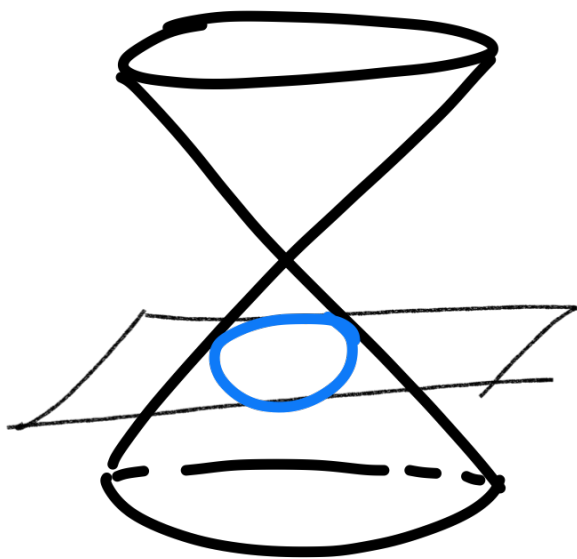
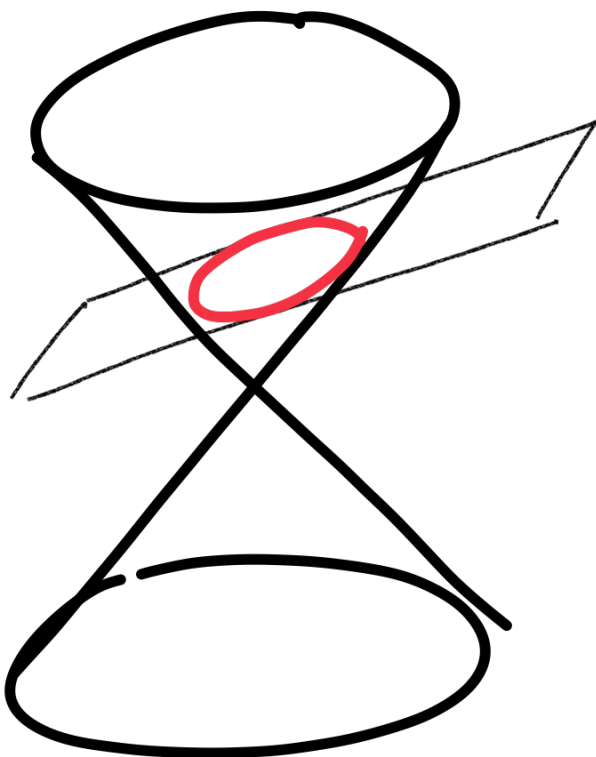
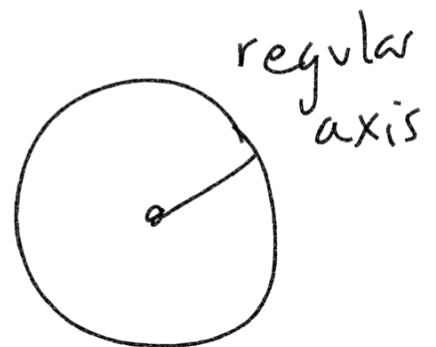


