

The University of the State of New York

323D HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Tuesday, January 25, 1955 — 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 and III (a) name of school where you have studied, (b) number of weeks and recitations a week in intermediate algebra.

The minimum time requirement is four or five recitations a week for half a school year after the completion of elementary algebra.

Part II

Answer three questions from this part. Show all work.

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

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

$$2x^2 - y^2 = 7$$

$$2x + y = 5$$

28 Using logarithms, find to the *nearest tenth* the value of: [10]

$$\sqrt[3]{\frac{1.5 \times 221}{3.14 \times 4.4}}$$

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

b From the graph, estimate to the *nearest tenth* the roots of $x^2 - 2x - 4 = 0$. [2]

c On the same set of axes used in a, draw the graph of $y = -6$. [1]

d From the graphs made in answer to a and c, what conclusion can you draw about the roots of $x^2 - 2x - 4 = -6$? [1]

*30 Solve the equation $3x^3 - 7x^2 - 22x + 8 = 0$. [10]

*31 Solve the following system of equations for x , y and z and check: [8, 2]

$$2x - y + z = 5$$

$$4x - 3y = 5$$

$$6x + 2y + 2z = 7$$

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

INTERMEDIATE ALGEBRA — *continued*

Part III

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

32 The time required to go by train between two cities is two hours less than the time required to go by bus. The average rate of the bus is 10 miles an hour less than the average rate of the train. Find the rate of the train if the two cities are 240 miles apart. [6, 4]

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

a. The sum of the digits of a two-digit number is 13. If the digits are reversed, the new number is 9 less than the original number. Find the number. [5]

b. How much water must be added to 20 ounces of a 10% solution of boric acid to reduce it to a 4% solution? [5]

34 A quiz program awarded prizes totaling \$1900. The first winner received \$100 and each winner after the first received \$20 more than the one who immediately preceded him. How many prizes were awarded? [*A purely arithmetic solution of this problem will not be accepted.*] [10]

35 A man invests an amount of money in bonds paying an annual interest rate of 3%, and y times as much in stocks paying an annual interest rate of 7%. His total annual income is 6% of his total investment.

a. Form the equation which can be used to find y . [4]

b. From the equation in *a.*, what is the value of y which must be used to find the amount invested in stocks? [3]

c. If the amount invested in bonds is \$2500, find his annual income from stocks. [3]

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 Factor $2x^2 + 5x - 3$. 1.....
- 2 Express $\frac{1}{\sqrt{6} + 1}$ as an equivalent fraction with a rational denominator. 2.....
- 3 Express $2\sqrt{-25}$ in terms of i . 3.....
- 4 Solve for x the equation $\sqrt{2x - 1} = 3$. 4.....
- 5 Find two numbers that, when inserted between 4 and 108, form with these numbers a geometric progression. 5.....
- 6 If $x^{-2} = 25$, find the positive value of x . 6.....
- 7 Find the value of $2x^0 + x^{\frac{3}{2}}$ when $x = 27$. 7.....
- 8 Find the product of the roots of the equation $2x^2 - 9x + 6 = 0$. 8.....
- 9 Find the slope of the line $4y = 3x + 9$. 9.....
- 10 What is the name of the graph of the equation $4x^2 - 25y^2 = 100$? 10.....
- 11 Find $\log 27.53$. 11.....
- 12 Find the number whose logarithm is $9.7432 - 10$. 12.....
- 13 Find to the *nearest foot* the height of a tree which casts a shadow 10 feet long at a time when the angle of elevation of the sun is 72° . 13.....

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

x	-1	0	3	5
y	-5	-3	3	7

14.....

15 If v varies directly as b^2 and if $v = 45$ when $b = 3$, find the value of v when $b = 6$.

15.....

16 Solve the formula $T = 2\pi r (r + h)$ for h .

16.....

17 Write in *simplest form* the first two terms in the expansion of $(x + 3y)^5$.

17.....

18 Express 6.5×10^4 as an integer.

18.....

19 Simplify the complex fraction:
$$\frac{2 - \frac{1}{x}}{2 + \frac{1}{x}}$$

19.....

20 Find the sum of the infinite series $2, \frac{2}{3}, \frac{2}{9}, \dots$

20.....

Directions (21–25): Indicate the correct completion for *each* of the following by writing on the line at the right the letter a , b or c .

21 The equation of the axis of symmetry of the graph $y = 2x^2 - 8x - 7$ is (a) $x = 8$ (b) $x = 4$ (c) $x = 2$

21.....

22 The fraction $\frac{a^2 - ab}{ab}$ equals (a) $a^2 - 1$ (b) a^2 (c) $\frac{a - b}{b}$

22.....

23 The expression $(2a^2)^3$ equals (a) $6a^6$ (b) $8a^6$ (c) $8a^5$

23.....

24 If a quadratic equation has roots which are real, rational and unequal, its discriminant may be (a) -4 (b) 0 (c) 9

24.....

25 If $\log x^2 = 0.8762$, then $\log 10x$ is (a) 4.3810 (b) 1.4381 (c) 1.7524

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. For questions 21-25, allow credit if the pupil has written the correct answer instead of the letter *a*, *b* or *c*.

- | | |
|----------------------------|---------------------------------|
| (1) $(2x - 1)(x + 3)$ | (14) $y = 2x - 3$ |
| (2) $\frac{\sqrt{6}-1}{5}$ | (15) 180 |
| (3) $10i$ | (16) $h = \frac{T}{2\pi r} - r$ |
| (4) 5 | (17) $x^5 + 15x^4y$ |
| (5) 12, 36 | (18) 65,000 |
| (6) $\frac{1}{5}$ | (19) $\frac{2x-1}{2x+1}$ |
| (7) 11 | (20) 3 |
| (8) 3 | (21) <i>c</i> |
| (9) $\frac{3}{4}$ | (22) <i>c</i> |
| (10) hyperbola | (23) <i>b</i> |
| (11) 1.4398 | (24) <i>c</i> |
| (12) 0.5536 | (25) <i>b</i> |
| (13) 31 | |

