

Study Guide and Intervention

Solving Absolute Value Equations

Absolute Value Expressions The absolute value of a number is its distance from 0 on a number line. The symbol $|x|$ is used to represent the absolute value of a number x .

Absolute Value	<ul style="list-style-type: none"> Words if x is less than 0 and x then it is $= x$ if a is positive then abs value a is a if a neg then abs value a is opp
	<ul style="list-style-type: none"> Symbols $x < 0$ then $= -x$ $x > 0$ then $x = x$

Example 1: Evaluate $|-4| - |-2x|$ if $x = 6$.

$$\begin{aligned} & |-4| - |-2(6)| \text{ substitute} \\ & |-4| - |-12| \text{ pmdas (Absolute)} \\ & 4 - 12 \text{ pmdas} \\ & -8 \text{ pmdas} \end{aligned}$$

Example 2: Evaluate $|2x - 3y|$ if $x = -4$ and $y = 3$.

$$\begin{aligned} & |2(-4) - 3(3)| \text{ substitute} \\ & |-8 - 9| \text{ pmdas} \\ & |-17| \text{ Absolute value rule} \\ & 17 \end{aligned}$$

Exercises

Evaluate each expression if $w = -4$, $x = 2$, $y = \frac{1}{2}$, and $z = -6$.

1. $|2x - 8|$

$$\begin{aligned} & |2(2) - 8| \\ & |4 - 8| \\ & |-4| \\ & 4 \end{aligned}$$

2. $|6 + z| - |-7|$

$$\begin{aligned} & |6 + (-6)| - |-7| \\ & |0| - |-7| \\ & 0 - 7 \\ & -7 \end{aligned}$$

3. $5 + |w + z|$

$$\begin{aligned} & 5 + |(-4) + (-6)| \\ & 5 + |-10| \\ & 5 + 10 \\ & 15 \end{aligned}$$

4. $|x + 5| - |2w|$

$$\begin{aligned} & |2 + 5| - |2(-4)| \\ & |7| - |-8| \\ & 7 - 8 \\ & -1 \end{aligned}$$

5. $|x| - |y| - |z|$

$$\begin{aligned} & |2| - \left| \frac{1}{2} \right| - |-6| \\ & 2 - \frac{1}{2} - 6 \\ & \frac{4}{2} - \frac{1}{2} - \frac{12}{2} \\ & \frac{3}{2} - \frac{12}{2} = -\frac{9}{2} \end{aligned}$$

6. $5|w| + 2|z - 2y|$

$$\begin{aligned} & 5|-4| + 2|-6 - 2\left(\frac{1}{2}\right)| \\ & 5(4) + 2\left|-\frac{12}{2} - \frac{2}{2}\right| \\ & 5(4) + 2|-7| \\ & 5(4) + 2(7) \\ & 20 + 14 \\ & 34 \end{aligned}$$