

Section 6.4 Solving Absolute Value Equations

Warm-Up: Solve the following.

1. $|x|=5$

$$\begin{aligned} x &= -5 & |-5| &= 5 \\ x &= 5 & |5| &= 5 \\ x &= \{-5, 5\} \end{aligned}$$

2. $|x|=0$

$$x=0 \quad |0|=0$$

3. $|x|=-5$

Not Possible

EXAMPLES

1. Solve the following absolute value equations.

a. $|x-4|=8$ (2 ans)

$$\begin{array}{|l} x-4=8 \\ +4+4 \\ \hline x=12 \end{array} \quad \begin{array}{|l} x-4=-8 \\ +4+4 \\ \hline x=-4 \end{array}$$

$$x = \{-4, 12\}$$

b. $|5x+1|+3=14$

$$\begin{aligned} x &= -\frac{12}{5} \\ 5\left(-\frac{12}{5}\right)+1 &+3=14 \\ -11+3 &=14 \\ -8 &=14 \end{aligned}$$

$|5x+1|=11$ (2 ans)

$$\begin{array}{|l} 5x+1=11 \\ -1-1 \\ \hline 5x=10 \\ x=2 \end{array} \quad \begin{array}{|l} 5x+1=-11 \\ -1-1 \\ \hline 5x=-12 \\ x=-\frac{12}{5} \end{array}$$

$$x = \left\{-\frac{12}{5}, 2\right\}$$

c. $|9+x|=15$ 2 ans

$$\begin{array}{|l} 9+x=15 \\ -9-9 \\ \hline x=6 \end{array} \quad \begin{array}{|l} 9+x=-15 \\ -9-9 \\ \hline x=-24 \end{array}$$

$$x = \{-24, 6\}$$

d. $|7-4x|-4=14$

$$\begin{aligned} |7-4x| &= 18 \\ 7-4x &= 18 \\ -7-7 \\ \hline -4x &= 11 \\ x &= \frac{11}{4} \end{aligned} \quad \begin{aligned} 7-4x &= -18 \\ -7-7 \\ \hline -4x &= -25 \\ x &= \frac{25}{4} \end{aligned}$$

$$x = \left\{-\frac{11}{4}, \frac{25}{4}\right\}$$

$$x. \frac{|2x+1|}{5} = 3 \cdot 5$$
$$|2x+1| = 15$$

$2x+1=15$ $2x=14$ $x=7$	$2x+1=-15$ $2x=-16$ $x=-8$
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$$x = \{7, -8\}$$

$$-3|x-1| - 5 = -5$$
$$-3|x-1| = 0$$
$$|x-1| = 0$$
$$x = 1$$