Ch. 8: Conic Sections

Name/Orientation		Equation	Focus (Foci)	Other			Identification
Parabola	Horizontal	$x = a(y-k)^2+h$	$h+\frac{1}{4a},k$	Directrix $x = h-\frac{1}{4a}$	Length of Latus Rectum $\left\|\frac{1}{a}\right\|$	Graphing Pattern $\frac{a}{1},\frac{3a}{1},\frac{5a}{1},\frac{7a}{1}\ldots$	$A = 0$ or $C = 0$ but not both
	Vertical	$y = a(x-h)^2+k$	$h,k+\frac{1}{4a}$	$y = k-\frac{1}{4a}$			
Circle		$(x-h)^2+(y-k)^2=r^2$	N/A				$A = C$
Ellipse	Horizontal	$\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$	$h\pm c,k$	Major axis $2a$ Minor Axis $2b$		a,b,c relationship $a^2\geq b^2$ $c^2=a^2-b^2$	A and C have the same sign and $A \neq C$
	Vertical	$\frac{(y-k)^2}{a^2}+\frac{(x-h)^2}{b^2}=1$	$h,k\pm c$				
Hyperbola	Horizontal	$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$	$h\pm c,k$	Asymptotes $y-k=\pm\frac{b}{a}(x-h)$	Transverse axis $2a$ Conjugate axis $2b$	a,b,c relationship $c^2=a^2+b^2$	A and C have opposite signs
	Vertical	$\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$	$h,k\pm c$	$y-k=\pm\frac{a}{b}(x-h)$			

Notes:
Centers are at (h,k)

Midpoint formula: $\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}$

Distance formula: $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Illustrations