

Solving Equations with Variables on Both Sides

DAY 1 NOTES

Use inverse operations to:

- 1.) Bring variables on one side
- 2.) Bring constants to the other side
- 3.) Solve

Examples:

1.) $3x = 2x - 4$

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

$$\boxed{x = -4}$$

2.) $5n - 2 = 7n$

$$\begin{array}{r} -5n \quad -5n \\ \hline \end{array}$$

$$\frac{-2}{2} = \frac{2n}{2}$$

$$\boxed{n = -1}$$

3.) $4b + 2 = 3b$

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

$$\frac{2}{-1} = \frac{-b}{-1}$$

$$\boxed{b = -2}$$

4.) $5 + 3y = 7y - 3$

$$\begin{array}{r} -3y \quad -3y \\ \hline \end{array}$$

$$\begin{array}{r} 5 = 4y - 3 \\ +3 \quad +3 \\ \hline \end{array}$$

$$\frac{8}{4} = \frac{4y}{4}$$

$$\boxed{y = 2}$$

5.) $3z - 2 = z - 16$

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

$$\begin{array}{r} 2z - 2 = -16 \\ +2 \quad +2 \\ \hline \end{array}$$

$$\frac{2z}{2} = \frac{-14}{2}$$

$$\boxed{z = -7}$$

6.) $2(y + 6) = 3y$

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

$$\boxed{12 = y}$$

7.) $5 + 3(x - 4) = 2(x + 1)$

$$\begin{array}{r} 5 + 3x - 12 = 2x + 2 \\ \hline \end{array}$$

$$\begin{array}{r} -7 + 3x = 2x + 2 \\ -2x \quad -2x \\ \hline \end{array}$$

$$\begin{array}{r} -7 + x = 2 \\ +7 \quad +7 \\ \hline \end{array}$$

$$\boxed{x = 9}$$

8.) $5 - x - 2 = 3 + 4x + 5$

$$\begin{array}{r} 3 - x = 4x + 8 \\ +x \quad +x \\ \hline \end{array}$$

$$\begin{array}{r} 3 = 5x + 8 \\ -8 \quad -8 \\ \hline \end{array}$$

$$\frac{-5}{5} = \frac{5x}{5}$$

$$\boxed{x = -1}$$

****Look out for special cases****

9.) $6(x+7) - 20 = 6x$

$$6x + 42 - 20 = 6x$$

$$\begin{array}{r} 6x + 22 = 6x \\ -6x \quad -6x \\ \hline \end{array}$$

$$22 = 0 \rightarrow \text{false}$$

NO SOLUTION

10.) $x - 4 - 3x = -2x - 3 - 1$

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

$$-4 = -4 \rightarrow \text{true}$$

All real
Numbers

11.) $4 - 6a + 4a = -1 - 5(7 - 2a)$

$$-2a + 4 = -1 - 35 + 10a$$

$$\begin{array}{r} -2a + 4 = 10a - 36 \\ +2a \quad +2a \\ \hline \end{array}$$

$$\begin{array}{r} 4 = 12a - 36 \\ +36 \quad +36 \\ \hline \end{array}$$

$$40 = 12a$$

$$\frac{12}{12} \frac{40}{12}$$

$a = 10/3$

13.) $3 - 2a + 4a = -2 - (5 + 2a)$

$$2a + 3 = -2 - 5 - 2a$$

$$\begin{array}{r} 2a + 3 = -2a - 7 \\ +2a \quad +2a \\ \hline \end{array}$$

$$\begin{array}{r} 4a + 3 = -7 \\ -3 \quad -3 \\ \hline \end{array}$$

$$\begin{array}{r} 4a = -10 \\ 4 \quad 4 \\ \hline \end{array}$$

$a = -5/2$

12.) $\frac{1}{2}(b+6) = \frac{3}{2}b - 1$

$$\begin{array}{r} \frac{1}{2}b + 3 = \frac{3}{2}b - 1 \\ -\frac{1}{2}b \quad -\frac{1}{2}b \\ \hline \end{array}$$

$$\begin{array}{r} 3 = b - 1 \\ +1 \quad +1 \\ \hline \end{array}$$

$4 = b$

14.) $3(b-6) + 12 = 3b - 6$

$$3b - 18 + 12 = 3b - 6$$

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

$$-6 = -6$$

All real
Numbers