Name ______________________________ Date ______________ Class______________

LESSON 2-3

Solving Absolute Value Inequalities

Reteach

To solve an absolute-value inequality, first use inverse operations to isolate the absolute-value expression. Then write and solve a compound inequality.

Example

Solve $|x - 2| + 8 < 10$.

Step 1: Isolate the absolute-value expression.

$$\begin{array}{rcl} |x-2| + 8 & < & 10 \\ \underline{\quad -8} & & \underline{-8} \\ |x-2| & < & 2 \end{array}$$

Subtract 8 from both sides.

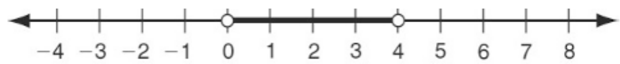
Step 2: Solve a compound inequality.

$|x - 2| < 2$ means $x - 2 > -2$ AND $x - 2 < 2$.

$$\begin{array}{rcl} \underline{+2} & & \underline{+2} \\ x & > & 0 \end{array} \text{ AND } \begin{array}{rcl} \underline{+2} & & \underline{+2} \\ x & < & 4 \end{array}$$

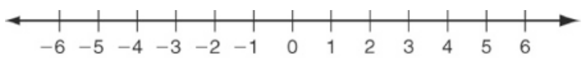
Solve each inequality.

Graph the solution as shown.

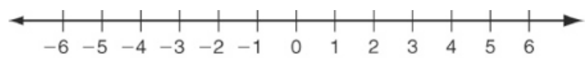


Solve each inequality and graph the solution.

1. $|x| + 12 < 16$ ________________



2. $|x - 1| + 5 \le 9$ ________________



Use a similar method to solve absolute-value inequalities that have a greater-than symbol (>).

Example

Solve $|x - 5| - 4 > -1$.

Step 1: Isolate the absolute-value expression.

$$\begin{array}{rcl} |x-5| - 4 & > & -1 \\ \underline{\quad +4} & & \underline{+4} \\ |x-5| & > & 3 \end{array}$$

Add 4 to both sides.

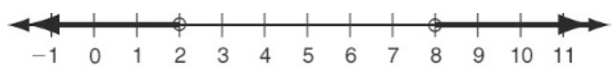
Step 2: Solve a compound inequality.

$|x - 5| > 3$ means $x - 5 < -3$ OR $x - 5 > 3$.

$$\begin{array}{rcl} \underline{+5} & & \underline{+5} \\ x & < & 2 \end{array} \text{ OR } \begin{array}{rcl} \underline{+5} & & \underline{+5} \\ x & > & 8 \end{array}$$

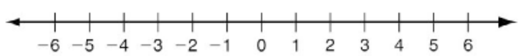
Solve each inequality.

Graph the solution as shown.



Solve each inequality and graph the solution.

3. $4 + |x| \ge 5$ ________________



4. $2|x + 2| > 6$ ________________