TOPIC 8

LESSON 8.4a

Be Greater Than

7.EE.4b

Objective

Solving Inequalities with Incerse Operations

Warm-Up

Graph each inequality on a number line.

1. $x > 5$

2. $x \geq 6\frac{1}{2}$

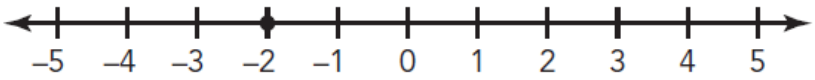
3. $x < 5.2$

4. $x \leq 12$

GETTING STARTED

Equations Versus Inequalities

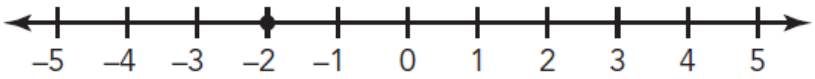
Consider the equation 4x + 9 = 1. The solution is shown on the number line.



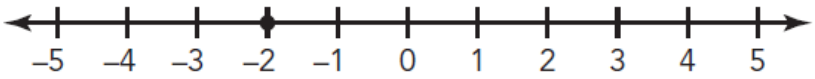
1. Verify the solution is correct. Are there any other solutions to this equation? Explain your reasoning.

Consider the set of numbers {−5, −4, −3, −2, −1, 0, 1}.
2. Use substitution to determine which values are solutions to each inequality. Plot the solutions for each inequality on the given number line.

a. 4x + 9 > 1



b. 4x + 9 ≤ 1



3. Use your number lines to make predictions about other solutions to each inequality. Create a number line to illustrate each of your conjectures.

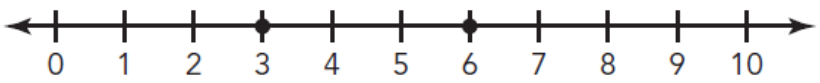
EXPLORE 1

Adding and Subtracting with Inequalities

In this lesson, you will learn to solve an inequality. To solve an inequality means to determine the values of the variable that make the inequality true. The objective when solving an inequality is similar to the objective when solving an equation. You want to isolate the variable on one side of the inequality symbol by using the operations of addition, subtraction, multiplication, and division.

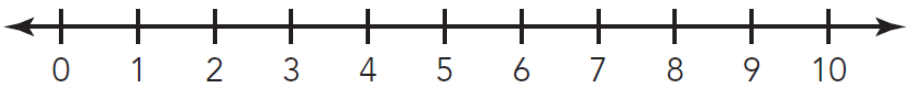
Let's investigate what happens when each side of an inequality is added or subtracted by the same number.

Consider the relationship between the two numbers 3 and 6.
Since 3 is to the left of 6, you know that $3 < 6$.



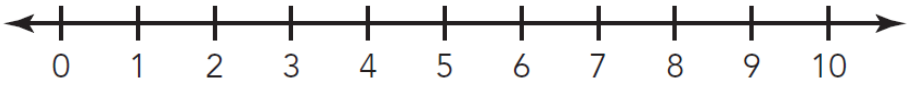
1. Perform each operation to the numbers 3 and 6. Then, plot the new values on the number line. Finally, write a corresponding inequality statement.

a. Add $\frac{1}{2}$ to each number.



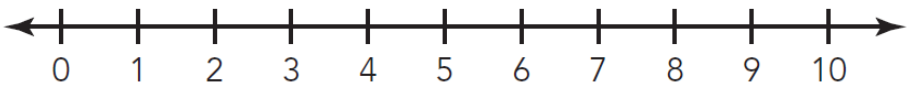
$3 + \frac{1}{2}$ _____ $6 + \frac{1}{2}$

b. Add 2 to each number.



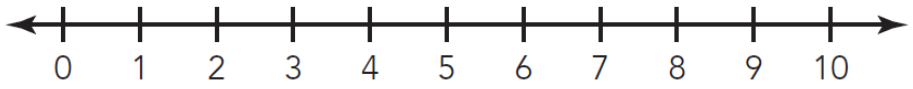
3 + 2 _____ 6 + 2

c. Add 3 to each number.



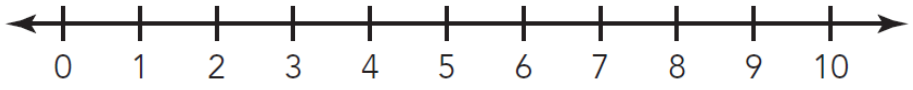
3 + 3 _____ 6 + 3

d. Subtract $\frac{1}{2}$ from each number.



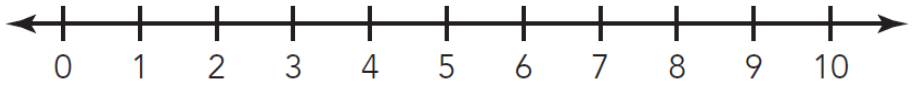
$3 - \frac{1}{2}$ _____ $6 - \frac{1}{2}$

e. Subtract 2 from each number.



3 – 2 _____ 6 – 2

f. Subtract 3 from each number.



3 – 3 _____ 6 – 3

2. When you add the same number to each side of the inequality or subtract the same number from each side of the inequality, what do you notice about the resulting inequality symbol?

3. Explain why Simone is correct.

Simone

No matter what number I add to or subtract from both sides of the inequality, the relationship between the two sides of the inequality stays the same:

$$3 < 6$$

$$3 + a < 6 + a$$

$$3 - a < 6 - a$$

4. Consider the inequality $x - 2 > 6 - 2$.

a. Write an inequality to describe the possible values of x.

b. What could you do to both sides of the original inequality to determine your answer to part (a)?

5. Suppose you have the inequality $x - 2 > 6$. Determine the possible values of x and sketch the solution set on a number line. Explain your reasoning.

6. Mike is 5 years older than his brother Jim.
For each question, write and solve an equation or inequality to describe Jim's possible ages. Then, graph the solution set on the number line.

a. How old will Jim be when Mike is 29 years old?

b. How old will Jim be when Mike is at least 25 years old?

c. How old will Jim be when Mike is younger than 30 years old?

7. Solve each inequality and graph the solution set on the number line. Then choose one value from your solution set and one value outside your solution set to check your work.

a. $13 < x + 11$

b. $10 + x \geq 45$

c. $x < 5 + 9$

d. $x - 3 \leq 21$

8. Choose one of the inequalities from Question 7 and write a real-world situation that can be modeled by the algebraic statement.

Name: _____ Date: _____ Class: _____

Homework HW

LESSON 8.4a

Be Greater Than

Objective

Solving Inequalities with Incerse Operations

Review

Solve each two-step equation.

1. $2(3x + 4) = 19$

2. $-3.2x + 9.1 = 4.62$

Rewrite each linear expression by factoring out the coefficient of the variable.

3. $-2x + 7$

4. $3x - 12$

Use properties to rewrite each expression with the fewest possible terms.

5. $\left(\frac{6}{7}x + 4\frac{1}{3}\right) + \left(-1\frac{1}{2}x - 9\right)$

6. $(10.7x - 19.2) - (81.6x - 33.6)$