The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, June 19, 1961 — 1:15 to 4:15 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 Solve the following set of equations:

$$x + 2y = 6$$
$$x + y = 0$$

1.....

2 Solve the equation: $\frac{1}{x-1} = \frac{2}{3}$

2.....

3 Perform the indicated operations and express the result in **simplest** form:

$$\frac{3}{x+1} - \frac{1}{x+2}$$

3.....

4 What is the number of terms in the expansion of $(x + y)^8$?

4.....

5 Express in simplest form: $\dfrac{a-1}{1-\frac{1}{a}}$

5.....

6 Solve for w: $gt = wv - wt$

6.....

7 Pressure p varies inversely as volume v. When p is 30, v is 120. **Find** p when v is 200.

7.....

8 Find to *four* decimal places the logarithm of 642.8.

8.....

9 If $\log N = 8.9143 - 10$, find N.

9.....

[OVER]

10 Write in simplest form: $3\sqrt{8} + 4\sqrt{\frac{1}{2}}$ 10.....

11 Express $\frac{3}{4+\sqrt{5}}$ as an equivalent fraction with a rational denominator. 11.....

12 Find the arithmetic mean of the numbers 2 and 8. 12.....

13 Solve for x: $8 = 2 + \sqrt{2x-4}$ 13.....

14 The roots of $x^2 + px + q = 0$ are $1 + \sqrt{2}$ and $1 - \sqrt{2}$. What is the value of q? 14.....

15 Find the sum of the infinite geometric progression $3, \frac{3}{4}, \frac{3}{16}, \ldots$. 15.....

16 What is the value of $(2x)^0(x+1)^{-\frac{1}{2}}$ if $x = 8$? 16.....

17 Find the roots of the equation $2x^2 - 5x - 3 = 0$. 17.....

18 A purse contains \$2.00 in nickels and dimes. If there are twice as many dimes as nickels, how many nickels are there in the purse? 18.....

19 Write an equation of the line which passes through (3, 0) and has the same slope as the line $2x - y = 1$. 19.....

20 Write in simplest form:

$$\left(\frac{ax^2}{b^3}\right)^3 \left(\frac{b}{a^2x}\right)^2$$ 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 graph of $x^2 + 2y^2 = 8$ is

(1) a circle
(2) an ellipse
(3) a hyperbola
(4) a parabola

21.....

22 The expression $\log \frac{M^2}{2N}$ is equal to

(1) $\frac{\log M^2}{\log 2N}$
(2) $\frac{2 \log M}{\log 2 + \log N}$
(3) $2 \log M - \log 2 - \log N$
(4) $2 \log M - \log 2 + \log N$

22.....

23 The expression $x^2 + 2x + 1 = a$ is an identity if a is equal to

(1) 0
(2) $x + 1$
(3) $(x + 1)^2$
(4) $(x - 1)^2$

23.....

24 The equation $x^2 + y^2 = 4$ is satisfied by the number pair

(1) $(0, \sqrt{2})$
(2) $(0, -\sqrt{2})$
(3) $(2, -2)$
(4) $(1, -\sqrt{3})$

24.....

25 The roots of the equation $x^2 + 2x + 2 = 0$ are

(1) real, rational, equal
(2) real, irrational, unequal
(3) real, rational, unequal
(4) imaginary

25.....

26 The set of equations $x + 2y = 4$, $2x + 4y = 10$, has

(1) one solution only
(2) two solutions only
(3) no solution
(4) an infinite set of solutions

26.....

27 The expression $\sqrt{-81} + 2i - \sqrt{-9}$ is equal to

(1) $8i$
(2) $74i$
(3) $-4i$
(4) $14i$

27.....

28 If $\log_{10} M = x$, then M is equal to

(1) x^{10}
(2) 10^x
(3) $10x$
(4) $x - 10$

28.....

29 Point P $(1, 2)$ lies on the graph of

(1) $y = x + 2$
(2) $x = y + 2$
(3) $y = 2x^2$
(4) $x = 2y^2$

29.....

30 The sides of a right triangle are 5, 12 and 13. The sine of the smallest angle is

(1) $\frac{5}{12}$
(2) $\frac{5}{13}$
(3) $\frac{12}{13}$
(4) $\frac{13}{5}$

30.....

[OVER]

Part II

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

31 Find to the *nearest tenth* the roots of the equation $3x^2 + 7x = 1$. [10]

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

$$3x^2 + 2y^2 = 11$$
$$x - y = 1$$

33 The period of a simple pendulum is given by the approximate formula $t = 6.28\sqrt{\frac{L}{32.2}}$, where L is the length of the pendulum in feet and t is the time in seconds. Using logarithms, find t to the *nearest hundredth of a second* if L = 9.70 feet. [10]

34 *a* Solve *graphically* the following set of equations: [8]

$$xy = 12$$
$$y = 2x + 2$$

b Check the solution(s) obtained in answer to part *a*. [2]

35 The tens digit of a two-digit number is 3 more than the units digit. The number itself is 4 less than the sum of the squares of its digits. Find the number. [4, 6]

36 Consider the statement: The difference of the squares of any two consecutive odd integers is exactly divisible by 8.

a Show that the above statement is true for the consecutive odd integers 7 and 9. [2]

b If n is any integer, then $2n + 1$ represents an odd integer. Express in terms of n the next consecutive odd integer. [2]

c Express in terms of n the difference of the squares of the consecutive odd integers in part *b*. [2]

d Show that the difference of the squares of any two consecutive odd integers is exactly divisible by 8. [4]

*37 Find the roots of the equation $x^3 + 3x^2 - 2x - 6 = 0$. [10]

* 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

Monday, June 19, 1961 — 1:15 to 4:15 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. For questions 21–30, allow credit if the pupil has written the correct answer instead of the number **1, 2, 3 or 4.**

(1) $(-6, 6)$ *or* $\begin{matrix} x = -6 \\ y = 6 \end{matrix}$

(2) $\frac{5}{2}$

(3) $\frac{2x + 5}{(x + 1)(x + 2)}$

(4) nine

(5) a

(6) $\frac{gt}{v - t}$

(7) 18

(8) 2.8081

(9) 0.0821

(10) $8\sqrt{2}$

(11) $\frac{3(4 - \sqrt{5})}{11}$

(12) 5

(13) 20

(14) -1

(15) 4

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

(17) $-\frac{1}{2}$ and 3

(18) 8

(19) $y = 2x - 6$

(20) $\frac{x^4}{ab^7}$

(21) 2

(22) 3

(23) 3

(24) 4

(25) 4

(26) 3

(27) 1

(28) 2

(29) 3

(30) 2

[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 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.

Part II

(31) 0.1 and — 2.5 [10]

(32) Solution [7]

x	-1	$\frac{9}{5}$
y	-2	$\frac{4}{5}$

[1]

Check [2]

(33) 3.45 [10]

(34) *a* Graph consists of a hyperbola (both branches) and a straight line intersecting at (2, 6) and (—3, —4). [8]

b Check [2]

(35) Analysis [4]

85 [6]

(36) *b* $2n + 3$ [2]

c $(2n + 3)^2 - (2n + 1)^2$ *or* $8n + 8$ [2]

(37) $-3, \sqrt{2}, -\sqrt{2}$ [10]