

Name: Notes | Examples

Date:

Period:

Lesson 1.3 Absolute Value Equations Notes

Warm-Up:

$$\frac{3|m+8|}{3} = \frac{39}{3} \quad \text{*see your review handout notes}$$
$$|m+8| = 13$$
$$\begin{array}{r} m+8 = 13 \\ -8 \quad -8 \\ \hline m = 5 \end{array} \quad \begin{array}{r} m+8 = -13 \\ -8 \quad -8 \\ \hline m = -21 \end{array}$$

Notes:

1. Isolate the absolute value expression
2. Write two equations.
3. Solve both equations.
4. Check for extraneous solutions.

Extraneous solution: solutions that do not make your equation true although you determined them algebraically correct.

Directions: Solve each equation. Be sure to check for extraneous solutions

Ex: $9 - 4|c+10| = -15$

$$\begin{array}{r} 1. \quad -9 \qquad \qquad \qquad -9 \\ \hline -4|c+10| = -24 \\ \hline -4 \quad -4 \\ \hline |c+10| = 6 \end{array}$$

$$\begin{array}{r} 2. \quad c+10 = 6 \qquad \qquad c+10 = -6 \\ \quad -10 \quad -10 \qquad \quad -10 \quad -10 \\ \hline \quad c = -4 \qquad \qquad \quad c = -16 \end{array}$$

Check:

$$\begin{array}{l} 1. \\ 9 - 4|-4+10| = -15 \qquad 9 - 4|-16+10| = -15 \\ 9 - 4|6| = -15 \qquad \quad 9 - 4|-6| = -15 \\ 9 - 4(6) = -15 \qquad \quad 9 - 4(6) = -15 \\ 9 - 24 = -15 \qquad \quad 9 - 24 = -15 \\ -15 = -15 \checkmark \qquad \quad -15 = -15 \checkmark \end{array}$$

Ex2: $16|r-5| = -32$

$$\frac{16}{16} \frac{|r-5|}{16} = \frac{-32}{16}$$

$$|r-5| = -2$$

no solution

An absolute value can not equal a negative number.

\emptyset

Check:

If you did continue, the solutions would not make your equations true.

$$\begin{array}{r} r-5 = -2 \\ +5 \quad +5 \\ \hline r = 3 \end{array}$$

$$\begin{array}{r} r-5 = 2 \\ r = 7 \end{array}$$

$$\begin{array}{l} 16|3-5| = -32 \\ 16|-2| = \\ 16(2) = \\ 32 \neq -32 \end{array}$$

$$\begin{array}{l} 16|7-5| = -32 \\ 16|2| = \\ 16(2) = \\ 32 \neq -32 \end{array}$$

Ex3: $|8-2n| - 5n = n+2$

$$\frac{|8-2n| - 5n + 5n}{-2} = \frac{n+2 + 5n}{-2}$$

$$|8-2n| = 6n+2$$

$$\begin{array}{r} 8-2n = 6n+2 \\ -2 \quad -2 \\ \hline 6-2n = 6n \end{array}$$

$$\begin{array}{r} 6-2n = 6n \\ +2n \quad +2n \\ \hline 6 = 8n \end{array}$$

$$\frac{6}{8} = \frac{8n}{8}$$

$$n = \frac{6}{8} = \frac{3}{4}$$

$$\begin{array}{r} 8-2n = -(6n+2) \\ 8-2n = -6n-2 \\ +2 \quad +2 \\ \hline 10-2n = -6n \end{array}$$

$$\begin{array}{r} 10-2n = -6n \\ +2n \quad +2n \\ \hline 10 = -4n \end{array}$$

$$\begin{array}{r} 10 = -4n \\ -4 \quad -4 \\ \hline n = \frac{10}{-4} = -\frac{5}{2} \end{array}$$

Check:

$$|8-2(\frac{3}{4})| - 5(\frac{3}{4}) = \frac{3}{4} + 2$$

$$|8-\frac{3}{2}| - \frac{15}{4} = \frac{3}{4} + \frac{8}{4}$$

$$|\frac{16}{2}-\frac{3}{2}| - \frac{15}{4} = \frac{11}{4}$$

$$\frac{13}{2} - \frac{15}{4} =$$

$$\frac{26}{4} - \frac{15}{4} =$$

$$\frac{11}{4} = \frac{11}{4} \checkmark$$

$$|8-(-\frac{5}{2})| - 5(-\frac{5}{2}) = \frac{-5}{2} + 2$$

$$|8+5| + \frac{25}{2} = -\frac{5}{2} + \frac{4}{2}$$

$$13 + \frac{25}{2} = -\frac{1}{2}$$

$$\frac{26}{2} + \frac{25}{2} =$$

$$\frac{51}{2} \neq -\frac{1}{2}$$

Extraneous

Ex4: $|y-10| = -6$

$$\frac{|y-10|}{-2} = \frac{(-6)(-2)}{-2}$$

$$|y-10| = 12$$

$$\begin{array}{r} y-10 = 12 \\ +10 \quad +10 \\ \hline y = 22 \end{array}$$

$$\begin{array}{r} y-10 = -12 \\ +10 \quad +10 \\ \hline y = -2 \end{array}$$

Check:

$$\frac{|22-10|}{-2} = -6$$

$$\frac{|12|}{-2} = -6$$

$$\frac{12}{-2} = -6$$

$$-6 = -6 \checkmark$$

$$\frac{|-2-10|}{-2} = -6$$

$$\frac{|-12|}{-2} = -6$$

$$\frac{12}{-2} = -6$$

$$-6 = -6 \checkmark$$