The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Monday, June 17, 1963 — 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 Factor: $6x^2 + 5x - 21$ 1.....

2 Solve the set of equations: $2x + y = 8$
$3x + 2y = 9$ 2.....

3 Write an equation of the line which passes through (0,5) and which has the same slope as the line $3x - y = 1$. 3.....

4 Solve the equation: $\frac{3}{2x-1} = \frac{1}{3x-5}$ 4.....

5 Find the number whose logarithm is 1.5137. 5.....

6 Find the logarithm of 0.6738. 6.....

7 Solve for n the formula $c = \frac{en}{s+nr}$. 7.....

8 The roots of $x^2 + kx + n = 0$ are $2 - \sqrt{2}$ and $2 + \sqrt{2}$. Find the value of k. 8.....

9 Express the sum of $3i$ and $\sqrt{-36}$ as a monomial in terms of i. 9.....

10 Express $\frac{3}{\sqrt{5}-1}$ as an equivalent fraction with a rational denominator. 10.....

[OVER]

11 Write in *simplest form* the third term only in the expansion of $(2 - a)^5$. 11.....

12 Find the sum of the first 12 terms of the arithmetic progression 20, 18, 16, ... 12.....

13 Write as an integer the 6th term of the geometric progression $\sqrt{3}, 3, 3\sqrt{3}, \ldots$. 13.....

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

x	-1	0	3	5
y	-7	-5	1	5

14.....

15 In triangle ABC, angle $C = 90°$, $AB = 12$ and $AC = 7$. Find to the *nearest degree* the number of degrees in angle B. 15.....

16 Write an equation of the axis of symmetry of the graph of $y = 2x^2 + 4x - 1$. 16.....

17 If $x = \dfrac{1}{1+a}$, express $2x - 1$ as a single fraction in terms of a. 17.....

18 The distance covered by an object falling freely from rest varies directly as the square of the number of seconds it falls. If an object falls 144 feet in 3 seconds, how many feet will it fall in 10 seconds? 18.....

19 Write the coordinates of the point of intersection of the graph of $2x - 3y + 8 = 0$ and the x-axis. 19.....

20 A boat requires one-half hour to travel 10 miles in still water. If this boat is moving upstream against a current of r miles per hour, express in terms of r the number of miles per hour at which the boat is traveling upstream. 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 or answers the question.

21 If $x = 4$, the value of $4x^{\frac{1}{2}} + (x^0 + 3)^{-1}$ is

(1) $8\frac{1}{4}$ (2) $8\frac{1}{7}$ (3) $4\frac{1}{3}$ (4) $\frac{11}{28}$ 21.....

22 The expression $\dfrac{2+\dfrac{1}{n}}{\dfrac{1}{n^2}}$ is equivalent to

(1) $\dfrac{2n+1}{n}$ (2) $\dfrac{n}{2n+1}$ (3) $2n+1$ (4) $n(2n+1)$ 22.....

23 The expression 3.18×10^{-3} is equivalent to

(1) 3,180 (2) 318,000 (3) 0.00318 (4) 0.000318 23.....

24 Which number is irrational?

(1) 3.75 (2) 0.5555... (3) $\sqrt{12}$ (4) $\sqrt[3]{-27}$ 24.....

25 If the graphs of $x^2 + y^2 = 16$ and $y = -3$ were drawn on the same set of axes, the total number of points common to the graphs would be

(1) 1 (2) 2 (3) 3 (4) 4 25.....

26 Which is an example of the associative law for multiplication?

(1) $2(3 \cdot 4) = (2 \cdot 3)4$
(2) $2(3 \cdot 4) = 2(4 \cdot 3)$
(3) $2(3 \cdot 4) = (3 \cdot 4)2$
(4) $2(3+4) = 2 \cdot 3 + 2 \cdot 4$ 26.....

27 Given the equation $0 = ax^2 + bx + c$ in which a, b and c are integers. If the discriminant of this equation is equal to 8, then the roots of the equation must be

(1) real (2) positive (3) equal (4) rational 27.....

28 The equation $\sqrt{y-3} = 5 - y$ has

(1) both 7 and 4 as roots
(2) 7 as its only root
(3) 4 as its only root
(4) neither 7 nor 4 as roots 28.....

