

Solutions of Inequalities

COMMON CORE

CC.6.EE.5
CC.6.EE.6
CC.6.EE.8

Essential question: *How can you represent solutions of inequalities?*

You have seen the symbols $>$ and $<$ used in inequalities.

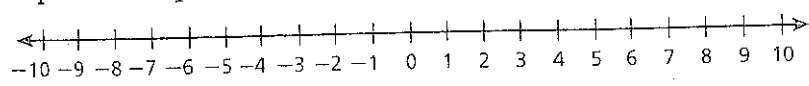
- The symbol $>$ means _____.
- The symbol $<$ means _____.

Two additional symbols used in inequalities are \geq and \leq .

- The symbol \geq means "is greater than or equal to".
- The symbol \leq means "is less than or equal to".

1 EXPLORE Inequalities with Variables

- A** The lowest temperature ever recorded in Florida was -2°F . Graph this temperature on the number line.



- B** The temperatures 0°F , 3°F , 6°F , 5°F , and -1°F have also been recorded in Florida. Graph these temperatures on the number line.

- C** How do the temperatures in **B** compare to -2 ?

How can you see this relationship on the number line?

- D** How many other numbers have the same relationship to -2 as the temperatures in **B**? Give some examples.

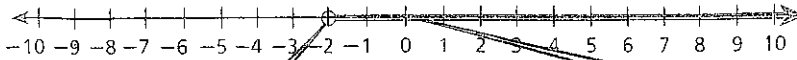
- E** Suppose you could graph all of the possible answers to **D** on a number line. What would the graph look like?

Let the variable x represent any of the possible answers to **D**.

Complete this inequality: x _____ -2

When an inequality contains a variable, a solution of that inequality is any value of the variable that makes the inequality true. For example, 7 is a solution of $x > -2$, since $7 > -2$ is a true statement. In **1**, the numbers you listed in **D** are solutions of the inequality $x > -2$.

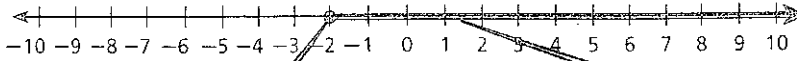
This number line shows the solutions of $x > -2$:



An *empty* circle means the number *is not* included in the solution. -2 is *not* a solution of $x > -2$.

Shade the number line to the right of -2 to indicate all numbers greater than -2 . The arrowhead means that the shaded region extends indefinitely.

This number line shows the solutions of $x \geq -2$:



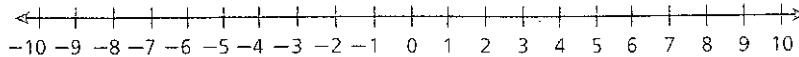
A *solid* circle means the number *is* included in the solution. -2 is a solution of $x \geq -2$.

Shade the number line to the right of -2 to indicate all numbers greater than -2 . The arrowhead means that the shaded region extends indefinitely.

2 EXAMPLE Graphing Inequalities

Graph the solutions of each inequality.

A $y \leq -3$



Step 1 Draw a circle at -3 .

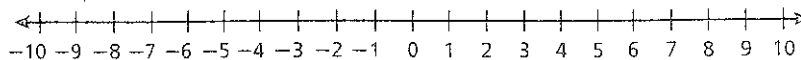
Is -3 a solution of $y \leq -3$? _____

Will you draw an empty circle or a solid circle? _____

Step 2 Shade the number line.

The variable y represents numbers less than or equal to -3 . Where are numbers less than -3 located on the number line?

B $w > 2$



Step 1 Draw a circle at 2 .

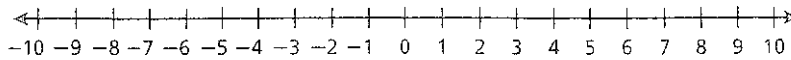
Is 2 a solution of $w > 2$? _____

Will you draw an empty circle or a solid circle? _____

Step 2 Shade the number line.

The variable w represents numbers greater than 2 . Where are these numbers located on the number line?

$$-5 > m$$



Step 1 Draw a circle at -5 .

Is -5 a solution of $-5 > m$? _____

Will you draw an empty circle or a solid circle? _____

Step 2 Shade the number line.

