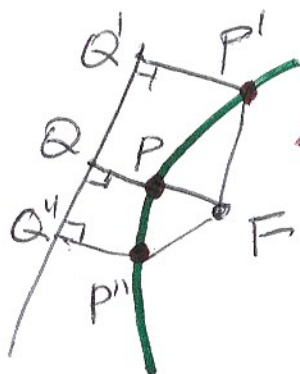


MATH 43:

CONIC

A ~~PARABOLA~~ IS THE LOCUS OF POINTS
IN A PLANE SUCH THAT
THE RATIO OF A POINT TO A FIXED POINT
↑
THE DISTANCE FROM ("FOCUS")
TO THE DISTANCE OF THAT POINT
TO A FIXED LINE ("DIRECTRIX")
(NOT CONTAINING THE FIXED POINT)
IS EQUAL TO $\pm$. A FIXED CONSTANT

("ECCENTRICITY")



$$e = \frac{PF}{PQ} = \frac{P'F}{P'Q'} = \frac{P''F}{P''Q'} = e$$

↑
NOT THE e FROM $\ln$
 $\log_e$

NOTE: A PARABOLA IS A CONIC WITH ECCENTRICITY $e=1$

ELLIPSE $0 < e < 1$

PARABOLA $e = 1$

HYPERBOLA $e > 1$

AS $e \rightarrow 0$, CONIC $\rightarrow$ CIRCLE

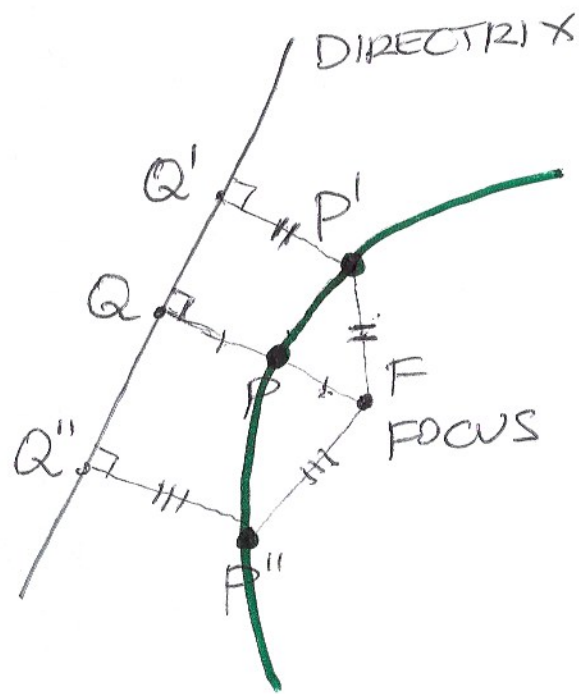
10.9 POLAR CONICS

MATH 41: A PARABOLA IS
THE LOCUS OF POINTS
(SET)

WHOSE DISTANCE TO A FIXED
LINE EQUALS THEIR DISTANCE
TO A FIXED POINT NOT ON
THE LINE

DIRECTRIX

FOCUS



ALGEBRA:
 $x = ay^2 + by + c$ or $y = ax^2 + bx + c$
 $a \neq 0$

GRAPH IS A
PARABOLA

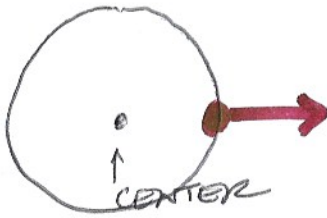
$$\begin{aligned} PF &= PQ \\ P'F &= P'Q' \\ P''F &= P''Q'' \end{aligned}$$

$$\begin{aligned} \frac{PF}{PQ} &= 1 \\ \frac{P'F}{P'Q'} &= 1 \\ \frac{P''F}{P''Q''} &= 1 \end{aligned}$$

NOTE:

