Name: _____ Date: _____

# Student Exploration: Modeling and Solving Two-Step Equations

**Vocabulary:** equation, solution, solve

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)
Your car breaks down on the highway, and you need to have it towed to a garage. A towing company charges $50 plus $4 per mile.

1. Write an equation for the cost to have a car towed. _____

   Explain. _____

2. If the bill was $138, how far were you towed? _____ Explain. _____

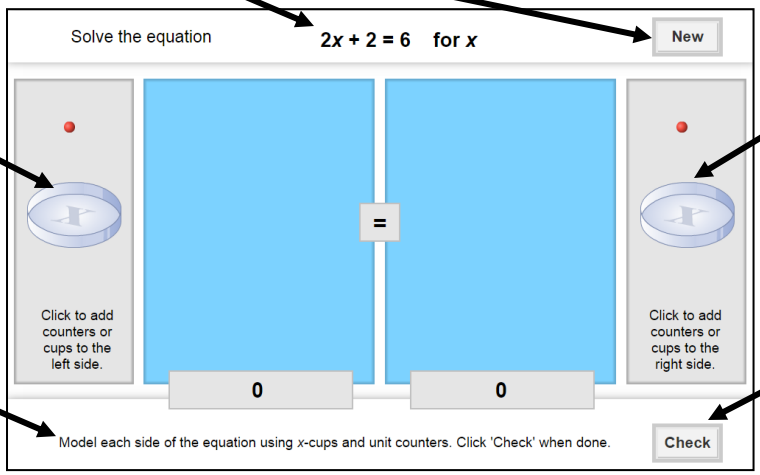
   _____

**Gizmo Overview**
An **equation** is a mathematical sentence stating that two expressions are equal. In the *Modeling and Solving Two-Step Equations* Gizmo, you can model an equation using *x*-cups and unit counters, and then solve it with the help of step-by-step instructions. To **solve** an equation is to find its **solution** – the value or values that make the equation true.

Here's how the Gizmo looks at first:

The equation to solve is shown here. Click **New** for additional equations.

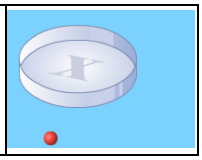
Click on *x*-cups and unit counters to model the left side of the equation.




Click on *x*-cups and unit counters to model the right side of the equation.

Feedback and instructions are given at the bottom.

Click **Check** to see if you have done each step correctly.

| **Activity:**<br>**Solving an equation** | Get the Gizmo ready:<br>• You should see the equation $2x + 2 = 6$. If not, click **Refresh** in your browser. |  |
|---|---|---|

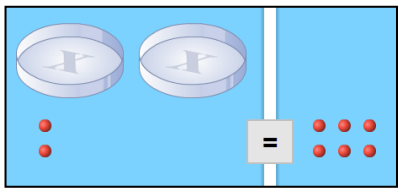
1. When you begin, you should see the equation $2x + 2 = 6$ at the top of the Gizmo. The *x*-cups represent the variable, *x*, and the unit counters represent the constant.

   A. How many of each are used to model "$2x + 2$"? *x*-cups: _____ counters: _____

   B. How many of each are used to model "6"? *x*-cups: _____ counters: _____

   C. Drag the appropriate number of *x*-cups and unit counters to each side of the equation. Click the **Check** button to make sure that your model is correct.

   D. To isolate the $2x$ term, how many counters do you need to remove from each side? _____

   E. Click the counters to isolate $2x$. What equation do you have now? _____ Click **Check**.

   F. Finally, divide the remaining counters so that there is an equal number in each *x*-cup. How many counters did you place in each cup? _____

   G. What is the solution to the equation? _____ Click **Check** to verify your solution.

2. Click **New** to try another equation. Model and solve this equation in the Gizmo.

   A. What equation were you given? _____

   B. Explain how you modeled and solved the equation. _____

   _____

   _____

   C. What is the solution? _____ Click **Check** to confirm this.

   D. In the space to the right, substitute your solution for *x* in the original equation and simplify. If your solution is correct, this value of *x* should make the equation true.

3. Click **New** to try additional equations using the Gizmo.

**(Activity continued on next page)**

**Activity (continued from previous page)**

4. Solve each equation below. Show your work. Check your solution using substitution.

   A. $2x + 6 = 12$

   B. $17 = 3x + 5$

   C. $29 = 4x + 1$

   D. $35 = 8x + 19$

   E. $3x + 14 = 47$

   F. $6x - 9 = 39$

5. Write *two different* two-step equations whose solutions are $x = 8$.

   A. Equation 1: _____ Equation 2: _____

   B. Explain how you found those. _____