Name: _____ Date: _____

Student Exploration: Solving Linear Inequalities in One Variable

Vocabulary: boundary point, inequality, solution

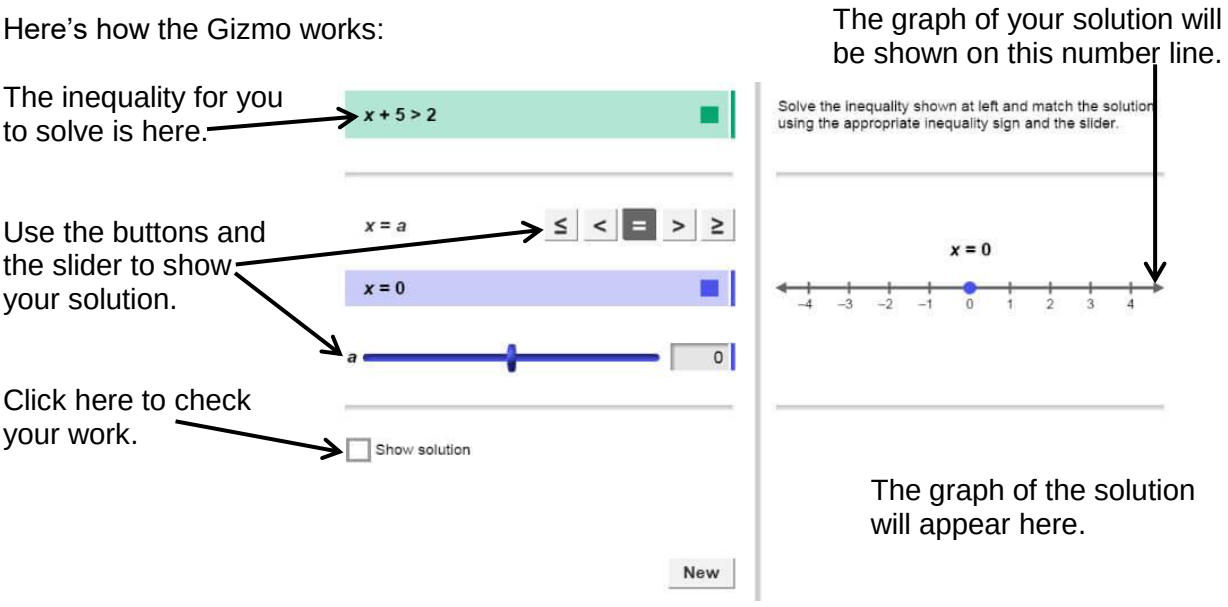
Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. Larry has at least 3 more books than Pat. If Pat has 6 books, what do you know about the number of books Larry has? _____

2. Suppose Larry has 16 books and Pat has *x* books. (Larry still has at least 3 more than Pat.)
   A. Use <, ≤, >, or ≥ to write an **inequality** to compare the number of books Larry has to the number of books Pat has. _____
   B. What do you know about the number of books Pat has? _____

Gizmo Overview
In the *Solving Linear Inequalities in One Variable* Gizmo, you will be given inequalities like $x + 3 \leq 16$ and find their **solutions**, the values that make the inequalities true.

Here's how the Gizmo works:



After your have solved the inequality correctly, click **New** for a new inequality to solve.

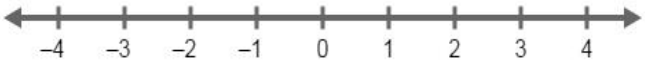
Activity A: **Solutions to inequalities**	Get the Gizmo ready: • You should see the inequality $x + 5 > 2$. If not, click **Refresh** in your browser.	$x + 5 > 2$

1. In this question, you will solve the inequality $x + 5 > 2$.

   A. What do you have to do to each side to solve $x + 5 > 2$? _____

   B. Solve $x + 5 > 2$ for x. Show your work to the right.

   Set ***a*** to the number in your solution and select **>**. (To quickly set the value of a slider, type the number into the text box to the right of the slider and press **Enter**.) Sketch your solution below. Select **Show solution** to check your work.

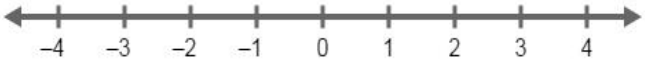


   C. The open point on the number line is the **boundary point** of the graph. Is the boundary point a solution of $x + 5 > 2$? _____ Explain. _____

2. Click **New**. You should see the inequality $x - 4 \leq -3$.

   A. What do you have to do to each side to solve $x - 4 \leq -3$? _____

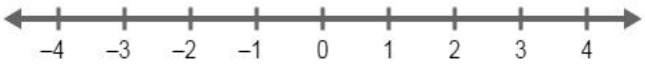
   B. Solve $x - 4 \leq -3$. Show your work to the right. Graph your solution in the Gizmo and sketch the graph below. Select **Show solution** to check your work.



3. Click **New**. You should see the inequality $5x < 20$.

   A. What do you have to do to each side to solve $5x < 20$? _____

   B. Solve $5x < 20$. Show your work to the right. Graph your solution in the Gizmo and sketch the graph below. Select **Show solution** to check your work.



(Activity A continued on next page)

Activity A (continued from previous page)

4. So far, you have solved inequalities in the same way you solve equations. However, an interesting thing happens when the coefficient of x is negative. Before doing the next problem in the Gizmo, consider the inequality $-x < -2$.

x	$-x$	Is $-x < -2$ true?
1		
2		
3		
4		
5		

   A. Fill in the table for the values of x shown. What values of x make $-x < -2$ true?

   _____

   B. Write an inequality to describe the values of x that make $-x < -2$ true. _____

   C. Look at the inequality signs in $-x < -2$ and in the inequality you wrote above.

   What do you notice? _____

5. Click **New**. You should see $\frac{x}{-4} \geq -1$.

   A. Rewrite $\frac{x}{-4} \geq -1$ so the negative sign in the fraction is with x. _____

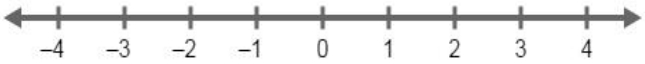
   B. Multiply each side by 4. What inequality do you get? _____

   C. If $-x$ is greater than or equal to -4, then what must be true about x? _____

   _____ Test several values of x to check your answer.

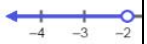
   D. You can also solve $\frac{x}{-4} \geq -1$ by multiplying each side by -4. What do you think will happen to the "≥" sign when you multiply each side by -4? _____

   E. Solve $\frac{x}{-4} \geq -1$. Show your work to the right. Graph your solution in the Gizmo and sketch the graph below. Select **Show solution** to check your work.



6. Click **New**. Work through more problems in the Gizmo. Be sure to practice solving a variety of inequalities, including several in which x is multiplied or divided by a negative number.

   In general, what happens to the inequality sign when you multiply or divide each side of an inequality by a negative number? _____

Activity B: **Solving inequalities**	Get the Gizmo ready: • Click **New** if you need more practice solving inequalities.	

Solve each inequality. Show your work in the space below each problem. Then graph the solution on the number line.

1. $x + 9 < 12$

2. $x - 6 \geq 1$

3. $0.5x \leq 4$

4. $-5x > -20$

5. $\frac{x}{7} \leq -1$

6. $\frac{x}{-3} > -2$