

The University of the State of New York

288TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, June 16, 1943 — 9.15 a. m. to 12.15 p. 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) 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.

Part II

Answer three questions from part II.

26 a Find the ordinate of the point in which the graph of $y = x^2 + 2x - 9$ crosses the y axis.
[Construction of graph not necessary] [1]

b Find *algebraically*, correct to the *nearest tenth*, the abscissas of the points in which the graph of $y = x^2 + 2x - 9$ crosses the x axis. [9]

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

$$x^2 = 2y + 10$$

$$3x - y = 9 \quad [7, 2, 1]$$

28 Using logarithms, find, correct to the *nearest integer*, the value of

$$\frac{47.9 \times \tan 34^\circ}{\sqrt[3]{.0475}} \quad [10]$$

29 Given $x^2 + y^2 = 25$

$$xy = 12$$

a Draw the graph of $x^2 + y^2 = 25$ [2]

b Draw the graph of $xy = 12$ [6]

c From the graphs made in answer to a and b, find the solutions of the given pair of equations. [2]

30 Three integers are in the ratio 2:5:8. If 2 is subtracted from the middle integer, the resulting number will be the second term of a geometric progression of which the other two integers are the first and third terms. Find the three integers. [10]

Part III

Answer one question from part III.

31 A and B travel along straight roads that are at right angles to each other, starting at the same time from the intersection. A travels 3 miles an hour faster than B. At the end of three hours they are 45 miles apart. Find the rate of speed at which *each* travels. [10]

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

a The length of a rectangle is 5 greater than its width. If the length is decreased by 2 and the width is increased by 1, the area remains unchanged. Find the dimensions of the rectangle. [5]

b A grocer purchased a number of cans of corn for \$14.40. Later the price increased 2 cents a can and he found that he received 24 fewer cans for the same amount of money. How many cans were in his first purchase? [5]

*33 Solve the following set of equations: [10]

$$\frac{2}{x} + \frac{3}{y} = 2$$

$$\frac{1}{x} - \frac{1}{z} = \frac{3}{10}$$

$$\frac{12}{y} - \frac{5}{z} = 3$$

Part IV

Answer one question from part IV.

34 Each of the following statements is sometimes true and sometimes false depending on the values of p and q . In *each* case assign to p and q numerical values that will make the statement true and also numerical values that will make the statement false.

a The graph of $px^2 + qy^2 = 9$ is an ellipse. [2]

b The roots of $px^2 + 4x + q = 0$ are imaginary. [2]

c The graphs of $px + qy = 4$ and $2x + 3y = 6$ are parallel lines. [2]

d The graph of $px + qy = 5$ intersects the x axis. [2]

e The roots of $x^2 + px + q = 0$ are equal numerically but opposite in sign. [2]

35 For \$75 it is possible to buy a war savings bond that will be worth \$100 in 10 years. Using the formula $A = P(1 + r)^n$, find, correct to the *nearest tenth of a per cent*, the rate of interest on this investment if interest is compounded annually. [10]

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

INTERMEDIATE ALGEBRA
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 The approximate distance S in feet a body will fall in t seconds is given by the formula $S = 16t^2$. How many seconds will it take a body to fall 1600 feet?

1.....

2 Find the three factors of $x^3 - a^2x$

2.....

3 Find the sum of $\frac{4}{a-1}$ and $\frac{3}{1-a}$

3.....

4 Express $9\sqrt{-4} + 4\sqrt{-9}$ as a product of a real number and i .

4.....

5 Solve the equation $\sqrt{2x+1} = 3$

5.....

6 Find the value of the discriminant of the equation $2x^2 - 7x + 4 = 0$

6.....

7 Find the logarithm of .06725

7.....

8 Find, correct to the nearest tenth, the number whose logarithm is 2.6596

8.....

9 If x varies directly as y and $x = 9$ when $y = 5$, what is the value of y when $x = 15$?

9.....

10 Insert three arithmetic means between 5 and 17.

10.....

11 What is the slope of the graph of the equation $y = -3x + 2$?

11.....

12 Divide a^{3m} by a^m

12.....

13 What is the greatest possible integral value of a for which $\sqrt{a-3}$ is an imaginary number?

13.....

14 Find the first three terms of the expansion of $(a+b)^6$

14.....

15 Write the formula for the sum S of an infinite decreasing geometric progression in terms of the first term a and the ratio r .

15.....

16 Find the value of $2^2 \times 2^{-1} + 2^0$

16.....

17 Solve the equation $2x^2 - 5x + 2 = 0$

17.....

18 Write the linear equation expressing the relationship between x and y shown in the following table:

x	2	4	7	11	15
y	3	7	13	21	29

18.....

19 At a point 20 feet from the base of a tree, the angle of elevation of its top is 67 degrees. Find, correct to the nearest foot, the height of the tree.

19.....

20 What is the ordinate of the minimum point of the graph of the equation $y = x^2 - 3$?

20.....

Directions (questions 21-25) — Indicate the correct answer to each question by writing on the dotted line at the right the letter *a*, *b* or *c*.

- 21 The fraction $\frac{2x+4}{2x}$, when reduced to lowest terms, is (a) 4,
 (b) $\frac{2x+2}{x}$ or (c) $\frac{x+2}{x}$ 21.....
- 22 The expression $\log 2a$ is equal to (a) $2 \log a$, (b) $\log 2 + \log a$ or
 (c) $\log (2+a)$ 22.....
- 23 The sum of the roots of the equation $2x^2 + 3x + 1 = 0$ is (a) 3,
 (b) $-\frac{3}{2}$ or (c) $\frac{1}{2}$ 23.....
- 24 The graph of the equation $x^2 - 2y^2 = 8$ is (a) a circle, (b) an
 ellipse or (c) a hyperbola. 24.....
- 25 The fraction $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{2}}$ is equal to (a) $\sqrt{3}$, (b) $\frac{\sqrt{3}+2}{2}$
 or (c) $\frac{\sqrt{6}+2}{2}$ 25.....