HOW MANY SOLUTIONS?

LEARNING GOAL

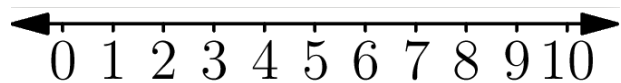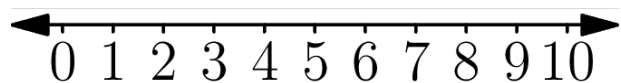1. I can tell when a compound inequality has no solution, one solution, or many solutions.
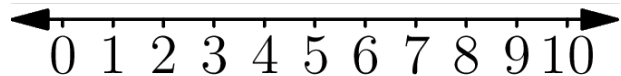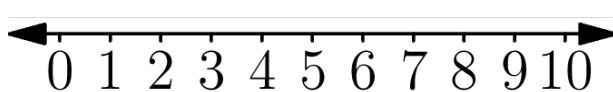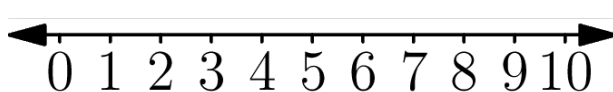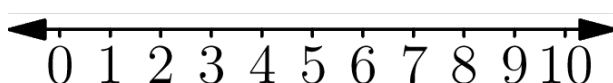
POSSIBILITIES

No solution
$$x \geq 5$$
and
$$x < 3$$

One solution
$$x \geq 5$$
and
$$x \leq 5$$

Many solutions
$$x \geq 5$$
and
$$x < 8$$

0 1 2 3 4 5 6 7 8 9 10	0 1 2 3 4 5 6 7 8 9 10	0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 9 10	0 1 2 3 4 5 6 7 8 9 10	0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 9 10	0 1 2 3 4 5 6 7 8 9 10	0 1 2 3 4 5 6 7 8 9 10
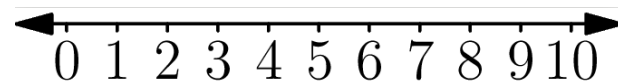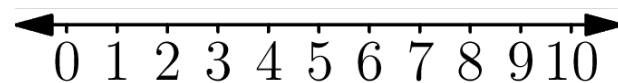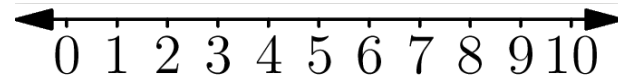
EXAMPLE 1

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

```
 +--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```
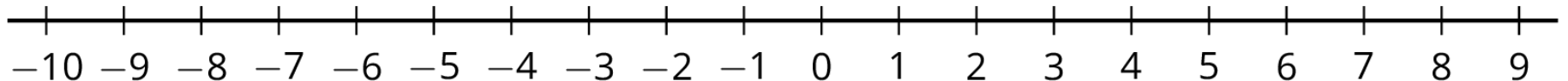
EXAMPLE 2

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

```
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1  0  1  2  3  4  5  6  7  8  9
```
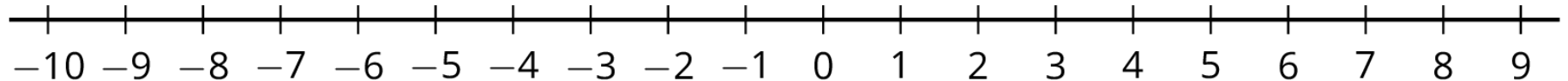
EXAMPLE 3

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

number line from −10 to 9

$-10 \quad -9 \quad -8 \quad -7 \quad -6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9$
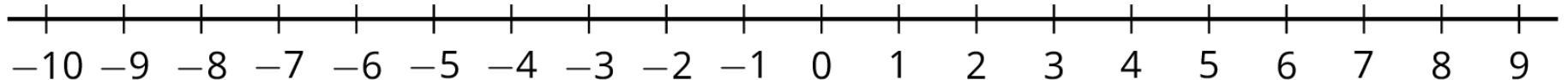
EXERCISE 1

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

$$-10 \quad -9 \quad -8 \quad -7 \quad -6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9$$

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.
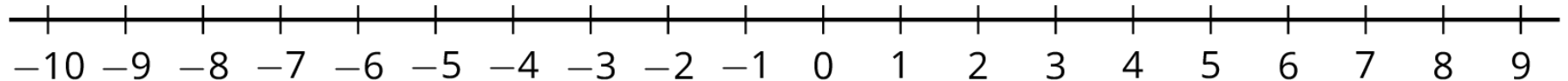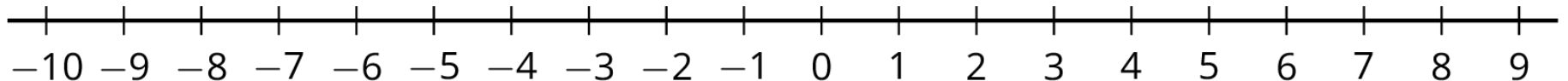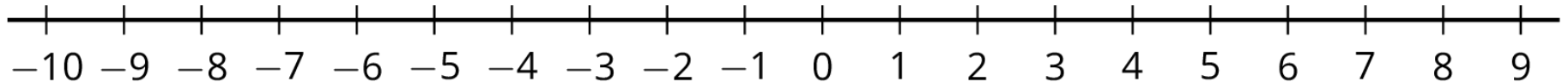
$$-10 \quad -9 \quad -8 \quad -7 \quad -6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9$$

EXERCISE 4

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

```
    +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+
   −10  −9   −8   −7   −6   −5   −4   −3   −2   −1    0    1    2    3    4    5    6    7    8    9
```