The University of the State of New York

272D HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, June 22, 1938 — 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.

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.

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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 2½ credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

1 Solve the equation $\sqrt{x-2}-5=0$ 1.....

2 The formula for the sum S of a geometric series in terms of the first term a, the number of terms n and the common ratio r, is $S = \ldots$ 2.....

3 Find the *17th* term of the series 3, 7, 11, ... 3.....

4 Find the logarithm of 41.74 4.....

5 Find the four-digit number whose logarithm is 9.9353 — 10 5.....

6 In right triangle ABC, angle $C = 90°$, angle $A = 42°$ and $AB = 70$; find AC correct to the *nearest integer*. 6.....

7 What is the name of the graph of the equation $4x^2 + 9y^2 = 36$? 7.....

8 The fraction $\frac{6+\sqrt{18}}{3}$ is equal to (*a*) $2+\sqrt{18}$, (*b*) $2+\sqrt{2}$ or (*c*) $3\sqrt{2}$; which is correct, (*a*), (*b*) or (*c*)? 8.....

9 The roots of $x^2 - 5x + 10 = 0$ are (*a*) real, equal and rational, (*b*) real, unequal and rational, (*c*) real, unequal and irrational or (*d*) imaginary. Which is correct, (*a*), (*b*), (*c*) or (*d*)? 9.....

10 Write in the form $x^2 + px + q = 0$, the equation whose roots are 8 and —3. 10.....

11 Write the sum of the roots of the equation $x^2 - 7x + q = 0$ 11.....

12 Factor $x^{2n} - 5x^n - 14$ 12.....

13 Perform the indicated operation: $(\frac{1}{x^2} - 1) \div (\frac{1}{x} - 1)$ 13.....

14 Write the equation of the line passing through the points whose coordinates are given in the following table:

x	0	2	4	6	8
y	1	5	9	13	17

14.....

15 Solve the following pair of simultaneous equations:

$$x + y = 2$$
$$2x - y = 7$$

15.....

16 Find the value of $27^{\frac{2}{3}} - (8x)^0 + 3^{-1}$ 16.....

17 Find the value of $x^2 - 2x - 2$ if $x = 1 + \sqrt{3}$ 17.....

18 Write the first *two* terms of the expansion of $(2x + 3)^5$ 18.....

19 Solve for b' the formula $K = \frac{h}{2}(b + b')$ 19.....

20 Two numbers are represented by x and y. By how much does the square of their sum exceed the sum of their squares? 20.....

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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 $3x^2 - 4x - 5 = 0$ [10]

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

$$2x^2 - y^2 = 5$$
$$3x^2 + 4y^2 = 57 \qquad [7, 2, 1]$$

23 By the use of logarithms find, correct to the *nearest thousandth*, the value of

$$\sqrt[4]{\frac{745 \times \sin 38^\circ}{21.6}} \qquad [10]$$

24 A huckster paid \$24 for some watermelons. By selling all but 20 for 20 cents apiece more than he paid for them, he received as much as they all cost. How many melons did he buy? [6, 4]

25 A man borrowed \$120 from his bank and repaid it one year later with interest at 6%. If he had borrowed the money from a finance corporation, he would have had to repay the loan in 12 monthly payments of \$13.60, \$13.30, \$13.00, etc.

a By means of a formula find the amount he would have paid the finance corporation. [7]

b How much more would it have cost him to borrow the money from the finance corporation? [3]

26 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 Two men leave the same point at the same time. One travels east at a certain rate and the other travels north at a rate 21 miles per hour faster. At the end of one hour they are 51 miles apart. Find the rate of each. [5]

b How much water must be evaporated from 12 quarts of a 10% solution of salt and water in order to obtain a 15% solution? [5]

c A and B together can do a certain piece of work in 6 days. Working alone, it takes B 5 days longer to do it than A. How long would it take each to do the work alone? [5]

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

b Using the same set of axes as in *a*, draw the graph of $y = \frac{1}{2}x + 3$ [2]

c From the graphs made in answer to *a* and *b*, estimate, correct to the *nearest tenth*, the values of x and y common to both equations. [2]

*28 The depth of a small rectangular box is 2 inches more than the width and the length exceeds the width by 7 inches. If the capacity of the box is 624 cubic inches, find its dimensions. [3, 7]

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