

Thursday, October 05, 2017

6:09 PM

KEY

Precalc

1.7C Hor. & Vert. Stretch & Shrink

Obj: To graph functions that have horizontal/vertical stretches & shrinks

Hwk: Finish 1.7C packet

1.7C #53 - 59 odd, 65, 73; 1.7 VC

1.6 - 1.7 Assessment Thursday, October 12

Do Now:

Section 1.7C: Horizontal/Vertical Stretching & Shrinking
- 1st row only.

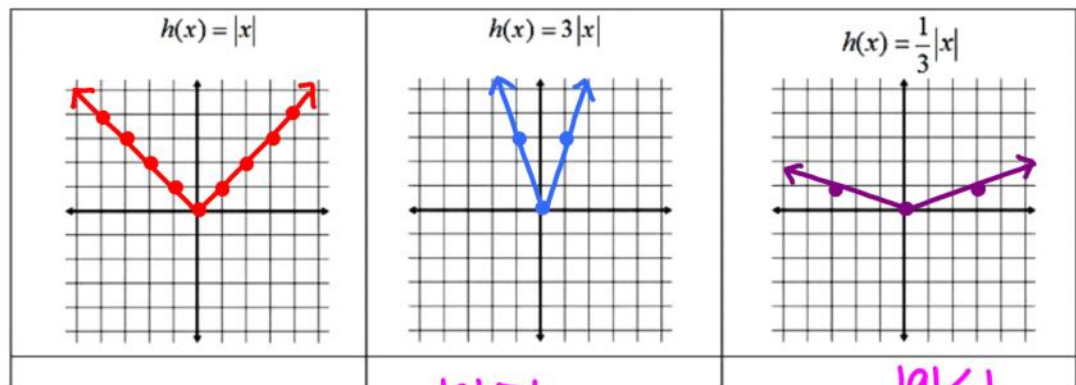
Compare and contrast the graphs. What do you notice?

Name: _____ Date: _____ Section: _____

Section 1.7C: Horizontal/Vertical Stretching & Shrinking

Horizontal shifts, vertical shifts, and reflections are rigid transformations.

Horizontal and vertical stretches and shrinkings are non-rigid transformations.



Recap:

Rigid transformation - only changes position, not shape

Translation

Reflection

❖ Reflection in x-axis: $h(x) = -f(x)$

❖ Reflection in y-axis: $h(x) = f(-x)$

Together do 2 or 3 problems from 1.7B - (Reflections & Shifts)

* IF needed

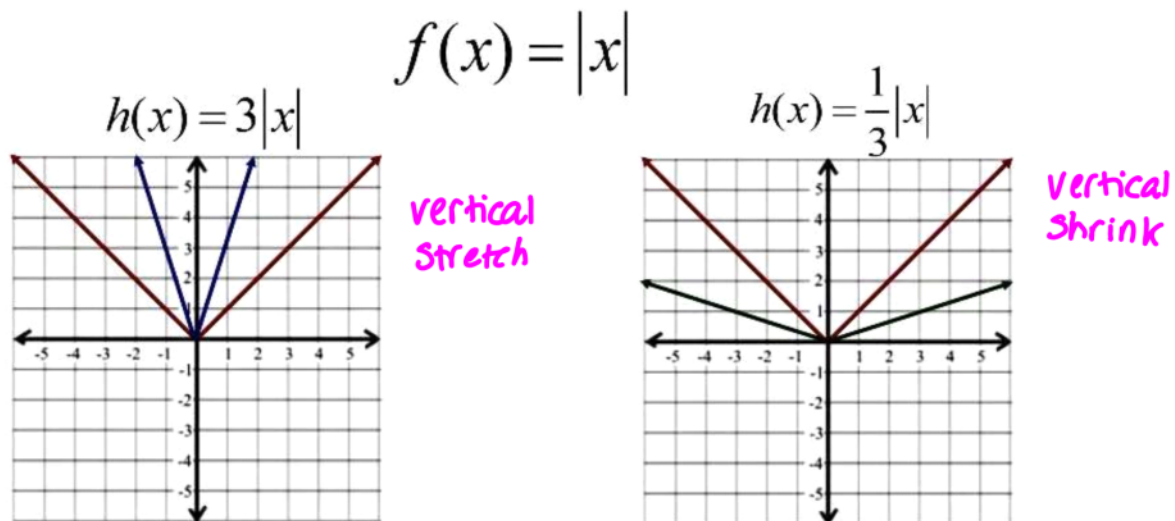
Answers are posted on website, as well as blank copy if you'd like to try again or redo.

Class Notes:

Today's topic: stretching and shrinking - types of non-rigid transformations.

Non-rigid transformation - changes the shape of the original function. a.k.a. distortion, **stretch, shrink**

In DO NOW, how did "a" affect each function?



