Algebra: Linear Equations in One Variable

To solve a linear equation:

1. Use the distributive property to remove any parentheses.

2. Combine any like terms.

3. Use the addition (or subtraction) property of equality to move all constants to one side of the equation and all terms with variables to the other side of the equation.

4. Use the multiplication or division property of equality to isolate the variable and reveal the solution.

5. Check your solution by replacing the variable in the original equation with your solution.

Example: Solve $5x = 2x - 12$ for x.

$5x = 2x - 12$ $5x - 2x = 2x - 2x - 12$	Use the subtraction property of equality to move the $2x$ to the left side to get the variable terms on the same side.
$3x = -12$ $\dfrac{3x}{3} = \dfrac{-12}{3}$	Combine like terms. Use the division property of equality to divide both sides by 3 to isolate the variable.
$x = -4$	Simplify. Check the solution. $5(-4) = 2(-4) - 12$; $-20 = -8 - 12$; $-20 = -20$ is true. The solution is {-4}

Example: Solve $\dfrac{2}{5}x - 7 = 9$ for x.

$\dfrac{2}{5}x - 7 = 9$ $\dfrac{2}{5}x - 7 + 7 = 9 + 7$	Use the addition property of equality to move the -7 to the right side to isolate the variable term.
$\dfrac{2}{5}x = 16$ $\dfrac{5}{2} \bullet \dfrac{2}{5}x = \dfrac{5}{2} \bullet 16$	Combine like terms. Use the multiplication property of equality to multiply both sides by the reciprocal to isolate the variable. Reduce.
$1 \bullet x = 5 \bullet 8$ $x = 40$	Simplify. Check the solution. $\dfrac{2}{5}(40) - 7 = 9$; $2 \bullet 8 - 7 = 9$; $16 - 7 = 9$; $9 = 9$ is true. The solution is {40}

TRY: Solve each of the following for the variable.

$3x - 5 = 7$ $5 - 6x = -19$

$\dfrac{2}{5}x + 7 = 17$ $8x - 6 = 4x + 18$

$-3(2x + 4) = -10x$ $4(-x - 2) = -2(2x + 7) - 5$