


Math 30-1

Unit 1: Transformations





1.4 Combining Transformations

General Form of a Transformed Function

$$y = af[b(x - h)] + k$$

When performing multiple transformations on a functions, you must perform them in a specific order:

1. Stretch/Reflect in any order. 'a'/'b'
2. Translate in any order. 'h'/'k'



Ex.) Describe the following transformations on $y = f(x)$:

a) $y = f(x - 4) + 6$ HT of 4 right
VT of 6 up

b) $y = 9f(x) - 3$ VS of 9
VT 3 down

c) $y = f(2x) + 7$ HS of $\frac{1}{2}$
VT 7 up

d) $y = f(3(x - 6)) + 1$ HS of $\frac{1}{3}$
↑ ↑ ↑
b h k HT 6 right
VT 1 up

e) $y = 3f(2x + 4) - 5$

$y = 3f[2(x+2)] - 5$ VS of 3
must factor HS of $\frac{1}{2}$
'b' out HT 2 left
VT 5 down



Ex.) Consider the function $y = f(x)$. Write the following functions in the form:

$$y = a[f[b(x-h)]] + k.$$

↑ HS ↑ VT

a) A Horizontal Stretch by a factor of 3 about the y-axis and a Vertical Translation 6 unit up.

HS of 3 VT 6 up
 $y = f(bx) + k$
 $y = f(\frac{1}{3}x) + 6$

b) A Vertical Stretch by a factor of 2 about the x-axis then translates 5 units left and 2 units up.

VS of 2 'a'
 HT 5 left 'h'
 VT 2 up 'k'
 $y = a[f[b(x-h)]] + k$
 $y = 2f(x+5) + 2$

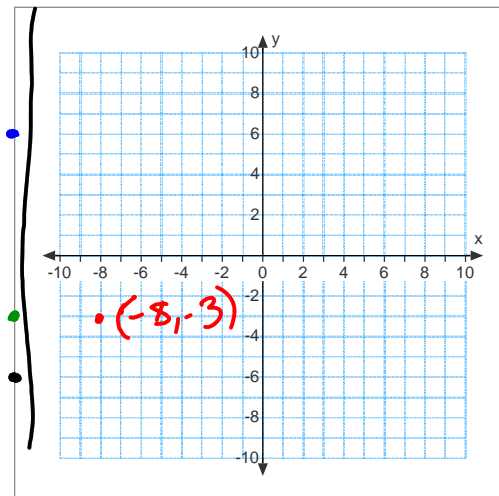
c) A Horizontal Stretch by a factor of 4, a Vertical Stretch by a factor of 2, a Reflection about the y-axis and translated 10 units down.

$$y = 2f(-\frac{1}{4}x) - 10$$



Ex.) Point A (-12, 6) is on the graph $y = g(x)$. If $y = g(x)$ is transformed to $y = -\frac{1}{2}g(x-4)$ then where will point A be located.

- Reflect about x-axis ①
- VS of $\frac{1}{2}$ ②
- HT 4 right ③





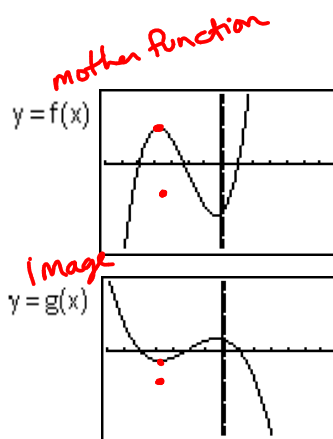
Ex.) The graph of $g(x)$ is a transformation of $f(x)$. Which of the following equations would generate the graph of $g(x)$?

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

B $g(x) = -\frac{1}{4}f(x)$

~~C~~ $g(x) = f(4x)$

~~D~~ $g(x) = \frac{1}{4}f(x)$



Pg. 39 # 4, 6, 7, 9.