

HOW MANY SOLUTIONS?

LEARNING GOAL

1. I can tell when a compound inequality has no solution, one solution, or many solutions.

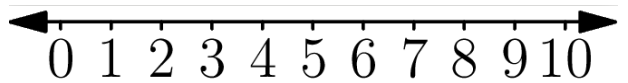
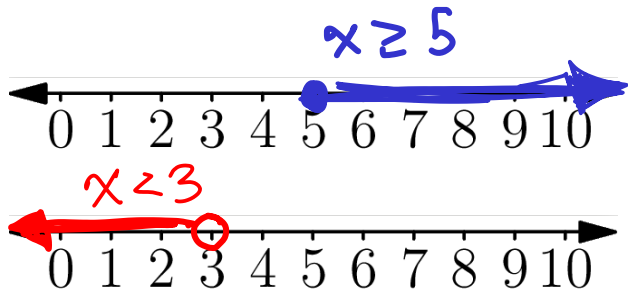
POSSIBILITIES

No solution

$$x \geq 5$$

and

$$x < 3$$



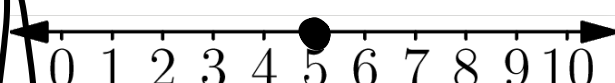
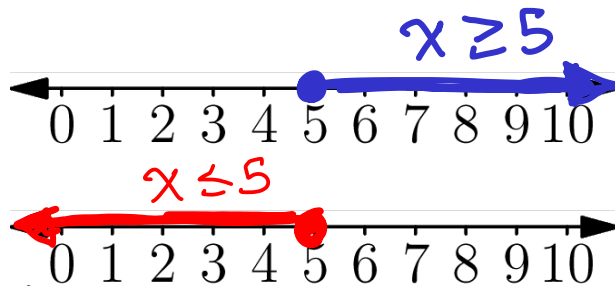
no solution

One solution

$$x \geq 5$$

and

$$x \leq 5$$



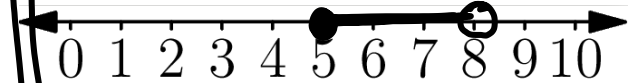
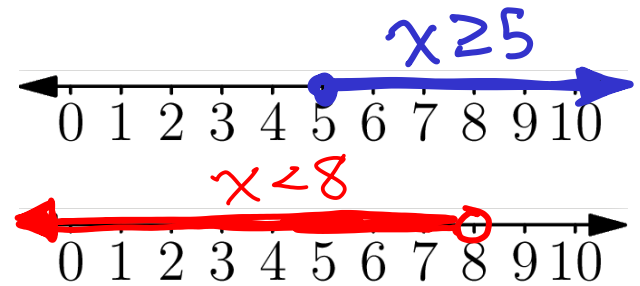
$x = 5$
one solution

Many solutions

$$x \geq 5$$

and

$$x < 8$$



$5 \leq x < 8$
many solutions

EXAMPLE 1

Solve: $x - 3 \leq -2$ and $2x - 1 > 3$. Graph the solution set on the number line.

$$\begin{array}{rcl} x - 3 & \leq & -2 \\ +3 & +3 & \\ \hline x & \leq & 5 \end{array}$$

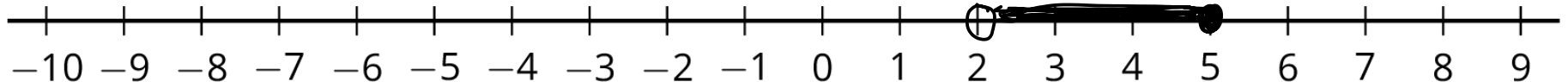
and

$$\begin{array}{rcl} 2x - 1 & > & 3 \\ +1 & +1 & \end{array}$$

$$\begin{array}{rcl} 2x & > & 4 \\ \frac{2x}{2} & > & \frac{4}{2} \\ x & > & 2 \end{array}$$

