Section 6.4 Solving Absolute Value Equations

Warm-Up: Solve the following.

1. $|x| = 5$

$x = -5$ $|-5| = 5$

$x = 5$ $|5| = 5$

$x = \{-5, 5\}$

2. $|x| = 0$

$x = 0$ $|0| = 0$

3. $|x| = -5$

Not Possible

EXAMPLES

1. Solve the following absolute value equations.

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

$x - 4 = 8$ | $x - 4 = -8$

$+4 \quad +4$ | $+4 \quad +4$

$x = 12$ | $x = -4$

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

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

$-3 \quad -3$

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

$5x + 1 = 11$ | $5x + 1 = -11$

$-1 \quad -1$ | $-1 \quad -1$

$5x = 10$ | $5x = -12$

$x = 2$ | $x = -\frac{12}{5}$

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

$x = -\frac{12}{5}$: $5(-\frac{12}{5}) + 1 \;|\; +3 = 14$

$11 + 3 = 14$

$14 = 14$

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

$9 + x = 15$ | $9 + x = -15$

$-9 \quad -9$ | $-9 \quad -9$

$x = 6$ | $x = -24$

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

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

$+4 \quad +4$

$|7 - 4x| = 18$

$7 - 4x = 18$ | $7 - 4x = -18$

$-7 \quad -7$ | $-7 \quad -7$

$-4x = 11$ | $-4x = -25$

$x = -\frac{11}{4}$ | $x = \frac{25}{4}$

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

$$\frac{|2x+1|}{5} = 3.5$$

$$|2x+1| = 15$$

$2x+1=15$	$2x+1=-15$
$2x=14$	$2x=-16$
$x=7$	$x=-8$

$x = -8, 7$

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

$$+5 \quad +5$$

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

$$\frac{-3|x-1|}{-3} = \frac{0}{-3}$$

$$|x-1| = 0$$

$x = 1$