

Graphing Quadratics

The graph of a quadratic is called a “**parabola**,” and it looks like a giant U that keeps getting wider.

To graph a parabola, there are a few things that you’ll need:

1. **The vertex**

It’s the most important point of a quadratic—it’s where the parabola turns

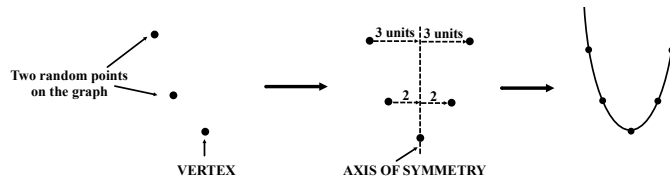
It’s also where the **axis of symmetry** lives

*The axis of symmetry is like a mirror—everything on the right side is a reflection of the left

2. **Any two random points on the graph**

To find them, plug in any x -values you want (except the x from the vertex)

The easiest points to find will always be x -values close to the vertex (or $x = 0$)



EXAMPLE

Graph $f(x) = x^2 + 6x + 3$

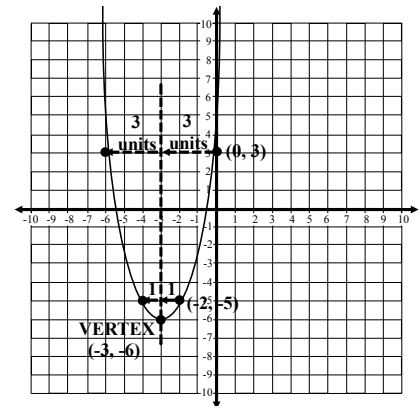
Vertex: $x = -\frac{b}{2a} = -\frac{6}{2(1)} = -\frac{6}{2} = -3$
 $f(-3) = (-3)^2 + 6(-3) + 3 = 9 - 18 + 3 = -9 + 3 = -6$

So, the vertex is: $(-3, -6)$

Two Random Points:

$x = -2$ I chose this one because it’s close to x -value from the vertex.
 $f(-2) = (-2)^2 + 6(-2) + 3 = 4 - 12 + 3 = -8 + 3 = -5$ **POINT: $(-2, -5)$**

$x = 0$ I chose this one because it’s easy (and it gets me the y -intercept).
 $f(0) = (0)^2 + 6(0) + 3 = 0 + 0 + 3 = 3$ **POINT: $(0, 3)$**



EXAMPLE

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

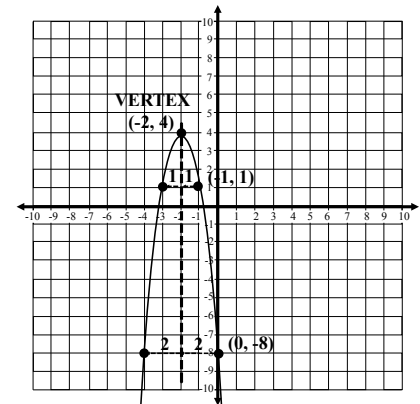
Vertex: (h, k) , taken out of the equation $f(x) = a(x - h)^2 + k$

So, the vertex is: $(-2, 4)$

Two Random Points:

$x = -1$ I chose this one because it’s close to x -value from the vertex.
 $f(-1) = -3(-1 + 2)^2 + 4 = -3(1)^2 + 4 = -3(1) + 4 = -3 + 4 = 1$ **POINT: $(-1, 1)$**

$x = 0$ I chose this one because it’s easy (and it gets me the y -intercept).
 $f(0) = -3(0 + 2)^2 + 4 = -3(2)^2 + 4 = -3(4) + 4 = -12 + 4 = -8$ **POINT: $(0, -8)$**



1. Graph $f(x) = 2(x - 5)^2 - 3$

Vertex:

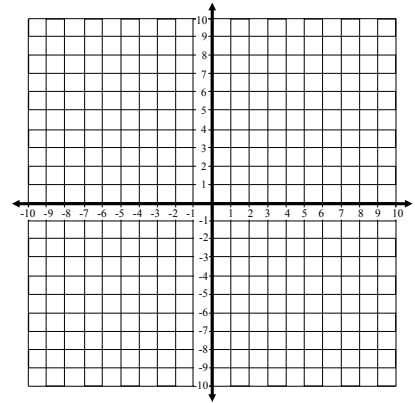
Two Random Points:

$x =$

POINT: _____

$x =$

POINT: _____



2. Graph $f(x) = -x^2 + 8x - 7$

Vertex:

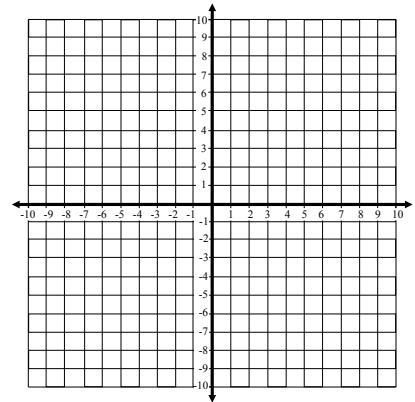
Two Random Points:

$x =$

POINT: _____

$x =$

POINT: _____



3. Graph $f(x) = -(x - 3)^2$

Vertex:

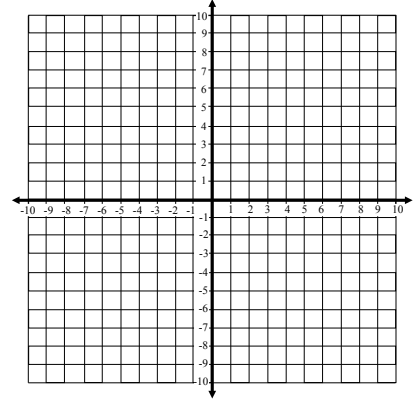
Two Random Points:

$x =$

POINT: _____

$x =$

POINT: _____



4. Graph $f(x) = 4x^2 + 8x - 5$

Vertex:

Two Random Points:

$x =$

POINT: _____

$x =$

POINT: _____

