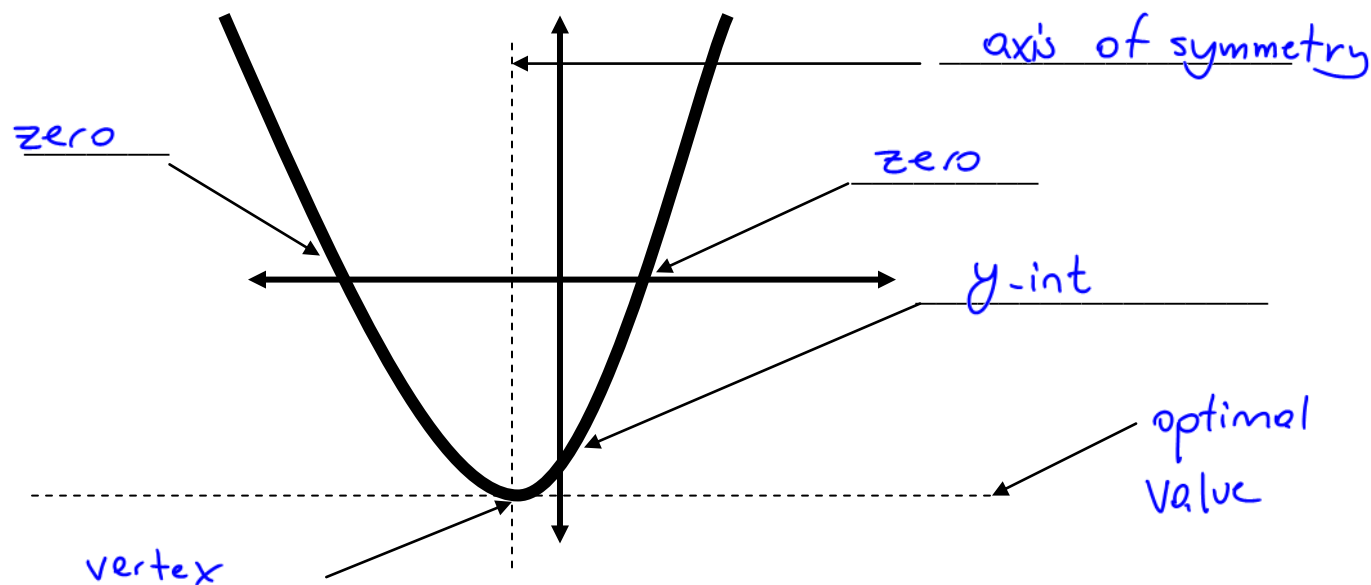


Introducing... The Parabola

The graph of a quadratic relation is called a parabola. The parabola has some important features:

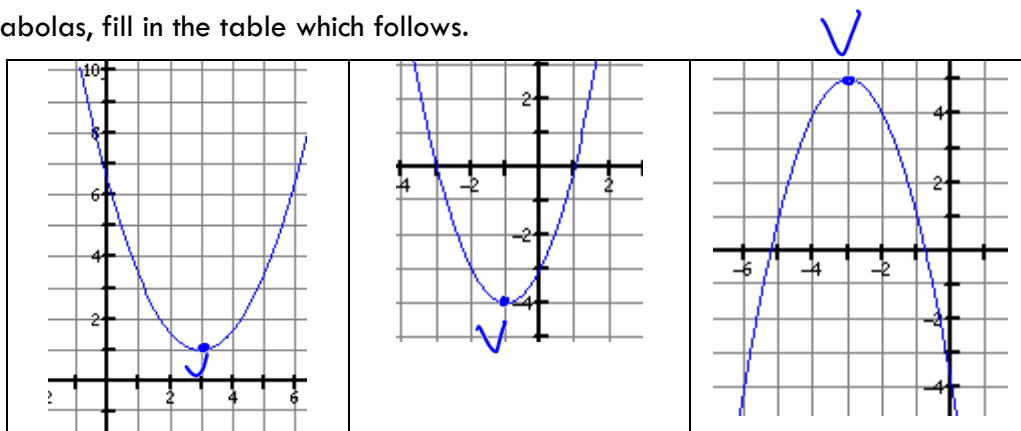


Everything you ever wanted to know about parabolas...

