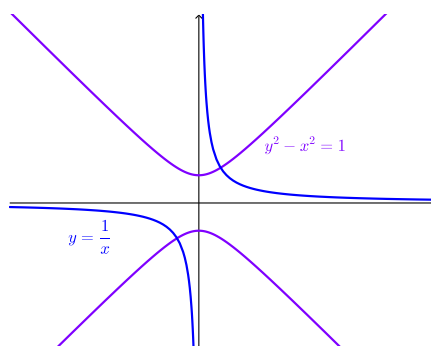


Hyperbola

The shape of graphs such as $y = 1/x$ or $y^2 - x^2 = 1$ is a *hyperbola*. It is a type of [conic section](#).



It is also (approximately) the path of an object that falls into the solar system, is flung out again by the Sun's gravity, and never returns.

The Cartesian equation of a hyperbola centred on the origin with its axes (lines of symmetry) along the coordinate axes and crossing the x -axis is

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

One of the branches can also be described parametrically as

$$\begin{aligned}x(t) &= a \cosh t, \\y(t) &= b \sinh t\end{aligned}$$

or both branches can be described as

$$\begin{aligned}x(t) &= a \sec t, \\y(t) &= b \tan t.\end{aligned}$$