

## Indicator 45 Class Notes by Mrs. Joshi

### One-Step Inequalities-(7.EE.3/7.EE.4a/7.EE.4b)

#### 2.6b Solving Inequalities

Check It Out  
Lesson Tutorials  
BigIdeasMath.com

#### Key Ideas

##### Study Tip

You can solve inequalities in much the same way you solve equations. Use inverse operations to get the variable by itself.

##### Addition Property of Inequality

**Words** If you add the same number to each side of an inequality, the inequality remains true.

**Algebra** If  $a < b$ , then  $a + c < b + c$ .

##### Subtraction Property of Inequality

**Words** If you subtract the same number from each side of an inequality, the inequality remains true.

**Algebra** If  $a < b$ , then  $a - c < b - c$ .

These properties are true for  $<$ ,  $>$ ,  $\leq$ , and  $\geq$ .

#### EXAMPLE 1 Solving Inequalities Using Addition or Subtraction

a. Solve  $x - 5 < -3$ . Graph the solution.

$$x - 5 < -3 \quad \text{Write the inequality.}$$

Undo the subtraction.

$$\xrightarrow{+5 \quad +5}$$

Add 5 to each side.

$$x < 2$$

Simplify.

❖ The solution is  $x < 2$ .



Check:  $x = 0$  is a solution.

Check:  $x = 3$  is not a solution.

##### Reading

The inequality  $-8.3 \leq x$  is the same as  $x \geq -8.3$ .

b. Solve  $-3.5 \leq 4.8 + x$ .

$$-3.5 \leq 4.8 + x \quad \text{Write the inequality.}$$

Undo the addition.

$$\xrightarrow{-4.8 \quad -4.8}$$

Subtract 4.8 from each side.

$$-8.3 \leq x$$

Simplify.

❖ The solution is  $x \geq -8.3$ .

## Indicator 45 Class Notes by Mrs. Joshi

### Key Idea

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

**Words** If you multiply or divide each side of an inequality by the same *positive* number, the inequality remains true.

**Algebra** If  $a < b$ , then  $a \cdot c < b \cdot c$  for a positive number  $c$ .

If  $a < b$ , then  $\frac{a}{c} < \frac{b}{c}$  for a positive number  $c$ .

### EXAMPLE 2 Solving Inequalities Using Multiplication or Division

a. Solve  $\frac{x}{10} \leq -2$ . Graph the solution.

$$\frac{x}{10} \leq -2$$

Write the inequality.

Undo the division.

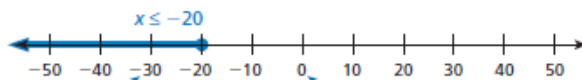
$$\rightarrow 10 \cdot \frac{x}{10} \leq 10 \cdot (-2)$$

Multiply each side by 10.

$$x \leq -20$$

Simplify.

❖ The solution is  $x \leq -20$ .



Check:  $x = -30$  is a solution.

Check:  $x = 0$  is not a solution.

b. Solve  $2.5x > 11.25$ . Graph the solution.

$$2.5x > 11.25$$

Write the inequality.

Undo the multiplication.

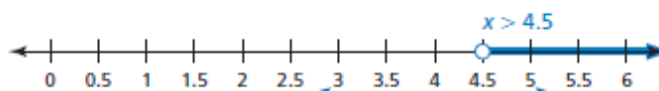
$$\rightarrow \frac{2.5x}{2.5} > \frac{11.25}{2.5}$$

Divide each side by 2.5.

$$x > 4.5$$

Simplify.

❖ The solution is  $x > 4.5$ .



Check:  $x = 3$  is not a solution.

Check:  $x = 5$  is a solution.



## Indicator 45 Class Notes by Mrs. Joshi

### Common Error

A negative sign in an inequality does not necessarily mean you must reverse the inequality symbol. Only reverse the inequality symbol when you multiply or divide each side by a negative number.

### Key Idea

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

**Words** If 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.

**Algebra** If  $a < b$ , then  $a \cdot c > b \cdot c$  for a negative number  $c$ .

If  $a < b$ , then  $\frac{a}{c} > \frac{b}{c}$  for a negative number  $c$ .

### EXAMPLE 3 Solving Inequalities Using Multiplication or Division

a. Solve  $\frac{y}{-4} > 6$ . Graph the solution.

$$\frac{y}{-4} > 6$$

Write the inequality.

Undo the division.

$$\rightarrow -4 \cdot \frac{y}{-4} < -4 \cdot 6$$

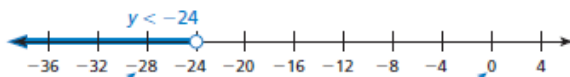
Multiply each side by  $-4$ .

Reverse the inequality symbol.

$$y < -24$$

Simplify.

❖ The solution is  $y < -24$ .



Check:  $y = -28$  is a solution.

Check:  $y = 0$  is not a solution.

b. Solve  $-21 \geq -1.4y$ .

$$-21 \geq -1.4y$$

Write the inequality.

Undo the multiplication.

$$\rightarrow \frac{-21}{-1.4} \leq \frac{-1.4y}{-1.4}$$

Divide each side by  $-1.4$ .

Reverse the inequality symbol.

$$15 \leq y$$

Simplify.

❖ The solution is  $y \geq 15$ .