



Graphing Calculator Investigation

A Follow-Up of Lesson 10-3

Sharp EL-9600c

Graphing Quadratic Functions in Vertex Form

Quadratic functions written in the form $y = a(x - h)^2 + k$ are said to be in **vertex form**.

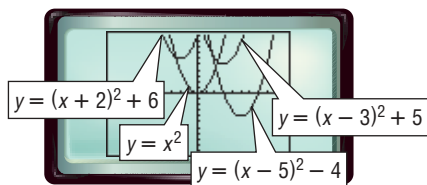
Graph each group of equations on the same screen. Use the standard viewing window. Compare and contrast the graphs.

a. $y = x^2$

$y = (x - 3)^2 + 5$

$y = (x + 2)^2 + 6$

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



Each graph opens upward and has the same shape. However, the vertices are different.

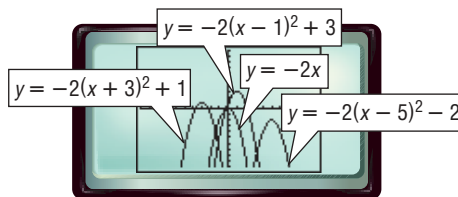
Equation	Vertex
$y = x^2$	(0, 0)
$y = (x - 3)^2 + 5$	(3, 5)
$y = (x + 2)^2 + 6$	(-2, 6)
$y = (x - 5)^2 - 4$	(5, -4)

b. $y = -2x^2$

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

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

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



Each graph opens downward and has the same shape. However, the vertices are different.

Equation	Vertex
$y = -2x^2$	(0, 0)
$y = -2(x - 1)^2 + 3$	(1, 3)
$y = -2(x + 3)^2 + 1$	(-3, 1)
$y = -2(x - 5)^2 - 2$	(5, -2)

Exercises

- Study the relationship between the equations in vertex form and their vertices. What is the vertex of the graph of $y = a(x - h)^2 + k$? (***h, k***)
- Completing the square can be used to change a quadratic equation to vertex form. Copy and complete the steps needed to rewrite $y = x^2 - 2x - 3$ in vertex form.

$y = x^2 - 2x - 3$

$y = (x^2 - 2x + \underline{\quad? \quad}) - 3 - \underline{\quad? \quad}$ **1, 1**

$y = (x - \underline{\quad? \quad})^2 - \underline{\quad? \quad}$ **1, 4**

3-5. See margin for graphs.

Complete the square to rewrite each quadratic equation in vertex form. Then determine the vertex of the graph of the equation and sketch the graph.

3. $y = x^2 + 2x - 7$

$y = (x + 1)^2 - 8; (-1, -8)$

4. $y = x^2 - 4x + 8$

$y = (x - 2)^2 + 4; (2, 4)$

5. $y = x^2 + 6x - 1$

$y = (x + 3)^2 - 10; (-3, -10)$



www.algebra1.com/other_calculator_keystrokes