

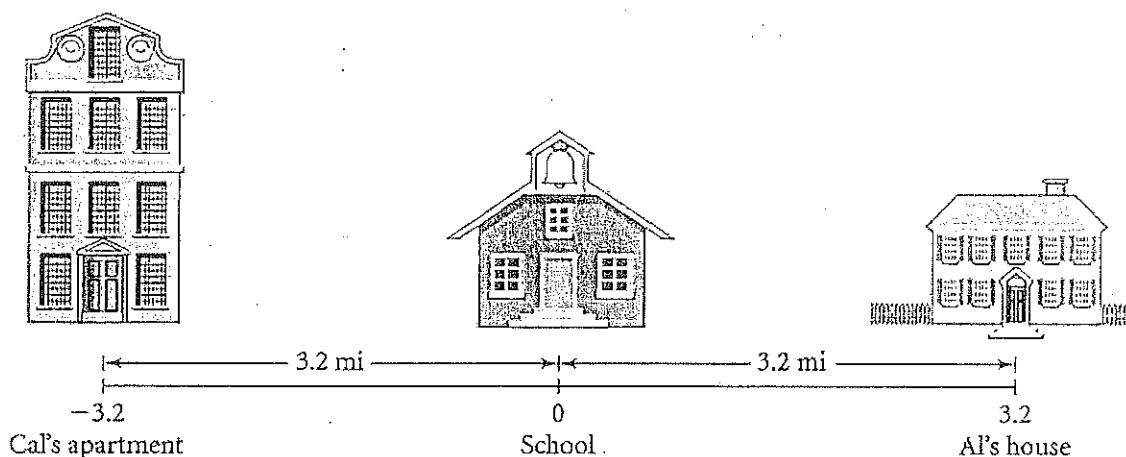
Lesson 5: Absolute Value Functions

Objective:

Investigate, analyze and interpret absolute value functions.

Distance

Cal and Al both live 3.2 miles from school, but in opposite directions. If you assign the number 0 to the school, you can show that Cal and Al live in opposite directions from it by assigning $+3.2$ to Al's house and -3.2 to Cal's apartment. For both Cal and Al, the distance from school is 3.2 miles.



Distance is never negative but is sometimes found by subtracting (which can lead to a negative result). Because of this, there is a **Function** that is used to turn any number into the same positive

The absolute value of a number is its size or magnitude regardless if the number is positive or negative. The notation to represent Absolute Value are vertical lines on either side of the number or expression. $|-3.2| = 3.2$ and $|3.2| = 3.2$

Definition
Your
Definition

In the space provided, write your own definition of an **absolute value** of a number. Use examples and the vocabulary (opposite, positive, negative)

Evaluate each expression (Always use order of operations)

Practice and Examples

a) $|4| = 4$

b) $|-5| = 5$

c) $|3-7| = |-4| = 4$

d) $|-6| - |-6| = 6 - 6 = 0$

e) $-|9| = -9$

f) $2|-7| + 9 = 23$
 $2(7) + 9 \nearrow$

Variables and the Absolute Value Function

When solving for a variable in an absolute value, the result will be both the positive and negative value of the number. In other words, you will have two solutions.

For example:

$$|x| + 7 = 12$$

$$-7 \quad -7$$

$$|x| = 5 \quad \text{so,}$$

$$x = 5 \text{ or } -5$$

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

Solve the following two equations with absolute values (Hint: Each will have 2 solutions)

Practice

a. $|x-2| + 7 = 12$

$$-7 \quad -7$$

$$|x-2| = 5$$

$$x-2 = 5$$

$$+2 \quad +2$$

$$x = 7$$

$$x-2 = -5$$

$$+2 \quad +2$$

$$x = -3$$

$$|7-2| + 7 = 12$$

$$|5| + 7 = 12$$

$$5 + 7 = 12$$

$$12 = 12$$

$$|-3-2| + 7 = 12$$

$$|-5| + 7 = 12$$

$$5 + 7 = 12$$

$$12 = 12$$

b. $2|x| + 8 = 20$

$$-8 \quad -8$$

$$2|x| = 12$$

$$|x| = 6$$

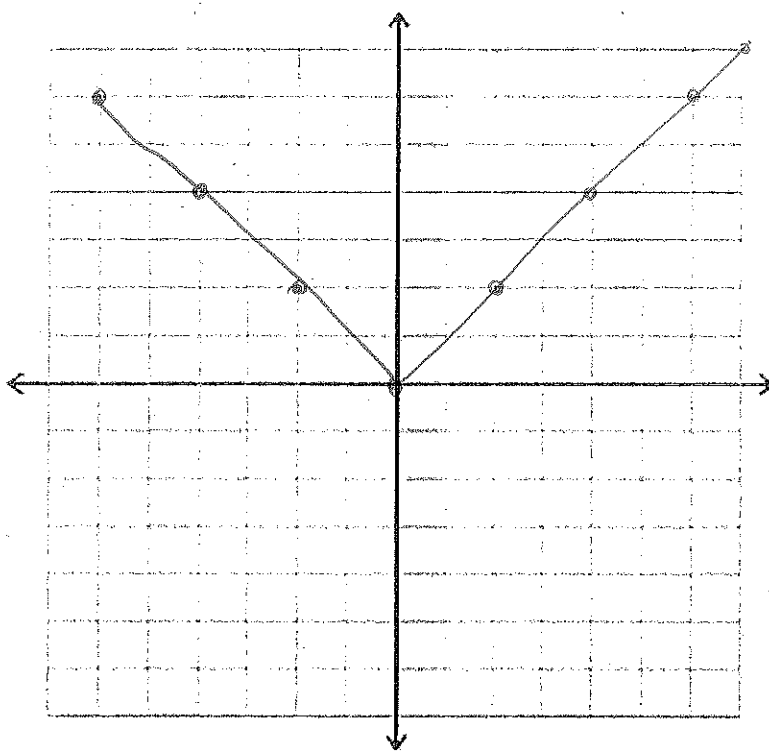
$$x = 6, -6$$

Complete the following steps to graph the function $f(x) = |x|$

Step 1: Complete the table of values for the function $f(x) = |x|$

x	-6	-4	-2	0	2	4	6	7
f(x)	6	4	2	0	2	4	6	7

Plot the points on the graph below. This is a **continuous** function so make sure to connect the coordinates.



In the space below, describe any distinguishing features of the graph.