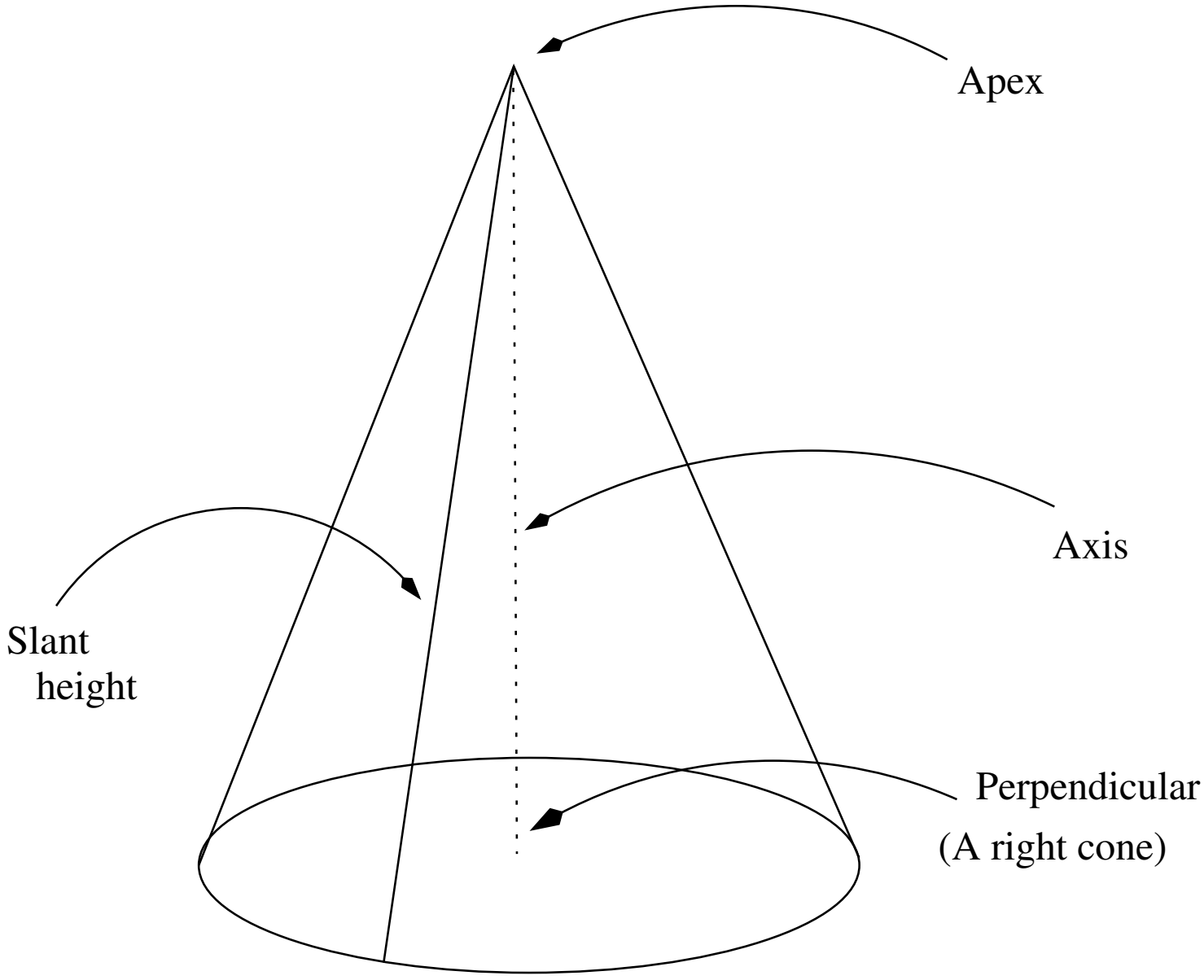
