

Solving Equations

Equation: A mathematical statement that says two expressions are equal.

Example: $3x + 3 = 2x - 1$

To **solve an equation** means to find the value of the variable that makes the equation true.

Solving an equation: To solve an equation you must isolate the unknown variable by performing opposite operations to move everything except the unknown variable to the other side of the equation.

Steps for solving equations:

- 1) Eliminate fractions by multiplying all terms by a common denominator.
- 2) Eliminate brackets using the distributive property
- 3) Collect like terms on each side of the equation
- 4) Isolate the variable term on one side of the equation
- 5) Solve for the variable

Chapter 4 - Equations

Rearranging Formulas

Cross Multiplication

Formula: describes an algebraic relationship between two or more variables

How to rearrange a formula:

- 1) Isolate the term that contains the unknown variable
- 2) Isolate the unknown variable

Example: Rearrange the formula $y = mx + b$ for x .

$$y = mx + b$$

$$y - b = mx$$

$$\frac{y-b}{m} = x \text{ or } x = \frac{y-b}{m}$$

When you have an equation involving just two rational expressions, you can cross-multiply to clear the denominators.

$$\begin{aligned}\frac{k+2}{3} &= \frac{k-4}{5} \\ 5(k+2) &= 3(k-4) \\ 5k+10 &= 3k-12 \\ 5k-3k &= -12-10 \\ 2k &= -22 \\ k &= -11\end{aligned}$$

Note: cross-multiplication can only be used if you have two rational expressions equal to each other. If you have more than two expressions, you must clear denominators using the lowest common denominator.

Example of solving an equation with fractions:

$$\frac{3p}{4} + \frac{p-5}{3} = \frac{1}{2}$$

Eliminate fractions by finding the LCD between 4,3, and 2

$$(12) \left(\frac{3p}{4} \right) + (12) \left(\frac{p-5}{3} \right) = (12) \left(\frac{1}{2} \right)$$

Multiply all terms on both sides of the equation by the LCD

$$(3)(3p) + (4)(p - 5) = 6$$

Simplify to eliminate fractions

$$9p + 4p - 20 = 6$$

Get rid of brackets by multiply terms together

$$9p + 4p = 6 + 20$$

Isolate the variable terms on one side of the equation

$$13p = 26$$

Collect like terms

$$p = \frac{26}{13}$$

Solve for the unknown variable

$$p = 2$$

You have your answer! You can check if this is correct by plugging it in to the original equation and checking if LS=RS