The University of the State of New York

292d High School Examination

INTERMEDIATE ALGEBRA

Wednesday, August 23, 1944 — 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 1944 or number and length in minutes of lessons taken in the summer of 1944 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 1944 or an equivalent program of tutoring approved in advance by the Department is required.

Part II

Answer three questions from part II.

26 *a* Find algebraically, correct to the *nearest tenth,* the roots of the equation
$x^2 - 20x - 10 = 0$ [7]

b What is the name of the graph of $y = x^2 - 20x - 10$?   [1]

c At what points does the graph of $y = x^2 - 20x - 10$ intersect the x axis?   [2]

27 Solve the following set of equations, group your answers and check: [7, 2, 1]
$$2x^2 + 3y^2 = 9$$
$$x^2 - y^2 = 2$$

28 Using logarithms, find the value of K in the formula $K = \dfrac{WV^2}{2g}$ when $W = 350, V = 1025$ and $g = 32.16$ [10]

29 *a* Using the same set of axes, draw the graphs of $xy = 12$ and $x - y = 5$ [6, 2]

b From the graphs made in answer to *a*, determine the values of x and y common to the two equations.   [2]

*30 Solve the following problem by means of a graph: [10]

Two towns A and B, connected by a straight road, are 20 miles apart. A boy leaves A at 8 a. m. and walks toward B at the rate of 2 miles per hour. Two hours later a man leaves B and walks toward A at the rate of 3 miles per hour. At what time will the boy and man meet and how far from A will the meeting point be?

* This question is based on one of the optional topics in the syllabus and may be used in either part II or part III.

Part III

Answer one question from part III.

31 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 width of a rectangular piece of tin is $\frac{2}{3}$ of its length. If a strip one inch wide is cut off along one of the longer edges, the ratio of the width to the length of the rectangular piece left will be $\frac{3}{5}$. Find the dimensions of the original piece of tin. [5]

   b A Conqueror engine is making 400 more revolutions per minute than a Wasp engine. It takes the Wasp 6 minutes to make as many revolutions as the Conqueror makes in 5 minutes. How many revolutions is each engine making per minute? [5]

32 Two trains made the same run of 300 miles. One traveled 10 miles an hour faster than the other and used $1\frac{1}{2}$ hours less time. Find the rate at which *each* train traveled. [10]

Part IV

Answer one question from part IV.

33 State whether *each* of the following is *true* or *false*. If a statement is *false,* write it in *correct* form.

   a $(x^2)^{-\frac{2}{3}} = \sqrt[3]{x^{-4}}$ [2]

   b If $10^x = 34.8$, then $x = 3.48$ [2]

   c $\log a\sqrt{b} = \log a + 2 \log b$ [2]

   d The equation $x(x - 2) = 0$ has two roots. [2]

   e If the ratio of the speed of one train to that of a second is $a : b$, then the second train travels $\dfrac{bm}{a}$ miles while the first travels m miles. [2]

34 For *each* of the following statements indicate whether you have been given (1) too little information, (2) just enough information or (3) more information than is necessary, to justify the conclusion.

   a When two linear equations in x and y are given, then a common solution to the two equations can always be found. [2]

   b In any quadratic equation, $ax^2 + bx + c = 0$, if $b^2 - 4ac$ is a perfect square, then the expression $ax^2 + bc + c$ has two rational factors. [2]

   c If a man is rowing on a stream and we know his rate downstream, his rate upstream and the rate of the current, then we can determine the man's rate in still water. [2]

   d If two numbers have the same sequence of figures, then they have the same logarithms. [2]

   e If any two terms of an arithmetic (or geometric) progression are given and in each case the number of the term is known, then the progression can be written. [2]

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 From $\dfrac{2}{y-x}$ subtract $\dfrac{1}{x-y}$

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

2 Solve for W in terms of A and t the formula $t = \dfrac{6W}{A-W}$

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

3 Find the roots of the equation $2x^2 + 3x - 2 = 0$

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

4 Write the quadratic equation whose roots are $+2$ and -3.

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

5 Write a quadratic equation whose roots are imaginary.

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

6 What value of x satisfies the equation $\sqrt{x^2 - 7} = x - 1$?

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

7 A 20-foot ladder AB leans against a house that stands on level ground. The ladder, at A, makes an angle of 65° with the ground. How high is B above the ground?

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

8 Find the logarithm of .06432

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

9 Find the four-digit number whose logarithm is 0.7423

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

10 In how many points does the graph of the equation $y = x^2 - x - 5$ intersect the x axis?

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

11 Write the equation of the circle whose center is at the origin and whose radius is $\sqrt{3}$.

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

12 If the graph of the equation $Ax + By = 12$ passes through the point $(4, 0)$, what is the value of A?

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

13 Write a linear equation whose graph passes through the point $(0, 5)$.

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

14 Factor $x^{n+2} - 3x^n$

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

15 Express $3\sqrt{-25}$ in terms of i.

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

16 Express 10^{-6} as a decimal.

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

17 Solve for x: $2^x = \frac{1}{8}$

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

18 Find the *20th* term of the series $4\frac{1}{2}, 3, 1\frac{1}{2}, \ldots$

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

19 Find the sum of the first *seven* terms of the series $\frac{1}{8}, \frac{1}{4}, \frac{1}{2}, \ldots$

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

20 If a man travels a miles north and then b miles west, express in terms of a and b the distance from his final position to the starting point.

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

21 Write the *third* term of the expansion of $(r - s)^5$

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

Directions (questions 22–25) — Indicate the correct answer to *each* question by writing on the line at the right the letter *a, b* or *c*.

22 The fraction $\dfrac{2}{1 - \sqrt{3}}$ is equal to $(a)\dfrac{2+\sqrt{3}}{-2}$, (b) $-1 + \sqrt{3}$,

22................

(c) $-1 -\sqrt{3}$

23 The numbers $\frac{1}{2}$, $\frac{1}{6}$, $\frac{1}{12}$, are the first *three* terms of (*a*) an arithmetic series, (*b*) a geometric series, (*c*) *neither* an arithmetic nor a geometric series.

23...............

24 The expression $2x^0$ is equal to (*a*) 0, (*b*) 1, (*c*) 2.

24...............

25 The roots of the equation $4x^2 - 8x + 9 = 0$ are (*a*) real and equal, (*b*) real and unequal, (*c*) imaginary.

25...............