The variable m represents numbers _____ than -5 . Where are these numbers located on the number line? _____

EXERCISE

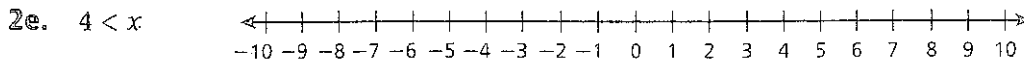
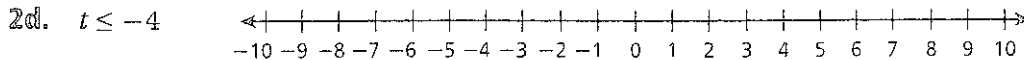
2a. Rewrite the inequality from **c** with m on the left: m _____ -5

2b. How is $x < 5$ different from $x \leq 5$?

2c. When graphing an inequality that contains $>$ or $<$, use a(n) _____ circle.
When graphing an inequality that contains \geq or \leq , use a(n) _____ circle.

TRY THESE!

Graph the solutions of each inequality.



EXAMPLE Representing Real-World Situations with Inequalities

There are at least 5 gallons of water in an aquarium. Write and graph an inequality to represent this situation.

Step 1 Write the inequality.

Let g represent the amount of water in gallons.

Can there be 5 gallons of water in the aquarium? _____

Can there be more than 5 gallons of water in the aquarium? _____

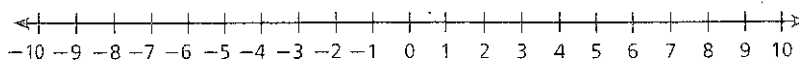
Can there be less than 5 gallons of water in the aquarium? _____

The inequality is g _____ 5 .

Step 2 Graph the inequality.

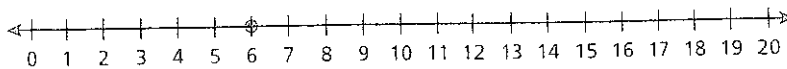
Draw a(n) _____ circle at _____.

Shade the number line to the _____.

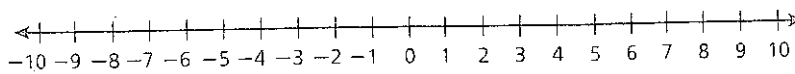


Write and graph an inequality to represent each situation.

3a. Megan must run a mile in 6 minutes or less to beat her best time. _____



3b. The temperature today will rise above 2 °F. _____

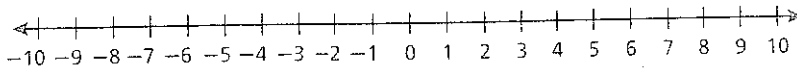


PRACTICE

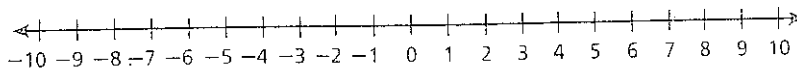
1. Which numbers in the set $\{-5, 0.03, -1, 0, 1.5, -6, \frac{1}{2}\}$ are solutions of $x \geq 0$?

Graph each inequality.

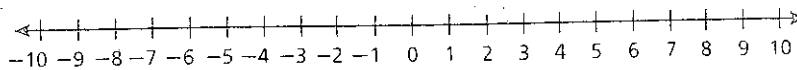
2. $t \leq 8$



3. $-7 < h$

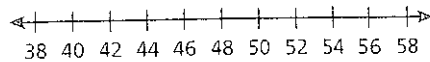


4. $x \geq -9$



5. A child must be at least 48 inches tall to ride a roller coaster.

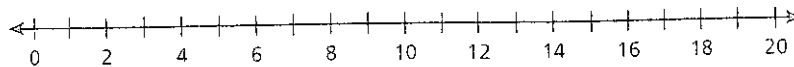
a. Write and graph an inequality to represent this situation. _____



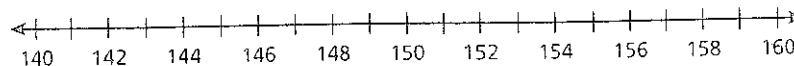
b. Can a child who is 46 inches tall ride the roller coaster? Explain.

Write and graph an inequality to represent each situation.

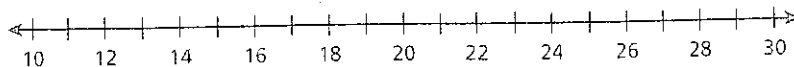
6. There are fewer than 15 students in the cafeteria. _____



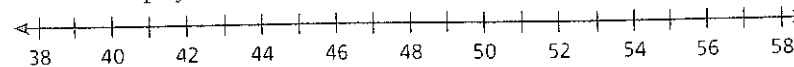
7. No more than 150 people can be seated at the restaurant. _____



8. At least 20 students must sign up for the field trip. _____



9. Shaun can pay at most \$50 to have his computer repaired. _____



10. The goal of the fundraiser is to raise more than \$250. _____

