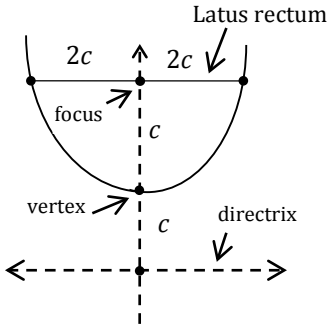
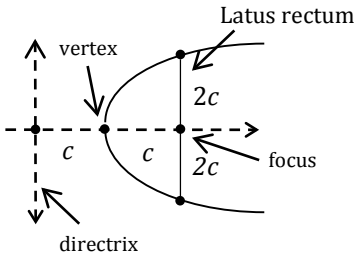
Conic Sections Formula Sheet

Circles:

	Center at Origin	Center at (h, k)
Standard Form	$x^2 + y^2 = r^2$	$(x - h)^2 + (y - k)^2 = r^2$
Radius:	r	r
Diameter:	$2r$	$2r$

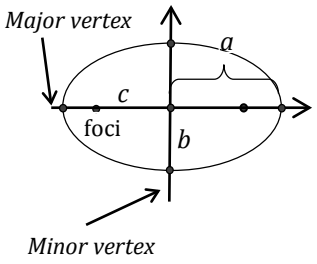
Parabolas:

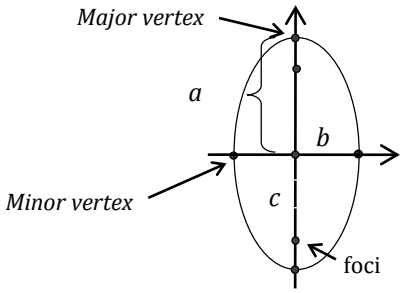




Parabolas centered at the Origin:		
Orientation:	**Vertical**	**Horizontal**
Standard Form of Equation	$x^2 = 4cy$	$y^2 = 4cx$
Axis of Symmetry	$x = 0$	$y = 0$
Focus	$(0, c)$	$(c, 0)$
Directrix	$y = -c$	$x = -c$
Parabolas centered at (h, k)		
Standard Form of Equation	$(x - h)^2 = 4c(y - k)$	$(y - k)^2 = 4c(x - h)$
Axis of Symmetry	$x = h$	$y = k$
Focus	$(h, k + c)$	$(h + c, k)$
Directrix	$y = k - c$	$x = h - c$
Opening	Upward if $c > 0$ Downward if $c < 0$	Right if $c > 0$ Left if $c < 0$

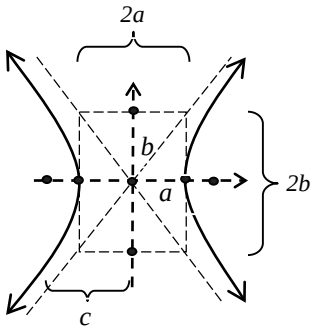
Ellipses:

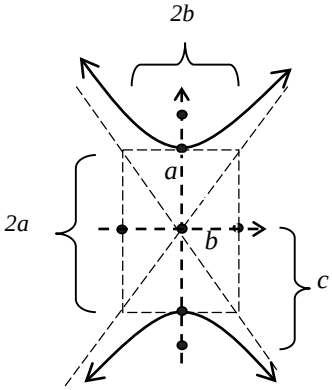




a^2 is always largest		$c^2 = a^2 - b^2$
Orientation:	**Horizontal**	**Vertical**
Equation in Standard Form Centered at the Origin:	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$
Ellipses centered at (h, k):		
Equation in Standard Form	$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$	$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$
Major Vertices	$(h \pm a, k)$	$(h, k \pm a)$
Foci	$(h \pm c, k)$	$(h, k \pm c)$

Hyperbolas:





a^2 is always first		$c^2 = a^2 + b^2$
Orientation:	**Horizontal**	**Vertical**
Equation in Standard Form Centered at the Origin:	$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$	$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$
Hyperbolas centered at (h, k):		
Equation in Standard Form	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$	$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$
Foci	$(h \pm c, k)$	$(h, k \pm c)$
Asymptotes	$y - k = \pm\frac{b}{a}(x-h)$	$y - k = \pm\frac{a}{b}(x-h)$