Introduction to Inequalities

Learning Goals

Students will be able to …
1. Read inequalities from left to right.
2. Write inequalities given a phrase with the variable always being written on the left side.
3. Graph one variable inequalities on a number line.
4. Identify whether or not a value is a solution of a one-variable inequality.

Standards

CCSS.MATH.CONTENT.HSA.REI.B.3
Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
(from http://www.corestandards.org/Math/)

Prior Knowledge: Recognition of inequality symbols and their definitions.

Materials   **Time:** Block Period (1.5 hrs)   **Grades:** 6th-9th

Activity page
PhET Sim - Equality Explorer
PowerPoint Presentation

Warm-up: (5 minutes) Give students 5-7 minutes to work together to answer the following question. Let students volunteer their responses and discuss.

Ticket to Start: On your desk, or the whiteboard, answer the following question(s).

By law, the height of a newly constructed building in Washington, D.C., can be no greater than the width of the adjacent street, plus 20 ft. Pennsylvania Avenue, shown at the right, is the widest street in Washington, D.C. What is the maximum allowable height of a new building? Explain your reasoning.
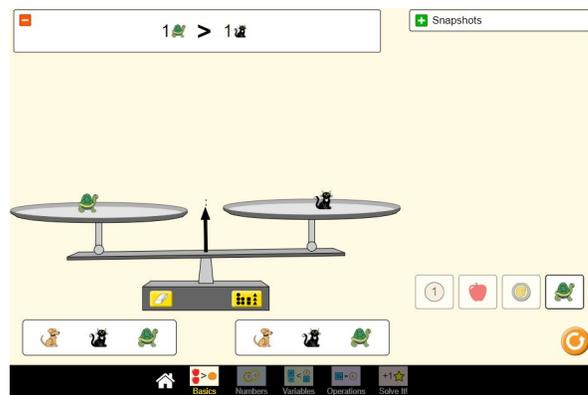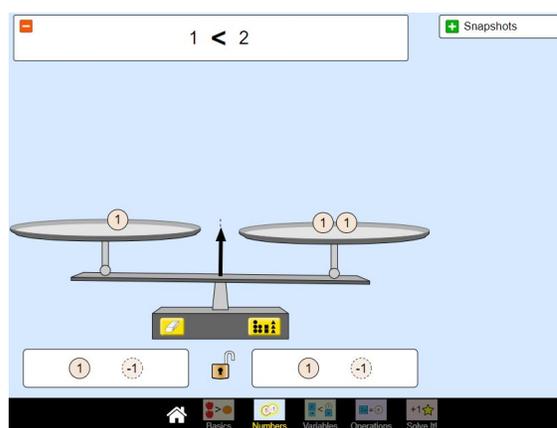
Goal 1: Reading Inequalities

Using the PhET link on our classroom page, go to the [Equality Explorer](#) simulation.
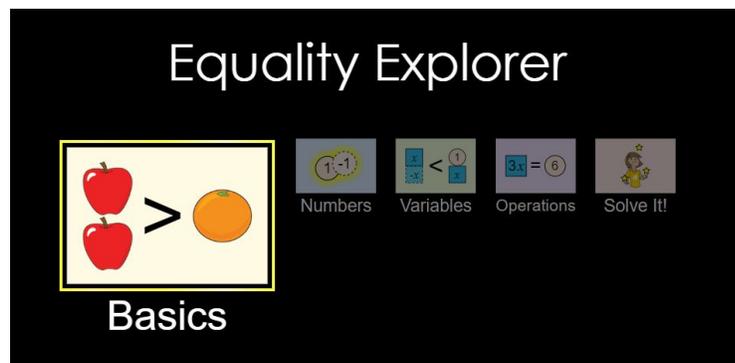
Step1: (10 minutes) Using the "Basics" tab use 5 minutes to play around and see what relationships you can find between the animals, fruit, and/or coins. Answer the questions on the activity sheet under "Goal 1: Reading Inequalities Exploration". Once you have completed questions 1-6, pause to discuss your answers with your partner and with the class.

Step 2: (10 minutes) Using the "Numbers" tab, create a numerical inequality of your choice. Answer the questions under "Goal 1: Reading Inequalities Numbers Activity". Once you have completed questions 1-3, pause to discuss your answers with your partner and with the class.

