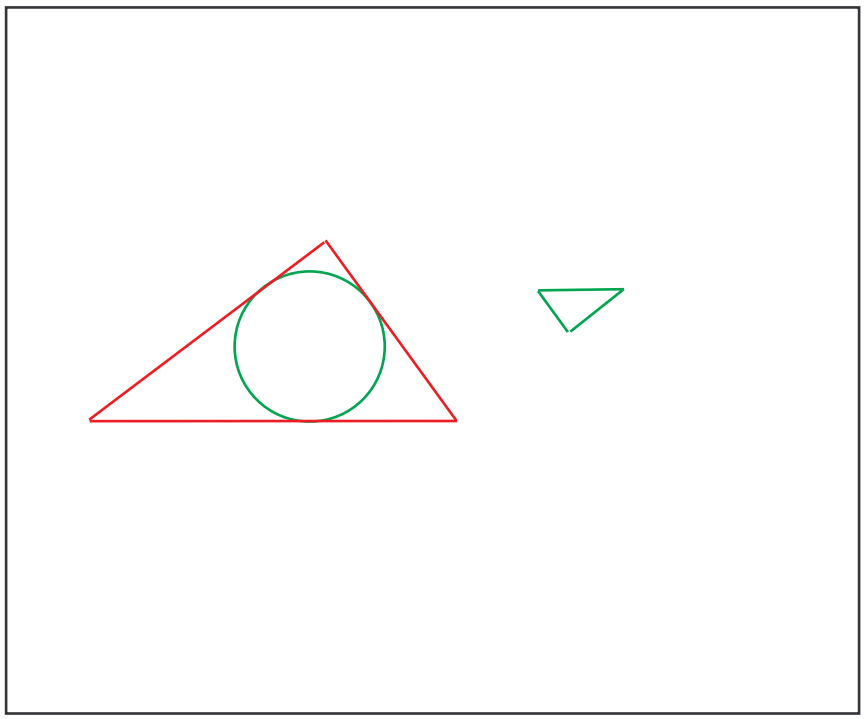
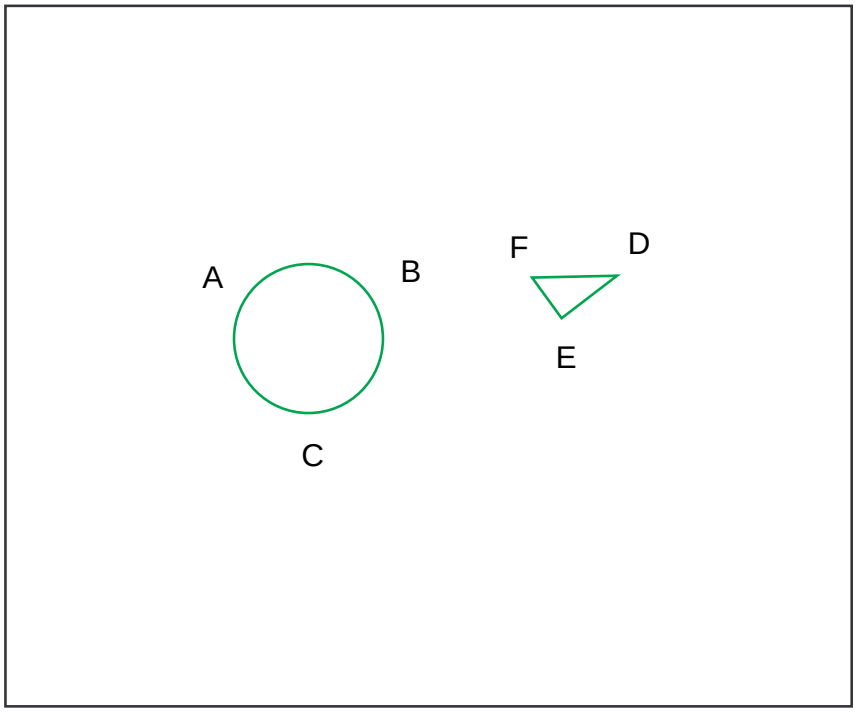
Construction 25: Book IV, Proposition 3

