
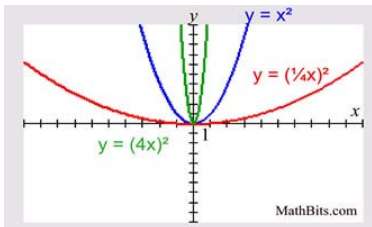


Math 30-1

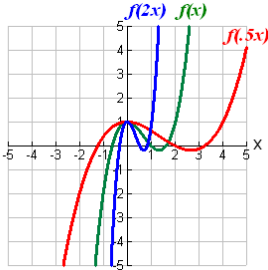
Unit 1: Transformations



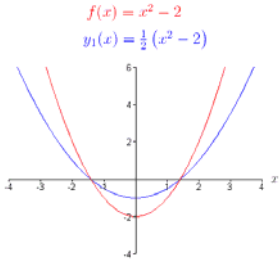
1.2 Horizontal and Vertical Stretches



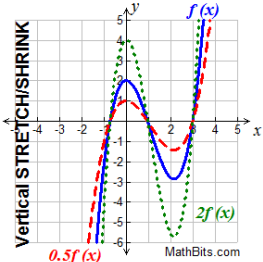
MathBits.com



$f(x) = x^2 - 2x^2 + 1$




$f(x) = x^2 - 2$   
 $y_1(x) = \frac{1}{2}(x^2 - 2)$

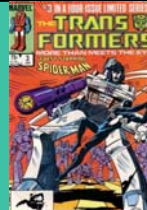


Vertical STRETCH/SHRINK

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

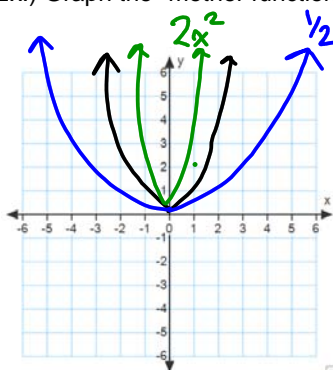


Vertical Stretches

$f(x) = y$

X-value remains the same and the y-value changes by a factor of 'a'.

Ex.) Graph the "mother function"  $y = x^2$  and perform the following vertical stretches:



$y = 2x^2$

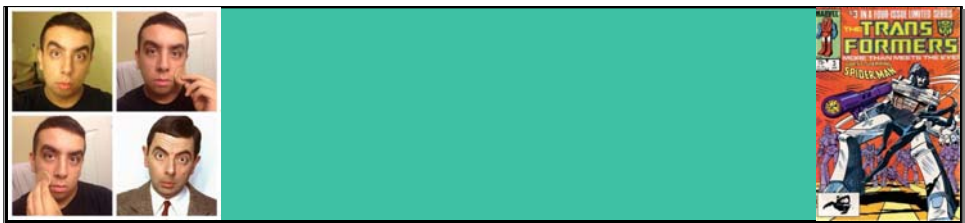
$y = \frac{1}{2}x^2$

Invariant points are located on the X-axis

$y = 0$

Function:  $y = af(x)$

Mapping Notation:  $(x, y) \rightarrow (x, ay)$



Ex.) Describe the following transformations:

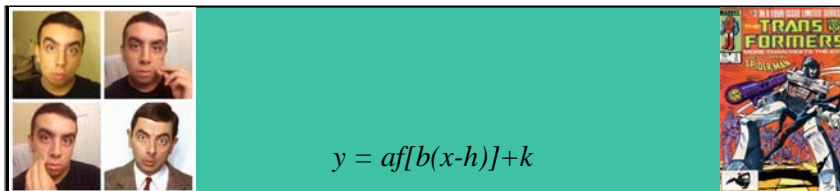
a)  $y = 4f(x)$  VS of 4

b)  $y = \frac{1}{4}f(x)$  VS by a factor of  $\frac{1}{4}$

c)  $\frac{5y}{5} = \frac{f(x)}{5} \Rightarrow y = \frac{1}{5}f(x) = \frac{1}{5}f(x)$  VS of  $\frac{1}{5}$

d)  $(x, y) \rightarrow (x, 3y)$  VS of 3

e)  $y = 7f(x - 5) + 6$   
 VS of 7  
 VT 6 up  
 HT 5 right

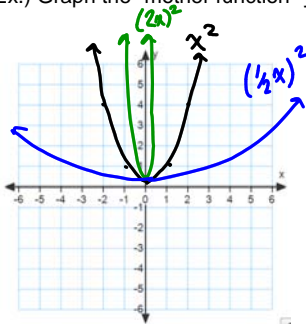


$$y = af[b(x-h)]+k$$

Horizontal Stretches

Y-value remains the same and the x-value changes by a factor of '1/b'.

Ex.) Graph the "mother function"  $y = x^2$  and perform the following horizontal stretches:



$y = (2x)^2$  HS of  $\frac{1}{2}$   
 $y = (\frac{1}{2}x)^2$  HS of 2

Invariant points are located on the y-axis  
 $x=0$

Function:  $y = f(bx)$   $\frac{1}{b}$

Mapping Notation:  $(x, y) \rightarrow (bx, y)$  \*

"What you see is what you get."



Ex.) Describe the following transformations:

a)  $y = f(5x)$  HS of  $\frac{1}{5}$

b)  $y = f(\frac{1}{4}x)$  HS of 4

c)  $y = f(\frac{3}{4}x)$  HS of  $\frac{4}{3}$

d)  $(x, y) \rightarrow (2x, y)$  HS of 2

e)  $y = 7f(4x) + 6$  VS of 7

$f(x) = |x|$  HS of  $\frac{1}{4}$

$7|4x| + 6$  VT of 6 up

Pg. 28 # 5ab, 6, 7ac, 9, 10, 14, 15cd.