The University of the State of New York

263D HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Thursday, June 20, 1935 — 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.

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

$$3x^2 + 4xy + 4y = 0$$
$$x = -2y \qquad [7, 2, 1]$$

22 From a piece of cardboard it is desired to cut a rectangle whose width shall be 3 inches less than its length and whose area shall be 12 square inches. Find the length of the rectangle correct to the *nearest tenth of an inch.* [10]

23 A man rows down a stream, a distance of 8 miles, in 2 hours, but he requires 3 hours to row back to the starting point. Find his rate of rowing in still water and the rate of the stream. [10]

24 A rectangular field has a perimeter of 320 feet. If the length of the field is shortened by 20 feet, and the width increased by 10 feet, the area of the new field will be 200 square feet greater than the area of the original field. Find the dimensions of the original field. [6, 4]

25 The area K of an equilateral triangle whose side is a is given by the formula $K = \frac{a^2}{4}\sqrt{3}$; using logarithms, find, correct to the *nearest tenth of an inch,* a side of the equilateral triangle whose area is 1279 square inches. [10]

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 A, working alone, can do a piece of work in 18 days. A and B, working together, can do the same piece of work in 12 days. After A and B work together for 6 days, A stops working and B finishes the work. How long does it take B to complete the work? [5]

b A dairyman wishes to combine milk and cream to make 30 gallons of a mixture containing 20% butterfat. If milk contains 4% butterfat while cream contains 40% butterfat, how many gallons of each must he use? [5]

c The sum of the digits of a two-digit number is 9. If 9 is added to the number, a new number is formed whose digits are those of the original number but in reverse order. Find the original number. [5]

d The sum of three numbers in arithmetic progression is 9. The largest number is 7 times the square of the smallest number. Find the numbers. [5]

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

b Using the same set of axes as in *a*, draw the graph of the equation $x^2 + y^2 = 25$ [2]

c On the graphs made in answer to *a* and *b*, locate the points whose coordinates represent the solutions common to both equations and write these coordinates. [2]

*28 *a* Factor $x^3 - x^2 + 2x + 4$ [5]

b *Using synthetic division,* find the remainder when $x^3 - x^2 + 2x + 4$ is divided by $x - 3$ [5]

* 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 $2\frac{1}{2}$ credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

1 Factor $2x^2 + x - 10$ *Ans*.....

2 What is the product of the roots of the equation $3x^2 - x + 15 = 0$? *Ans*.....

3 If one root of the equation $x^2 - 4x + q = 0$ is 6, what is the numerical value of the other root? *Ans*.....

4 Find the logarithm of .2347 *Ans*.....

5 Find the number whose logarithm is 1.3922 *Ans*.....

6 In triangle ABC, $C = 90°$, $A = 20°$, $AC = 20$; find BC correct to the *nearest integer*. *Ans*.....

7 Find the value of $x^{-\frac{3}{2}} + 2^0x$, if $x = 4$ *Ans*.....

8 Combine the similar terms in the expression *Ans*.....

$$\sqrt[3]{3} + 2\sqrt{27} - 3\sqrt[3]{3} + 4\sqrt{3}$$

9 Solve for a the formula $\frac{1}{f} = \frac{1}{a} + \frac{1}{c}$ *Ans*.....

10 Simplify $\dfrac{1 - \dfrac{1}{1+x}}{1 + \dfrac{1}{x-1}}$ *Ans*.....

11 Write the *third* term of the expansion $(2x^2 - y)^4$ *Ans*.....

12 Write the equation of the line that has a slope of -2 and passes through the point $(1, 4)$. *Ans*.....

13 Solve for x the equation $1 - \sqrt{4x^2 + 5x} = 2x$ *Ans*.....

14 Find the *eighth* term of the progression $x - 3, x - 1, x + 1, \ldots$ *Ans*.....

15 Write the *third* term of the geometric progression whose first term is 3 and whose fourth term is -24. *Ans*.....

16 Does $\dfrac{1}{\cos x}$ increase or decrease as x increases from 0° to 90°? *Ans*.....

17 If the logarithm of 81 to the base x is 4, find x. *Ans*.....

18 The roots of the equation $x^2 - 2x - 4 = 0$ are (a) imaginary, (b) real and equal or (c) real, unequal and irrational. Which is correct, (a), (b) or (c)? *Ans*.....

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

x	0	3	7	12	...
y	2	8	16	26	...

Ans.....

20 A man walked at a uniform rate from A to B, a distance of x miles, in 5 hours. How far was he from B at the end of 2 hours? *Ans*.....

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