- Parabolas can open UP or DOWN
- The zero of a parabola is where the graph crosses the x - axis
- "Zeros" can also be called "x - intercepts" or "roots"
- The axis of symmetry divides the parabola into two equal halves
- The vertex of a parabola is the point where the axis of symmetry and the parabola meet. It is the point where the parabola is at its max or min value.
- The optimal value is the value of the y coordinate of the vertex
- The y - intercept of a parabola is where the graph crosses the y - axis

ANALYZING PARABOLAS

For the following parabolas, fill in the table which follows.



Vertex	$(3, 1)$	$(-1, -4)$	$(-3, 5)$
Optimal Value	1	-4	5
Axis of Symmetry	$x = 3$	$x = -1$	$x = -3$
Zeroes	None	$(-3, 0)$ and $(1, 0)$	$\approx (5.2, 0)$ and $\approx (-0.8, 0)$
Direction of Opening	UP	↑	↓
y – intercept	$(0, 7)$	$(0, -3)$	$(0, -4)$



True or False... (use the above for answers)

F

The axis of symmetry goes through the y – intercept.

T

The vertex is always located halfway between the zeroes.

T

The y – coordinate of the vertex is always the same as the optimal value.

F

A parabola must always have at least one x-intercept.

T

The x – coordinate of the vertex is always the same as the axis of symmetry.

F

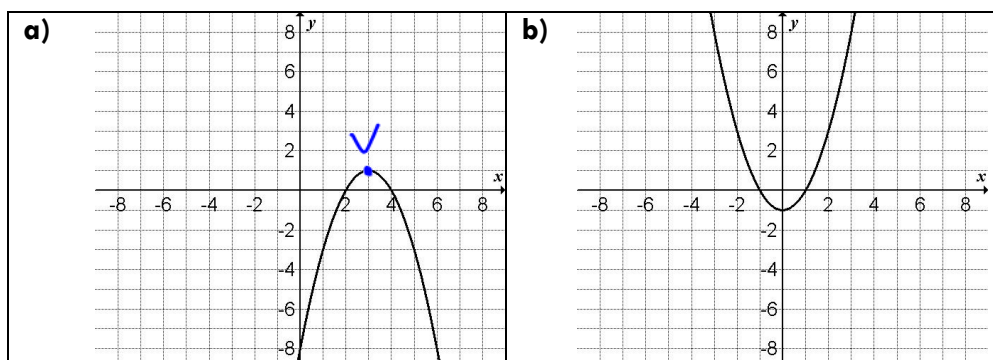
A parabola must open up.

F

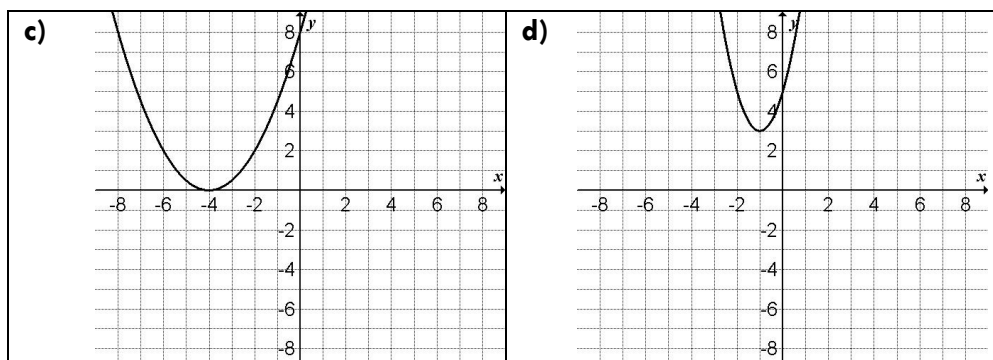
The y – intercept is always positive.

