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:
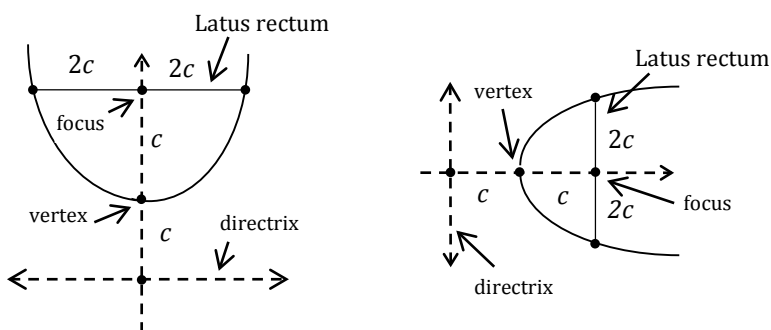
Parabolas centered at the Origin:		
Orientation:	**Vertical**	**Horizontal**
Standard Form of Equation	$x^2 = 4cy$	$y^2 = 4cx$
Axis of Symmetry	$x = 0$	$y = 0$
Focus	$(0, c)$	$(c, 0)$
Directrix	$y = -c$	$x = -c$
Parabolas centered at (h, k)		
Standard Form of Equation	$\left(x - h\right)^2 = 4c(y - k)$	$(y - k)^2 = 4c(x - h)$
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 $c < 0$

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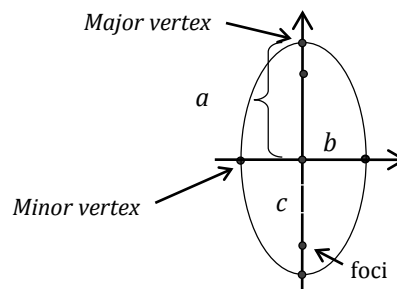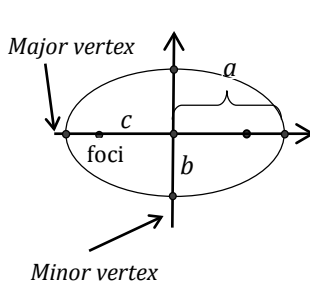
Ellipses:

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

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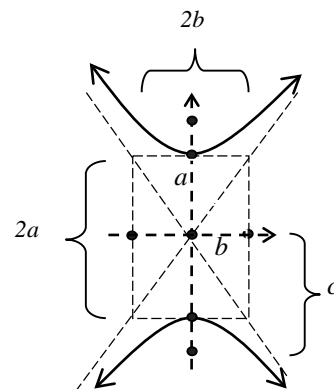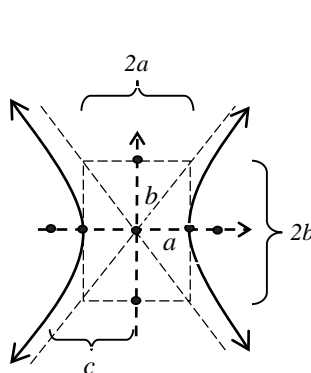
a^2 is always first		$c^2 = a^2 + b^2$	
Orientation:	**Horizontal**		**Vertical**
Equation in Standard Form Centered at the Origin:	$\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = 1$		$\dfrac{y^2}{a^2} - \dfrac{x^2}{b^2} = 1$
Hyperbolas centered at (h, k):			
Equation in Standard Form	$\dfrac{(x-h)^2}{a^2} -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

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