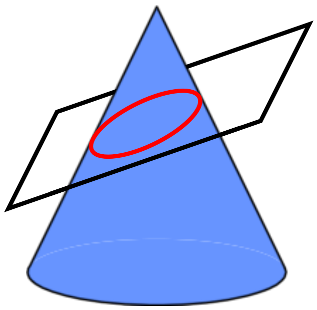
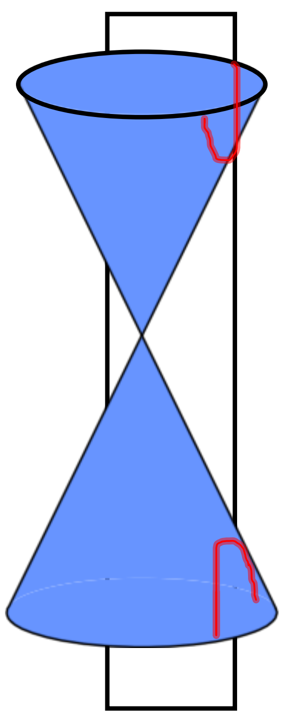
8.1 Conic Sections and Parabolas

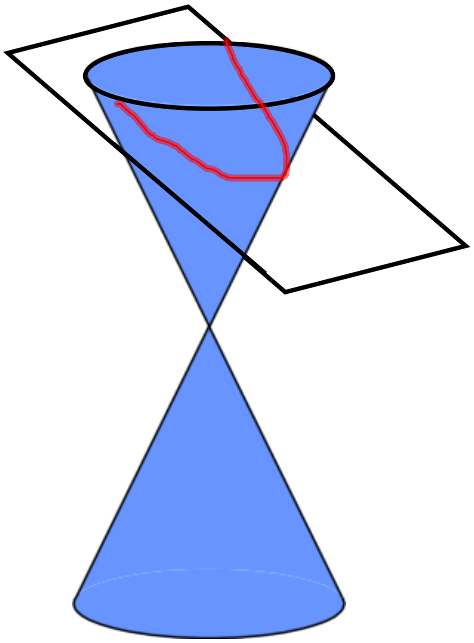


ellipse

circle - the plane has to be parallel to the base of the cone

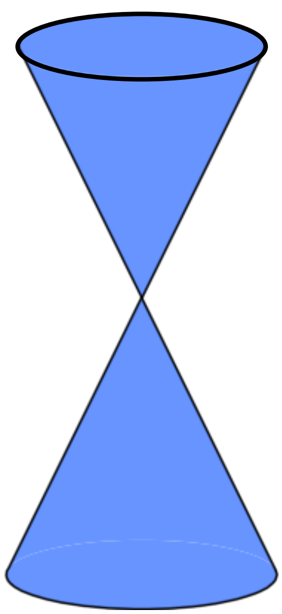


hyperbola



parabola

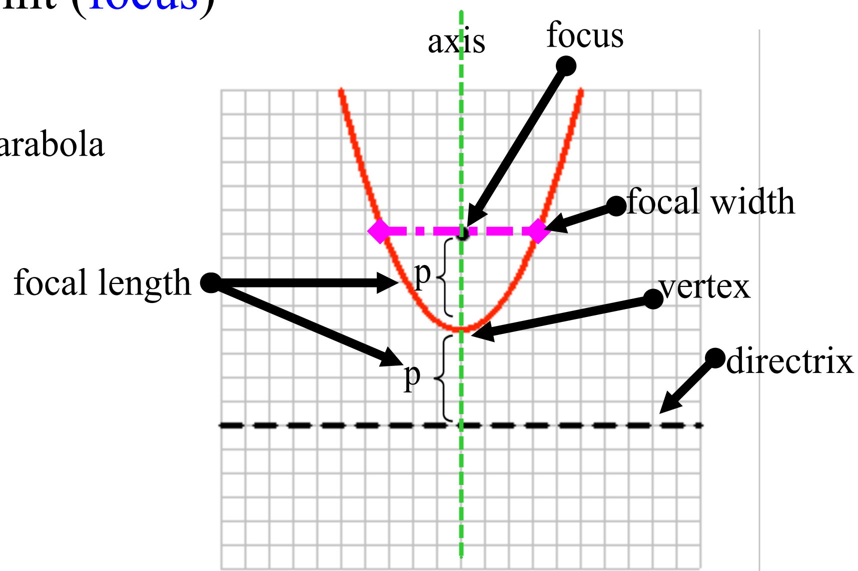
Degenerate forms



Point
Line
Intersecting Lines

Parabola : set of all points in a plane equidistant from a particular line (directrix) and a particular point (focus) #80

the parts of a parabola



axis of symmetry is $\perp$ to the directrix

Latus rectum = focal width - the segment thru the focus $\perp$ to the axis of symmetry. Its endpts lie on the parabola & length = $|4p|$ (parallel to the directrix)

Axis of Symmetry - line $\perp$ to the latus rectum & directrix. It intersects the parabola at the vertex.

measure from the focus to an endpt of the latus rectum = measure from the focus to the directrix.