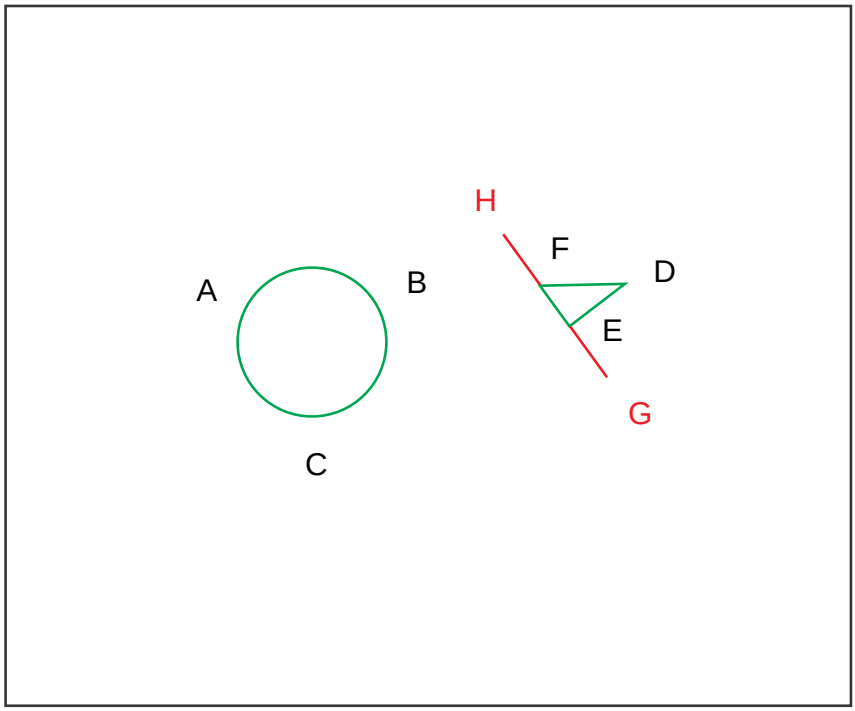
About a given circle to circumscribe a triantgle equiangular with a given triangle.



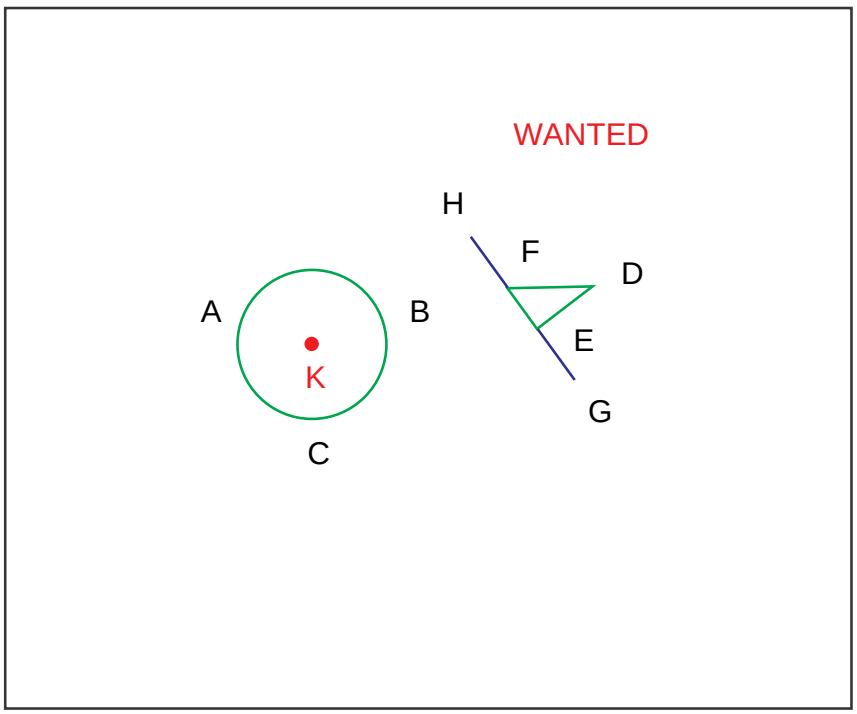
IV.3:3. Let ABC be the given circle, and DEF the given triangle;



IV.3:7. Let EF be produced in both directions to the points G, H.

