factor each completely.

$x^2 + 100$

NOT FACTORABLE

because of the + sign

$x^2 - 1224$

NOT FACTORABLE

because 1224 is not a perfect square

$2x^{13} - 162x$

$2x(x^{12} - 81)$

$2x(x^6+9)(x^6-9)$

$2x(x^6+9)(x^3+3)(x^3-3)$

Factor completely.

$x^3 - 8x^2 + 25x - 200$

	x	-8
x^2	x^3	$-8x^2$
$+25$	$+25x$	-200

$(x-8)(x^2+25)$

FACTOR BY GROUPING

$x^3 - 8x^2 + 25x - 200$

$x^2(x-8) + 25(x-8)$

$(x-8)(x^2+25)$

Standard Form of a Quadratic Function:

$y = ax^2 + bx + c$

Quadratic Term

Linear Term

Constant

Every Quadratic Function has either a Maximum or a Minimum.

the Max or Min of a Quadratic occurs at the Vertex.

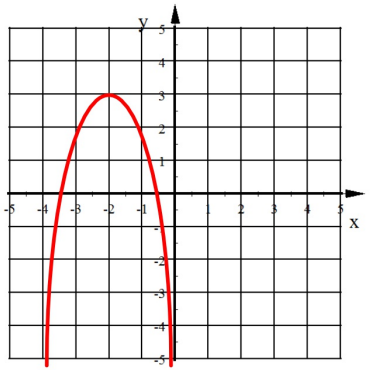
Does this Quadratic have a Max or a Min?

max

What is the maximum of this Quadratic? 3

The max or min value of a Quadratic is the y-coordinate of the vertex.

What does the x-coordinate of the Vertex represent? When the max or min occurs



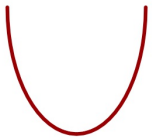
This Quadratic has a maximum of 3 when x=-2

$y = ax^2 + bx + c$

The graph of a quadratic function is a PARABOLA

Parabola that opens up:

a > 0



vertex is a minimum

Parabola that opens down:

a < 0

vertex is a maximum

1. State if each parabola opens up or down.

a) $y = -400x^2 + 6x + 89$ b) $f(x) = -2(x+3)^2 - 1$ c) $y = -8x + .002x^2 - 5$

a<0 down a>0 up a>0 up

2. State if the vertex of each parabola is a Maximum or a Minimum.

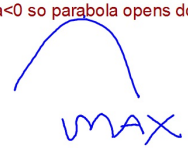
a) $y = 55x^2 - 78x - 201$

a>0 so parabola opens up.

min

b) $f(x) = -.15x^2 + 82x + 113$

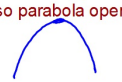
a<0 so parabola opens down



MAX

d) $y = -5(x-2)^2 + 3$

a<0 so parabola opens down



max

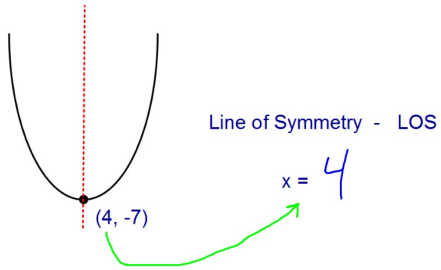
Every parabola has a Line of Symmetry (LOS).

What kind of line is the LOS? Vertical

What does the equation of the LOS look like? $x =$

The LOS of every parabola passes through what point? Vertex

If the the vertex of a parabola is (4, -7) what is the equation of the Line of Symmetry?

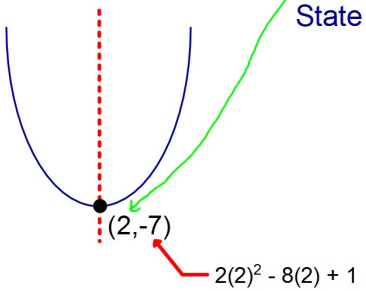


$y = 2x^2 - 8x + 1$

The LOS of this parabola is x = 2.

State the coordinates of the Vertex.

(2, -7)



What is the relationship between the Vertex and the equation of the LOS?

LOS: x = # Vertex (x, y)

these are always the same because the LOS is a vertical line that passes through the Vertex

3. Use this quadratic function: $y = -2x^2 - 20x + 7$

The equation of the Line of Symmetry is $x = -5$

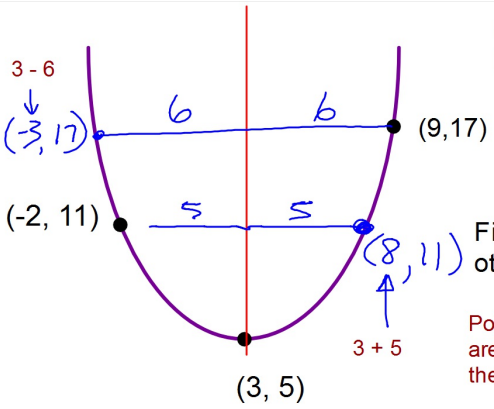
a) State the coordinates of the Vertex: (-5, 57)

b) What is the maximum value of this function? 57

$-2(-5)^2 - 20(-5) + 7$

c) When does this maximum value occur?

when x = -5

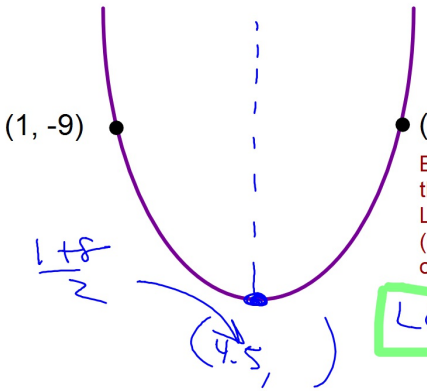


What is the equation for the LOS of this parabola?

$x = 3$

Find the coordinates of two other points on this parabola.

Points that are reflections of each other are on opposite sides of the LOS and the same distance away from the LOS



What is the equation of the LOS of this parabola?

Because these points have the same y-coord they must be reflections of each other over the LOS. This means the x-coord of the vertex (and eq of LOS) must be exactly in the middle of 1 and 8.

LOS $\Rightarrow x = 4.5$