Name: _____ Date: _____

Student Exploration: Using Algebraic Equations

Vocabulary: equation, variable

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

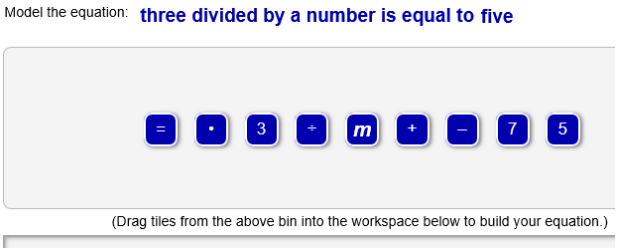
1. The words “like,” “dogs,” and “walks” can be used to form a sentence.
   A. Write a sentence in which “dogs” is used first. _____
   B. Write a sentence in which “walks” is used first. _____

2. Do you think both sentences make sense? _____ Why or why not? _____

_____

Gizmo Warm-up

In the *Using Algebraic Equations* Gizmo, you translate algebraic equations into English sentences and vice versa.



An **equation** is a mathematical sentence that states that two expressions are equal. An algebraic equation contains at least one **variable** – a letter used to represent unknown numbers.

In general, the Gizmo will give you either an algebraic equation or a sentence at the top of the Gizmo. Below the equation or sentence is a set of tiles. Your goal is to use the tiles to form a sentence to match the equation, or an equation to match the sentence.

1. Drag a tile with a word representing a number from the top bin into the bottom bin. Look to the left under the bottom bin. What do you see? _____

2. Drag a tile with a word that represents an operation into the bottom bin. Use the little gray arrow to help you place it after the first tile. Then drag the first tile after the second tile.

   What happens at the bottom when you change the order of the tiles? _____

_____

Activity A: **Equations and sentences**	Get the Gizmo ready: • Click **Refresh** in your browser.	

1. You should see the equation to the right at the top of the Gizmo. Model the equation: $x + 3 = 2$

   A. To make a sentence that means "x + 3 = 2," you will need one tile for each number, variable, and sign. How many tiles will you use for this equation? _____

   B. You can read x + 3 = 2 from left to right in the same way you read a sentence. What does "x" stand for, in words? _____ Drag that tile into the bottom bin.

   C. Which two tiles should come next, to mean "+ 3"? _____ Drag them into the bottom bin.

   D. Drag two more tiles down, to finish off the "= 2" part of the equation. If a check mark appears, then you are correct. Write the sentence for this equation.

   _____

   E. Switch the first tile and the third tile. The check mark should still indicate that the sentence is correct. Why do you think you can switch these tiles in this equation?

   _____

   F. Drag the "two" tile from last to first. Move another tile until you get another correct sentence. What sentence did you make? _____

2. Click **New**. You should see the sentence to the right in the Gizmo. Model the equation: **a number increased by nine is equal to seven**

   A. The first part of this phrase is "a number." Which tile represents an unknown number? _____ Drag that tile into the bottom bin.

   B. What symbol means "increased by?" _____ Drag that tile into the bottom bin.

   C. Keep going until you have an algebraic equation that matches the given phrase. What equation did you make? _____

3. Click **New**. Work through more problems in the Gizmo. If you need help, click **HINT**.

(Activity A continued on next page)
Activity A (continued from previous page)

4. Write a sentence for each algebraic equation.

   A. $22 + r = 10$ _____

   B. $15 = 14 - b$ _____

   C. $n \bullet 10 = 20$ _____

   D. $26 \div y = 2$ _____

   E. $18 = 9 \bullet x$ _____

   F. $2 \bullet 5 + a = 7$ _____

   G. $9 = 12 + c - 5$ _____

5. Write an algebraic equation for each sentence.

   A. a number plus twelve is equal to three _____

   B. two is equal to twenty times a number _____

   C. sixteen minus a number is equal to ten _____

   D. five is equal to thirty divided by a number _____

   E. ten increased by a number is equal to twelve _____

   F. a number divided by sixteen is equal to eight _____

   G. twenty added to a number minus four is equal to seven _____

Activity B: **Equivalent equations**	Get the Gizmo ready: • Click **NEW** until the Gizmo gives you an algebraic equation that involves multiplication.	times a number

1. In the Gizmo, be sure you now have an algebraic equation that involves multiplication.

   A. What is the equation? _____

   B. Drag tiles to the bottom bin to make a sentence that is equivalent to this equation.

   What is your sentence? _____

   C. There is more than one sentence that is equivalent to your equation. For example, the equation $n + 5 = 6$ is equivalent to all of these sentences:

   - a number plus five is equal to six
   - five plus a number is equal to six
   - six is equal to a number plus five
   - six is equal to five plus a number

   You've already written one sentence above. Adjust the tiles in the Gizmo to make three more sentences equivalent to your equation. What are they?

   _____

   _____

   _____

2. Click **NEW** until the Gizmo gives you an equation that involves subtraction.

   A. What is the equation? _____

   B. Use the Gizmo to make all the equivalent sentences. How many are there? _____

   C. What sentences did you make? _____

   _____

3. You can write more sentences for equations with addition or multiplication than for equations with subtraction or division. Explain why. _____

   _____

4. Write as many sentences as possible for the equation $70 \div h = 10$. _____

   _____