Graphing Quadratic Functions in Standard Form

Quadratic Function: $f(x) = ax^2 + bx + c, \ a \neq 0$

ax^2 Quadratic Term

bx Linear Term.

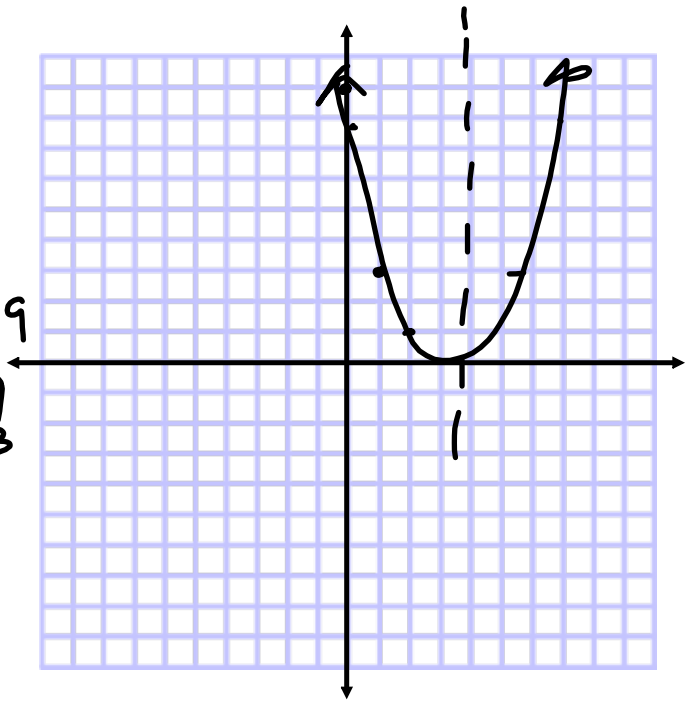
c Constant Term

Graphing Quadratic Functions

How can we graph a function when we don't know how to graph the function?

$$f(x) = 2x^2 - 8x + 9$$

x	$2x^2 - 8x + 9$ = y
-1	$2(-1)^2 - 8(-1) + 9 = 19$
0	$2(0)^2 - 8(0) + 9 = 9$
1	$2(1)^2 - 8(1) + 9 = 3$
2	$2(2)^2 - 8(2) + 9 = 1$



Y-Intercept:

Is there Symmetry?

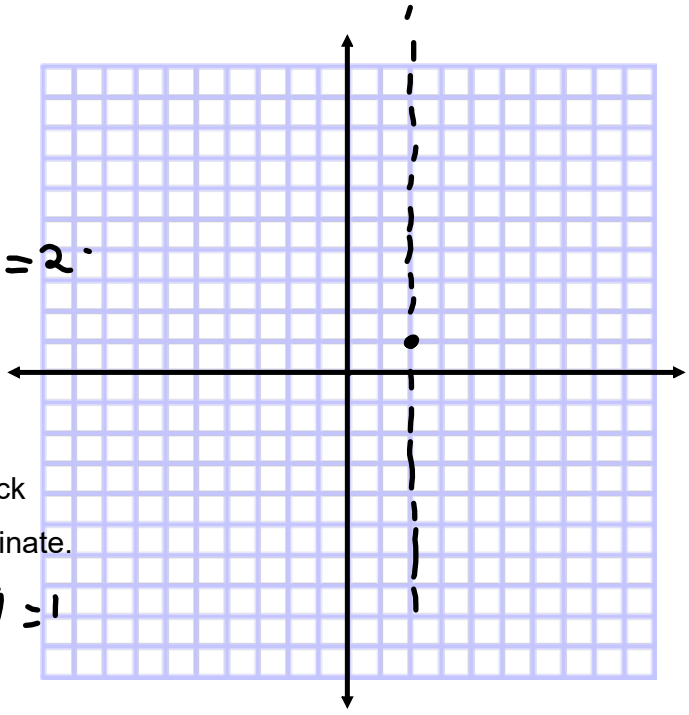
Graphing Quadratic Functions

Axis of Symmetry

$f(x) = \overset{a}{2}x^2 - \overset{b}{8}x + 9$

Finding the Axis of Symmetry

$x = -\frac{b}{2a} = -\frac{-8}{2(2)} = 2$



Finding the Vertex $(2, 1)$

Substitute the axis of symmetry back into the equation to get the y coordinate.

$= 2(2)^2 - 8(2) + 9 = 1$

Graphing Quadratic Functions

Find the Y-Intercept, Axis of Symmetry, and Vertex. Then graph each function using a t-table.

$f(x) = x^2 - 4x + 4$ (a, b, c)

y-intercept:

(0, 4)

Axis of Symmetry:

