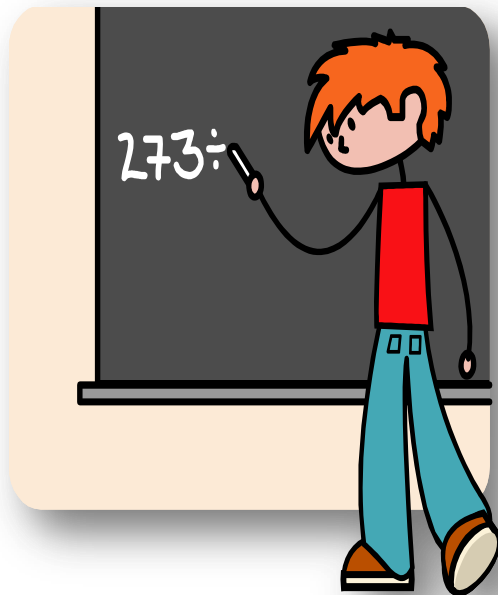


2.7 Absolute Value Equations & Inequalities

By: Cindy Alder



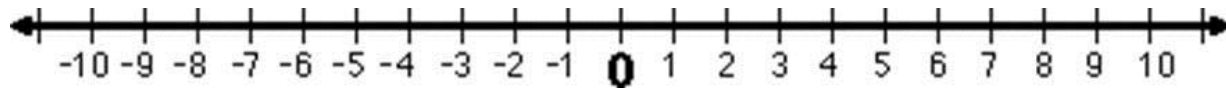
Objectives:

- Use the distance definition of absolute value.
- Solve equations of the form $|ax + b| = k$ for $k > 0$.
- Solve inequalities of the form $|ax + b| < k$, for $k > 0$ and of the form $|ax + b| > k$, for $k > 0$.
- Solve absolute value equations that involve rewriting.
- Solve equations of the form $|ax + b| = |cx + d|$.
- Solve special cases of absolute value equations and inequalities.

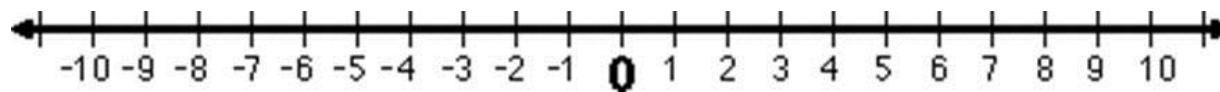
Absolute Value

Absolute value-

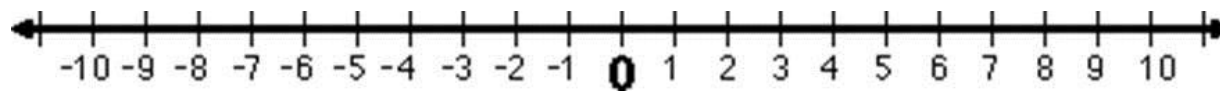
$$|x| = 4$$

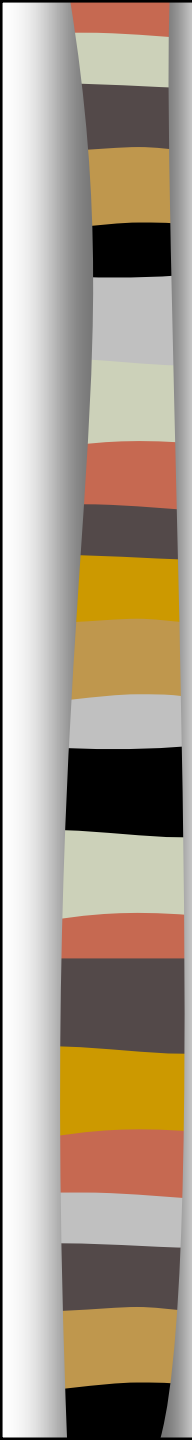


$$|x| > 4$$



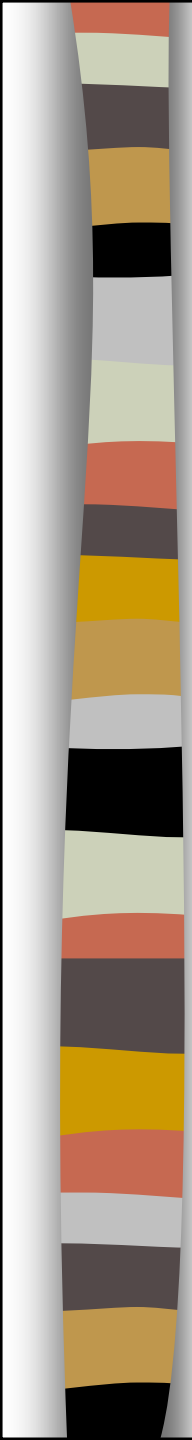
$$|x| < 4$$





Solving Absolute Value Equations and Inequalities

- Case 1: To solve $|ax + b| = k$
- Case 2: To solve $|ax + b| > k$
- Case 3: To solve $|ax + b| < k$