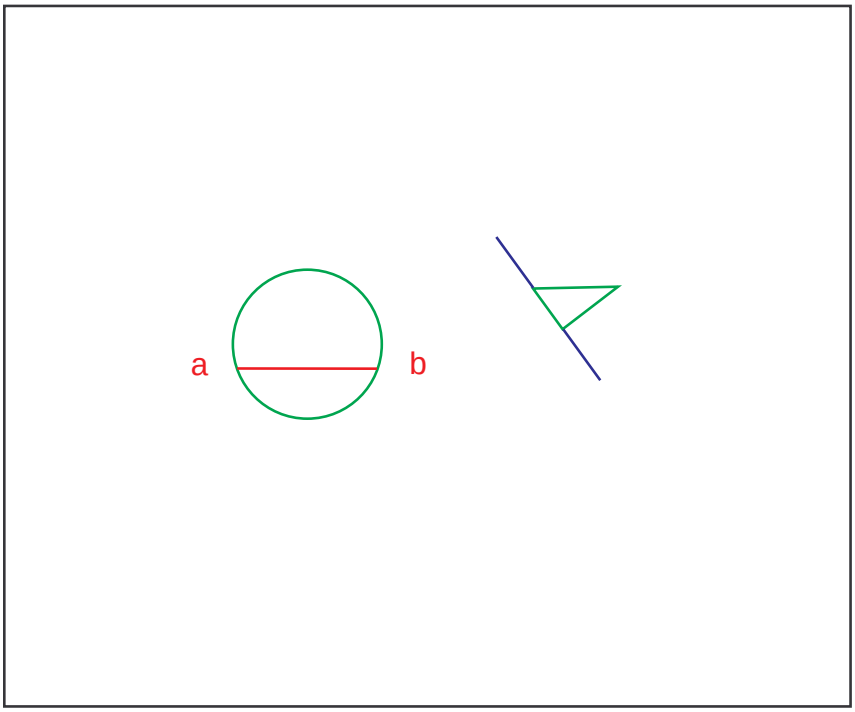


IV.3:9. let the centre K of the circle ABC be taken [III.1].



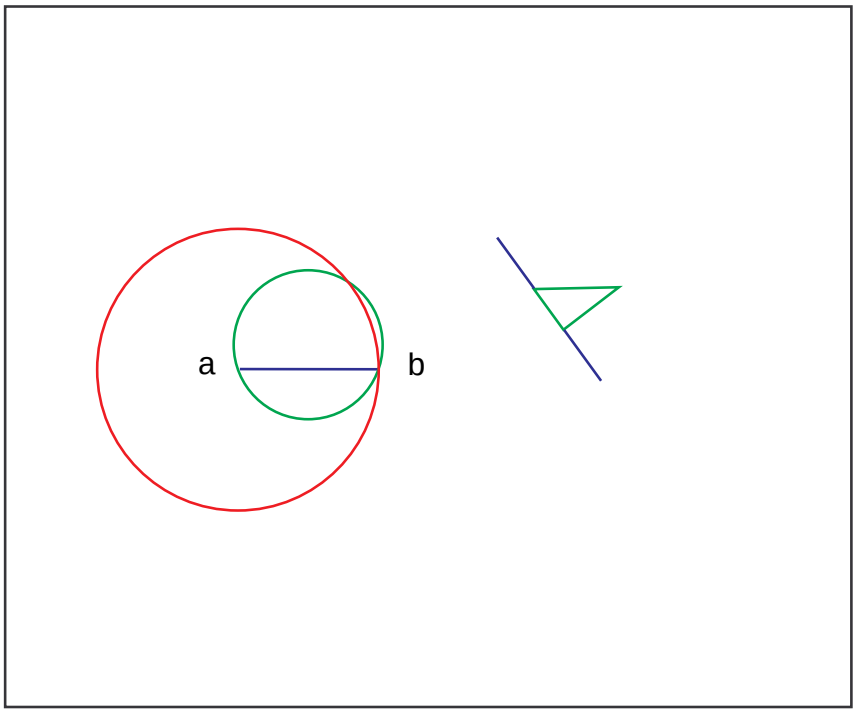
GOSUB III.1 (C#17)
Relabel the circle.

