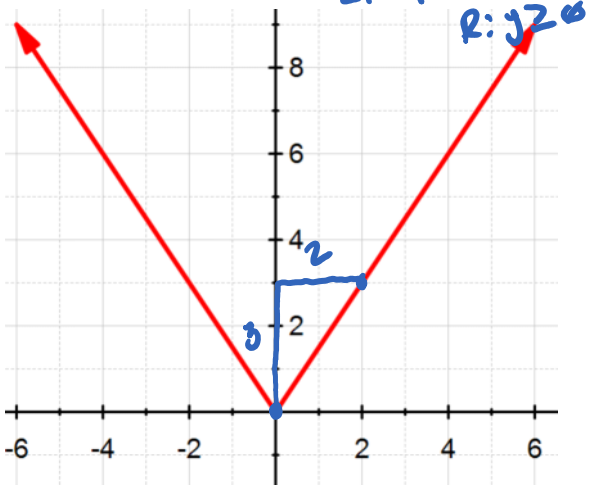
5.4 Transformations of Absolute Value Functions

Monday, September 23, 2019 7:46 AM

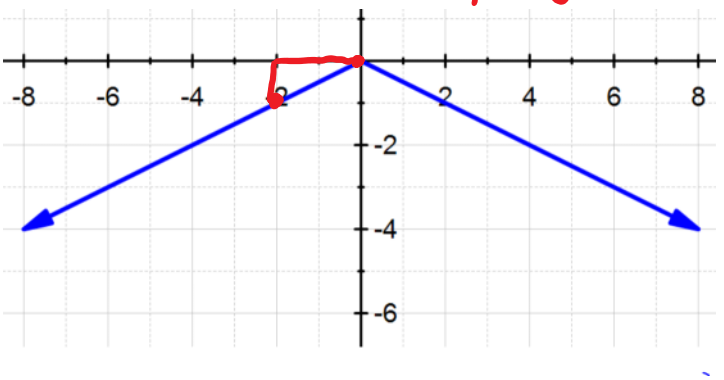
Warm Up

For the two graphs below, find the function shown in the graph and the **Domain** and **Range** of each.

$f(x) = \frac{3}{2}|x|$ D: R R: $y \geq 0$



$g(x) = -\frac{1}{2}|x|$ D: R, R: $y \leq 0$



Essential Question

How do constants affect the graphs of absolute value functions?

Goal: "I can. . .

Graph and analyze transformations of absolute value functions.."

What do we know so far?

What is the difference of the y values for the functions?

What is the differences in the **Domain** and **Range** of the functions?

How do the graphs differ? For f(x) and g(x) are both $y \geq 0$

What is the differences in the **Domain** and **Range** of the functions?

How do the graphs differ?

For all is D:ℝ ↳ f(x) and g(x) are both y≥ø but h(x) is y≤ø

-negative in front means flip over.

$f(x) = |x|$ $g(x) = 2|x|$ $h(x) = -1|x|$

X	Y
-2	2
-1	1
ø	ø
1	1
2	2

•2

X	Y
-2	4
-1	2
ø	ø
1	2
2	4

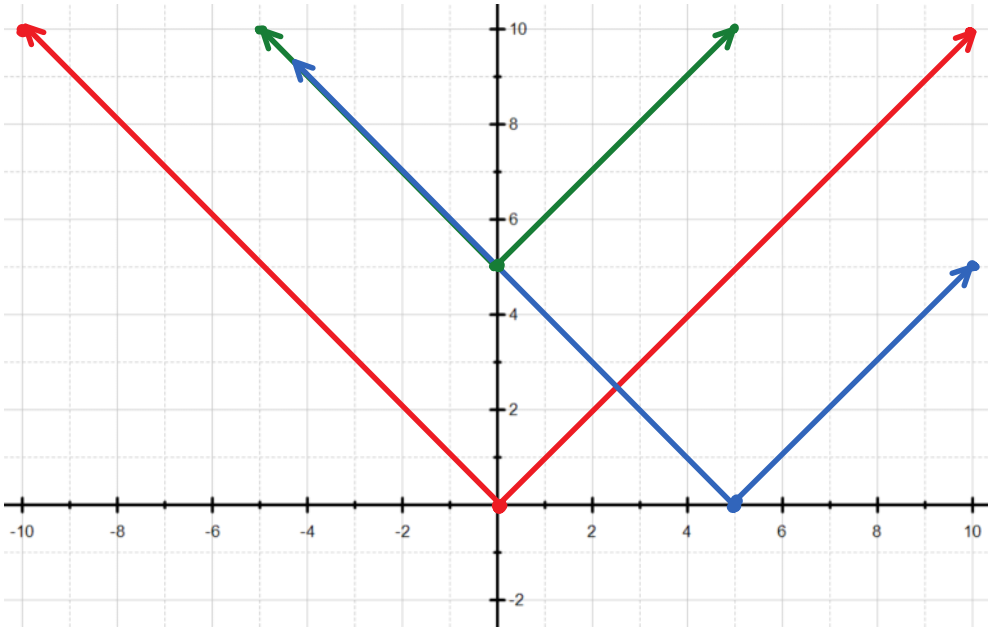
•-1

X	Y
-2	-2
-1	-1
ø	ø
1	-1
2	-2

What does adding a constant at the end do to the graph?