Example 1

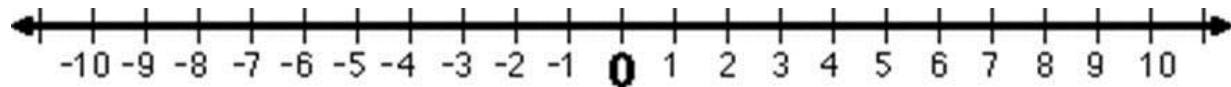
- Solve the absolute value equation.

$$|3x - 4| = 11$$

Example 2

- Solve the absolute value inequality and graph the solution set.

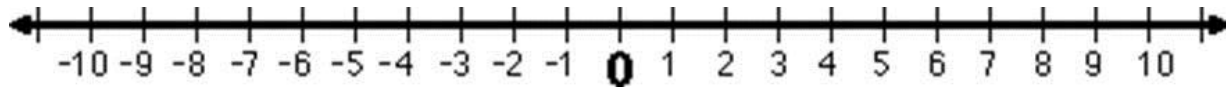
$$|3x - 4| > 11$$

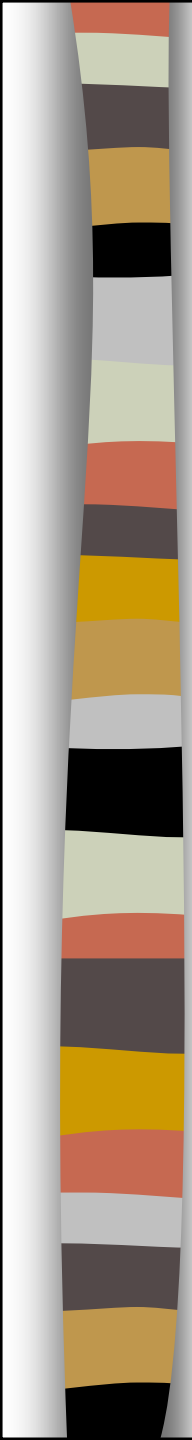


Example 3

- Solve the absolute value inequality and graph the solution set.

$$|3x - 4| < 11$$





Example 4

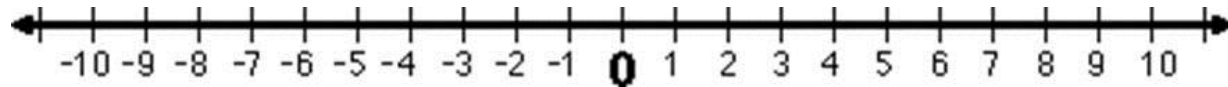
- Solve the absolute value equation.

$$|10x - 2| - 2 = 12$$

Example 5

- Solve the absolute value inequality and graph the solution set.

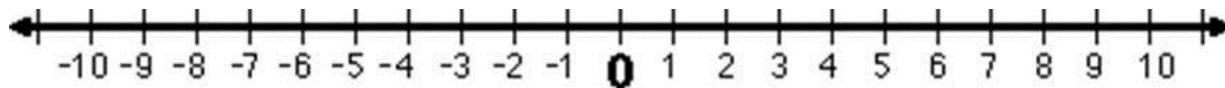
$$|x + 2| - 3 \geq 2$$

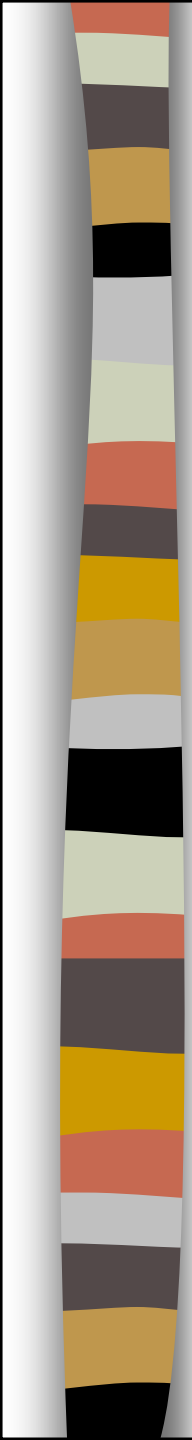


Example 6

- Solve the absolute value inequality and graph the solution set.