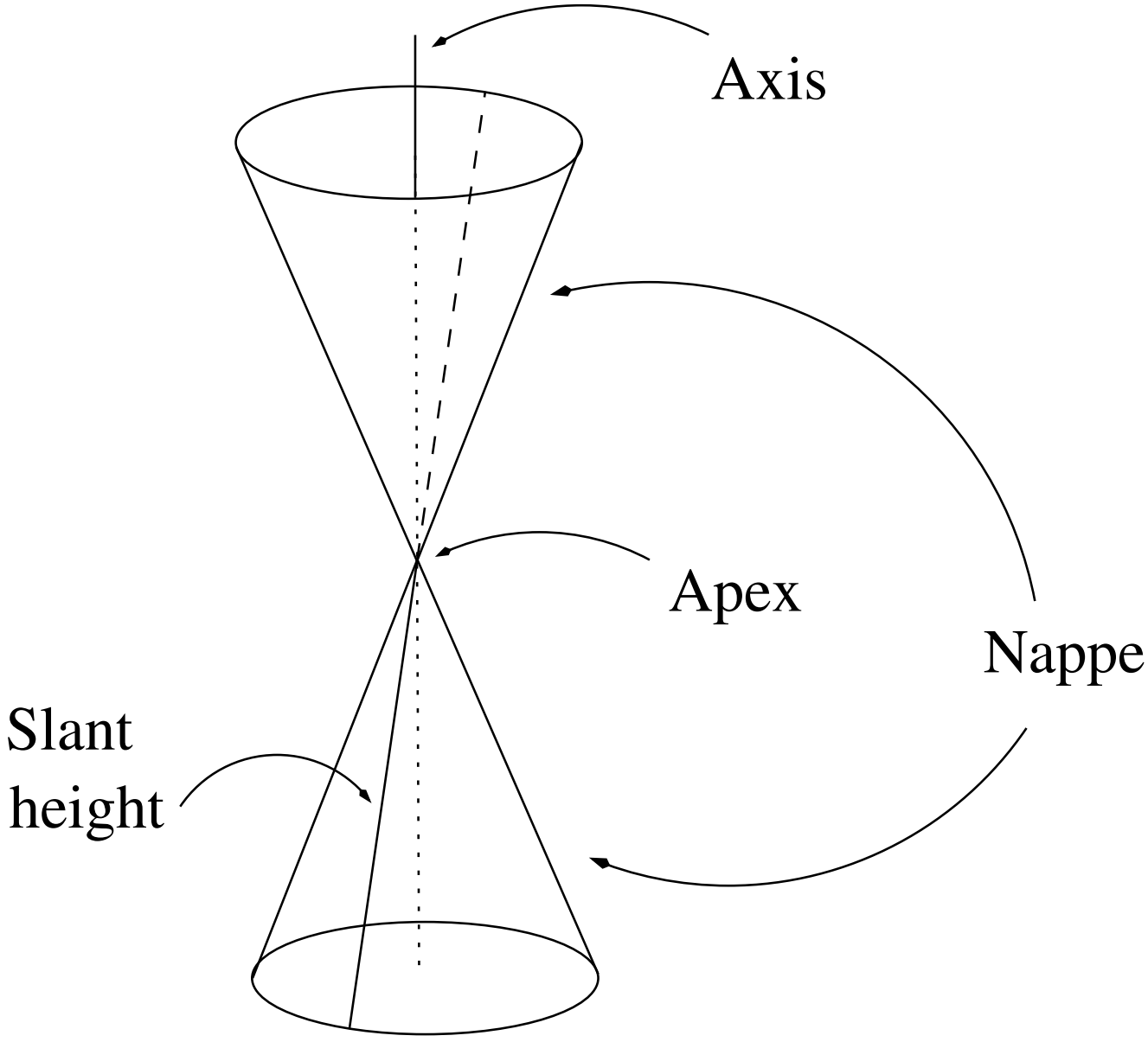
cone

