



# Solving Multi-Step Inequalities

Unit 3 Lesson 4

## **SOLVING MULTI-STEP INEQUALITIES**

### **Students will be able to:**

solve linear inequalities involving more than one operation  
and using the distributive property.

### **Key Vocabulary:**

- Multi-Step

## **SOLVING MULTI-STEP INEQUALITIES**

### **SOLVING TWO-STEP INEQUALITIES**

When solving inequalities that contain more than one operation, follow the order of operation

## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 1:** Solve each inequality.

A.  $3x - 6 > 9$

B.  $2x - 5 \leq 11$

C.  $8 - x < 13$

D.  $-7x + 3 \geq 24$

## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 1:** Solve each inequality.

A.  $3x - 6 > 9$        $3x - 6 + 6 > 9 + 6$

$$\frac{3x}{3} > \frac{15}{3}$$

B.  $2x - 5 \leq 11$        $2x - 7 + 7 \leq 11 + 7$

$$\frac{2x}{2} \leq \frac{18}{2}$$

C.  $8 - x < 13$        $8 - 8 - x < 13 - 8$

$$\frac{-x}{-1} > \frac{5}{-1}$$

D.  $-7x + 3 \geq 24$        $-7x + 3 - 3 \geq 24 - 3$

$$\frac{-7x}{-7} \leq \frac{21}{-7}$$

## SOLVING MULTI-STEP INEQUALITIES

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**A. Use the Distributive property:** distribute then combine like terms then simplify.

## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 2:** Solve each inequality.

A.  $3(x - 5) \geq 9$

B.  $-4(5 - x) < 100$

C.  $7(x - 1) - 2(x + 4) > 124$

D.  $14x - 3(9x - 10) \leq 4$

## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 2:** Solve each inequality.

A.  $3(x - 5) \geq 9$

$$3x + 3(-5) \geq 9$$

$$3x - 15 \geq 9$$

$$3x - 15 + 15 \geq 9 + 15$$

$$3x \geq 24$$

$$\frac{3x}{3} \geq \frac{24}{3}$$

$$x \geq 8$$

B.  $-4(5 - x) < 100$

$$(-4)(5) + (-4)(-x) < 100$$

$$-20 + 4x < 100$$

$$-20 + 20 + 4x < 100 + 20$$

$$4x < 120$$

$$\frac{4x}{4} < \frac{120}{4}$$

$$x < 30$$



## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 2:** Solve each inequality.

C.  $7(x - 1) - 2(x + 4) > 124$

$$7x + 7 - 2x - 8 > 124$$

$$5x - 1 > 124$$

$$5x - 1 + 1 > 124 + 1$$

$$5x > 125$$

$$\frac{5x}{5} > \frac{125}{5}$$

$$x > 25$$

D.  $14x - 3(9x - 10) \leq 4$

$$14x - 27x - (-30) \leq 4$$

$$-13x + 30 - 4 \leq 4 - 4$$

$$-13x + 13x + 26 \leq 0 + 13x$$

$$26 \leq 13x$$

$$\frac{26}{13} \leq \frac{13x}{13}$$

$$x \leq 4$$

## SOLVING MULTI-STEP INEQUALITIES

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**B. Variables on both side of the inequality:** Gather the variables on one side and the Constants on the other side.

## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 3:** Solve each inequality.

A.  $3x - 5 > 5x - 2$

B.  $-x + 7 \leq -2x + 4$

C.  $2x + 10 \geq 7(x + 1)$

D.  $-2x + 5 < 4(2x - 10)$

## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 3:** Solve each inequality.

$$\begin{aligned}\text{A.} \quad & 3x - 5 > 5x - 2 \\ & 3x - \mathbf{3x} - 5 > 5x - \mathbf{3x} - 2 \\ & -5 > 2x - 2 \\ & -5 + \mathbf{2} > 2x - 2 + \mathbf{2} \\ & -3 > 2x \\ & \frac{-3}{\mathbf{2}} > \frac{2x}{\mathbf{2}} \\ & -\frac{3}{2} > x\end{aligned}$$

$$\begin{aligned}\text{B.} \quad & -x + 7 \leq -2x + 4 \\ & -x + \mathbf{2x} + 7 \leq -2x + \mathbf{2x} + 4 \\ & x + 7 \leq 4 \\ & x + 7 - \mathbf{7} \leq 4 - \mathbf{7} \\ & x \leq -3\end{aligned}$$

## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 3:** Solve each inequality.

C.  $2x + 10 \geq 7(x + 1)$

$$2x + 10 \geq 7(x) + 7(1)$$
$$2x + 10 \geq 7x + 7$$
$$2x - 2x + 10 \geq 7x - 2x + 7$$
$$10 \geq 5x + 7$$
$$10 - 7 \geq 5x + 7 - 7$$
$$\frac{3}{5} \geq \frac{5x}{5}$$
$$\frac{3}{5} \geq x$$

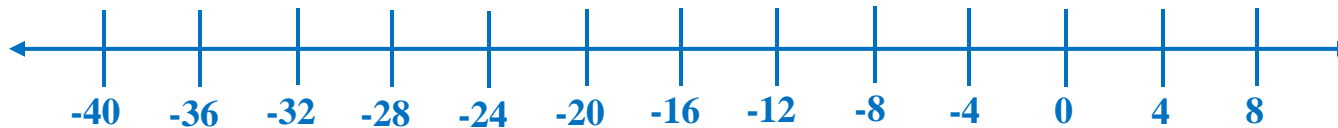
D.  $-2x + 5 < 4(2x - 10)$

$$-2x + 5 < 4(2x) + 4(-10)$$
$$-2x + 5 < 8x - 40$$
$$-2x + 2x + 5 < 8x + 2x - 40$$
$$5 < 6x - 40$$
$$5 + 40 < 6x - 40 + 40$$
$$\frac{45}{6} < \frac{6x}{6}$$
$$\frac{15}{2} < x$$

## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 4:** Write, solve and graph each inequality.

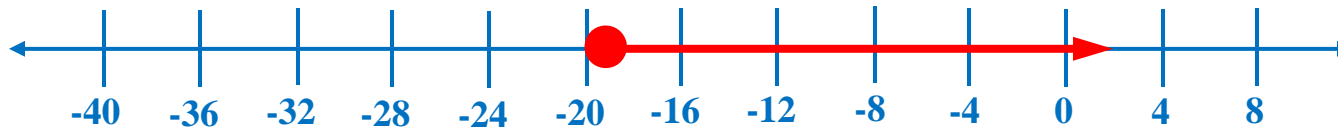
Three times a number minus eighteen is at least five times the number plus twenty.



## SOLVING MULTI-STEP INEQUALITIES

**Sample Problem 4:** Write, solve and graph each inequality.

Three times a number minus eighteen is at least five times the number plus twenty.



$$3x - 18 \leq 5x + 20$$

$$3x - 3x - 18 \leq 5x - 3x + 20$$

$$-18 - 20 \leq 2x + 20 - 20$$

$$-38 \leq 2x$$

$$-\frac{38}{2} \leq \frac{2x}{2}$$

$$-19 \leq x$$