The University of the State of New York

225TH HIGH SCHOOL EXAMINATION

# INTERMEDIATE ALGEBRA

Monday, June 13, 1921—9.15 a. m. to 12.15 p. m., only

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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 (1) elementary algebra, (2) intermediate algebra.
The minimum time requirement is four recitations a week for half a school year, after the completion of elementary algebra.

*Answer eight questions, including either question 4 or question 5. 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 Find the prime factors of *each* of the following:

$x^3 - 64$  [2½]

$10a - 7a^2 - 6a^3$  [2½]

$3x^{3a} + 3x^{2a} - 18x^a$  [2½]

$x^3 - 8x^2 + 17x - 10$  [2½]

$4(a-b)^2 - 12(a-b)c + 9c^2$  [2½]

[No partial credit allowed on any part.]

2 Find to the *nearest* hundredth the roots of the equation $5x^2 = 15x - 11$  [12½]

3 a Rationalize the denominator in $\dfrac{\sqrt[3]{20} - \sqrt[3]{18}}{\sqrt[3]{12}}$  [7½]

b Find the value of $\dfrac{3^0x + 4x^{-1}}{x - 4}$ when $x = 8$  [5]

4 A labor report states that in a certain factory 1200 men and women are employed; the average daily wage is $3.40 for a man and $1.80 for a woman. If the labor cost is $3376 per day, how many men and how many women are employed? Equation [8], solution [4½]

5 A traveler having 18 miles to go, calculates that his usual rate would make him one half hour late for an appointment; he finds that in order to arrive on time he must travel at a rate one half mile per hour faster. What is his usual rate? Equation [8], solution [4½]

6 a If $10^{1.602} = 40$, what logarithm is indicated? Why? [2½]

b If log 69 = 1.8388, what is the value of $x$ in $10^x = 69$? Why? [2½]

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c Find by use of logarithms the value of $\sqrt[3]{.046}$  [3½]

d Find by use of logarithms the value of $(5.276)^4$  [4]

7 A certain month contained five Fridays; the sum of the numbers representing the corresponding dates was 85. On what date did the first Friday fall and on what day did the last of the month occur? [No credit given for answers obtained by guess or trial.] Equation [8], solution [4½]

8 Solve for $x$ and $y$ and correctly group your answers:

$x^2 + 2xy = 16$

$3x^2 - 4xy + 2y^2 = 6$

Solution [9], grouping [3½]

9 In *each* of the following equations fill in the parenthesis and explain your method:

$x^2 - 4x + ( ) = 0$ if one root is 3  [3½]

$6x^2 + ( )x = 12$ if one root is ½  [4]

$x^2 + 7 = ( )x$ if one root is $3 - \sqrt{2}$  [4]

10 Solve for $x$ and check:

$2\sqrt{x} - \sqrt{4x - 11} = 1$

Solution [9], check [3½]

11 Write as a simple fraction in its lowest terms and check, letting $a = 2$:

$$\dfrac{\dfrac{a-5}{2} - 7 + \dfrac{24}{a}}{\dfrac{9-3a}{a}}$$

Simplification [8], check [4½]

12 The formula for amount ($A$) when money is invested at simple interest is $A = P(1 + rt)$ where $P$ is the principal, $r$ the rate per cent expressed fractionally and $t$ the time in years. Make a graph of the formula where $P = $200$ and $r = 6\%$. From this graph estimate the number of years in which the principal will double itself.

Making graph [9], making estimate from graph [3½]