Section 4.3 Absolute Value Equations

# Objective 1: Solving Absolute Value Equations

The **absolute value of a number** is its distance from $0$ on the number line. In this section, we will concentrate on solving equations containing the absolute value of a linear expression.

The equation $\left|x\right|=3$ is an example of an absolute value equation. Its solution set will contain all numbers that are a distance of $3$ units from $0$ on the number line. There are two such numbers, $-3$ and $3$.



Thus, the solution set of the equation $\left|x\right|=3$ is $\{-3, 3\}$.

**Solving Equations of the form** $\left|X\right|=a$

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

Find the solution set of the equation.

|  |  |
| --- | --- |
| a. $\left|3a\right|=10$ | b. $\left|x-6\right|=5$ |
| c. $\left|\frac{m+4}{3}\right|=2$ | d. $\left|13n+1\right|=0$ |

To apply the absolute value rule, first make sure that the absolute value expression is isolated.

Find the solution set of the equation.

|  |  |
| --- | --- |
| e. $\left|5c+4\right|-20=-6$ | f. $9-\left|6n\right|=3$ |
| g. $2\left|17-2x\right|=76$ | h. $\left|3t-9\right|+8=5$ |