

Solving Unknown Variables

The Language of Algebra	
Algebra is a type of maths that uses variables to represent numbers. In this unit, you will learn more algebraic terms and how to solve for unknown variables within equations.	
Variables	Variables represent numbers or quantities. The value they represent can vary. EXAMPLE: $x = 8$
Equations	Equations are made up of two expressions on either side of an equal sign. These expressions do not have to have the same number of terms (numbers or variables). EXAMPLE: (3 terms) $2x + 1 = 7$ (1 term)
Solve	Solving an equation in algebra is to find the unknown value of a variable. This involves balancing. Balancing is the method of moving terms around. We want to move all the terms that we know to one side of the equals sign and isolate the unknown variable. To move a term across the equals sign, We use the opposite math operation and apply it to both sides of the equation. EXAMPLE: Solve for x if $2x + 1 = 11$. $ \begin{array}{rclcl} 2x & + & 1 & = & 11 \\ 2x & + & 1 & - & 1 = 11 - 1 \\ & & 2x & = & 10 \\ 2x & \div & 2 & = & 10 \div 2 \\ & & x & = & 5 \end{array} $



Instructions: Solve for the variables in the algebraic equations below.

1 Solve for x if $\frac{4(144-12x)}{8} = 4(x-2)$

Solve for x

Check with substitution.

2 Solve for x if $\frac{x(7x+6)}{-3x} = \frac{5(x+2)}{(x+2)}$

Solve for x

Check with substitution.



3 Solve for x if $\frac{2(3x+2)(x-3)}{6(3x+2)} = 2(19 - 2x)$

Solve for x

Check with substitution.

4 Solve for x if $\frac{2(x+2)(x+3)}{(x+3)(x-3)} = x + 2$

Solve for x

Check with substitution.



5 Solve for x if $\frac{(6-5x)(x+4)}{4(x+4)} = -(3x + 2)$

Solve for x

Check with substitution.

6 Solve for x if $\frac{2x(x-11)}{2x-22} = 13$

Solve for x

Check with substitution.



7 Solve for x if $\frac{12x+8}{(3x+2)(12+x)} = \frac{-4}{x}$

Solve for x

Check with substitution.

8 Solve for x if $\frac{(60+24x)(x-2)}{4(2x+5)} = (x-9)(x+2)$

Solve for x

Check with substitution.



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Variables

Variables represent numbers or quantities.
The value they represent can vary.

EXAMPLE: $x = 8$

Equations

Equations are made up of two expressions on either side of an equal sign. These expressions do not have to have the same number of terms (numbers or variables).

EXAMPLE:

$$(3 \text{ terms}) \quad 2x + 1 = 7 \quad (1 \text{ term})$$

Solve

Solving an equation in algebra is to find the unknown value of a variable. This involves balancing.

Balancing is the method of moving terms around. We want to move all the terms that we know to one side of the equals sign and isolate the unknown variable.

To move a term across the equals sign, We use the **opposite** math operation and apply it to **both** sides of the equation.

EXAMPLE: Solve for x if $2x + 1 = 11$.

$$\begin{aligned} 2x + 1 &= 11 \\ 2x + 1 - 1 &= 11 - 1 \\ 2x &= 10 \\ 2x \div 2 &= 10 \div 2 \\ x &= 5 \end{aligned}$$



Instructions: Solve for the variables in the algebraic equations below.

1 Solve for x if $\frac{2(x+2)^2}{(x-2)(x+2)} = \frac{x}{x-2}$

Solve for x

Check with substitution.

2 Solve for x if $\frac{3x+9}{4x} = \frac{x+3}{x-1}$

Solve for x

Check with substitution.



3 Solve for x if $\frac{2x}{10x-12} = 45x - 54$

Solve for x

Check with substitution.

4 Solve for x if $\frac{(x+2)^2(x-2)}{(x-2)(x+2)} = \frac{(3x+8)(x+2)}{(x-2)}$

Solve for x

Check with substitution.



5 Solve for x if $\frac{(99-121x)(x+5)}{3x+5-2x} = \frac{-22(5x+1)(x+5)}{2x+10}$

Solve for x

Check with substitution.

6 Solve for x if $\frac{(49x-14)(x-7)}{2} = \frac{7x(7x-2)(x-7)^2}{(x-7)}$

Solve for x

Check with substitution.



7 Solve for x if $\frac{x(36-24x)}{10x+8} = -\left(\frac{7x+3-9x}{5x+4}\right)$

Solve for x

Check with substitution.

8 Solve for x if $\frac{(45x+63)(18-9x)}{2-x} = \frac{x^2(5x+7)^2}{(2x+9+3x-2)}$

Solve for x

Check with substitution.