The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

# INTERMEDIATE ALGEBRA

Tuesday, August 20, 1957 — 12 m. to 3 p.m., only

**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 Express as a monomial in terms of $i$: $\frac{1}{2}\sqrt{-4}+3i$. 1.....

2 Solve for $x$: $\sqrt{x-7}=3$. 2.....

3 If $y$ varies directly as $x$ and $y=4$ when $x=6$, find the value of $y$ when $x=5$. 3.....

4 Express as a single decimal the number $3.24\times10^{-5}$. 4.....

5 Simplify the complex fraction: $\dfrac{1-\frac{1}{x}}{1+\frac{1}{x^2}}$ 5.....

6 Solve the equation $k=ar^6$ for $r$ in terms of $k$ and $a$. 6.....

7 Find the third term *only* of the expansion of $(x+y)^7$. 7.....

8 A taxi ride costs 45 cents for the first mile and 25 cents for each succeeding mile. Write a formula for the cost, $C$, in cents, of riding $n$ miles where $n$ is an integer greater than 1. 8.....

9 Find, to the *nearest integer*, the number of feet in the height of a building that casts a shadow 32 feet long when the angle of elevation of the sun is 64°. 9.....

10 Find the logarithm of 0.4167. 10.....

11 Find the number whose logarithm is 3.8958. 11.....

12 If three arithmetic means are inserted between 5 and 13, find the *common difference* of the resulting arithmetic progression. 12.....

13 Find the sum of the 49 even integers from 2 to 98, inclusive. 13.....



[OVER]

14 Find the sum of the infinite geometric progression $6, 2, \frac{2}{3}, \ldots$. 14.....

15 Write an equation of the circle whose center is the origin and which passes through the point $(6, 8)$. 15.....

16 Write an equation of the line parallel to the graph of $y = 3x - 4$ and which passes through the point $(0, 2)$. 16.....

17 What is the product of the roots of the equation $2x^2 - 3x - 4 = 0$? 17.....

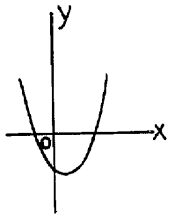
18 A man can do a job in 5 days working alone and his helper can do the job in 10 days working alone. What part of the job can they do in one day when working together at their respective rates? 18.....

19 Write an equation of the axis of symmetry of the graph of the equation $y = 3x^2 + 6x - 1$. 19.....

*Directions* (20–25): Indicate the correct completion for *each* of the following by writing on the line at the right the letter *a*, *b*, *c*, *d* or *e*.

20 The graphs of the equations $xy = 10$ and $y = x$
(*a*) intersect in one point (*b*) intersect in two points
(*c*) do not intersect (*d*) are tangent at one point
(*e*) are tangent at two points 20.....

21 The graph of the equation $y = ax^2 + bx + c$ is shown below.




From information derived from the graph, it can be concluded that the discriminant of the equation is (*a*) positive (*b*) negative (*c*) zero (*d*) a perfect square (*e*) not a perfect square 21.....

22 The graph of the equation $x^2 - y^2 = 4$ is (*a*) a circle (*b*) an ellipse (*c*) a parabola (*d*) a hyperbola (*e*) two straight lines 22.....

23 The roots of the equation $4x^2 - 12x + 9 = 0$ are (*a*) real, irrational and equal (*b*) real, irrational and unequal (*c*) real, rational and equal (*d*) real, rational and unequal (*e*) imaginary 23.....

24 If $3^{n-1} = \frac{1}{27}$, then $n =$ (*a*) $-2$ (*b*) $-1$ (*c*) 0 (*d*) 1 (*e*) 2 24.....

25 If $\log N = \log x - 2 \log y + \log z$, then $N$ is equal to
(*a*) $\frac{x}{2yz}$ (*b*) $\frac{xz}{2y}$ (*c*) $\frac{x+z}{y^2}$ (*d*) $\frac{xz}{y^2}$ (*e*) $\frac{x}{y^2z}$ 25.....

