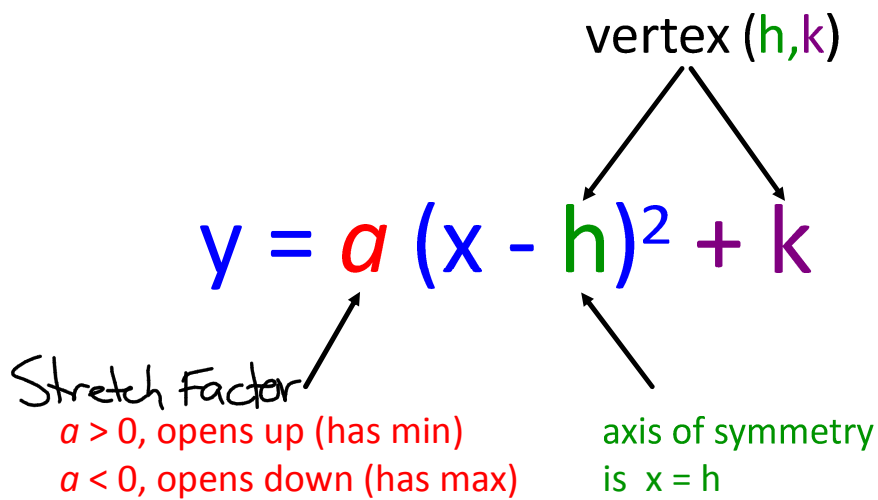


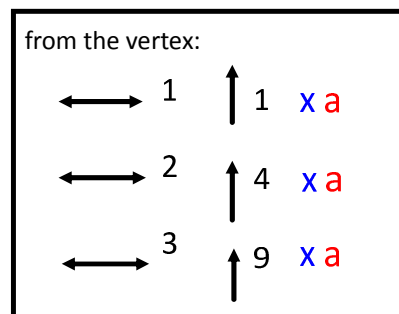
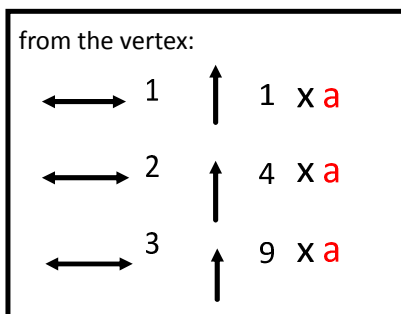
### 3.4 Graphing $y = a(x - h)^2 + k$

- Steps:
1. Plot the vertex.
  2. Up or down?
  3. Count over & up/downs to get 4 more points.
  4. Draw a smooth curve.



if  $a > 1$ , then there is a stretch by a factor of  $a$

if  $0 < a < 1$ , then there is a compression by a factor of  $\frac{1}{a}$

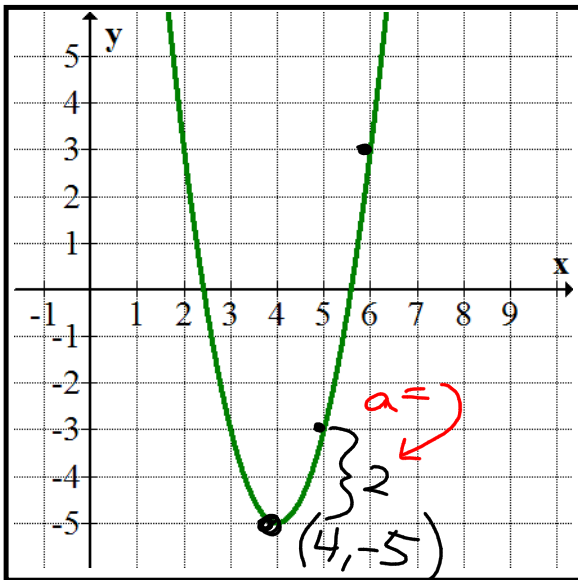


Ex. 1 Complete the table.

