The University of the State of New York

228TH HIGH SCHOOL EXAMINATION

ELEMENTARY ALGEBRA

Wednesday, January 24, 1923—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* Find the prime factors of *four* of the following:

$9a^3 - 36a^2$ [2]

$m^2 - 13m - 48$ [2]

$16x^2 - 120xy + 225y^2$ [2]

$6b^2 + 7b - 24$ [2]

$9r^{2a} - 25s^{6a}$ [2]

b A boy bought d dozen oranges at s cents an orange and had c cents left; how many cents did he have in the beginning? [3]

c Multiply $x^{2a} + 3x^a - 4$ by $2x^a - 3$ [4]

d Write as a single fraction in its lowest terms and check the work, letting $x = 5$:

$$\left(\frac{2x}{x-2} - \frac{x}{x-1}\right) \div \left(\frac{3x}{x-3} - \frac{2x}{x-2}\right) \quad [3, 3, 1, 2]$$

e $S = \frac{1}{2}g(2t - 1)$

Solve the above formula for t. [5]

Find the value of t to the *nearest* tenth when $S = 236.432$ and $g = 32.16$. [4, 1]

f Simplify *each* of the following radicals and unite the results into a single term:

$$\sqrt{98x^3} - \sqrt{\tfrac{x}{8}} - \tfrac{1}{8}\sqrt{2(4x-6)^2} \quad [1, 2, 1, 2]$$

g Solve the following and check one answer:

$$\frac{5x}{3} = x + \frac{3-x}{2+x} \quad [8, 2]$$

2 On one occasion a man buys 3 tons of hard coal and 2 tons of soft coal, paying \$51; on another occasion he buys 2 tons of hard coal and 6 tons of soft coal, paying \$62. What is the price of each per ton? [7, 3]

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3 Two numbers are in the ratio 3:5; if 4 is subtracted from the smaller number and 8 is added to the larger number the ratio becomes 5:12. Find the two numbers. [7, 3]

4 Solve for x and y:

$$ax + by = b$$
$$cx - dy = d \quad [10]$$

5 Find to the *nearest* tenth the roots of the following equation:

$$y^2 = 3y + 5 \quad [10]$$

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

$$xy + x^2 = 24$$
$$y - 3x = -4 \quad [8, 1, 1]$$

7 Find the square root of

$$a^4 - 6a^3 + 10a^2 - 3a + \tfrac{1}{4} \quad [10]$$

8 Below is given a table which shows the weekly wage at various ages, from 14 years to 25 years, of boys who leave school at the age of 14 and boys who leave school at the age of 18:

Age in years	Weekly wage of a boy who leaves school at the age of 14	Weekly wage of a boy who leaves school at the age of 18
14	\$4.00	
16	5.00	
18	7.00	\$10.00
20	9.00	15.00
22	11.00	20.00
24	12.00	24.00
25	13.00	30.00

On the same diagram make a graph of the two sets of data, using a broken line for each. [10]