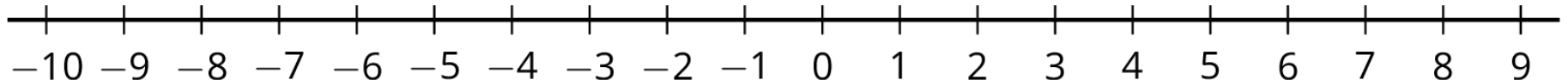
and

$$x > 2 \text{ and } x \leq 5$$



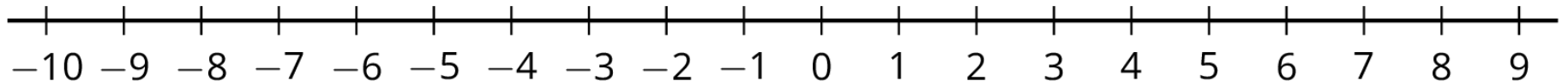
EXAMPLE 2

Solve: $3 - x \geq -5$ and $x - 3 \geq 5$. Graph the solution set on the number line.



EXAMPLE 3

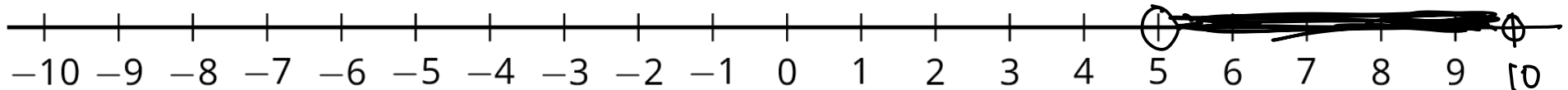
Solve: $x - 3 \leq -2$ or $2x - 1 > 3$. Graph the solution set on the number line.



EXERCISE 1

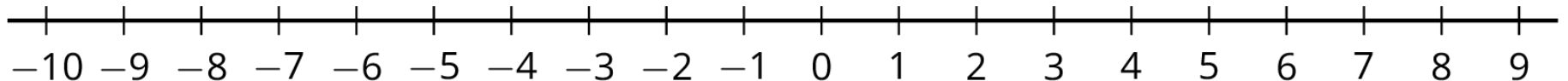
Solve: $2x - 5 < 15$ and $2x > 10$. Graph the solution set on the number line.

$$\begin{array}{lcl} 2x - 5 < 15 & \text{and} & 2x > 10 \\ +5 & & \frac{\quad}{2} \quad \frac{\quad}{2} \\ \hline 2x < 20 & & x > 5 \\ \frac{2x}{2} & & \\ x < 10 & & \end{array}$$



EXERCISE 2

Solve: $10 - 3x \geq 25$ and $3x + 10 \geq 10$. Graph the solution set on the number line.



EXERCISE 3

Solve: $10 - 3x \geq 25$ or $3x + 10 \geq 10$. Graph the solution set on the number line.

$$\begin{array}{r} 10 - 3x \geq 25 \\ -10 \quad -10 \end{array}$$

$$\begin{array}{r} -3x \geq 15 \\ \underline{-3} \quad \underline{-3} \end{array}$$

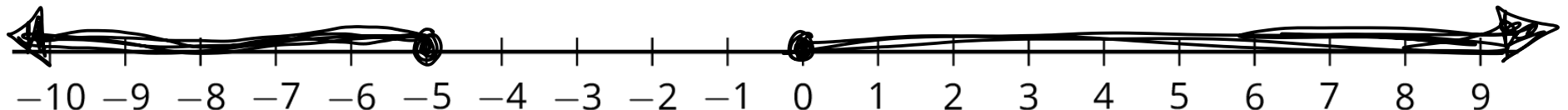
$$x \leq -5$$

or

$$\begin{array}{r} 3x + 10 \geq 10 \\ -10 \quad -10 \end{array}$$

$$\begin{array}{r} 3x \geq 0 \\ \underline{3} \quad \underline{3} \end{array}$$

$$x \geq 0$$



EXERCISE 4

Solve: $8 - 6x \geq 20$ and $6x - 8 \geq -20$. Graph the solution set on the number line.

