

Absolute Value Inequalities Video Lecture

Section 9.3

Course Learning Objectives:

Solve certain types of linear inequalities.

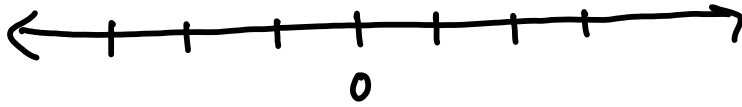
Weekly Learning Objectives:

- 1) Solve absolute value inequalities of the form $|x| < a$.**
- 2) Solve absolute value inequalities of the form $|x| > a$.**

Absolute Value Inequalities

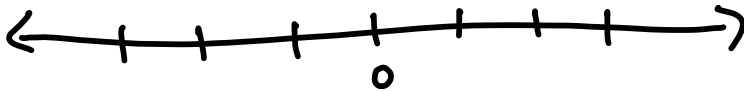
Consider $|x| = 3$

Recall that $|x|$ measures the distance that x is from zero on a number line.

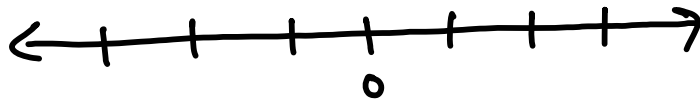


Distance can only be greater than or equal to 0.

Consider $|x| < 3$



Consider $|x| > 3$



$|x - 2| < 4$

$|x - 2| > 4$

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

$$|7-2x| \leq 1$$

$$-3 + |5x-3| \geq 2$$

$$\left| \frac{3}{5} + 4x \right| - 6 \leq -1$$

No algebraic manipulations are used to analyze an absolute value inequality compared to a negative number! Remember that the absolute value of every expression is ALWAYS zero or positive.

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

$$|2x - 5| \leq -5$$

$$|3 - 4x| < -1$$

$$|2x + 1| > -1$$

$$|x - 2| \geq -4$$

$$|6x + 2| > -5$$

$$|3 + 2x| < 0$$

$$|3 + 2x| > 0$$

$$|3 + 2x| \leq 0$$

$$|3 + 2x| \geq 0$$

$$|4 - x| < 0$$

$$|2x - 1| \geq 0$$

$$|3x - 4| \leq 0$$

$$|x - 5| > 0$$

Summary of Absolute Value Inequalities:

| expression | < a, a is positive

$$-a < \text{exp} < a$$

| expression | \leq a, a is positive

$$-a \leq \text{exp} \leq a$$

| expression | > a, a is positive

$$\text{exp} < -a \text{ or } \text{exp} > a$$

| expression | \geq a, a is positive

$$\text{exp} \leq -a \text{ or } \text{exp} \geq a$$

| expression | < a, a is negative

$$\emptyset$$

| expression | \leq a, a is negative

$$\emptyset$$

| expression | > a, a is negative

$$(-\infty, \infty)$$

| expression | \geq a, a is negative

$$(-\infty, \infty)$$

| expression | > 0

Let $k =$ where $\text{exp} = 0$

$$(-\infty, k) \cup (k, \infty)$$

| expression | ≥ 0

$$(-\infty, \infty)$$

| expression | < 0

$$\emptyset$$

| expression | ≤ 0
Let $k =$ where $\text{exp} = 0$
 $\{k\}$

