

2.2

Algebra 2

Goal 1.3.D.11: You will solve absolute value equations.

The Absolute Value of a number is the distance the number is from 0 on the number line.

$$|x| = \begin{cases} x, & \text{if } x \text{ is positive} \\ 0, & \text{if } x = 0 \\ -x, & \text{if } x \text{ is negative} \end{cases}$$

Solve a simple absolute value equation

- write 2 equations: $ax + b = c$ and $ax + b = -c$
- solve each equation
- check sol'n in original abs value equation

1. $|x+3| = 8$

$$\begin{array}{l} |5+3| = 8 \\ |8| = 8 \end{array} \quad \begin{array}{l} |-11+3| = 8 \\ |-8| = 8 \end{array}$$

$$\begin{array}{l} x+3=8 \\ \underline{-3 \quad -3} \\ x=5 \end{array} \quad + \quad \begin{array}{l} x+3=-8 \\ \underline{-3 \quad -3} \\ x=-11 \end{array}$$

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

$$\begin{array}{l} |2 \cdot 12 - 9| = 15 \\ |15| = 15 \end{array} \quad \begin{array}{l} |2 \cdot (-3) - 9| = 15 \\ |-15| = 15 \end{array}$$

$$\begin{array}{l} 2x-9=15 \\ \underline{+9 \quad +9} \\ 2x=24 \\ x=12 \end{array} \quad + \quad \begin{array}{l} 2x-9=-15 \\ \underline{+9 \quad +9} \\ 2x=-6 \\ x=-3 \end{array}$$

Check for extraneous solutions - an apparent solution that must be rejected b/c it does not satisfy the original equation.

1. $|4x+10| = 6x$

$$\begin{array}{l} |4 \cdot 5 + 10| = 6 \cdot 5 \\ |30| = 30 \\ 10 = 2x \\ x=5 \end{array} \quad \begin{array}{l} |4 \cdot (-1) + 10| = 6 \cdot (-1) \\ |6| \neq -6 \\ -4x+10 = -6x \\ \underline{-4x+10 = -6x} \\ 10 = -10x \\ x = -1 \end{array}$$

GP: p 53; 1, 4, 5

1. $|x| = 5$

$$x=5 \quad x=-5$$

4. $|3x-2| = 13$

$$\begin{array}{l} 3x-2=13 \\ \underline{+2 \quad +2} \\ 3x=15 \\ x=5 \end{array} \quad \begin{array}{l} 3x-2=-13 \\ \underline{+2 \quad +2} \\ 3x=-11 \\ x=-\frac{11}{3} \end{array}$$

5. $|2x+5| = 3x$

$$\begin{array}{l} 2x+5=3x \\ \underline{-2x \quad -2x} \\ 5=x \end{array} \quad \begin{array}{l} 2x+5=-3x \\ \underline{-2x \quad -2x} \\ 5=-5x \\ x=-1 \end{array}$$

3. $|3x-2| = 13$

$$\begin{array}{l} |3 \cdot 5 - 2| = 13 \\ |13| = 13 \end{array} \quad \begin{array}{l} |3 \cdot (-\frac{11}{3}) - 2| = 13 \\ |-13| = 13 \end{array}$$

2. $|2x+5| = 3x$

$$\begin{array}{l} |2 \cdot (-1) + 5| = 3 \cdot (-1) \\ |3| = 15 \end{array} \quad \begin{array}{l} |2 \cdot 5 + 5| = 3 \cdot 5 \\ |15| = 15 \end{array}$$

$$\begin{array}{l} -2+5=3 \\ |3| = -3 \end{array}$$

$$-3 - |8-9m| = -14$$

$$\frac{-1|8-9m|}{-1} = \frac{-17}{-1}$$

$$|8-9m| = 17$$

$$\frac{-8-9m}{-8} = \frac{17}{-8}$$

$$\frac{-9m}{-9} = \frac{9}{-9}$$

$$m = -1$$

$$3 - |8-9 \cdot 1| = -14$$

$$3 - |17| = -14$$

$$3 - |8-9 \cdot \frac{25}{9}| = -14$$

$$3 - |17| = -14$$

$$+ \frac{-8-9m}{-8} = \frac{-17}{-8}$$

$$\frac{-9m}{-9} = \frac{25}{-9}$$

$$m = \frac{25}{9}$$

$$|8-5m| = -7$$

∅

↑ Abs value can't equal a negative #

Homework 😊

Worksheet