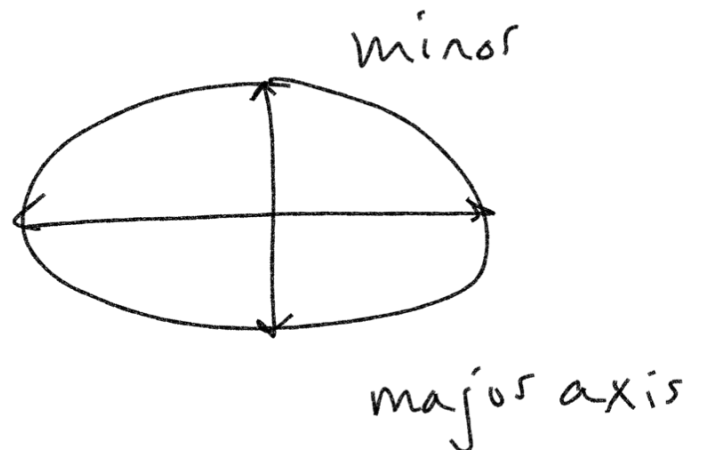
Conic Sections

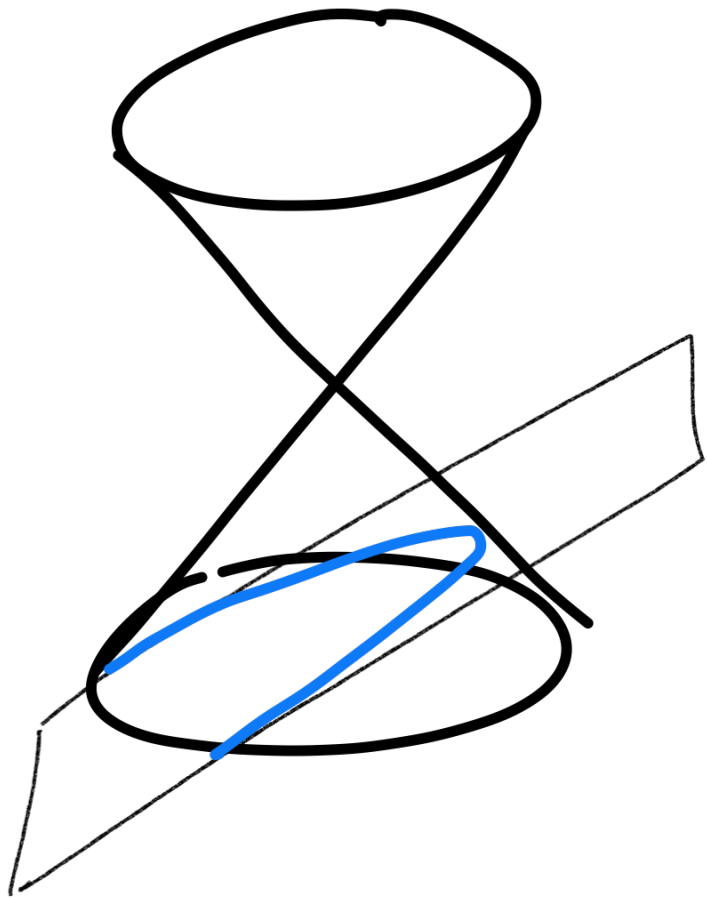


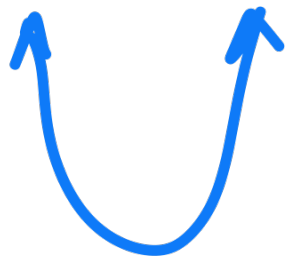
parallel  
**Circle**




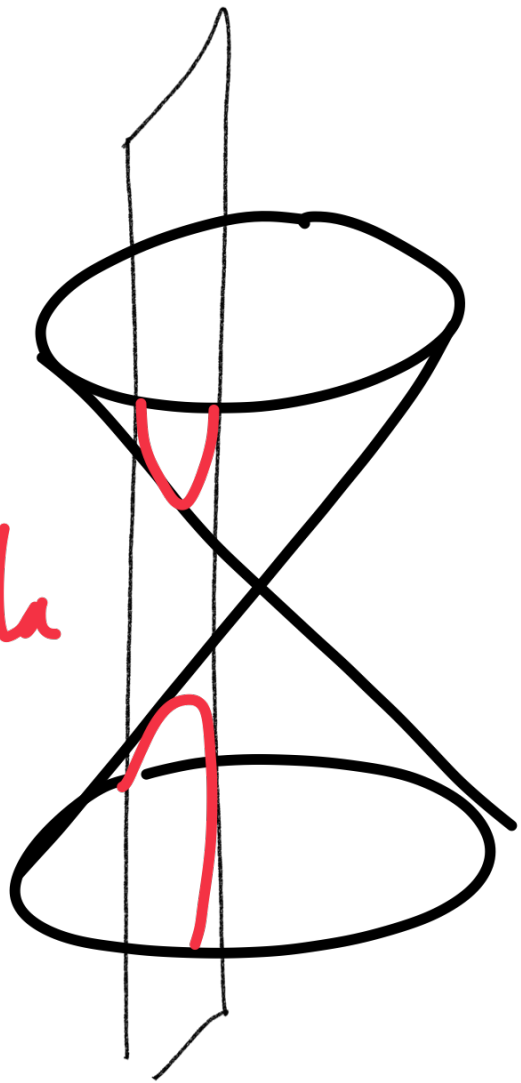
**Ellipse**





  
parabola

  
hyperbola



# General Formula

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

$$b^2 - 4ac$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

⊕

$$b^2 - 4ac > 0$$

Quadratic formula  
Discriminant

↻ ↻ ↻ ↻ hyperbola

$$b^2 - 4ac = 0 \text{ parabola}$$

$$b^2 - 4ac < 0 \text{ } \ominus \text{ ellipse/circle}$$

