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3-1 Inequalities and Their Graphs

A solution of an inequality is any number that makes the inequality true. For example, the solution of the inequality $x < 3$ are all numbers that are less than 3.

Example 1: Identifying Solutions by Mental Math

Is each number a solution of: $x \leq 7$?

- | | | | |
|------|------|--------|------|
| a. 9 | b. 2 | c. -10 | d. 7 |
| no | yes | yes | yes |

Understanding Check:

Is each number a solution of:

- | | | | | |
|---------------|-------|---------|--------|-------|
| $x \geq -4.1$ | a. -5 | b. -4.1 | c. 8 | d. 0 |
| $x < -3$ | a. 5 | b. -4.1 | c. 8 | d. 0 |
| $x \leq -.5$ | a. .3 | b. -.2 | c. -.2 | d. .6 |

Example 2: Identifying Solutions by EvaluatingIs each number a solution of $-5x + 2 > 13$?

a. -4

Steps

b. 3

$-5x + 2 > 13$

$-5x + 2 > 13$

$-5(-4) + 2 > 13$

 \leftarrow substitute \rightarrow

$-5(3) + 2 > 13$

$20 + 2 > 13$

 \leftarrow simplify \rightarrow

$22 > 13$

 \leftarrow compare \rightarrow

$-13 > 13$

yes \leftarrow answer yes/no \rightarrow

no

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✓ Understanding Check:Is each number a solution of $6x - 3 > 10$?show
work

a. 1

b. 2

c. 3

d. 4

no

no

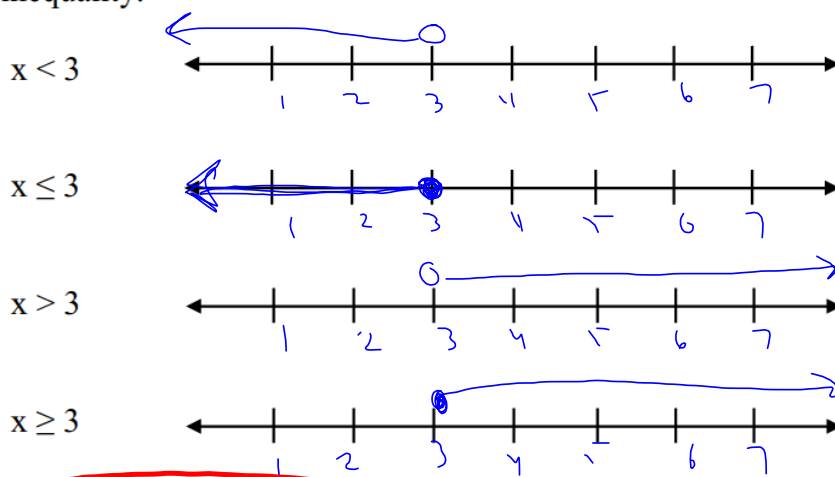
yes

yes

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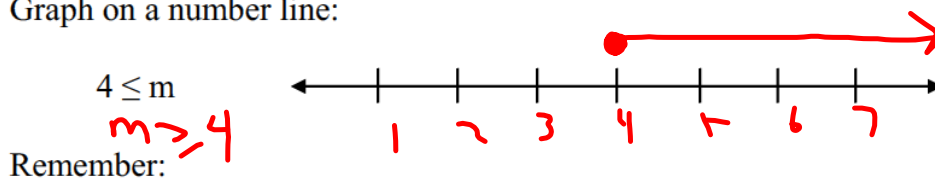
Example 3: Graphing Inequalities

You can use a graph (number line) to indicate all of the solutions of an inequality.



Sometimes you will see an inequality written this way: $-2 < x$. It means the same as $x > -2$. So before graphing, it helps to reverse the inequality so the variable is on the left.

Graph on a number line:

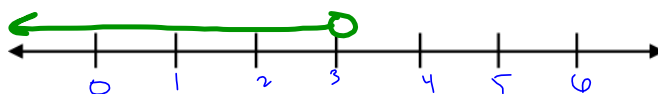
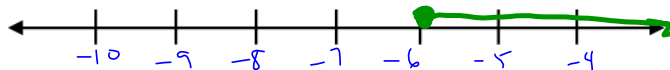
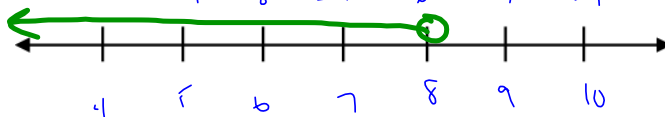


Remember:

Use open point for $<$ and $>$.

Use closed point for \leq and \geq .

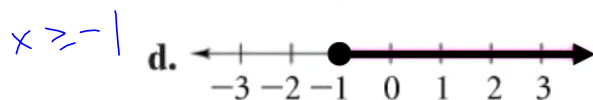
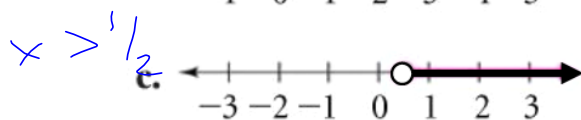
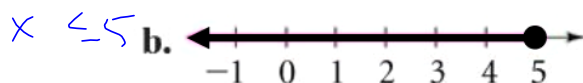
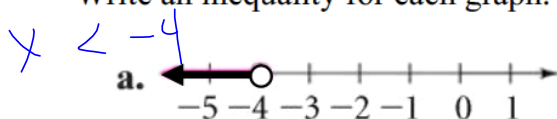
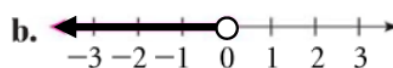
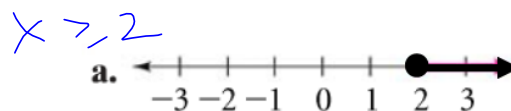
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✓ Understanding Check:a. Graph: $a < 3$ b. Graph: $n \geq -6$ c. Graph: $8 > p$ 

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Example 4: Writing an Inequality From a Graph

Write an inequality for each graph.

Understanding Check

$$0 > x$$

$$x < 0$$

page 39 continued...**Example 5: Application**

Define and write a variable and write an inequality for each situation.

a.



Let $s =$ speed
The sign indicates that $s \leq 55$

b.



Let $p =$ pay
The sign indicates that $p \geq 9$

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The words " **at most** " are often used to indicate all values **less than** and **equal to** than a value.

The words " **at least** " are often used to indicate all values **greater than** and **equal to** than a value.

✓ Understanding Check:

Translate to an inequality:

- a. You must be at least 16 to get a driver's license.

let $x = \text{age}$. $x \geq 16$

- b. You can be at most 12 to play on the Mc Donald's playground.

let $a = \text{age}$. $a \leq 12$

- c. To earn an A in this class, your grade percent must be more than 89.5 %.

let $x = \text{grade for A}$. $x \geq 89.5$