

Chapter 9 Day 2:

Today we will be studying Vertex Form of a parabola.

$$y = \underline{a}(\underline{x} - h)^2 + \underline{k}$$

(3, 4)


* (h, k) is the vertex

* if $a > 0$, opens up

* if $a < 0$, opens down

⇒ * axis of symmetry is $y = h$

* minimum or maximum is k

Example: $y = 5(x + 4)^2 - 7$

Identify the vertex: $(-4, -7)$

Identify the axis of symmetry: $x = -4$

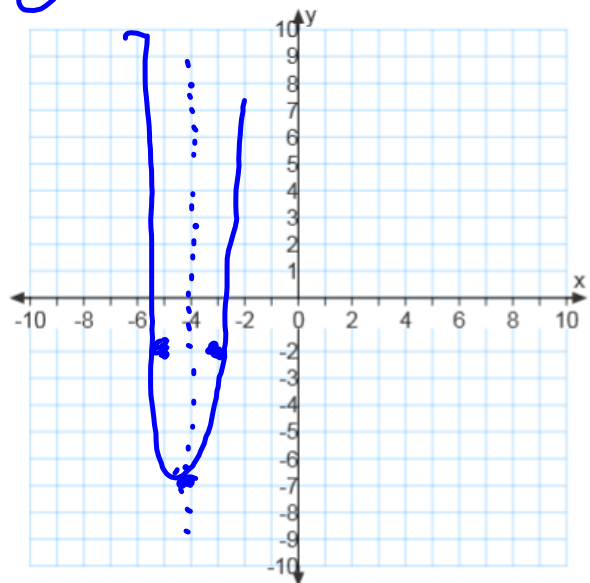
Identify the minimum or maximum: $y = -7$

Identify the y-intercept: $(0, 73)$

Domain:

Range:

X	Y
-4	-7
0	73
-3	-2
-5	-2



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

Identify the vertex: (1, 3)

Identify the axis of symmetry: $x = 1$

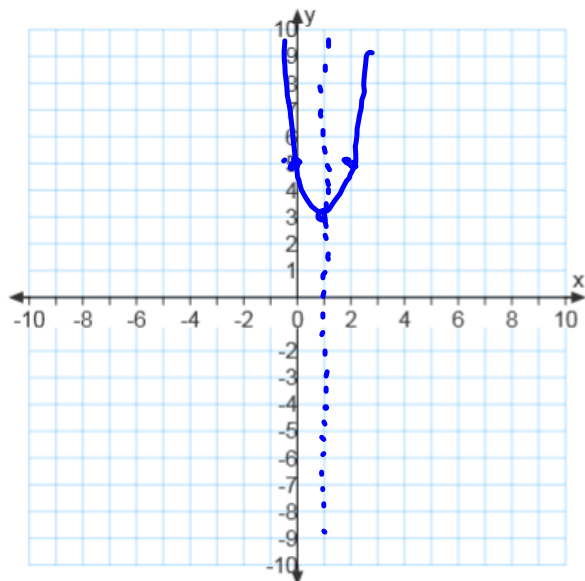
Identify the minimum or maximum:

Identify the y-intercept: (0, 5)

Domain:

Range:

X	Y
1	3
0	5
2	5



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

Identify the vertex: $(-3, -4)$

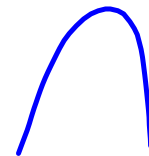
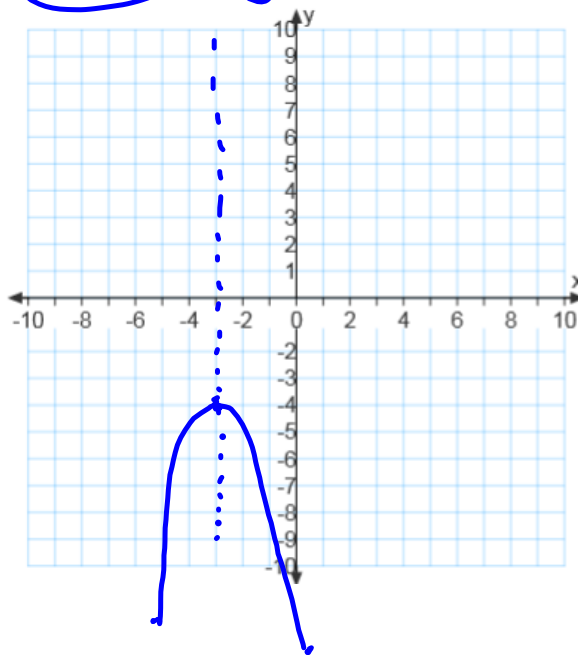
Identify the axis of symmetry: $x = -3$

Identify the minimum or maximum: $y = -4$

Identify the y-intercept:

Domain: $\mathbb{R}$
Range: $y \leq -4$

X	Y
-3	-4
0	-13
-6	-13



Example: Change from vertex to standard form.

$$y = 3(x + 6)^2 - 2$$

$$y = 3(x^2 + 12x + 36) - 2$$

$$y = 3x^2 + 36x + 108 - 2$$

$$y = 3x^2 + 36x + 106$$

Identify $a = \underline{3}$, $b = \underline{36}$, and $c = \underline{106}$.

Example: Change from vertex to standard form.

$$f(x) = -8(x + 2)^2 + 3$$

$$\begin{aligned} y &= -8(x^2 + 4x + 4) + 3 \\ y &= -8x^2 + 32x + 32 + 3 \\ y &= -8x^2 + 32x + 29 \end{aligned}$$

Identify $a = -8$, $b = 32$, and $c = 29$.

