

3C.5. Solving Absolute Value Equations

(10F)

Solve the indicated equations for x . Be sure to check your solutions in the original equation.

(1) $|x-4| = -8$

no solution \leftarrow the absolute value cannot be negative.

(2) $|x-4| = 8$

$$-(x-4) = 8, -x+4 = 8, x-4 = -8, x = -4 \quad \checkmark$$

$$x-4 = 8, x = 12 \quad \checkmark$$

(3) $|x-4| = 2x+1$

$$-(x-4) = 2x+1, -x+4 = 2x+1, 3x = 3, x = 1 \quad \checkmark$$

$$x-4 = 2x+1, x = -5 \quad \times$$

(4) $|x-4| = \frac{1}{2}x+1$

$$-(x-4) = \frac{1}{2}x+1, -x+4 = \frac{1}{2}x+1, \frac{3}{2}x = 3, x = 2 \quad \checkmark$$

$$x-4 = \frac{1}{2}x+1, \frac{1}{2}x = 5, x = 10 \quad \checkmark$$

(5) $|x-4| = \frac{1}{2}x-3$

$$-(x-4) = \frac{1}{2}x-3, -x+4 = \frac{1}{2}x-3, \frac{3}{2}x = 7, x = \frac{14}{3} \quad \times$$

$$x-4 = \frac{1}{2}x-3, \frac{1}{2}x = 1, x = 2 \quad \times$$