

## ELEMENTARY ALGEBRA

Wednesday, June 21, 1922—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 five 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  $a^4 + 2a^3 - 6a^2 + 26a - 15$  by  $a^2 + 4a - 3$  and check, letting  $a = 2$ . [5, 1]

- b Find the prime factors of four of the following:

$$a^2 - 2a - 48 \quad [2]$$

$$100x^4 - 49y^6 \quad [2]$$

$$36m^2 + 60mn + 25n^2 \quad [2]$$

$$12c^2 + 7c - 12 \quad [2]$$

$$3y^{2a} - 6y^a \quad [2]$$

- c Write as a single fraction in its lowest terms:

$$\left(4 - \frac{6}{a+1}\right) \div \left(8 - \frac{4a-8}{a^2-1}\right) \quad [6]$$

- d Solve and check:

$$6x - y = 0.9$$

$$x + 2y = 0.8 \quad \text{Solution [8], check [2]}$$

- e Simplify each of the following radicals and unite the results into a single term:

$$2\sqrt{108} - 6x\sqrt{5\frac{1}{2}} + \sqrt{3(8x-1)^2} \quad [1, 2, 1, 2]$$

- f Multiply  $2\sqrt{3} - \sqrt{6}$  by  $\sqrt{3} + 3\sqrt{6}$  and write the result in the simplest form. [3, 1]

- g Solve and check:

$$\frac{3x}{2} = x + \frac{x+7}{x-3} \quad [8, 2]$$

2 In a classroom there are 36 desks, some single and some double; if the seating capacity of the room is 42, how many desks of each kind are there? Equation [7], solution [3]

$$3 \text{ a Solve for } r: C = \frac{E}{R+r} \quad [5]$$

- b Find the value of  $r$  to the nearest tenth when  $C = 15.6$ ,  $R = 4.3$ ,  $E = 110.7$ . [5]

- 4 Find the roots of the following equation correct to the nearest tenth:  $x^2 + 2x = \frac{3}{4}$  [10]

- 5 a If the length of a room is  $L$  yards, the width  $W$  yards and the height  $H$  yards, write in terms of these letters an expression to represent the total surface of (1) the four walls, (2) the ceiling. [3, 2]

- b From a board  $b$  feet in length a piece  $c$  feet long is cut from one end and a piece  $d$  inches long is cut from the other end; how many inches in length remain? [2]

- c If  $C$  represents the cost of an article and  $r$  the gain per cent, express the selling price in terms of  $C$  and  $r$ . [3]

- 6 In a certain high school the number of pupils in the four classes was distributed as follows:

|            |            |            |            |
|------------|------------|------------|------------|
| First year | 690 pupils | Third year | 420 pupils |
|------------|------------|------------|------------|

|             |       |             |       |
|-------------|-------|-------------|-------|
| Second year | 750 " | Fourth year | 300 " |
|-------------|-------|-------------|-------|

Represent this information by the use of the bar or circle graph. [10] [The protractor may be used in constructing this graph.]

- 7 The numerator and denominator of a certain fraction are in the ratio 2 : 3; if 3 is subtracted from the numerator and 6 from the denominator, the value of the resulting fraction is  $\frac{1}{4}$ . What is the original fraction? Equation [7], solution [3]

- 8 Solve for  $x$  and  $y$ , group your answers and check one set:

$$3x + 2y = 5$$

$$xy + 3 = 6x$$

[8, 1, 1]