Parabola - standard form

#81

up/down

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

vertical axis of symmetry

vertex (h, k)

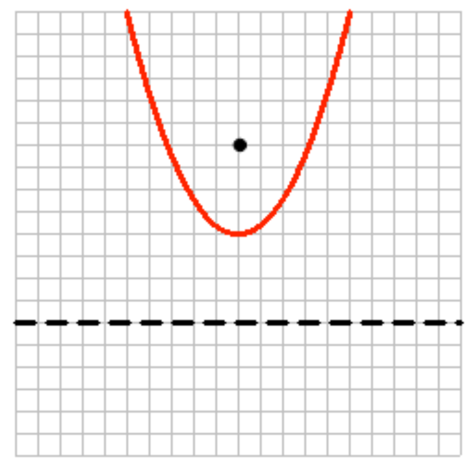
focus (h, k + p)

directrix y = k - p

axis x = h

focal length p

focal width $|4p|$



81 - back

left/right

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

horizontal axis of symmetry

vertex (h, k)

focus (h + p, k)

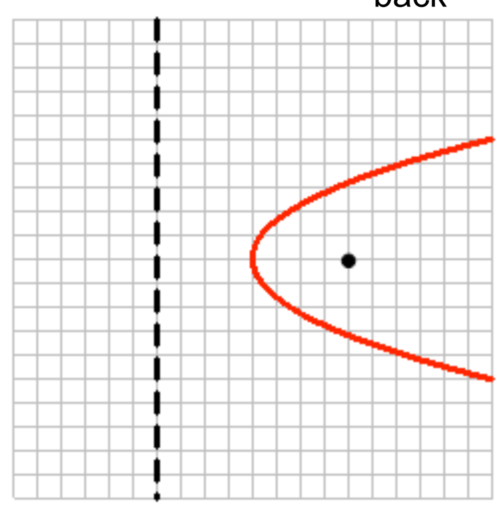
directrix x = h - p

axis y = k

focal length p

focal width $|4p|$

(not a function)



Graph: $2(x-2)=(y-3)^2$

vertex

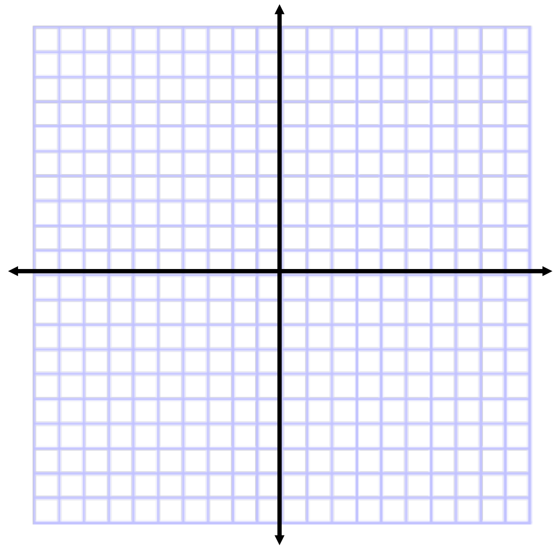
focus

directrix

axis

focal length

focal width



Example:

Write the equation for a parabola with V: (2, -1) and a focal width of 4, opening down.

Write the equation for a parabola with V: (4, 3) and directrix x = 6

#82

Parabola - General Form

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

Steps:

1. move the variable w/o a square term to the left & everything else to the rt.

2. Complete the sq. w/ the variables that have a sq. & linear term.

3. Write the completed square in factored form

4. Simplify

Prove the graph of the equation is a parabola, find the vertex, focus and directrix

$$y^2 - 3x + 6y + 12 = 0$$

Prove the graph of the equation is a parabola, find the vertex, focus and directrix

$$3x^2 - 6x - 6y + 10 = 0$$