Without the vertex you need 3 noncollinear points to write the equation of a parabola.

Find the equation of the parabola that passes through these three points:

(4, -1) (-7,9) (0,6)

Make a table out of these three points and

(4, -1) (-7,9) (0,6)

x	y
4	-1
-7	9
0	6

Perform a Quadratic Regression

rounded to the nearest thousandth:

$y = -0.120x^2 - 1.27x + 6$

What if you don't have a calculator that can do a Quadratic Regression?

Find a website that does it for you!

Check my blog

Or - Use a system of equations and solve with matrices.

$y = ax^2 + bx + c$

(4, -1) (-7,9) (0,3)

(4,-1)	$-1 = a(4)^2 + b(4) + c$	$-1 = 16a + 4b + c$
(-7,9)	$9 = a(-7)^2 + b(-7) + c$	$9 = 49a - 7b + c$
(0,3)	$3 = a(0)^2 + b(0) + c$	$3 = c$

A

3x3

$$\begin{bmatrix} 16 & 4 & 1 \\ 49 & -7 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

B

3x1

$$\begin{bmatrix} -1 \\ 9 \\ 3 \end{bmatrix}$$

$[A]^{-1}[B] =$

a= -0.0212765957

b= -0.914893617

c= 3

Matrices can only be used to find the equation of a parabola if there is exactly three points.

If you have more than three points you shouldn't use matrices because you'd have to ignore some of the data.

A toy rocket is shot upward from ground level. The table shows the height of the rocket at different times.

Time (sec)	1	2	3	4
Height (ft)	256	480	672	832

a. Find a quadratic model for this data by doing a quadratic regression.

$y = -16t^2 + 272t$

b. Use this model to find the height of the rocket after 1.5 seconds.

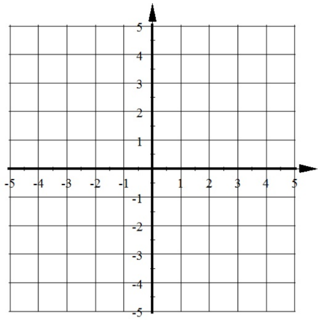
replace t with 1.5: $-16(1.5)^2 + 272t = 372$ feet high

You can now do hwk #16 which will be due __Monday____

Find a regression equation for the following population data, using $t = 0$ to stand for 1950. Then estimate the population of Namibia in the years 1940, 1997, and 2005. Note: Population values are in thousands.

year t	0	5	10	15	20	25	30	35	40	45	50
pop.	511	561	625	704	800	921	1 018	1 142	1 409	1 646	1 894

Graph the function $y = 2(x - 3)^2 - 5$ using 5 points.



$y = 2x^2 + 3$

This graph has translated in which directions? Up only How far? 3 units

What are the coordinates of the vertex? (0, 3)

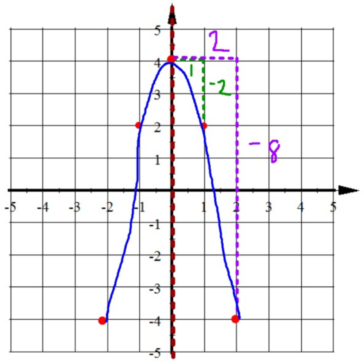
What is the equation of the Line of Symmetry?

X=0

Graphing $y = ax^2 + c$

- Translate the vertex c units vertically from the origin.
- Find two more points using a table or the parent function.
- Use the Line of Symmetry ($x = 0 \longrightarrow$ y-axis) to find the remaining two points.

Graph the function $y = -2x^2 + 4$ using 5 points.



Use a table

x	y
1	2
2	-4

or

Use the Parent Function and vert stretch factor -2

Parent Function		This Function
1, 1	$1 \times -2 \longrightarrow$	1, -2
2, 4	$4 \times -2 \longrightarrow$	2, -8

Then reflect these two points over the Line of Symmetry to get the remaining two points.

Vertex Form of a Quadratic:

What is the connection between the equation

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

and the Line of Symmetry?

LOS: $x = h$

LOS is always the x-coordinate of the vertex and in Vertex Form this is always the value of h

Standard Form of a Quadratic:

What is the connection between the equation

$y = ax^2 + bx + c$

and the Line of Symmetry?

EQ	LOS
$y = x^2 + 6x + 77$	$x = -3$
$y = x^2 - 8x + 95$	$x = 4$
$y = x^2 + 14x - 3$	$x = -7$
$y = 2x^2 + 12x - 50$	$x = -3$
$y = -3x^2 + 12x + 87$	$x = 2$

Equation for the LOS: $x = \dfrac{-b}{2a}$

Find the coordinates of the vertex and the equation of the LOS for each quadratic.

1. $y = 4x^2 - 24x + 3$

LOS $x = \frac{24}{8} = 3$

Vertex $(3, -33)$

$4(3)^2 - 24(3) + 3$

2. $y = -2x^2 - 20x - 11$

LOS $x = \frac{20}{-4} = -5$

Vertex $(-5, 39)$

Find the coordinates of the vertex and the equation of the LOS for this quadratic.

$y = 4(x + 3)^2 - 24$ 3 Left 24 down

LOS $x = -3$

Vertex $(-3, -24)$

Find the y-intercept for each quadratic.

replace x with zero!

1. $y = 6x^2 - 14x + 35$

y-int = $6(0)^2 - 14(0) + 35 = 35$

y-int = 35 which is the point (0,35)

2. $y = 5(x - 3)^2 - 17$

y-int=$5(0-3)^2 - 17 = 28$

y-int=28 which is the point (0,28)

The y-intercept for a quadratic in

Standard Form
$y = ax^2 + bx + c$

y-int is ALWAYS = C

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

y-int is whatever you get for y when you substitute zero for x.