

ALGEBRA

August 1897—Three hours, only

100 credits, necessary to pass, 75

Answer to questions but no more. If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits.

1 Define *numeric equation*, *homogeneous equation*, *pure equation*, *quadratic equation*, *surd*.

2 Simplify $\left(\frac{a+ab}{ab+b} - \frac{a-ab}{ab-b}\right) \left(b + \frac{b}{ab}\right)$

3 Factor $8a^3 - b^3$, $a^3 + a^3b^3 + b^3$, $6m^3 + 5mn = 6n^3$,
 $9x^3 = \frac{4}{9}$, $ab + bc = b^2 - ac$

4 Find the greatest common divisor (highest common factor) of $x^4 - 4x^2 + 3$ and $4x^3 - 18x + 18$

5 Solve $\frac{x+6}{11} - \frac{3x-18}{3} + \frac{2x+3}{4} = 5\frac{1}{3} + \frac{3x-4}{12}$

6 Solve $\frac{1}{x} + \frac{3a}{y} = \frac{3b+4a^2}{6ab}$, $\frac{b}{x} = \frac{1}{y} = \frac{3b^2-3a}{6ab}$

7 Solve $x^2 + 3xy = 98$, $xy + 4y^2 = 8$. Find four values of each unknown quantity.

8 Solve $\sqrt{2x} - y + \sqrt{3x} + y = 8$

9 Expand by the binomial formula $(aa - \frac{3b}{4})^4$. Give all the work of finding the coefficients.

10 Simplify $\sqrt{a^2b} = ab^2 + b^3$, $3\sqrt{\frac{2}{5}} = 3\sqrt{\frac{1}{10}}$, $\frac{\sqrt{75} + \sqrt{48}}{\sqrt{37}}$

$\sqrt{\frac{1}{a}} + \sqrt{\frac{1}{b}}, (\sqrt{a} + i)(\sqrt{b} - i)$

11 Multiply $a^{20} + a^{19}b^{19} + b^{20}$ by $a^{20} + a^{19}b^{19} + b^{20}$

12-13 The area of a certain rectangle is 9400 sq. ft.; if its length is decreased 10 feet and its breadth increased 10 feet, its area will be increased 100 sq. ft. Find its length and breadth.

14-15 Given a number of three digits such that the first digit is $\frac{1}{3}$ the last and the second twice the first. If 396 is added to the number the order of the digits is inverted. Find the number.