

Algebra I

Lesson 6-5

- I can solve absolute value equations.
- I can solve absolute value inequalities.

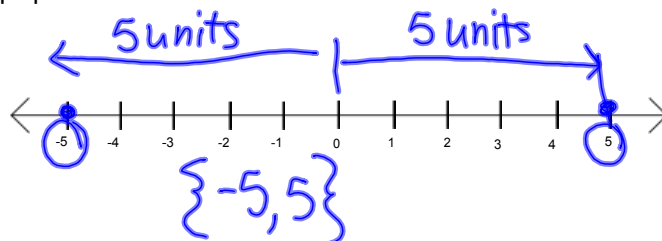
There are three types of open sentences that can involve absolute value.

$$|x| = n \quad |x| < n \quad |x| > n$$

$$|x| = n$$

ex

$|x| = 5$ means the distance from 0 to x is 5 units.



Absolute Value Equations

When solving equations that involve absolute value, there are two cases to consider.

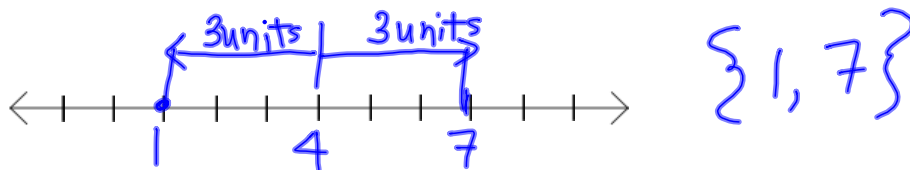
Case 1: The value inside the absolute value symbol is positive

Case 2: The value inside the absolute value symbol is negative

**Equations involving absolute value can be solved by graphing them on a number line or by writing them as a compound sentence and solving it.

$$\text{Solve } |a - 4| = 3$$

Method 1: Graphing



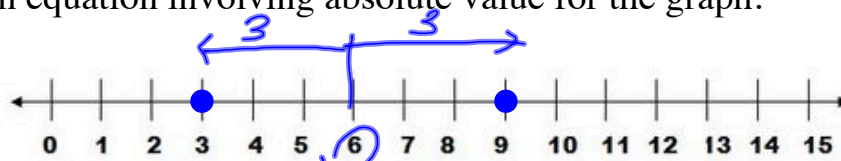
Method 2: Compound Sentence

$$|a - 4| = 3$$

$$a - 4 = 3 \quad \text{or} \quad a - 4 = -3$$

$$\begin{array}{r} +4 \quad +4 \\ \hline a = 7 \end{array} \quad \begin{array}{r} +4 \quad +4 \\ \hline a = 1 \end{array} \quad \{1, 7\}$$

Write an equation involving absolute value for the graph.



$$|a - 6| = 3$$

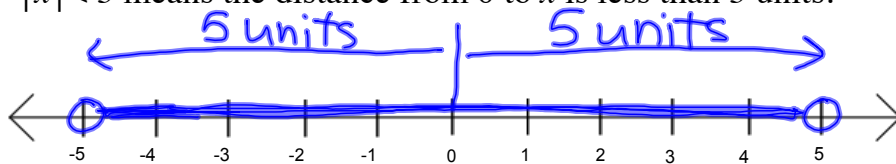
$$a - 6 = 3 \quad \text{or} \quad a - 6 = -3$$

$$\begin{array}{r} a - 6 = 3 \\ +6 \quad +6 \\ \hline a = 9 \end{array} \quad \begin{array}{r} a - 6 = -3 \\ +6 \quad +6 \\ \hline a = 3 \end{array}$$

Absolute Value Inequalities

$$|x| < n$$

ex: $|x| < 5$ means the distance from 0 to x is less than 5 units.



$$\{x \mid -5 < x < 5\}$$

When solving inequalities of the form $|x| < n$, find the intersection of these two cases.

Case 1:

The value inside the absolute value symbol is less than the positive value of n

Case 2:

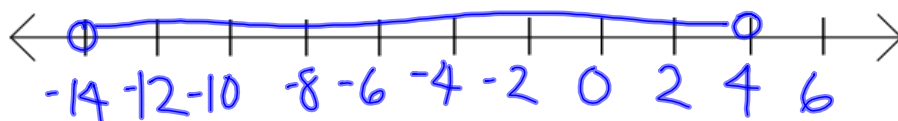
The value inside the absolute value symbol is greater than the negative value of n .

Solve $|t + 5| < 9$. Then graph the solution set.

$$\begin{array}{r} t + 5 < 9 \\ -5 \quad -5 \\ \hline t < 4 \end{array}$$

$$\begin{array}{r} t + 5 > -9 \\ -5 \quad -5 \\ \hline t > -14 \end{array}$$

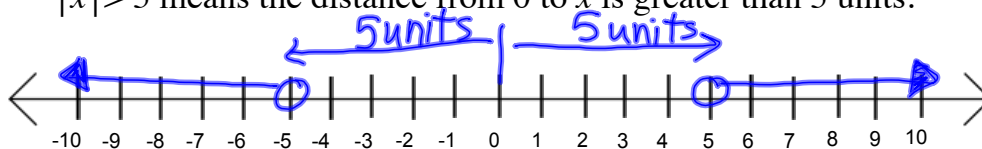
$$\{t \mid -14 < t < 4\}$$



$$|x| > n$$

ex.

$|x| > 5$ means the distance from 0 to x is greater than 5 units.



$$\{x \mid x < -5 \text{ or } x > 5\}$$

When solving inequalities of the form $|x| > n$, find the union of these two cases. "OR"

Case 1:

The value inside the absolute value symbol is greater than the positive value of n .

Case 2:

The value inside the absolute value symbol is less than the negative value of n .

Solve $|2x + 8| \geq 6$. Then graph the solution set.

$$2x + 8 \geq 6$$

$$\frac{-8}{-8} \quad \frac{-8}{-8}$$

$$\frac{2x}{2} \geq \frac{-2}{2}$$

$$x \geq -1$$

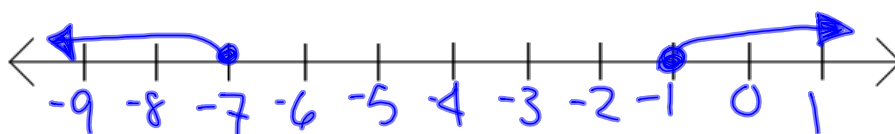
$$2x + 8 \leq -6$$

$$\frac{-8}{-8} \quad \frac{-8}{-8}$$

$$\frac{2x}{2} \leq \frac{-14}{2}$$

$$x \leq -7$$

$$\{x \mid x \leq -7 \text{ or } x \geq -1\}$$



Absolute Value Equations and Inequalities

If $|x| = n$, then $x = -n$ or $x = n$

If $|x| < n$, then $x < n$ and $x > -n$

also true for \leq

If $|x| > n$, then $x > n$ or $x < -n$

also true for \geq



Assignment:

Pgs. 349-350 #20-36 even,
40-44 even, 48, 49