Solve Inequities by Multiplication or Division

Objective: solve inequalities by using the Multiplication or Division properties of inequality
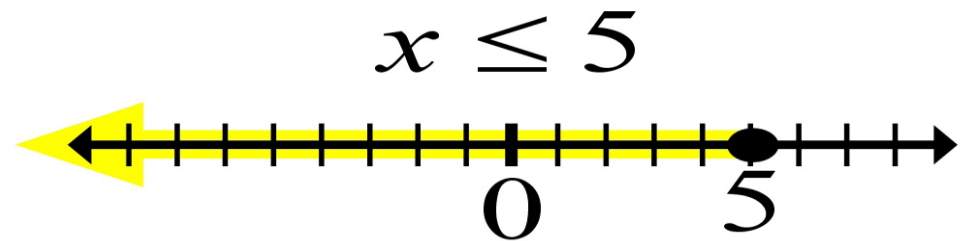
Review vocabulary

- Inequality

- An open sentence that uses >, <, ≥, ≤ or ≠ to compare two quantities.

- Graph (Number Line)

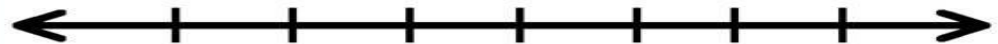- The Process of placing a point on the number line or a coordinate plane at its proper location

$$x \leq 5$$

Review

Symbol	Words	Open or closed dot on number line?
>	Greater than	Open dot
	Greater than or equal to	
	Less than	
≤		

Review: Solve Inequality by Addition or subtracting by graphing the solution

h – 16 ≤ -24

Quiz

MATH may not teach us how to ADD love or SUBTRACT hate but it gives us hope that EVERY PROBLEM has a SOLUTION.

good Luck

Introduction

- If you were solving the equation 8x = 40, what would be the first step to solve the equation?

- Based on this, what is the first step to solve the inequality?

Multiplication and Division Properties of Inequality, Positive Number

Words
The **Multiplication Property of Inequality** and the **Division Property of Inequality** state that an inequality remains true when you multiply or divide each side of an inequality by a positive number.

Symbols
For all numbers a, b, and c, where $c > 0$,

1. if $a > b$, then $ac > bc$ and $\dfrac{a}{c} > \dfrac{b}{c}$.

2. if $a < b$, then $ac < bc$ and $\dfrac{a}{c} < \dfrac{b}{c}$.

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

Examples

1. **Solve $8x \leq 40$.**

$8x \leq 40$ Write the inequality.

$\dfrac{8x}{8} \leq \dfrac{40}{8}$ Divide each side by 8.

$x \leq 5$ Simplify.

The solution is $x \leq 5$. You can check this solution by substituting 5 or a number less than 5 into the inequality.

2. **Solve $\dfrac{d}{2} > 7$.**

$\dfrac{d}{2} > 7$ Write the inequality.
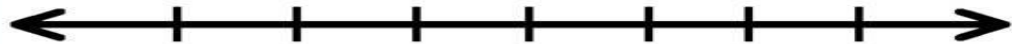
$2\left(\dfrac{d}{2}\right) > 2(7)$ Multiply each side by 2.

$d > 14$ Simplify.

The solution is $d > 14$. You can check this solution by substituting a number greater than 14 into the inequality.

Solve inequalities and graph the solution

a. 4x < 40

b. $6 \geq \frac{x}{7}$

Multiplication and Division Properties of Inequality, Negative Number

Words	When you multiply or divide each side of an inequality by a negative number, the inequality symbol must be reversed for the inequality to remain true.
Symbols	For all numbers a, b, and c, where $c < 0$,
	1. if $a > b$, then $ac < bc$ and $\dfrac{a}{c} < \dfrac{b}{c}$.
	2. if $a < b$, then $ac > bc$ and $\dfrac{a}{c} > \dfrac{b}{c}$.

Examples

$$7 > 1$$
$$-2(7) < -2(1) \qquad \text{Reverse the symbols.}$$
$$-14 < -2$$

$$-4 < 16$$
$$\frac{-4}{-4} > \frac{16}{-4}$$
$$1 > -4$$

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

Examples

3. Solve $-2g < 10$. Graph the solution set on a number line.

$-2g < 10$ Write the inequality.

$\dfrac{-2g}{-2} > \dfrac{10}{-2}$ Divide each side by -2 and reverse the symbol.

Simplify.

$g > -5$

4. Solve $\dfrac{x}{-3} \le 4$. Graph the solution set on a number line.

$\dfrac{x}{-3} \le 4$ Write the inequality.

