

2-4 Notes: Solving Equations with the Variable on Each Side, Solving by LCD and Consecutive integer problems.

Variables on Each Side To solve an equation with the same variable on each side, first use the Addition or the Subtraction Property of Equality to write an equivalent equation that has the variable on just one side of the equation. Then solve the equation.

Example 1: Solve $5y - 8 = 3y + 12$.

$$\begin{array}{r} -3y \quad -3y \\ \hline 2y - 8 = 12 \\ +8 \quad +8 \\ \hline 2y = 20 \\ \hline y = 10 \end{array}$$

Grouping Symbols When solving equations that contain grouping symbols, first use the Distributive Property to eliminate grouping symbols. Then solve.

Example: Solve $4(2a - 1) = -10(a - 5)$.

$$\begin{array}{r} 4(2a) + 4(-1) = -10(a) - 10(-5) \\ 8a - 4 = -10a + 50 \\ +10a \quad +10a \\ \hline 18a - 4 = 50 \\ +4 \quad +4 \\ \hline 18a = 54 \\ \hline a = 3 \end{array}$$

Solving an equation with fractions: Reduce away denominators by multiplying the entire equation by the Lowest Common Divisor. DO NOT CROSS MULTIPLY!!!!

EX: $\left[\frac{b-4}{6} = \frac{b}{2} \right] \Rightarrow \frac{b-4}{\cancel{6}} = \left(\frac{\cancel{b}}{2} \right) \frac{1}{1}$

LCD = 6

$$\begin{array}{r} b-4 = \frac{6b}{2} \\ \hline b-4 = 3b \\ -b \quad -b \\ \hline -4 = 2b \\ \hline -2 = b \end{array}$$

EX: $\left(\frac{3x}{2} + \frac{x+3}{5} + x - 1 \right) = \frac{3x+20}{10} \Rightarrow 5(3x) + 2(x+3) + 10(x-1) = 3x+20$

LCD = 10

$$\begin{array}{r} 15x + 2x + 6 + 10x - 10 = 3x + 20 \\ \hline 27x - 4 = 3x + 20 \\ -3x \quad -3x \\ \hline 24x - 4 = 20 \\ +4 \quad +4 \\ \hline 24x = 24 \\ \hline x = 1 \end{array}$$

Variable on the denominator

$$LCD = 5(y-8)$$

$$EX: \frac{2y}{y-8} = \frac{2}{5}$$

$$\Rightarrow \left(\frac{2y}{y-8} \right) \cancel{5(y-8)} = \left(\frac{2}{\cancel{5}} \right) \cancel{5(y-8)}$$
$$5(2y) = 2(y-8)$$
$$10y = 2y - 16$$
$$\begin{array}{r} 10y \\ -2y \\ \hline 8y = -16 \end{array} \rightarrow \frac{8y}{8} = \frac{-16}{8} \quad (y = -2)$$

Consecutive Integer Problems:

EX: Find two consecutive integers such that the larger minus twice the smaller is -13.

$$\text{let } x = 1^{\text{st}}$$
$$x+1 = 2^{\text{nd}}$$

$$(x+1) - 2x = -13$$

$$\begin{array}{r} -x + 1 \\ -2x \\ \hline -x + 1 = -13 \end{array}$$

$$\begin{array}{r} -x \\ -1 \\ \hline -x = -14 \end{array}$$

$$x = 14$$
$$x+1 = 15$$

$$\boxed{\begin{array}{l} 1^{\text{st}} = 14 \\ 2^{\text{nd}} = 15 \end{array}}$$

EX: Find two consecutive, even integers such that

The larger plus three times the smaller is 18.

$$\text{let } x = 1^{\text{st}} \text{ integer}$$
$$x+2 = 2^{\text{nd}} \text{ even integer}$$

$$(x+2) + 3x = 18$$

$$\begin{array}{r} 4x + 2 \\ -2 \\ \hline 4x + 2 = 18 \end{array}$$

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

$$\boxed{\begin{array}{l} 1^{\text{st}} \text{ integer} = 4 \\ 2^{\text{nd}} \text{ even} = 6 \end{array}}$$

Note: Consecutive even integers are 2, 4, 6, 8, etc... so n , $n+2$, $n+4$, etc....

Consecutive odd integers are 1, 3, 5, 7, 9, etc... so n , $n+2$, $n+4$, etc....