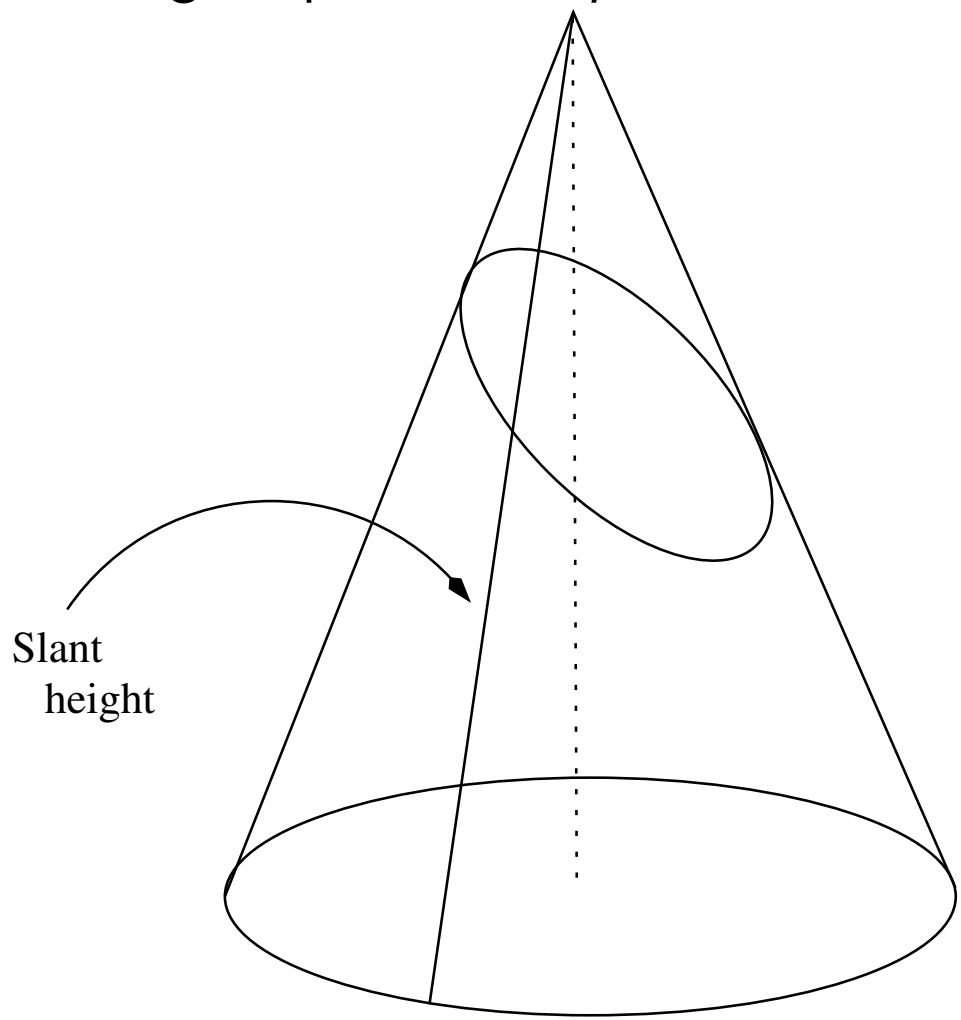


double cone



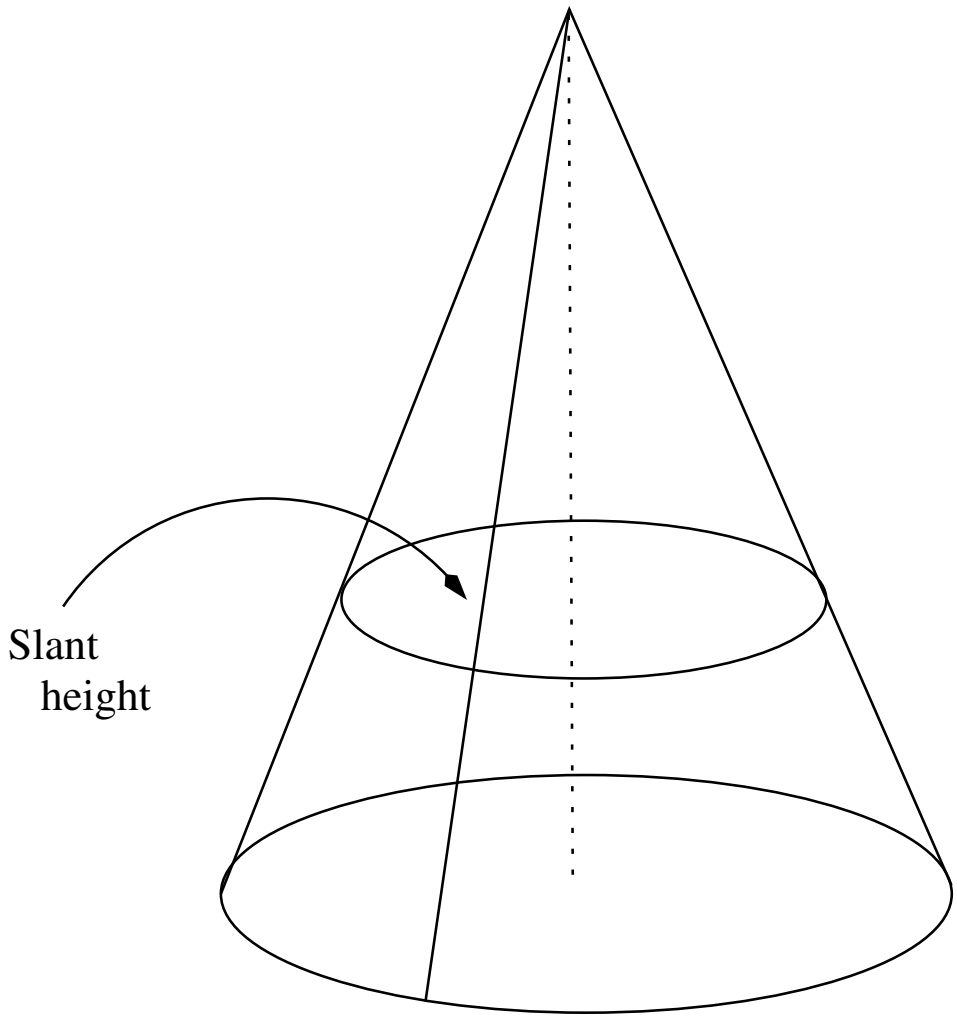
Ellipse

If we cut the cone with a plane that intersects all the slant heights, the resulting shape is an *ellipse*.



