Sec. 10.1 Graphing Parabolas

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

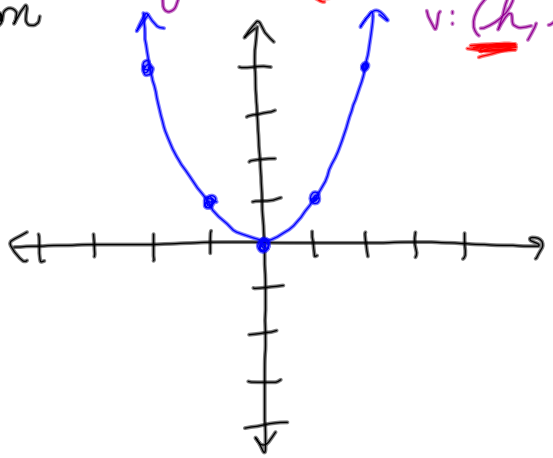
v: (h, k)

Parent function

$y = x^2$

v: (0,0)

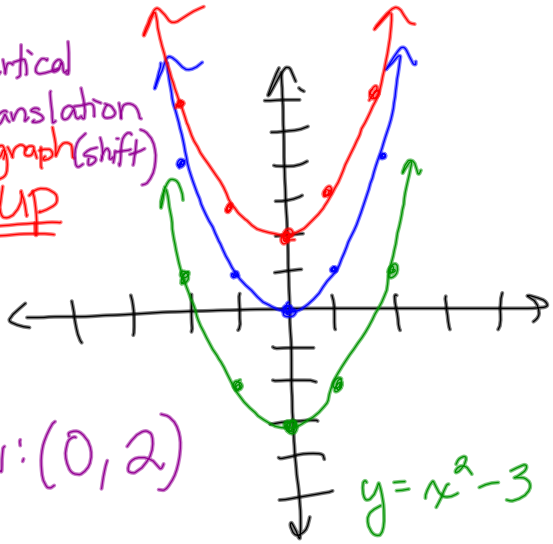
x	y
-2	4
-1	1
0	0
1	1
2	4



Transformations

$y = x^2 + 2$ → vertical translation graph(shift) UP

x	x^2	y
-2	4	6
-1	1	3
0	0	2
1	1	3
2	4	6

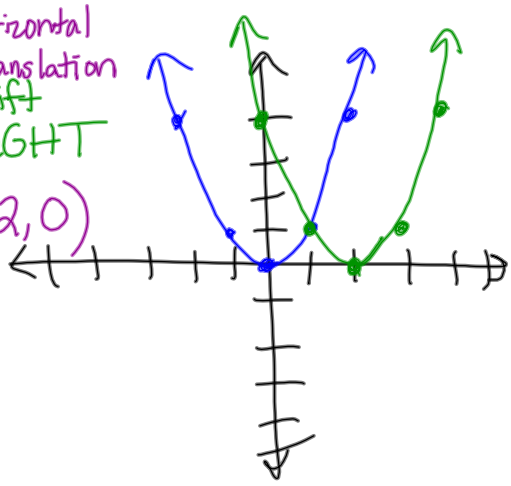


v: (0, 2)

