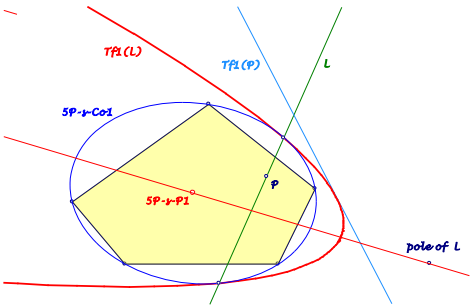
EQF-Note 2017-12-30

Background for these notes is:
Chris van Tienhoven:
Encyclopedia of Quadri-Figures and Poly Geometry
http://www.chrisvantienhoven.nl/

Loci wrt 5P-s-Tf1,2,3,4

Tf1,2 map points to lines, Tf3 maps points to points and Tf4 maps lines to lines. So there are several possibilities, to study loci wrt points on a line or lines through a point.

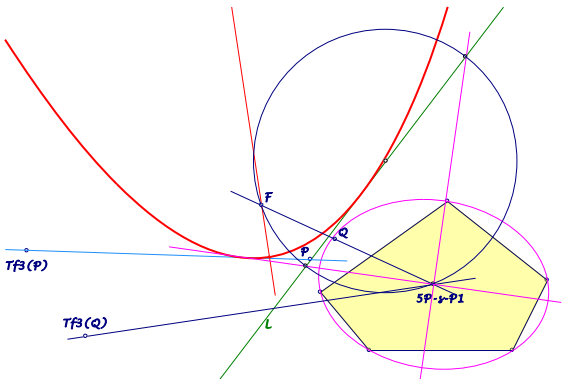
***Tf1* of points *P* on a line *L* give a parabola,**
… tangent to *5P-s-Co1* in the intersections with *L*,
… with axis through *5P-s-P1* and pole of *L* wrt *5P-s-Co1*.



***Tf2* of points *P* on a line *L* give a line pencil**
… for the pole of *L* wrt *5P-s-Co1*.

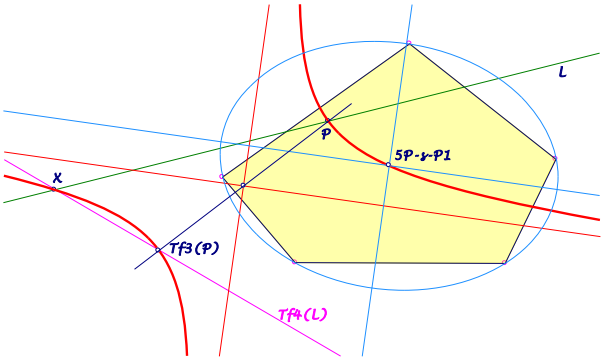
***Tf3* of points *P* on a line *L* give the line *Tf4(L)*.**

Tf4* of lines *L* through a point *P
… give the line pencil of *Tf3(P)*.

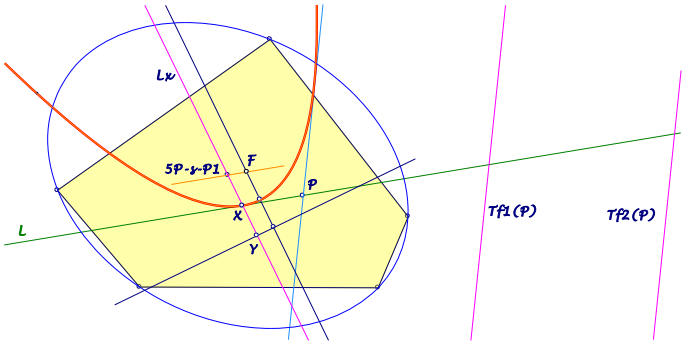


Lines *P.Tf3(P)* for points *P* on a line *L* give a parabola
… tangent to *L* and the axes of *5P-s-Co1*
… directrix *5P-s-P1.Tf3(Q)* with *Q* = pole of *L* wrt *5P-s-Co1*
… and focus in the 2nd intersection of *Q.5P-s-P1*
… … and the circumcircle of the triangle
… … with sidelines *L* and the axes of *5P-s-Co1*.

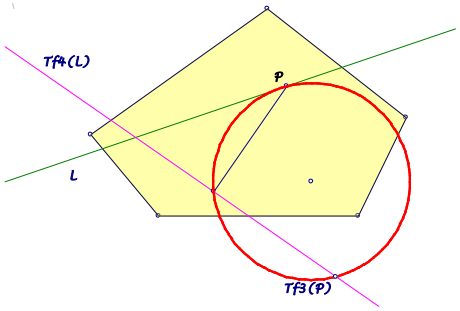
Points $L \cap Tf4(L)$ for a line pencil of point P
… give an orthogonal hyperbola,
… through *5P-s-P1*, *P* and *Tf3(P)*,
… centered in the midpoint of *P* and *Tf3(P)*
… with asymptotes parallel to the axes of *5P-s-Co1*.



Parallels to *Tf1,2(P)* through *P* for points *P* on a line *L*
… give a parabola,
… tangent to *L* in *X*, the intersection with the line L_x
… … through *5P-s-P1* and pole of *L* wrt *5P-s-Co1*,
… with directrix orthogonal L_x
… … through *Y*, the reflection of *5P-s-P1* in *X*,
… with focus *F* in the reflection of *Y* in *L*.



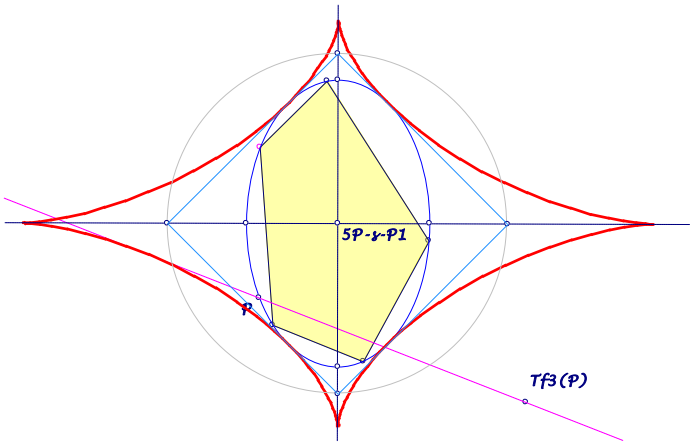
Pedal points of *P* on *Tf4(L)* for lines *L* through *P*
… give a circle with diameter *P.Tf3(P)*.



Final remarks

- ***Tf3* maps a conic to a conic, also the centers of the conics.**

Lines *P.Tf3(P)* for points *P* on *5P-s-Co1* give an astroid
… with the same axes as *5P-s-Co1*
… and common tangents with *5P-s-Co1*,
… … which form a square,
… and cusps inverse to the apexes of *5P-s-Co1* wrt the circumcircle of the square.



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