

# Parent Newsletter

## Chapter 11: Inequalities

### Key Terms

An **inequality** is a mathematical sentence that compares expressions. It contains the symbols  $<$ ,  $>$ ,  $\leq$ , or  $\geq$ .

A **solution of an inequality** is a value that makes the inequality true.

The set of all solutions of an inequality is called the **solution set**.

The **graph of an inequality** shows all the solutions of the inequality on a number line.

### Students will...

Write and graph inequalities.

Use substitution to check whether a number is a solution of an inequality.

Solve inequalities using addition or subtraction.

Solve inequalities using multiplication or division.

Solve multi-step inequalities.

Solve real-life problems.

### Standards

#### **Common Core:**

**7.EE.4b:** Solve word problems leading to inequalities of the form  $px + q > r$  or  $px + q < r$ , where  $p$ ,  $q$ , and  $r$  are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

### Key Ideas

#### Addition Property of Inequality

- When you add the same number to each side of an inequality, the inequality remains true.
- If  $a < b$ , then  $a + c < b + c$ .
- If  $a > b$ , then  $a + c > b + c$ .

#### Subtraction Property of Inequality

- When you subtract the same number from each side of an inequality, the inequality remains true.
- If  $a < b$ , then  $a - c < b - c$ .
- If  $a > b$ , then  $a - c > b - c$ .

#### Multiplication and Division Properties of Inequality (Case 1)

- When you multiply or divide each side of an inequality by the same *positive* number, the inequality remains true.
- If  $a < b$  and  $c$  is positive, then  $a \cdot c < b \cdot c$  and  $\frac{a}{c} < \frac{b}{c}$ .
- If  $a > b$  and  $c$  is positive, then  $a \cdot c > b \cdot c$  and  $\frac{a}{c} > \frac{b}{c}$ .

#### Multiplication and Division Properties of Inequality (Case 2)

- When you multiply or divide each side of an inequality by the same *negative* number, the direction of the inequality symbol must be reversed for the inequality to remain true.
- If  $a < b$  and  $c$  is negative, then  $a \cdot c > b \cdot c$  and  $\frac{a}{c} > \frac{b}{c}$ .
- If  $a > b$  and  $c$  is negative, then  $a \cdot c < b \cdot c$  and  $\frac{a}{c} < \frac{b}{c}$ .

These properties are also true for  $\leq$  and  $\geq$ .



## Reference Tools

A **Y Chart** can be used to compare two topics. List differences between the two topics in the branches of the Y and similarities in the base of the Y. A Y chart serves as a good tool for assessing knowledge of a pair of topics that have subtle but important differences.

### Solving Equations

- The sign between two expressions is an equal sign,  $=$ .
- One number is the solution.

### Solving Inequalities

- The sign between two expressions is an inequality symbol:  $<$ ,  $>$ ,  $\leq$ , or  $\geq$ .
- More than one number can be a solution.

- Use inverse operations to group numbers on one side.
- Use inverse operations to group variables on one side.
- Solve for the variable.

## Quick Review

Inequality Symbols				
Symbol	$<$	$>$	$\leq$	$\geq$
Key Phrases	<ul style="list-style-type: none"><li>• is less than</li></ul>	<ul style="list-style-type: none"><li>• is greater than</li></ul>	<ul style="list-style-type: none"><li>• is less than or equal to</li></ul>	<ul style="list-style-type: none"><li>• is greater than or equal to</li></ul>
	<ul style="list-style-type: none"><li>• is fewer than</li></ul>	<ul style="list-style-type: none"><li>• is more than</li></ul>	<ul style="list-style-type: none"><li>• is at most</li><li>• is no more than</li></ul>	<ul style="list-style-type: none"><li>• is at least</li><li>• is no less than</li></ul>

- When you multiply or divide by a negative quantity, reverse the direction of the inequality symbol.
- You solve two-step inequalities in much the same way as you solve two-step equations. You only need to remember to change the direction of the inequality symbol if you multiply or divide by a negative quantity.

## Essential Questions

How can you use a number line to represent solutions of an inequality?

How can you use addition or subtraction to solve an inequality?

How can you use multiplication or division to solve an inequality?

How can you use an inequality to describe the dimensions of a figure?

## What's the Point?

The ability to write and solve inequalities is very useful in real life for events like making a household budget. Ask your student how they plan on spending their money next month. Then have them make a budget to show at least how much money they will need to earn to cover all the costs.

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 11: Space Cadets STEM Video is available online at [www.bigideasmath.com](http://www.bigideasmath.com).

