

# Lesson 4.4:

## Solving Multi-Step Inequalities

### 4.4 Notes

Get out your spiral notebooks!

## Essential Question

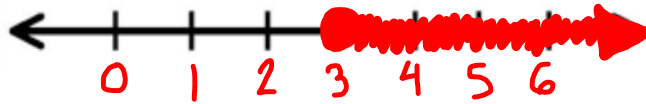
How can you solve a two-step inequality?

Same as with equations... start with the outside layers and work your way in. We're zooming in on the variable.

**Example 1:**

Solve  $5x - 4 \geq 11$ . Graph the solution.

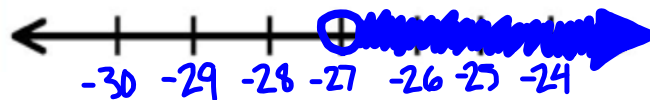
$$\begin{array}{r|l} +4 & +4 \\ \hline 5x & \geq 15 \\ \div 5 & \div 5 \\ \hline x & \geq 3 \end{array}$$



b. Solve  $\frac{b}{-3} + 4 \leq 13$ . Graph the solution.

$$\begin{array}{r|l} -4 & -4 \\ \hline \frac{b}{-3} & \leq 9 \\ \cdot (-3) & \cdot (-3) \\ \hline b & \geq -27 \end{array}$$

Multiplying by a negative,  
flip the inequality symbol



**Solve the inequality. Graph the solution.**

1.  $4 - 3d \geq 19$

$$\begin{array}{r|l} -4 & -4 \\ \hline -3d & \geq 15 \\ \div (-3) & \div (-3) \\ \hline d & \leq -5 \end{array}$$

Flip the  
inequality  
symbol

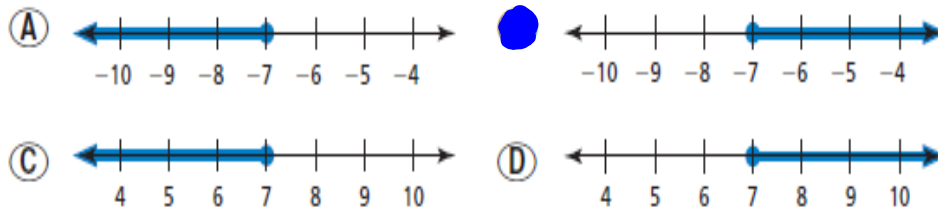
2.  $\frac{w}{-4} + 8 \geq 9$

$$\begin{array}{r|l} -8 & -8 \\ \hline \frac{w}{-4} & \geq 1 \\ \cdot (-4) & \cdot (-4) \\ \hline w & \leq -4 \end{array}$$



**Example 2:**

Which graph represents the solution of  $-7(x + 3) \leq 28$ ?



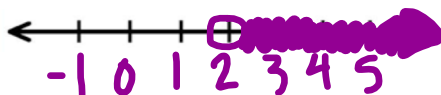
$$\begin{array}{r} \overbrace{-7(x+3)} \\ -7(x+3) \leq 28 \\ -7x - 21 \leq 28 \\ +21 \quad +21 \\ \hline -7x \leq 49 \\ \div(-7) \quad \div(-7) \\ \hline x \geq -7 \end{array}$$

Because this is a multiple choice question, you could plug and chug to eliminate answers. But be careful! Options B, C, and D all have 7 as a solution, for example.

Solve the inequality. Graph the solution.

3.  $-4(n - 10) < 32$

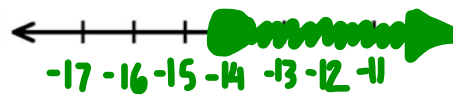
$$\begin{array}{r} \overbrace{-4(n-10)} \\ -4n + 40 < 32 \\ -40 \quad -40 \\ \hline -4n < -8 \\ \div(-4) \quad \div(-4) \\ \hline n > 2 \end{array}$$



4.  $-3 \leq 0.5(8 + y)$

$$\begin{array}{r} \overbrace{-3 \leq 0.5(8+y)} \\ -3 \leq 4 + 0.5y \\ -4 \quad -4 \\ \hline -7 \leq 0.5y \\ \cdot 2 \quad \cdot 2 \\ \hline -14 \leq y \\ y \geq -14 \end{array}$$

Variable on the left to graph



**Example 3:**  $\geq 8$ 

A contestant in a weight-loss competition wants to lose an average of at least 8 pounds per month during a 5-month period. How many pounds must the contestant lose in the fifth month to meet the goal?

Write and solve an inequality. Let  $x$  be the number of pounds lost in the fifth month.

$$\frac{12+9+5+8+x}{5} \geq 8$$

$$\frac{34+x}{5} \geq 8$$

$$\begin{array}{r|l} \cdot 5 & \cdot 5 \\ \hline 34+x \geq 40 & \\ -34 & -34 \\ \hline x \geq 6 & \end{array}$$

Progress Report	
Month	Pounds Lost
1	12
2	9
3	5
4	8
5	$x$

To find the average, you add up all of the values and divide by the number of values.