Step 3: (10 minutes) As a class, read the following inequalities out loud and discuss the following questions. What does it mean to be a solution of an inequality? What are some solutions to the inequalities (A-G)? What are the pitfalls of having the variable on the right side in F-G when trying to list solutions? Is there a better way to write the inequalities? How would we do that? Should we always write inequalities with the variables on the left side? (ppt)

A. $x < 3$ B. $x > -7$ C. $y \geq 4$ D. $z \leq 9$ E. $x > -1$ F. $12 > x$ G. $-4 \geq x$

Goal 2: Writing Inequalities

(10 minutes) Practice writing inequalities using words and symbols under the "Goal 2: Writing Inequalities" section on your activity sheet. Once you have completed parts A and B, pause to discuss your answers with your partner and with the class.

Goal 3: Graphing Inequalities

Step 1: (10 minutes) Using the "Variables" tab, create an inequality with the variable on the left. Follow the directions/answer the questions on the activity sheet under "Goal 3: Graphing Inequalities Variables Activity". Once you have completed questions 1-3, pause to discuss your answers with your partner and with the class.
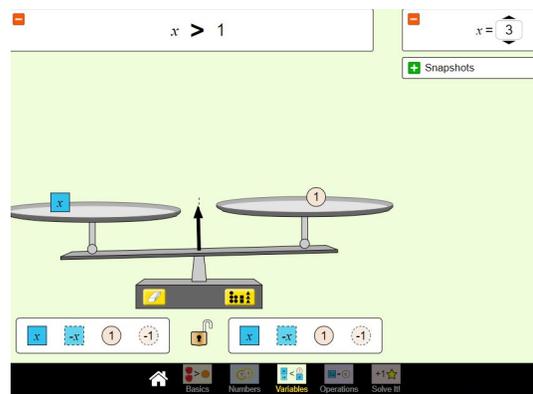
Step 2: (10 minutes) Practice graphing inequalities on a number line. (powerpoint) Discuss what you need to do to graph D-E and open/closed circles.

Goal 3: Graphing Inequalities
Step 2: In your notes, practice graphing inequalities on a number line.

○ Open circle: $<, >$ critical value is not a solution
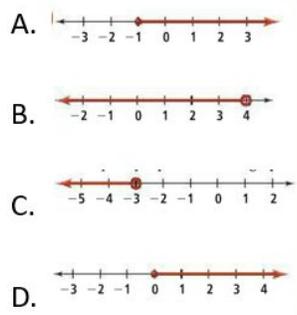● Closed circle: $\leq, \geq$ critical value IS a solution

Graph.
A. $n < 1$
B. $a \geq 0$
C. $x \leq -3$
D. $10 < r$
E. $-4 > x$

**Step 3: (10 minutes)** Write the inequality associated with each graph. (power point)

Goal 3: Graphing Inequalities

Step 3: In your notes, write the inequality for each graph.

A.

B.

C.

D.

Goal 4: Identifying if a value is a solution of an inequality

(10 minutes) Using the "Operations" tab create the inequality 2x+1 < 3. *Note you will need to toggle the value of x to obtain the < symbol.* Answer the questions under "Goal 4: Identifying if a value is a solution of an inequality". Once you have completed questions 1-5, pause to discuss your answers with your partner and with the class. We will complete #6 together.
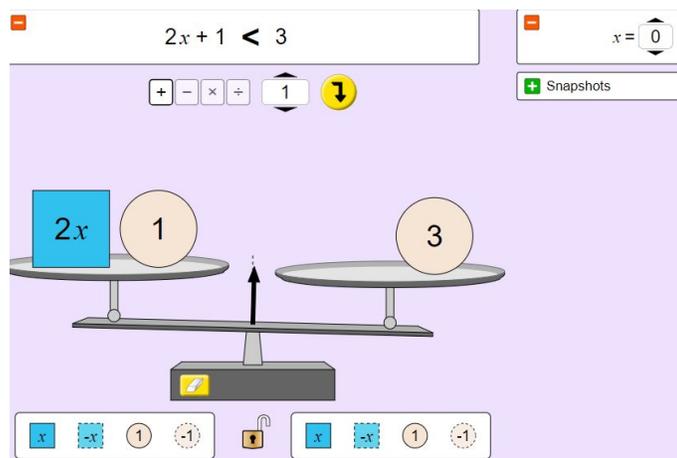
Ticket to Leave: (5 minutes) (ppt)

A. Write the expression in words AND graph it on a number line.

$$x > -13$$

B. Is 4 a solution to $3x - 5 > 14$? Support your answer using a formal model.