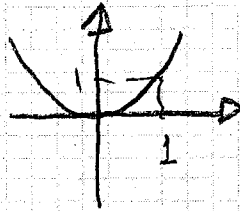


# Quadratic Functions

$y = mx + b$  linear

$y = ax^2 + bx + c$   $a \neq 0$

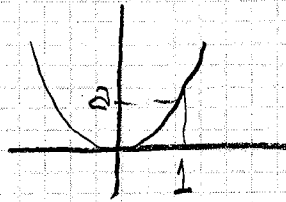
$y = x^2$



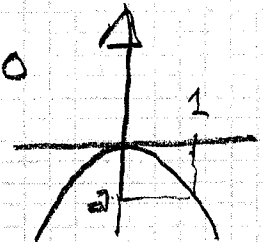
$y = ax^2$

↑  
vertical stretch

$a > 0$

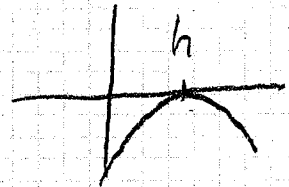
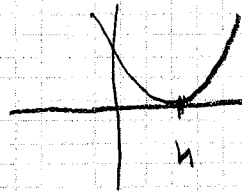


$a < 0$



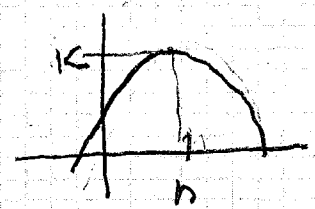
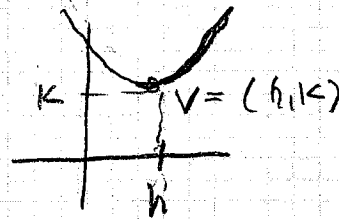
$y = a(x-h)^2$

↑  
shift to the right



$y = a(x-h)^2 + k$

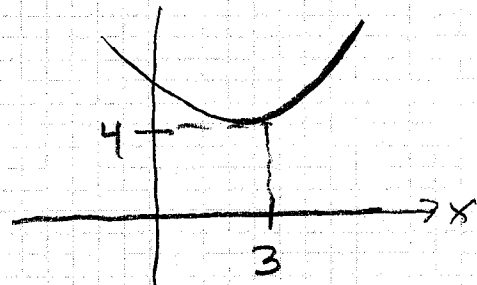
↑  
vertical shift



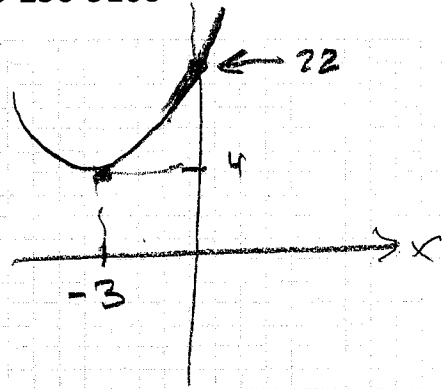
Ex:  $y = 2(x-3)^2 + 4$

Domain =  $(-\infty, \infty)$

Range =  $[4, \infty)$



Ex:  $y = 2(x+3)^2 + 4$   
 $= 2(x - (-3))^2 + 4$



$a = 2 > 0$

$h = -3 \quad k = 4$

Domain =  $(-\infty, \infty)$

Range =  $[4, \infty)$

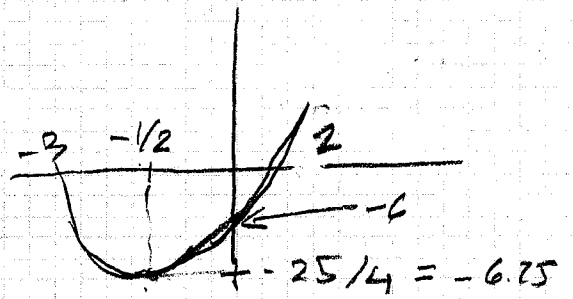
No x-intercepts

y-int: make  $x=0$  in  $y = 2(x+3)^2 + 4$

$y = 2 \cdot 3^2 + 4 = 22$

Ex:  $y = (x + \frac{1}{2})^2 - \frac{25}{4}$

$V = (-\frac{1}{2}, -\frac{25}{4})$



y-int  $y = (\frac{1}{2})^2 - \frac{25}{4} = -6$

x-int  $(x + \frac{1}{2})^2 - \frac{25}{4} = 0$

$(x + \frac{1}{2})^2 = (\frac{5}{2})^2 \Rightarrow$

$\Rightarrow x + \frac{1}{2} = \frac{5}{2} \Rightarrow x = \frac{5}{2} - \frac{1}{2} = 2$

or  $x + \frac{1}{2} = -\frac{5}{2} \Rightarrow x = -\frac{5}{2} - \frac{1}{2} = -3$

$x^2 = a^2 \Rightarrow$	$x = a$
	or
	$x = -a$