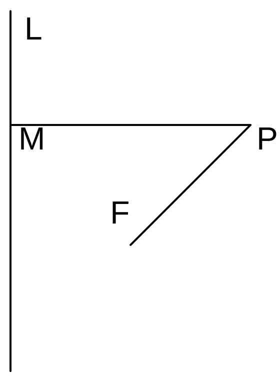
Conics

Definition

A conic is defined as the locus of a point, which moves such that its distance from a fixed line to its distance from a fixed point is always constant. The fixed point is called the focus of the **conic**. The fixed line is called the **directrix** of the conic. The constant ratio is the **eccentricity** of the conic.



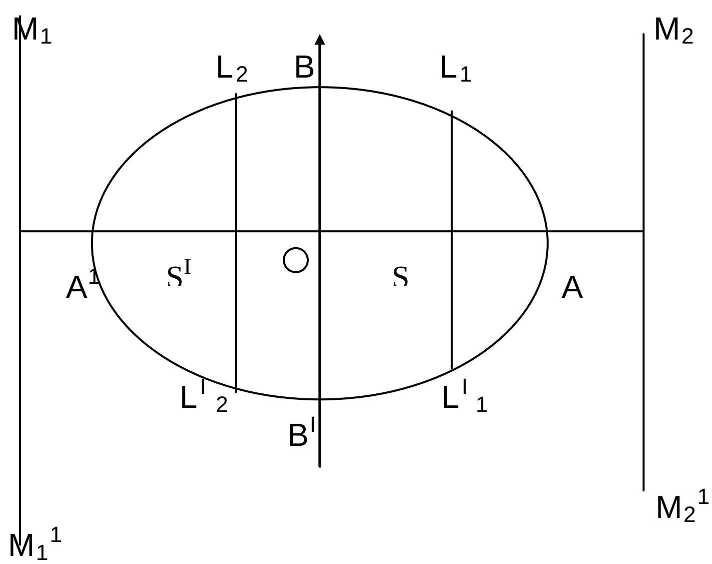
L is the fixed line – Directrix of the conic.

F is the fixed point – Focus of the conic.

$\frac{FP}{PM}$ = constant ratio is called the eccentricity = 'e'

Classification of conics with respect to eccentricity

1. If e < 1, then the conic is an Ellipse



1) The ***standard equation*** of an ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

2) The line segment AA^1 is the ***major axis*** of the ellipse, $AA^1 = 2a$

3) The equation of the major axis is Y = 0

4) The line segment BB^1 is the ***minor axis*** of the ellipse, BB1 = 2b

5) The equation of the minor axis is X = 0

6) The length of the major axis is always ***greater than*** the minor axis.

7) The point O is the intersection of major and minor axis.

8) The co-ordinates of O are (0,0)

9) The ***foci*** of the ellipse are S(ae,0)and S^l(-ae,0)

10) The vertical lines passing through the focus are known as ***Latusrectum***

11) The length of the Latusrectum is $\frac{2b^2}{a}$

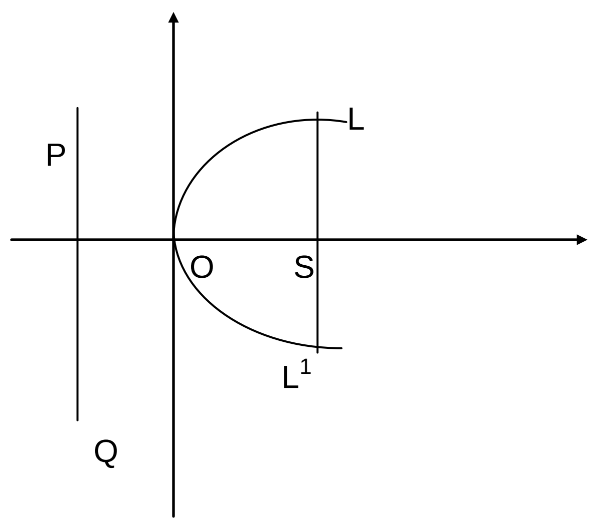
12) The points A (a,0) and A^1(-a,0)