III.1:4 Let a straight line ab be drawn through it at random,

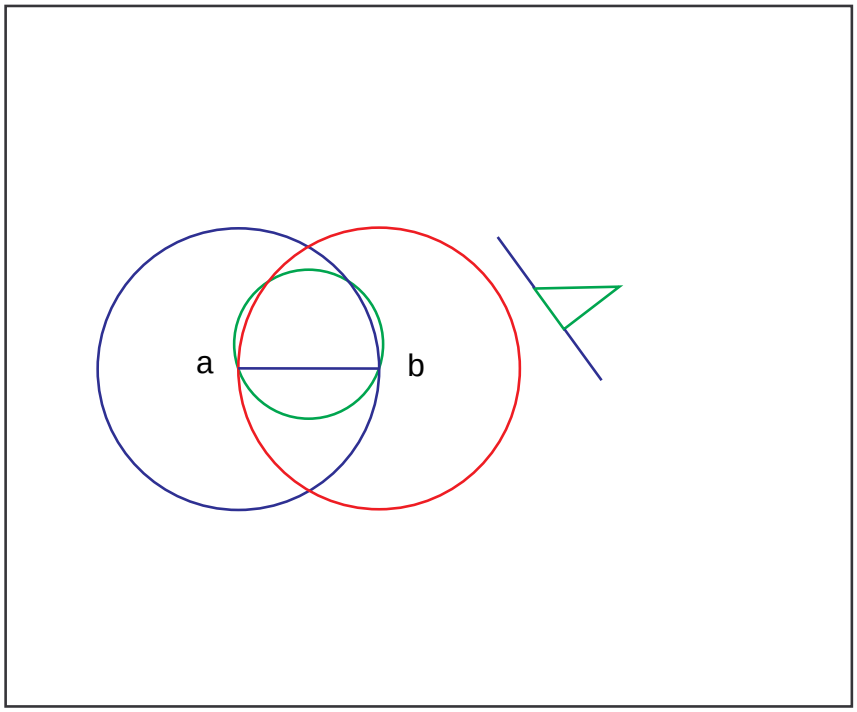


III.1:5. and let it be bisected at the point d; ([I.10])

GOSUB I.10 (C#5B)
Swing ab around a.



Swing ba around b.

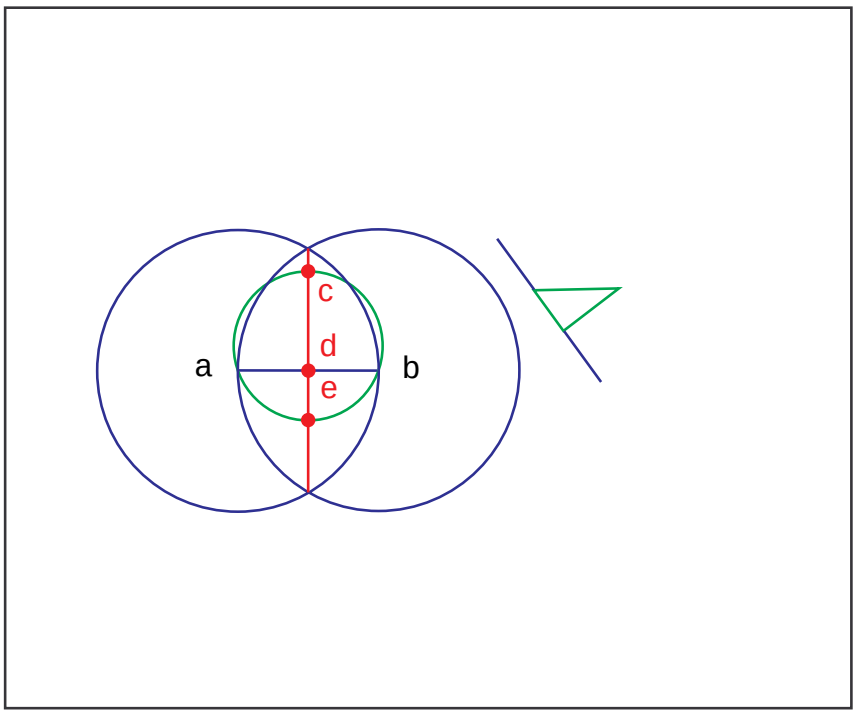


Connect the crossing points and mark the point d.

