

# Lesson 11.4:

## Solving Two-Step Inequalities

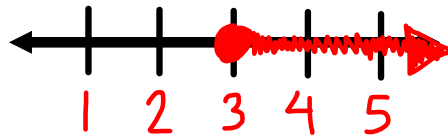
### Essential Question

How can you use an inequality to describe the dimensions of a figure?

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

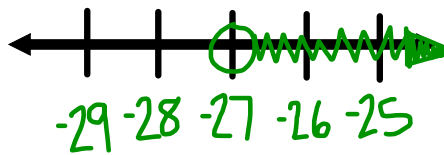
$$\begin{array}{r} +4 \quad +4 \\ \hline 5x \geq 15 \\ \hline x \geq 3 \end{array}$$

$$\begin{aligned} 5(4) - 4 &\geq 11 \\ 20 - 4 &\geq 11 \\ 16 &\geq 11 \checkmark \end{aligned}$$



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

$$\begin{array}{r} -4 \quad -4 \\ \hline \frac{b}{-3} < 9 \\ \hline \boxed{-3} \quad \boxed{-3} \\ \hline b < -27 \end{array}$$

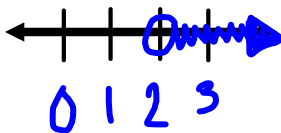


$$\begin{aligned} \frac{-24}{-3} + 4 &< 13 \\ 8 + 4 &< 13 \\ 12 &< 13 \checkmark \end{aligned}$$

Solve the inequality. Graph the solution.

1.  $6y - 7 > 5$

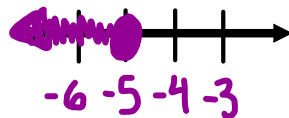
$$\begin{array}{r} +7 \quad +7 \\ \hline 6y > 12 \\ \hline y > 2 \end{array}$$



$$\begin{aligned} 6(3) - 7 &> 5 \\ 18 - 7 &> 5 \\ 11 &> 5 \checkmark \end{aligned}$$

2.  $4 - 3d \geq 19$

$$\begin{array}{r} -4 \quad -4 \\ \hline -3d \geq 15 \\ \hline d \leq -5 \end{array}$$



$$\begin{aligned} 4 - 3(-6) &\geq 19 \\ 4 - (-18) &\geq 19 \\ 4 + 18 &\geq 19 \\ 22 &\geq 19 \checkmark \end{aligned}$$

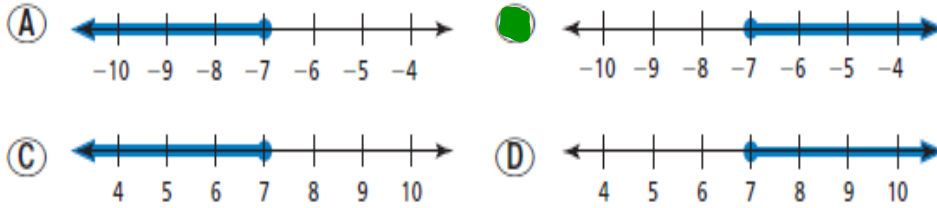
3.  $\frac{w}{-4} + 8 > 9$

$$\begin{array}{r} -8 \quad -8 \\ \hline \frac{w}{-4} > 1 \\ \hline \cdot -4 \quad \cdot -4 \\ \hline w < -4 \end{array}$$



$$\begin{aligned} \frac{-8}{-4} + 8 &> 9 \\ 2 + 8 &> 9 \\ 10 &> 9 \checkmark \end{aligned}$$

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



$$\begin{aligned}
 -7(x+3) &\leq 28 \\
 -7x - 21 &\leq 28 \\
 +21 \quad +21 & \\
 \hline
 -7x &\leq 49 \\
 \frac{-7}{-7} \quad \frac{-7}{-7} & \\
 x &\geq -7
 \end{aligned}$$

$$\begin{aligned}
 -7(x+3) &\leq 28 \\
 \frac{-7}{-7} \quad \frac{-7}{-7} & \\
 \hline
 x+3 &\geq -4 \\
 -3 \quad -3 & \\
 \hline
 x &\geq -7
 \end{aligned}$$

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.

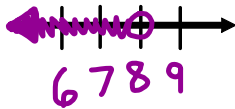
Progress Report	
Month	Pounds Lost
1	12
2	9
3	5
4	8

$$\begin{aligned}
 \frac{12+9+5+8+x}{5} &\geq 8 \\
 \frac{34+x}{5} &\geq 8 \\
 \cdot 5 \quad \cdot 5 & \\
 \hline
 34+x &\geq 40 \\
 -34 \quad -34 & \\
 \hline
 x &\geq 6
 \end{aligned}$$

Solve the inequality. Graph the solution.

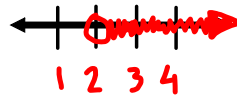
4.  $2(k - 5) < 6$

$$\begin{array}{r} 2k - 10 < 6 \\ +10 \quad +10 \\ \hline 2k < 16 \\ \frac{2k}{2} < \frac{16}{2} \quad k < 8 \end{array}$$



5.  $-4(n - 10) < 32$

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



6.  $-3 \leq 0.5(8 + y)$

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



7. **WHAT IF?** In Example 3, the contestant wants to lose an average of at least 9 pounds per month. How many pounds must the contestant lose in the fifth month to meet the goal?

$$\begin{array}{r} 34 + x \geq 9 \\ \hline 5 \quad \cdot 5 \\ \hline 34 + x \geq 45 \\ -34 \quad -34 \\ \hline x \geq 11 \end{array}$$