$

3 Perform the indicated operations:

$$\left(1 - \frac{ab}{a^2 - ab + b^2}\right) \left(1 - \frac{ab}{a^2 + 2ab + b^2}\right) \div \frac{a^3 - b^3}{a^3 + b^3}$$

4 Solve  $\begin{cases} \frac{x-3}{5y} = -2 \\ x+7y=6 \end{cases}$

5 a Simplify  $2\sqrt{54} - 6\sqrt{\frac{3}{8}} - \sqrt{96}$

b Multiply  $1 - \sqrt{3} + \sqrt{5}$  by  $\sqrt{3} - \sqrt{5}$

6 Solve  $\begin{cases} xy=6 \\ 3x-2y=16 \end{cases}$

7 Solve  $\sqrt{2x+7} = \sqrt{x} + 2$  Check your result.

8 Solve  $\frac{1}{2}(x+1) - \frac{x}{3}(2x-1) = \frac{2}{3}$  Check your result.

9 An automobile goes to a place 72 miles distant and then returns, the round trip occupying 9 hours; the average rate of speed in returning is 12 miles per hour faster than the rate in going. Find the rate of speed in (a) going, (b) returning.

10 If  $a=4$ ,  $b=-3$ ,  $c=2$  and  $d=-4$ , find the value of  $ab^3 - 3cd^2 + 2(3a-b)(c-2d)$

11 If 4 is added to both the numerator and the denominator of a certain fraction, the resulting fraction equals  $\frac{3}{4}$ ;

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if 2 is subtracted from both numerator and denominator, the new fraction equals  $\frac{1}{2}$ . Find the original fraction.

12 *a* Express in dollars  $p$  per cent of  $d$  dollars.

*b* Express in square yards the area of a rectangle that is  $a$  feet long and 9 feet wide.

*c* State what value of  $x$  will make the expression  $3(x+2) - 4(x-3)$  equal to twice the value of  $x$ .

13 *a* On a certain day the following hourly temperatures were recorded; find the average temperature:

7 a. m.  $-8^\circ$ , 8 a. m.  $-3^\circ$ , 9 a. m.  $0^\circ$ , 10 a. m.  $+5^\circ$ ,  
11 a. m.  $+14^\circ$ , 12 m.  $+16^\circ$

*b* Find the square root of  $9x^4 - 12x^3 + 28x^2 - 16x + 16$