

The University of the State of New York

282D HIGH SCHOOL EXAMINATION

**INTERMEDIATE ALGEBRA**

Friday, August 22, 1941 — 8.30 to 11.30 a. m., only

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**Instructions**

*Do not open this sheet until the signal is given.*

**Part I**

*This part is to be done first and the maximum time allowed for it is one and one half hours. Merely write the answer to each question in the space at the right; no work need be shown.*

If you finish part I before the signal to stop is given you may begin part II. However, it is advisable to look your work over carefully before proceeding, since *no credit will be given any answer in part I which is not correct and in its simplest form.*

When the signal to stop is given at the close of the one and one half hour period, work on part I must cease and this sheet of the question paper must be detached. The sheets will then be collected and you should continue with the remainder of the examination.

**Parts II, III and IV**

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 1941.

The minimum time requirement is 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 or five recitations a week for half a school year.

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high school in 1941 is required.

The use of the slide rule will be allowed for checking but all computations with tables must be shown on the answer paper.

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See instructions for parts II, III and IV on page 1.

### Part II

Answer three questions from this part.

26 Solve the equation  $2x^2 - 8x + 1 = 0$  for values of  $x$  correct to the *nearest tenth*. [10]

27 Solve the following set of equations, group the answers and check *one* set:

$$\begin{aligned}x^2 - 3y &= 7 \\ 2x - y &= 4 \quad [6, 2, 2]\end{aligned}$$

28 Using logarithms, calculate to the *nearest tenth* the value of  $x$  when

$$x = \frac{256 \sqrt[3]{.0783}}{8.63} \quad [10]$$

29 *a* Find the sum of all integers between 1 and 100 that are exactly divisible by 7. [6]

*b* What is the ratio of an infinite decreasing geometric series if the first term is 3 and the sum of the series approaches  $3\frac{1}{2}$  as a limit? [4]

30 *a* Using the same set of axes, plot the graphs of  $x = y^2 - 3y$  and  $x = y$ . [6, 2]

*b* From the graphs made in answer to *a*, determine the values of  $x$  and  $y$  that are common to the two equations. [2]

### Part III

Answer one question from this part.

31 A mechanic's helper requires twice as long as the mechanic to do the same amount of work. On a particular job they work together for 2 hours, when the mechanic is called away and the helper finishes it in 1 hour. How many hours would it take the helper to do the entire job? [7, 3]

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

*a* John and Sam together have \$48. After John pays Sam the \$2 he owes him, Sam has twice as much money as John. Find the amount of money *each* had originally. [5]

*b* In driving to Rochester, Mr Brown made 45 miles an hour until he was 15 miles from the city, where he was compelled to detour. On the detour he drove 5 miles an hour slower and arrived in Rochester 10 minutes later than he would have arrived by the direct route. Find the number of miles in the detour. [5]

### Part IV

Answer one question from this part.

33 Prove that if  $a, b, c$  are three numbers in arithmetic progression, and  $x$  is the geometric mean between  $a$  and  $b$ , and  $y$  is the geometric mean between  $b$  and  $c$ , then  $x^2, b^2, y^2$  are in arithmetic progression. [10]

34 A certain shelf will hold 18 copies of the same algebra text and 9 copies of the same geometry text or 14 algebras and 15 geometries. How many algebras will the shelf hold? [10]

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Fill in the following lines:

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

Detach this sheet and hand it in at the close of the one and one half hour period.

**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  $5x^2 - 4x - 12$  1.....
- 2 Write the discriminant of the equation  $3x^2 - 5x - 1 = 0$  2.....
- 3 What value of  $x$  satisfies the equation  $2\sqrt{2x} - 3 = 0$ ? 3.....
- 4 Write the *first three* terms of the expansion  $(x^2 - y)^7$  4.....
- 5 Find, correct to *four* figures, the number whose logarithm is  $9.7460 - 10$  5.....
- 6 Find  $\log 375.8$  6.....
- 7 What is the value of  $x^{\frac{3}{2}} - 2x^0$  when  $x = 8$ ? 7.....
- 8 What is the  $x$  intercept of the graph of the equation  $y = x - 6$ ? 8.....
- 9 Is the point  $(3, 5)$  on the graph of the equation  $y = x^2 - 4$ ? 9.....
- 10 Write an equation showing the relation between  $x$  and  $y$  as indicated in the table below: 10.....

$x$	1	2	4	5
$y$	0	2	6	8

- 11 Simplify  $(x - 1 - \frac{x^2 - 1}{x}) \times (1 + \frac{1}{x - 1})$  11.....

Directions (questions 12-16) — Indicate the correct answer to each question by writing on the dotted line at the right the letter  $a$ ,  $b$  or  $c$ .

- 12 If the discriminant of a quadratic equation is  $-81$ , the roots of the equation are (a) rational and unequal, (b) irrational and unequal or (c) imaginary. 12.....
- 13 The graph of  $3x^2 + 3y^2 = 10$  is (a) a circle, (b) an ellipse or (c) a hyperbola. 13.....
- 14 Given  $I = \frac{M}{d^2}$ , where  $M$  is a constant; if  $d$  is halved,  $I$  is (a) multiplied by 2, (b) multiplied by 4 or (c) divided by 4. 14.....
- 15 If  $.4735 = \log m$  and  $.1744 = \log n$ , then  $.6479$  equals (a)  $\log(m + n)$ , (b)  $\log(mn)$  or (c)  $\log \frac{m}{n}$  15.....
- 16 Without solving the problem below, decide whether there is (a) not enough, (b) just enough or (c) more than enough, information given to answer the question:  
It takes Tom 15 minutes to walk to school. If he lives  $\frac{3}{8}$  of a mile from school, how many miles will he have walked to and from school in 5 days, if he takes the direct route and does not go home to lunch? 16.....

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- 17 One root of the equation  $x^2 - 5x + q = 0$  is 4. What is the value of the other root? 17.....
- 18 At a distance of 75 feet from a tree, a boy from the trigonometry class found the angle of elevation of the top of the tree to be  $22^\circ$ . What was the height of the tree correct to the *nearest foot*? 18.....
- 19 If 0 is one root of the equation  $x^2 + px + q = 0$ , what must be the value of  $q$ ? 19.....
- 20 Insert a positive geometric mean between 2 and 6. 20.....
- 21 Write the formula that would be used to find the sum of 10 terms of the series  $3 + 4\frac{1}{2} + 6\frac{3}{4} + \dots$  21.....
- 22 What is the 95th term of the progression  $-5, -3, -1, \dots$  ? 22.....
- 23 Using the formula  $V = \pi r^2 h$ , find the length of the radius ( $r$ ) of the base of a tin can if the volume ( $V$ ) of the can is to be  $29\frac{1}{3}$  cubic inches and its height ( $h$ )  $2\frac{1}{3}$  inches. [Use  $\pi = \frac{22}{7}$ ] 23.....
- 24 From the two simultaneous equations  $y = x^2 - 3$  and  $x - 2y = 0$  obtain a quadratic equation in  $x$  only. 24.....
- 25 Mr Brown is paid at the rate of 80 cents an hour for a 40-hour week and time and a half for overtime. One week he earned \$44. How many hours overtime did he work? 25.....