

Section 2-4: Solving Equations With Variables on Both Sides

- Objectives: 1) To solve equations with variables on both sides.
2) To identify equations that are identities or have no solution.

In this section, we will continue to use the properties of equality and inverse operations to solve.

Problem 1 – Solving Equations with Variables on Both Sides

$$\begin{aligned} \text{a) } 7k + 2 &= 4k - 10 \\ -4k &\quad -4k \\ 3k + 2 &= -10 \\ 3k &= -12 \\ k &= -4 \end{aligned}$$

$$\begin{aligned} \text{b) } 4(2y + 1) &= 2(y - 13) \\ 8y + 4 &= 2y - 26 \\ 6y &= -30 \\ y &= -5 \end{aligned}$$

Now you try...

$$\begin{aligned} \text{1) } 8 - (3 + b) &= b - 9 \\ 8 - 3 - b &= b - 9 \\ 5 - b &= b - 9 \\ 14 - b &= b \\ 14 &= 2b \quad b = 7 \end{aligned}$$

$$\begin{aligned} \text{2) } 7(4 - a) &= 3(a - 4) \\ 28 - 7a &= 3a - 12 \\ -10a &= -40 \\ a &= 4 \end{aligned}$$

Problem 2 – Identities and Equations with No Solution

$$\begin{aligned} \text{a) } 3(4b - 2) &= -6 + 12b \\ 12b - 6 &= -6 + 12b \\ +6 &\quad +6 \\ 12b &= 12b \\ 0 &= 0 \\ \text{All real \#}'s \end{aligned}$$

Now you try...

$$\begin{aligned} \text{1) } 2(a - 4) &= 4a - (2a - 4) \\ 2a - 8 &= 4a - 2a + 4 \\ 2a - 8 &= 2a + 4 \\ -2a &\quad -2a \\ -8 &\neq 4 \\ \text{NO SOLUTION} \end{aligned}$$

$$\begin{aligned} \text{b) } 2x + 7 &= -1(3 - 2x) && \text{True statement} \\ 2x + 7 &= -3 + 2x && \rightarrow \text{All real \#}'s \\ 2x + 4 &= 2x && \\ -2x &\quad -2x && \\ 4 &\neq 0 && \text{False state:} \\ &&& \rightarrow \text{NO SOLUTION} \end{aligned}$$

NO SOLUTION

$$\begin{aligned} \text{2) } 5y + 2 &= \frac{1}{2}(10y + 4) \\ 5y + 2 &= 5y + 2 \\ -5y &\quad -5y \\ 2 &= 2 \\ 0 &= 0 \\ \text{All real \#}'s \end{aligned}$$