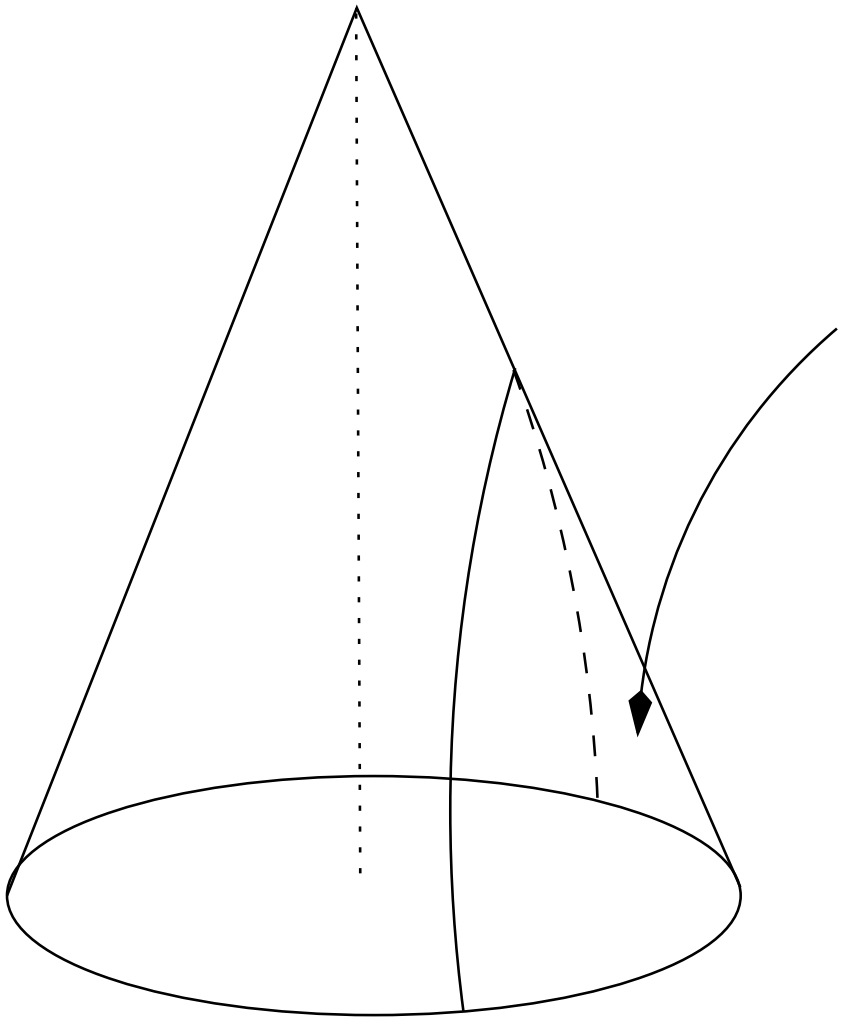
Circle

If we cut the cone with a plane that intersects all the slant heights and is perpendicular to the axis, the resulting shape is an *circle*. A circle is a special case of an ellipse.