Parabola Practice

1. Complete the analysis for each of the following parabolas

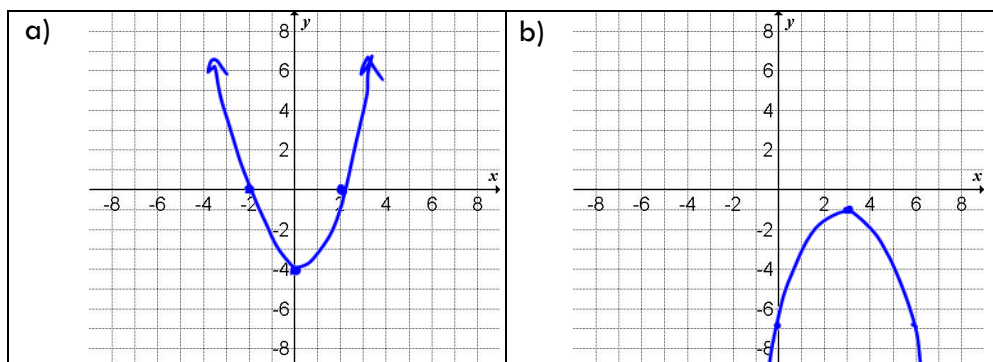


Vertex	$(3, 1)$	$(0, -2)$
Optimal Value	1	-2
Axis of Symmetry	$x = 3$	$x = 0$
Zeroes	$(2, 0)$ and $(4, 0)$	$(-1, 0)$ and $(1, 0)$
Direction of Opening	↓	↑
y – intercept	$(0, -8)$	$(0, -2)$

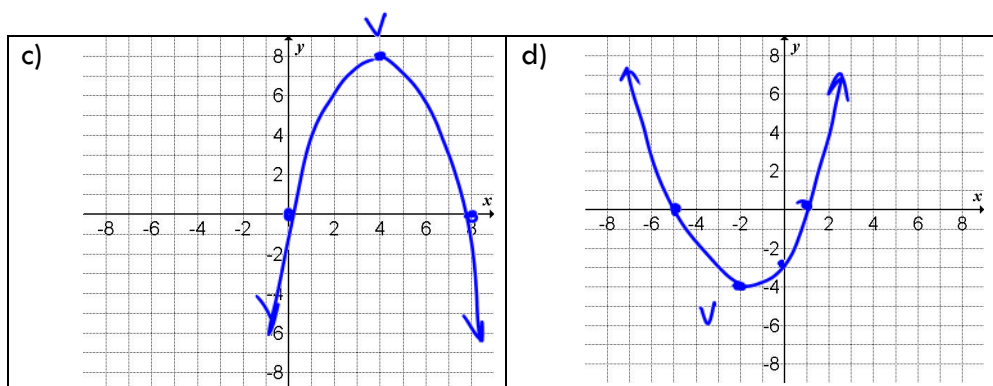


Vertex	$(-4, 0)$	$(-1, 5)$
Optimal Value	0	5
Axis of Symmetry	$x = -4$	$x = -1$
Zeroes	$(-4, 0)$	NONE
Direction of Opening	↑	↑
y – intercept	$(0, 0)$	$(0, 5)$

2. Sketch the parabola graph associated with each set of analysis shown.



Vertex	(0, -4)	(3, -1)
Optimal Value	-4	-1
Axis of Symmetry	$x = 0$	$x = 3$
Zeroes	(-2, 0) , (2, 0)	No zeroes
Direction of Opening	Up (minimum)	Down (maximum)
y – intercept	(0, -4)	(0, -7)



Vertex	(4, 8)	(-2, -4)
Optimal Value	8	-4
Axis of Symmetry	$x = 4$	$x = -2$
Zeroes	(0, 0) , (8, 0)	(-5, 0) , (1, 0)
Direction of Opening	Down (maximum)	Up (minimum)
y – intercept	(0, 0)	(0, -3)

3. Why are the x-intercepts called zeroes?

b/c at these points the y values are 0s.