Name ___Key___   Period _____

Lesson 5.5 Notes (Inequalities Involving Absolute Value)

Objectives:
- Solve and graph absolute value inequalities (<).
- Solve and graph absolute value inequalities (>).

Absolute Value Inequalities

- Case 1: The expression inside the absolute value symbols is *positive*.

- Case 2: The expression inside the absolute value symbols is *negative*.

$$|X| \geq k \qquad |X| \leq k$$

$$|X| > k \qquad |X| < k$$
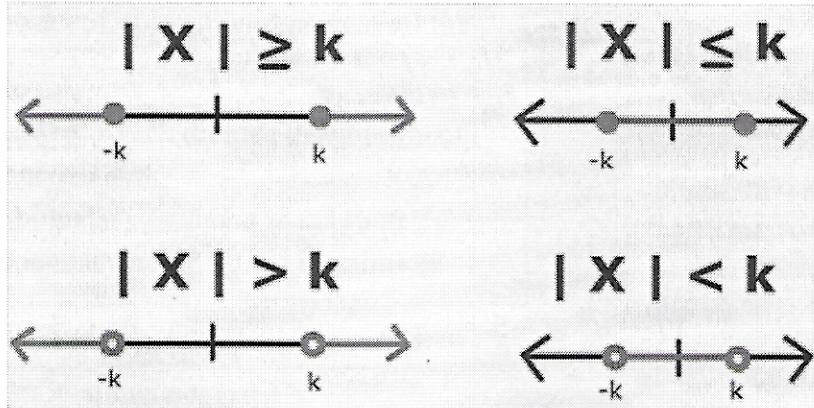
Absolute Value Inequalities (<)

- The solution is the **intersection** of the solutions of the 2 cases.

- Examples: Solve each inequality. Then graph the solution set.

1. $|m + 2| < 11$

$$m + 2 < 11 \qquad -(m+2) < 11$$
$$\underline{-2 \quad -2} \qquad m+2 > -11$$
$$m < 9 \qquad m > -13$$

$$\boxed{-13 < m < 9}$$

(graph: open circles at -13 and 9, shaded between)

2. $|n - 8| \leq 2$

$$n - 8 \leq 2 \qquad -(n-8) \leq 2$$
$$n \leq 10 \qquad n - 8 \geq -2$$
$$n \geq 6$$

$$\boxed{6 \leq n \leq 10}$$

(graph: closed circles at 6 and 10, shaded between)

3. $|2c - 5| < -3$ $\emptyset$

NOT Possible

(empty graph)

9
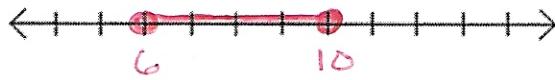
Absolute Value Inequalities (≥)

- The solution is the **union** of the solutions of the 2 cases.

- Examples: Solve each inequality. Then graph the solution set.

4. $|3n + 6| \geq 12$

$3n + 6 \geq 12$ $-(3n + 6) \geq 12$
$3n \geq 6$ $3n + 6 \leq -12$
$n \geq 2$ $3n \leq -18$
                  $n \leq -6$

-6 -4 -2 0 2

$\boxed{n \geq 2 \quad OR \quad n \leq -6}$

5. $|r - 6| \geq -5$

Always True

-5 -4 -3 -2 -1 0 1 2 3 4 5

$\boxed{\{r \mid r \text{ is a real number}\}}$

6. $|2k + 1| > 7$

$2k + 1 > 7$ $-(2k + 1) > 7$
$2k > 6$ $2k + 1 < -7$
$k > 3$ $2k < -8$
               $k < -4$

-4 0 3
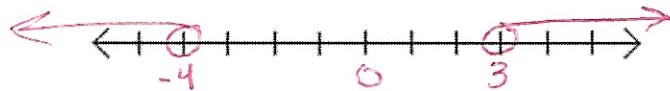
$\boxed{k > 3 \quad OR \quad k < -4}$

Application

7. A recent survey showed that 65% of young adults watched online video clips. The margin of error was within 3 percentage points. Write and solve an absolute value inequality to find the range of young adults who use video sharing sites.

Let x = % of young adults

$|x - 65| \leq 3$

$x - 65 \leq 3$ $-(x - 65) \leq 3$
$x \leq 68$ $x - 65 \geq -3$
                   $x \geq 62$

$\boxed{62\% \leq x \leq 68\%}$