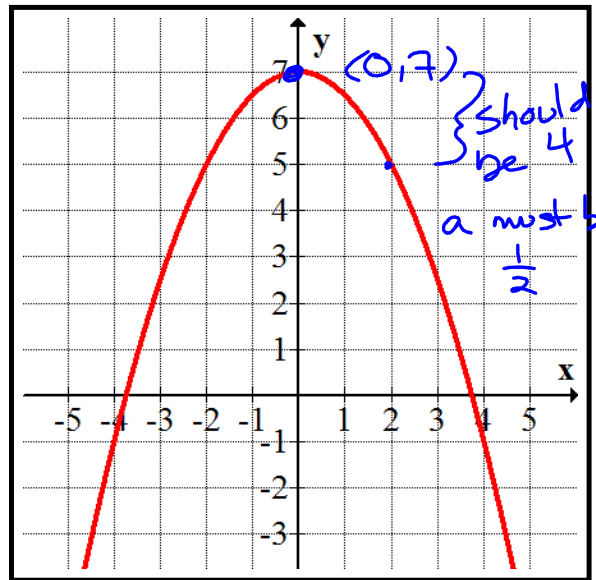
values that  
y can take

Equation	Direction of Opening UP/DOWN	Vertex	Equation of Axis of Symmetry	Stretch Factor $a$	Range
$y = 3(x-5)^2 + 9$	UP	$(5, 9)$	$x = 5$	3	$y \geq 9$
$y = -\frac{3}{4}(x+4)^2 - 7$	DOWN	$(-4, -7)$	$x = -4$	$-\frac{3}{4}$	$y \leq -7$
$y = -2x^2 - 3$	DOWN	$(0, -3)$	$x = 0$	-2	$y \leq -3$
$y = 7(x+2)^2 + 5$	Up	$(-2, 5)$	$x = -2$	7	$y \geq 5$
$y = -4(x-3)^2 - 2$	Down	$(3, -2)$	$x = 3$	-4	$y \leq -2$

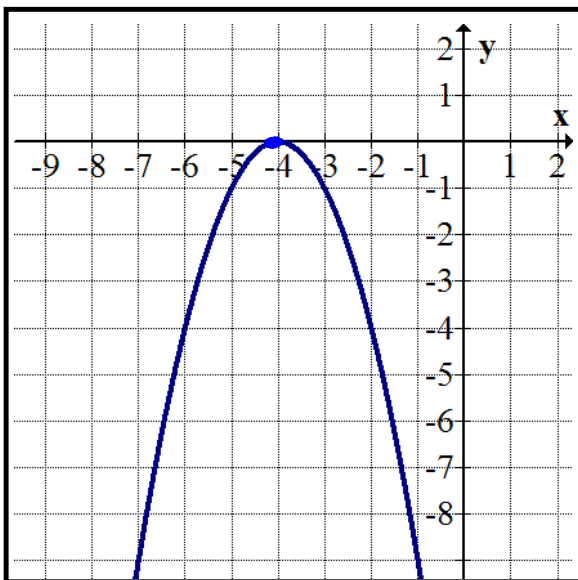
Ex. 2 Write an equation for each parabola.



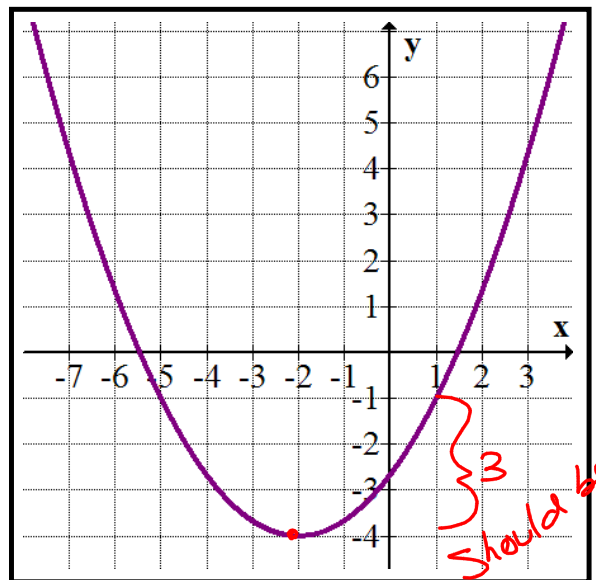
$$y = 2(x-4)^2 - 5$$



$$y = -\frac{1}{2}x^2 + 7$$



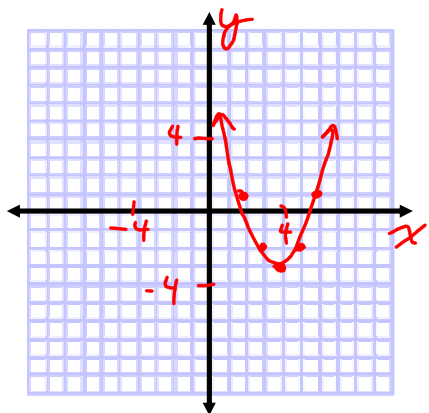
$$\begin{aligned} &V(-4, 0) \\ &y = -(x+4)^2 + 0 \\ &= -(x+4)^2 \end{aligned}$$