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

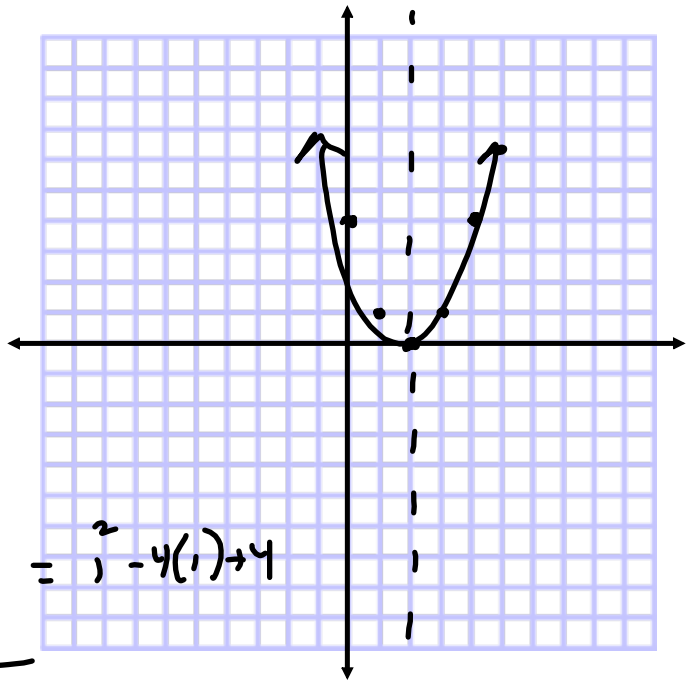
Vertex:

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

(2, 0)

x	y
0	4
1	1
2	0
3	1
4	

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



Graphing Quadratic Functions

Find the Y-Intercept, Axis of Symmetry, and Vertex. Then graph each function using a t-table.

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

$2(1)^2 = 2$

$2(2)^2 = 8$

y-intercept:

(0,0)

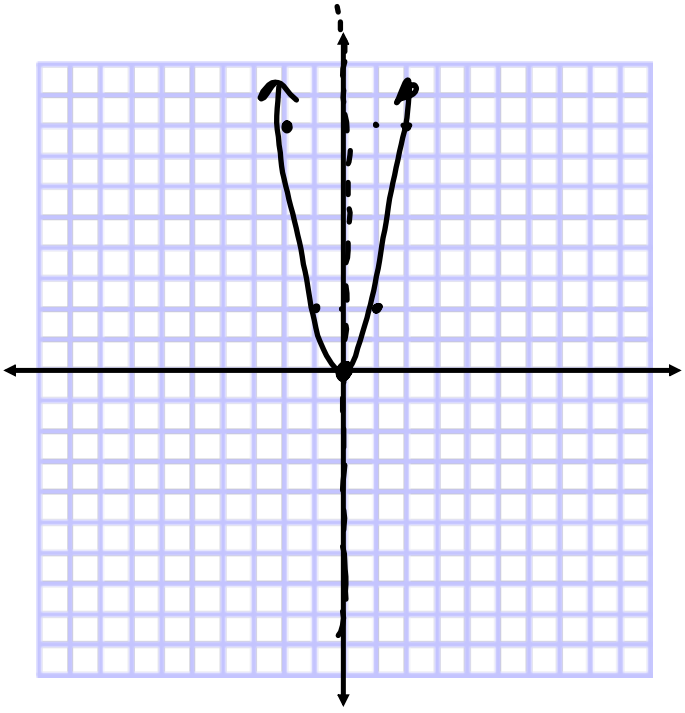
Axis of Symmetry:

$x = \frac{-0}{2(2)} \quad \frac{-b}{2(a)}$

Vertex:

2(0)

x	y
2	8
1	2
0	0
-1	2
-2	8



Graphing Quadratic Functions

Find the Y-Intercept, Axis of Symmetry, and Vertex. Then graph each function using a t-table.

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

y-intercept:

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

Axis of Symmetry:

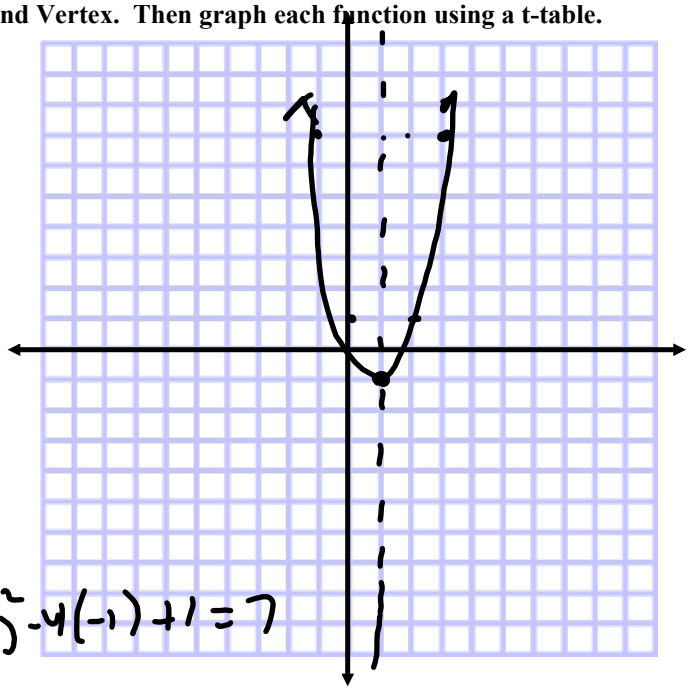
$x = \frac{-(-4)}{2(2)} = \frac{4}{4} = 1$

Vertex:

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

$(1, -1)$

$2(-1)^2 - 4(-1) + 1 = 7$



Graphing Quadratic Functions

Find the Y-Intercept, Axis of Symmetry, and Vertex. Then graph each function using a t-table.

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

$3x^2 + 0x + 1$

y-intercept:

(0, 1)

Axis of Symmetry:

$x = \frac{0}{2(3)} = 0$

Vertex:

x	y
2	13
1	4
0	1
-1	4
-2	13

$3(0)^2 + 0 + 1 = 1$

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

$3(2)^2 + 1 = 13$