

The University of the State of New York
284TH HIGH SCHOOL EXAMINATION
INTERMEDIATE ALGEBRA
Wednesday, June 17, 1942 — 9.15 a. m. to 12.15 p. m., only

Instructions

Do not open this sheet until the signal is given.

Part I

This part is to be done first and the maximum time allowed for it is one and one half hours. Merely write the answer to each question in the space at the right; no work need be shown.

If you finish part I before the signal to stop is given you may begin part II. However, it is advisable to look your work over carefully before proceeding, since *no credit will be given any answer in part I which is not correct and in its simplest form.*

When the signal to stop is given at the close of the one and one half hour period, work on part I must cease and this sheet of the question paper must be detached. The sheets will then be collected and you should continue with the remainder of the examination.

Parts II, III and IV

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

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

The use of the slide rule will be allowed for checking but all computations with tables must be shown on the answer paper.

Name of school.....Name of pupil.....

Detach this sheet and hand it in at the close of the one and one half hour period.

Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Each answer must be reduced to its simplest form.

- 1 Express $3\sqrt{-16}$ in terms of i . 1.....
 - 2 Solve the equation $\sqrt{x^2 + 15} = 5 - x$ 2.....
 - 3 Find, correct to the nearest tenth, the number whose logarithm is 2.6932 3.....
 - 4 Find the logarithm of 0.7593 4.....
 - 5 Write the linear equation expressing the relationship between x and y shown in the following table: 5.....
- | | | | | |
|-----|----|----|---|---|
| x | -1 | 0 | 1 | 2 |
| y | -3 | -1 | 1 | 3 |
- 6 Does a change in the value of b affect the slope of the graph of the equation $y = mx + b$? [Answer yes or no.] 6.....
 - 7 If the roots of the equation $x^2 + px + q = 0$ are numerically equal but opposite in sign, what is the value of p ? 7.....
 - 8 What is the product of the roots of the equation $2x^2 + 7x - 17 = 0$? 8.....
 - 9 If x is a positive integer, what is the greatest value of x that will make $\sqrt{x - 5}$ imaginary? 9.....
 - 10 In the expression $y = \frac{5}{2 + x^2}$, does y increase or decrease as x increases? [Consider only positive values of x .] 10.....
 - 11 Factor $x^{2a} - 5x^a + 4$ 11.....
 - 12 Insert two geometric means between 2 and 54. 12.....
 - 13 Find the 40th term of the series $-26, -24, -22, \dots$ 13.....
 - 14 Write as a single fraction the sum of $\frac{x}{y}$ and $\frac{y}{x}$. 14.....
 - 15 Solve for F : $\frac{1}{F} = \frac{1}{g} + \frac{1}{h}$ 15.....
 - 16 Write the first three terms of the expansion $(a + b)^6$. 16.....
 - 17 Express $\frac{1}{2 - \sqrt{2}}$ as a fraction with a rational denominator. 17.....
 - 18 In triangle ABC , angle $C = 90^\circ$, angle $A = 47^\circ$ and $AB = 100$; find the length of AC correct to the nearest integer. 18.....

146

Directions (questions 19-25) — Indicate the correct answer to each question by writing on the dotted line at the right the letter *a*, *b* or *c*.

- 19 If the discriminant of a quadratic equation with real coefficients is 4, the roots of the equation are (a) real and equal, (b) real and unequal or (c) imaginary. 19.....
- 20 The number of points of intersection of the graphs of the equations $x^2 + y^2 = 13$ and $x + y = 3$ is (a) one, (b) two or (c) none. 20.....
- 21 The graph of the equation $y = x + 3$ makes with the x axis an acute angle which is (a) less than 45° , (b) equal to 45° or (c) greater than 45° . 21.....
- 22 The graph of $2x^2 + 2y^2 = 50$ is (a) an ellipse, (b) a circle or (c) a hyperbola. 22.....
- 23 The value of $5^{\frac{3}{2}} \times 5^{\frac{1}{2}}$ is (a) $5^{\frac{3}{2}}$, (b) 25 or (c) 5. 23.....
- 24 The result of dividing x^{2m} by x is (a) x^m , (b) 1^{2m} or (c) x^{2m-1} 24.....
- 25 If $\log x = a$, then $\log \sqrt[3]{x}$ is (a) $\sqrt[3]{a}$, (b) $3a$ or (c) $\frac{a}{3}$ 25.....

See instructions for parts II, III and IV on page 1.

Part II

Answer three questions from this part.

26 Find, correct to the nearest tenth, the roots of the equation $2x^2 - 5x = 6$ [10]

27 Solve the following pair of equations, group your answers and check one set:

$$y^2 + 4x = 21$$

$$y - 2x + 3 = 0 \quad [7, 2, 1]$$

28 Using logarithms, find, correct to the nearest tenth the value of

$$\frac{2.35 \times \tan 75^\circ}{\sqrt[3]{0.376}}$$

[10]

29 a Draw the graph of the equation $y = x^2 - 2x - 5$ from $x = -2$ to $x = 4$ inclusive. [6]b On the set of axes used in answer to a, draw the graph of the equation $x + 2y = 2$ [2]c From the graphs made in answer to a and b, estimate, correct to the nearest tenth, the values of x and y common to the two equations. [2]30 Derive the formula for the sum (S) of an arithmetic progression in terms of the number of terms n , the first term a and the last term l . [10]

Part III

Answer one question from this part.

31 Two trains, starting at the same time from stations 396 miles apart, meet in $4\frac{1}{2}$ hours. How far has the faster train traveled when it meets the slower one, if the difference in their rates is 8 miles an hour? [7, 3]

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

a The senior class of a certain high school decided to purchase a gift for their school. The cost of the gift was \$36. During the year two of the seniors left the school, thus causing an increase of three cents in the amount each senior was expected to pay. How many were there in the class originally? [5]

b The length of a rectangular swimming pool is twice its width. The pool is surrounded by a cement walk 4 feet wide. The area of the walk is 784 square feet. Find the dimensions of the pool. [5]

*33 Find, correct to the nearest year, the time it will take for \$96 to amount to \$125 at 3% interest compounded annually. [Use the formula $A = P(1 + r)^n$] [10]

Part IV

Answer one question from this part.

34 Indicate whether each of the following statements is true or false: [10]

a If a number n is d greater than another number r , then $n + d = r$.b If the units digit of a two-digit number is u and the tens digit is t , then the number is tu .c If a pounds of coffee worth c cents a pound are mixed with b pounds of coffee worth d cents a pound, then the resulting mixture should be worth $\frac{ac + bd}{a + b}$ cents a pound.d If a piece of work can be done by one machine in p hours and by another machine in q hours, then the time required by both machines working together to do the work is

$$\frac{p + q}{2} \text{ hours.}$$

e If a man travels d miles an hour for r hours and m miles an hour for s hours, then his average rate for the entire trip is $\frac{d + m}{2}$ miles an hour.35 Starting with the general form of the quadratic equation $ax^2 + bx + c = 0$, derive the formula for the roots of that equation in terms of a , b and c . [10]

* This question is based on one of the optional topics in the syllabus. [2]