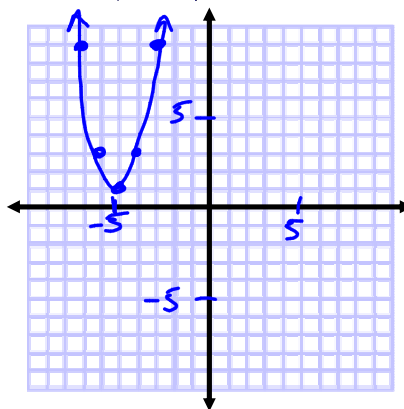
$$\begin{aligned} &V(-2, -4) \quad \text{a must be } \frac{1}{3} \\ &y = \frac{1}{3}(x+2)^2 - 4 \end{aligned}$$

Ex. 3 Graph. (show at least 5 points)

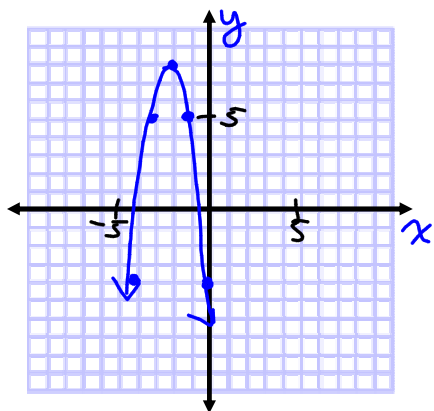
a)  $y = (x-4)^2 - 3$



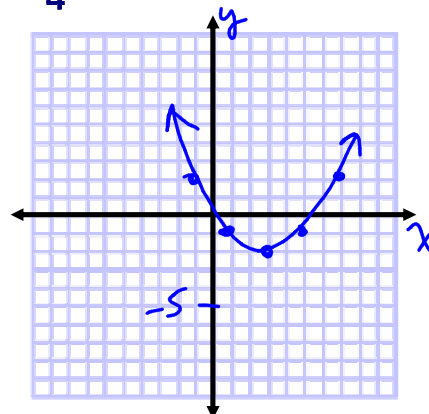
b)  $y = 2(x+5)^2 + 1$



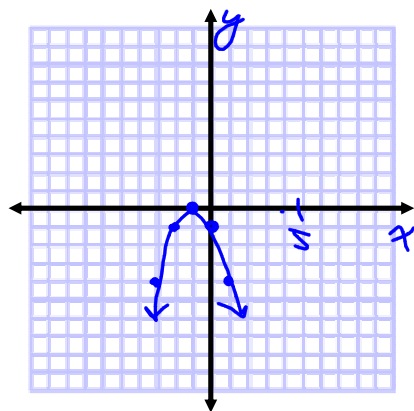
c)  $y = -3(x+2)^2 + 8$



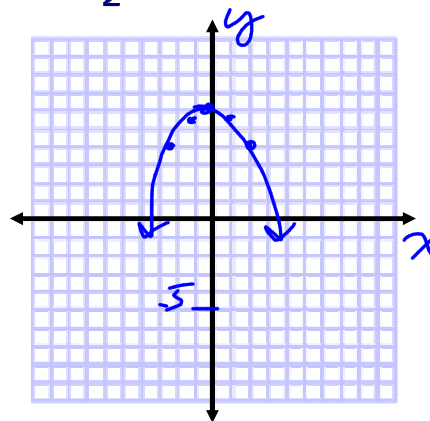
d)  $y = \frac{1}{4}(x-3)^2 - 2$



e)  $y = -(x+1)^2$



f)  $y = -\frac{1}{2}x^2 + 6$



**Your Turn --> FBUHL!**

pg. 185 #C3, 1-7

