

Objectives:

- By the end of class students will be able to graph absolute value functions.

Vocabulary:

- General form of an absolute value graph: $f(x) = a|x - h| + k$ vertex: (h, k)

Warm-Up:

Evaluate the following expressions.

- $|-2|$
= 2
- $|-1|$
= 1
- $|0|$
= 0
- $|1|$
= 1
- $|2|$
= 2

Example 1: Finish the table of values by plugging x into the function. Graph the function by plotting your points.

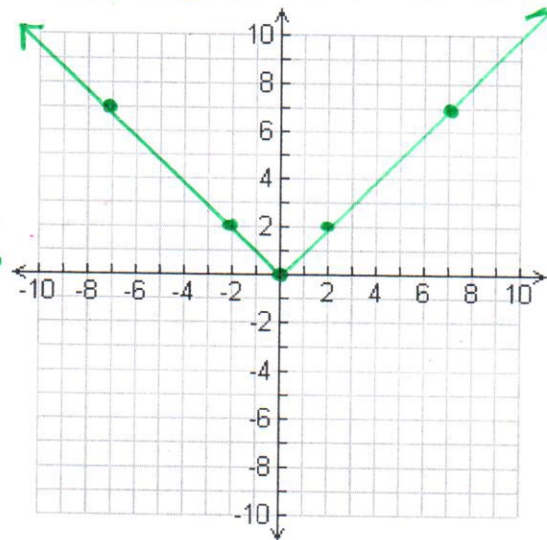
$y = |x|$
parent function

x	y
-7	7
-2	2
0	0
2	2
7	7

$|-7|$

vertex

slope $m=1$



General form of an absolute value function:

$$f(x) = a|x - h| + k$$

a = changes the slope

h = shifts the graph L or R.

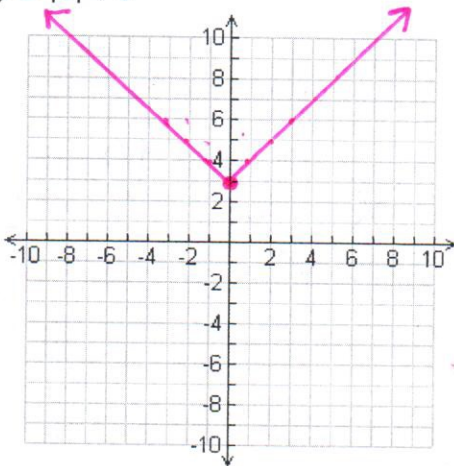
"insiders lie"

k = shifts the graph up or down

Example Set 2: Sketch the graph of each function. Identify the domain and range.

1. $y = |x| + 3$

$m=1$
 $\uparrow 3$
vertex
(0, 3)

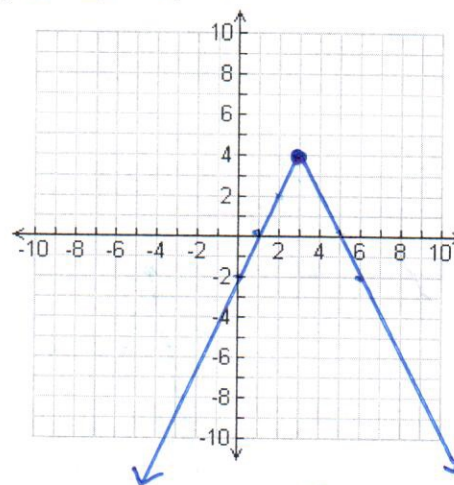


Domain: $(-\infty, \infty)$

Range: $[3, \infty)$

2. $y = -2|x - 3| + 4$

$m=-2$
R3 $\uparrow 4$
vertex
(3, 4)



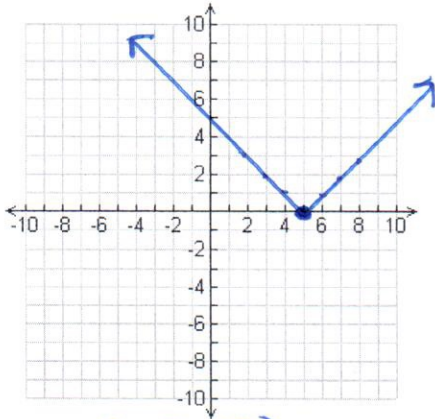
Domain: $(-\infty, \infty)$

Range: $(-\infty, 4]$

Practice Problems: Sketch the graph of each function. Identify the domain and range.

