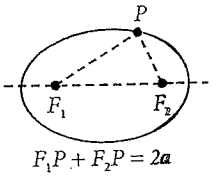
Definition of Ellipse

An **ellipse** is the set of all points P in a plane such that the sum of the distances from P to two fixed points, F_1 and F_2, called the **foci**, is a constant.

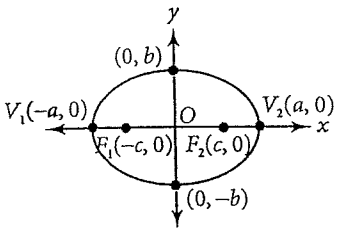


Standard Equation of an Ellipse

The standard equation of an ellipse centered at the origin is given below.

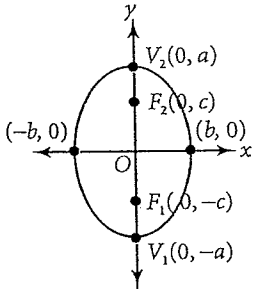
Horizontal major axis

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



Vertical major axis

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



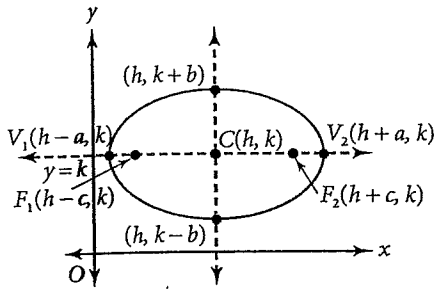
In each case: • $a^2 > b^2$, and $a^2 - b^2 = c^2$,
• the length of the major axis is $2a$, and
• the length of the minor axis is $2b$.

Standard Equation of a Translated Ellipse

The standard equation of an ellipse centered at (h, k) is given below.

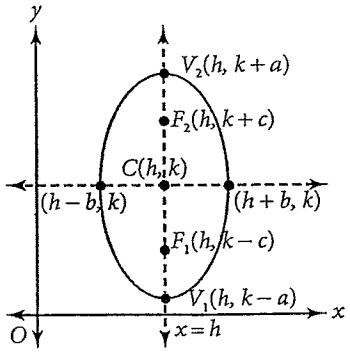
Horizontal major axis

$$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$$



Vertical major axis

$$\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$$



In each case: • $a^2 > b^2$, and $a^2 - b^2 = c^2$,
• the length of the major axis is $2a$, and
• the length of the minor axis is $2b$.