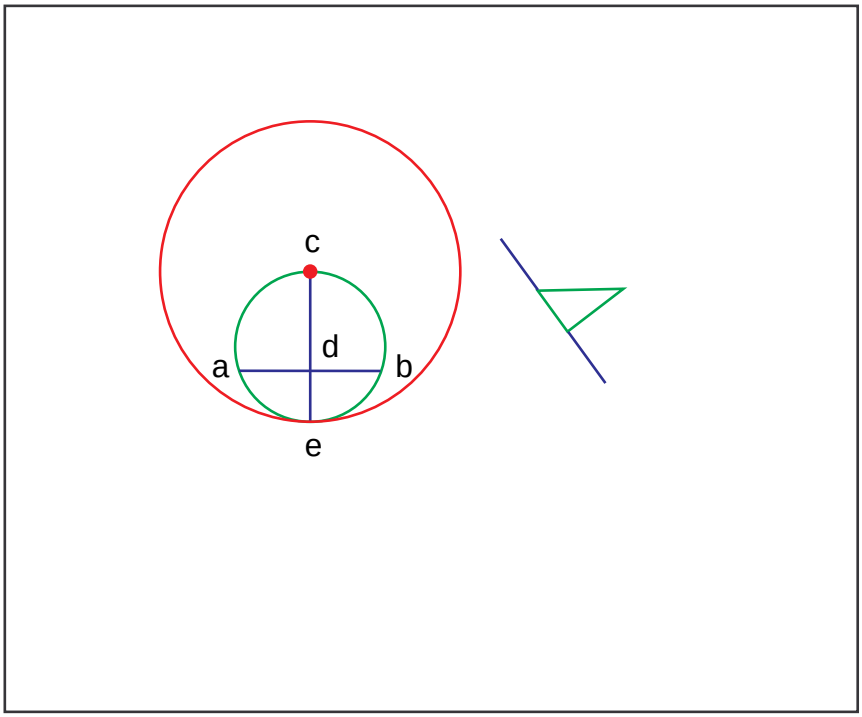
RETURN to III.1 at line 5.

III.1:7. from d let dc be drawn at right angles to ab and let it be drawn through to e;
mark the points c and e.

Cleanup.

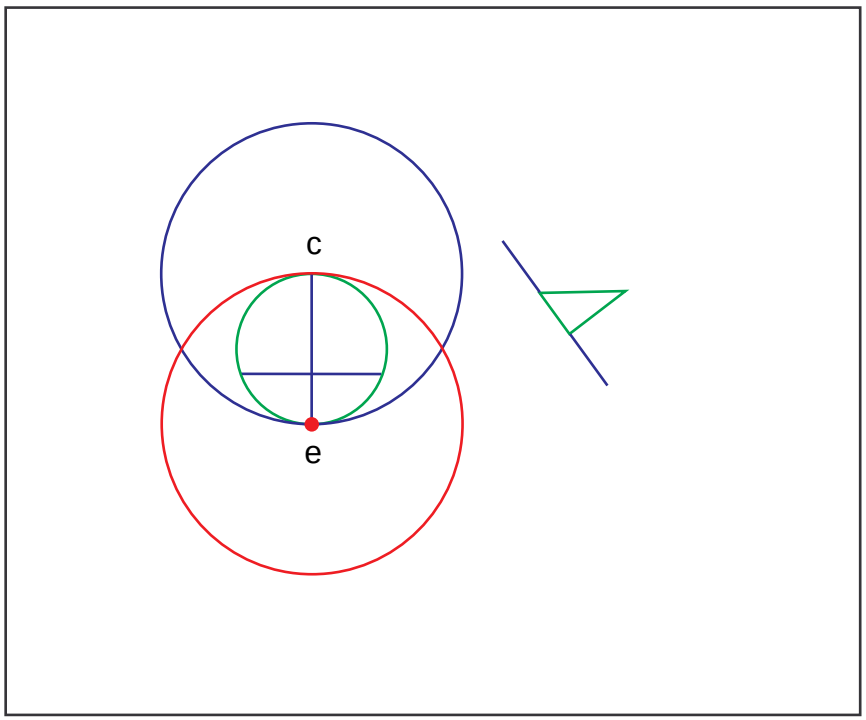


III.1:9. let ce be bisected at f;
([I.10])



