

Properties

Justify Solving Equations

Commutative Property
 $a+b = b+a$ or $ab = ba$

Associative Property
 $(a+b)+c = a+(b+c)$
 $(ab)c = a(bc)$

$$2(x+4) = -7 \quad \text{Given}$$

$$2x + 8 = -7 \quad \text{Distributive Prop}$$

$$2x + 8 + -8 = -7 + -8 \quad \text{Subtraction/ Addition Prop}$$

$$2x + 0 = -15 \quad \text{Additive Inverse}$$

$$2x = -15 \quad \text{Additive Identity}$$

$$\frac{1}{2}(2x) = 15\left(\frac{1}{2}\right) \quad \text{Multiplication Property}$$

$$1x = -\frac{15}{2} \quad \text{multiplicative Inverse}$$

$$x = -7\frac{1}{2} \rightarrow \frac{15}{2} \quad \text{Simplify}$$

$$3x + (x - 8) = 12 \quad \text{Given}$$

$$4x - 8 = 12 \quad \text{Associative Prop.}$$

$$4x = 20$$

$$x = 5$$

Addition
Prop. of Eq.
Division Prop.
Mult. Prop.

$$4 - 3x = 16 + x$$
$$\begin{array}{r} -x \\ -x \end{array}$$

$$4 - 4x = 16$$

$$-4x = 12$$

$$x = -3$$

Subtraction
Prop

Subtraction
Prop

Division Prop

Same Side

Summary:

1. Combine like terms
2. Use Inverse Operations to Solve

Ex 1) $3x - 4 + 2x = 36$

check
 $3(8) - 4 + 2(8)$
 $36 = 36 \checkmark$
 😊

$$5x - 4 = 36$$

$$5x = 40$$

$$x = 8$$

2. $12x + 9 - 3x + 5 = -49$

$$9x + 14 = -49$$

$$9x = -63$$

$$x = -7$$

3. $3x + 5(x - 2) = 14$

$$3x + 5x - 10 = 14$$

$$8x - 10 = 14$$

$$8x = 24$$

$$x = 3$$

Both Sides

1. Move all the variables to one side (left)
2. Combine like terms
3. Use Inverse Operations

$$\begin{array}{r}
 \text{S} \quad \quad \text{G} \quad \quad \quad \text{G} \quad \quad \text{S} \\
 4) \quad -2x + 15 = 4x + 39 \\
 \quad \quad -4x \quad -15 \quad \quad -4x \quad -15 \\
 \hline
 \quad \quad \quad -6x = 24 \quad \quad x = -4
 \end{array}$$

$$\begin{array}{r}
 5. \quad 13x - 5 = 10x + 37 - 4x \\
 \quad \quad 13x - 5 = 6x + 37 \\
 \quad \quad -6x \quad 13 \quad -6x \quad +5 \\
 \quad \quad \quad 7x = 42 \\
 \quad \quad \quad \quad x = 6
 \end{array}$$

$$\begin{array}{r}
 6. \quad -7(x - 1) = -5(x - 5) \\
 \quad \quad -7x + 7 = -5x + 25 \\
 \quad \quad +5x \quad -7 \quad +5x \quad -7 \\
 \quad \quad \quad -2x = 18 \quad \quad x = -9
 \end{array}$$