The University of the State of New York

328TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Tuesday, August 21, 1956 — 12 m. to 3 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 and III (*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 1956.

The minimum time requirement is four or 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 (four 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 1956.

Part II

Answer three questions from this part. Show all work.

26 Solve the following system of equations and check: [8, 2]

$$x^2 + 2y^2 = 2$$
$$x - 2y = 2$$

27 *a* Draw the graph of the equation $y = x^2 + 2x + 1$ from $x = -4$ to $x = 2$ inclusive. [4]

b On the same set of axes used in part *a*, draw the graph of the equation $x - y + 3 = 0$. [2]

c From the graphs made in answer to parts *a* and *b*, find the common solutions of the two equations and check. [2, 2]

28 Find to the *nearest tenth* the roots of the equation $3x^2 + 4x - 5 = 0$. [10]

29 Using logarithms, find to the *nearest integer* the value of

$$\sqrt[3]{\frac{3.3 \times 468}{0.87 \times 0.61}}.$$ [10]

*** The following questions, *30 and *31, are based upon optional topics in the syllabus, and one of them may be substituted for any one question in either part II or part III. Therefore one, but not both, of these questions may be included in the total of 5 required questions from parts II and III.**

*30 Solve the equation $3x^3 - 5x^2 - 16x + 12 = 0$. [10]

*31 Three numbers, x, y and z, are such that their sum is 35. The difference between the largest number and the smallest number is 3, and the two smaller numbers differ by 2.

a Write a set of *three* equations that can be used to find the numbers. [3]

b Find the numbers and check. [6, 1]

[OVER]

Part III

Answer two questions from this part. Show all work unless otherwise directed.

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

a The senior girls can decorate the school gymnasium in two-thirds of the time required by the senior boys. The boys worked alone for $1\frac{1}{2}$ hours and stopped; the girls alone completed the decorations in 2 hours. How many hours would it have taken the girls working alone to decorate the gymnasium? [5]

b How many pounds of water must be evaporated from 25 pounds of a 4% solution of salt in order to make the result a 5% solution of salt? [5]

33 A bus is scheduled to make the trip from A to B, a distance of 90 miles, in a certain time. If the bus is $\frac{3}{4}$ of an hour late in leaving A, it can reach B on time by increasing its usual average speed by 10 miles per hour. Find the usual average speed of the bus. [5, 5]

34 The sum of the digits of a two-digit number is 12. If the digits are reversed, the resulting number is 18 more than the original number. Find the original number. [6, 4]

35 List the numbers 1–5 on your answer paper, and tell whether *each* statement is always true, sometimes true or never true by writing the word *always, sometimes* or *never* opposite the appropriate number on your answer paper. [10]

In each of the following, a, b and c are real numbers:

(1) The graph of the equation $y = ax^2 + bx + c$ intersects the x-axis in two points.
(2) The graph of $y = ax^2 + bx + c$ has a maximum point when a is a positive number.
(3) The graphs of $x + y = 0$ and $xy = a$ intersect when a is a negative number.
(4) The graph of $x^2 - y^2 = c$ intersects the y-axis when c is a positive number.
(5) The line $x = a$ is tangent to the graph of $x^2 + y^2 = a^2$ when a is *not* zero.

INTERMEDIATE ALGEBRA

Fill in the following lines:

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

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed.

1 Express $3\sqrt{-4}$ in terms of i. 1.....

2 Factor $3x^2 + 7x - 6$. 2.....

3 A parcel-delivery service charges 25 cents for the first pound and 3 cents for each additional pound. Write an equation expressing the charge in cents (c) to deliver a package which weighs n pounds. 3.....

4 Write an equation which expresses the relationship between x and y shown in the following table:

x	-1	0	2	5
y	-1	1	5	11

4.....

