

L5 Vertical and Horizontal Translations



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Lesson 5 Vertical/Horizontal Translations

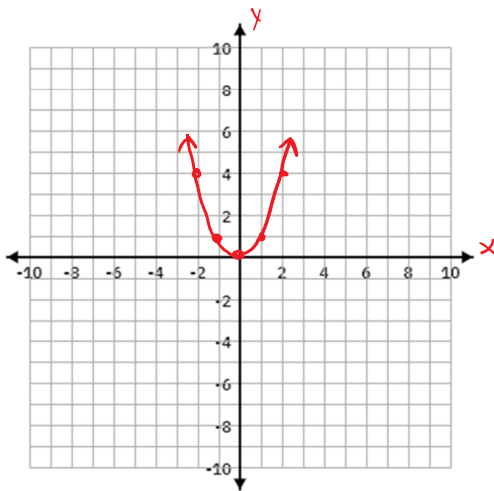
$y = (x - h)^2$ horizontal translation h units right/left

$x - h$ right h units

$x + h$ left h units

$y = x^2 + k$ vertical translation k units up/down

Recall: Basic parabola: Sketch $y = x^2$.



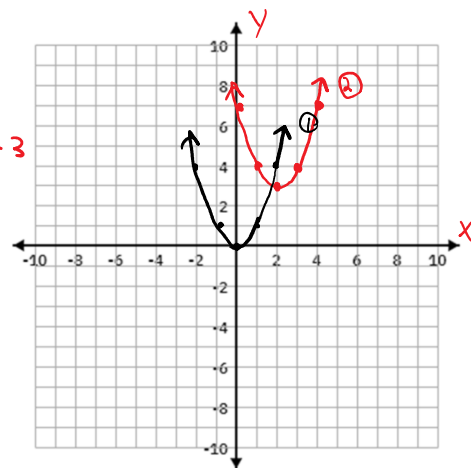
x	y
-2	4
-1	1
0	0
1	1
2	4

Example 1

Sketch the following graphs.

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

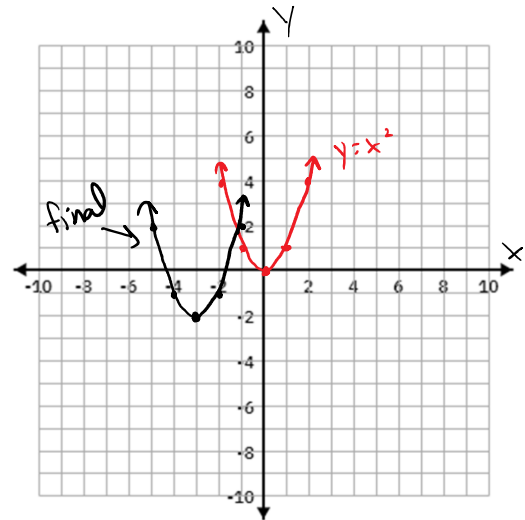
$\textcircled{1} y = x^2$
 $\textcircled{2} y = (x - 2)^2 + 3$
 right 2 units
 up 3 units
 $V(2, 3)$



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

left 3 down 2

$\sqrt{(-3, -2)}$

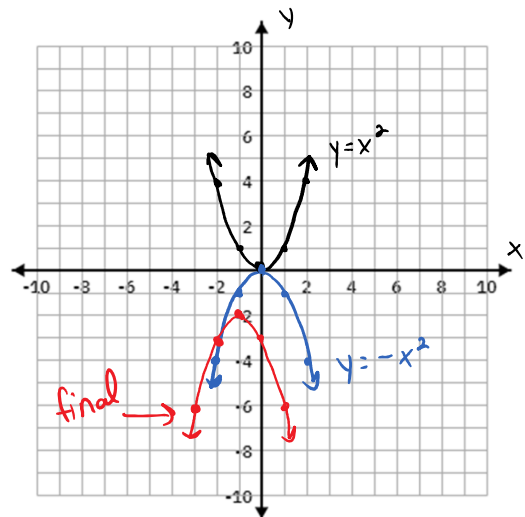


c.) $y = -(x + 1)^2 - 2$

* Always perform stretches/reflections first

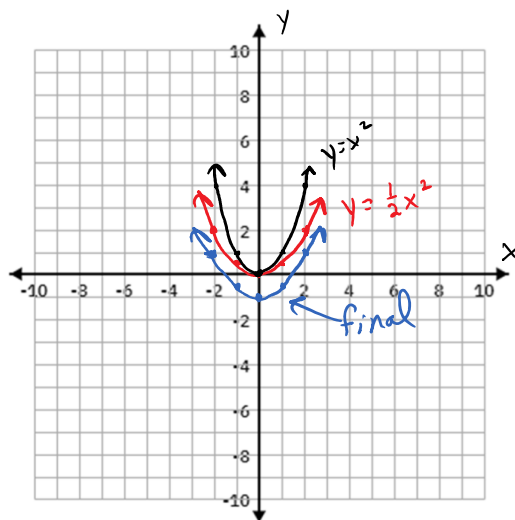
① reflection over the x-axis (mult y-coords by (-1))

left 1 down 2



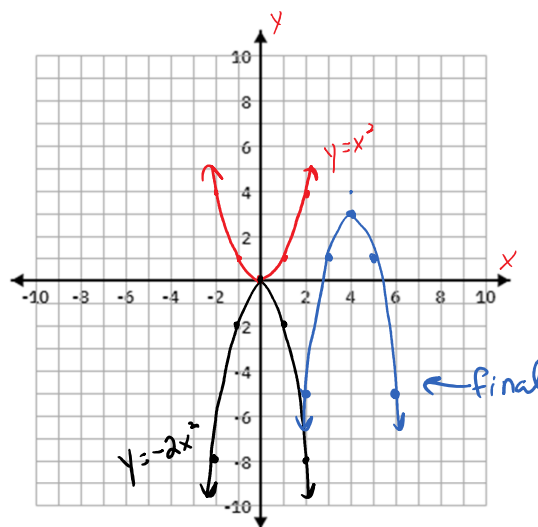
d.) $y = \frac{1}{2}x^2 - 1$

$y = \frac{1}{2}(x-0)^2 - 1$
 ↑ $h=0$
 vertical compression by $\frac{1}{2}$
 ↑ $k=-1$ moves down 1



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

① mult y -coords by (-2)
 ② right 4 up 3



Sketch
 $y = -(x-2)^2 + 3$
 $y = 2(x+1)^2 - 4$

$y = -2(x+2)^2 - 3$

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