29 Log $\dfrac{100}{x}$ is equal to

(1) $\dfrac{2}{\log x}$ (2) $2 - \log x$ (3) $\dfrac{2}{x}$ (4) $2 - x$ 29.....

30 The graph of the equation $2x^2 + y^2 = 3$ is

(1) a circle (2) an ellipse (3) a hyperbola (4) a parabola 30.....

Part II

Answer four questions from this part. Show all work unless otherwise directed. Only an algebraic solution will be accepted in 33.

31 Determine *algebraically* the coordinates of the points of intersection of the graphs of the following set of equations. Check your answers. [8, 2]

$$x + 2y = 4$$
$$y^2 - xy = 7$$

32 Find to the *nearest tenth* the roots of the equation $3x^2 - 7x - 2 = 0$. [10]

33 A merchant purchased a number of coats, each at the same price, for a total of \$720. He sold them at \$40 each, thus realizing a profit equal to his cost of 8 coats. How many did he buy? [5, 5]

34 *a* Draw the graph of $y = 2x^2 - 4x - 5$, using all integral values of x from $x = -2$ to $x = 4$, inclusive. [6]

b From the graph made in answer to part *a*, estimate to *tenths* the roots of $2x^2 - 4x - 5 = 0$. [2]

c Give a value of k for which the roots of $2x^2 - 4x - 5 = k$ are imaginary. [2]

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 Two men start at the same time from the same place and travel along roads that are at right angles to each other. One man travels 4 miles per hour faster than the other, and at the end of 2 hours they are 40 miles apart. Determine their rates of travel. [5]

b The tens digit of a two-digit number is 4 less than the units digit. If 16 is subtracted from three times the original number, the result is equal to the number obtained by reversing the digits of the original number. Find the original number. [5]

36 A formula for finding the side of a regular pentagon is $s = \sqrt{\dfrac{0.8K}{\tan 54°}}$.

Using logarithms, find to the *nearest hundredth* the length of a side of the pentagon when $K = 1.29$. [10]

*37 Answer *either* *a* or *b* but *not* both: [10]

a Find the roots of the equation $4x^3 - 5x^2 - 7x + 2 = 0$.

OR

b In how many years will \$530 amount to \$725 if interest is compounded annually at 4%? [Use the formula $A = P(1 + r)^n$ and give your answer to the *nearest year*.]

*These questions are based on optional topics in the syllabus.

FOR TEACHERS ONLY

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SCORING KEY
INTERMEDIATE ALGEBRA

Monday, June 17, 1963 — 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. Do not allow credit unless an equation is written in 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) $(3x + 7)(2x - 3)$

(2) $(7, -6)$

(3) $3x - y = -5$

(4) 2

(5) 32.64

(6) $9.8286 - 10$

(7) $\frac{cs}{e - cr}$

(8) -4

(9) $9i$

(10) $\frac{3(\sqrt{5}+1)}{4}$

(11) $80a^2$

(12) 108

(13) 27

(14) $y = 2x - 5$

(15) 36

(16) $x = -1$

(17) $\frac{1-a}{1+a}$

(18) 1600

(19) $(-4,0)$

(20) $20 - r$

(21) 1

(22) 4

(23) 3

(24) 3

(25) 2

(26) 1

(27) 1

(28) 3

(29) 2

(30) 2

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) $(6, -1)$ and $\left(-\frac{2}{3}, \frac{7}{3}\right)$ [8]
Check [2]

(32) 2.6 and —0.3 [10]

(33) Analysis [5]
24 [5]

(34) *b* Allow 3.0, 2.9 *or* 2.8 and —1.0, —0.9 *or* —0.8. [2]
c $k < -7$ [2]

(35) *a* Let r = rate of one man
$(2r)^2 + (2r + 8)^2 = 1600$ [5]
b Let t = tens digit and u = units digit
$t = u - 4$
$3(10t + u) - 16 = 10u + t$ [5]

(36) 0.87 [10]

(37) *a* $-1, \frac{1}{4}, 2$ [10]
b 8 [10]