Parabola

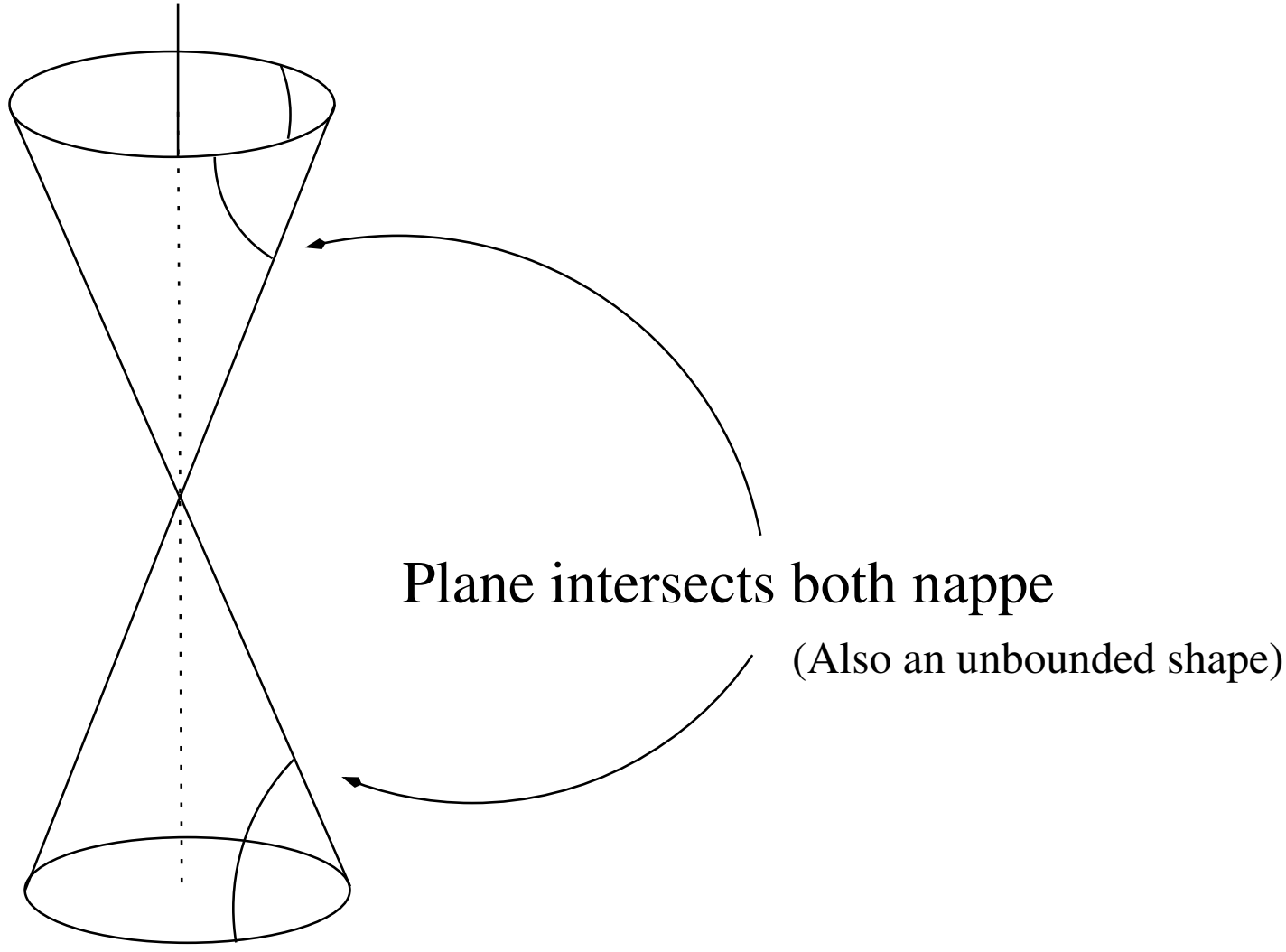
If we cut the cone with a plane that is parallel to a tangent plane, the resulting shape is an *parabola*



Note:
This is unbounded,
since the cone is unbounded

hyperbola

If we cut the double cone with a plane that intersects both nappe, the resulting shape is an *hyperbola*



