The University of the State of New York

289TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Thursday, August 19, 1943 — 8.30 to 11.30 a. m., only

Instructions

Part I is to be done first and the maximum time allowed for it is one and one half hours. At the end of that time, this part of the examination must be detached and will be collected by the teacher. If you finish part I before the signal to stop is given, you may begin part II.

Write at top of first page of answer paper to parts 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 1943 or number and length in minutes of lessons taken in the summer of 1943 under a tutor licensed in the subject and supervised by the principal of the school you last attended.

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 those pupils who have met the time requirement, the minimum passing mark is 65 credits; for all others 75 credits.

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high school in 1943 or an equivalent program of tutoring approved in advance by the Department is required.

Part II

Answer three questions from part II.

26 Find, correct to the *nearest tenth,* the roots of the equation $x^2 + 2x - 4 = 0$ [10]

27 Solve the following set of equations, group your answers and check *one* pair:
$$x^2 - 3y^2 = 13$$
$$1 + 2y = x \qquad [7, 2, 1]$$

28 The formula for finding the time t in seconds it takes a pendulum of length L feet to make one oscillation is $t = \pi \sqrt{\dfrac{L}{g}}$. Using logarithms, find the time of *one* oscillation of a pendulum 2.16 feet long.   [Use $\pi = 3.14$ and $g = 32.2$]   [10]

29 a Draw the graph of $x^2 + y^2 = 16$ [2]
   b On the same set of axes used in answering a, draw the graph of $2y = x^2$ [6]
   c From the two graphs, find, correct to the *nearest tenth,* the real values of x and y common to the two equations.   [2]

*30 Find all the roots of the equation $x^3 - 4x^2 + 4x = 3$ [10]

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

[1]   [OVER]

Part III

Answer one question from part III.

31 A woman bought chuck beef and liver totaling 10 pounds, for which the butcher collected 74 points in red coupons. If chuck beef requires 8 points per pound and liver 6 points per pound, how much of each did she buy? [10]

32 A manufacturer has been asked to make open boxes each of which shall have a capacity of 128 cubic inches. If the boxes are made from square sheets of metal by cutting a 2-inch square out of each corner and turning up the sides, what must be the size of each sheet of metal? [7, 3]

Part IV

Answer one question from part IV.

33 In *each* of the following find a value of A which will make the statement true:

   a The roots of the equation $2x^2 - x = A$ are imaginary. [2]

   b The product of $\sqrt[3]{10}$ and $\sqrt[3]{A}$ is a rational number. [2]

   c The graphs of $x^2 + y^2 = 10$ and $2x = A$ do not intersect. [2]

   d The graph of $x^2 - Ay^2 = 16$ is an ellipse. [2]

   e The graph of $y = Ax$ passes through the second and fourth quadrants. [2]

34 A fruit merchant invested $60 in a number of crates of berries. He sold all but three crates, receiving for each crate $2 more than it cost. If he received $85 from the sale of the berries, how many crates did he sell? [6, 4]

Fill in the following lines:

Name of school...Name of pupil...

Part I

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

1 Factor $30 - x - x^2$

1................

2 Find the value of $\dfrac{2a}{a-b} + \dfrac{2b}{b-a}$

2................

3 Find the value of x that satisfies the equation $\dfrac{9x}{7} = x + 2$

3................

4 Express $\dfrac{7}{\sqrt{5}}$ as an equivalent fraction whose denominator is rational.

4................

5 Express $\sqrt{-\tfrac{1}{4}}$ in terms of i.

5................

6 Find the arithmetic mean between -24 and 6.

6................

7 What is the positive value of b for which the equation $x^2 + bx + 4 = 0$ has equal roots?

7................

8 Solve the equation $x^{1/2} = 5$

8................

9 What is the name of the graph of $y = x^2 + 1$?

9................

10 What extraneous root is introduced into the equation $2x + 5 = x - 1$ by multiplying each member by $x + 1$?

10................

11 The cost of riding in a certain taxi is a cents for the first mile and b cents for each additional mile. Write the formula for finding c, the cost in cents of riding x miles.

11................

12 Solve for t the equation $a = p(1 + rt)$

12................

13 The power required to drive a ship varies directly as the cube of the speed. If a ship requires 4000 horsepower for a speed of 6 miles per hour, what horsepower will be required for a speed of 12 miles per hour?

13................

14 Express 92×10^{-3} as a decimal fraction.

14................

15 Write the first *two* terms of the expansion $(2a + b)^4$

15................

16 Find the logarithm of 2.018

16................

17 What is the number whose logarithm is 0.0341?

17................

18 The following numbers represent points on the graph of a linear equation. Find the missing value of x.

y	-1	1	3	6	7
x	0	4	8	14	?

18................

19 What is the slope of the line whose equation is $y = 5x + 6$?

19................

20 Find, correct to the *nearest degree,* the angle at which a road is inclined to the horizontal, if it rises 4 feet in every 100 feet of horizontal distance.

20................

21 If a rectangle is twice as long as it is wide and if w represents its width, express P, its perimeter, in terms of w.

21................

[3]   [OVER]

22 Using the formula $N = \dfrac{rc}{2}$ in which N = the number of power strokes an airplane engine makes per minute, r the number of revolutions per minute and c the number of cylinders, find the number of power strokes per minute of a 9-cylinder engine making 2000 revolutions per minute.   22................

Directions (questions 23–25) — Indicate the correct answer to *each* question by writing on the line at the right the letter *a, b* or *c*.

23 Which of the following *is not* a geometric progression? (*a*) 16, 8, 4, ... (*b*) 3, —6, 12, ...   (*c*) 2, 5, 8, ...   23......

24 Which of the following points *does not* lie on the graph of the equation $y = 2x + 2$? (*a*) (—2, —2)   (*b*) (0, —1)   (*c*) ($\frac{1}{2}$, 3)   24......

25 The product of the roots of the equation $2x^2 — 5x + 3 = 0$ is (*a*) greater than 3   (*b*) less than 3   (*c*) equal to 3   25......