

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.

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

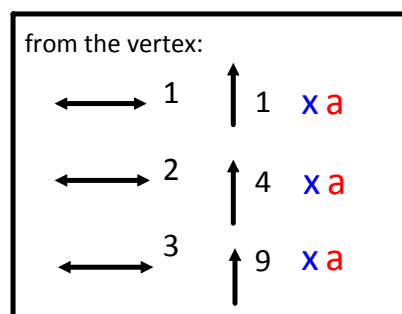
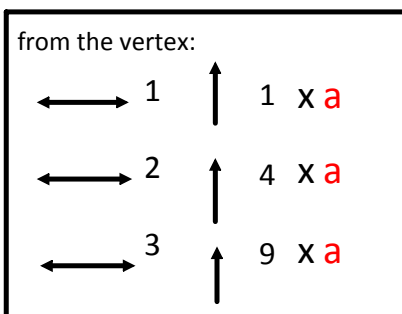
vertex (h,k)

$a > 0$, opens up (has min)
 $a < 0$, opens down (has max)

axis of symmetry
 is $x = h$

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 $\frac{1}{a}$



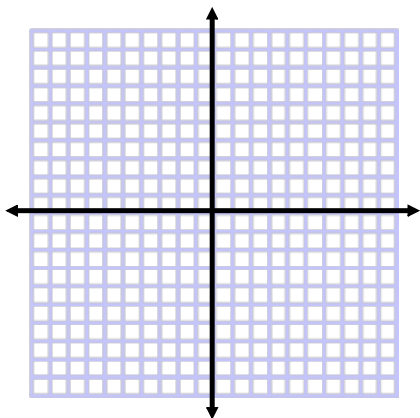
Ex. 1 Complete the table.

values that
y can take

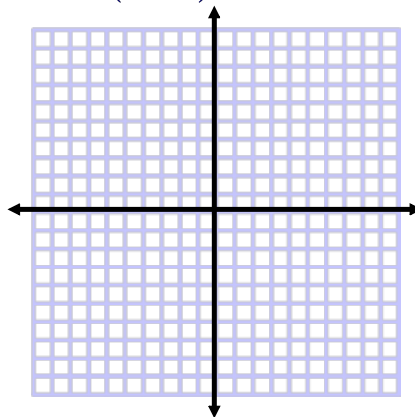
Equation	Direction of Opening	Vertex	Equation of Axis of Symmetry	Stretch Factor	Range
$y = 3(x - 5)^2 + 9$					
$y = -\frac{3}{4}(x + 4)^2 - 7$					
$y = -2x^2 - 3$					
	Up	(-2,5)		7	
	Down		$x = 3$	4	$y \leq -2$

Ex. 2 Graph. (show at least 5 points)

