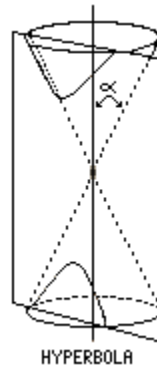# Hyperbola

Hyperbola, plane curve, one of the conic sections formed by a plane that cuts both nappes of a right circular cone but does not pass through the vertex of the cone. A hyperbola has two U-shaped nonintersecting branches, identical in form, with the open parts facing in opposite directions; the arms of each branch separate as they recede.

HYPERBOLA

A hyperbola is also defined as the locus of all points, such that the difference between the distances from any point on the hyperbola to two fixed points, called the *foci,* is equal to a constant. Each branch contains one focus in its interior area; the line joining the foci intersects each branch at a point called a *vertex.* The line through the vertices and the foci is called the *transverse axis.* The line perpendicular to the transverse axis and passing through the point midway between the vertices is the *conjugate axis.* The two axes meet at the centre of the hyperbola. The hyperbola is symmetric with respect to each axis and the centre.

A hyperbola has two asymptotes passing through the centre; an asymptote of a curve is a straight line with the property that the distance between it and the curve approaches zero as the curve recedes to infinity. A *rectangular* or *equilateral* hyperbola has asymptotes that are perpendicular to each other.

The hyperbola has useful and important properties. In particular, the angle formed at a point on the hyperbola by the lines joining the point to the foci is bisected by the tangent to the hyperbola at that point. In astronomy, some orbits are hyperbolic in shape. For example, certain comets that have a high enough velocity and a large enough mass cannot be captured by the Sun's gravitational field; such comets move in hyperbolic orbits. The modern navigational device called loran also uses hyperbolas.

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