

# INTERMEDIATE ALGEBRA

Wednesday, August 20, 1930

Fill in the following lines:

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 question has 2½ credits assigned to it; no partial credit should be allowed. Each answer must be reduced to its simplest form.*

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|---|----------|
| 1 Write the quadratic equation with integral coefficients, the sum of whose roots is $\frac{1}{2}$ and the product of whose roots is $-\frac{3}{8}$ . | Ans..... |
| 2 What value must $y$ have in order that $x^2 + 2x + 3 = y$ shall be a quadratic equation having equal roots?   | Ans..... |
| 3 Write the general formula for finding the $n$ th term of the series 6, 9, 13½. [Do not substitute numbers in your formula.]                         | Ans..... |
| 4 The roots of a quadratic equation are $3 + \sqrt{-5}$ and $3 - \sqrt{-5}$ ; is the discriminant positive, zero or negative?                         | Ans..... |
| 5 Which term of the progression 3, 7, 11, ... is 383?   | Ans..... |
| 6 Express as a single term $3\sqrt{-49} - 4\sqrt{-9}$   | Ans..... |
| 7 The graph of $y = 3x^2 - 2x + k$ cuts the $x$ -axis at the point whose abscissa is 3; find the value of $k$ .                                       | Ans..... |
| 8 Rationalize the denominator of $\frac{8}{3 + \sqrt{5}}$   | Ans..... |
| 9 Express as a single term $2^1 \times 2^1 + 2^{-1}$  | Ans..... |
| 10 Find the trinomial factor of $x^3 - x^2 - 3x + 6$  | Ans..... |
| 11 Find the trinomial factor of $x^3 + 5x^2 - 24$   | Ans..... |
| 12 If $x = \sqrt[3]{10}$ , find the value of $\log x^2$ .   | Ans..... |
| 13 Given $y = \log x$ ; if $y$ is doubled, by what quantity is $x$ multiplied?  | Ans..... |
| 14 Solve for $x$ :<br>$3 = x + \sqrt{x^2 - 3}$  | Ans..... |
| 15 Find the value of $8^3 + 3(3^3 + x)^3$   | Ans..... |
| 16 Solve for $x$ :<br>$\frac{1}{x} + \frac{1}{y} = 5$<br>$\frac{1}{x^2} - \frac{1}{y^2} = 5$  | Ans..... |
| 17 Simplify $x^3 - \left(\frac{2x+1}{3}\right) + \left(\frac{3x+1}{8}\right)$   | Ans..... |
| 18 Find the value of $x^2 - 2x$ when $x = 3 - 2\sqrt{2}$  | Ans..... |
| 19 If $p$ pounds of sugar cost $c$ cents, how many pounds can be bought for $d$ dollars?  | Ans..... |
| 20 From the two equations, $x = \frac{1}{2}gt^2$ and $v = gt$ , derive an equation containing only $x$ , $v$ and $g$ .                                | Ans..... |

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Write at top of first page of answer paper (a) names of schools where you have studied, (b) number of weeks and recitations a week in (1) elementary algebra, (2) intermediate algebra previous to entering summer high school, (c) number of recitations in this subject attended in summer high school of 1930.

The minimum time requirement previous to entering summer high school is five recitations a week for half a school year, or the equivalent, after the completion of elementary algebra.

For those pupils who have met the time requirement previous to entering summer high school the minimum passing mark is 65 credits; for all others 75 credits.

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high school in 1930 is required.

## Part II

*Answer five questions from this part. Full credit will not be granted unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each answer should be reduced to its simplest form.*

*In the examination in intermediate algebra the use of the slide rule will be allowed for checking, provided all computations with tables are shown on the answer paper.*

21 Solve for  $x$  and check:  $\sqrt{x+15} - \sqrt{x} = \frac{10}{\sqrt{x+15}}$  [8, 2]

22 Find three numbers in the ratio 2:5:7, such that if 7 is subtracted from the second number they will be in arithmetic progression. [7, 3]

23 A real-estate agent bought a number of acres of land for \$900. He kept 10 acres for himself and sold the remainder at an advance of \$10 an acre. If he received \$1050 for the land he sold, how many acres did he buy? [6, 4]

24  $A$  can do a piece of work in 10 days. After he worked 3 days alone on it, he and  $B$  finished the work in  $2\frac{1}{3}$  days. How many days would it take  $B$  alone to do the piece of work? [7, 3]

25 What sum of money will amount to \$1476 in 10 years at 6% interest, compounded annually? [Find answer to the nearest dollar.] [10]

26 Find the roots of  $x = \frac{1}{5x-2}$  to the nearest hundredth. [10]

27 On the same set of axes, plot the graphs of  $xy = 12$  and  $x - y = 1$ . From the graph find the common solutions of this pair of equations and indicate the positions of these solutions on the graph. [10]