

3 Algebra with Variable on Both Sides

January 15, 2020 8:37 PM

Math 9 Ch 6

Name: _____

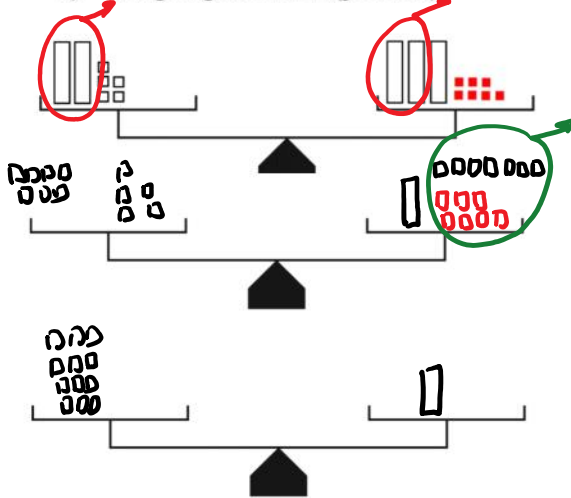
Level 3: Algebra with Variables on BOTH Sides of the Equation (6.1-6.2) Page 1 of 2

Learning Outcome 6A: I can solve algebra equations with variables on both sides.

If the equation contains variables on both sides of the equation, simply move one term with the variable to the other side. Think “zero pairs”.

Example 1: Solve: $2x + 5 = 3x - 7$.

a) Using Algebra Tiles (pictures)



b) Using Algebra
Variable on right side.

$$\begin{aligned} 2x + 5 &= 3x - 7 \\ -2x &\quad -2x \\ \hline 5 &= x - 7 \\ +7 &\quad +7 \\ \hline 12 &= x \\ \boxed{x = 12} \end{aligned}$$

Variable on left side.

$$\begin{aligned} 2x + 5 &= 3x - 7 \\ -3x &\quad -3x \\ \hline -x + 5 &= -7 \\ -5 &\quad -5 \\ \hline -x &= -12 \\ -1 &\quad -1 \\ \hline x &= 12 \\ \boxed{x = 12} \end{aligned}$$

ExerciseS: Solve each of the following equations using whatever way you wish.

1. $5x + 12 = 3x + 2$

$$\begin{aligned} -3x &\quad -3x \\ \hline 2x + 12 &= 2 \\ -12 &\quad -12 \\ \hline 2x &= -10 \\ \frac{2x}{2} &= \frac{-10}{2} \\ \boxed{x = -5} \end{aligned}$$

Verify your solution: Plug $x = -5$ into equation

$$5x + 12 = 3x + 2$$

$$5(-5) + 12 = 3(-5) + 2$$

$$-25 + 12 = -15 + 2$$

$$-13 = -13 \text{ TRUE!}$$

So our solution is correct!

2. $5m + 3 = -7 - 5m$

$$\begin{aligned} +5m &\quad +5m \\ \hline 10m + 3 &= -7 \\ -3 &\quad -3 \\ \hline 10m &= -10 \\ \frac{10m}{10} &= \frac{-10}{10} \\ \boxed{m = -1} \end{aligned}$$

In some equations you will have to combine like terms on each side, before solving.

Level 3: Algebra with Variables on BOTH Sides of the Equation (6.1-6.2)

Example 2: Solve $(4k) + 8 - 2k - 3 = 8 - 4k + 9$ by collecting like terms first.

$$\begin{aligned}
 2k + 5 &= -4k + 17 \\
 +4k & \quad +4k \\
 \hline
 6k + 5 &= 17 \\
 -5 & \quad -5 \\
 \hline
 6k &= 12 \\
 \frac{6k}{6} &= \frac{12}{6} \\
 \boxed{k} &= 2
 \end{aligned}$$

Example 3: Solve the following equations. Note: If an equation has brackets, expand first.

$$\begin{aligned}
 2(4x-3) &= 3(2x+4) \\
 2(4x) + 2(-3) &= 3(2x) + 3(4) \\
 8x - 6 &= 6x + 12 \\
 -8x & \quad -8x \\
 \hline
 -6 &= -2x + 12 \\
 -12 & \quad -12 \\
 \hline
 -18 &= -2x \\
 \frac{-18}{-2} &= \frac{-2x}{-2} \\
 \boxed{x} &= 9
 \end{aligned}$$

Ex. 11: Ben and Hines want to rent scooters while on a vacation. They come across two rental shops with the following rates:

- * Scooter-World \$17 for the first hour, \$16 for each additional hour
- Vespa-Ville \$35 for the first hour, \$12 for each additional hour

Ben decides to rent from Scooter-World and Hines rents from Vespa-Ville. How long would they have to ride for to pay the exact same rental amount?

The 2 costs are the same when

$$\begin{aligned}
 17 + 16h &= 35 + 12h \\
 -12h & \quad -12h \\
 \hline
 17 + 4h &= 35
 \end{aligned}$$



$$\begin{aligned}
 17 + 4h &= 35 \\
 -17 & \quad -17 \\
 \hline
 4h &= 18 \\
 \frac{4h}{4} &= \frac{18}{4} \\
 \boxed{h} &= 4.5
 \end{aligned}$$

The cost is the same if they ride for 4.5 more hours.

Assignment: "What is the Title of This Picture?" & "How Might a Pair of Snakes Be Used for Driving in the Rain?" Worksheets

$$\begin{aligned}
 7x - 12 &= 5x - 22 \\
 -5x & \quad -5x \\
 \hline
 2x - 12 &= -22 \\
 +4x & \quad +4x \\
 \hline
 \frac{2x}{2} &= \frac{-10}{2} \\
 x &= -5
 \end{aligned}$$