Circle:  $(x-h)^2 + (y-k)^2 = r^2$   $(h, k)$  center  
 $r = \text{radius}$

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



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

$\ominus$   $\curvearrowright$

parabola:  $y = a(x-h)^2 + k$

$(h, k)$  vertex

1.)  $[x^2 - 4x] + [y^2 + 2y] = 4$

circle

2.)  $\frac{5x^2}{25} + \frac{20y^2}{25} = \frac{25}{25}$

$$\frac{x^2}{5} + \frac{4y^2}{5} = 1$$

$$\frac{x^2}{5} + \frac{y^2}{\frac{4}{5}} = 1$$

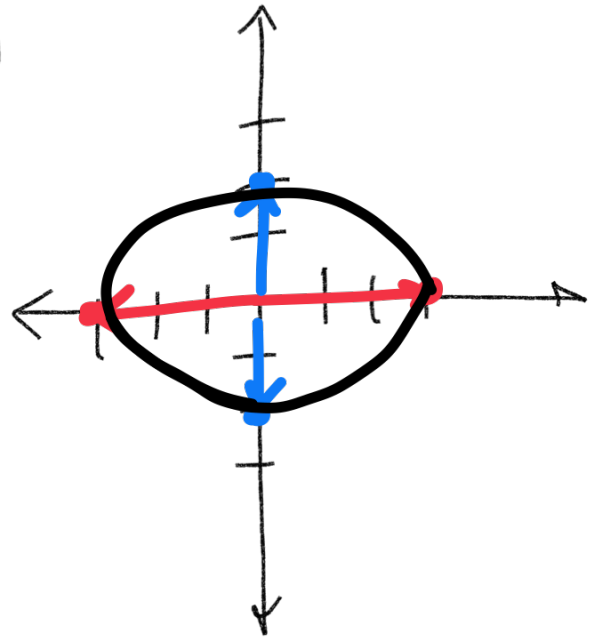
ellipse



$$\frac{x^2}{9} + \frac{y^2}{4} = 1$$