1. $y = |x - 5|$

$m=1$
R5
vertex
(5,0)

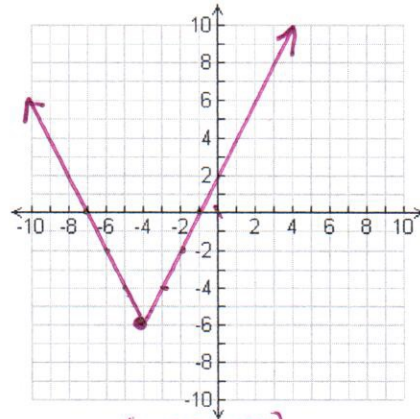


Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

2. $y = 2|x + 4| - 6$

$m=2$
L4 ↓ 6
vertex
(-4, -6)

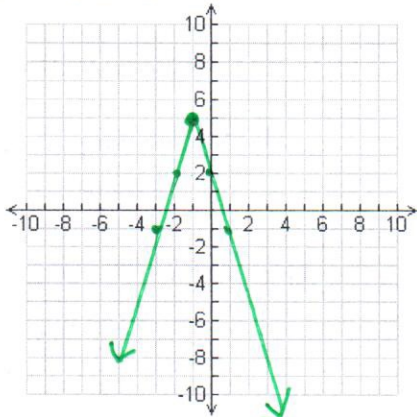


Domain: $(-\infty, \infty)$

Range: $[-6, \infty)$

3. $y = -3|x + 1| + 5$

$m=-3$
L1 ↑ 5
vertex
(-1, 5)

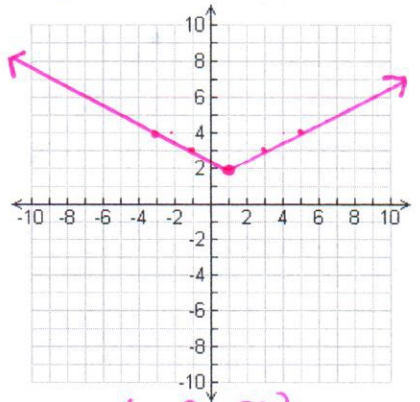


Domain: $(-\infty, \infty)$

Range: $(-\infty, 5]$

4. $y = \frac{1}{2}|x - 1| + 2$

$m=\frac{1}{2}$
R1 ↑ 2
vertex
(1, 2)



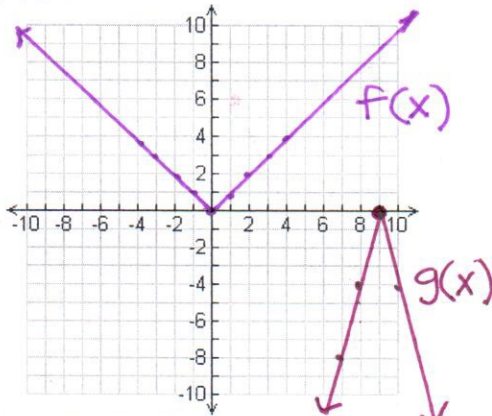
Domain: $(-\infty, \infty)$

Range: $[2, \infty)$

Create a graph showing each pair of functions. Describe any similarities and differences between the graphs, including domain and range.

5. $f(x) = |x|$
 $g(x) = -4|x - 9|$

$m=-4$
R9
vertex
(9,0)

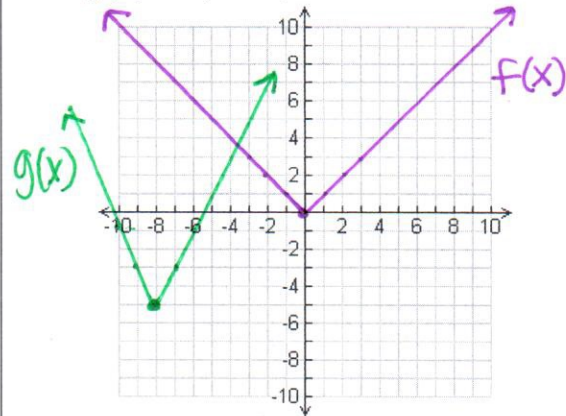


Describe similarities & differences:

domains	Slopes
$k=0$	opposite directions
infinite	Ranges
	vertex
	no intersection

6. $f(x) = |x|$
 $g(x) = 2|x + 8| - 5$

$m=2$
L8 ↓ 5
vertex
(-8, -5)



Describe similarities & differences:

domains	sizes
positive slopes	Ranges
infinite	vertex
	slopes