

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, August 20, 1962 — 12:30 to 3:30 p.m., only

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

Name of teacher.....

Part I

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

1 Find the positive root of the equation $3x^2 - x - 14 = 0$. 1.....

2 Combine into a single fraction: $\frac{3b}{2a} - \frac{2a}{3b}$ 2.....

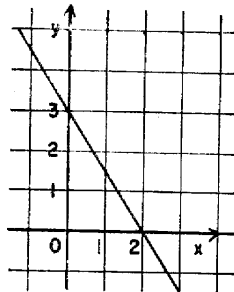
3 Solve for b in terms of R and a : $\frac{1}{R} = \frac{1}{a} + \frac{1}{b}$ 3.....

4 What is the sum of the first 50 positive odd integers? 4.....

5 Express $7\sqrt{-8}$ in terms of i . 5.....

6 Perform the indicated operations and write the result in *simplest form*:
 $\left(\frac{4x - 8ax^2}{3}\right) \left(\frac{3 + 6ax}{8a^2x^2 - 2}\right)$ 6.....

7 In the diagram, the oblique line represents the graph of an equation. Write this equation.



7.....

8 Find the value of $2x^0 - x^{-\frac{2}{3}}$ when $x = 64$. 8.....

9 Express $\frac{7\sqrt{2}}{5 - \sqrt{2}}$ as an equivalent fraction with a rational denominator. 9.....

10 Write in *simplest form* the fourth term only in the expansion of $(x - 2)^6$. 10.....

- 11 Find the logarithm of 416.3. 11.....
- 12 If $\log N = 8.2196 - 10$, find N . 12.....
- 13 Find to the *nearest degree* the angle of elevation of the sun when a vertical pole casts a shadow half as long as the height of the pole above the ground. 13.....
- 14 In a geometric progression the first term is 5 and the fifth term is $\frac{5}{81}$. Write the third term. 14.....
- 15 Find the sum of the infinite geometric progression .2, .02, .002, 15.....
- 16 Write a linear equation expressing the relationship between x and y shown in the accompanying table:
- | | | | | |
|-----|-----|---|----|----|
| x | -2 | 1 | 3 | 4 |
| y | -20 | 1 | 15 | 22 |
- 16.....
- 17 Find the sum of the roots of the equation $3x^2 - 7x + 9 = 0$. 17.....
- 18 Solve the following set of equations:
- $$\begin{aligned} 3y &= 2x + 14 \\ x - 2y &= -8 \end{aligned}$$
- 18.....
- 19 If a is divided by b , the quotient is q and the remainder is r . Express a in terms of b , q and r . 19.....
- 20 Next year Steve will be n years old. Five years ago John was twice as old as Steve was then. Express in terms of n John's age five years ago. 20.....

Directions (21-30): Write on the line at the right of *each* of the following the *number* preceding the expression that best completes the statement.

- 21 The number of intersections of the graph of $y = 2x^2 + 7x - 15$ and the x -axis is
- | | | |
|-------|-------|---------|
| (1) 1 | (3) 3 | 21..... |
| (2) 2 | (4) 0 | |
- 22 The equation $\sqrt{2-x} = x$ has
- | | | |
|-------------------------|-------------------------------|---------|
| (1) 1 as its only root | (3) both -2 and 1 as roots | 22..... |
| (2) -2 as its only root | (4) neither -2 nor 1 as roots | |

- 23 An example of an equation which has *no* real root is
 (1) $2x^2 - 5x - 8 = 0$ (3) $2x^2 + 5x - 8 = 0$
 (2) $2x^2 = 5x$ (4) $2x^2 - 5x + 8 = 0$ 23.....
- 24 The equation of the axis of symmetry of the graph of $y = 2x^2 + 3x + 4$ is
 (1) $x = \frac{3}{4}$ (3) $x = -\frac{3}{4}$
 (2) $x = \frac{3}{2}$ (4) $x = -\frac{3}{2}$ 24.....
- 25 A rule from mechanics states that v , the velocity of a jet of liquid flowing through an opening, varies directly as the square root of h , the height of the surface of the liquid above the opening. This rule is expressed by the formula
 (1) $v = kh^{\frac{1}{2}}$ (3) $v = kh^{-\frac{1}{2}}$
 (2) $v = kh^2$ (4) $v = kh^{-2}$ 25.....
- 26 The equation $3x - 5y = 7$ is satisfied by
 (1) only one number pair (3) only three number pairs
 (2) only two number pairs (4) many number pairs 26.....
- 27 The expression $(a + b) + c = a + (b + c)$ is an illustration of
 (1) the distributive principle
 (2) the commutative principle for addition
 (3) the associative principle for addition
 (4) an additive inverse 27.....
- 28 The graph of the equation $5y^2 = 3y + x$ is
 (1) a straight line (3) an ellipse
 (2) a hyperbola (4) a parabola 28.....
- 29 If $n = \frac{a^2}{b}$, then $\log n$ equals
 (1) $\frac{2 \log a}{\log b}$ (3) $2 \log \left(\frac{a}{b} \right)$
 (2) $2 \log a - \log b$ (4) $2(\log a - \log b)$ 29.....
- 30 In $ax^2 + bx + a = 0$, a and b are integers. If one root is $\frac{1}{2}$, the other root is
 (1) $\frac{1}{2}$ (3) $-\frac{2b}{a}$
 (2) 2 (4) $-\frac{b}{2a}$ 30.....

