Vertex Form of Quadratic Equations

Standard form: $ax^2 + bx + c = 0$

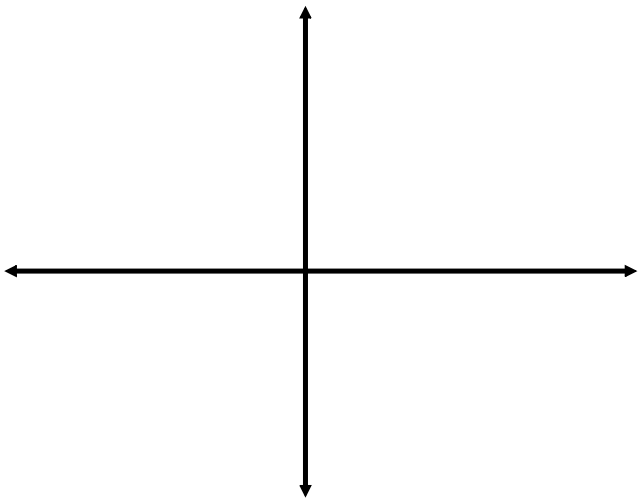
Vertex form: $y = a(x - h)^2 + k$

Useful for graphing, writing equations

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

Vertex (h, k)

Points on parabola (x, y)



Write in vertex form
Then graph: $-2x^2 + 16x - 31$

1. Rewrite from standard form to vertex form:

1a. Coefficient of x^2 is 1

- Step 1 add "c" to the y side of the equation
- Step 2 complete the square on the right side of the equation (**factor out** co-efficient of x^2 if needed)
- Step 3 add "c" plus back to right side of equation

Example:

Write in vertex form:

$y = x^2 + 8x - 3$

1b. Coefficient of x^2 is not 1

- Step 1 add "c" to the y side of the equation
- Step 2 **factor out** co-efficient of x^2
- Step 3 Complete the square on right side equation; Add full constant to both sides
- Step 4 add "c" plus back to right side of equation

Example: $y = -2x^2 - 4x + 2$

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

$y - 2 = -2(x^2 + 2x \quad)$

$y - 2 \quad = -2(x^2 + 2x + 1)$

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

$y - 4 = -2(x + 1)^2$

$y = -2(x + 1)^2 + 4$

Vertex (-1, 4)
Axis of symmetry: x = -1
Opens down

Example: $y = -3x^2 - 18x + 11$

Write in vertex form, find vertex, axis of symmetry, direction of opening

Write a quadratic equation that transforms the graph of $y = 2(x-1)^2 + 3$ so that it is:

a. 5 units up

b. 2 units to the left

c. 4 units to the right

d. wider

e. opening in the opposite direction

Your assignment:

2. *Write a quadratic equation in vertex form given the vertex and a point on the parabola.* $y = a(x - h)^2 + k$

➔hint: You need to fill in a, h, and k

Given: V(1, 2) point (3, 4)