The University of the State of New York

230TH HIGH SCHOOL EXAMINATION

ELEMENTARY ALGEBRA

Wednesday, January 23, 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 $12x^4 - x^3 - 27x^2 - 3x + 10$ by $4x^2 + x - 2$ and check your work, letting $x = 2$.   Division [4], check [2]

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

$c^2 + c - 72$ [2]

$3mr^2 - 363m^3$ [2]

$3y^2 - 7y - 6$ [2]

$M^2 - 8MN + 16N^2 - 4R^2$ [2]

$9x^{4a} + 30x^{2a} + 25$ [2]

c Simplify the following and express the result as a fraction in its lowest terms:

$$\left(\frac{5}{x^2 - 4} + \frac{2}{2 - x}\right) \div \left(2 + \frac{3}{x - 2}\right) \quad [3, 3, 2]$$

d Solve and check:

$$4 - \frac{5x - 15}{4} + \frac{2(x + 2)}{3} = \frac{5(x - 1)}{6} \quad [5, 1]$$

e Solve for *x* and *y*:

$$\frac{x}{2a} - \frac{y}{5b} = \frac{2}{5}$$

$$\frac{x}{a} + \frac{y}{b} = 5 \quad [6, 2]$$

f Simplify each radical and unite the results into a single term:

$$\sqrt{\frac{25a^3}{8}} + \frac{1}{4}\sqrt{98a^3} - 3\sqrt{2}(a^2 - 4a + 4) \quad [2, 2, 2, 2]$$

g Solve:

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

h Solve the following formula for *n*: $C = \frac{cn}{R + nr}$ [3]

ELEMENTARY ALGEBRA—*concluded*

1 Evaluate the expression $\frac{3a\sqrt{a^3 - 2ab}}{4b}$ when $a = 8.5$ and $b = 3.2$, expressing the result to the *nearest* tenth.   [7]

2 Two numbers are in the ratio 3:5; if 12 is added to each number their ratio becomes 2:3.   What are the numbers? Equation [6], solution [4]

3 *a* What is the divisor (*d*) when the dividend is *D*, the quotient *Q* and the remainder *R*?   [3]

b A rectangular field is *L* rods long; what must be its width (*W*) if its perimeter is *P* rods?   [3]

c Two automobiles *m* miles apart travel toward each other, one at the rate of *a* miles an hour, the other at the rate of *b* miles an hour; how far apart will they be at the end of *h* hours?   [4]

4 Find to the *nearest* tenth the roots of $\frac{x^2}{4} - \frac{3x}{2} = \frac{5}{2}$ [10]

5 A clothier purchased a number of overcoats for $720, paying the same amount for each; he sold them for $40 each, making a profit equal to the cost of 8 of the coats.   How many did he buy? Equation [6], solution [4]

6 Solve for *x* and *y*, correctly group your answers and check:

$$3x + 2y = 5$$

$$xy + 3 = 6x \quad [7, 1, 2]$$

7 The following table shows the results of a test to determine the minimum distance in which automobiles traveling at different speeds should be able to stop if the brakes are in proper order:

If the speed is	The car should stop in
15 miles an hour	21 feet
20 " " "	37 "
25 " " "	58 "
30 " " "	83 "
35 " " "	104 "
40 " " "	148 "

a Construct a curve (or broken line) to represent this data.   [8]

b From the graph determine in what distance a car traveling 38 miles an hour should be able to stop.   [1]

c A car stops 45 feet from the point at which the brakes were applied; from the graph determine its rate of speed.   [1]