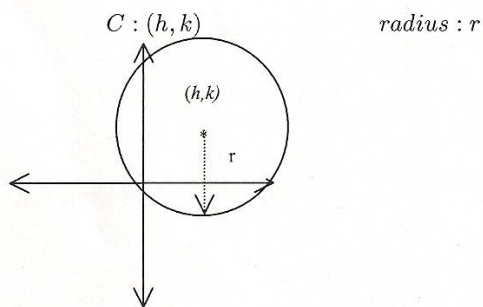


Summary of the Conic Sections

Circles

$$(x - h)^2 + (y - k)^2 = r^2$$



Parabolas

case 1: axis of symmetry vertical

$$(y - k) = \frac{1}{4p}(x - h)^2$$

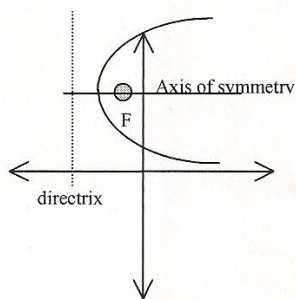
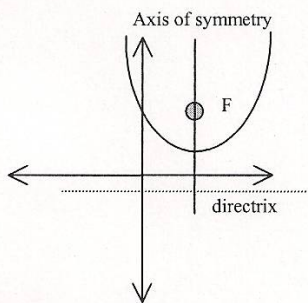
$$D : y = k - p$$

$$V : (h, k)$$

$$A : x = h$$

$$F : (h, k + p)$$

$$e = 1$$



case 2: axis of symmetry horizontal

$$(x - h) = \frac{1}{4p}(y - k)^2$$

$$D : x = h - p$$

$$V : (h, k)$$

$$A : y = k$$

$$F : (h + p, k)$$

$$e = \frac{c}{a}$$

Note: parabolas open negatively or when $p < 0$.

Summary of the Conic Sections

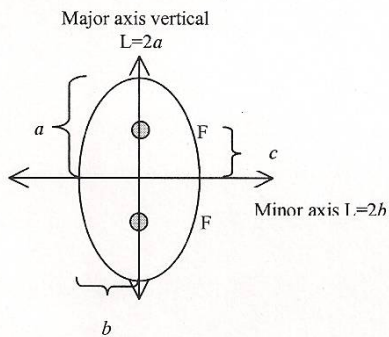
Ellipses

case 1: Major axis vertical

$$\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$$

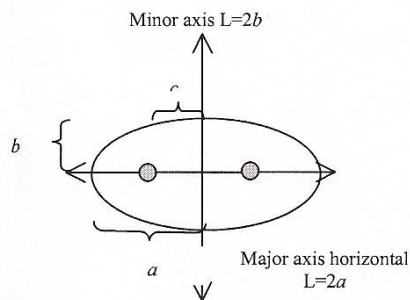
Vertices : $(h, k \pm a)$

Directrix : $y = \pm a/e$



C : (h, k)

Foci : $(h, k \pm c)$



case 2: Major axis horizontal

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

Vertices : $(h \pm a, k)$

Directrix : $x = \pm a/e$

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

Major axis length = $2a$

eccentricity : $e = \frac{c}{a}$

C : (h, k)

Foci : $(h \pm c, k)$

minor axis length = $2b$

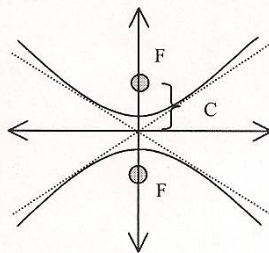
Hyperbolas

case 1: Transverse axis vertical

$$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$$

Vertices : $(h, k \pm a)$

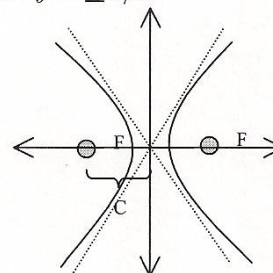
asymptotes : $y = k \pm \frac{b}{a}(x - h)$



C : (h, k)

Foci : $(h, k \pm c)$

Directrix : $y = \pm a/e$



case 2: Transverse axis horizontal

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$

Vertices : $(h \pm a, k)$

asymptotes : $y = k \pm \frac{b}{a}(x - h)$

$$c^2 = a^2 + b^2$$

eccentricity : $e = \frac{c}{a}$

C : (h, k)

Foci : $(h \pm c, k)$

Directrix : $x = \pm a/e$