Conic Sections Formulas

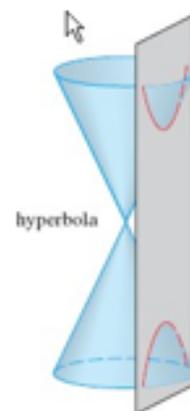## Parabola

	Vertical Axis	Horizontal axis
equation	$(x-h)^2=4p(y-k)$	$(y-k)^2=4p(x-h)$
Axis of symmetry	$x=h$	$y=k$
Vertex	(h,k)	(h,k)
Focus	$(h,k+p)$	$(h+p,k)$
Directrix	$y=k-p$	$x=h-p$
Direction of opening	p>0 then up; p<0 then down	p>0 then right; p<0 then left
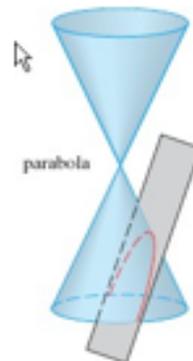
Ellipse

	Vertical Major Axis	Horizontal Major axis
equation	$\dfrac{(x-h)^2}{h^2}+\dfrac{(y-k)^2}{a^2}=1$	$\dfrac{(x-h)^2}{a^2}+\dfrac{(y-k)^2}{h^2}=1$
center	(h,k)	(h,k)
Vertices	$(h,k\pm a)$	$(h\pm a,k)$
Foci	$(h,k\pm c)$	$(h\pm c,k)$
Major axis equation	2a=length of major axis	
Minor axis equation	2b=length of minor axis	
Equation that relates a, b, and c	$a^2=b^2+c^2$	
Eccentricity of an ellipse	$e=(c/a)$	
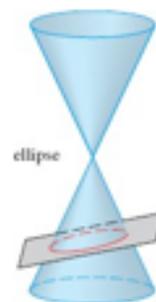
Hyperbola

	Vertical Transverse Axis	Horizontal Transverse axis
equation	$\dfrac{(y-k)^2}{a^2}-\dfrac{(x-h)^2}{h^2}=1$	$\dfrac{(x-h)^2}{a^2}-\dfrac{(y-k)^2}{h^2}=1$
center	(h,k)	(h,k)
Vertices	$(h,k\pm a)$	$(h\pm a,k)$
Foci	$(h,k\pm c)$	$(h\pm c,k)$
Assymptote equation	$y=k\pm\dfrac{a}{b}(x-h)$	$y=k\pm\dfrac{b}{a}(x-h)$
Equation relating a, b, and c	$c^2=a^2+b^2$	

Classifying conic sections	Circles	Parabola	Ellipse	Hyperbola
$Ax^2+Cy^2+Dx+Ey+F=0$	A=C	AC=0, Both are not 0	AC>0	AC<0