

The University of the State of New York

276TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Tuesday, August 22, 1939 — 8.30 to 11.30 a. m., only

Instructions

Do not open this sheet until the signal is given.

Group I

This group 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 group I before the signal to stop is given you may begin group II. However, it is advisable to look your work over carefully before proceeding, since *no credit will be given any answer in group 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 group 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.

Groups II, III and IV

Write at top of first page of answer paper to groups 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 1939.

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 1939 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 groups II, III and IV on page 1.

Group II

Answer three questions from this group.

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

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

$$\begin{aligned} 3x - 2y^2 &= 4 \\ x - y &= 6 \quad [7, 2, 1] \end{aligned}$$

28 Using logarithms, find, correct to the *nearest tenth*, the value of

$$\frac{(9.55)^3 \times \sqrt{\cos 48^\circ}}{59} \quad [10]$$

29 a Find the *ninth* term of the series 6, -12, 24, ... [5]

b In one section of a certain auditorium there are 10 rows of seats. If the lowest row has 12 seats and each higher one has 2 more seats than the one immediately below, how many seats are there in the section? [5]

30 a On the same set of axes, plot the graphs of $y = x^2 - 3x + 1$ and $y = 4$ [8]

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

*31 Solve the following set of equations:

$$\begin{aligned} x + y - 2z &= 7 \\ 3x - 2y + z &= 3 \\ 2x + y + z &= -4 \quad [10] \end{aligned}$$

Group III

Answer one question from this group.

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 How many gallons of water must be added to 9 gallons of a 20% solution of salt and water to reduce it to a 3% solution? [5]

b A man bought a number of books for \$100. He retained 5 books and sold the remainder at an advance of \$2 per book, thereby gaining \$20 on the entire transaction. How many books did he buy? [5]

33 The sum of the digits of a two-digit number is 11. If the digits are reversed, twice the resulting number exceeds the original number by 20; find the original number. [7, 3]

Group IV

Answer one question from this group.

34 Two men, A and B, start at the same time to travel over the same road in the same direction, B being at the start 100 miles ahead of A. A travels uniformly 32 miles each day. B travels 4 miles the first day, 8 miles the second day, 12 miles the third day, and so on. At the end of how many days will they be together? [10]

35 Water flowing from two pipes into a vat can fill the vat in 2 hours. It takes the smaller pipe alone 3 hours longer than the larger pipe. One day both pipes were opened simultaneously. At the end of 2 hours it was discovered that one pipe had become clogged and the vat was only half full.

a How many hours would each pipe alone require to fill the vat? [4]

b Which pipe became clogged and how long was it clogged? [6]

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

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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.

Group I

Answer all questions in this group. Each correct answer will receive 2 credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

- 1 Express $\sqrt{-9}$ in terms of the imaginary unit i . 1.....
- 2 Multiply $2\sqrt{5} + 3$ by $2\sqrt{3}$ 2.....
- 3 What is the product of the roots of the equation $ax^2 + bx + c = 0$? 3.....
- 4 Write the first *three* terms of the expansion $(1 + 2a)^5$ 4.....
- 5 Factor $2x^2 - 5x - 12$ 5.....
- 6 Solve for h the formula $A = \frac{h}{2}(b + b')$ 6.....
- 7 Write in the form $x^2 + px + q = 0$ the equation whose roots are 3 and -4 . 7.....
- 8 Are the graphs of the equations $y = 2x + 3$ and $y = 2x - 1$ parallel lines? [Answer *Yes* or *No*.] 8.....
- 9 Find the value of $(3a)^0 + 8^3$ 9.....
- 10 Express $a^2b^{-1} \div a^{-3}$ as a fraction with positive exponents. 10.....
- 11 Simplify $\frac{\frac{1}{x} - \frac{1}{y}}{\frac{y}{x} - 1}$ 11.....
- 12 Find the logarithm of 95.04. 12.....
- 13 Find, correct to *four* decimal places, the number whose logarithm is 9.6266 $- 10$ 13.....
- 14 Find the value of x in the equation $2\sqrt{x-2} - 3 = 0$ 14.....
- 15 Complete the formula for the sum S of a geometric progression $S = \dots$ 15.....
- 16 Insert *two* arithmetic means between 8 and 15. 16.....
- 17 At a point 20 feet from the foot of a flagpole, the angle of elevation of the top of the pole is 63° . Find, correct to the *nearest foot*, the height of the pole. 17.....
- 18 From the following set of equations obtain a second-degree equation in x in the form $x^2 + px + q = 0$:

$$x^2 - 2y = 5$$

$$x - 1 = y$$
18.....

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19 Write an equation expressing the relation between x and y as shown in the following table:

x	-1	0	2	3
y	-1	2	8	11

19.....

20 In the equation $y = 5 - \frac{1}{x}$, if x is limited to positive values, does y increase or decrease as x decreases?

20.....

21 The parcel-post rate for sending packages to any place in the third zone is 9 cents for the first pound and c cents for each additional pound. Express in cents the cost of sending a package of n pounds, when n is greater than 1.

21.....

Directions (questions 22-25) — Indicate the correct answer to each question by writing on the dotted line at the right the letter a , b or c .

22 If the discriminant of a quadratic equation is -4 , are the roots of the equation (a) rational and equal, (b) rational and unequal or (c) imaginary?

22.....

23 Is the graph of $4x^2 + y^2 = 16$ (a) a circle, (b) an ellipse or (c) a parabola?

23.....

24 In the formula $S = \frac{a}{1-r}$ for the sum of an infinite geometric progression, must r be (a) greater than 1, (b) equal to 1 or (c) less than 1?

24.....

25 Does $\log a^3$ equal (a) $\log 3 + \log a$, (b) $3 \log a$ or (c) $\frac{1}{3} \log a$?

25.....