Conic sections and quadratic equations

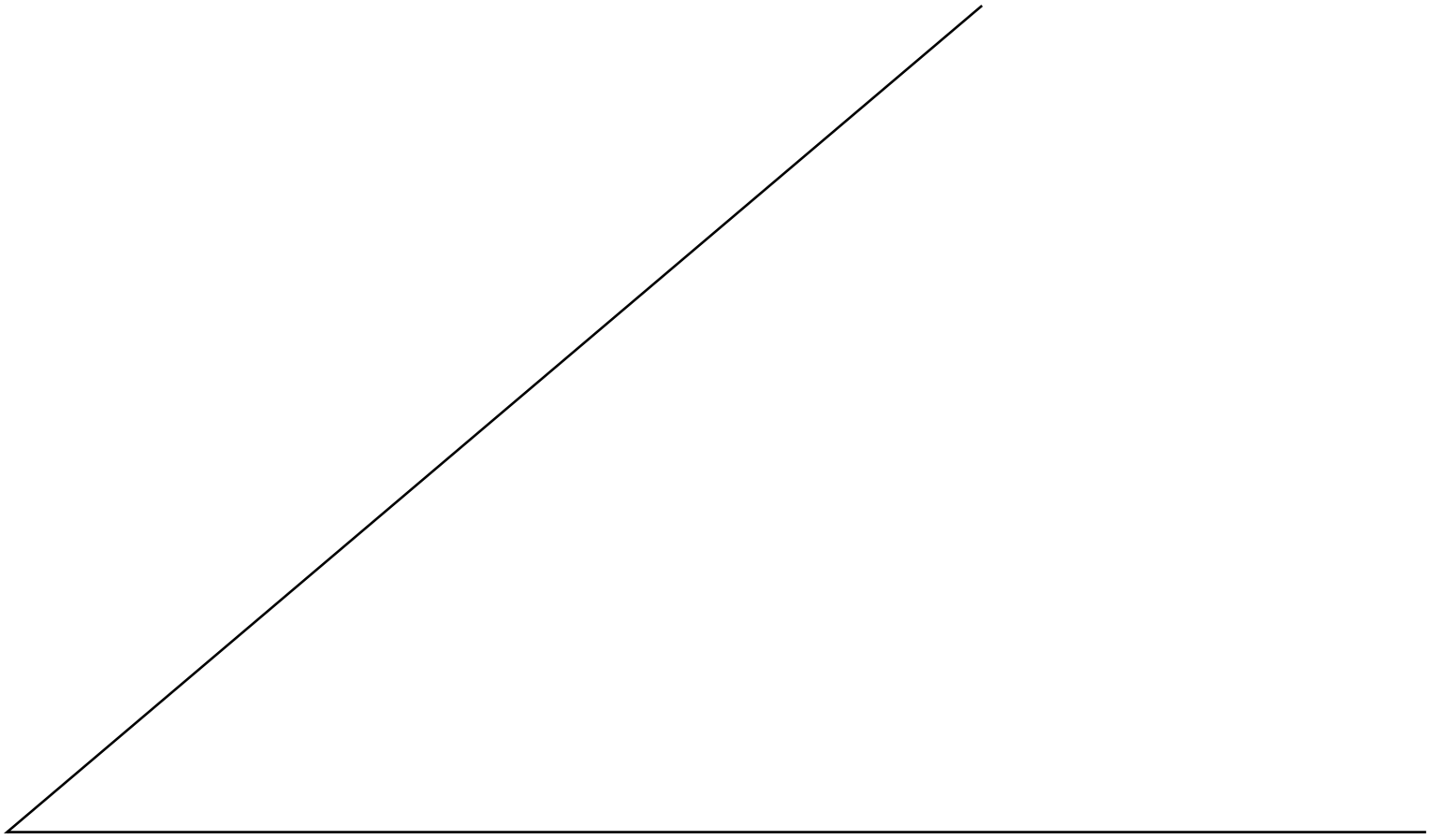
circle	$x^2 + y^2 = r^2$
ellipse	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
parabola	$y = x^2$
hyperbola	$x^2 - y^2 = a$

