The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, January 27, 1960 — 9:15 a.m. to 12:15 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 Express $\frac{3}{4-\sqrt{3}}$ as an equivalent fraction with a rational denominator. 1.....

2 Solve the following set of equations:

$$2x + 3y = 7$$
$$3x - y = -6$$

2.....

3 Factor: $6x^2 - 7x - 10$ 3.....

4 Find the value of $(x+2)^0 + (x+1)^{-\frac{2}{3}}$ when $x = 7$. 4.....

5 Solve the equation $ax + b = bx + c$ for x. 5.....

6 Find the logarithm of 0.2247. 6.....

7 Find the number whose logarithm is 2.8124. 7.....

8 Find the 33rd term in the arithmetic progression 9, 6, 3, ... 8.....

9 Find two numbers which, when inserted between 24 and 81, form with these numbers a geometric progression. 9.....

10 Find the sum of the infinite geometric progression 9, 6, 4, ... 10.....

11 Combine into a single fraction: $\frac{4}{x-2} - \frac{3}{x}$ 11.....

12 If b varies inversely as h and if $b = 8$ when $h = 9$, find b when $h = 6$. 12.....

13 Write an equation of the line which has a slope of 2 and which passes through the point $(2, -1)$. 13.....

[OVER]

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

x	—1	1	4	8
y	—2	4	13	25

14.....

15 Express the sum of $\sqrt{-12}$ and $i\sqrt{3}$ as a monomial in terms of i. 15.....

16 The number 0.0000017 is to be expressed in the form 1.7×10^n. Find the value of n. 16.....

17 Write in simplest form the third term *only* in the expansion of $(x+2)^7$. 17.....

18 Find the product of the roots of the equation $3x^2 + 7x - 6 = 0$. 18.....

Directions (19–25): Write on the line at the right of *each* of the following the *number* preceding the expression that best completes the statement.

19 The value of x which satisfies the equation $\sqrt{x-1} + x = 7$ is
(1) 10 only (2) —10 only (3) both 5 and 10 (4) 5 only 19.....

20 If $x = \log m$, then $x + 2$ equals (10) $\log m^2$ (2) $\log 2m$
(3) $\log 100m$ (4) $\log (m+2)$ 20.....

21 The roots of the equation $x^2 + px + q = 0$ are —1 and 3. The value of p is (1) —2 (2) 2 (3) 3 (4) —3 21.....

22 An equation of the axis of symmetry of the graph of the equation $y = 2x^2 + 6x - 5$ is (1) $x = -\frac{3}{2}$ (2) $x = -3$
(3) $y = -\frac{3}{2}$ (4) $y = -3$ 22.....

23 The graph of the equation $4x^2 = 25 + 4y^2$ is (1)an ellipse
(2)a parabola (3)a hyperbola (4)a circle 23.....

24 The fraction $\frac{x^{-1}}{x^{-1}+y^{-1}}$ is equal to (1) y (2) $\frac{y}{x+y}$
(3) $\frac{x+y}{x}$ (4) $\frac{x}{x+y}$ 24.....

25 The roots of the equation $3x^2 - 7x + 4 = 0$ are (1)real, rational, equal (2)real, rational, unequal (3)real, irrational, unequal
(4)imaginary 25.....

Part II

Answer three questions from this part. Show all work unless otherwise directed.

26 Solve the following system of equations, group your answers and check them in both equations: [6, 2, 2]

$$x^2 - 3xy = 10$$
$$x + y = 1$$

27 *a* Draw the graph of $y = x^2 - 5x + 4$ from $x = -1$ to $x = 6$. [6]

b On the same set of axes used in *a*, draw the graph of $x^2 + y^2 = 16$. [2]

c From the graphs made in answer to *a* and *b*, determine the values of x and y common to both equations. [2]

28 Find to the *nearest tenth* the roots of $x^2 + 4x + 2 = 0$. [10]

29 Using logarithms, find to the *nearest tenth* the value of $\dfrac{\tan 75^\circ\ (4.66)^2}{\sqrt[3]{0.941}}$. [10]

The following questions, *30 and *31, are based upon optional topics in the syllabus, and one of them may be substituted for any one question in either part II or part III. Therefore one, but not both, of these questions may be included in the total of 5 required questions from parts II and III.

*30 *a* Solve for x: $8^{x-2} = 2^{2x}$ [4]

b Solve for x to the *nearest tenth*: $3^{2x} = 50$ [6]

*31 Solve the following set of equations for x, y and z and check: [8, 2]

$$3x + 2y - 4z = 11$$
$$2x - y + 3z = 0$$
$$x + 3y - 5z = 8$$

Part III

Answer two questions from this part. Show all work unless otherwise directed. Only algebraic solutions will be accepted in 33–35.

32 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 John can do a job in 10 minutes less time than William. One day John worked alone for 15 minutes; then William worked alone for 20 minutes to finish the job. How long would it take each working alone to do the job? [5]

b If a two-digit number is divided by the sum of the digits, the result is 4. If the digits are reversed, the new number exceeds the original number by 36. Find the original number. [5]

33 Three numbers are in the ratio of 1 : 2 : 3. If 2 is added to the smallest number, the resulting number together with the other two numbers form a geometric progression. Find the original numbers. [5, 5]

34 A rectangular piece of cardboard is twice as long as it is wide. From each of its four corners a square piece 3 inches on a side is cut out. The flaps are then turned up to form an open box. If the volume of the box is 168 cubic inches, find the original dimensions of the piece of cardboard. [6, 4]

35 A chemist wishes to make 30 ounces of 12% solution of disinfectant. To do this he mixes a 33% solution of disinfectant with a 10% solution. Find to the *nearest tenth* the number of ounces of *each* that he uses. [5, 5]

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 check marks 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 19–25, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3 or 4.

(1) $\frac{3(4+\sqrt{3})}{13}$

(2) $x = -1, y = 3$ *or* $(-1, 3)$

(3) $(6x+5)(x-2)$

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

(5) $\frac{c-b}{a-b}$ *or* $\frac{b-c}{b-a}$

(6) $9.3516 - 10$ *or* -0.6484

(7) 649.3

(8) -87

(9) 36, 54

(10) 27

(11) $\frac{x+6}{x(x-2)}$

(12) 12

(13) $y = 2x - 5$

(14) $y = 3x + 1$

(15) $3i\sqrt{3}$

(16) -6

(17) $84x^5$

(18) -2

(19) 4

(20) 3

(21) 1

(22) 1

(23) 3

(24) 2

(25) 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

(26) Solution [6]

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

[2]

Check [2]

(27) c $\begin{array}{c|c|c} x & 0 & 4 \\ \hline y & 4 & 0 \end{array}$ *or* (0, 4) and (4, 0) [2]

(28) —0.6 and —3.4 [10]

(29) 82.7 [10]

*(30) *a* $x = 6$ [4]
b $x = 1.8$ [6]

*(31) $x = 2, y = -\frac{1}{2}, z = -\frac{3}{2}$ [8]

Check [2]

Part III

(32) *a* Let x = number of minutes for William alone.

$$\frac{15}{x-10} + \frac{20}{x} = 1$$ [5]

b Let u = units digit and t = tens digit

$$\frac{10t+u}{t+u} = 4 \text{ and } 10u + t - 36 = 10t + u$$ [5]

(33) Analysis [5]
6, 12, 18 [5]

(34) Analysis [6]
10 in. by 20 in. [4]

(35) Analysis [5]
2.6 oz. of 33% solution and 27.4 oz. of 10% solution [5]