What does adding a constant inside the brackets do to the graph?

$f(x) = |x|$ $g(x) = |x| + 5$ $h(x) = |x - 5|$



•graph was moved up 5 units (+5)

•graph was moved (K) 5 units. (-5)

What we need to know:

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

a: Dilates the graph (stretches or compresses)

a is negative: [illegible]

h: •moves left (L) or right (R) h units.
•moves opposite of what the sign says.

k: •moves ↑ or ↓ by K units.

K>ø: ↑ K units

compresses

a is negative: Flip graph vertically.

a is more than 1: stretches

a is less than 1: compresses

what the sign says.

h > 0 : moves (L) h units

h < 0 : moves (R) h units

K > 0: ↑ K units

K < 0: ↓ K units

Example 1

For each function, identify the vertex and axis of symmetry.

$p(x) = |x| + 3$

↑3

(0, 3) Axis: x = 0

$g(x) = |x| - 2$

↓2

(0, -2) Axis: x = 0

Example 2

For each function, identify the vertex and axis of symmetry.

$m(x) = |x - 3|$

(R) 3

(3, 0) Axis: x = 3

$t(x) = |x + 2|$

(L) 2

(-2, 0) Axis: x = -2

Example 3

For each function, identify the vertex and axis of symmetry.

$g(x) = |x - 1| - 3$

(1) ↓3

(1, -3) Axis: x=1

$j(x) = |x + 2| + 6$

(-2) ↑6

(-2, 6) Axis: x=-2

Example 4

Compare the graph of each function with the parent function $f(x) = |x|$.

$h(x) = 3|x|$

- Dilated by 3
- stretched

$p(x) = -\frac{1}{3}|x|$

- Dilated by ⅓
- compressed
- Flipped vertically (opens down)

Example 5

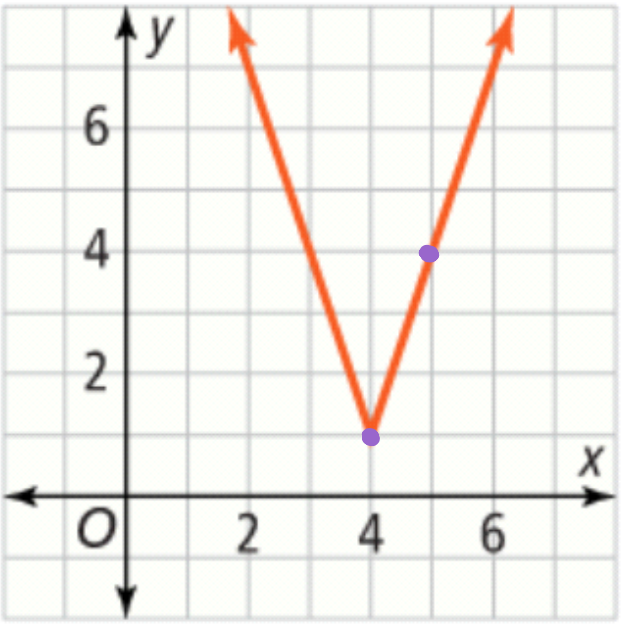
How can you use the constants a, h, and k to write a function given its graph?

vertex: (4, 1) slope: $\frac{3}{1}$ $a=3$

(K) ↑ ↑

$h=4$ $k=1$

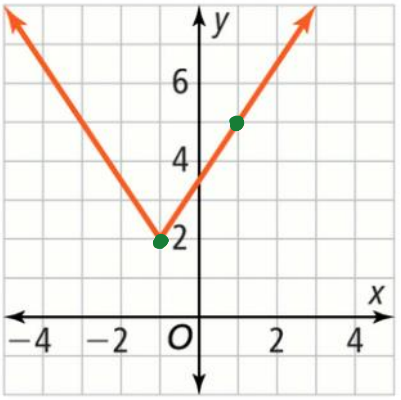
$t(x)=3|x-4|+1$



Write a function for the graph shown.

(-1, 2) slope: $\frac{3}{2}$

$t(x)=\frac{3}{2}|x+1|+2$



Write the function of the graph after a translation 1 unit right and 4 units up.

(K) 1 ↑4

$c(x)=|x-1|+4$

https://tinyurl.com/smew329

Homework

Pg. 207
16, 18, 20, 22-27, 29, 31, 35