The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, August 21, 1961 — 12 m. to 3 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 negative root of the equation $2x^2 + 11x - 21 = 0$. 1.....

2 The roots of the equation $x^2 + px + 4 = 0$ are equal. Find a value of p. 2.....

3 Write an equation of the axis of symmetry of the graph of $y = x^2 + 2$. 3.....

4 If the graphs of $x^2 + y^2 = 25$ and $x = 5$ are plotted on the same axes, how many points will they have in common? 4.....

5 The point $(-2, a)$ is on the graph of $4x - 3y = 7$. Find the value of a. 5.....

6 Express $\sqrt{-25} + 2\sqrt{-36}$ as a monomial in terms of i. 6.....

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

8 Solve for m: $\frac{a}{m} - b = c$ 8.....

9 Express $\frac{3}{1-x} - \frac{2}{x}$ as a single fraction in simplest form. 9.....

10 Find the logarithm of 17.64. 10.....

11 If $\log N = 9.9549 - 10$, find N. 11.....

12 Find to the *nearest degree* a base angle of an isosceles triangle if each leg is 30 and the altitude to the base is 20. 12.....

[OVER]

13 In a certain arithmetic progression, the sum of the first seven terms is 224. If the first term is 9, find the seventh term. 13.....

14 The sum of an infinite geometric progression is 12. If the first term is 8, find the common ratio. 14.....

15 Mr. Jones can do a job in b hours; his son takes twice as long to do the same job. Write an expression in terms of b for the part of the job which the son can do in one hour. 15.....

16 Factor completely: $3x^2 - 48$ 16.....

17 The roots of $x^2 + kx + m = 0$ are $2 - \sqrt{3}$ and $2 + \sqrt{3}$. Find the value of m. 17.....

18 If $x = -3$, find the value of $(x + 11)^{-\frac{2}{3}}$. 18.....

19 Find the positive geometric mean between $\sqrt{2}$ and $2\sqrt{2}$. 19.....

20 If x varies directly with the square of y and if x is 3 when y is 4, find x when y is 6. 20.....

21 Solve the set of equations:

$$x - 2y = 7$$
$$3x + 4y = -4$$

21.....

Directions (22–30): 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.

22 The fraction $\dfrac{\dfrac{a}{2} - 1}{a^2 - 1}$ is equivalent to

(1) $\dfrac{a-2}{2a^2-2}$ (3) $\dfrac{a-1}{2a^2-1}$

(2) $\dfrac{a-2}{a^2-1}$ (4) $\dfrac{1}{2a+2}$ 22.....

23 The expression $3.14(7) + 3.14(3)$ can be rewritten as

(1) $6.28(21)$ (3) $3.14(21)$

(2) $6.28(10)$ (4) $3.14(10)$ 23.....

24 The equation $x - 3 = \sqrt{x - 3}$ has

(1) both 4 and 3 as roots
(2) 4 as its only root
(3) 3 as its only root
(4) neither 4 nor 3 as roots

24.....

25 If $\log x = a$, then $\log 100x$ may be expressed in terms of a as

(1) $100a$
(2) $2 + a$
(3) $100 + a$
(4) $2 + \log a$

25.....

26 When the number 0.00716 is written in the form 7.16×10^x, the value of x is

(1) -3
(2) 2
(3) 3
(4) -2

26.....

27 The graph of the equation $x = \frac{6}{y}$ is

(1) a circle
(2) a straight line
(3) an ellipse
(4) a hyperbola

27.....

28 Which number is irrational?

(1) .33333....
(2) $\sqrt[3]{-8}$
(3) $\sqrt{8}$
(4) 2.79

28.....

29 The slope of any line parallel to $5x - 2y = 6$ is

(1) $\frac{-2}{5}$
(2) $\frac{-5}{2}$
(3) $\frac{5}{2}$
(4) $\frac{2}{5}$

29.....

30 The tens digit of a two-digit number is twice the units digit. If x represents the units digit, then the number can be represented by

(1) $3x$
(2) $11x$
(3) $12x$
(4) $21x$

30.....

Part II

Answer four questions from this part. Show all work unless otherwise directed. Only algebraic solutions will be accepted in 34 and 35.

31 *a* The length of a rectangle is 3 more than twice the width. Letting x represent the number of units in the width, write an expression for the area of the rectangle in terms of x. [2]

b If the area is 15 square units, find to the *nearest tenth* the number of units in the width. [8]

32 Solve the following set of equations and check your answers: [8, 2]

$$y^2 = xy$$
$$3x + y = 1$$

33 *a* Draw the graph of $y = x^2 - 3x$ from $x = -1$ to $x = 4$, inclusive. [4]

b On the same set of axes, draw the graph of $xy = 12$. [4]

c Estimate to *tenths* the coordinates of the point(s) of intersection of the graphs made in answer to *a* and *b*. [2]

34 On a certain day, under favorable conditions, a pilot was able to increase his usual speed by 30 miles per hour and complete his scheduled flight in 4 hours. On another day, when he had to reduce his usual speed by 20 miles per hour, the trip took $4\frac{2}{3}$ hours. Find the number of miles in the scheduled flight. [6, 4]

35 A dealer paid \$100 for a set of identical pictures. A fire destroyed five of them. When he sold the rest at a gain of \$2 on the original cost of each, he gained \$20 on the whole transaction. How many pictures did he have originally? [5, 5]

36 Using logarithms, find S to the *nearest tenth of a square inch* if $S = \dfrac{\pi a^2}{2 \sin B}$, $a = 2.97$ inches and angle $B = 50°$. [Use the approximation 3.14 for π.] [10]

*37 Solve the following equation: [10]

$$x^3 - 8x^2 + 11x + 20 = 0$$

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

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 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 if the answer to question 11 is not expressed to *four significant digits.* For questions 22–30, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3 or 4.

(1) -7

(2) 4 *or* -4

(3) $x = 0$

(4) 1

(5) -5

(6) $17i$

(7) $84x^5$

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

(9) $\frac{5x-2}{x-x^2}$ *or* $\frac{5x-2}{x(1-x)}$

(10) 1.2465

(11) 0.9014

(12) 42

(13) 55

(14) $\frac{1}{3}$

(15) $\frac{1}{2b}$

(16) $3(x+4)(x-4)$

(17) 1

(18) $\frac{1}{4}$

(19) 2

(20) $6\frac{3}{4}$

(21) $x = 2,\ y = -2\frac{1}{2}$

(22) 1

(23) 4

(24) 1

(25) 2

(26) 1

(27) 4

(28) 3

(29) 3

(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) *a* $2x^2 + 3x$ [2]
b 2.1 [8]

(32) $x = \frac{1}{3}$, $y = 0$
$x = \frac{1}{4}$, $y = \frac{1}{4}$ [8]
Check [2]

(33) *b* Both branches of the hyperbola must be drawn for full credit. [4]
c Allow $x = 3.7$, 3.8 *or* 3.9
Allow $y = 3.0$, 3.1 *or* 3.2 [2]

(34) Analysis [6]
1,400 [4]

(35) Analysis [5]
25 [5]

(36) 18.1 [10]

(37) —1, 4, 5 [10]