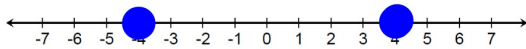
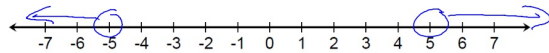


Where on the number line could you be to make each statement true?

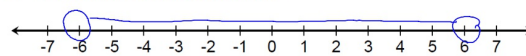
1. Exactly 4 units from zero.



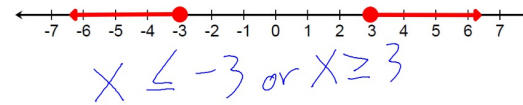
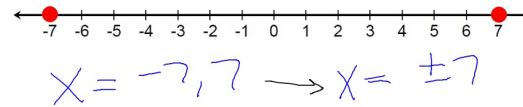
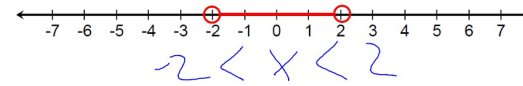
2. More than 5 units from zero.



3. Less than 6 units from zero.



Write an algebraic statement for each graph.



Absolute Value:

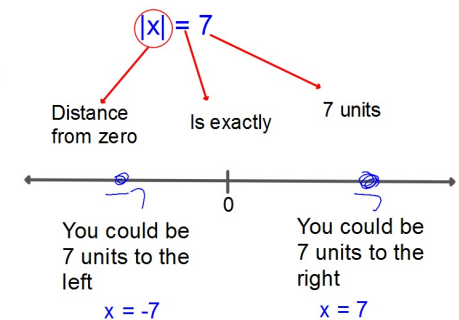
- Distance a number is from zero.
- Distance is a POSITIVE quantity.

Solve for x: $|x| = 7$

Definition	Algebraic Definition of Absolute Value
• If $x \geq 0$, then $ x = x$.	• If $x < 0$, then $ x = -x$.

$$|x| = 7 \longrightarrow x = 7, x = -7$$

$$x = \pm 7$$



Solve:

$$|2x - 5| = 13$$

Exactly 13 units from zero

$$2x - 5 = -13$$

$$+5 \quad -5$$

$$2x = -8$$

$$x = -4$$



or $2x - 5 = 13$

$$+5 \quad +5$$

$$2x = 18$$

$$x = 9$$

$$x = -4, 9$$

Solve: $|x| > 5$

ties

Absolute Value Inequalities

represent a positive real number.

k is equivalent to $x \leq -k$ or $x \geq k$.

k is equivalent to $-k \leq x \leq k$.

$$|x| > 5$$

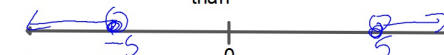
$$x < -5 \text{ or } x > 5$$

$$|x| > 5$$

Distance from zero

Is more than

5 units



You could be more than 5 units to the left

You could be more than 5 units to the right

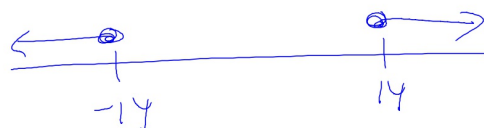
$$x < -5$$

OR

$$x > 5$$

Solve: $|5x + 2| \geq 14$

Further than 14 units from zero



$$5x + 2 \leq -14 \text{ or } 5x + 2 \geq 14$$

$$x \leq -3.2 \text{ or } x \geq 2.4$$

Solve: $|x| \leq 12$

Properties

Absolute Value Inequalities

Let k represent a positive real number.

$|x| \geq k$ is equivalent to $x \leq -k$ or $x \geq k$.

$|x| \leq k$ is equivalent to $-k \leq x \leq k$.

$$|x| \leq 12$$

$$-12 \leq x \leq 12$$

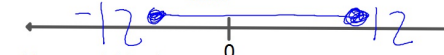
$$x \geq -12 \text{ and } x \leq 12$$

$$|x| \leq 12$$

Distance from zero

Is less than

12 units



You could be less than 12 units to the left

You could be less than 12 units to the right

$$x \geq -12$$

AND

$$x \leq 12$$

$$-12 \leq x \leq 12$$

Solve: $|4x + 1| < 23$

Closer than 23 units from zero



$$-6 < x < 5.5$$

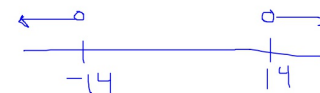
$$\begin{aligned} -23 &< 4x + 1 < 23 \\ -1 &\quad -1 \quad -1 \\ -24 &< 4x < 22 \\ \frac{-24}{4} &< \frac{4x}{4} < \frac{22}{4} \end{aligned}$$

What would you have to do first?

$$3|x + 7| - 11 > 31$$

Add 11 then divide by 3

$$\begin{aligned} 3|x + 7| &> 42 \\ \frac{3}{3}|x + 7| &> \frac{42}{3} \\ |x + 7| &> 14 \end{aligned}$$



$$x + 7 < -14 \quad \text{or} \quad x + 7 > 14$$

$$x < -21 \quad \text{or} \quad x > 17$$