Section 5 – Topic 3
Graphing Quadratic Functions in Vertex Form – Part 1

The vertex form of a quadratic equation is $f(x) = a(x - h)^2 + k$

Consider the following quadratic function.

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

Complete the table below for $f(x)$.

Opening: If $a > 0$, quadratic opens upward. If $a < 0$, quadratic opens downward.

up

Vertex: (h, k) $(-2, -4)$

Axis of Symmetry: Use the x–coordinate of the vertex to find the axis of symmetry.

$x = -2$

x-intercepts: Substitute 0 for y and solve for x.

$2 - 2 = x$ $-2 - 2 = x$
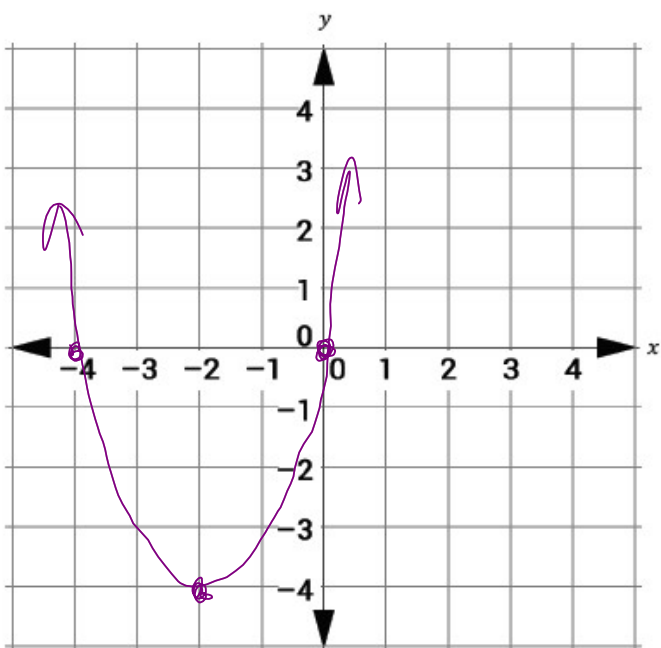
$0 = (x+2)^2 - 4$ $0 = x$ $-4 = x$

$4 = (x+2)^2$

$\pm 2 = x + 2 \rightarrow \pm 2 - 2 = x$

y-intercept: Substitute 0 for x and solve for y.

$f(x) = (0+2)^2 - 4$

$f(x) = 0$ $(0,0)$ $f(x) = (2)^2 - 4$

Sketch the graph of $f(x)$.

Try It!

1. Consider the following quadratic function.

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

a. Complete the table below for $f(x)$.

$0 = -(x-1)^2 + 2 \quad \pm\sqrt{2} = x - 1$

$-2 = -(x-1)^2 \quad \pm 1.4 = x - 1$

$2 = (x-1)^2 \quad \pm 1.4 + 1 = x$

Opening: If $a > 0$, quadratic opens upward. If $a < 0$, quadratic opens downward.

down

Vertex: (h, k)

$(1, 2)$

Axis of Symmetry: Use the x-coordinate of the vertex to find the axis of symmetry.

$x = 1$

x-intercepts: Substitute 0 for y and solve for x.

$1.4 + 1 = x \qquad -1.4 + 1 = x$

$2.4 = x \qquad -0.4 = x$

y-intercept: Substitute 0 for x and solve for y.

$f(x) = -(0-1)^2 + 2$

$-(-1)^2 + 2 \qquad (0, 1)$

$-1 + 2 = 1$

b. Sketch the graph of $f(x)$.