Section 4.4 Absolute Value Inequalities

# Objective 1: Solving Absolute Value Inequalities of the Form $\left|x\right|<a$

Consider the absolute value inequality $\left|x\right|<2$. The solution set contains all numbers that have a distance from $0$ that is less than $2$ units.



Thus, the solution set of the inequality $\left|x\right|<2$ is $\{x|-2<x<2\}$.

**Solving Inequalities of the Form** $\left|X\right|<a$

If $a$ is a positive number, then $\left|X\right|<a$ is equivalent to $-a<X<a$.

This property also holds true for the inequality symbol $\leq $.

Find the solution set of the inequality. Then graph the solution set on the number line.

|  |  |
| --- | --- |
| a. $\left|x\right|\leq 4$ | b. $\left|p+1\right|<9$ |
| c. $\left|3x-6\right|<5$ | d. $\left|3x-6\right|<-5$ |

As with solving absolute value equations, when solving absolute value inequalities, first make sure that the absolute value expression is isolated.

Find the solution set of the inequality. Then graph the solution set on the number line.

|  |  |
| --- | --- |
| e. $2\left|t-6\right|-8\leq -2$ |  |

# Objective 2: Solving Absolute Value Inequalities of the Form $\left|x\right|>a$

Consider the absolute value inequality $\left|x\right|\geq 3$. The solution set contains all numbers that have a distance from $0$ that is $3$ units or more.



Thus, the solution set of the inequality $\left|x\right|\geq 3$ is $\{x|x\leq -3 or x\geq 3\}$.

**Solving Inequalities of the Form** $\left|X\right|>a$

If $a$ is a positive number, then $\left|X\right|>a$ is equivalent to $X<-a $or $X>a$.

This property also holds true for the inequality symbol $\geq $.

Find the solution set of the inequality. Then graph the solution set on the number line.

|  |  |
| --- | --- |
| a. $\left|x\right|>4$ | b. $\left|k+8\right|-3\geq 8$ |
| c. $\left|3w\right|+12>9$ | d. $\left|\frac{4x+1}{2}\right|\geq 5$ |