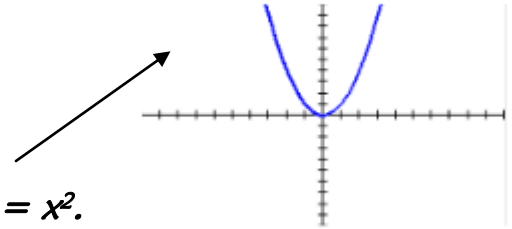
Name_____

Vertex Form of a Quadratic Equation

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



As you complete this worksheet you will be comparing graphs to this parent graph of $y = x^2$.

Complete the table below for each equation. *Graph the parent equation in Y_1 and the original equation in Y_2.*

Equation	Graph the Parent Equation	Opens? *Up Down*	Compare to $y = x^2$ *Wider Narrower Same*	Vertex (Ordered pair)	Graph the Original Equation	a	h	k	Vertex (Ordered pair)	Compare to parent graph
$y = -2(x+3)^2 + 1$	$y = -2x^2$	Down	Narrower	(0,0)	$y = -2(x+3)^2 + 1$	-2	-3	1	(-3, 1)	Moved 3 units left and 1 unit up
$y = (x - 1)^2 + 4$	$y = x^2$				$y = (x - 1)^2 + 4$					
$y = (x - 3)^2 + 2$	$y = x^2$				$y = (x - 3)^2 + 2$					
$y = -(x + 1)^2 - 2$	$y = -x^2$				$y = -(x + 1)^2 - 2$					
$y = (x + 3)^2$	$y = x^2$				$y = (x + 3)^2$					
$y = -(x -5)^2 + 4$	$y = -x^2$				$y = -(x -5)^2 + 4$					
$y = 2(x -6)^2 - 3$	$y = 2x^2$				$y = 2(x -6)^2 - 3$					
$y = -2x^2 - 1$	$y = -2x^2$				$y = -2x^2 - 1$					
$y = \frac{1}{2}(x + 5)^2 - 2$	$y = \frac{1}{2}x^2$				$y = \frac{1}{2}(x + 5)^2 - 2$					

Equation	Graph the Parent Equation	Opens? *Up Down*	Compare to $y = x^2$ *Wider Narrower Same*	Vertex (Ordered pair)	Graph the Original Equation	a	h	k	Vertex (Ordered pair)	Compare to parent graph
$y = -x^2 + 4$	$y = -x^2$				$y = -x^2 + 4$					
$y = \frac{1}{3}(x - 4)^2 - 2$	$y = \frac{1}{3}x^2$				$y = \frac{1}{3}(x - 4)^2 - 2$					
$y = -2(x + 3)^2 + 4$	$y = -2x^2$				$y = -2(x + 3)^2 + 4$					
$y = -3(x + 1)^2 - 5$	$y = -3x^2$				$y = -3(x + 1)^2 - 5$					

Without graphing, identify the features of the graph of each equation.

a. $y = 2(x - 5)^2 + 7$

Opens: (Up) or Down

Wider or (Narrower) or Same

Translation(s): **5 units right and 7 units up**

Vertex: **(5 , 7)**

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

Opens: Up or Down

Wider or Narrower or Same

Translation(s):

Vertex:

c. $y = -x^2 - 4$

Opens: Up or Down

Wider or Narrower or Same

Translation(s):

Vertex:

d. $y = 0.5(x + 2)^2$

Opens: Up or Down

Wider or Narrower or Same

Translation(s):

Vertex:

e. $y = x^2 + 5$

Opens: Up or Down

Wider or Narrower or Same

Translation(s):

Vertex:

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

Opens: Up or Down

Wider or Narrower or Same

Translation(s):

Vertex:

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

Opens: Up or Down

Wider or Narrower or Same

Translation(s):

Vertex:

h. $y = -\frac{2}{3}(x + 8)^2 + 11$

Opens: Up or Down

Wider or Narrower or Same

Translation(s):

Vertex: