Conic Section

$$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$$

$B^2 - 4AC = 0$ Parabola

$B^2 - 4AC > 0$ Hyperbola

$B^2 - 4AC < 0$ either circle or ellipse

Circle: $(x-h)^2 + (y-k)^2 = r^2$ $\therefore$ (h, k) center point, r - radius

Ellips: with horizontal major axis $\dfrac{(x-h)^2}{a^2} + \dfrac{(y-k)^2}{b^2} = 1$

Length of major axis is $\to 2a$
length of minor axis is $\to 2b$
$c^2 = a^2 - b^2$, $a > b > 0$

with vertical major axis $\dfrac{(x-h)^2}{b^2} + \dfrac{(y-k)^2}{a^2} = 1$

Hyperbola: Hyperbola with horizontal transverse axis $\dfrac{(x-h)^2}{a^2} - \dfrac{(y-k)^2}{b^2} = 1$

distance b/w the vertices is $2a$
= = = Foci is $2c$

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

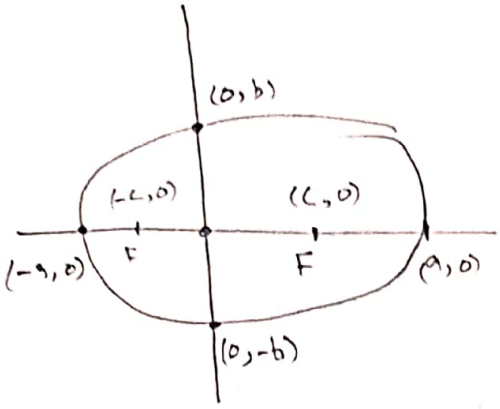
Hyperbola with vertical transverse axis $\dfrac{(y-k)^2}{a^2} - \dfrac{(x-h)^2}{b^2} = 1$

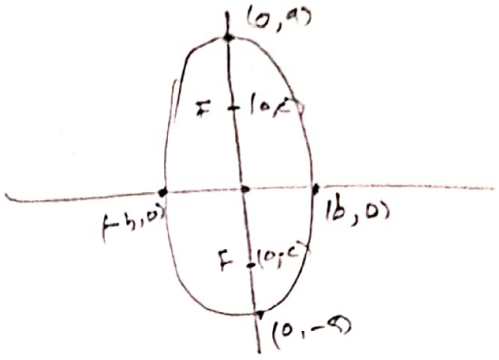
Parabola: Parabola with horizontal axis $(y-k)^2 = 4p(x-h)$, $p \neq 0$

Parabola with vertical axis $(x-h)^2 = 4p(y-k)$, $p \neq 0$

vertex (h, k)	(h, k)
Foci $(h+p, k)$	$(h, k+p)$
Directrix $x = h-p$	$y = k-p$
Axis is the line $y = k$	$x = h$

Ellipse:

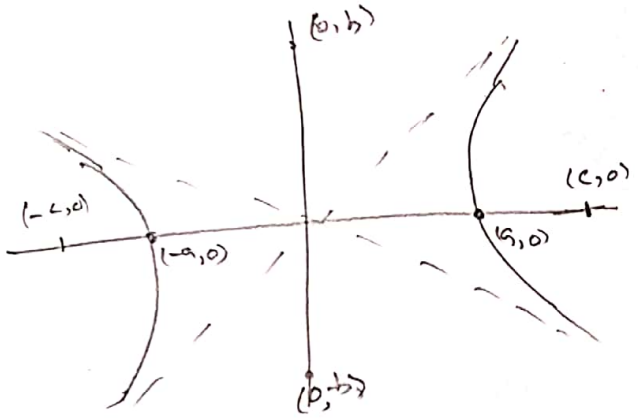


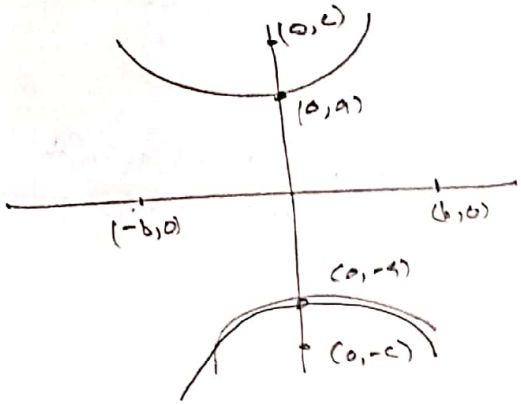


$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ Standard eq:- $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$

$\therefore$ eccentricity $e = \sqrt{1 - \frac{b^2}{a^2}}$ length of latus rectum $= \frac{2b^2}{a}$

Hyperbola

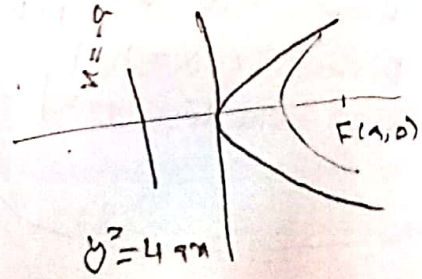




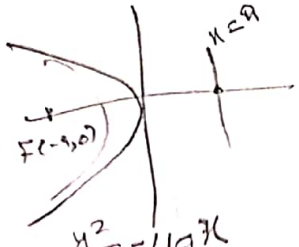
$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$

Parabola

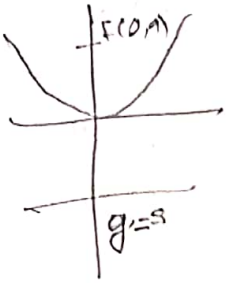
$\therefore$ eccentricity $e = \sqrt{1 + \frac{b^2}{a^2}}$ length of latus rectum $= \frac{2b^2}{a}$



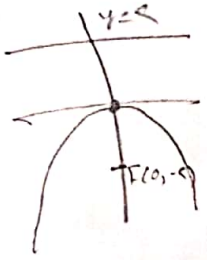
$y^2 = 4ax$



$y^2 = -4ax$



$x^2 = 4ay$



$x^2 = -4ay$

$\therefore$ eccentricity $e = 1$ latus rectum $= 4a$