Vertical Stretches and Shrinks:

If $|a| > 1$ (i.e. 2, 3, 2.25, etc), then **STEEPER**

a.k.a. **VERTICAL STRETCH**

If $|a| < 1$ (i.e. $\frac{1}{2}, \frac{3}{4}, \frac{1}{8}$, etc), then **WIDER**

a.k.a. **VERTICAL SHRINK**

Horizontal STRETCH/SHRINK:

Ex. You are having a **PARTY!!!** You have \$100 to spend.

If you have 10 guests → \$10 per person

Party Crashers!!! 20 people show up - $\frac{1}{2}(10)$ or \$5 per person (i.e. DOUBLE the people)

Everyone gets sick beforehand and can't go - 5 people or $\frac{1}{2}$ show up → \$20 per person or $2(10)$

RECIPROCAL EFFECT!!!

Notice how the coefficient of "x" has the "OPPOSITE" effect!

Horizontal Stretches and Shrinks:*

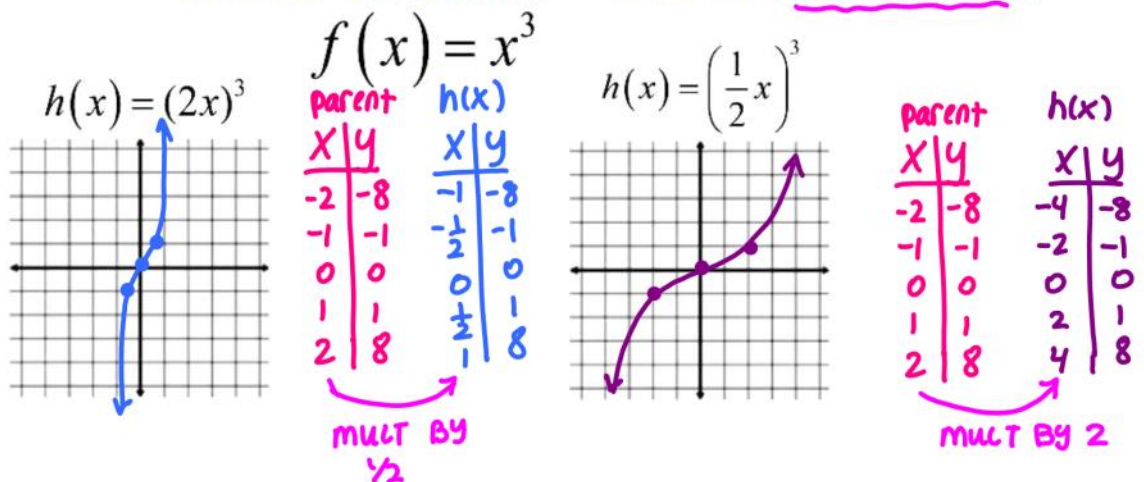
If $|a| > 1$ (i.e. 2, 3, 2.25, etc)

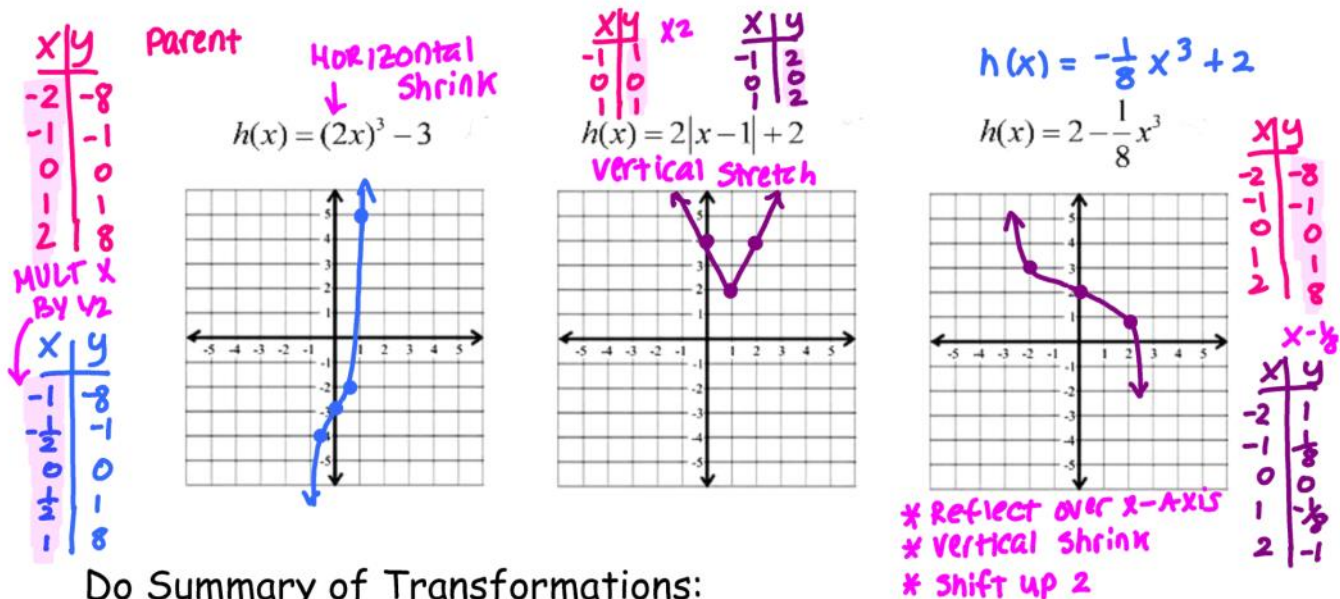
a.k.a. HORIZONTAL SHRINK

If $|a| < 1$ (i.e. $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{8}$, etc)

a.k.a. HORIZONTAL STRETCH

*Do the "OPPOSITE" - take the RECIPROCAL





Do Summary of Transformations:

