3 Algebra with Variables on Both Sides

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Math 9 Ch 6 Name: _____

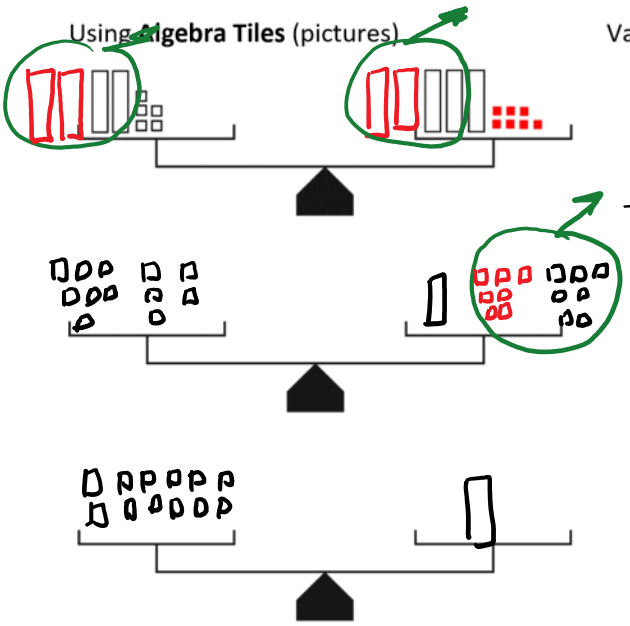
Level 3: Algebra with Variables on BOTH Sides of the Equation (6.1-6.2) Page 1 of 2

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: $2x+5=3x-7$.

Using **Algebra Tiles** (pictures)



Variable on **right** side.

$2x+5=3x-7$

$-2x \quad -2x$

$5=x-7$

$+7 \quad +7$

$12=x$

$\boxed{x=12}$

Variable on **left** side.

$2x+5=3x-7$

$-3x \quad -3x$

$-x+5=-7$

$-5 \quad -5$

$\frac{-x}{-1}=\frac{-12}{-1}$

$\boxed{x=12}$

Exercise 1: **Solve** each of the following equations using whatever way you wish.

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

$-3x \quad -3x$

$2x+12=2$

$-12 \quad -12$

$\frac{2x}{2}=\frac{-10}{2}$

$\boxed{x=-5}$

Verify the solution: Plug $x=-5$ back in.

$5x+12=3x+2$

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

$-25+12=-15+2$

$-13=-13$ ✓

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

$5m \quad +5m$

$10m+3=-7$

$-3 \quad -3$

$\frac{10m}{10}=\frac{-10}{10}$

$\boxed{m=-1}$

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

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

$4k-2k+8-3=-4k+17$

$2k+5=-4k+17$

$+4k \qquad +4k$

$6k+5=17$

$-5 \qquad -5$

$\frac{6k}{6}=\frac{12}{6}$ → $\boxed{k=2}$

Example 3: Solve the following equations. Note: If an equation has brackets, distribute (multiply) first.

$2(4x-3)=3(2x+4)$

$2(4x)+2(-3)=3(2x)+3(4)$

$8x-6=6x+12$

$-6x \qquad -6x$

$2x-6=12$

$+6 \qquad +6$

$\frac{2x}{2}=\frac{18}{2}$

$\boxed{x=9}$

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 equal.

Let h = # of hours extra

Scooter world: cost = $17+16x$

Vespa-Ville: cost = $35+12x$

$17+16x=35+12x$

$-12x \qquad -12x$

$17+4x=35$

$-17 \qquad -17$

$4x=18$

$\frac{4x}{4}=\frac{18}{4}=\frac{9}{2}$

$\boxed{x=4.5}$ hours

Assignment: "What is the Title of This Picture?" & "How Can You Visit the Sun Without Burning Up (do #5!!)?"

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

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