The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Thursday, January 24, 1963 — 1:15 to 4:15 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 Solve for x and y: $x - y = 5$
$x + y = 17$ 1.....

2 Express $6x^3 + x^2 - 15x$ as the indicated product of *three* linear factors. 2.....

3 Write a quadratic equation whose roots are 3 and —5. 3.....

4 Write an equation of the line which is parallel to the line $7x - 2y = 10$ and which passes through the point (1,5). 4.....

5 Find the coordinates of the point at which the line $2y = 3x + 8$ intersects the y-axis. 5.....

6 If (1,—3), (a,2) and (7,7) are the coordinates of three points on a straight line, find the value of a. 6.....

7 If n pencils cost c cents, write an expression in terms of n, c and p for the cost in cents of p pencils. 7.....

8 Solve for a: $\frac{3}{2a-1} + 2 = \frac{9}{2a-1}$ 8.....

9 Express $\frac{\frac{y}{y+3}}{1-\frac{y}{y+3}}$ in simplest form. 9.....

10 Solve for x in terms of a, b and c: $ax = b - cx$ 10.....

11 Find the value of the discriminant of the quadratic equation $3x^2 + 2x + 1 = 0$. 11.....

12 In the quadratic equation $x^2 + 2x + c = 0$, one root is —4. Find the other root. 12.....

13 Express $\sqrt{-8} + 2\sqrt{-50}$ as a monomial in terms of the imaginary unit i. 13.....

14 Find to the *nearest integer* the number of feet in the length of a shadow cast on level ground by a 15-foot vertical pole when the angle of elevation of the sun is 53°. 14.....

15 If $x = 5$, evaluate $2x^0 + (5x)^{-\frac{1}{2}}$. 15.....

16 If $\log a = x$, express $\log 100a$ in terms of x. 16.....

[OVER]

17 Find the logarithm of 0.8162. 17.....

18 If $\log N = 2.3235$, find the value of N. 18.....

19 Express $\frac{4}{3-\sqrt{2}}$ as an equivalent fraction with a rational denominator. 19.....

20 The sum of an arithmetic progression of 50 terms is 350. Find the average of the first and last terms. 20.....

21 Find the fifth term of a geometric progression whose first term is $-\frac{1}{3}$ and whose common ratio is $\frac{1}{2}$. 21.....

22 Find the sum of the infinite geometric progression $7, \frac{7}{8}, \frac{7}{64}, \ldots$. 22.....

23 If it takes an object 2 seconds to move a certain distance at the rate of 3 inches per second, how many seconds would it take to move the same distance at the rate of $\frac{3}{4}$ inch per second? 23.....

24 Write in simplest form the third term only of the expansion of $(x+2)^7$. 24.....

25 Combine into a single fraction: $\frac{2}{x-2} + \frac{1}{2-x}$ 25.....

Directions (26–30): Write on the line at the right of *each* of the following the *number* preceding the expression that best completes the statement or answers the question.

26 Which of the following is an irrational number?

(1) $\sqrt[3]{-8}$ (3) $\frac{2}{5}$
(2) $\sqrt{6}$ (4) 0.666.... 26.....

27 The equation whose graph is an ellipse is

(1) $4x^2 + 9y = 18$ (3) $3x^2 = 7 - 5y^2$
(2) $3x^2 = 7 + 5y^2$ (4) $4x + 9y = 36$ 27.....

28 The relationship, y varies directly as the square of x, is expressed by

(1) $y = kx^2$ (3) $y^2 = kx$
(2) $yx^2 = k$ (4) $y^2x = k$ 28.....

29 Which computation illustrates an application of the postulate, "Multiplication is an associative operation"?

(1) $3.14(200) = 200(3.14) = 628$
(2) $25(4 \times 3.14) = 100(3.14) = 314$
(3) $3.14(7+3) = 3.14(10) = 31.4$
(4) $3.14(36) + 3.14(64) = 3.14(100) = 314$ 29.....

30 The following statement appeared on a pupil's paper: "If both members of any equation are divided by the same number, the new equation has the same roots as the original equation." This statement would have been correct if the pupil had indicated that the number used as a divisor

(1) must be positive (3) must not be negative
(2) must be rational (4) must not be zero 30.....

Part II

Answer four questions from this part. Show all work unless otherwise directed. Only an algebraic solution will be accepted in question 36.

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

$$3x^2 + xy = 15$$
$$2x + y = 2$$

32 Solve and express the roots to the *nearest tenth*: $5x^2 + 3x = 1$ [10]

33 *a* Plot the graph of $y = x^2 - 4x$ for values of x from -1 to 5, inclusive. [4]

b On the same set of axes used in part *a*, draw the graph of $y = -x + 4$. [2]

c Using the graphs made in answer to parts *a* and *b*, determine the coordinates of the point(s) of intersection of the graphs. [2]

d List *two* values of x for which $x^2 - 4x = -x + 4$. [2]

34 Using logarithms, compute the value of $32\sqrt[3]{\dfrac{(152)^2}{\sin 63°}}$ to the *nearest integer*. [10]

35 Write the 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 gallons of water should be added to 40 gallons of a 30% solution of antifreeze in order to change it to a 24% solution? [5]

b A trip consisted of 50 miles by car and 400 miles by airplane. The airplane traveled 150 miles per hour faster than the car, and that portion of the trip covered by plane took one hour longer than that covered by car. Find the average speed of the car. [5]

36 A sequence of four integers consisting of 4, x, y, 18 is such that the first three form an arithmetic progression and the last three form a geometric progression. Find x and y. [5, 5]

*37 *a* Write the polynomial $x^3 + 5x^2 - 2x - 24$ as the indicated product of *three* linear factors. [5]

b If $5^x = 317$, find the value of x to the *nearest tenth*. [5]

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

FOR TEACHERS ONLY

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SCORING KEY

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 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 3 and 4. For questions 26–30, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3 or 4.

(1) (11, 6)

(2) $x(3x + 5)\ (2x - 3)$

(3) $x^2 + 2x - 15 = 0$

(4) $y = \frac{7}{2}x + \frac{3}{2}$

(5) (0,4)

(6) 4

(7) $\frac{cp}{n}$

(8) 2

(9) $\frac{y}{3}$

(10) $\frac{b}{a + c}$

(11) -8

(12) 2

(13) $12i\sqrt{2}$

(14) 11

(15) $\frac{11}{5}$

(16) $2 + x$

(17) 9.9118—10

(18) 210.6

(19) $\frac{12 + 4\sqrt{2}}{7}$

(20) 7

(21) $-\frac{1}{48}$

(22) 8

(23) 8

(24) $84x^5$

(25) $\frac{1}{x - 2}$

(26) 2

(27) 3

(28) 1

(29) 2

(30) 4

[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) (3, —4) and (—5, 12) [8]
Check [2]

(32) 0.2 and —0.8 [10]

(33) *c* (—1,5) and (4,0) [2]
d —1 and 4 [2]

(34) 947 [10]

(35) *a* Let x = no. gals. water added
$.24\ (40 + x) = 12$
b Let r = average speed of the car
$$\frac{400}{r + 150} - \frac{50}{r} = 1$$

(36) Analysis [5]
$x = 8$ and $y = 12$ [5]

(37) *a* $(x - 2)\ (x + 3)\ (x + 4)$ [5]
b 3.6 [5]