Summary of Transformations

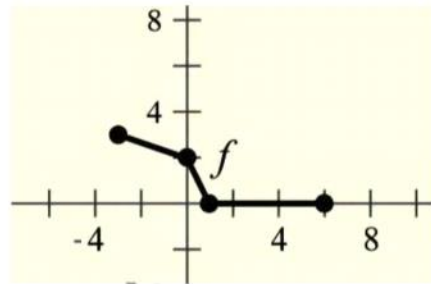
$c > 0, a > 0$

Transformation	Appearance in Function	Transformation of Point
Vertical Shift c units up	$f(x) \rightarrow f(x) + c$	$(x, y) \rightarrow (x, y + c)$
Vertical Shift c units down	$f(x) \rightarrow f(x) - c$	$(x, y) \rightarrow (x, y - c)$
Horizontal Shift c units right	$f(x) \rightarrow f(x - c)$	$(x, y) \rightarrow (x + c, y)$
Horizontal Shift c units left	$f(x) \rightarrow f(x + c)$	$(x, y) \rightarrow (x - c, y)$
Vertical Stretch by a factor of a	$f(x) \rightarrow a \cdot f(x)$	$(x, y) \rightarrow (x, a \cdot y)$
Vertical Shrink by a factor of $1/a$	$f(x) \rightarrow \frac{1}{a} f(x)$	$(x, y) \rightarrow (x, \frac{1}{a} y)$
Horizontal Stretch by a factor of a	$f(x) \rightarrow f\left(\frac{1}{a}x\right)$	$(x, y) \rightarrow (a \cdot x, y)$
Horizontal Shrink by a factor of $1/a$	$f(x) \rightarrow f(a \cdot x)$	$(x, y) \rightarrow (\frac{1}{a}x, y)$

* reciprocal

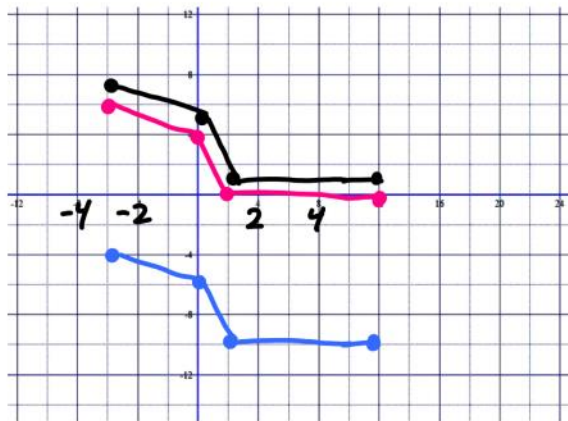
1.7 Exercise #66, p. 82

Use the graph of f to sketch the graph of g



a) $g(x) = f(x) - 5$

b) $g(x) = f(x) + \frac{1}{2}$

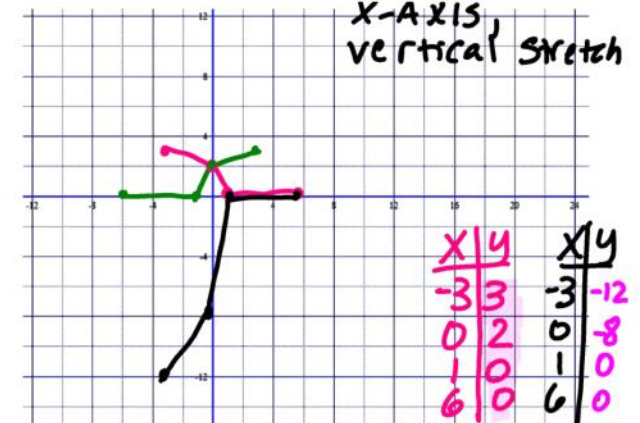


c) $g(x) = f(-x)$

* Reflect over y-axis

d) $g(x) = -4f(x)$

* Reflect over x-axis
vertical stretch



x	y
-3	3
0	2
1	0
6	0

x	y
-3	-12
0	-8
1	0
6	0

$x(-4)$

e) $g(x) = f(2x) + 1$ ← horiz. shrink ← shift up 1

f) $g(x) = f\left(\frac{1}{4}x\right) - 2$ ← horiz. stretch shift down 2

x	y
-3	3
0	2
1	0
6	0

x	y
-1.5	3
0	2
0.5	0
3	0

$x(\frac{1}{2})$



x	y
-3	3
0	2
1	0
6	0

x	y
-12	3
0	2
4	0
24	0

$x4$