$$|x + 2| - 3 \leq 2$$

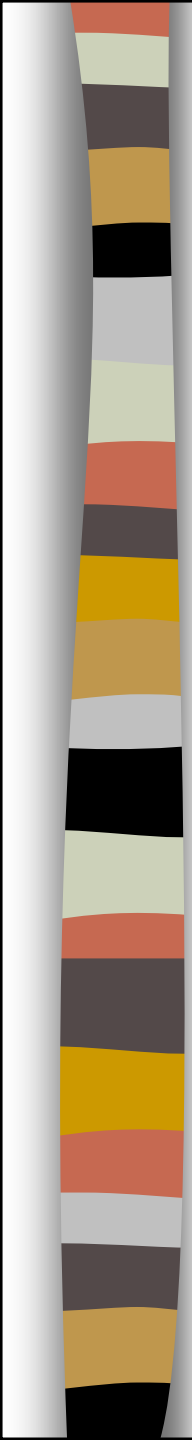




Example 7

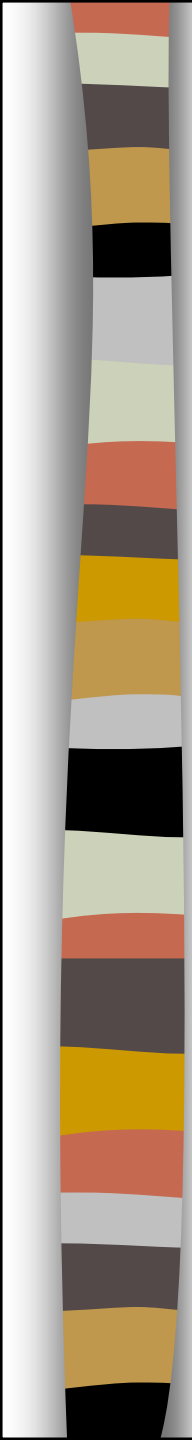
- Solve the absolute value equation.

$$|4x - 1| = |3x + 5|$$



Special Cases of Absolute Value

- Case 1: The absolute value can never be negative.
That is,
- Case 2: The absolute value of an expression equals 0 only when the expression is equal to 0.

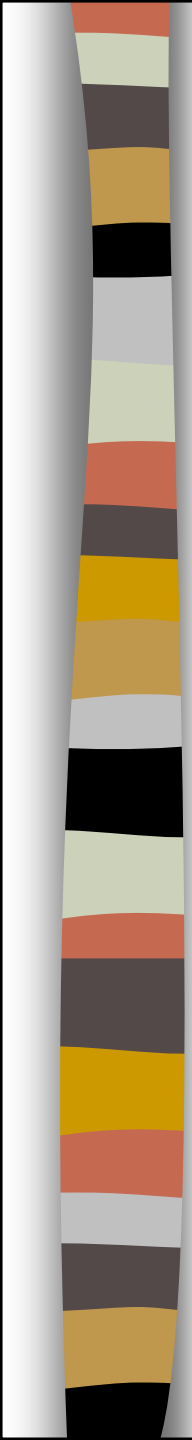


Example 8

- Solve each absolute value equation.

$$|6x + 7| = -5$$

$$\left| \frac{1}{4}x - 3 \right| = 0$$

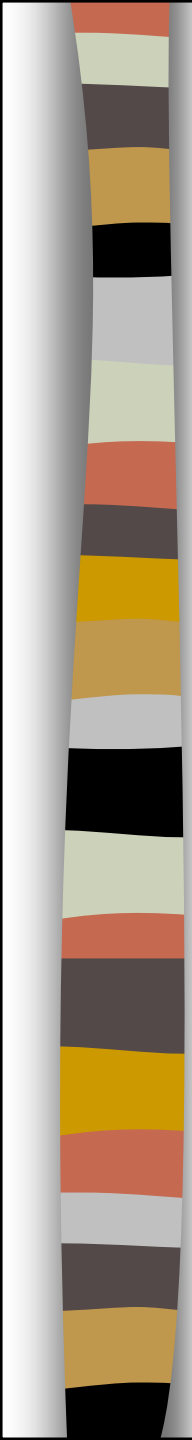


Example 9

- Solve each absolute value inequality.

$$|x| > -1$$

$$|x + 10| - 2 \leq -3$$



Example 10

- Solve each absolute value inequality.

$$|x + 2| \leq 0$$

What about:

$$|x + 2| < 0$$

$$|x + 2| \geq 0$$

$$|x + 2| > 0$$