

The University of the State of New York

308TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, January 25, 1950—9.15 a. m. to 12.15 p. m., only

Instructions

Part I is to be done first and the maximum time allowed for it is one and one half hours. At the end of that time, this part of the examination must be detached and will be collected by the teacher. If you finish part I before the signal to stop is given, you may begin part II.

Write at top of first page of answer paper to parts II, III and IV (a) name of school where you have studied, (b) number of weeks and recitations a week in intermediate algebra.

The minimum time requirement is four or five recitations a week for half a school year after the completion of elementary algebra.

Part II

Answer three questions from part II.

26 Find, to the *nearest tenth*, the roots of the equation $2x^2 - 7x + 2 = 0$ [10]

27 Solve the following system of equations, group your answers and check both sets:

$$y^2 + 4x = 21$$

$$y - 2x + 3 = 0 \quad [7, 1, 2]$$

28 Using logarithms, find, to the *nearest tenth*, the value of $\frac{212 \sqrt[3]{.492}}{\sin 40^\circ}$ [10]

29 a On the same set of axes draw the graphs of $y = 2x - 1$ and $xy = 8$ [2, 6]

b From the graphs made in answer to a, estimate, to the *nearest tenth*, the values of x and y common to the two equations. [2]

*30 a If $2^{3x+1} = 4^x$, find x [3]

b If $2^{3x} = 7$, find x to the *nearest tenth*. [7]

Part III

Answer one question from part III.

31 Write the equations that would be used in solving the following problems. In *each* case state what the letter or letters represent. [Solution of the equations is not required.]

a The sum of the digits of a two-digit number is 9. If the number is divided by the units digit, the result is 21. Find the number. [5]

b A man in a motorboat finds it takes him one hour longer to travel 24 miles upstream than it takes him to return. If the rate of the boat is 10 miles per hour in still water, find the rate of the stream. [5]

32 A man had a rectangular garden whose dimensions were 20 feet by 30 feet. In order to double the area of the garden he added a border of uniform width around it. How wide was the border? [6, 4]

* This question is based on one of the optional topics in the syllabus.

Part IV

Answer one question from part IV.

33 The sum of the 2d and the 9th terms of an arithmetic progression is s , and the sum of the 8th and the 10th terms is t . Find the first term of the progression in terms of s and t . [4, 6]

34 Each of the expressions in parts (1)–(5) is equivalent to *two* of the four choices given. Write on your answer paper the numbers (1) through (5) and after *each* indicate the correct choices by writing *two* of the letters a , b , c and d .

$$(1) (x^2)^{-3} \text{ equals } (a) x^{-6}, (b) \frac{1}{(x^2)^3}, (c) x^{-8}, (d) \frac{1}{\sqrt[3]{x^2}} \quad [2]$$

$$(2) .000027 \text{ equals } (a) \frac{27}{1000000}, (b) 2.7 \times 10^{-6}, (c) (.003)^3, (d) 2.7 \times 10^{-5} \quad [2]$$

$$(3) \frac{1 - \frac{1}{a}}{1 - \frac{1}{a^2}} \text{ equals } (a) \frac{1}{1 + \frac{1}{a}}, (b) \frac{1}{1 - \frac{1}{a}}, (c) \frac{a}{a+1}, (d) \frac{1}{a+1} \quad [2]$$

$$(4) 2^x \cdot 4^x \text{ equals } (a) 8^x, (b) 8^{2x}, (c) 2^{3x}, (d) 4^{3x} \quad [2]$$

$$(5) \text{Log } 10x^2 \text{ equals } (a) 2 \text{ log } 10x, (b) 20 \text{ log } x, (c) \text{ log } 5x + \text{ log } 2x, \\ (d) 1 + 2 \text{ log } x \quad [2]$$

[2]

Fill in the following lines:

Name of pupil..... Name of school.....

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed.

- 1 Factor $2x^2 - 3x - 9$ 1.....
 - 2 Is 2 a root of the equation $2x^3 - 7x - 2 = 0$? Answer *yes* or *no*. 2.....
 - 3 In terms of i write $\sqrt{-16}$ in its simplest form. 3.....
 - 4 Express as a single term the sum of $\sqrt{27}$ and $\sqrt{12}$ 4.....
 - 5 Solve for x the equation $\sqrt{2x} + 2 = 6$ 5.....
 - 6 Write $\frac{7}{\sqrt{7}-2}$ as a fraction with a rational denominator. 6.....
 - 7 Find the value of $x^{\frac{3}{2}} - x^0$ if $x = 4$ 7.....
 - 8 Write in simplest form the first two terms in the expansion of $(x + 2y)^5$. 8.....
 - 9 Solve for a the formula $S = \frac{1}{2}n(a + l)$ 9.....
 - 10 Using the formula $T = 2\pi r(r + h)$, find T if $\pi = 3.14$, $r = 10$ and $h = 5$. 10.....
 - 11 Express as a single fraction in its lowest terms $\frac{5}{2a} - \frac{a-b}{6a^2}$ 11.....
 - 12 Find the logarithm of 4.827 12.....
 - 13 If $\log x = 2.8403$, find x to the *nearest tenth*. 13.....
 - 14 Solve the following pair of equations for x and y :
 $2x + y = 3$ 14 $x =$
 $2x - 3y = 7$ $y =$
 - 15 At a point 20 feet from the base of a flagpole the angle of elevation of its top is 58° . Find, to the *nearest foot*, the height of the flagpole. 15.....
 - 16 Write an equation of the straight line which passes through the points whose coordinates are given in the following table: 16.....
- | | | | | |
|-----|---|---|---|----|
| x | 0 | 1 | 2 | 3 |
| y | 5 | 7 | 9 | 11 |
- 17 Find the slope of the straight line whose equation is $2y = 6x + 5$ 17.....
 - 18 If x varies directly as y^2 and if $x = 9$ when $y = 2$, find x when $y = 8$ 18.....
 - 19 Paul was r years old m years ago. Express his age b years from now. 19.....
 - 20 Find the 13th term of the progression 7, 4, 1 ... 20.....
 - 21 Find two positive numbers which, when inserted between $\frac{1}{2}$ and 32, form with those numbers a geometric progression. 21.....

050

INTERMEDIATE ALGEBRA

- 22 Find the sum of the infinite geometric progression $3, \frac{3}{2}, \frac{3}{4} \dots$ 22.....
- 23 The sum of the roots of a quadratic equation is -2 and their product is 5 . Write this equation in the form $x^2 + px + q = 0$ 23.....

Directions (questions 24–25) — Indicate the correct answer to *each* question by writing on the line at the right the letter *a*, *b* or *c*.

- 24 If the discriminant of a quadratic equation is -49 , the roots are
 (a) imaginary (b) real and unequal (c) real and equal 24.....
- 25 The graph of the equation $2x^2 - 2y^2 = 15$ is (a) a circle (b) an ellipse
 (c) a hyperbola 25.....

101