

The University of the State of New York

274TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, January 23, 1939—9.15 a. m. to 12.15 p. 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) name of school where you have studied, (b) number of weeks and recitations a week in intermediate algebra.

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

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

INTERMEDIATE ALGEBRA
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.

Directions (questions 1-8) — Indicate the correct answer to each of the following questions by writing on the dotted line at the right the letter *a*, *b*, or *c*.

1 If the discriminant of a quadratic equation is 5, the roots of the equation are (a) real and equal, (b) real, unequal and rational or (c) real, unequal and irrational. 1.....

2 The sum of the roots of the equation $2x^2 - 5x + q = 0$ is (a) 5, (b) $-\frac{5}{2}$ or (c) $\frac{5}{2}$. 2.....

3 The statement $(a+b)^2 = a^2 + 2ab + b^2$ is (a) true for all values of *a* and *b*, (b) true only for certain values of *a* and *b* or (c) never true. 3.....

4 If x^{2m} is divided by x^2 the quotient is (a) x^m , (b) x^{2m-2} or (c) 1^m 4.....

5 When drawn on the same set of axes, the graphs of $y = 2x - 1$ and $y = -x + 3$ (a) do not intersect, (b) intersect in one point or (c) intersect in more than one point. 5.....

6 The graph of $4x^2 + 9y^2 = 144$ is (a) an ellipse, (b) a circle or (c) a hyperbola. 6.....

7 $\text{Log } \frac{a}{b}$ is equal to (a) $\frac{\log a}{b}$, (b) $\frac{\log a}{\log b}$ or (c) $\log a - \log b$ 7.....

8 If in the expression $y = \frac{1}{x}$ the value of *x* increases, the value of *y* (a) increases, (b) decreases or (c) remains the same. 8.....

Directions (questions 9-25) — Write the correct answer in the space at the right.

9 Expressed in terms of *i*, $\sqrt{-25}$ is 9.....

10 The value of *x* that satisfies the equation $\sqrt{2x+3} = 5$ is 10.....

11 The positive root of the equation $x^2 - 6x - 7 = 0$ is 11.....

12 The value of the discriminant of the equation $x^2 - 4x + 1 = 0$ is 12.....

13 The three factors of $ax^2 - a$ are 13.....

14 The slope of the line whose equation is $y = 3x + 1$ is 14.....

15 The equation expressing the relation between *x* and *y* shown in the table

<i>x</i>	0	3	6	9
<i>y</i>	1	7	13	19

 is 15.....

16 The fraction $\frac{1}{\sqrt{3}-1}$ expressed with a rational denominator is 16.....

- 17 The sum of the fractions $\frac{2}{x-y}$ and $\frac{1}{y-x}$ is 17.....
- 18 The formula $F = \frac{W y^2}{g r}$, when solved for W , is $W = \dots$ 18.....
- 19 The value of $5x^0 + (4)^{\frac{1}{2}}$ is 19.....
- 20 The logarithm of 3.672 is 20.....
- 21 The number whose logarithm is 3.7305 is 21.....
- 22 In right triangle ABC , angle $C = 90^\circ$, angle $A = 32^\circ$, $AB = 10$; the length of AC correct to the nearest tenth is 22.....
- 23 The 21st term of the series 2, 6, 10, ... is 23.....
- 24 The formula for finding the sum S of the infinite series a, ar, ar^2, \dots when r is less than 1, is $S = \dots$ 24.....
- 25 The first two terms of the expansion of $(a + 2b)^5$ are 25.....

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

Group II

Answer three questions from this group.

26 Find, correct to the nearest tenth, the roots of the equation $x^2 - 3x - 2 = 0$ [10]

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

$$x^2 - 2xy + 8 = 0$$

$$y = x + 1$$

[7, 2, 1]

28 Using logarithms find, correct to the nearest hundredth, the value of

$$\sqrt[3]{\frac{18.2 \times \sin 42^\circ}{.316}}$$

[10]

29 A boy saves 5 cents one week, 10 cents the next week, 15 cents the third week and so on. At this rate, in how many weeks will he save the sum of \$10.50? [6, 4]

30 a Draw the graph of the equation $y = x^2 - 3x - 2$ from $x = -2$ to $x = 5$ inclusive. [6]b On the same set of axes used in answer to a, draw the graph of the equation $x + y = 1$ [2]c From the graphs drawn in answer to a and b, determine the values of x and y common to the two equations. [2]

Group III

Answer one question from this group.

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

a A 5% solution of salt and water, weighing 100 pounds, is to be reduced to a 3% solution. How many pounds of water must be added? [5]

b The sum of the digits of a two-digit number is 11. If the digits are reversed, the resulting number is 20 less than twice the original number. Find the original number. [5]

32 A motorist drove his car a distance of 100 miles. Returning over the same route, he increased his average rate by 10 miles per hour and made the trip in one half hour less time. Find his rate each way. [5, 5]

*33 The sum of three numbers is 13. Twice the first number exceeds three times the third number by 8. Twice the sum of the first and second numbers is equal to eleven times the third number. What are the three numbers? [5, 5]

Group IV

Answer one question from this group.

34 Given a rectangle whose perimeter is 14 and whose width is represented by w a Express the area A of the rectangle in terms of the width w . [4]b With the aid of a graph estimate, correct to the nearest tenth, the value of w that will give the maximum value of A . [6]35 An article costs a merchant \$72. He wishes to find out at what price he should mark the article so that he can allow a discount of 10% of the marked price and still make a profit of 20% on the selling price. Answer each of the following, letting x represent the marked price:a What is the selling price in terms of x ? [2½]b What is the profit in terms of x ? [2½]c Write an equation in x which expresses the relation between the cost, the profit and the selling price. [2½]d Find the value of x . [2½]

* This question is based on one of the optional topics in the syllabus. [2]