

The University of the State of New York

324TH HIGH SCHOOL EXAMINATION

INTERMEDIATE ALGEBRA

Wednesday, June 22, 1955 — 9.15 a.m. to 12.15 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.

Part II

Answer three questions from this part. Show all work.

26 Find to the *nearest tenth* the roots of the equation $12 - 5x = x^2$. [10]

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

$$\begin{aligned}x^2 + xy &= 6 \\ 3x - y &= 2\end{aligned}$$

28 Solve graphically the following system of equations: [6, 2, 2]

$$\begin{aligned}xy &= 6 \\ x - 3y &= 3\end{aligned}$$

29 Using logarithms, find to the *nearest integer* the value of

$$\frac{38.4 \times (1.82)^2}{\sqrt[3]{0.0870}} \quad [10]$$

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 $2x^3 - 3x^2 - 23x + 12 = 0$. [10]

*31 In how many years (n) will \$709 amount to \$952 if interest is compounded annually at 3%? [Use the formula $A = P(1 + r)^n$.] [10]

* Note: Be sure to read the directions immediately preceding *30. DO NOT ANSWER BOTH *30 AND *31.

INTERMEDIATE ALGEBRA

Part III

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

32 In a two-digit number the ratio of the tens digit to the units digit is 2:3. If the digits are reversed, the resulting number exceeds the original number by 18. Find the original number. [*A purely arithmetic solution to this problem will not be accepted.*] [6, 4]

33 Write the equations that would be used to solve the following problems. In *each* case state what the letter or letters represent. [*Do not solve the equations.*]

- a A young man earned \$44 a week. After he received an increase of 10¢ an hour, he was able to earn the same weekly wage by working 4 hours less each week. How many hours per week did the young man work before receiving the hourly increase? [5]
- b A certain alloy of copper and silver weighs 50 pounds and is 10% silver. How much silver must be added to produce a metal which is 25% silver? [5]

34 It takes Tom three hours longer to do a certain job than it takes his brother Bill. They worked together for three hours; then Tom left and Bill finished the job in one hour. How many hours would it have taken Bill to do the job working alone? [*A purely arithmetic solution to this problem will not be accepted.*] [6, 4]

35 A man drove his automobile from his home to a resort hotel in exactly 4 hours. On the return trip he followed a different route which was 18 miles longer, but by increasing his average speed by 12 miles per hour, he was able to make the return trip in $\frac{2}{3}$ of an hour less time. Find the rate at which he traveled from his home to the resort hotel. [*A purely arithmetic solution to this problem will not be accepted.*] [6, 4]

INTERMEDIATE 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 completely $P + 2Pr + Pr^2$. 1.....
- 2 Find *one* of the roots of the equation $3x^2 + x - 14 = 0$. 2.....
- 3 Express as a single term the sum of $5\sqrt{-1}$ and $-2i$. 3.....
- 4 Write the fraction $\frac{1}{\sqrt{7}-2}$ as an equivalent fraction with a rational denominator. 4.....
- 5 Write the fraction $\frac{6}{1-x}$ as an equivalent fraction whose denominator is $x - 1$. 5.....
- 6 Express the complex fraction $\frac{\frac{a}{x^2}}{1 + \frac{b}{x}}$ in *simplest form*. 6.....
- 7 Solve the following pair of equations for x :

$$\begin{aligned} 3x + 2y &= 9 \\ x + y &= 3 \end{aligned}$$
7.....
- 8 Find the value of $2a^0 + 3a^{-\frac{1}{2}}$ when $a = 9$. 8.....
- 9 If s varies inversely as t , and if $s = 6$ when $t = 2$, find s when $t = 4$. 9.....
- 10 Write in *simplest form* the third term in the expansion of $(x - 1)^9$. 10.....
- 11 Find the logarithm of 0.2372 11.....
- 12 If $\log n = 0.8085$, find n . 12.....
- 13 In triangle ABC , angle $C = 90^\circ$, angle $A = 58^\circ$ and side $BC = 17$. Find the length of side AC to the *nearest integer*. 13.....
- 14 Write an equation of the straight line whose slope is 3 and whose y -intercept is the same as that of the line whose equation is $y = 5x - 7$. 14.....

INTERMEDIATE ALGEBRA

- 15 Express in terms of a , r and n the sum of the first n terms of the geometric progression a , ar , ar^2 , 15.....
- 16 The first term of an arithmetic progression is 10 and the thirtieth term is -77 . Find the common difference. 16.....
- 17 The roots of the equation $x^2 + px + q = 0$ are $3 + \sqrt{2}$ and $3 - \sqrt{2}$. Find the value of p . 17.....
- 18 Solve for R : $C = \frac{E}{R + S}$ 18.....

Directions (19-25): Indicate the correct completion for *each* of the following statements by writing the letter a , b or c on the line at the right.

- 19 The value of $a^3 \div a^n$ is equal to (a) a^{3-n} (b) a^{n-3} (c) a^{2n} 19.....
- 20 An equation whose graph is a circle is (a) $x^2 - y^2 = 25$ (b) $x^2 + y^2 = 25$ (c) $x^2 + 25 = y$ 20.....
- 21 The equation of the axis of symmetry of the graph of $y = x^2 + 4x - 8$ is (a) $x = 4$ (b) $x = -4$ (c) $x = -2$ 21.....
- 22 In the equation $ax^2 + bx + c = 0$ (where a , b and c are real numbers) if $b^2 = 4ac$, the roots are (a) real and equal (b) real and unequal (c) imaginary 22.....
- 23 The expression $\frac{3 + \sqrt{18}}{3}$ when simplified is equal to (a) $1 + \sqrt{18}$ (b) $1 + \sqrt{2}$ (c) $\sqrt{18}$ 23.....
- 24 If $\log 2 = 0.3010$, $\log 2y$ is equal to (a) $0.3010 y$ (b) $0.3010 + y$ (c) $0.3010 + \log y$ 24.....
- 25 If the tens digit of a two-digit number is 5 and the units digit is represented by x , the number may be represented by (a) $5x$ (b) $50x$ (c) $50 + x$ 25.....

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. For questions 19–25, allow credit if the pupil has written the correct answer instead of the letter *a*, *b* or *c*.

- | | |
|--|-----------------------------------|
| (1) $P(1+r)^2$ | (13) 11 |
| (2) 2 or $-2\frac{1}{2}$ | (14) $y = 3x - 7$ |
| (3) $3i$ or $3\sqrt{-1}$ | (15) $S = \frac{a - ar^n}{1 - r}$ |
| (4) $\frac{\sqrt{7} + 2}{3}$ | (16) -3 |
| (5) $\frac{-6}{x - 1}$ | (17) -6 |
| (6) $\frac{a}{x^2 + bx}$ or $\frac{a}{x(x + b)}$ | (18) $R = \frac{E - CS}{C}$ |
| (7) $x = 3$ | (19) <i>a</i> |
| (8) 3 | (20) <i>b</i> |
| (9) $s = 3$ | (21) <i>c</i> |
| (10) $36x^7$ | (22) <i>a</i> |
| (11) $9.3751 - 10$ | (23) <i>b</i> |
| (12) 6.434 | (24) <i>c</i> |
| | (25) <i>c</i> |

