The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Friday, June 14, 1957 — 1:15 to 4:15 p.m., only

Instructions

Part I is to be done first and the maximum time allowed for it is one and one half hours. At the end of that time, this part of the examination must be detached and will be collected by the teacher. If you finish part I before the signal to stop is given, you may begin part II.

Write at top of first page of answer paper to parts II and III (a) name of school where you have studied, (b) number of weeks and recitations a week in intermediate algebra.

The minimum time requirement is four or five recitations a week for half a school year after the completion of elementary algebra.

Fill in the following lines:

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 Factor $12x^2 + x - 6$.

1..............

2 Express as a single term the sum of $\sqrt{-16}$ and $-i$.

2..............

3 In the equation $T = 80 - \dfrac{x}{4}$, find the value of x when $T = 60$.

3..............

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

4..............

5 If $K = \frac{1}{2}ab$ and $b = 2a$, express K in terms of b.

5..............

6 Write an equation of the line whose y-intercept is 3 and whose slope is the same as that of the line whose equation is $y = 2x - 7$.

6..............

7 The graph of the equation $5x + 2y = 12$ passes through the point P, whose abscissa is 4. Find the ordinate of P.

7..............

8 Solve for e the equation $S = \sqrt{\dfrac{20e}{k}}$.

8..............

9 If the number 0.0000736 is written in the form 7.36×10^n, find the value of n.

9..............

10 The tens digit of a certain two-digit number is represented by x and the units digit by y. Express the number in terms of x and of y.

10..............

[1]

11 Perform the indicated operations and express in *simplest form:*

$$\left(\frac{1}{t} + \frac{1}{s}\right) \left(\frac{t}{s+t}\right)$$

11................

12 Find the logarithm of 0.04123

12................

13 Find the number whose logarithm is 1.1650

13................

14 In right triangle ABC, angle $C = 90°$, side $AB = 20$ and side $BC = 8$. Find angle B to the *nearest degree.*

14................

15 The first term of an arithmetic progression is 2 and the 20th term is $\frac{27}{4}$. Find the common difference.

15................

16 Find the sum of the infinite geometric progression 2, 1, $\frac{1}{2}$, $\frac{1}{4}$, ...

16................

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

17................

18 Joe can mow a certain lawn in K minutes. What part of the lawn can he mow in 15 minutes, K being greater than 15?

18................

19 If x varies directly as y^2 and if $x = 2$ when $y = 1$, find the value of x when $y = 3$.

19................

20 Find the sum of the roots of the equation $2x^2 - 7x - 130 = 0$.

20................

Directions (21–25): Indicate the correct completion for *each* of the following by writing the letter a, b, c or d on the line at the right.

21 If $3\sqrt{2} = \sqrt{a}$, the value of a is (a) 6 (b) 2 (c) 12 (d) 18

21................

22 When drawn on the same set of axes, the graphs of $y = x$ and $x^2 + y^2 = 16$ will intersect in (a) one point (b) two points (c) three points (d) four points

22................

23 The roots of the equation $6x^2 - 2x - 3 = 0$ are (a) real and irrational (b) real and rational (c) imaginary (d) equal

23................

24 If $x = 3 + \sqrt{2}$, the value of x^2 is (a) 11 (b) $11 + 6\sqrt{2}$ (c) $9 + \sqrt{2}$ (d) 5

24................

25 If $\log n = K$, then $\log nt$ equals (a) $K + t$ (b) Kt (c) $K \log t$ (d) $K + \log t$

25................

[2]

Part II

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

26 Find to the *nearest tenth* the roots of the equation $2x^2 + 6x + 3 = 0$.   [10]

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

  b From the graph drawn in answer to part *a*, determine the *least integral* value of k for which the roots of the equation $x^2 - 2x + 4 = k$ are real.   [2]

  c Write an equation of the circle whose center is the origin and which passes through the y-intercept of the graph drawn in answer to part *a*.   [2]

28 *a* Solve the following system of equations and check *one set* of answers: [6, 1]

$$y = 2x - 3$$
$$3x^2 = 4 + xy$$

  b Give the name of the graph of *each* of the following: [*Drawing the graphs is not required.*]   [3]

  (1) $xy = 10$
  (2) $x + y = 25$
  (3) $3x^2 + 2y^2 = 6$

29 Given the formula $t = \pi \sqrt{\dfrac{L}{g}}$.

Using logarithms, find to the *nearest hundredth* the value of t when $L = 1.38$, $g = 32.2$ and $\pi = 3.14$.   [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 Solve the following system of equations for x, y and z and check: [8, 2]

$$3x + 3y - 2z = 0$$
$$4x - 9y + 4z = 6$$
$$5x - 6y + 6z = 6$$

*31 In how many years (n) will \$400 amount to \$1,200 if interest is compounded annually at 4%? [Use the formula $A = P(1 + r)^n$ and give your answer to the *nearest integer*.]   [10]

[3]

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 equations that would be used in solving the following problems. In *each* case state what the letter or letters represent. [*Solution of the equations is not required.*]

    a The hypotenuse of a right triangle exceeds the longer of the two legs by 2. If the perimeter of the triangle is 40, find the lengths of the three sides of the triangle. [5]

    b A speedboat traveling at 30 miles per hour traveled the length of a lake in 20 minutes less time than when traveling at 24 miles per hour. Find the length of the lake. [5]

33 The members of a club were asked to contribute equally to provide a fund of $60. When 5 members failed to contribute, each of the others had to increase his contribution by $.40 to get the required $60. How many members contributed to this fund? [5, 5]

34 *a* The sequence of *positive* numbers 3, *x*, *y*, 25 is such that the first three terms form an arithmetic progression and the last three terms form a geometric progression.

    (1) Write an equation in *x* and *y* expressing the relationship that 3, *x*, and *y* form an arithmetic progression. [3]

    (2) Write an equation in *x* and *y* expressing the relationship that *x*, *y*, and 25 form a geometric progression. [3]

    b Using the formula $S = \dfrac{ar^n - a}{r - 1}$, find in *simplest form* the sum of the four terms of the progression $2, 3, \dfrac{9}{2}, \dfrac{27}{4}$. [4]

35 A flask with a capacity of 120 cubic centimeters is partially filled with a 2% solution of iodine in alcohol. The flask is then completely filled by adding a 10% iodine solution. If the contents of the flask then test to be 3% iodine, how much of the 2% solution was originally in the flask? [6, 4]

[4]

FOR TEACHERS ONLY

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INSTRUCTIONS FOR RATING
INTERMEDIATE ALGEBRA

Friday, June 14, 1957 — 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 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 12 is not expressed to *four* decimal places and if the answer to question 13 is not expressed to *four significant digits*. For questions 21–25, allow credit if the pupil has written the correct answer instead of the letter *a, b, c* or *d*.

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

(2) $3i$

(3) 80

(4) $1\frac{1}{2}$

(5) $K = \dfrac{b^2}{4}$

(6) $y = 2x + 3$

(7) -4

(8) $e = \dfrac{ks^2}{20}$

(9) -5

(10) $10x + y$

(11) $\dfrac{1}{s}$

(12) $8.6152 - 10 \; or \; \bar{2}.6152$

(13) 14.62

(14) 66

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

(16) 4

(17) $21x^5y^2$

(18) $\dfrac{15}{K}$

(19) 18

(20) $\dfrac{7}{2}$

(21) d

(22) b

(23) a

(24) b

(25) d