

The University of the State of New York

304TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Tuesday, August 24, 1948 — 8.30 to 11.30 a. 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) names of schools where you have studied, (b) number of weeks and recitations a week in intermediate algebra previous to entering summer high school, (c) number of recitations in this subject attended in summer high school of 1948 or number and length in minutes of lessons taken in the summer of 1948 under a tutor licensed in the subject and supervised by the principal of the school you last attended.

The minimum time requirement is four or five recitations a week for half a school year after the completion of elementary algebra. The summer school session will be considered the equivalent of one semester's work during the regular session (four or five recitations a week for half a school year).

For those pupils who have met the time requirement, the minimum passing mark is 65 credits; for all others 75 credits.

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high school in 1948 or an equivalent program of tutoring approved in advance by the Department is required.

Part II

Answer three questions from part II.

26 Solve for  $x$  to the nearest tenth:  $2x^2 - 8x + 3 = 0$  [10]

27 Solve for  $x$  and  $y$ , correctly group your answers and check *one* set: [7, 2, 1]

$$x^2 - xy - y^2 = 19$$

$$x - y = 7$$

28 The diameter  $D$  of a spherical balloon which is to lift a given weight  $W$  is calculated by the formula  $D = \sqrt[3]{\frac{W}{.524 \times .0751}}$ . If  $W = 1250$ , find  $D$  to the nearest tenth. [10]

29 a Draw the graph of  $y = x^2 - 2x - 1$  from  $x = -1$  to  $x = 3$  inclusive. [5]

b Write the equation of the axis of symmetry. [1]

c Draw the line parallel to the  $x$  axis and 1 unit above it. [1]

d Estimate to the nearest tenth the coordinates of the points of intersection of the graph made in answer to a and the line made in answer to c. [2]

e Write the equation of the line tangent to the graph made in answer to a at its turning point. [1]

\*30 Solve for  $x$ ,  $y$  and  $z$ : [10]

$$5x - y + 2z = 12$$

$$3x + 5y + z = 1$$

$$x + 3y + 3z = 7$$

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

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Part III

Answer one question from part III.

31 Write the equations that may be used to solve the following problems. In *each* case state what the letter or letters represent. [Solution of the equation is not required.]

- a* A man bought an article for \$297. He expects to pay for it in monthly instalments. He pays \$25 the first month, \$27 the second month, \$29 the third month, and so on, until the debt is paid. How many months will he need to pay for the article? [5]
- b* If the digits of a two-digit number are reversed, the sum of the resulting number and twice the given number is 216. If the given number is divided by the sum of its digits, the quotient is 7. Find the given number. [5]

32 If a man travels 120 miles by one train and returns on a train whose rate is 10 miles an hour faster, he will need 7 hours for the entire trip. Find the rate of the slower train. [6, 4]

Part IV

Answer one question from part IV.

- 33 *a* For what value of  $x$  is  $3^y \times 3^x$  equal to  $3^y$ ? [2]
- b* For what value of  $x$  is  $2^{2x-1}$  equal to 8? [2]
- c* For what value of  $x$  is  $\sqrt{a} + \sqrt{x}$  equal to  $\sqrt{a+x}$ ? [2]
- d* For what value of  $x$  is  $\log x^2$  equal to 6? [2]
- e* For what value of  $x$  is the sum of the infinite progression  $x, \frac{x}{2}, \frac{x}{4}, \dots$  equal to 6? [2]

34 A salt-water solution weighing  $p$  pounds contains  $r\%$  salt.

- a* Express the number of pounds of salt in the solution in terms of  $p$  and  $r$ . [3]
- b* If  $x$  pounds of water are added, the solution will contain  $s\%$  salt. Express the number of pounds of salt in the new solution in terms of  $p, s$  and  $x$ . [3]
- c* Express  $x$  in terms of  $p, s$  and  $r$ . [4]

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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. Each answer must be reduced to its simplest form.

1 Factor  $x^{2a} - 9$  1.....

2 Solve for  $x$  and  $y$ :  $2x - y = -1$   
 $x + y = 7$   $x =$ .....  
2  $y =$ .....

3 Find the slope of the line whose equation is  $2y = 5x + 3$  3.....

4 Solve  $\sqrt{x^2 + 7} = 1 + x$  for  $x$ . 4.....

5 Write the linear equation expressing the relationship between  $x$  and  $y$  shown in the following table: 5.....

$x$	-1	0	5	8
$y$	0	2	12	18

6 If  $y$  varies directly as  $x$  and if  $y = 12$  when  $x = 3$ , find  $y$  when  $x = 7$  6.....

7 Combine and express in terms of  $i$ :  $\sqrt{-2} + \sqrt{-8}$  7.....

8 Express  $\frac{2}{3 + \sqrt{2}}$  as an equivalent fraction with a rational denominator. 8.....

9 Find the logarithm of 3.002 9.....

10 Find the number whose logarithm is 3.7940 10.....

11 Find the *common ratio* if two geometric means are inserted between 4 and  $\frac{1}{2}$  11.....

12 Find the 20th term of the series  $-13, -9, -5 \dots$  12.....

13 Which is the greater number,  $(\frac{1}{4})^{-2}$  or  $(\frac{1}{2})^4$ ? 13.....

14 Express  $212 \times 10^{-3}$  as a decimal. 14.....

15 Simplify:  $\frac{1 + \frac{1}{x^2}}{1 + \frac{1}{x}}$  15.....

16 Solve the formula  $S = \frac{n}{2} (a + l)$  for  $l$ . 16.....

17 Write the first *three* terms of  $(x + y)^{10}$  17.....

18 At a point on level ground 145 feet from the foot of a building, the angle of elevation of the top of the building is  $39^\circ$ . Find to the *nearest foot* the height of the building. 18.....

19 If the square of a certain number  $x$  is increased by  $n$  times the number, the result is  $m$ . Write an equation showing this relationship. 19.....

20 Find the quotient when  $2x^2 + x - 6$  is divided by  $2x - 3$  20.....

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Directions (questions 21-25) — Indicate the correct answer to *each* question by writing on the line at the right the letter *a, b, c* or *d*.

21 Log  $\frac{x}{y}$  is equal to (a)  $\log x - y$  (b)  $\log x - \log y$

(c)  $\frac{\log x}{\log y}$  (d)  $\log(x - y)$  21.....

22 If both the numerator and the denominator of the fraction  $\frac{x}{x+y}$  are

divided by  $x$ , the result will be (a)  $\frac{1}{1+y}$  (b)  $\frac{1}{x+y}$

(c)  $\frac{x}{x+y}$  (d)  $1 + \frac{1}{y}$  22.....

23 The roots of the equation  $2x^2 - 3x - 3 = 0$  are (a) real and equal  
(b) real and rational (c) real and irrational (d) imaginary 23.....

24 The product of the roots of the equation  $2x^2 + 5x - 6 = 0$  is (a)  $-6$   
(b)  $+6$  (c)  $-3$  (d)  $+3$  24.....

25 The graph of  $2x^2 + 2y^2 = 7$  is (a) a circle (b) an ellipse  
(c) a hyperbola (d) a parabola 25.....