$$\frac{PF}{PQ} = \frac{P'F}{P'Q'} = \frac{P''F}{P''Q''} = 1$$

CIRCLE



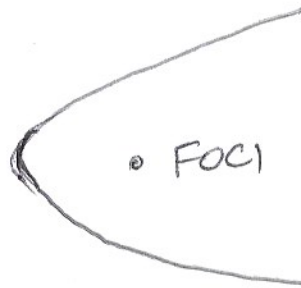
ELLIPSE



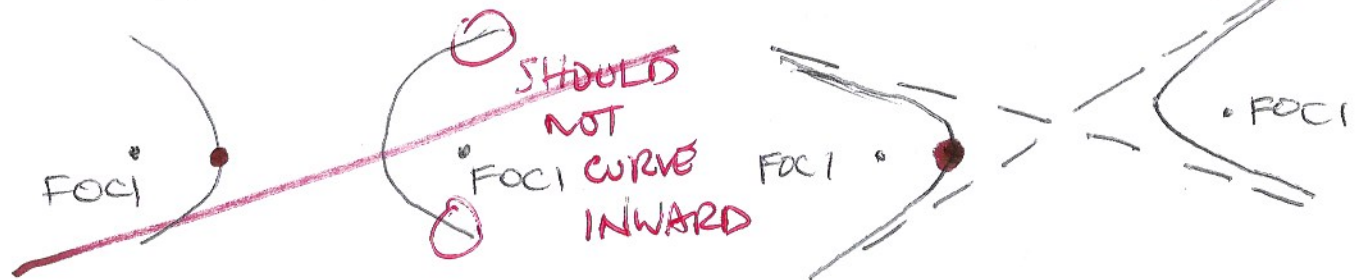
ONLY NEED 1 FOCI

TO GENERATE ELLIPSE USING MATH 43 DEF'N

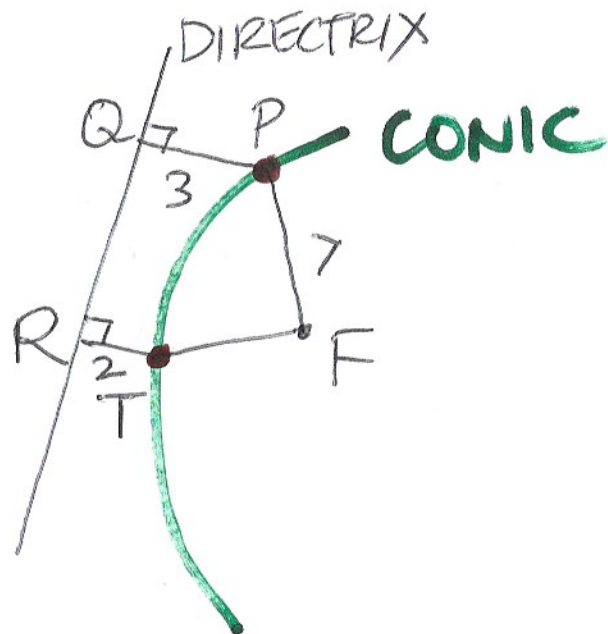
PARABOLA



HYPERBOLA



eg.



SHAPE OF CONIC?

$$\frac{PF}{PQ} = \frac{7}{3} = e > 1$$

HYPERBOLA

HOW FAR IS T FROM F?

$$\frac{TF}{TR} = e$$

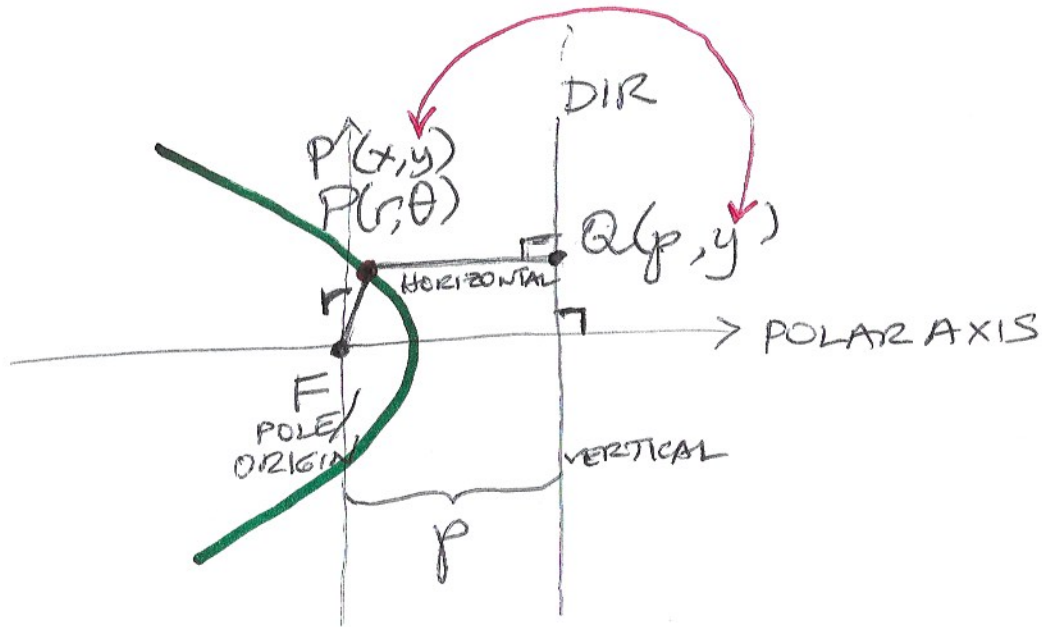
$$\frac{TF}{2} = \frac{7}{3}$$

$$TF = \frac{7}{3} \cdot 2 = \frac{14}{3}$$

POLAR EQUATION OF CONIC WITH FOCUS @ POLE

+ DIRECTRIX IS VERTICAL

+ p UNITS TO THE RIGHT OF POLE



$$\frac{PF}{PQ} = \frac{r}{p-x} = e$$

$$r = e(p-x)$$

$$r = e(p - r \cos \theta)$$

$$r = ep - er \cos \theta$$

$$r + er \cos \theta = ep$$

$$r(1 + e \cos \theta) = ep$$

$$r = \frac{ep}{1 + e \cos \theta}$$