

9.2 Graphing Quadratic Functions

A **quadratic function** written in **standard form** looks like this:  $y = ax^2 + bx + c$

These graphs are called **parabolas**.

Nov 17-11:12 AM

The **vertex** is the highest or lowest point of a parabola. The line that divides the parabola into two matching pieces is called the **axis of symmetry**.

The **axis of symmetry** is the x-coordinate of your **vertex**.

$y = x^2$   
+a opens up (U-shape)

$y = -x^2$   
-a opens down (-shape)

$x=0$

axis of symmetry.

Nov 17-11:47 AM

What is the vertex and axis of symmetry?

$v: (4, 1)$   
a of s:  $x = 4$

$v: (-2, -3)$   
a of s:  $x = 2$

Dec 2-12:16 PM

For the quadratic equation  $y = ax^2 + bx + c$ ,

1. The axis of symmetry is  $x = \frac{-b}{2a}$
2. Plug this value into equation to get y.
3. Vertex = (x, y)

Ex. Find the axis of symmetry and the vertex.

$y = 9x^2 + 4x + 4$

$x = \frac{-4}{2(9)} = \frac{-4}{18} = -\frac{2}{9}$

$y = (-\frac{2}{9})^2 + 4(-\frac{2}{9}) + 4 = 0$

a of s:  $x = -\frac{2}{9}$   
v:  $(-\frac{2}{9}, 0)$

Apr 25-10:20 AM

Find the vertex and the axis of symmetry:

$y = 2x^2 + 4x + 6$

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

$y = 2(-1)^2 + 4(-1) + 6 = 4$

a of s:  $x = -1$   
v:  $(-1, 4)$

$y = -3x^2 + 4$

$x = \frac{0}{2(-3)} = \frac{0}{-6} = 0$

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

a of s:  $x = 0$   
v:  $(0, 4)$

Apr 14-1:13 PM

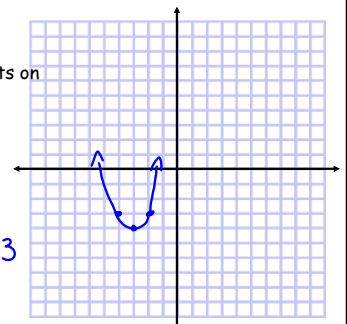
GRAPHING QUADRATICS!

1. Find the axis of symmetry.
2. Use calculator to pick points on the left and right of vertex.

$y = x^2 + 6x + 5$

$x = \frac{-6}{2(1)} = \frac{-6}{2} = -3$

$\begin{array}{r} x \\ -4 \\ -3 \\ -2 \\ -3 \end{array}$



Nov 25-7:11 PM

Graph. Label the vertex and axis of symmetry.

$$y = -2x^2 + 8x - 6$$

$$x = \frac{-8}{2(-2)} = \frac{-8}{-4} = 2$$

x	y
1	0
2	2
3	0

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

$$x = \frac{-(-6)}{2(3)} = \frac{6}{6} = 1$$

x	y
0	2
1	-1
2	2

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Tell whether the function has a minimum or maximum. Then find the minimum or maximum value.

$$f(x) = 3x^2 - 12x + 10$$

maximum

$$x = \frac{-(-12)}{2(3)} = \frac{12}{6} = 2$$

$$y = 3(2)^2 - 12(2) + 10 = 22$$

**(2, 22)**

May 4-11:59 AM

During halftime of a basketball game, a slingshot launches t-shirts at the crowd. The projectory models the quadratic function  $h = -16t^2 + 72t + 5$ . After how many seconds does the t-shirt reach its maximum height. What is the maximum height?

$$t = \frac{-72}{2(-16)} = \frac{-72}{-32} = 2.25 \text{ sec}$$

$$h = -16(2.25)^2 + 72(2.25) + 5$$

**h = 86 ft**

May 4-12:08 PM

**Classwork: p.580**

**#4, 8, 12, 16, 18, 26, 28, 32, 36, 40**

Graph paper #16, 18, 26

**Final Five**

A half-pipe ramp at a skate park is approximately parabolic in shape. It can be modeled by the quadratic function  $y = x^2 - 6x + 9$ . At what point would a skater be at the lowest part of the ramp?

A (-3, 36)     B (36, -3)     C (3, 0)     D (0, 3)

Nov 25-7:11 PM