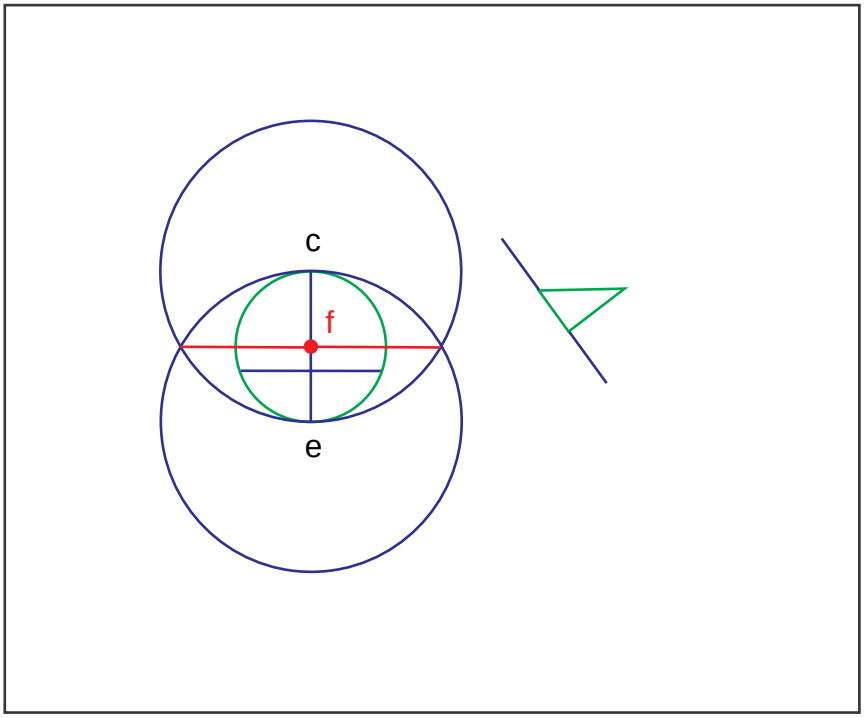
GOSUB I.10 (C#5B).
Swing ce around c.

Swing ec around e.

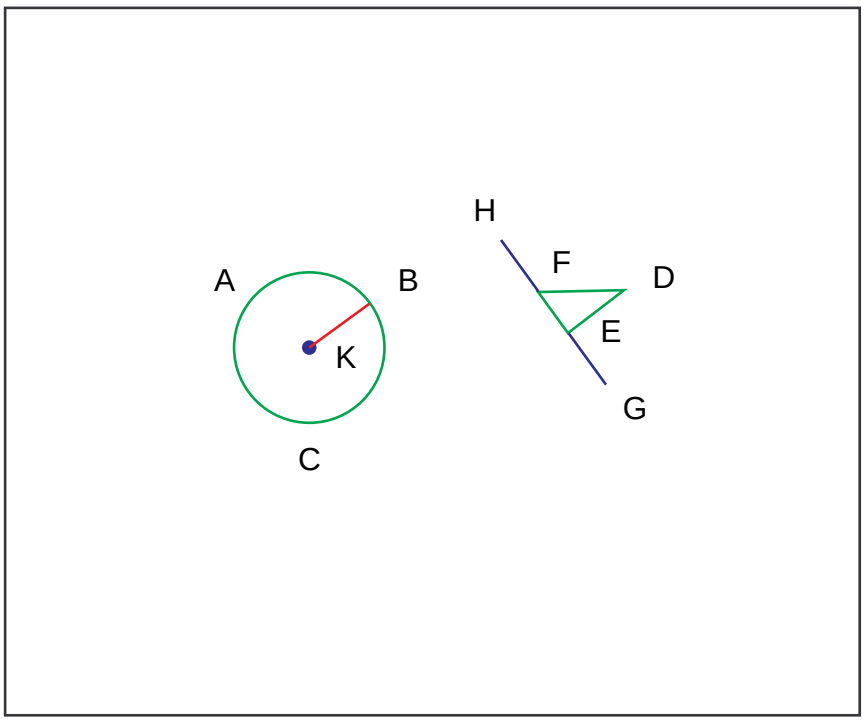


Connect the crossing points.
Mark the point f.

