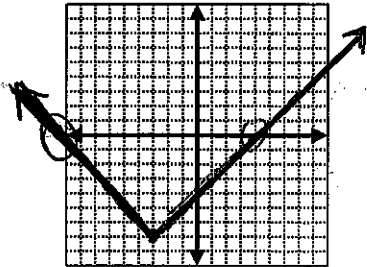


Unit 1: Linear Functions
3 – 6 Absolute Value Equations

Name: _____

EXPLORATION: Solve the following absolute value equation, $|x + 3| = 7$. This equation is equivalent to $|x + 3| - 7 = 0$ which will be used to find the solutions (x-intercepts).

Graph $|x + 3| - 7 = 0$ and identify the solutions (x-intercepts).



Solutions: $(-10, 0)$ and $(4, 0)$

How can we solve to find the solutions algebraically?

$$\begin{array}{r} |x+3| - 7 = 0 \\ +7 \quad +7 \\ \hline |x+3| = 7 \end{array}$$

left

$$\begin{array}{r} x+3 = -7 \\ -3 \quad -3 \\ \hline x = -10 \end{array}$$

right

$$\begin{array}{r} x+3 = 7 \\ -3 \quad -3 \\ \hline x = 4 \end{array}$$

Steps

1. Isolate the abs. value exp.
2. Analyze what abs. value means:
"distance from zero"
left and right

Solve the following absolute value equations.

1) $|3c - 6| = 9$

left

$$\begin{array}{r} 3c - 6 = -9 \\ +6 \quad +6 \\ \hline 3c = -3 \\ \frac{3c}{3} = \frac{-3}{3} \\ c = -1 \end{array}$$

right

$$\begin{array}{r} 3c - 6 = 9 \\ +6 \quad +6 \\ \hline 3c = 15 \\ \frac{3c}{3} = \frac{15}{3} \\ c = 5 \end{array}$$

2) $|2j + 3| = 7$

left

$$\begin{array}{r} 2j + 3 = -7 \\ -3 \quad -3 \\ \hline 2j = -10 \\ \frac{2j}{2} = \frac{-10}{2} \\ j = -5 \end{array}$$

right

$$\begin{array}{r} 2j + 3 = 7 \\ -3 \quad -3 \\ \hline 2j = 4 \\ \frac{2j}{2} = \frac{4}{2} \\ j = 2 \end{array}$$

$$3) \quad -7 = |m+1| \quad \text{or} \quad |m+1| = -7$$

distance can't
be negative!

no solution

Ferris Bueller's

Ferrari

$$4) \quad \frac{2|4m|}{2} = \frac{72}{2}$$

$$|4m| = 36$$

left

$$\frac{4m}{4} = \frac{-36}{4}$$

$$m = -9$$

right

$$\frac{4m}{4} = \frac{36}{4}$$

$$m = 9$$

$$5) \quad \begin{array}{r} |x| - 3 = 5 \\ +3 \quad +3 \end{array}$$

$$|x| = 8$$

left

right

$$x = -8$$

$$x = 8$$

$$6) \quad \frac{7|n-14|}{7} = \frac{28}{7}$$

$$|n-14| = 4$$

left

right

$$\begin{array}{r} n-14 = -4 \\ +14 \quad +14 \end{array}$$

$$n = 10$$

$$\begin{array}{r} n-14 = 4 \\ +14 \quad +14 \end{array}$$

$$n = 18$$

$$7) \quad \begin{array}{r} 4 = 3|w| - 2 \\ +2 \quad +2 \end{array}$$

$$\frac{6}{3} = \frac{3|w|}{3}$$

$$2 = |w|$$

left

right

$$-2 = w$$

$$2 = w$$

$$8) \quad \frac{-5|g+1|}{-5} = \frac{-35}{-5}$$

$$|g+1| = 7$$

left

right

$$\begin{array}{r} g+1 = -7 \\ -1 \quad -1 \end{array}$$

$$g = -8$$

$$\begin{array}{r} g+1 = 7 \\ -1 \quad -1 \end{array}$$

$$g = 6$$