## Part II

**Answer three questions from this part. Show all work.**

26 Perform the indicated operations and express the results in *simplest form.* [5, 5]

*a* $\dfrac{6x^2 + x - 2}{2x^2 + 4x} \div \dfrac{3x + 2}{x^3 - 4x}$

*b* $\dfrac{1}{x^2 - 9} - \dfrac{1}{6 - 2x}$

27 Solve the following system of equations and check: [8, 2]

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

28 Find to the *nearest tenth* the roots of the equation $5x^2 - x = 3$. [10]

29 Using logarithms, find to the *nearest tenth,* the value of $a$ in the formula

$a = \sqrt{\dfrac{6V}{h \sin C}}$ when $V = 462$, $h = 9.16$ and $C = 52°$. [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 equation $6x^3 + 11x^2 - 4x - 4 = 0$. [10]

*31 Solve the following system of equations and check: [8, 2]

$$3x - 2y + 2z = 8$$
$$2x + 4y + 6z = -5$$
$$2x + 6y - 4z = -3$$

## Part III

**Answer two questions from this part. Show all work unless otherwise directed. Only algebraic solutions will be accepted in 33–34.**

32 Write the 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* The ratio of the altitude to the base of a triangle is 2:3. If the altitude is increased by 6 and the base decreased by 6, the area is increased by 36. Find the base of the triangle. [5]

*b* A man left New York City at 8:00 a.m. to travel to Springfield, Massachusetts, a distance of 140 miles. After a stay of $1\frac{1}{2}$ hours in Springfield, he started back over the same route, and in order to arrive home at 5:00 p.m., he increased his average speed by 5 miles an hour over his average speed enroute to Springfield. What was his average speed from New York to Springfield? [5]

33 How many ounces of a 10% argyrol solution must be added to 8 ounces of a 25% solution of argyrol in order that the resulting solution will be 12% argyrol? [6, 4]

34 The units digit of a two-digit number exceeds the tens digit by 2. If the number is divided by the units digit, the quotient is equal to the sum of the digits. Find the number. [5, 5]

35 Write the numbers 1–5 on your answer paper and next to *each* indicate the correct completion for the corresponding statement by writing the letter *a, b, c, d* or *e*: [10]

(1) $8^{\frac{2}{3}}$ is equal to (*a*) $-4$ (*b*) 64 (*c*) 256 (*d*) 4 (*e*) $\frac{1}{4}$

(2) $\frac{x^2y^{-1}}{z}$ is equal to (*a*) $\frac{x^2}{yz}$ (*b*) $\frac{1}{x^2yz}$ (*c*) $\frac{x^2z}{y}$ (*d*) $\frac{y}{x^2z}$ (*e*) $\frac{z}{x^2y}$

(3) $\frac{x^0+y^{-2}}{z^2}$ is equal to (*a*) $\frac{y^2+1}{y^2z^2}$ (*b*) $\frac{y^2+1}{z^2}$ (*c*) $\frac{1}{y^2z^2}$ (*d*) $\frac{z^2}{(1+y)^2}$ (*e*) $\frac{1}{(1+y^2)z^2}$

(4) $\frac{y^{\frac{1}{2}}}{z}$ is equal to (*a*) $\sqrt{\frac{y}{z}}$ (*b*) $\sqrt{\frac{z}{y}}$ (*c*) $\frac{1}{y^2z}$ (*d*) $\frac{\sqrt{y}}{z}$ (*e*) $\pm\frac{1}{yz}$

(5) $\frac{(x-y)^{-1}}{x+y}$ is equal to (*a*) $\frac{y-x}{x+y}$ (*b*) $\frac{x+y}{x-y}$ (*c*) $\frac{1}{y^2-x^2}$ (*d*) $\frac{y-x}{xy(x+y)}$ (*e*) $\frac{1}{x^2-y^2}$

# 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 10 is not expressed to *four* decimal places, and if the answer to question 11 is not expressed to *four significant digits*. For questions 20–25, allow credit if the pupil has written the correct answer instead of the letter *a, b, c, d* or *e*.

(1) $4i$

(2) 16

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

(4) 0.0000324

(5) $\dfrac{x^2-x}{x^2+1}$

(6) $r=\sqrt[5]{\dfrac{k}{a}}$

(7) $21x^5y^2$

(8) $C=45+25(n-1)$ *or* $C=25n+20$

(9) 66

(10) 9.6198 — 10

(11) 7867

(12) 2

(13) 2450

(14) 9

(15) $x^2+y^2=100$

(16) $y=3x+2$

(17) $-2$

(18) $\frac{3}{10}$ *or* $\frac{1}{5}+\frac{1}{10}$

(19) $x=-1$ *or* $x+1=0$

(20) $b$

(21) $a$

(22) $d$

(23) $c$

(24) $a$

(25) $d$

### Part III

**Answers to the objective question only are given below.**

35 (1) $d$ (3) $a$ (5) $e$

(2) $a$ (4) $d$