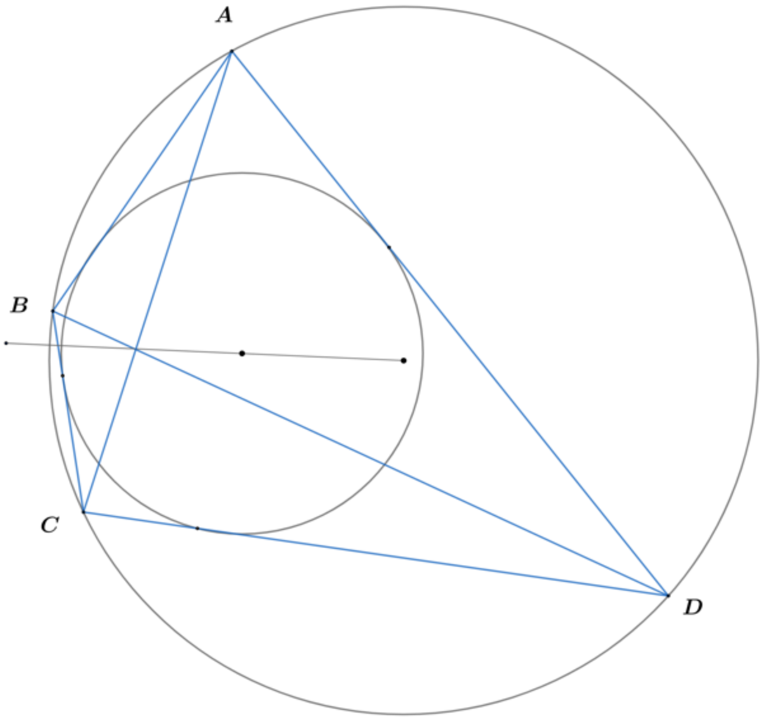
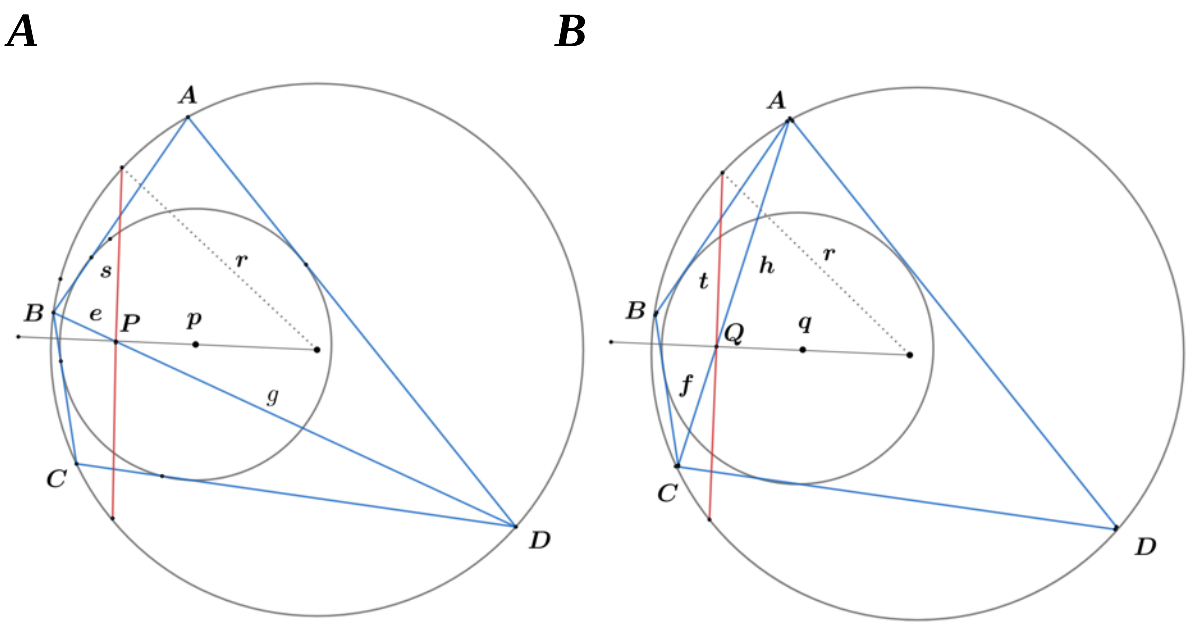
4.3.4 The diagonals of a *CT*

Show that the diagonals of a *CT* cut on the line of centres of the in- and circum-circles.



A, ***B*** show the two diagonals of a *CT*. One cuts the line of centres of the inner and outer circles at *P*, the other at *Q*. The red lines are perpendicular to the line of centres.



By the intersecting chord theorem,

$eg = s^2 = r^2 - p^2$ **(Equation 1)**,
$fh = t^2 = r^2 - q^2$ **(Equation 2)**.

These two equations establish the following set of consistent conditions. The intersection point cannot lie off the line of centres without upsetting this equivalence.

$eg = fh \Leftrightarrow s = t \Leftrightarrow p = q \Leftrightarrow P, Q$ are the same point $\Leftrightarrow$ The two centres and the intersection of the diagonals are collinear.

(When the *CT* has a symmetry axis, it is also true that the diagonals of the inscribed *CO* cut on this line.)