Key

Graphing Quadratics in Vertex Form Notes

Vertex Form

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

- $a > 0$ opens up; min
- $a < 0$ opens down; max
- opens up or down
- x-value of vertex; also, AOS = h
- y-value of vertex

Example:

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

vertex: $(h, k) = (1, 3)$

Example:

AOS: $x = 1$

y-int: $y = 2(0-1)^2 + 3$

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

$y = 2(1) + 3$

$y = 2 + 3$

$y = 5$

y-int: $(0, 5)$

Vertex Form:

How to graph a quadratic equation written in Vertex Form:

1. Identify vertex and Axis of Symmetry
2. Find y-intercept → Plug zero in for X
3. find another point, reflect over the AOS

Graph the following functions in vertex form.

1) $g(x) = (x+3)^2 - 2$ (h = 3, K = −2)

Vertex: $(-3, -2)$

Axis of Symmetry: $x = -3$

Y – Intercept: $(0+3)^2 - 2$

$(0, 7)$ $= 3^2 - 2 = 9 - 2 = 7$

x	-3	0	-6	-1	-5
y	-2	7	7	2	2

$x = -1$:

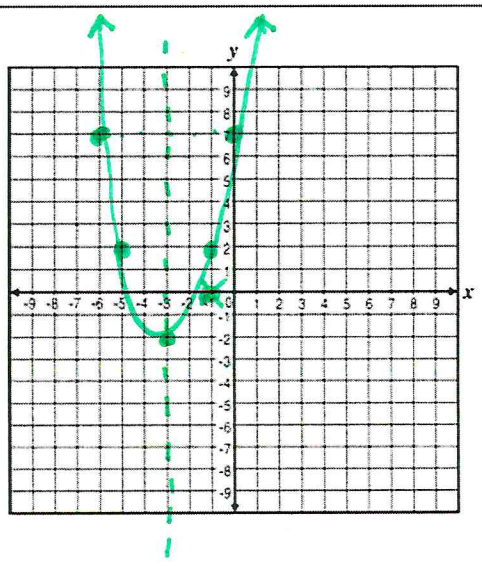
$y = (-1+3)^2 - 2$

$y = (2)^2 - 2$

$y = 4 - 2$

$y = 2$

$(-1, 2)$



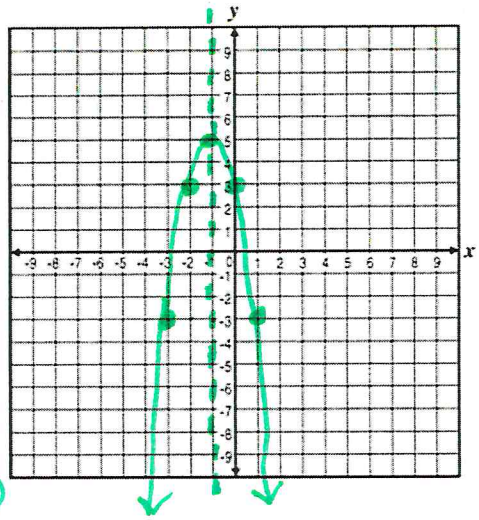
2) $g(x) = -2(x+1)^2 + 5$ (h = 1, K = 5)

Vertex: $(-1, 5)$

Axis of Symmetry: $x = -1$

Y – Intercept: $y = -2(0+1)^2 + 5$
$= -2(1)^2 + 5$
$= -2(1) + 5$
$= -2 + 5 = 3$
$(0, 3)$

$x = 1$:
$y = -2(1+1)^2 + 5$
$y = -2(2)^2 + 5$
$= -2(4) + 5$
$= -8 + 5$
$= -3$ $(1, -3)$



x	-1	0	-2	1	-3
y	5	3	3	-3	-3

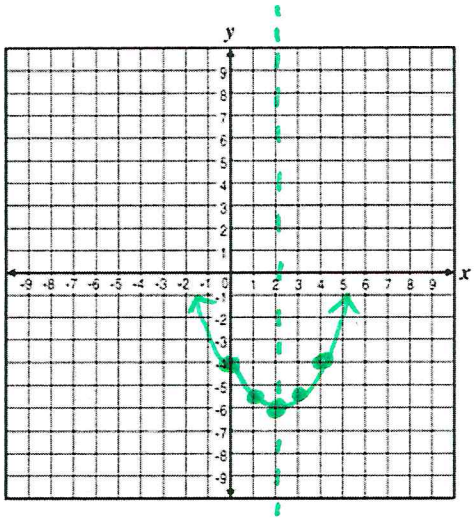
3) $g(x) = \frac{1}{2}(x-2)^2 - 6$ (h = 2, K = −6)

Vertex: $(2, -6)$

Axis of Symmetry: $x = 2$

Y – Intercept: $y = \frac{1}{2}(0-2)^2 - 6$
$= \frac{1}{2}(-2)^2 - 6$
$= \frac{1}{2}(4) - 6$
$= 2 - 6 = -4$
$(0, -4)$

$x = 1$
$y = \frac{1}{2}(1-2)^2 - 6$
$= \frac{1}{2}(-1)^2 - 6$
$= \frac{1}{2}(1) - 6$
$= \frac{1}{2} - 6$
$= -5.5$ $(1, -5.5)$



x	2	0	4	1	3
y	-6	-4	-4	-5.5	-5.5

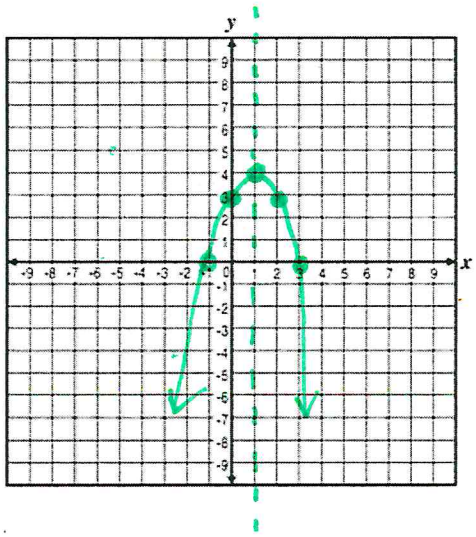
4) $g(x) = -(x-1)^2 + 4$ (h = 1, K = 4)

Vertex: $(1, 4)$

Axis of Symmetry: $x = 1$

Y – Intercept: $y = -(0-1)^2 + 4$
$= -(-1)^2 + 4$
$= -1 + 4$
$= 3$ $(0, 3)$

$x = 3$
$y = -(3-1)^2 + 4$
$= -(2)^2 + 4$
$= -4 + 4$
$= 0$
$(3, 0)$



x	1	0	2	3	-1
y	4	3	3	0	0