SATPREP

Summary of Conic Section

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 $y = k - p$	$(x-h)^2 = 4p(y-k)$	$p > 0$ opens up, $p < 0$ opens down
Foci $(h+p, k)$ Directrix at $x = h - p$	$(y-k)^2 = 4p(x-h)$	$p > 0$ opens right, $p < 0$ opens left
• **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: $(h, k \pm c)$	$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$ $\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$	• 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
• **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 : $y-k=\pm\frac{a}{b}(x-h)$	$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$ $\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$	• '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 not necessarily the longer axis but is associated with whichever variable is positive.