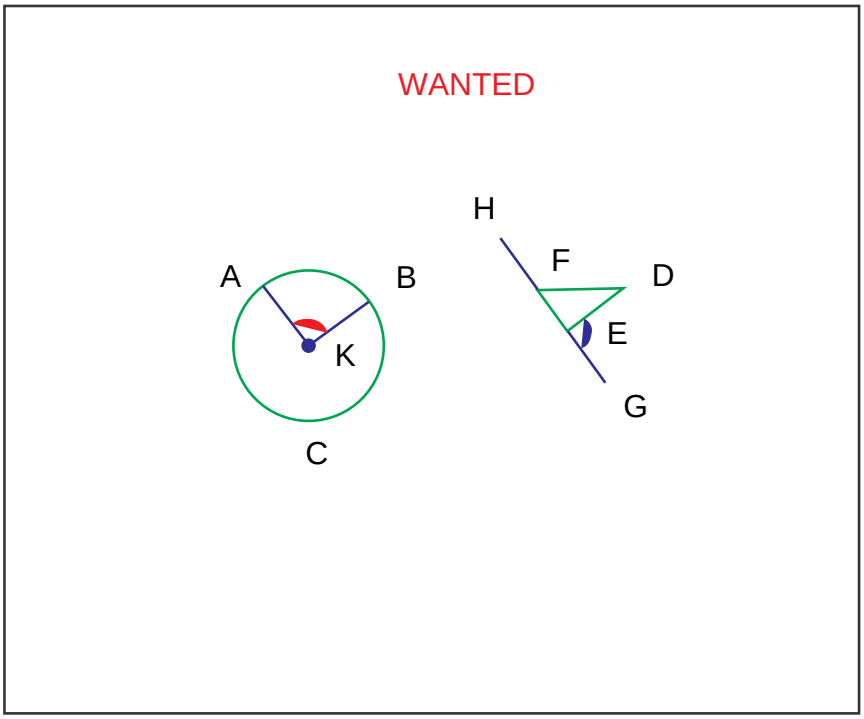
RETURN to III.1 at line 9.
RETURN to IV.3 at line 9.
Cleanup.
Relabel (f becomes K).



IV.3:9. and let the straight line KB be drawn across at random;

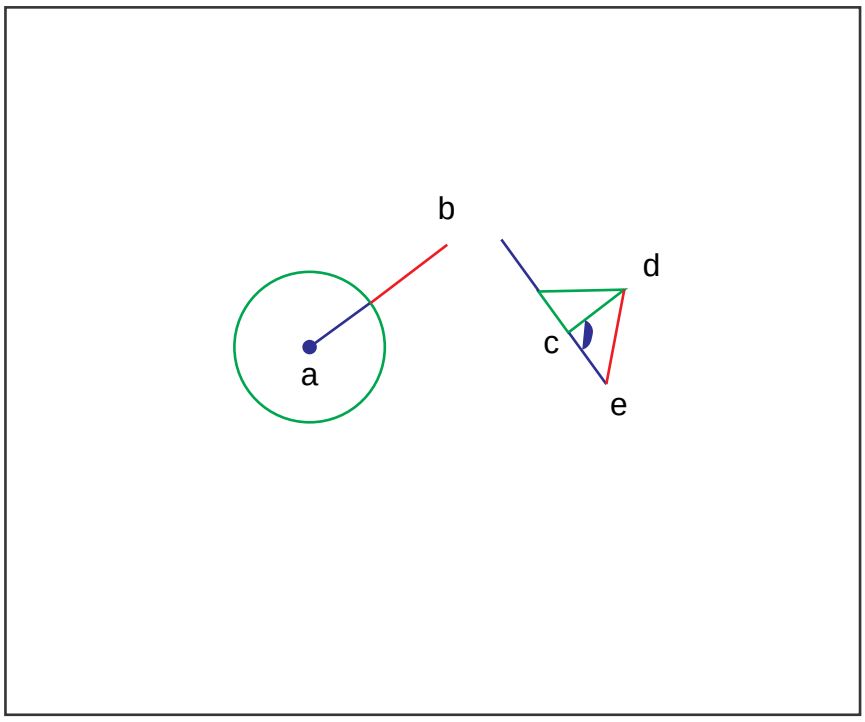


IV.3:11. on the straight line KB, and at the point K on it, let the angle BKA be constructed equal to the angle DEG, ([I.23])