13) The ***eccentricity*** of the ellipse is e = $\sqrt{1-\frac{b^2}{a^2}}$

14) The vertical lines $M_1M_1^1$and $M_2M_2^1$ are known as the ***directrix*** of the ellipse and their respective

equations are x = $\frac{a}{e}$ and x = $\frac{-a}{e}$

2. If e = 1, then the conic is a **Parabola.**



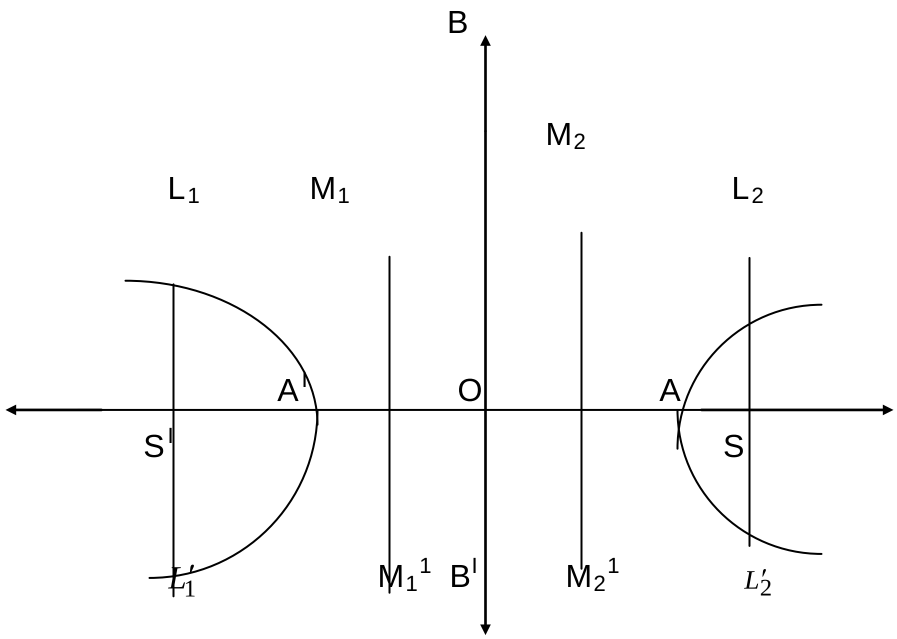
1) The ***Standard equation*** of the parabola is $y^2 = 4ax$.
2) The horizontal line is the ***axis of the parabola***.
3) The equation of the axis of the parabola is Y = 0
4) The parabola $y^2 = 4ax$ is ***symmetric*** about the axis of the parabola.
5) The ***vertex*** of the parabola is O (0,0)
6) The line PQ is called the ***directrix*** of the parabola.

7) The equation of the directrix is x = -a

8) The ***Focus*** of the parabola is S(a,0).

9) The vertical line passing through S is the ***latus rectum***. LL^1 is the Latus rectum and its length $LL^1 = 4a$

3. If e > 1 ,then the conic is ***Hyperbola.***



1) The **standard equation** of an hyperbola is $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

2) The line segment AA^1 is the **Transverse axis** of the hyperbola ,$AA^1 = 2a$

3) The equation of the **Transverse axis** is Y = 0

4) The line segment BB^1 is the **Conjugate axis** of the hyperbola ,$BB^1 = 2b$

5) The equation of the **Conjugate axis** is X = 0

6) The point O is the intersection of **Transverse** and **Conjugate** axis.

7) The co-ordinates of O are (0,0)

8) The **foci** of the hyperbola are S(ae,0)and S^I(-ae,0)

9) The vertical lines passing through the focus are known as **Latusrectum**

10) The length of the Latusrectum is $\frac{2b^2}{a}$

11) The points A (a,0) and A^1(-a,0)

12) The **eccentricity** of the hyperbola is e = $\sqrt{1+\frac{b^2}{a^2}}$

13) The vertical lines $M_1 M_1^1$ and $M_2 M_2^1$ are known as the **directrix** of the hyperbola and their respective equations are x = $\frac{a}{e}$ and x = $\frac{-a}{e}$