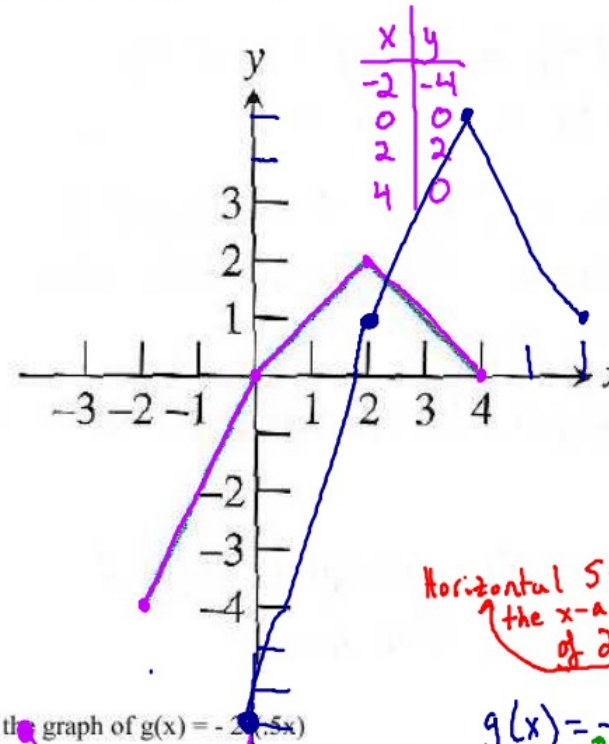
up 1 (y values) → add 1

vertical stretch by factor of 2 (y-values)

right 2 (x-values) → add +2

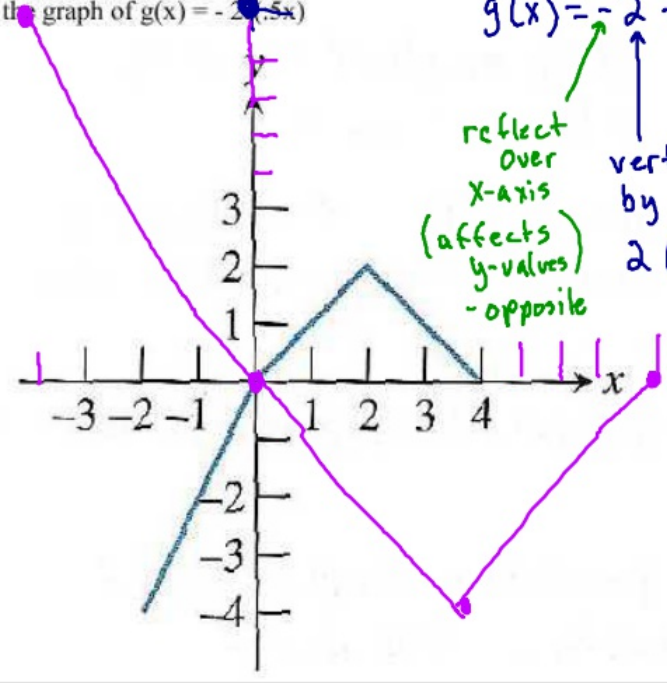
Sketch the graph of g(x) = 1 + 2f(x-2)



x	y
-2	-4
0	0
2	2
4	0

x	y
0	-7
2	1
4	5
6	1

Sketch the graph of g(x) = -2f(.5x)



Horizontal stretch toward the x-axis by a factor of 2 (mult by 2)

$g(x) = -2f(.5x)$

reflect over x-axis (affects y-values) - opposite

vertical stretch by a factor of 2 (mult by 2)

x	y
-2	-4
0	0
2	2
4	0

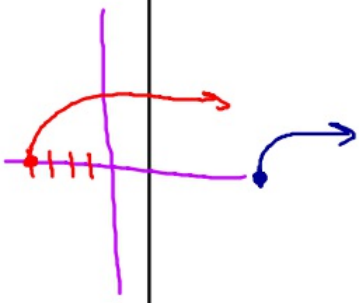
x	y
-4	8
0	0
4	-4
8	0

Describe how to transform the graph of f into the graph of g.

