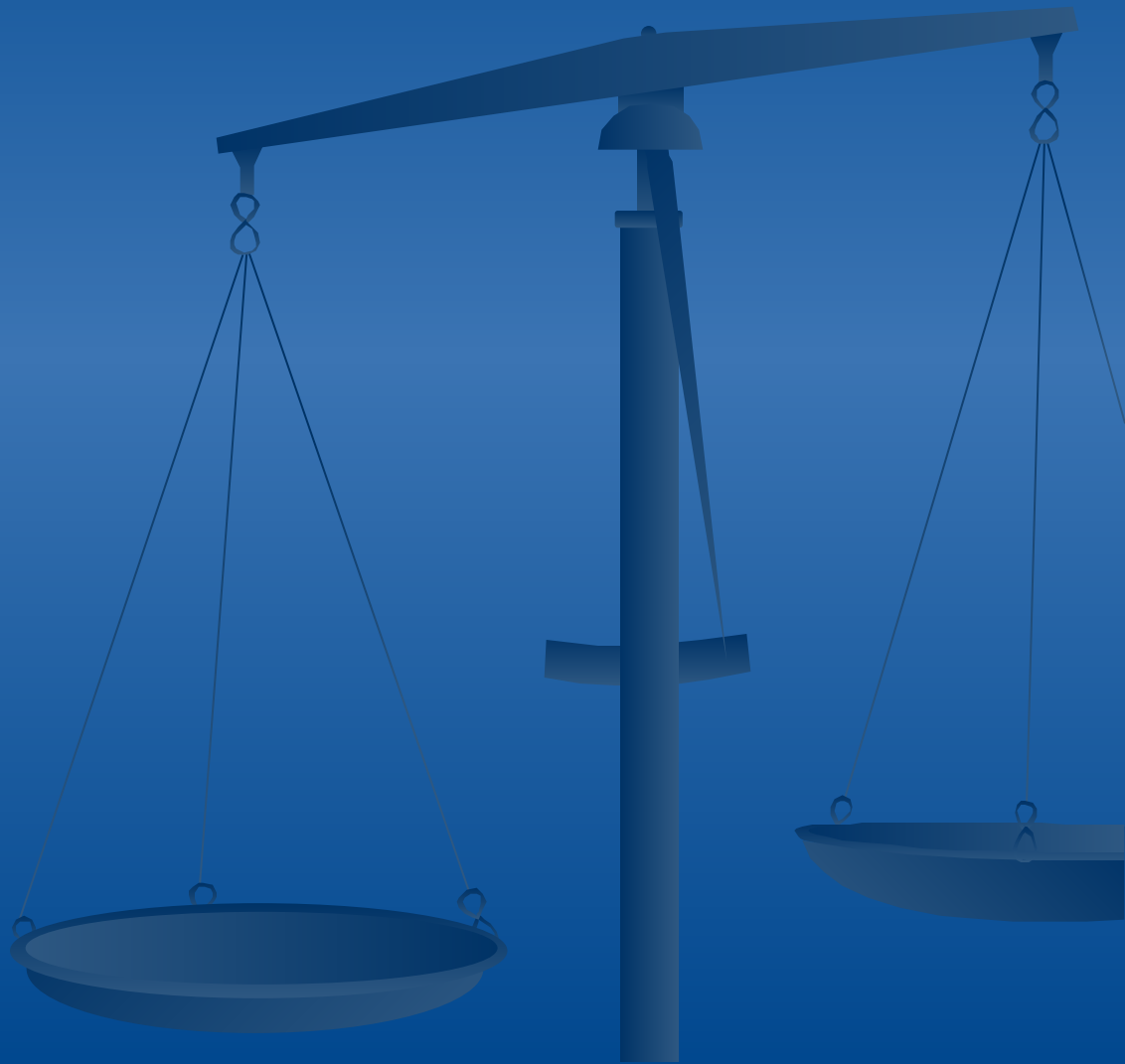
Solving Multi-Step Equations

* Use two or more transformations to solve an equation

Remember solving an equation is a balancing act.

What you do to one side you have to do to the other!!



Steps for Solving….

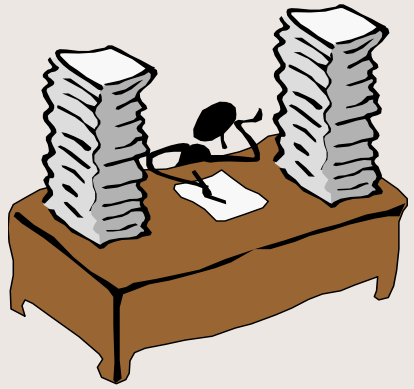
1. Simplify one or both sides of the equation (if needed).
2. Use inverse operations to isolate the variable. (DO THE OPPOSITE OF ORDER OF OPERATIONS)

To simplify you use:

P E M D A S

To solve you do the opposite:

S A D M E P



Solving a Linear Equation

$\frac{1}{3}x + 6 = -8$ Write the original equation.

$-6 = -6$ Subtract 6 from each side.

$\frac{1}{3}x = -14$ Simplify.

$3 \text{ x } \left(\frac{1}{3}x\right) = (-14) \text{ x } 3$ Multiply each side by 3.

$x = -42$ Simplify.

CHECK

Combining Like Terms First…

$7x - 3x - 8 = 24$ Write the original equation.

$4x - 8 = 24$ Combine like terms.

$+8 = +8$ Add 8 to each side.

$\frac{4x}{4} = \frac{32}{4}$ Simplify.

Divide each side by 4.

$x = 8$ Simplify.

CHECK

Using the Distributive Property…

$5x + 3(x + 4) = 28$ Write the original equation.

$5x + 3x + 12 = 28$ Distribute the 3.

$8x + 12 = 28$ Combine like terms.

$-12 = -12$ Subtract from both sides.

$\frac{8x}{8} = \frac{16}{8}$ Simplify

Divide both sides.

$x = 2$ Simplify.

CHECK

Distributing a Negative…

$4x - 3(x - 2) = 21$ Write the original equation.

$4x - 3x + 6 = 21$ Distribute the 3 and the negative.

$x + 6 = 21$ Combine like terms.

$-6 = -6$ Subtract from both sides.

$x = 5$ Simplify

CHECK

Multiplying by a Reciprocal First…

$$66 = -\frac{6}{5}(x+3)$$

Practice…

$2x + 7 = 15$

$-7x + 4x = 9$

$\frac{x}{2} + 13 = 20$

$3(x - 2) = 18$

$7 + \frac{2}{3}x = -1$

$12(2 - x) = 6$

$3x - 7 + x = 5$