Name _____ Class _____ Date _____

Reteaching 3-6

Absolute Value Equations and Inequalities

OBJECTIVE: Solving absolute value inequalities **MATERIALS:** None

The absolute value of a real number x, written $|x|$, is the distance of x from 0 on the real number line.

An inequality such as $|x| < k$, where k is a positive real number, is true for values of x that are less than k units from 0 on the number line. These are the numbers between $-k$ and k on the number line. Thus, x is a solution of $|x| < k$ whenever $-k < x < k$.

An inequality such as $|x| > k$, where k is a positive real number, is true for values of x that are more than k units from 0 on the number line. These are the numbers to the left of $-k$ and to the right of k on the number line. Thus, x is a solution of $|x| > k$ whenever $x < -k$ or $x > k$.

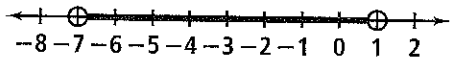
Example

Solve each inequality and graph the solution.

a. $|t + 3| < 4$ ← **The inequality is in the form $|x| < k$.**

$-4 < t + 3 < 4$ ← **Replace the form $|x| < k$ with the form $-k < x < k$. Here the expression $t + 3$ is in the place of x and $k = 4$.**

$-7 < t < 1$ ← **Subtract 3 from each part of the inequality.**

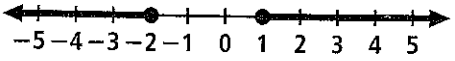


b. $|2y + 1| \geq 3$ ← **The inequality is in the form $|x| \geq k$.**

$2y + 1 \leq -3$ or $2y + 1 \geq 3$ ← **Replace the form $|x| \geq k$ with the form $x \leq -k$ or $x \geq k$. Here the expression $2y + 1$ is in the place of x and $k = 3$.**

$2y \leq -4$ or $2y \geq 2$ ← **Subtract 1 from each side of each inequality.**

$y \leq -2$ or $y \geq 1$ ← **Divide each side of each inequality by 2.**



Exercises

Solve each inequality and graph the solution.

1. $|c| < 5$
2. $|u| \geq 1$
3. $|a + 1| \leq 2$
4. $|3m - 2| > 1$
5. $\left|\frac{1}{2}y - 3\right| \geq \frac{1}{2}$
6. $|2n + 1| < 7$
7. $|4 - 2u| \leq 8$
8. $|2g + 5| > 3$
9. $|1 - 2y| \geq 9$