Part II

Answer four questions from this part. Show all work unless otherwise directed. Only algebraic solutions will be accepted in 36 and 37.

- 31 Solve the following set of equations, group your answers and check in both equations: [7, 1, 2]

$$\begin{aligned} 2x + y &= 6 \\ 2x^2 - 3y^2 &= 2 \end{aligned}$$

- 32 a On the same set of axes draw the graphs of $x^2 + y^2 = 49$ and $xy = 18$. [3, 4]

b How many common solutions do the two equations have? [1]

c From the graphs estimate to *tenths* the x and y values of one common solution. [2]

- 33 Find to the *nearest tenth* the roots of the equation $5x^2 = 9x - 1$. [10]

- 34 Using logarithms, compute to the *nearest thousandth* the value of

$$N \text{ if } N = \sqrt[3]{\frac{2.85 \sin 23^\circ}{52}}. \quad [10]$$

- 35 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 water must be evaporated from 40 ounces of an 8% salt solution to make it a 12% salt solution? [5]

b A rectangular sheet of metal is three times as long as it is wide. Congruent squares are cut from the four corners and the sides are turned up to make an open box 2 inches high with a volume of 102 cubic inches. What was the width of the original rectangular sheet? [5]

- 36 On a trip a man traveled 40 miles per hour for the first third of the distance and 50 miles per hour for the remainder of the distance. If the entire trip took 4 hours and 20 minutes, how many miles did he travel? [6, 4]

- *37 In a certain three-digit number the hundreds digit is the sum of the other two digits. If the units and tens digits are interchanged, the new number is 9 more than the original number. If the hundreds and tens digits are interchanged, the new number is 270 less than the original number. Find the original number. [5, 5]

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

FOR TEACHERS ONLY

IA

INSTRUCTIONS FOR RATING INTERMEDIATE ALGEBRA

Monday, August 20, 1962 — 12:30 to 3:30 p.m., only

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 checkmarks 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 unless an equation is written in 7 and 16. For questions 21–30, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3 or 4.

- | | | |
|----------------------------------|--------------------|--------|
| (1) $\frac{7}{3}$ | (11) 2.6194 | (23) 4 |
| (2) $\frac{9b^2 - 4a^2}{6ab}$ | (12) 0.01658 | (24) 3 |
| (3) $\frac{Ra}{a - R}$ | (13) 63 | (25) 1 |
| (4) 2,500 | (14) $\frac{5}{9}$ | (26) 4 |
| (5) $14i\sqrt{2}$ | (15) $\frac{2}{9}$ | (27) 3 |
| (6) $-2x$ | (16) $y = 7x - 6$ | (28) 4 |
| (7) $2y + 3x = 6$ | (17) $\frac{7}{3}$ | (29) 2 |
| (8) $1\frac{15}{16}$ | (18) $(-4, 2)$ | (30) 2 |
| (9) $\frac{35\sqrt{2} + 14}{23}$ | (19) $bq + r$ | |
| (10) $-80x^2$ | (20) $2(n - 6)$ | |
| | (21) 2 | |
| | (22) 1 | |

[OVER]

Part II

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers in Mathematics*. Care should be exercised in making deductions as to whether the error is purely a mechanical one or due to a violation of some principle. A mechanical error generally should receive a deduction of 10 percent, while an error due to a violation of some cardinal principle should receive a deduction ranging from 30 percent to 50 percent, depending on the relative importance of the principle in the solution of the problem.

(31) Solution [7]

$$\begin{array}{r|l|l} x & \frac{11}{5} & 5 \\ \hline y & \frac{8}{5} & -4 \end{array} \quad [1]$$

Check [2]

(32) b 4 [1]

c (6.4, 2.8) or (2.8, 6.4) or (-6.4, -2.8) or (-2.8, -6.4); also full credit should be granted for the reading if it is estimated within one-tenth from the graph as made. For example, for the first point listed above, allow $x = 6.3$ or 6.5 and allow $y = 2.7$ or $y = 2.9$ [2]

(33) 1.7 and 0.1 [10]

(34) 0.278 [10]

(35) a Let $x =$ number of ounces of water to be evaporated
 $.12(40 - x) = .08(40)$ [5]

b Let $w =$ number of inches in the width of the rectangular sheet
 $102 = 2(3w - 4)(w - 4)$ [5]

(36) Analysis [6]
 200 [4]

*(37) Analysis [5]
 523 [5]