$y = x^2 - 3$

$y = (x-2)^2$ → horizontal translation shift RIGHT

x	(x-2)	x^2
0	-2	4
1	-1	1
2	0	0
3	1	1
4	2	4



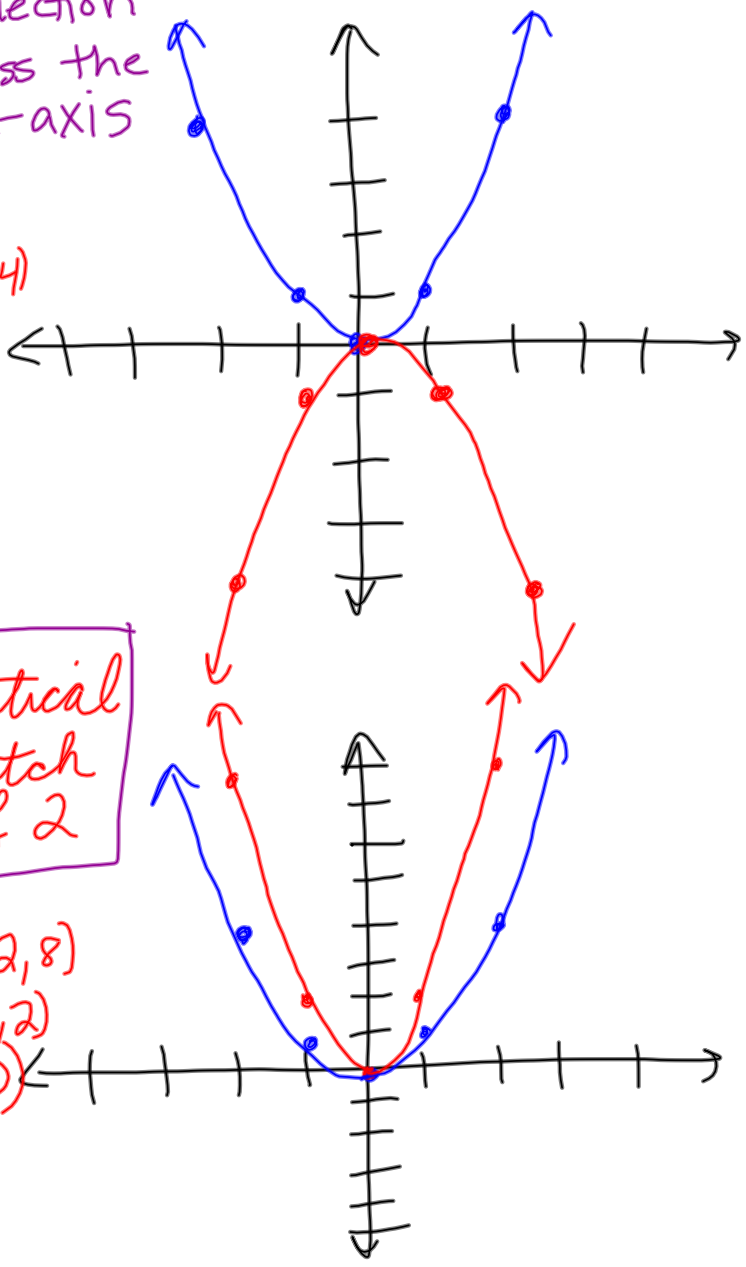
v: (2, 0)

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

Shift Left/Right (h) Shift up/down (k)

$y = -x^2$ reflection across the x-axis

x	x^2	$-1x^2$	
-2	4	-4	(-2,-4)
-1	1	-1	(-1,-1)
0	0	0	
1	1	-1	
2	4	-4	



$y = x^2$

$y = 2x^2$ vertical stretch of 2

x	x^2	$2x^2$	
-2	4	8	(-2,8)
-1	1	2	(-1,2)
0	0	0	(0,0)
1	1	2	
2	4	8	

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

Compare to $y = x^2$. Describe the vertical and horizontal translations.

a. $y = 3(x-5)^2 - 2$

V: (5, -2)

right 5 units, down 2 units

b. $y = (x+1)^2 + 3$

V: (-1, 3)

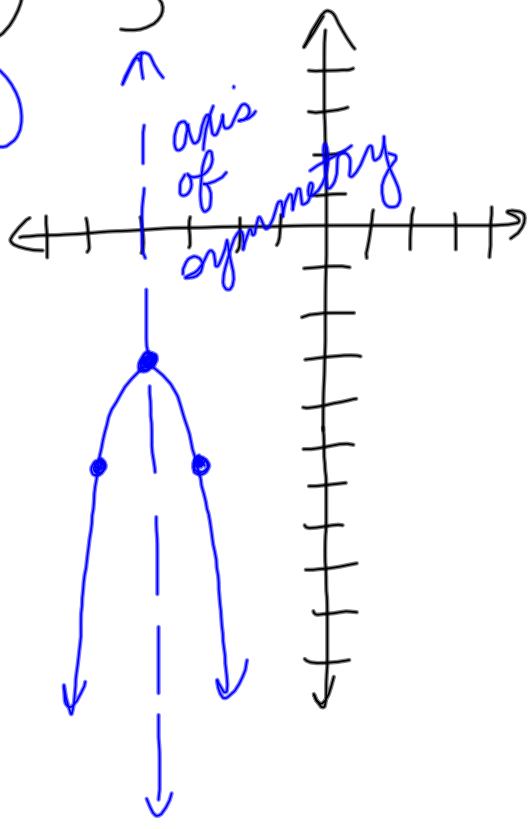
left 1 unit, up 3 units

Graph

a. $y = -2(x+4)^2 - 3$

V: (-4, -3)

