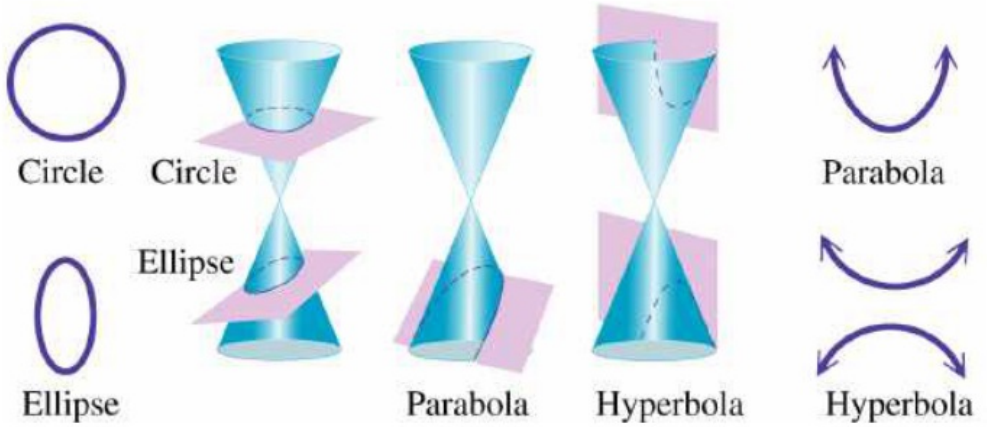


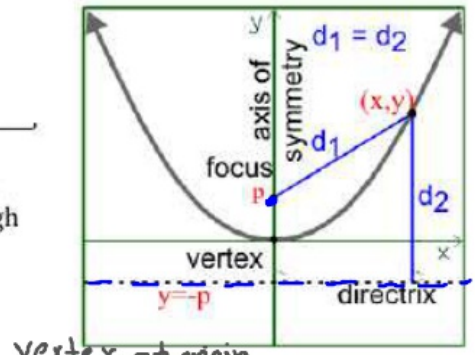
Conic Section:

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

$Ax^2+Bx+C=y$ Parabola

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

A **parabola** is the set of all points (x, y) in a plane that are equidistant from a fixed line, called a directrix, and a fixed point called the focus, not on the line. The vertex is the midpoint between the focus and the directrix. The axis of the parabola is the line passing through the focus and the vertex.



vertex at origin

Standard Equation of a Parabola:

p: + p: −

$(x-h)^2=4p(y-k)$, $p\neq0$

$(y-k)^2=4p(x-h)$, $p\neq0$

Vertex: (h,k)

$x^2=4py$ vertical axis

$y^2=4px$ horizontal axis

focus is inside the parabola

Examples:

1. Find the standard form of the equation of the parabola with vertex at the origin and focus $(0,\frac{3}{8})$.

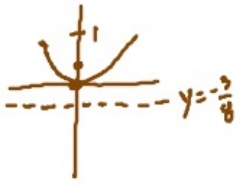
$p=\frac{3}{8}$

directrix: $y=-\frac{3}{8}$

Vertex: $(0,0)$

$x^2=4\left(\frac{3}{8}\right)y$

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



used to seeing: $y=(x-h)^2+k$

$(y-k)^2=4p(x-h)$

2. Find the focus of the parabola $x=\frac{1}{4}y^2+\frac{3}{2}y+\frac{13}{4}$.

mult. all by 4

$4x=y^2+6y+13$

$-13 \qquad -13$ subtract 13

$4x-13=y^2+6y$

$+9 \qquad +9$ complete the square

$4x-4=y^2+6y+9$

$4(x-1)=(y+3)^2$

$4p \quad h=1 \quad k=-3$

vertex $(1,-3)$

$4p=4$ means $p=1$

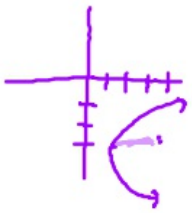
Focus is $(2,-3)$

(directrix is $x=0$)

3. Find the standard form of the equation of the parabola with vertex $(2,-3)$ and focus $(4,-3)$.

$(y+3)^2=4p(x-2)$

$p=2 \quad 4-2$



$(y+3)^2=8(x-2)$

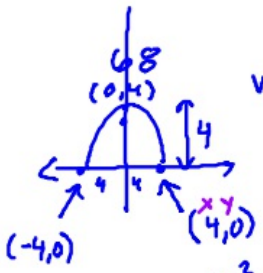
(directrix $x=0$)

65.

a)

$x^2=4py$

$x^2=4y$



vertex: $(0,4)$

$x^2=4p(y-4)$

$(4)^2=4p((0)-4)$ solve for p

$16=-16p$

$p=-1$

$x^2=-4(y-4)$

focus is $(0,3)$

directrix is $y=5$

p. 700: 9-14, 19, 23, 25, 27, 31, 33, 35, 37, 63, 69