The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, January 25, 1961 — 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 m: $r(m + 3) = w$ 1.....

2 Factor completely: $6ax^2 + 13\,ax - 15a$ 2.....

3 Find the coordinates of the point where the graph of $3x + 2y + 8 = 0$ intersects the y-axis. 3.....

4 Solve the following set of equations:

$$2x + y = -2$$
$$4x + y = -8$$

4.....

5 Express $\dfrac{5}{3 - \sqrt{3}}$ as an equivalent fraction with a rational denominator. 5.....

6 Solve for x: $2\sqrt{x - 1} - 1 = 0$ 6.....

7 If $\log y = 0.3302$, find the value of y. 7.....

8 Find the logarithm of 0.5514. 8.....

9 Express $\sqrt{-45} - \sqrt{-5}$ as a monomial in terms of i. 9.....

10 A man travels m miles in h hours. At the same average rate, how far can he go in t hours? 10.....

11 The roots of the equation $x^2 + gx + h = 0$ are -6 and 2. What is the value of h? 11.....

12 Write a linear equation which expresses the relationship between x and y shown in the following table:

x	-2	0	1	5
y	-10	-4	-1	11

12.....

[OVER]

13 If F varies inversely as d^2 and if $F = 6$ when $d = 2$, find the value of F when $d = 4$. 13.....

14 What is the number of terms in the expansion of $(2x - y^4)^7$? 14.....

15 In triangle ABC, angle $C = 90°$, angle $A = 69°$ and side $AC = 10$. Find side BC to the *nearest integer*. 15.....

16 Write an equation for the axis of symmetry of the graph of $y = x^2 + 4x - 5$. 16.....

17 Find the slope of the straight line through the points $(-3, 6)$ and $(0, 8)$. 17.....

18 Find the sum of the infinite geometric progression $4, 1, \frac{1}{4}, \ldots$. 18.....

19 Express in *simplest* form: $\dfrac{1 + \dfrac{1}{m}}{\dfrac{1}{m^2}}$ 19.....

20 The formula for the volume of a container is $V = \frac{1}{3}\pi r^2 h$. If its height h is six times the radius r of its base, express the volume in terms of π and r. 20.....

21 Find the 21st term of an arithmetic progression whose first term is 9 and whose common difference is $-\frac{3}{4}$. 21.....

22 If the equation $9x^2 - 12x + p = 0$ has equal roots, find the value of p. 22.....

Directions (23–30): Write on the line at the right of *each* of the following the *number* preceding the expression that best completes the statement.

23 A salesman earns the following amounts in dollars on five consecutive days: m, $3m$, 10, m, 25. His average earnings in dollars per day is

(1) $5m + 35$ (3) $5m + 7$
(2) $m + 35$ (4) $m + 7$ 23.....

24 If $x = 8$, the value of $x^{-\frac{2}{3}} + 3x^0$ is

(1) $1\frac{1}{4}$ (2) $3\frac{1}{4}$ (3) 5 (4) 7 24.....

25 The graph of the equation $x - y^2 = 0$ is

(1) a hyperbola (3) a parabola
(2) an ellipse (4) a straight line 25.....

26 If $\log x = a$ and $\log y = b$, the logarithm of xy^2 is equal to

(1) $\log (a + 2b)$ (3) $a + 2b$
(2) $\log a + \log 2b$ (4) $a + b^2$ 26.....

27 The graphs of $x = 6$ and $x^2 + y^2 = 36$ are drawn on the same axes. The total number of points common to the two graphs is
(1) 1 (2) 2 (3) 0 (4) 4 27.....

28 The value of 2.16×10^{-4} is
(1) 21,600 (3) 0.000216
(2) 0.00216 (4) 0.0000216 28.....

29 If a, b and c are three unequal positive numbers which in this order form a geometric progression, then
(1) $a + b = b + c$ (3) $a - b = b - c$
(2) $b = \sqrt{ac}$ (4) $a = \sqrt{bc}$ 29.....

30 If $y = (a^3)^2$ and a is negative, then y is equal to
(1) $-a^6$ (2) $-a^5$ (3) a^5 (4) a^6 30.....

Part II

Answer four questions from this part. Show all work unless otherwise directed. Only algebraic solutions will be accepted in 32, 33 and 34.

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

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

32 The length of a rectangle exceeds twice its width by 3 inches. Its area is 10 square inches. Find the dimensions of the rectangle to the *nearest tenth of an inch.* [2, 8]

33 A rectangular picture 24 inches by 32 inches is surrounded by a frame of uniform width. If the area of the frame is 528 square inches less than the area of the picture, find the width of the frame. [6, 4]

34 A boy started on a trip across a lake by motorboat. After he had traveled 15 miles, the motor failed and he had to row the remaining 6 miles to his destination. His average speed by motor was 4 miles per hour faster than his average speed while rowing. If the entire trip took $5\frac{1}{2}$ hours, what was his average speed while rowing? [5, 5]

35 Using logarithms, compute to the *nearest tenth* the value of $\dfrac{85.1 \sin 27°}{\sqrt[3]{0.394}}$. [10]

36 *a* Draw the graph of the equation $y = 2x^2 + 6x + 1$ from $x = -4$ to $x = 1$, inclusive. [6]
b What are the coordinates of the turning point? [1]
c Draw the axis of symmetry for this graph. [1]
d From the graph made in answer to part *a*, estimate to *tenths* the roots of $2x^2 + 6x + 1 = 0$. [2]

*37 *a* Solve for x: $27^x = 3^{2x-1}$ [3]
b Solve for y to the *nearest tenth*: $27^y = 500$ [7]

*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 7 is not expressed to *four significant digits.* For questions 23–30, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3 or 4.

(1) $\frac{w}{r} - 3$ *or* $\frac{w-3r}{r}$

(2) $a\,(x+3)\,(6x-5)$

(3) $(0, -4)$

(4) $x = -3, y = 4$

(5) $\frac{5\,(3+\sqrt{3})}{6}$

(6) $\frac{5}{4}$

(7) 2.139

(8) 9.7415—10 *or* $\overline{1}.7415$

(9) $2i\sqrt{5}$

(10) $\frac{mt}{h}$

(11) —12

(12) $y = 3x - 4$

(13) $1\frac{1}{2}$

(14) 8

(15) 26

(16) $x = -2$

(17) $\frac{2}{3}$

(18) $\frac{16}{3}$

(19) $m^2 + m$ *or* $m\,(m+1)$

(20) $V = 2\pi r^3$

(21) —6

(22) 4

(23) 4

(24) 2

(25) 3

(26) 3

(27) 1

(28) 3

(29) 2

(30) 4

[OVER]

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%, 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.

Part II

(31) Solution [7]

x	$1\frac{1}{2}$	0
y	$-\frac{1}{4}$	-1

[1]
Check [2]

(32) Analysis [2]
width = 1.6″
length = 6.2″ [8]

(33) Analysis [6]
width = 2″ [4]

(34) Analysis [5]
2 m.p.h. [5]

(35) 52.7 [10]

(36) *b* $(-1\frac{1}{2}, -3\frac{1}{2})$ [1]
d Allow —0.3, —0.2 *or* —0.1
and —2.9, —2.8 *or* —2.7 [2]

*(37) *a* $x = -1$ [3]
b $y = 1.9$ [7]