

5.5 Solving Absolute Value Equations

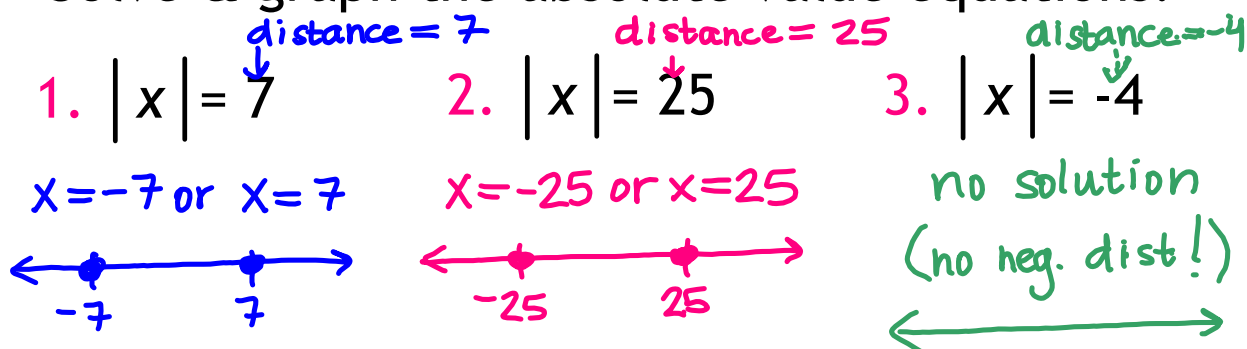
An **absolute value equation** is in the form $|ax + b| = c$.

To solve an absolute value equation when $c \geq 0$:

$$ax + b = c \quad \text{or} \quad ax + b = -c$$

****Always isolate the absolute value before separating into two equations!!****

Solve & graph the absolute value equations.



Solve & graph the absolute value equations.

4. $|x - 2| = 5$ dist = 5

$$\begin{array}{r} x - 2 = -5 \text{ or } x - 2 = 5 \\ \underline{+2 \quad +2} \quad \underline{+2 \quad +2} \\ x = -3 \text{ or } x = 7 \end{array}$$

5. $|x + 3| = 18$ dist = 18

$$\begin{array}{r} x + 3 = -18 \text{ or } x + 3 = 18 \\ \underline{-3 \quad -3} \quad \underline{-3 \quad -3} \\ x = -21 \text{ or } x = 15 \end{array}$$

Solve the absolute value equations.

6. $|4x + 6| = 28$ dist = 28

$$\begin{array}{r} 4x + 6 = -28 \text{ or } 4x + 6 = 28 \\ \underline{-6 \quad -6} \quad \underline{-6 \quad -6} \\ \frac{4x}{4} = \frac{-34}{4} \quad \frac{4x}{4} = \frac{22}{4} \\ x = -\frac{17}{2} \quad x = \frac{11}{2} \end{array}$$

7. $|7 - 2x| = 19$ dist = 19

$$\begin{array}{r} 7 - 2x = -19 \text{ or } 7 - 2x = 19 \\ \underline{-7 \quad -7} \quad \underline{-7 \quad -7} \\ -2x = -26 \quad -2x = 12 \\ \underline{-2 \quad -2} \quad \underline{-2 \quad -2} \\ x = 13 \quad x = -6 \end{array}$$

Solve the absolute value equations.

$$8. \quad \begin{array}{r} |x+1| + 2 = 5 \\ \quad \quad \quad -2 \quad -2 \\ \hline |x+1| = 3 \quad \checkmark \text{dist} = 3 \end{array}$$

$$\begin{array}{r} x+1 = -3 \quad \text{or} \quad x+1 = 3 \\ -1 \quad -1 \quad \quad \quad -1 \quad -1 \\ \hline x = -4 \quad \quad \quad x = 2 \end{array}$$

$$9. \quad \begin{array}{r} |2x-8| - 14 = -4 \\ \quad \quad \quad +14 \quad +14 \\ \hline |2x-8| = 10 \quad \checkmark \text{dist} = 10 \end{array}$$

$$\begin{array}{r} 2x-8 = -10 \quad \text{or} \quad 2x-8 = 10 \\ +8 \quad +8 \quad \quad \quad +8 \quad +8 \\ \hline 2x = -2 \quad \quad \quad 2x = 18 \\ \frac{2x}{2} = \frac{-2}{2} \quad \quad \quad \frac{2x}{2} = \frac{18}{2} \\ x = -1 \quad \text{or} \quad x = 9 \end{array}$$

Solve the absolute value equations.

$$10. \quad \begin{array}{r} 2|x-3| = 16 \\ \quad \quad \quad 2 \quad \quad \quad 2 \\ \hline |x-3| = 8 \quad \checkmark \text{dist} = 8 \end{array}$$

$$\begin{array}{r} x-3 = -8 \quad \text{or} \quad x-3 = 8 \\ +3 \quad +3 \quad \quad \quad +3 \quad +3 \\ \hline x = -5 \quad \text{or} \quad x = 11 \end{array}$$

$$11. \quad \begin{array}{r} |x+4| = 3 \cdot 5 \\ \quad \quad \quad 5 \quad \quad \quad 5 \\ \hline |x+4| = 15 \quad \checkmark \text{dist} = 15 \end{array}$$

$$\begin{array}{r} x+4 = -15 \quad \text{or} \quad x+4 = 15 \\ -4 \quad -4 \quad \quad \quad -4 \quad -4 \\ \hline x = -19 \quad \text{or} \quad x = 11 \end{array}$$