

8.5 Solving Equations with Variables on Each Side

To solve equations with variables on each side, use the Addition or Subtracting Property of Equality to write an equivalent equation with variables on one side.

Example: Solve each equation.

$$1.) 3x = \cancel{5x} + 8$$

$$\begin{aligned} & \cancel{-1x} \quad \cancel{-1x} \\ 2x &= 8 \\ \frac{2x}{2} &= \frac{8}{2} \\ \boxed{x=4} \end{aligned}$$

$$2.) 7x = \cancel{5x} + 4$$

$$\begin{aligned} & \cancel{-5x} \quad \cancel{-5x} \\ 2x &= 4 \\ \frac{2x}{2} &= \frac{4}{2} \\ \boxed{x=2} \end{aligned}$$

Example: Solve each equation.

$$3.) \cancel{3x} - 2 = x$$

$$\begin{aligned} & \cancel{-3x} \quad \cancel{-3x} \\ -2 &= -2x \\ \frac{-2}{-2} &= \frac{-2x}{-2} \\ \boxed{x=1} \end{aligned}$$

$$\begin{aligned} 3x - 2 &= x \\ \cancel{-x} \quad \cancel{-x} \\ 2x - 2 &= 0 \\ \frac{2x}{2} - 2 &= \frac{0}{2} \\ \frac{2x}{2} &= \frac{2}{2} \\ \boxed{x=1} \end{aligned}$$

$$4.) \cancel{5x} + 12 = 2x$$

$$\begin{aligned} & \cancel{-5x} \quad \cancel{-5x} \\ 12 &= -3x \\ \frac{12}{-3} &= \frac{-3x}{-3} \\ \boxed{x=-4} \end{aligned}$$

Example: Solve each equation.

5.) $\frac{6}{5}y + 8 = \frac{1}{5}y - 10$

$$-\frac{1}{5}y$$

$$-\frac{1}{5}y$$

$$\frac{2}{5}y + 8 = -10$$

$$-8 \quad -8$$

$$\frac{5}{2} \cdot \frac{2}{5}y = -18 \cdot \frac{5}{2}$$

$$y = \frac{-18 \cdot 5}{2} = -45$$

6.) $2.1x + 3 = 3.1x - 2$

$$-2.1x$$

$$-2.1x$$

$$3 = 1x - 2$$

$$+2$$

$$+2$$

$$5 = x$$

Example: Solve each equation.

7.) $\frac{3}{4}x - 3 = \frac{1}{4}x + 3$

$$-\frac{1}{4}x$$

$$-\frac{1}{4}x$$

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

$$+3 \quad +3$$

$$\frac{1}{2}x = 6 \cdot 2$$

$$x = 12$$

8.) $\frac{1.2}{2.2}p - 15 = \frac{3}{4}p - 3$

$$\frac{2}{4}p - 15 = \frac{3}{4}p - 3$$

$$-\frac{2}{4}p$$

$$-\frac{2}{4}p$$

$$-15 = \frac{1}{4}p - 3$$

$$+3$$

$$+3$$

$$4 \cdot -12 = \frac{1}{4}p \cdot \frac{4}{4}$$

$$-48 = p$$