

Conics Summary

Conic Section	Standard Form	Other Info.
Circle Centre (h, k) Radius r	$(x - h)^2 + (y - k)^2 = r^2$	Derived from the distance formula.
Parabola - Vertex (h, k) Focus $(h, k + p)$ Directrix at $y = k - p$ Foci $(h + p, k)$ Directrix at $x = h - p$	$(x - h)^2 = 4p(y - k)$ $(y - k)^2 = 4p(x - h)$	$p > 0$ opens up, $p < 0$ opens down $p > 0$ opens right, $p < 0$ opens left
<ul style="list-style-type: none"> • Ellipse - Centre (h, k) • Horizontal major axis: $a > b$ Vertices: $(h \pm a, k)$ Foci: $(h \pm c, k)$ • Vertical major axis: $a > b$ Vertices: $(h, k \pm a)$ Foci: $(h, k \pm c)$ Eccentricity: $e = c/a$ 	$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$ $\frac{(x - h)^2}{b^2} + \frac{(y - k)^2}{a^2} = 1$	<ul style="list-style-type: none"> • The longer axis is called the major axis, the shorter axis is called the minor axis. • 'a' is the distance from the centre to each vertex (the end of the major axis). • 'b' is the distance from the centre to the end of the minor axis. • 'c' is the distance from the centre to each focus. $c^2 = a^2 - b^2$ • Length of major axis = $2a$ • Length of minor axis = $2b$
<ul style="list-style-type: none"> • Hyperbola - Centre (h, k) • Horizontal transverse axis (x coefficient is positive) Vertices: $(h \pm a, k)$ Foci: $(h \pm c, k)$ Asymptote: $y - k = \pm \frac{b}{a}(x - h)$ • Vertical transverse axis (y coefficient is positive) Vertices: $(h, k \pm a)$ Foci: $(h, k \pm c)$ Asymptote: $y - k = \pm \frac{a}{b}(x - h)$ 	$\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$ $\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1$	<ul style="list-style-type: none"> • 'a' is the distance from the centre to each vertex. • 'b' is a point on the conjugate axis but is not a point on the hyperbola (it helps determine asymptotes) • 'c' is the distance from the centre to each focus. $c^2 = a^2 + b^2$ • N.B. The transverse axis is <u>not necessarily</u> the longer axis but is associated with whichever variable is positive.