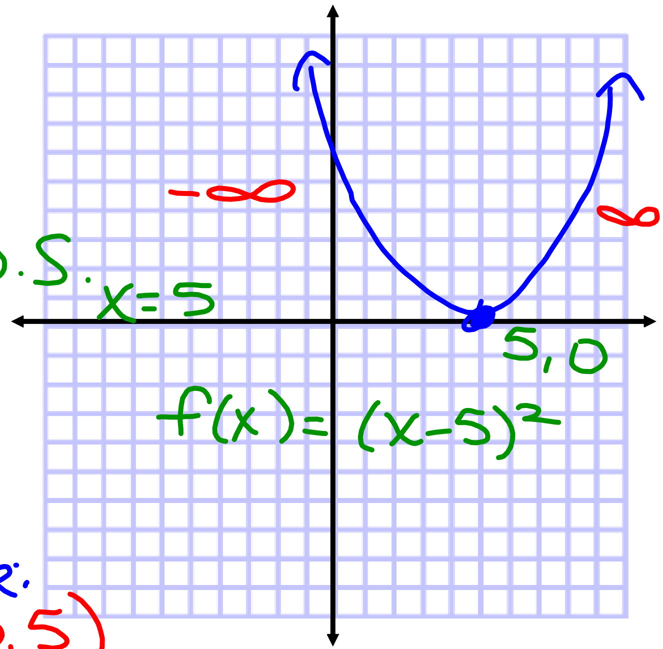
Write the equation
Analyze the graph



Domain: $\mathbb{R}$

A.O.S. $x=5$

Range: $y \geq 0$

y-int: $(0,6)$

X-int: $(5,0)$

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

Increase: $(5,\infty)$

Decrease: $(-\infty,5)$

Converting
Vertex to Standard

1. Rewrite what is being squared twice
   ex = $(x-h)^2 = (x-h)(x-h)$
2. Multiply ⇒ FOIL First Outside Inside Last
3. Simplify Answer must be in standard form

Standard: $y = ax^2 + bx + c$

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

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

$y = (x^2 + 3x + 3x + 9) - 5$

$x^2 + 6x + 9 - 5$

$y = x^2 + 6x + 4$

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

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

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

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

$-x^2 + 2x - 1 + 2$

$\boxed{-x^2 + 2x + 1}$

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

$2(x-2)(x-2) - 3$

$2(x^2 - 2x - 2x + 4) - 3$

$2(x^2 - 4x + 4) - 3$

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

$2x^2 - 8x + 5$

Standard Form to Vertex Form

$f(x) = ax^2 + bx + c$

1. Label a, b, + c
2. Find the vertex (h, k)

   $h = \frac{-b}{2a}$

   Plug in h to find k

3. Substitute a, h, + k into vertex form

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

<u>Ex</u> $y = x^2 - 6x$

$a = 1 \quad b = -6 \quad c = 0$

$h = \frac{-b}{2a} = \frac{6}{2(1)} = \frac{6}{2} = 3$

$k = (3)^2 - 6(3) = -9 \quad y = (x-3)^2 - 9$

$y = x^2 + 4x + 1$

$a = 1 \quad b = 4 \quad c = 1$

$h = \frac{-4}{2(1)} = -2$

$k = (-2)^2 + 4(-2) + 1 = -3$

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

$y = 5x^2 - 10x + 9$

$a = 5 \quad b = -10 \quad c = 9$

$h = \frac{-b}{2a} = \frac{10}{2(5)} = 1 \quad y = 5(x-1)^2 + 4$

$k = 5(1)^2 - 10(1) + 9$

$5 - 10 + 9 = 4$