

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 $\frac{a}{1}, \frac{3a}{1}, \frac{5a}{1}, \frac{7a}{1} \dots$	$A = 0$ 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:

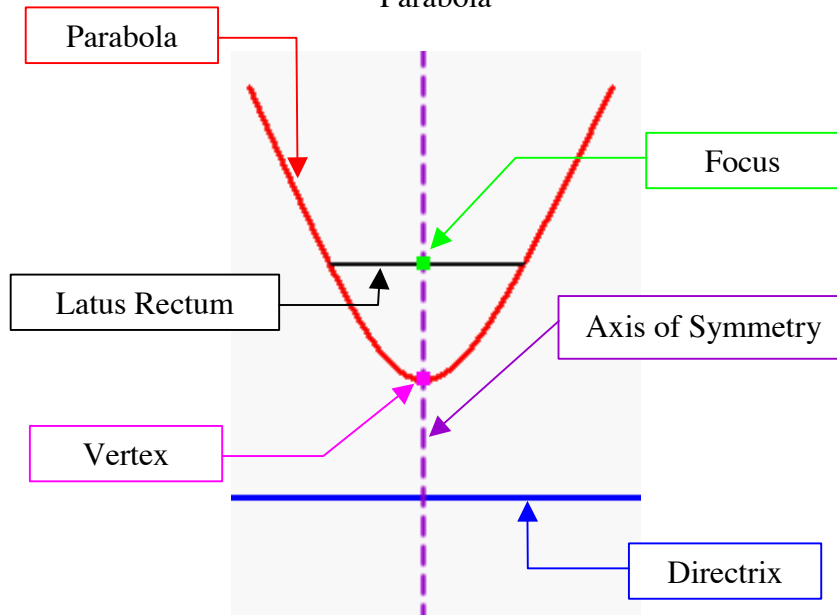
Centers are at (h,k)

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

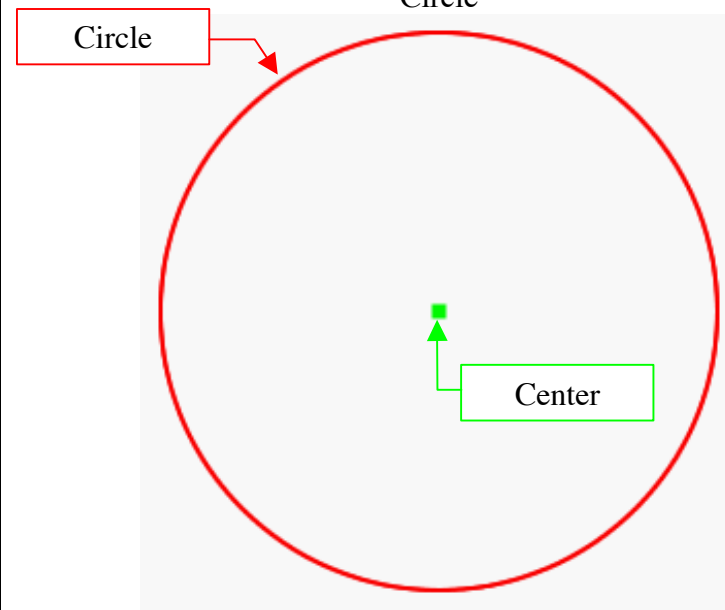
Distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Illustrations

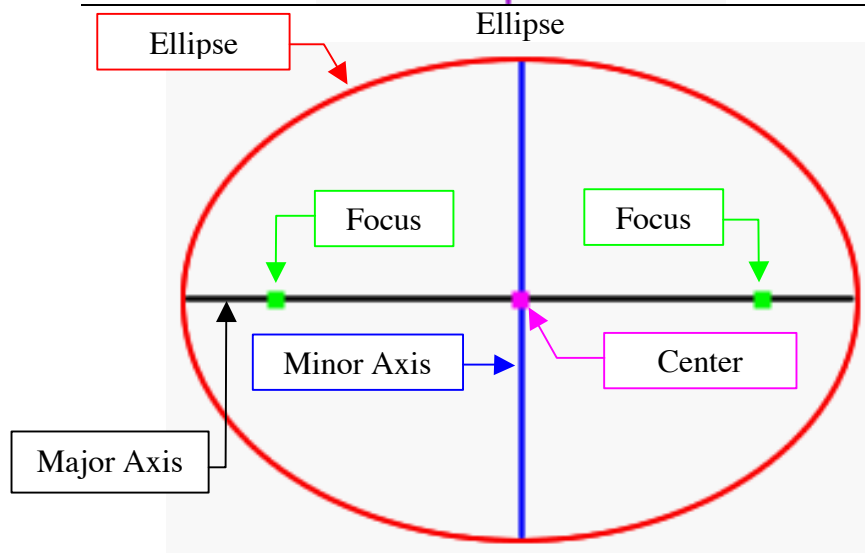
Parabola



Circle



Ellipse



Hyperbola

