Big Ideas Math: Algebra 1

Chapter Summary

Chapter 2: Solving Linear Inequalities

Learning Goals

Write linear inequalities.

Sketch the graphs of linear inequalities.

Write linear inequalities from graphs.

Solve inequalities using addition.

Solve inequalities using subtraction.

Solve inequalities by multiplying or dividing by *positive* numbers.

Solve inequalities by multiplying or dividing by *negative* numbers.

Use inequalities to solve real-life problems.

Solve multi-step inequalities.

Use multi-step inequalities to solve real-life problems.

Write and graph compound inequalities.

Solve compound inequalities.

Use compound inequalities to solve real-life problems.

Solve absolute value inequalities.

Use absolute value inequalities to solve real-life problems.

Essential Questions

How can you use an inequality to describe a real-life statement?

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

How can you use division to solve an inequality?

How can you solve a multi-step inequality?

How can you use inequalities to describe intervals on the real number line?

How can you solve an absolute value inequality?

Core Vocabulary

An ***inequality*** is a mathematical sentence that compares expressions.

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 the solution set of the inequality on a number line.

Equivalent inequalities are inequalities that have the same solutions.

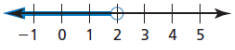
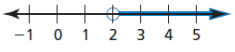
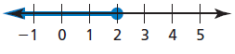
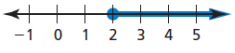
An inequality that contains an absolute value expression is an ***absolute value inequality***.

The absolute value of the difference of a number x and a given value is an ***absolute deviation***.

A ***compound inequality*** is an inequality formed by joining two inequalities with the word "and" or the word "or".

Core Concept

Representing Linear Inequalities

Words	Algebra	Graph
x is less than 2	$x < 2$	
x is greater than 2	$x > 2$	
x is less than or equal to 2	$x \leq 2$	
x is greater than or equal to 2	$x \geq 2$	

Game

- Direct Hit!

This is available online in the *Game Closet* at www.bigideasmath.com.

Core Concept

Addition Property of Inequality

Adding the same number to each side of an inequality produces an equivalent inequality.

- If $a > b$, then $a + c > b + c$.
- If $a \geq b$, then $a + c \geq b + c$.
- If $a < b$, then $a + c < b + c$.
- If $a \leq b$, then $a + c \leq b + c$.

Subtraction Property of Inequality

Subtracting the same number from each side of an inequality produces an equivalent inequality.

- If $a > b$, then $a - c > b - c$.
- If $a \geq b$, then $a - c \geq b - c$.
- If $a < b$, then $a - c < b - c$.
- If $a \leq b$, then $a - c \leq b - c$.

Solving Absolute Value Inequalities

- To solve $|ax + b| < c$ for $c > 0$, solve the compound inequality $ax + b > -c$ *and* $ax + b < c$.
- To solve $|ax + b| > c$ for $c > 0$, solve the compound inequality $ax + b < -c$ *or* $ax + b > c$.

In the inequalities above, you can replace $<$ with $\leq$ and $>$ with $\geq$.

Multiplication and Division Properties of Inequality (c > 0)

Multiplying or dividing each side of an inequality by the same *positive* number produces an equivalent inequality.

- If $a > b$ and $c > 0$, then $ac > bc$.
- If $a > b$ and $c > 0$, then $\frac{a}{c} > \frac{b}{c}$.
- If $a < b$ and $c > 0$, then $ac < bc$.
- If $a < b$ and $c > 0$, then $\frac{a}{c} < \frac{b}{c}$.

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

Multiplication and Division Properties of Inequality (c < 0)

When multiplying or dividing each side of an inequality by the same *negative* number, the direction of the inequality symbol must be reversed to produce an equivalent inequality.

- If $a > b$ and $c < 0$, then $ac < bc$.
- If $a > b$ and $c < 0$, then $\frac{a}{c} < \frac{b}{c}$.
- If $a < b$ and $c < 0$, then $ac > bc$.
- If $a < b$ and $c < 0$, then $\frac{a}{c} > \frac{b}{c}$.

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

Solving Inequalities

One-Step and Multi-Step Inequalities

- Follow the steps for solving an equation. Reverse the inequality symbol when multiplying or dividing by a negative number.

Compound Inequalities

- If necessary, write the inequality as two separate inequalities. Then solve each inequality separately. Include *and* or *or* in the solution.

Absolute Value Inequalities

- If necessary, isolate the absolute value expression on one side of the inequality. Write the absolute value inequality as a compound inequality. Then solve the compound inequality.

Additional Review

- Representing Linear Inequalities, *p. 57*
- Solving Multi-Step Inequalities, *p. 74*
- Special Solutions of Linear Inequalities, *p. 75*
- Writing and Graphing Compound Inequalities, *p. 82*
- Solving Compound Inequalities, *p. 83*

What's the Point?

The STEM Videos available online show ways to use mathematics in real-life situations.

The Chapter 2: Planning Electrical Circuits STEM Video is available online at www.bigideasmath.com.