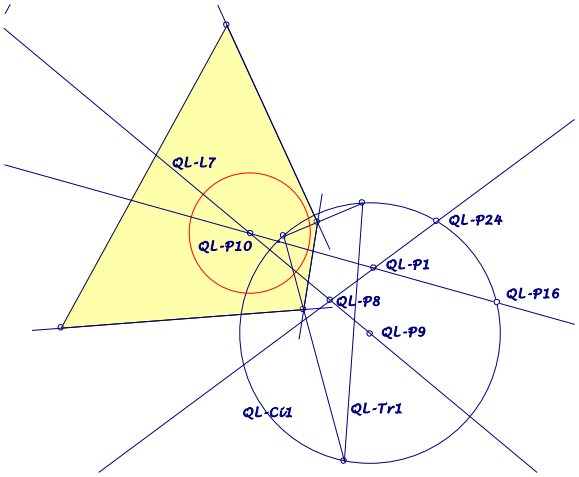
EQF-Note 2015-10-09

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

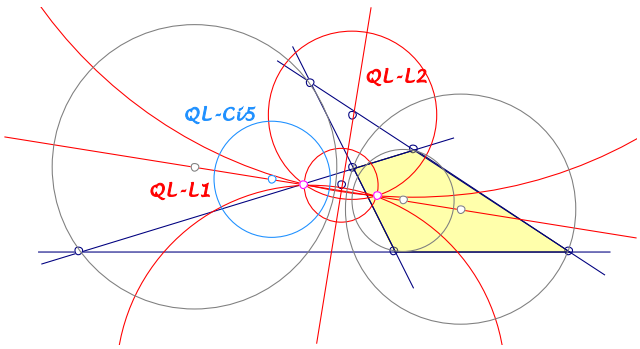
Polar Circle of QL-Tr1

The polar circle for the diagonal triangle QL-Tr1 of a quadrilateral has significant properties in QL-geometry, especially wrt its inversion. Here are gathered some results – Cabri controlled – for later applications.



The polar circle for a triangle is the only circle, to which the triangle is self-polar. Only for obtuse angled triangles the polar circle is real. Wrt a quadrilateral polar circles are mentioned in [1] and [2] with the property:

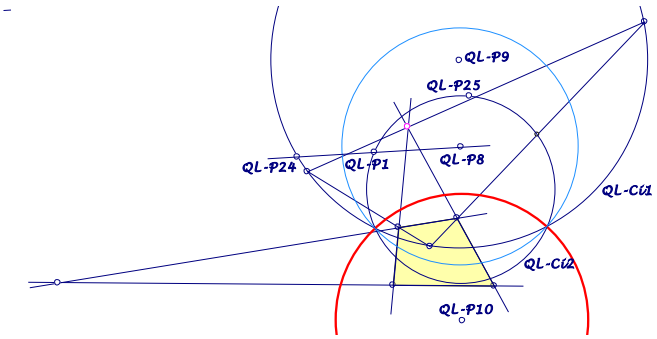
- **The polar circles for the triangle components of a quadrilateral are coaxal, conjugate wrt the circles over the diagonals** (see [1] p.40, [2], p.179).



This means in *EQF*-geometry:

... The coaxal line is *QL-L2*, the radical axis is *QL-L1*.
... The polar circle is orthogonal to the Plücker circle *QL-Ci5*.

Below the polar circle of the diagonal triangle *QL-Tr1* – not always real – shall be tested.



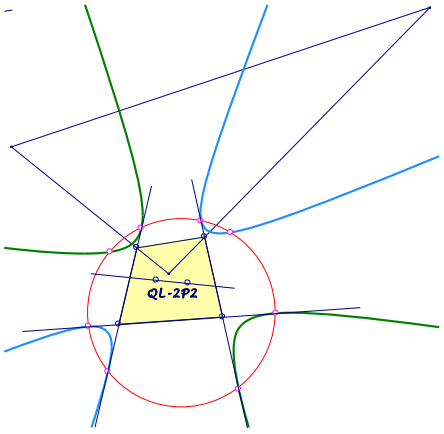
- **The polar circle is centered in *QL-P10*.**

- **The inversion wrt the polar circle swaps *QL-Ci1* and *QL-Ci2*.**

- **The reflections of *QL-P1* and *QL-P25* in the polar circle lie on the circumcircle *QL-Ci1* of the diagonal triangle.**

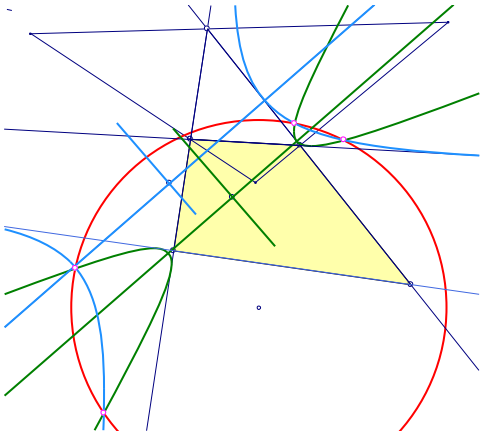
- **The inversion circle of *QL-P1* and *QL-P24* wrt *QL-P8* cuts the polar circle orthogonal in the intersections with *QL-Ci1*.**

- **A *QL*-inscribed conic cuts the polar circle in a cyclic quadrangle with the same diagonal triangle as the reference quadrilateral.**



- **The two *QL*-inscribed conics with centers *QL-2P2* have contact points with the *QL*-lines on the polar circle.**

- **Two *QL*-inscribed conics, whose axes are parallel *QL-Tf2*-partners, intersect on the polar circle.**



References

[1] http://forumgeom.fau.edu/FG2004volume4/index.html

[2] R. A. Johnson: Advanced Euclidean Geometry

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