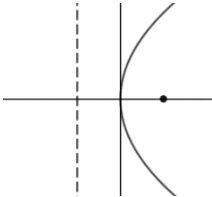
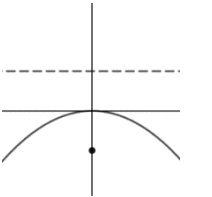
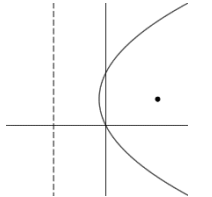
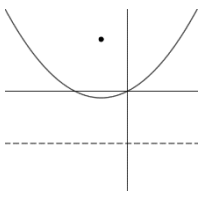


Conics

Parabola

$a > 0$: Open Up
 $a < 0$: Open down

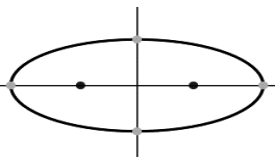
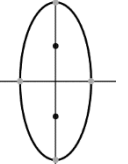
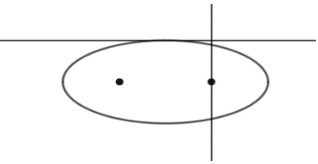
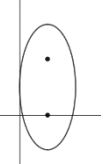
	$y^2 = 4ax$	$x^2 = 4ay$	$(y - k)^2 = 4a(x - h)$	$(x - h)^2 = 4a(y - k)$
Major Axis	Parallel to x-axis (Horizontal Axis)	Parallel to y-axis (Vertical Axis)	Parallel to x-axis (Horizontal Axis)	Parallel to y-axis (Vertical Axis)
Vertex	$(0,0)$	$(0,0)$	(h, k)	(h, k)
Focus	$(a, 0)$	$(0, a)$	$(h + a, k)$	$(h, k + a)$
Directrix	$x = -a$	$y = -a$	$x = h - a$	$y = k - a$
Graphical Example				

Ellipse

If a under x, more wide than tall, if a under y, more tall than wide, and if a=b it's a circle

$$a > b > 0$$

$$b^2 = a^2 - c^2$$

	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$	$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$	$\frac{(x - h)^2}{b^2} + \frac{(y - k)^2}{a^2} = 1$
Major Axis	Parallel to x-axis (Horizontal Axis)	Parallel to y-axis (Vertical Axis)	Parallel to x-axis (Horizontal Axis)	Parallel to y-axis (Vertical Axis)
Center	$(0,0)$	$(0,0)$	(h, k)	(h, k)
Vertices of Major Axis	$(\pm a, 0)$	$(0, \pm a)$	$(h \pm a, k)$	$(h, k \pm a)$
Endpoints of minor axis	$(0, \pm b)$	$(\pm b, 0)$	$(h, k \pm b)$	$(h \pm b, k)$
Foci	$(\pm c, 0)$	$(0, \pm c)$	$(h \pm c, k)$	$(h, k \pm c)$
Graphical Example				

Hyperbolas

If x is first, open left and right

If y is first open up and down

$$b^2 = c^2 - a^2$$

	$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$	$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$	$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$
Major Axis	Parallel to x-axis (Horizontal Transverse Axis)	Parallel to y-axis (Vertical Transverse Axis)	Parallel to x-axis (Horizontal Transverse Axis)	Parallel to y-axis (Vertical Transverse Axis)
Center	$(0,0)$	$(0,0)$	(h,k)	(h,k)
Vertices	$(\pm a, 0)$	$(0, \pm a)$	$(h \pm a, k)$	$(h, k \pm a)$
Foci	$(\pm c, 0)$	$(0, \pm c)$	$(h \pm c, k)$	$(h, k \pm c)$
Asymptotes	$y = \pm \frac{b}{a}x$	$y = \pm \frac{a}{b}x$	$y - k = \pm \frac{b}{a}(x - h)$	$y - k = \pm \frac{a}{b}(x - h)$
Graphical Example	