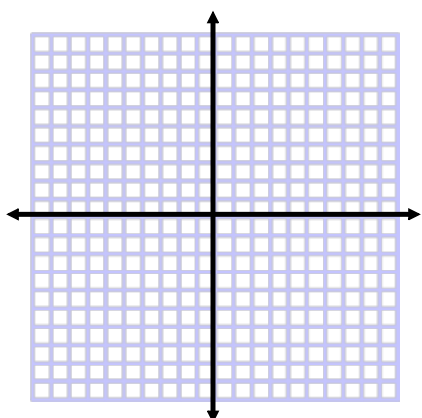
a) $y = (x - 4)^2 - 3$



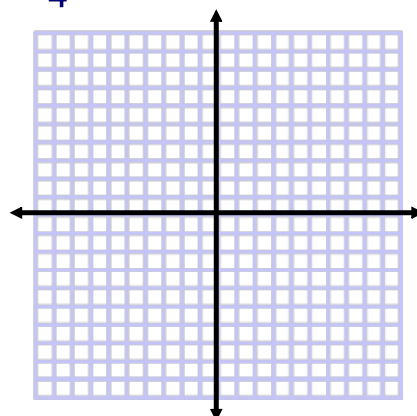
b) $y = 2(x + 5)^2 + 1$



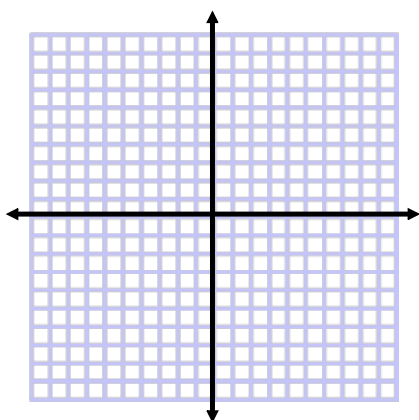
c) $y = -3(x + 2)^2 + 8$



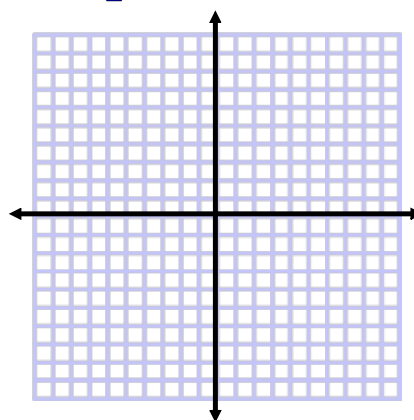
d) $y = \frac{1}{4}(x - 3)^2 - 2$



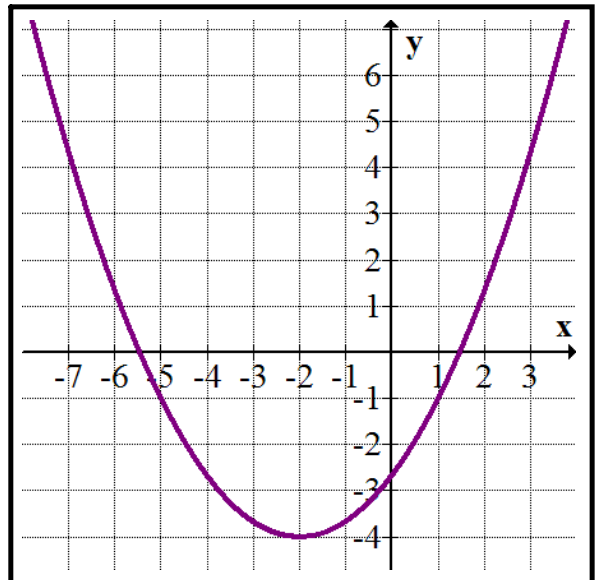
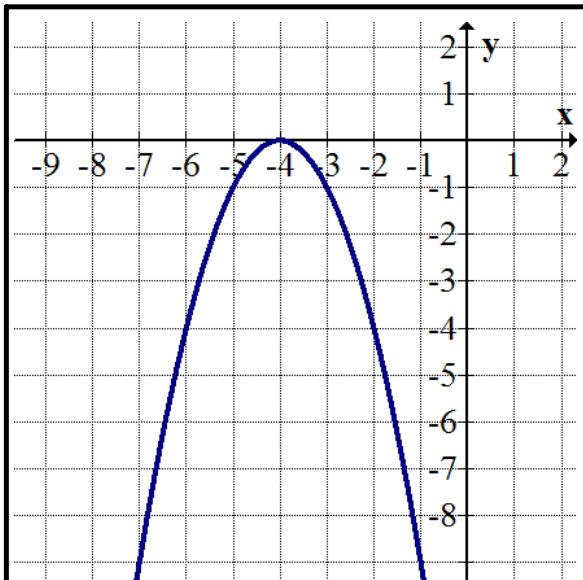
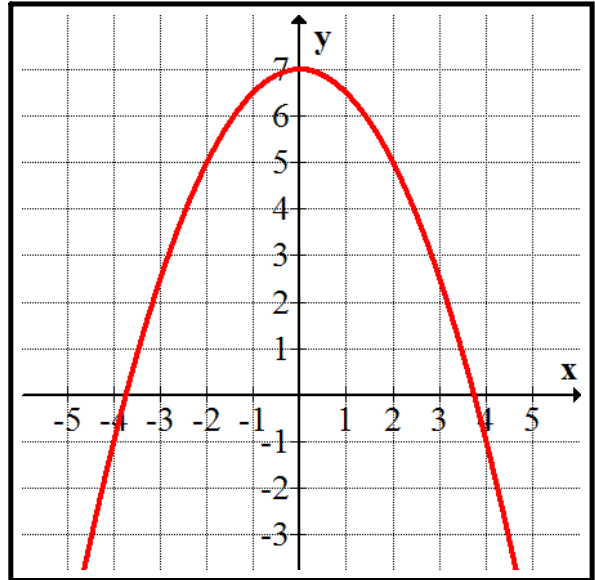
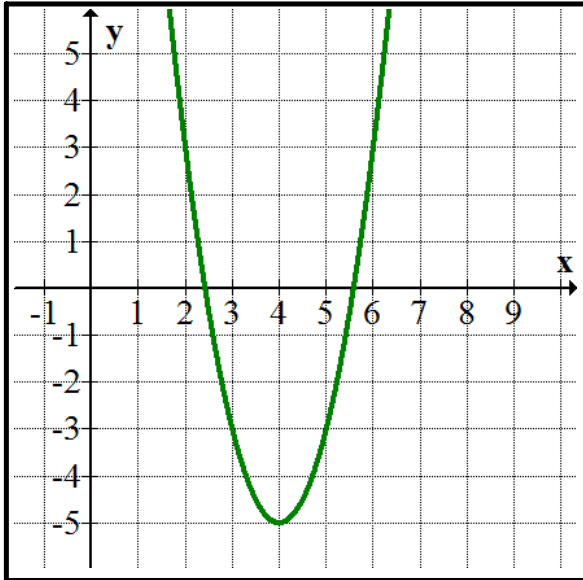
e) $y = -(x + 1)^2$



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



Ex. 3 Write an equation for each parabola.



Ex. 4 Determine an equation for each quadratic.

a) vertex at $(-3,4)$ through the point $(-1, -2)$

b) stretch by 4, reflection in x-axis, axis of symmetry at $x=-3$, through the point $(5,1)$

Attachments

4s4_Standard.gsp

4s4_Investigation.gsp