

Converting Standard Form to Vertex Form by Completing the Square

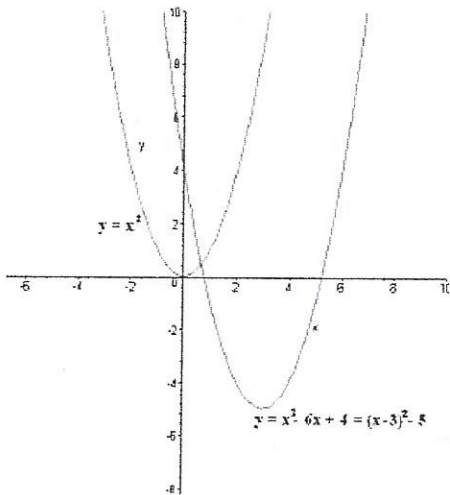
We want to convert standard form to vertex form because it gives us all the details for graphing. We do that by completing the square. That means we will manipulate the quadratic and force it to be a perfect square trinomial. That is where the first term and last term are perfect squares and when factored we get the exact same binomial in each set of parenthesis. Here's how...

Do Something Awesome \rightarrow B value
 i
v
d
e
b
y
2

q
u
a
r
e

d
d

Parent Function of a quadratic: $y = x^2$ AOS: $x=0$ Vertex: $(0,0)$



$$f(x) = x^2 - 6x + 4 \quad \frac{-b}{2} = \frac{-(-6)}{2} = 3$$

$$(x^2 - 6x + 9) - 9 + 4$$

$$f(x) = (x - 3)^2 - 5 \quad (3, -5)$$

Shifts right 3,
down 5

$$f(x) = x^2 - 12x + 27 \quad \frac{-b}{2} = \frac{-(-12)}{2} = 6$$

$$(x^2 - 12x + 36) - 36 + 27$$

$$f(x) = (x - 6)^2 - 9 \quad (6, -9)$$

Shifts right 6,
down 9

$$y = x^2 + 6x + 13 \quad \frac{b}{2} = \frac{6}{2} = 3$$

$$(x^2 + 6x + 9) - 9 + 13$$

$$y = (x + 3)^2 + 4 \quad (-3, 4)$$

Shifts left 3,
up 4