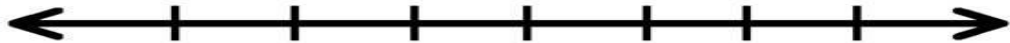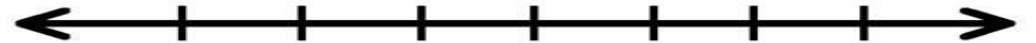$-3\left(\dfrac{x}{-3}\right) \ge -3(4)$ Multiply each side by -3 and reverse the symbol.

$x \ge -12$ Simplify.
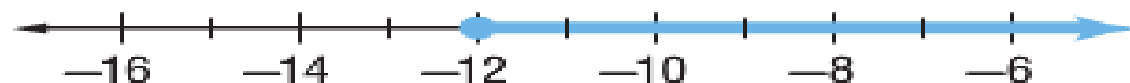
Solve inequalities and graph the solution

c. $\dfrac{K}{-2} < 9$

d. -3n ≤ -2

Solve inequalities and graph the solution

f. $\dfrac{t}{-4}$ < -11
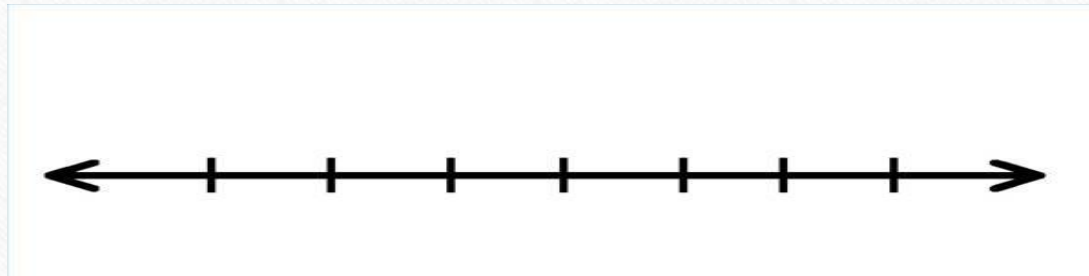
Fun Run activity

- **Instruction:**
- Be faster than other groups to bring the equations.
- You can only bring one equation at a time.
- Solve each question as a group.
- You will earn 200 if you answer as many question as you can.
- You will get 100 for neatness (good handwriting)
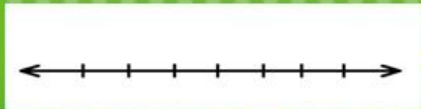- Solve each inequality.
- Good Luck!

Run on activity

1. $6y < 18$ _____

2. $-3s \geq 33$ _____

3. $60 \leq \dfrac{m}{3}$ _____

Number Line

$$6\,y < 18$$

1

$$60 = \frac{m}{3}$$

3

Run on activity

4. $\dfrac{t}{-2} < 6$ _____

5. $\dfrac{m}{-14} \leq -4$ _____

6. $-56 \leq -8x$ _____

Run on activity

7. $12n \leq 54$ _____

8. $\dfrac{h}{9} > \dfrac{1}{4}$ _____

9. $\dfrac{w}{-5} \geq 9$ _____

Question of the Day

20. Which inequality represents *twice a number is less than ten?*

Ⓐ $(5 + 2)n < 0$

Ⓑ $10n < -5$

Ⓒ $10 < 2n$

Ⓓ $2n < 10$
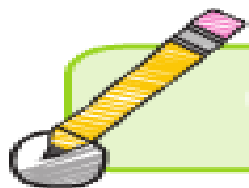
Standardized Test Practice

34. Which sentence represents the inequality shown below?

$$\frac{x}{5} \leq 8$$

- Ⓐ The difference of a number and 5 is at most 8.
- Ⓑ The quotient of a number and 5 is at most 8.
- Ⓒ The quotient of a number and 5 is 8.
- Ⓓ The quotient of a number and 5 is at least 8.

Homework (solve it by your self)

- Each one in the group will get 25 points if you:
  - solve all the problems
  - Good handwriting

    6 X 25 = ?

  - Total?

NAME _____ DATE _____ '

Lesson 7 Extra Practice
Solve Inequalities by Multiplication or Division
Solve each inequality. Graph the solution set on a number line.

1. $5p \geq 25$

2. $4x < 12$

3. $15 \leq 3m$

4. $\frac{d}{5} > 15$

5. $8 < \frac{r}{7}$

6. $9g < 27$

7. $4p \geq 24$

8. $-4 > \frac{-k}{3}$

9. $\frac{-s}{5} > 2$

10. $-3x \leq 9$

11. $-5x > -35$

12. $\frac{a}{-6} < 1$

Course 2 - Chapter 6 Equations and Inequalities