The University of the State of New York

266TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, June 17, 1936—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.

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.

Group II

Write at top of first page of answer paper to group II (*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.

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.

Answer all questions in this group. Each correct answer will receive 2½ credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

Group I

1 Write the quadratic equation whose roots are 5 and -2. *Ans*.....

2 What is the name of the graph whose equation is $2x^2 + 3y^2 = 6$? *Ans*.....

3 Express the fraction $\frac{5}{\sqrt{3}-1}$ with a rational denominator. *Ans*.....

4 Solve the following equation: $2\sqrt{x-2} - 3 = 0$ *Ans*.....

5 Is $2 - \sqrt{3}$ a root of the equation $x^2 - 4x + 1 = 0$? [Answer *Yes* or *No*.] *Ans*.....

6 Find the logarithm of 50.04 *Ans*.....

7 If $x = \sqrt[3]{42.5}$, find by logarithms the real value of x correct to the *nearest tenth*. *Ans*.....

8 Find to the *nearest degree* the angle of elevation of the sun at a time when a man 6 feet tall, standing on level ground, casts a shadow 4.5 feet in length. *Ans*.....

9 The roots of the equation $6x^2 - 7x + 2 = 0$ are (*a*) real and equal; (*b*) imaginary; (*c*) real, unequal and rational or (*d*) real, unequal and irrational. Which is correct, (*a*), (*b*), (*c*) or (*d*)? *Ans*.....

10 Find the value of $2^{-3} \times (64)^0 \times 32^{\frac{2}{5}}$ *Ans*.....

11 Given the formula $R = \frac{ab}{a+b}$; express b as a function of R and a. *Ans*.....

12 Simplify $\dfrac{a - \frac{1}{4}}{\frac{2}{a} - 8}$ *Ans*.....

13 What is the slope of the straight line whose equation is $3x + 2y = 6$? *Ans*.....

14 A straight line passes through the points whose coordinates are given in the table below. Write the equation of this straight line.

x	1	3	4	7	-2
y	6	10	12	18	0

Ans.....

15 Insert *two* geometric means between 3 and 192. *Ans*.....

16 Find the sum of the first *20* terms of the series 5, $4\frac{1}{2}$, 4, ... *Ans*.....

17 Write the first *three* terms of the expansion $(2x - y)^6$ *Ans*.....

18 Write the *three* factors of $x^{2+a} - 25x^a$ *Ans*.....

19 Using the imaginary unit i, write the expression $\sqrt[3]{-27} + \sqrt{-4}$ in its simplest form. *Ans*.....

20 If brass is composed of r parts of copper to s parts of zinc, how much copper is required for m pounds of brass? *Ans*.....

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See instructions for group II on page 1.

Group II

Answer five questions from this group. Full credit will not be granted unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each answer should be reduced to its simplest form. Purely arithmetical solutions for problems will not be accepted.

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

22 Solve the following pair of simultaneous equations, correctly group your answers and check *one* set:

$$\frac{1}{x} - \frac{1}{y} = -\frac{1}{2}$$

$$x = 3y - 1 \qquad [8, 1, 1]$$

23 Find the principal that must be invested at 4%, interest compounded semiannually, in order to yield an amount of \$4000 in 12 years. [Use the formula $A = P\ (1 + \frac{r}{2})^{2n}$, in which A is the amount, P the principal, r the annual rate of interest and n the number of years.] [10]

24 Find the first *three* terms of the arithmetic progression whose first term is 2 and whose second, fourth and eighth terms form a geometric progression. [10]

25 Write the equations that would be used in solving any *two* of the following problems; in each case state what the unknown letter or letters represent: [Solution of the equations is not required.]

a The units digit of a two-digit number exceeds the tens digit by 1. If the number is divided by the sum of the digits, the quotient is 5. Find the number. [5]

b A crew rows 12 miles downstream and returns to the starting point. The total rowing time for the round trip is 4 hours and 12 minutes. If the speed of the current is 3 miles per hour, at what rate does the crew row in still water? [5]

c How many pounds of pure water should be evaporated from 32 pounds of salt water, 5% of which (by weight) is pure salt, to increase it to an 8% solution? [5]

26 Several persons hired a motor boat for \$12, but two of them withdrew from the party and as a result each of the others had to pay 20 cents more. How many persons were originally in the party? [6, 4]

27 *a* Draw the graph of the equation $x^2 - 4x = y$ from $x = -1$ to $x = 5$ inclusive. [6]

b Draw the axis of symmetry. [1]

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

d Write the abscissa of the minimum point. [1]

e Using the graph made in answer to *a*, write the roots of the equation $x^2 - 4x = -3$ [1]

*28 The volume of a rectangular solid is 252 cubic inches. If the height exceeds the width by 4 inches and the length exceeds the height by 5 inches, find the dimensions. [Suggestion: Use the Factor Theorem.] [6, 4]

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