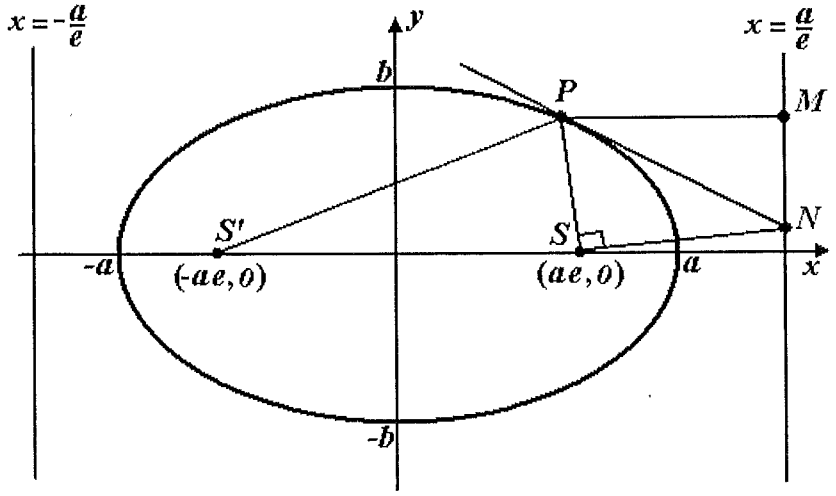
THE ELLIPSE

Graph of:

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$



major axis $2a$
($a > b$)

minor axis $2b$
($a > b$)

1. **Define the *eccentricity* of a 'conic section' to be 'e' where:** $e = \frac{SP}{PM}$ **< 1**

2. $b^2 = a^2.(1 - e^2)$ **when** $a > b$ 

3. $a^2 = b^2.(1 - e^2)$ **when** $b > a$ 

4. **SP + PS′ = 2a** **and** **$\angle$PSN = 90°**

5. ***Tangent*** **equation at P(x_1, y_1) is given by:** $\frac{x_1 x}{a^2}+\frac{y_1 y}{b^2}=1$

6. ***Tangent*** **equation at P$(a.\cos\theta, b.\sin\theta)$ is:** $\frac{x\cos\theta}{a}+\frac{y\sin\theta}{b}=1$

7. ***Normal*** **equation at P(x_1, y_1) is given by:** $\frac{a^2 x}{x_1}-\frac{b^2 y}{y_1}=a^2-b^2$

8. ***Normal*** **equation at P$(a.\cos\theta, b.\sin\theta)$ is:** $\frac{ax}{\cos\theta}-\frac{by}{\sin\theta}=a^2-b^2$

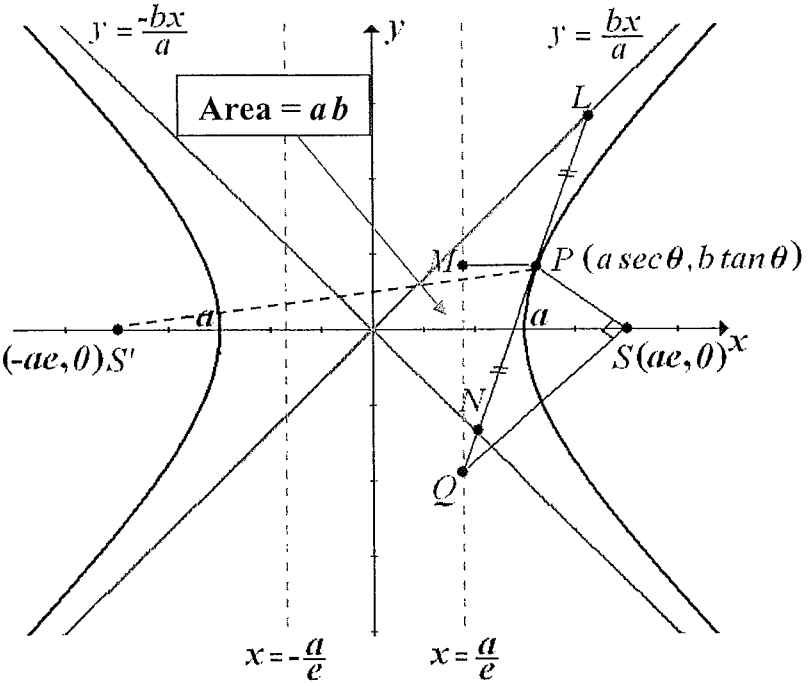
9. **Equation of the *Chord of Contact* is given by:** $\frac{x_0 x}{a^2}+\frac{y_0 y}{b^2}=1$

10. **PQ is a *focal chord* $\Rightarrow$ Tangents at P and Q meet on the directrix.**

11. **Area of Ellipse =** πab

THE HYPERBOLA

Graph of: $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$



1. **Define the *eccentricity* of a 'conic section' to be 'e' where:** $e = \frac{SP}{PM} > 1$

2. $b^2 = a^2.(e^2 - 1)$ **for** $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ 

3. $a^2 = b^2.(e^2 - 1)$ **for** $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ 

4. $\boxed{S'P - PS = 2a}$ **and** $\boxed{PL = PN}$ **and** $\boxed{\angle PSQ = 90^\circ}$

5. ***Tangent*** **equation at** $P(x_1, y_1)$ **is given by:** $\frac{x_1 x}{a^2} - \frac{y_1 y}{b^2} = 1$

6. ***Tangent*** **equation at** $P(a.\sec\theta, b.\tan\theta)$ **is:** $\frac{x\sec\theta}{a} - \frac{y\tan\theta}{b} = 1$

7. ***Normal*** **equation at** $P(x_1, y_1)$ **is given by:** $\frac{a^2 x}{x_1} + \frac{b^2 y}{y_1} = a^2 + b^2$

8. ***Normal*** **equation at** $P(a.\sec\theta, b.\tan\theta)$ **is:** $\frac{ax}{\sec\theta} + \frac{by}{\tan\theta} = a^2 + b^2$

9. **Equation of the *Chord of Contact* is given by:** $\frac{x_0 x}{a^2} - \frac{y_0 y}{b^2} = 1$

10. **PQ is a *focal chord* $\Rightarrow$ Tangents at P and Q meet on the directrix.**