

$$y = a[b(x - c)]^2 + d$$

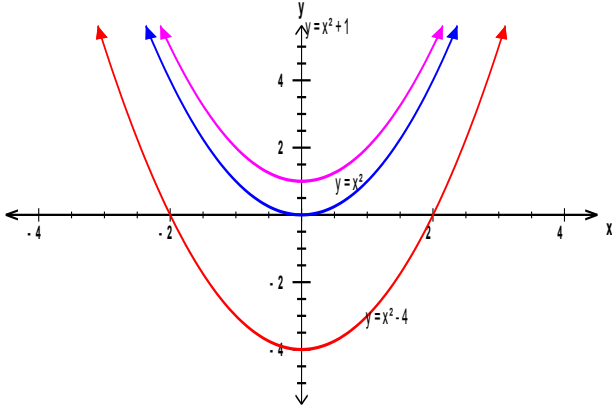
a dilates (stretches) graph parallel to y-axis with scale factor of a

c translates c units to right

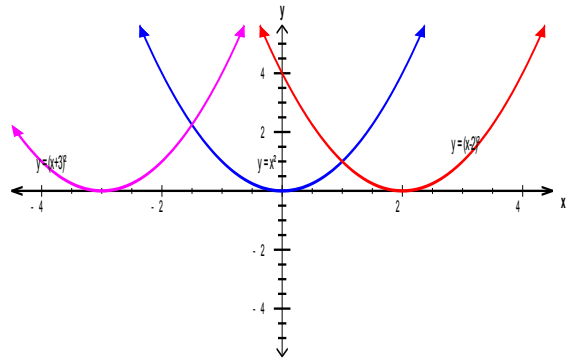
b dilates graph parallel to x-axis with scale factor of  $\frac{1}{b}$

d translates d units up

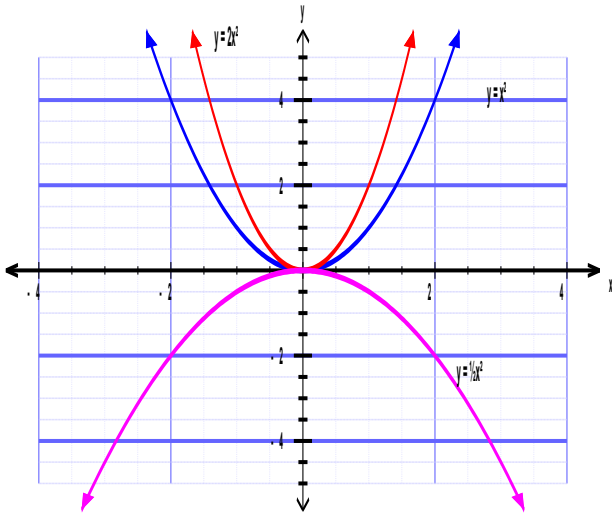
Red  $y = x^2 + 1$     Blue  $y = x^2$     Orange  $y = x^2 - 4$



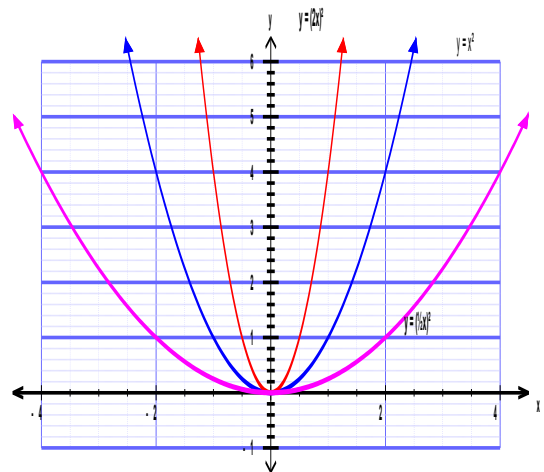
Red  $y = (x+3)^2$     Blue  $y = x^2$     Orange  $y = (x-2)^2$



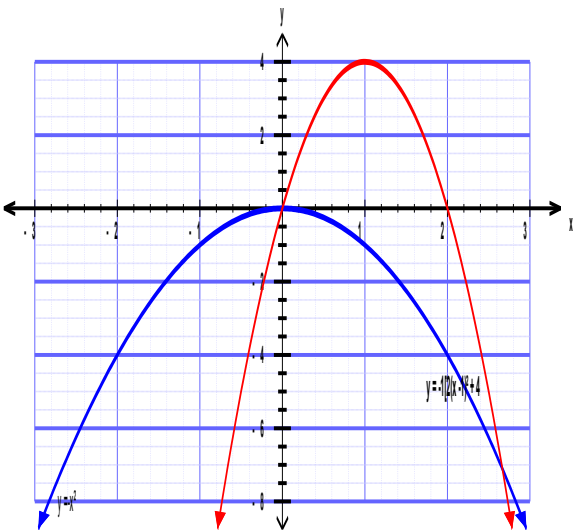
Red  $y = -\frac{1}{2}x^2$     Blue  $y = x^2$     Orange  $y = 2x^2$



Red  $y = (\frac{1}{2}x)^2$     Blue  $y = x^2$     Orange  $y = (2x)^2$



Blue  $y = x^2$     Orange  $y = -1[2(x-1)^2 + 4]$



Red  $y = -\frac{1}{2}(x+1)(x-2)$     Orange  $y = 2(x-1)(x+2)$   
Blue  $y = x^2$