In General, a 2^{nd} degree equation in x and y is

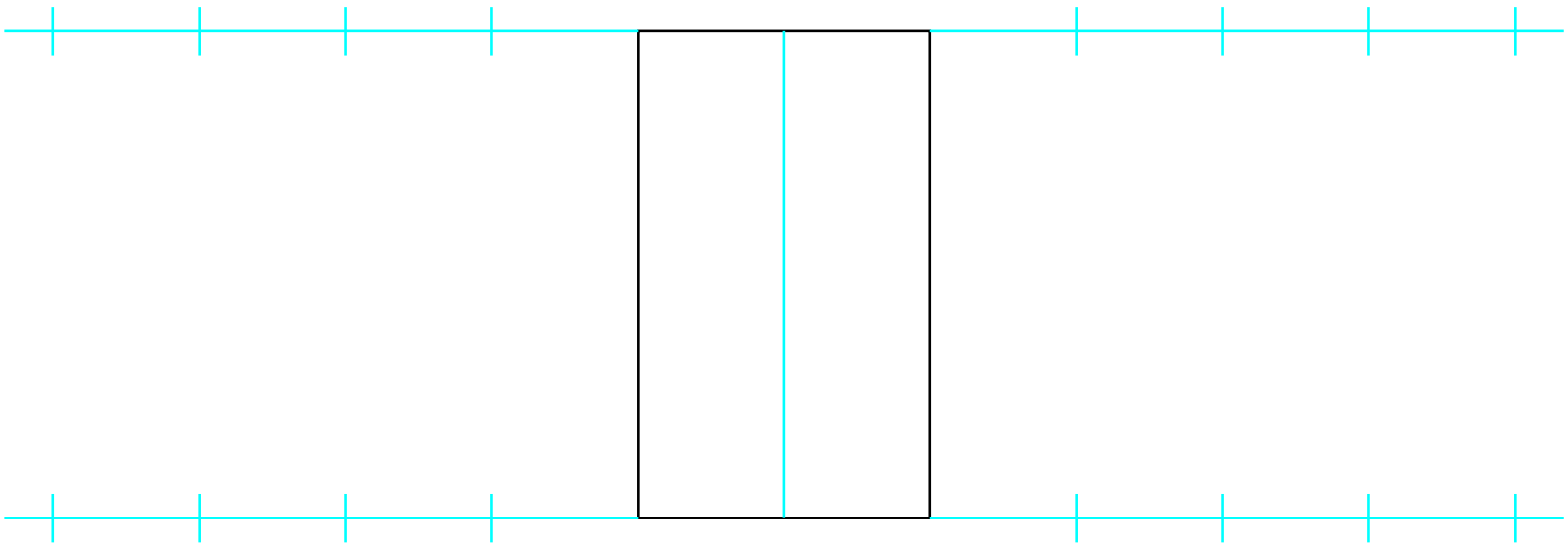
$$ax^2 + by^2 + cxy + dx + ey + f = 0$$

All non-trivial equations of this type are conic sections.

Conic constructions - parabola

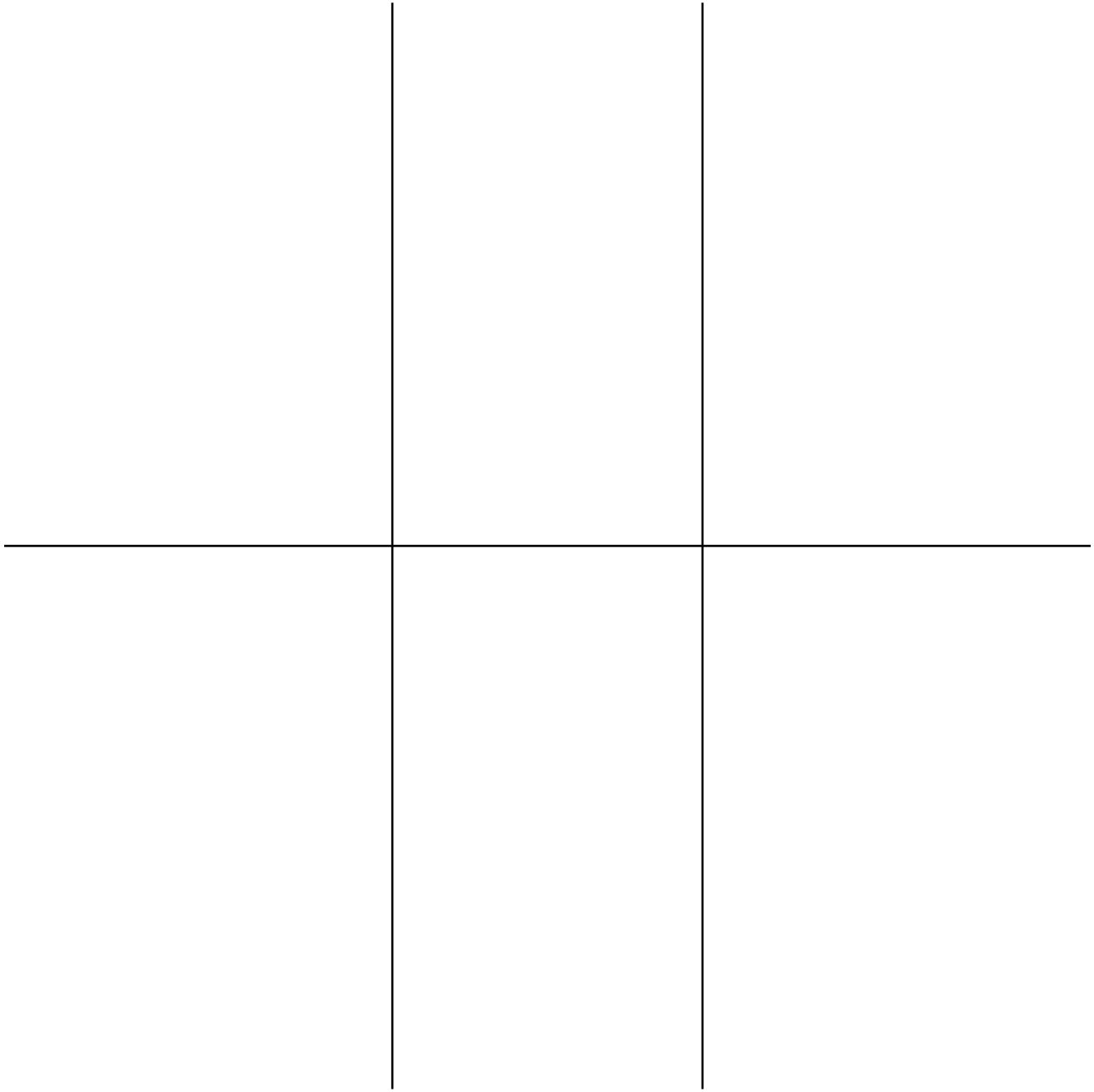


Conic constructions - ellipse (circle)

