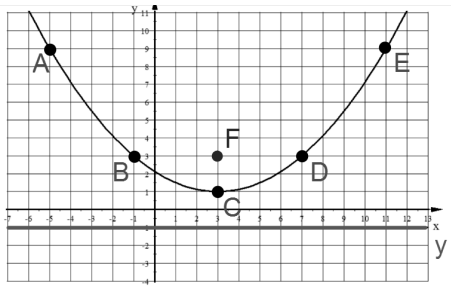


What do you notice about the distances in this table?

The distances from each point on the parabola to Pt. F and the line $y = -1$ is the SAME.

Point	Distance to Point F $(3,3)$	Distance to the line $y = -1$
A	10	10
B	4	4
C	2	2
D	4	4
E	10	10

For every distance except A to F and E to F you can count the distance because it is either Vertical or Horizontal. For A to F and E to F you can use the Distance Formula or create a right triangle and use the Pythagorean Theorem.

Parabola: Set of all points in a plane that are equidistant from a fixed line and a fixed point that is not on the line.

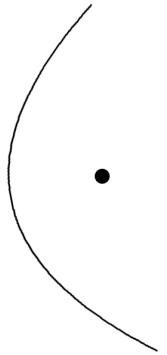
Focus: The fixed point

Directrix: The fixed line

Vertex: The point midway between the Focus and the Directrix.

Line of Symmetry:
Line Perpendicular to the Directrix passing through both the Vertex and the Focus

The Focus of a Parabola has REAL-LIFE applications:

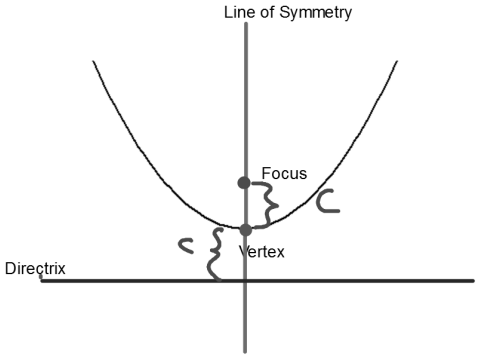


Satellite Dishes are Parabolic with the receiver at the focus.

Parabolic Microphones collect sound and "focus" it at the focus of the parabola.

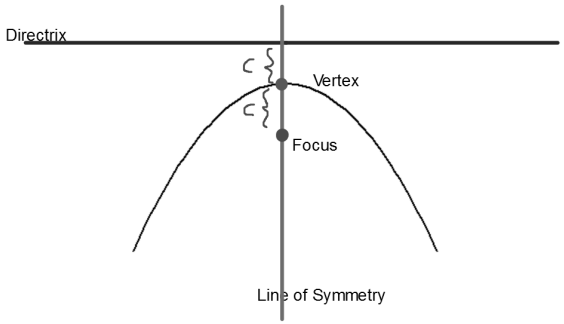
$y=ax^2$ when $a>0$

The parabola opens UP.



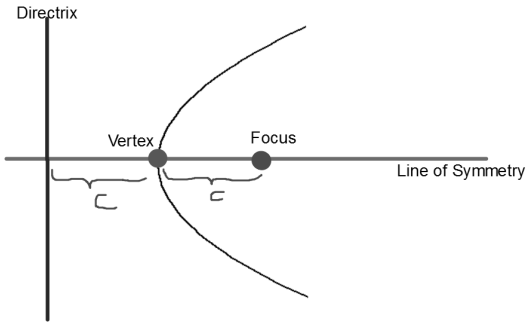
$y=ax^2$ when $a<0$

The parabola opens DOWN.



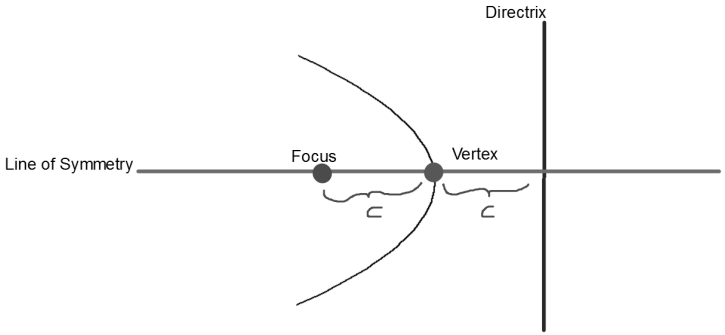
$x = ay^2$ when $a>0$

The parabola opens to the RIGHT.



$x = ay^2$ when $a<0$

The parabola opens to the LEFT.



In Parabolas:

a is the coefficient in the equation.

c is the distance from:
Vertex to Focus
and
Vertex to Directrix

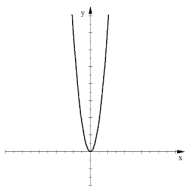
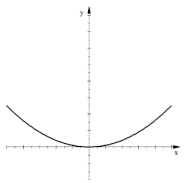
Relationship between a & c:

$$|a| = \frac{1}{4c}$$

which can be rewritten into:

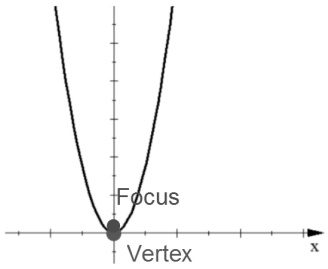
$$c = \frac{1}{4|a|}$$

$y = ax^2$

Eq: $y = 7x^2$	Eq: $y = 0.1x^2$
Graph: 	Graph: 
When a is large the parabola is Narrower	When a is small the parabola is Wider

C is the distance from the vertex to the focus:

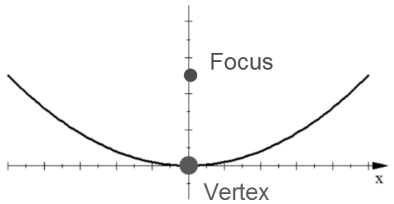
$$c = \frac{1}{4|a|}$$



$y = 7x^2$

$C = \frac{1}{4(7)} = \frac{1}{28}$

The Focus is only 1/28th of a unit above the Vertex.



$y=0.1x^2$

$C = \frac{1}{4(0.1)} = \frac{1}{0.4} = 2.5$

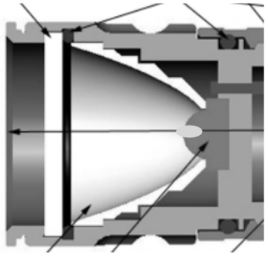
The Focus is 2.5 units above the Vertex.

$$c = \frac{1}{4|a|}$$

The Wider the parabola the FARTHER from the Vertex the Focus is

The Narrower the parabola the CLOSER to the Vertex the Focus is

Value a is "large"



Value of a is "small"