AOS: $x = -4$



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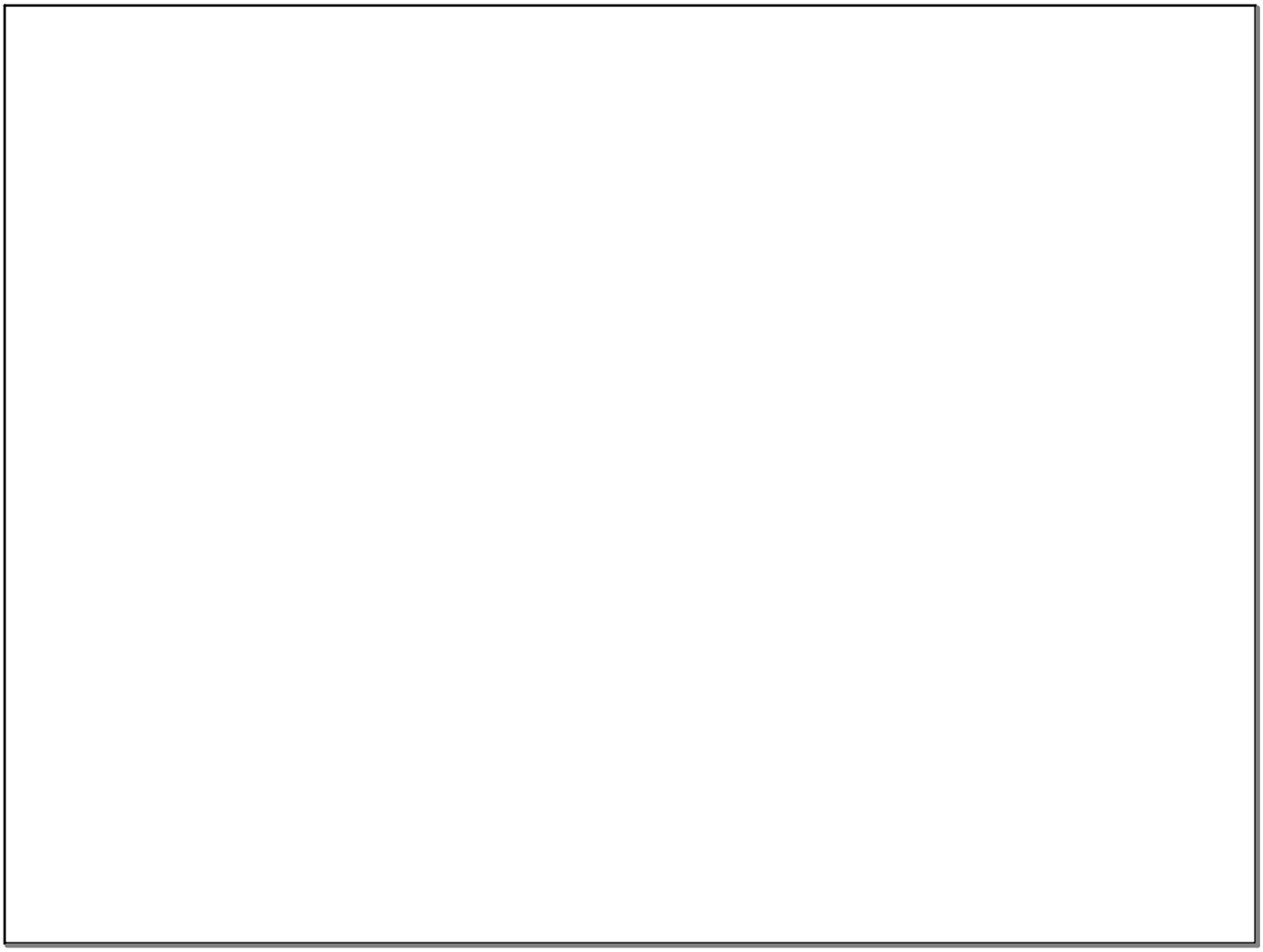

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