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

$$\frac{x^2}{3^2} + \frac{y^2}{2^2} = 1$$

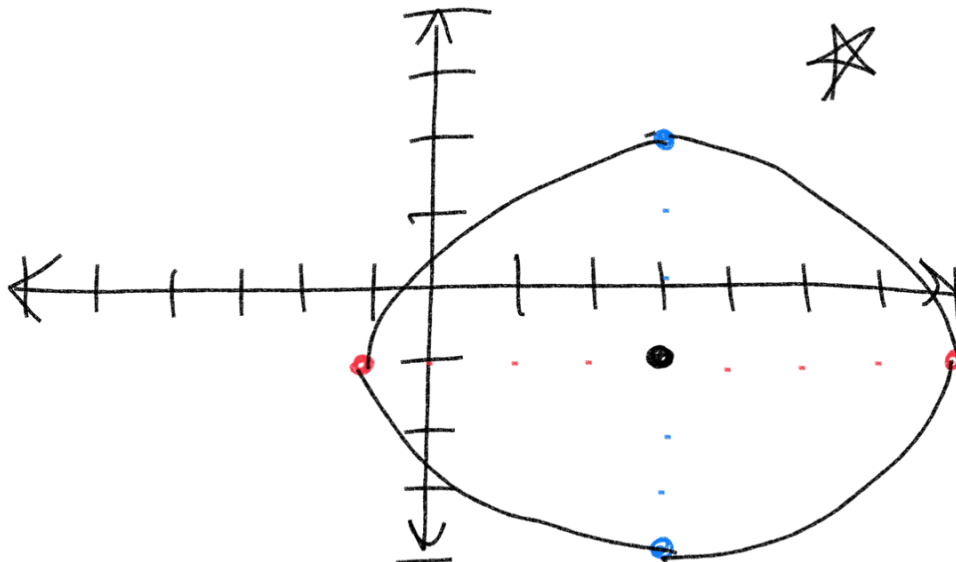


$$y = (x-h)^2 + k$$

$$\frac{(x-3)^2}{16} + \frac{(y+1)^2}{9} = 1$$

$\sqrt{16} \rightarrow 4^2$   
 $9 \sqrt{9}$

center  
(3, -1)



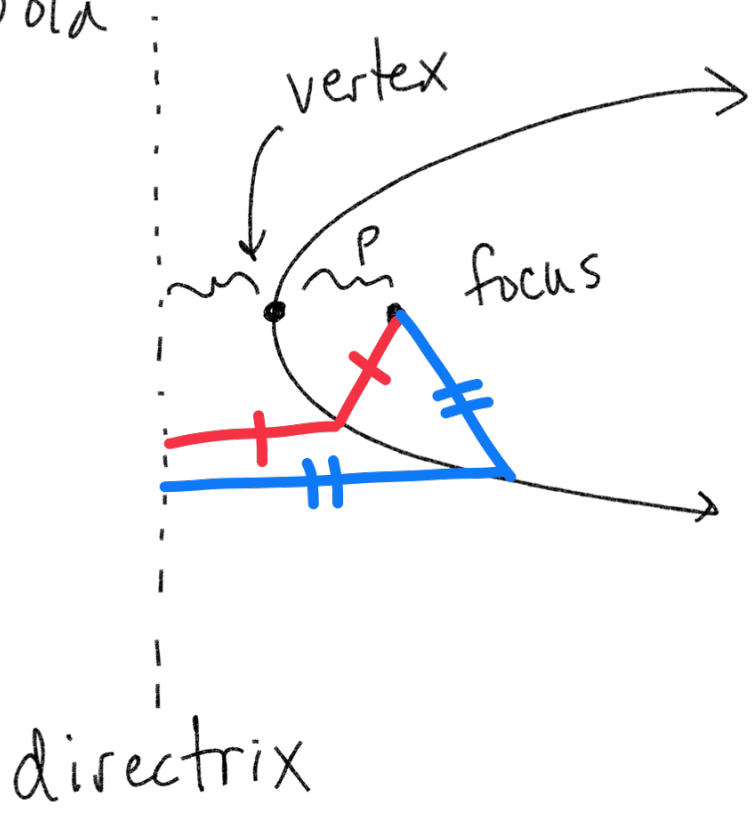
$$1.) \frac{2x^2}{2} + \frac{2y^2}{2} = \frac{10}{2} \quad \text{circle}$$

$$x^2 + y^2 = 5$$

$$2.) 2y^2 - x^2 = 16 \quad \text{hyperbola}$$

$$3.) y^2 - x = 2 \quad \text{parabola}$$

# Parabola



$$4xp = y^2$$

$p$  = distance  
between  
focus and  
vertex

