

Learning Goals:

Identify the location of the vertex, $V(h, k)$ from the equation.	Identify the vertex, $V(h,k)$ from a graph.	Describe the effect a has on the function if $a = 1, a > 1, a < 0$ (negative) , or $a = 0$.
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Quadratic Parent Function: $y = x^2$

Vertex form of a Quadratic: $y = a(x - h)^2 + k$

Phet Link: <https://phet.colorado.edu/en/simulation/graphing-quadratics>

1. **Open Play:** Once you have opened the Graphing Quadratics Phet simulator, go to the 3rd screen vertex form. Take some time to play around with it.
2. What information does a quadratic expression in the vertex form reveal? How does it show that information?
3. What doesn't it tell us?
4. Why do you think this form is used?

 Compare your results from questions 2-4 with your partner 

5. Using PhET again, complete the following table to describe what the a , h and k values do to the parent function.

a, h & k	Describe the effect (transformation) if any.	Example Equation	Vertex $V(h, k)$
$a = 1$			
$a > 1$ (positive)			
$a = 0$			
$a < 0$ (negative)			

a, h & k	Describe the effect (transformation) if any.	Example Equation	Vertex V(h, k)
$h > 0$ (positive)			
$h < 0$ (negative)			
$h = 0$			
$k > 0$ (positive)			
$k < 0$ (negative)			
$k = 0$			

PREDICT: Without graphing, predict the coordinates of the vertex of the graphs of these quadratic functions, and predict whether the graph is a U shape ("opens up") or an upside-down U ("opens down").

equations	coordinates of vertex	graph opens up or down?
a. $y = (x + 10)^2$		
b. $y = (x - 4)^2 + 8$		
c. $y = -(x - 4)^2 + 8$		
d. $y = x^2 - 7$		
e. $y = \frac{1}{2}(x + 3)^2 - 5$		
f. $y = -(x + 100) + 50$		
g. $y = a(x + m)^2 + n$		

SUMMARIZE:

- When a quadratic equation is in vertex form of $y = (x-h)^2 + k$, the coordinates of the vertex are _____.

- When the equation is graphed, the graph opens upward if . . .
- The graph opens downward if . . .