Write the three forms of a quadratic function and give what each tell you easily about the function.

Standard Form	Intercept Form	Vertex Form
$y = ax^2 + bx + c$	$y = a(x-p)(x-q)$	$y = a(x-h)^2 + k$
		$V(h, k)$
y-intercept	x-intercepts	
$(0, c)$	$(p, 0)$ $(q, 0)$	

Given the function $f(x) = (x - 6)(x + 4)$. Find the following key components and graph the function. Show your work or explain how to get the solution.

Look at a value

Opening Direction

$a = 1$

Opens up a value is positive

X-intercepts

$x - 6 = 0 \qquad x + 4 = 0$

$x = 6 \qquad x = -4$

Y-intercept

$y = (x-6)(x+4)$

Let $x = 0$

$y = (0-6)(0+4)$

$(-6)(4)$

-24

Line of symmetry and vertex

Find x-coordinate of vertex halfway between intercepts

$\frac{6+(-4)}{2} = \frac{2}{2} = 1$ Vertex $(1, -25)$

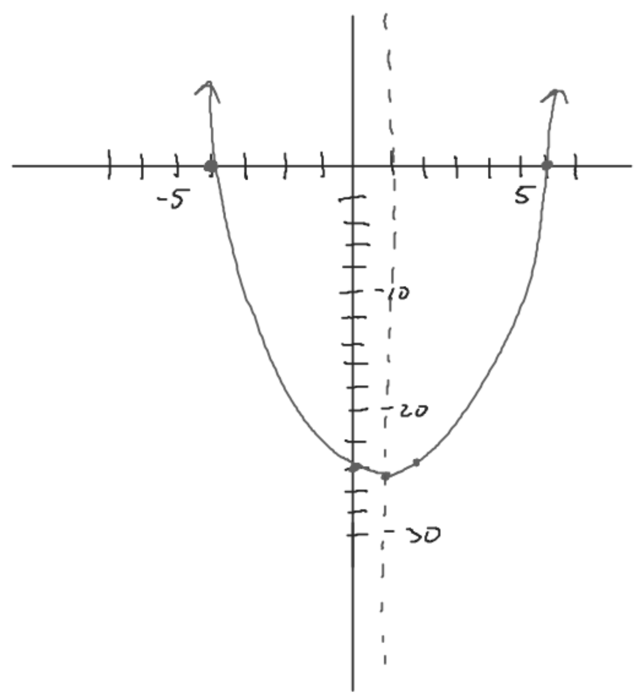
$y = (1-6)(1+4)$ A.O.S. $x = 1$

$(-5)(5)$

-25

Domain $(-\infty, \infty)$

Range $[-25, \infty)$



Given the function $f(x) = -3(x+1)^2 + 4$. Find the following key components and graph the function. Show your work or explain how to get the solution.

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

Opening Direction

$a = -3$

Open down because a is negative

Line of symmetry and vertex

$V(-1, 4)$ A.O.S $x = -1$

Y-intercept

$y = -3(x+1)^2 + 4$

Let $x = 0$

$-3(0+1)^2 + 4$

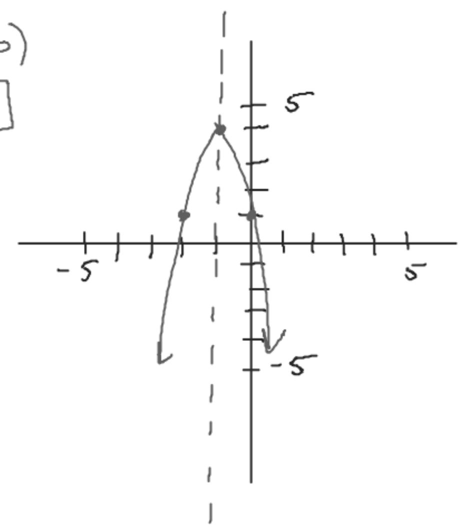
$-3(1) + 4$

1

$(0, 1)$

Domain $(-\infty, \infty)$

Range $(-\infty, 4]$



Rewrite the function $f(x) = -3(x+1)^2 + 4$ in standard form. What new information does this form give you easily?

Standard form

$y = ax^2 + bx + c$

$$f(x) = -3(x+1)^2 + 4$$

$$= -3(x+1)(x+1) + 4$$

$$-3(x^2+2x+1) + 4$$

$$-3x^2 - 6x - 3 + 4$$

$$-3x^2 - 6x + 1$$

y-intercept

$(0,1)$

Rewrite the function $f(x) = (x - 6)(x + 4)$ in standard form. What new information does this form give you easily?

$f(x) = (x-6)(x+4)$

$y = ax^2 + bx + c$

$f(x) = x^2 - 6x + 4x - 24$

$x^2 - 2x - 24$

y-intercept

$(0, -24)$

Convert the following equation from vertex form to standard form.

$y = ax^2 + bx + c$

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

$(x-3)(x-3) - 5$

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

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

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

$4(x+2)(x+2) + 1$

$4(x^2 + 4x + 4) + 1$

$4x^2 + 16x + 16 + 1$

$y = 4x^2 + 16x + 17$

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

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

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

$-2x^2 + 4x - 2 + 2$

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

Convert the following equation from intercept form to standard form.

$y = (2x - 3)(x + 4)$

$2x^2 + 8x - 3x - 12$

$y = 2x^2 + 5x - 12$

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

$2(x^2 + 6x - 2x - 12)$

$2(x^2 + 4x - 12)$

$y = 2x^2 + 8x - 24$

$y = -5(x - 1)(x - 3)$

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

$-5(x^2 - 4x + 3)$

$y = -5x^2 + 20x - 15$

Describe the transformation for each function from the function $f(x) = x^2$.

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

Vertical Stretch by Factor of 2

Shift Left 2

Down 3

$g(x) = -\frac{1}{2}(x - 1)^2 + 2$

Reflection over X-axis

Vertical compression by a factor of $\frac{1}{2}$

Right 1

Up 2