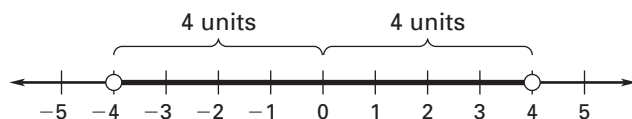# Investigating Algebra Activity: Absolute Value Inequalities

For use before the lesson "Solve Absolute Value Inequalities"

Materials: paper and pencil

QUESTION **How can you use a number line to solve absolute-value inequalities?**

You can solve an absolute-value inequality of the form $|x| < c$ by finding all points on the number line whose distance from zero is less than c.
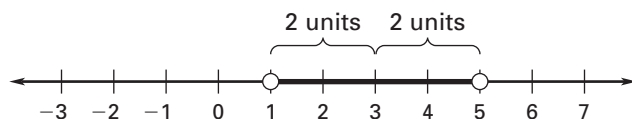
For example, the inequality $|x| < 4$ means x is less than 4 units from zero. As shown below, the numbers between -4 and 4 are less than 4 units from zero. An open circle is used at -4 and 4 because the inequality symbol is <.

4 units   4 units

$$\begin{array}{c} \longleftarrow \!\!\mid\!\!\overset{\circ}{\mid}\!\!\mid\!\!\mid\!\!\mid\!\!\mid\!\!\mid\!\!\mid\!\!\overset{\circ}{\mid}\!\!\mid\!\!\longrightarrow \\ -5 \; -4 \; -3 \; -2 \; -1 \; 0 \; 1 \; 2 \; 3 \; 4 \; 5 \end{array}$$

EXPLORE 1 **Use a number line to graph $|x - 3| < 2$**

STEP 1 Interpret inequality
The inequality can be read as "The distance between x and 3 is less than 2."
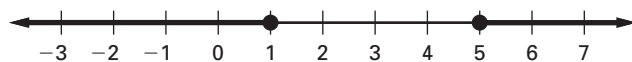
STEP 2 Draw graph
On a number line, find the points whose distance from 3 is less than 2. Use open circles because the inequality symbol is <.

2 units   2 units

$$\begin{array}{c} \longleftarrow \!\!\mid\!\!\mid\!\!\mid\!\!\mid\!\!\overset{\circ}{\mid}\!\!\mid\!\!\mid\!\!\mid\!\!\overset{\circ}{\mid}\!\!\mid\!\!\mid\!\!\longrightarrow \\ -3 \; -2 \; -1 \; 0 \; 1 \; 2 \; 3 \; 4 \; 5 \; 6 \; 7 \end{array}$$

EXPLORE 2 **Use a number line to graph $|x - 3| \geq 2$**

STEP 1 Interpret inequality
The inequality can be read as "The distance between x and 3 is greater than or equal to 2."

STEP 2 Draw graph
On a number line, find the points whose distance from 3 is greater than or equal to 2. Use closed circles because the inequality symbol is ≥.

$$\begin{array}{c} \longleftarrow \!\!\mid\!\!\mid\!\!\mid\!\!\mid\!\!\overset{\bullet}{\mid}\!\!\mid\!\!\mid\!\!\mid\!\!\overset{\bullet}{\mid}\!\!\mid\!\!\mid\!\!\longrightarrow \\ -3 \; -2 \; -1 \; 0 \; 1 \; 2 \; 3 \; 4 \; 5 \; 6 \; 7 \end{array}$$

DRAW CONCLUSIONS **Use a number line to solve the absolute-value inequality.**

1. $|x - 2| \leq 3$ **2.** $|x - 1| > 5$ **3.** $|x - 4| \geq 1$

4. $|x + 3| < 2$ **5.** $|x + 2| > 0$ **6.** $|x + 1| \leq -6$