

ABSOLUTE VALUE EQUATIONS

- Isolate the absolute value **FIRST**
- Split into **TWO** equations
- Solve each one.
- ****If there is a NEGATIVE number on the other side AFTER you isolate the absolute value, then there is no solution****

a. $|x| = 4$ $\{-4, 4\}$



b. $|x| = 3$



c. $|x| = -5$
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Example 3: Solve a simple absolute value equation.

a. $|x-5| = 7$

$$\begin{array}{r} x-5=7 \\ +5 \quad +5 \\ \hline x=12 \end{array} \quad \begin{array}{r} x-5=-7 \\ +5 \quad +5 \\ \hline x=-2 \end{array}$$

$\{-2, 12\}$

b. $|2x-9| = 15$

$$\begin{array}{r} 2x-9=15 \\ +9 \quad +9 \\ \hline 2x=24 \\ \frac{2x}{2} = \frac{24}{2} \\ x=12 \end{array} \quad \begin{array}{r} 2x-9=-15 \\ +9 \quad +9 \\ \hline 2x=-6 \\ \frac{2x}{2} = \frac{-6}{2} \\ x=-3 \end{array}$$

$\{-3, 12\}$

c. $|-x+3| = 7$

$$\begin{array}{r} -x+3=7 \\ +3 \quad -3 \\ \hline -x=4 \\ \frac{-x}{-1} = \frac{4}{-1} \\ x=-4 \end{array} \quad \begin{array}{r} -x+3=-7 \\ +3 \quad -3 \\ \hline -x=-10 \\ \frac{-x}{-1} = \frac{-10}{-1} \\ x=10 \end{array}$$

$\{-4, 10\}$

e. $|5-6x| = 13$

$$\begin{array}{r} 5-6x=13 \\ -5 \quad -5 \\ \hline -6x=8 \\ \frac{-6x}{-6} = \frac{8}{-6} \\ x=-\frac{4}{3} \end{array} \quad \begin{array}{r} 5-6x=-13 \\ -5 \quad -5 \\ \hline -6x=-18 \\ \frac{-6x}{-6} = \frac{-18}{-6} \\ x=3 \end{array}$$

$\{-\frac{4}{3}, 3\}$

d. $|-3x+3| = 15$

$$\begin{array}{r} -3x+3=15 \\ +3 \quad -3 \\ \hline -3x=12 \\ \frac{-3x}{-3} = \frac{12}{-3} \\ x=-4 \end{array} \quad \begin{array}{r} -3x+3=-15 \\ +3 \quad -3 \\ \hline -3x=-18 \\ \frac{-3x}{-3} = \frac{-18}{-3} \\ x=6 \end{array}$$

$\{-4, 6\}$

f. $|-5-4x| = -11$

\emptyset

↑
Absolute value cannot equal negative

1. $|x| = 6$

$x = 6$ $x = -6$

$\{-6, 6\}$

4. $|4x + 2| = -10$

\emptyset

2. $|x + 3| = 8$

$x + 3 = 8$	$x + 3 = -8$
$-3 - 3$	$-3 - 3$
<hr/>	<hr/>
$x = 5$	$x = -11$

$\{-11, 5\}$

5. $|2x - 5| = 9$

$2x - 5 = 9$	$2x - 5 = -9$
$+5 +5$	$+5 +5$
<hr/>	<hr/>
$2x = 14$	$2x = -4$
$\frac{2x}{2} = \frac{14}{2}$	$\frac{2x}{2} = \frac{-4}{2}$
$x = 7$	$x = -2$

$\{-2, 7\}$

3. $|3x - 6| = 12$

$3x - 6 = 12$	$3x - 6 = -12$
$+6 +6$	$+6 +6$
<hr/>	<hr/>
$3x = 18$	$3x = -6$
$\frac{3x}{3} = \frac{18}{3}$	$\frac{3x}{3} = \frac{-6}{3}$
$x = 6$	$x = -2$

$\{-2, 6\}$

6. $|x| = -3$

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