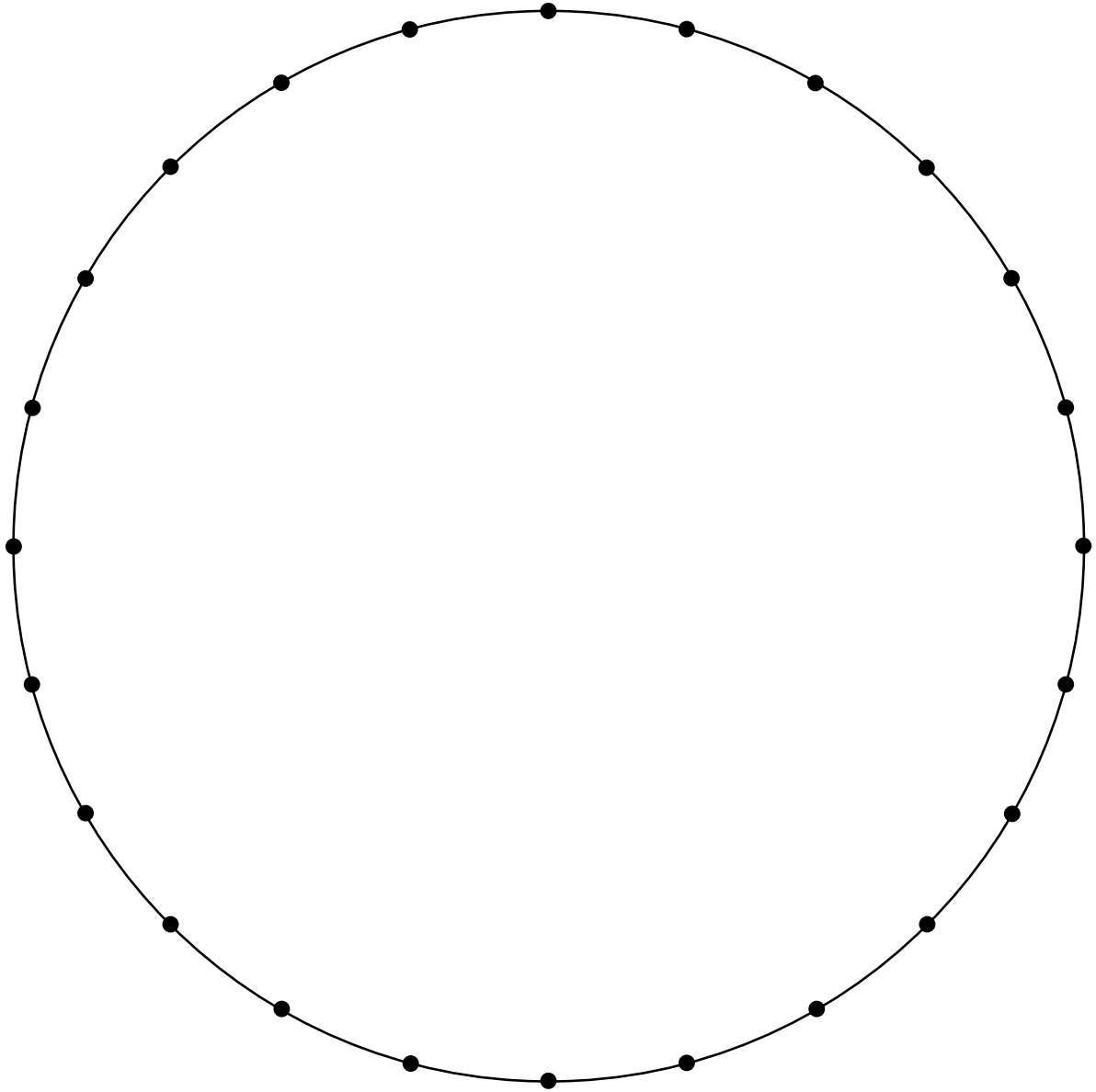


Conic constructions - circle

Conic constructions - hyperbola



Conic constructions - cardiod (1)



Conic constructions - cardiod (2)