

Solving Two Step Equations

I. Goal: To isolate the variable (get it by itself)

II. In an equation that has more than one operation, we have to undo the operations in the correct order.

First, undo the Addition or Subtraction } Reverse = SADMEF
Then, undo the Multiplication or division } PEMDAS

III Steps:

1) Use addition or subtraction to eliminate the Constant (the # without the variable)

2) Use multiplication or division to eliminate the coefficient (the # attached to the variable)

3) Check/Properties

IV. Examples: Solve

SADMEF to solve

$$\begin{array}{l} 1) 2x - 3 = 9 \\ \quad +3 \quad +3 \quad \text{Addition Property of Equality} \\ \hline 2x = 12 \\ \frac{2x}{2} = \frac{12}{2} \quad \text{Division Property of Equality} \\ \hline \boxed{x = 6} \end{array}$$

$$\begin{array}{l} 2) 56 = 5x + 6 \\ \quad -6 \quad -6 \\ \hline 50 = 5x \\ \frac{50}{5} = \frac{5x}{5} \\ 10 = x \\ \text{OR} \\ \boxed{x = 10} \end{array}$$

Check use regular PEMDAS

$$\begin{array}{l} 56 = 5x + 6 \\ 56 = 5(10) + 6 \\ 56 = 50 + 6 \\ 56 = 56 \\ \checkmark \end{array}$$

SADMEP to solve

Remember to check

$$3) \frac{x}{3} + 10 = 15$$

$$\begin{array}{r} \cancel{-10} \quad \cancel{-10} \\ \hline \end{array}$$

Subtraction Property of Equality

$$\left(\frac{3}{1}\right)\left(\frac{x}{3}\right) = (5)\left(\frac{3}{1}\right)$$

Multiplication Property of Equality

$$\boxed{x = 15}$$

$$4) 3 = \frac{1}{2}x - 6$$

$$\begin{array}{r} +6 \quad +6 \\ \hline \end{array}$$

$$\left(\frac{2}{1}\right)(3) = \left(\frac{1}{2}x\right)\left(\frac{2}{1}\right)$$

$$\boxed{x = 18}$$

check

$$3 = \frac{1}{2}x - 6$$

$$3 = \frac{1}{2}(18) - 6$$

$$3 = 9 - 6$$

$$3 = 3$$

$$5) 10 - 4x = 58$$

$$\begin{array}{r} \cancel{-10} \quad \cancel{-10} \\ \hline \end{array}$$

Subtraction Prop. of Equality

$$\begin{array}{r} -4x = 48 \\ \hline -4 \quad -4 \end{array}$$

Division Prop. of Equality

$$\boxed{x = -12}$$

$$6) 4 - 2x = 16$$

$$\begin{array}{r} \cancel{-4} \quad \cancel{-4} \\ \hline \end{array}$$

$$\begin{array}{r} -2x = 12 \\ \hline -2 \quad -2 \end{array}$$

$$\boxed{x = -6}$$

check

$$4 - 2x = 16$$

$$4 - 2(-6) = 16$$

$$4 + 12 = 16$$

$$16 = 16$$

$$7) \frac{2}{5}x + 2 = 12$$

$$\begin{array}{r} \cancel{-2} \quad \cancel{-2} \\ \hline \end{array}$$

Subtraction Prop. of Equality

$$\left(\frac{5}{2}\right)\left(\frac{2}{5}x\right) = (10)\left(\frac{5}{2}\right)$$

Multiplication Prop. of Equality

$$\boxed{x = 25}$$

$$8) 14 = 6z + 2$$

$$\begin{array}{r} -2 \quad -2 \\ \hline \end{array}$$

$$\frac{12}{6} = \frac{6z}{6}$$

$$\boxed{z = 2}$$

check

$$14 = 6z + 2$$

$$14 = 6(2) + 2$$

$$14 = 12 + 2$$

$$14 = 14$$

$$9) \frac{2}{8}x - 3 = -13$$

$$\begin{array}{r} +3 \quad +3 \\ \hline \end{array}$$

Addition Prop. of Equality

$$\left(\frac{8}{2}\right)\left(\frac{2}{8}x\right) = (-10)\left(\frac{8}{2}\right)$$

Mult. Prop. of Equality

$$\boxed{x = -40}$$

$$10) -4 = \frac{2}{3}x - 2$$

$$\begin{array}{r} +2 \quad +2 \\ \hline \end{array}$$

$$\left(\frac{3}{2}\right)(-2) = \left(\frac{2}{3}x\right)\left(\frac{3}{2}\right)$$

$$\boxed{x = -3}$$

check

$$-4 = \frac{2}{3}x - 2$$

$$-4 = \frac{2}{3}(-3) - 2$$

$$-4 = -2 - 2$$

$$-4 = -4$$