5 In the formula $t = \frac{1}{2}p(r + s)$, find the value of r when $p = 2.5$, $s = 5$ and $t = 11.25$ 5.....

6 Find the product of the roots of the equation $2x^2 - 5x + 7 = 0$. 6.....

7 Solve the equation $\sqrt{3x + 4} = 5$ for x. 7.....

8 Simplify the complex fraction: $\dfrac{\frac{3}{x} + 1}{\frac{3}{x} - 1}$ 8.....

9 If $9x^{-2} = 1$, find the positive value of x. 9.....

10 Find the value of $(x + 1)^0 - \left(\frac{8}{x}\right)^{\frac{1}{3}}$ when $x = 1$. 10.....

11 Express $\dfrac{2}{3 - \sqrt{2}}$ as an equivalent fraction with a rational denominator. 11.....

12 Find log 744.2 12.....

[OVER]

13 Find the number whose logarithm is 8.4574 — 10. 13.....

14 At a point 200 feet from the foot of a radio tower erected on level ground, the angle of elevation of the top of the tower is 40°. Find the height of the tower to the *nearest foot.* 14.....

15 If r varies directly as s^2 and if $r = 18$ when $s = 3$, find the value of r when $s = 4$. 15.....

16 Write *in simplest form* the first two terms in the expansion of $(x - 2y)^6$. 16.....

17 Find the 30th term in the progression —5, —1, 3, ... 17.....

18 What two numbers, inserted between 8 and 27, form a geometric progression of four terms? 18.....

19 Find the sum of the infinite series $10, 5, \frac{5}{2}, \ldots$. 19.....

Directions (20–25): Indicate the correct completion for *each* of the following by writing on the line at the right the letter *a, b* or *c.*

20 The point which is 3 units below the x-axis and 4 units to the left of the y-axis is (*a*) (3, —4) (*b*) (—3, —4) (*c*) (—4, —3) 20.....

21 The expression $(t^3)^4$ is equal to (*a*) t^7 (*b*) t^{12} (*c*) t^{81} 21.....

22 The expression $\frac{1-n}{n^2-1}$ is equal to (*a*) $\frac{1+n}{n^2+1}$ (*b*) $\frac{1}{n+1}$ (*c*) $-\frac{1}{n+1}$ 22.....

23 If 113,600 is expressed in the form 1.136×10^n, then n equals (*a*) 3 (*b*) 4 (*c*) 5 23.....

24 The equation of the axis of symmetry of the graph of the equation $y = 2x^2 + 4x - 5$ is (*a*) $x = -2$ (*b*) $x = -1$ (*c*) $x = 1$ 24.....

25 A quadratic equation has roots which are real, irrational and unequal when its discriminant is (*a*) 7 (*b*) 4 (*c*) 0 25.....

FOR TEACHERS ONLY

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INSTRUCTIONS FOR RATING
INTERMEDIATE ALGEBRA

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Use only *red* ink or pencil in rating Regents papers. Do not attempt to *correct* the pupil's work by making insertions or changes of any kind. Use check marks to indicate pupil errors.

Unless otherwise specified, mathematically correct variations in the answers will be allowed. In problems involving logarithms, answers should be left correct to four significant digits unless directions say otherwise. Units need not be given when the wording of the questions allows such omissions.

Part I

Allow 2 credits for each correct answer; allow no-partial credit. Do not allow credit if the answer to question 12 is not expressed to four decimal places. For questions 20–25, allow credit if the pupil has written the correct answer instead of the letter *a*, *b* or *c*.

(1) $6i$

(2) $(3x-2)(x+3)$

(3) $c = 25 + 3(n-1)$

(4) $y = 2x + 1$

(5) 4

(6) $\frac{7}{2}$

(7) 7

(8) $\frac{3+x}{3-x}$

(9) 3

(10) -1

(11) $\frac{2(3+\sqrt{2})}{7}$

(12) 2.8717

(13) .02867

(14) 168

(15) 32

(16) $x^6 - 12x^5y$

(17) 111

(18) 12, 18

(19) 20

(20) *c*

(21) *b*

(22) *c*

(23) *c*

(24) *b*

(25) *a*