

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, January 21, 1959 — 9:15 a.m. to 12:15 p.m., only

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 completely: $2ax^2 - 18a$ 1.....
- 2 Express the sum of $2\sqrt{-9}$ and $3\sqrt{-16}$ as a monomial in terms of i . 2.....
- 3 Solve the equation $2 + \sqrt{x} = 11$ for x . 3.....
- 4 Solve the following set of equations for x :
 $2x + 3y = 13$
 $x - y = 4$ 4.....
- 5 Write an equation of the straight line which passes through the points (0, 2) and (1, 5). 5.....
- 6 Express $\frac{5}{4 - \sqrt{2}}$ as an equivalent fraction with a rational denominator. 6.....
- 7 Find the logarithm of 38.57. 7.....
- 8 Find the number whose logarithm is 0.6318. 8.....
- 9 The sum of an arithmetic progression is 126. If the first term of the progression is 4 and the last term is 24, find the number of terms in the progression. 9.....
- 10 Find *two* numbers that, when inserted between 4 and 500, form with those numbers a geometric progression of four terms. 10.....
- 11 Find the sum of the infinite geometric progression $3, 1, \frac{1}{3}, \dots$ 11.....

INTERMEDIATE ALGEBRA — *continued*

- 12 Find, to the *nearest degree*, the angle of elevation of the sun at a time when a tree 20 feet high casts a shadow 12 feet long. 12.....
- 13 Solve the equation $R = \frac{ST}{S + T}$ for S . 13.....
- 14 Write in simplest form the third term *only* in the expansion of $(a - b)^9$. 14.....
- 15 Combine into a single fraction: $\frac{x}{x - 2} - 1$ 15.....
- 16 If s varies inversely as t^2 and if $s = 4$ when $t = 3$, find s when $t = 6$. 16.....
- 17 Write a quadratic equation whose roots are 6 and -4 . 17.....
- 18 If the number 0.000328 is expressed as 3.28×10^n , what is the value of n ? 18.....
- 19 Express in *simplest* form: $\frac{a - \frac{1}{b}}{\frac{1}{a} - b}$ 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, c or d .

- 20 One root of the equation $x^2 - 3x + q = 0$ is n . The other root is (a) $n - 3$
 (b) $3 - n$ (c) $-3 - n$ (d) $\frac{3}{n}$ 20.....
- 21 The value of $3x^0 + 16^{-\frac{3}{4}}$ is (a) $3\frac{1}{8}$ (b) $3\frac{1}{3}$ (c) $3\frac{1}{12}$ (d) $1\frac{1}{8}$ 21.....
- 22 If $\log x = n$, then $\log \frac{x^9}{10}$ is (a) $3n - 1$ (b) $\frac{3n}{10}$ (c) $\frac{n^9}{10}$
 (d) $3 \log n - 1$ 22.....
- 23 The equation of the axis of symmetry of the graph of $y = 2x^2 - 4x - 1$ is
 (a) $x = 2$ (b) $y = 1$ (c) $x = 1$ (d) $x = -1$ 23.....
- 24 The roots of the equation $2x^2 - 7x - 3 = 0$ are (a) equal (b) rational
 (c) irrational (d) imaginary 24.....
- 25 The graph of $x^2 = y^2 + 9$ is (a) a circle (b) an ellipse (c) a parabola
 (d) a hyperbola 25.....

INTERMEDIATE ALGEBRA — *continued*

Part II

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

26 Find to the *nearest tenth* the roots of $2x^2 + 8x + 1 = 0$. [10]

27 Solve the following set of equations and check in both equations: [8, 2]

$$x^2 + 3y^2 = 13$$

$$x - y = 3$$

28 Using logarithms, find, to the *nearest tenth*, the value of d if $d = \frac{23.8 \sqrt[3]{0.0642}}{\sin 38^\circ}$. [10]

29 Solve *graphically* the following set of equations: [Estimate the answers to *tenths*.] [6, 2, 2]

$$y = x^2 - 2x - 3$$

$$x + y = 1$$

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 $3x^3 - 4x^2 - 17x + 6 = 0$. [10]

*31 *a* If $4^{2x+1} = 8^{2x}$, find x . [4]

b If $3^{2x} = 40$, find x to the *nearest tenth*. [6]

Part III

Answer two questions from this part. Show all work unless otherwise directed. Only algebraic solutions will be accepted in 33–35.

- 32 Write the equation or equations that would be used to solve the following problems. In *each* case state what the letter or letters represent. [*Solution of the equations is not required.*]
- a* How many ounces of pure acid must be added to 24 ounces of a 10% solution of acid to make it a 40% solution? [5]
- b* A mechanic's helper requires 4 hours longer than the mechanic to repair a piece of machinery. The mechanic began the job alone and worked on it for 3 hours; then he was called away. The helper finished the job in 5 more hours. How long would it have taken the mechanic alone to do the whole job? [5]
- 33 A man went on a trip of 120 miles, traveling at a certain average rate. Several days later he returned over the same route at a rate 5 miles per hour faster than his earlier rate. The time for the return trip was one-third of an hour less than the time for the outgoing trip. Find his rate on *each* trip. [5, 5]
- 34 Three *positive* integers are in the ratio 1 : 4 : 7. If the first integer is left unchanged, the second integer decreased by 2 and the third integer increased by 4, the resulting numbers will form a geometric progression. Find the three original integers. [5, 5]
- 35 *a* If x represents the tens digit and y represents the units digit of a two-digit number,
- (1) express the number in terms of x and y [1]
- (2) show that the difference between the original number and the number with its digits interchanged is divisible by 9 [4]
- b* The sum of the digits of a two-digit number is 12. The original number exceeds the number with its digits interchanged by 18. Find the original number. [5]

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 7 is not expressed to *four decimal places* and if the answer to question 8 is not expressed to *four significant digits*. For questions 20–25, allow credit if the pupil has written the correct answer instead of the letter *a*, *b*, *c* or *d*.

- | | |
|----------------------------------|--------------------------|
| (1) $2a(x+3)(x-3)$ | (12) 59 |
| (2) $18i$ | (13) $\frac{RT}{T-R}$ |
| (3) 81 | (14) $28a^9b^2$ |
| (4) 5 | (15) $\frac{2}{x-2}$ |
| (5) $y = 3x + 2$ | (16) 1 |
| (6) $\frac{5(4 + \sqrt{2})}{14}$ | (17) $x^2 - 2x - 24 = 0$ |
| (7) 1.5863 | (18) -4 |
| (8) 4.284 | (19) $-\frac{a}{b}$ |
| (9) 9 | (20) <i>b</i> |
| (10) 20,100 | (21) <i>b</i> |
| (11) $4\frac{1}{2}$ | (22) <i>a</i> |
| | (23) <i>c</i> |
| | (24) <i>c</i> |
| | (25) <i>d</i> |