A) $f(x)=4|x|$ into $g(x)=12|x|$

multiply the y's by 3

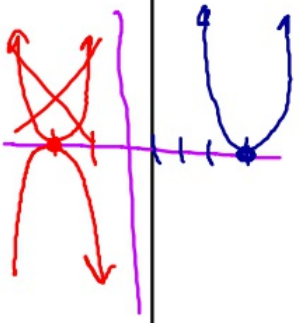
vertical stretch by a factor of 3



B) $f(x)=\sqrt{x+4}$ into $g(x)=\sqrt{x-10}$

subtract 14 from the x's

Horizontal shift ~~left~~ right 14



C) $f(x)=(x-4)^2$ into $g(x)=-(x+2)^2$

reflection over x-axis (opp of y's)

add 6 to x's

Horizontal shift left 6

Transform the function $f(x)=x^2+2x-3$

a) vertical transformation of 3

$f(x)=x^2+2x-3$

$3f(x)=3(x^2+2x-3)$

b) a horizontal shrink by a factor of 1/2

$f(x)=x^2+2x-3$

$f(2x)=(2x)^2+2(2x)-3$

Find the equation of the refection of f across the
a) x-axis and b) the y-axis

A) $f(x) = x^2 + 2x - 3$

x-axis $-f(x) = -(x^2+2x-3)$

y-axis $f(-x) = (-x)^2 + 2(-x) - 3$

B) $f(x) = 3\sqrt{x-2}+1$

x-axis: $-f(x) = -\left(3\sqrt{x-2}+1\right)$

y-axis: $f(-x) = 3\sqrt{(-x)-2}+1$

Write an equation whose graph is g(x)

A) $f(x) = x^2$ a vertical stretch by a factor of 4, then a shift left 6

$g(x) = 4(x+6)^2$

B) $f(x) = |x|$ a horizontal shift right 6 and a horizontal stretch by a Factor of 3

$g(x) = \left|\frac{1}{3}(x-6)\right|$

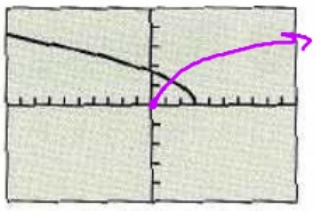
$\frac{1}{3}x - 6$ ~~$\frac{1}{3}(x-18)$~~

Write a formula for each function $f(x) = \sqrt{x}$

left 5
down 3

reflect over y
right 3

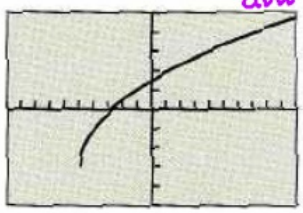
26.



[−10, 10] by [−5, 5]

$g(x) = \sqrt{-(x-3)}$

28.



[−10, 10] by [−5, 5]

Vertical stretch = 2

$g(x) = 2\sqrt{x+5} - 3$

Stretching vs Compressing

x	$y=x^2$
0	0
1	1
2	4
3	9
4	16

x	$y=2x^2$
0	0
1	2
2	8
3	18
4	32

This is a vertical stretch of 2 because the y-values double

---

x	$y=x^2$
0	0
1	1
2	4
3	9
4	16

x	$y=.5x^2$
0	0
1	.5
2	2
3	4.5
4	8

This is a vertical compression of .5 because the y-values get cut in half

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x	$y=x^2$
0	0
1	1
2	4
3	9
4	16

x	$y=(2x)^2$
0	0
1	4
2	16
3	36
4	64

This is is a horizontal compression of ½ because it took half as long for the y-values to reach 16.

---

x	$y=x^2$
0	0
1	1
2	4
3	9
4	16

x	$y=(.5x)^2$
0	0
1	.25
2	1
3	2.25
4	4

This is a horizontal stretch of 2 because it took twice as long for the y value to reach 4

Function	Change from base function $y = x^2$	What to notice in the equation
$y = (x - 1)^2$	Right 1	Do the opposite of the number inside the function (left or right movement)
$y = x^2 + 1$	Up 1	Do exactly what the function says outside the function (Up or Down movement)
$y = 2x^2$	Vertical Stretch toward the y-axis by a factor of 2	If there are no parenthesis and there is a number greater than 1 in front of the function this is vertical stretch
$y = \frac{1}{2}x^2$	Vertical Compression/Shrink away from the y-axis by a factor of $\frac{1}{2}$	If there are no parenthesis and there is a number between 0 and 1 in front of the function this is vertical compression
$y = (2x)^2$	Horizontal Compression/Shrink away from the x-axis by a factor of $\frac{1}{2}$	If the number is greater than 1 inside the function it is a horizontal compression/shrink by a factor of that numbers reciprocal
$y = \left(\frac{1}{2}x\right)^2$	Horizontal Stretch toward the x-axis by a factor of 2	If the number is between 0 and 1 inside of the function it is a horizontal stretch by a factor of that numbers reciprocal
$y = (-x)^2$	Reflection over the y-axis	This reflection occurs if the negative is inside the function
$y = -x^2$	Reflection over the x-axis	This reflection occurs if the negative is outside the function