Analytic Geometry

Parabola

	Horizontal	
	$(y-k)^2 = 4p(x-h)$ or $x = ay^2 + by + c$ $p = \frac{1}{4a}$	$y^2 = 4px$ or $x = \frac{1}{4p}y^2$
Vertex: V	$(h,\ k)$	$(0,\ 0)$
Foci: F	$(h+p,\ k)$	$(p,\ 0)$
Directrix	$x = h - p$	$x = -p$

	Vertical	
	$(x-h)^2 = 4p(y-k)$ or $y = ax^2 + bx + c$ $p = \frac{1}{4a}$	$x^2 = 4py$ or $y = \frac{1}{4p}x^2$
Vertex: V	$(h,\ k)$	$(0,\ 0)$
Foci: F	$(h,\ k+p)$	$(0,\ p)$
Directrix	$y = k - p$	$y = -p$

Ellipse

	Horizontal		Vertical	
	$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	$\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$	$\frac{y^2}{a^2} + \frac{x^2}{b^2} = 1$
Center: C	$(h,\ k)$	$(0,\ 0)$	$(h,\ k)$	$(0,\ 0)$
Vertices: V	$(h+a,\ k)$ $(h-a,\ k)$	$(a,\ 0)$ $(-a,\ 0)$	$(h,\ k+a)$ $(h,\ k-a)$	$(0,\ a)$ $(0,\ -a)$
Minor: M	$(h,\ k+b)$ $(h,\ k-b)$	$(0,\ b)$ $(0,\ -b)$	$(h+b,\ k)$ $(h-b,\ k)$	$(b,\ 0)$ $(-b,\ 0)$
Foci: F	$(h+c,\ k)$ $(h-c,\ k)$	$(c,\ 0)$ $(-c,\ 0)$	$(h,\ k+c)$ $(h,\ k-c)$	$(0,\ c)$ $(0,\ -c)$
	$c^2 = a^2 - b^2$		$c^2 = a^2 - b^2$	

Hyperbola

	Horizontal		**Vertical**	
	$\dfrac{(x-h)^2}{a^2}-\dfrac{(y-k)^2}{b^2}=1$	$\dfrac{x^2}{a^2}-\dfrac{y^2}{b^2}=1$	$\dfrac{(y-k)^2}{a^2}-\dfrac{(x-h)^2}{b^2}=1$	$\dfrac{y^2}{a^2}-\dfrac{x^2}{b^2}=1$
***Center:* C**	$(h,\ k)$	$(0,\ 0)$	$(h,\ k)$	$(0,\ 0)$
***Vertices:* V**	$(h+a,\ k)\quad(h-a,\ k)$	$(a,\ 0)\ (-a,\ 0)$	$(h,\ k+a)\quad(h,\ k-a)$	$(0,\ a)\ (0,\ -a)$
***End-points:* W**	$(h,\ k+b)\quad(h,\ k-b)$	$(0,\ b)\ (0,\ -b)$	$(h+b,\ k)\quad(h-b,\ k)$	$(b,\ 0)\ (-b,\ 0)$
***Foci:* F**	$(h+c,\ k)\quad(h-c,\ k)$	$(c,\ 0)\ (-c,\ 0)$	$(h,\ k+c)\quad(h,\ k-c)$	$(0,\ c)\ (0,\ -c)$
Asymptotes:	$y-k=\pm\dfrac{b}{a}(x-h)$	$y=\pm\dfrac{b}{a}x$	$y-k=\pm\dfrac{a}{b}(x-h)$	$y=\pm\dfrac{a}{b}x$
	$c^2=a^2+b^2$		$c^2=a^2+b^2$	