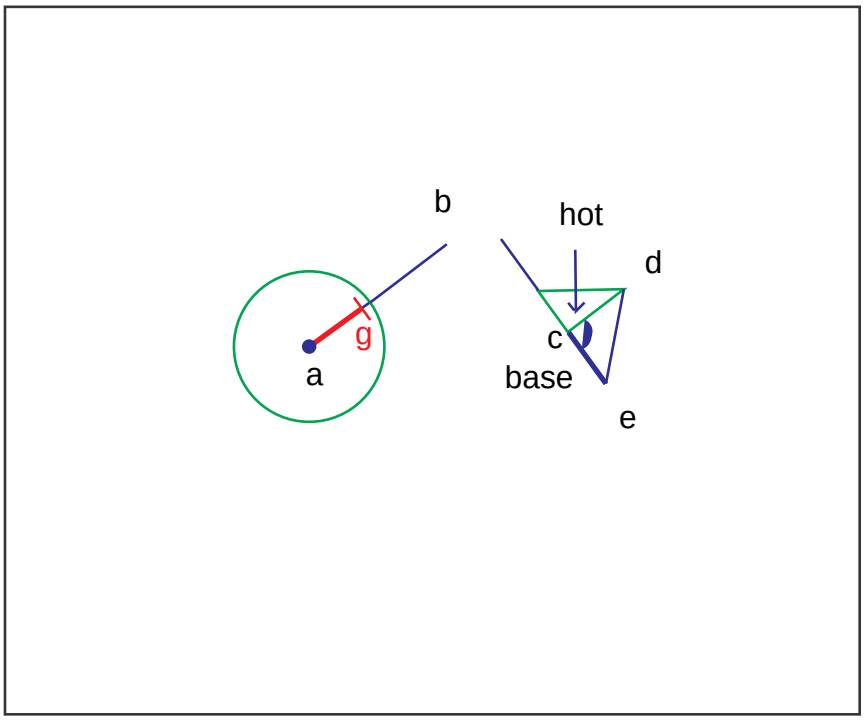
GOSUB I.23. (C#9)
Extend the line KB.
Relabel (G to e,
b to d,
E to c,
K to a).

I.23:9. let de be joined,

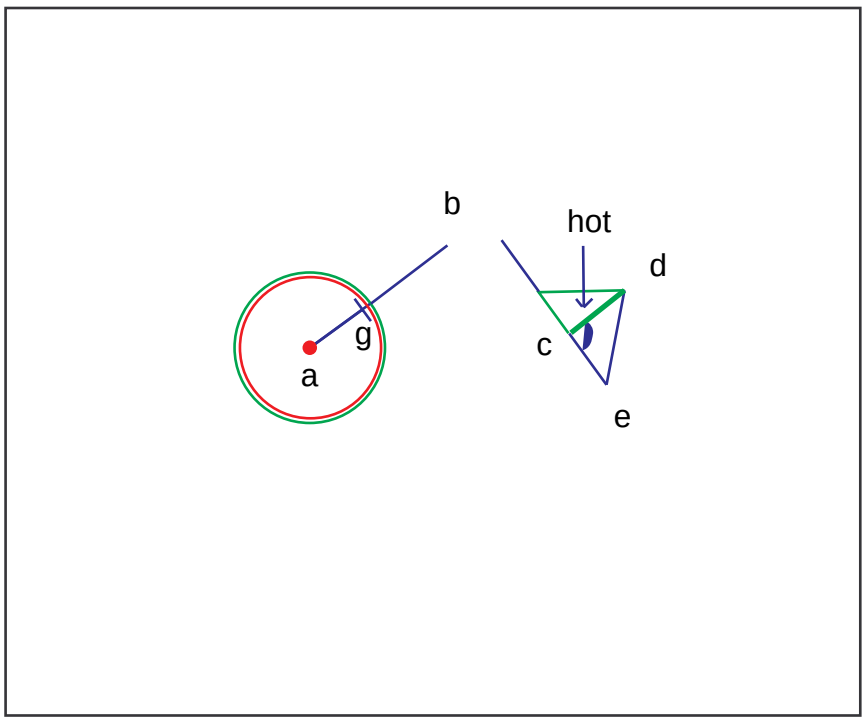


GOSUB I.22 (C#8P) to move the triangle cde.

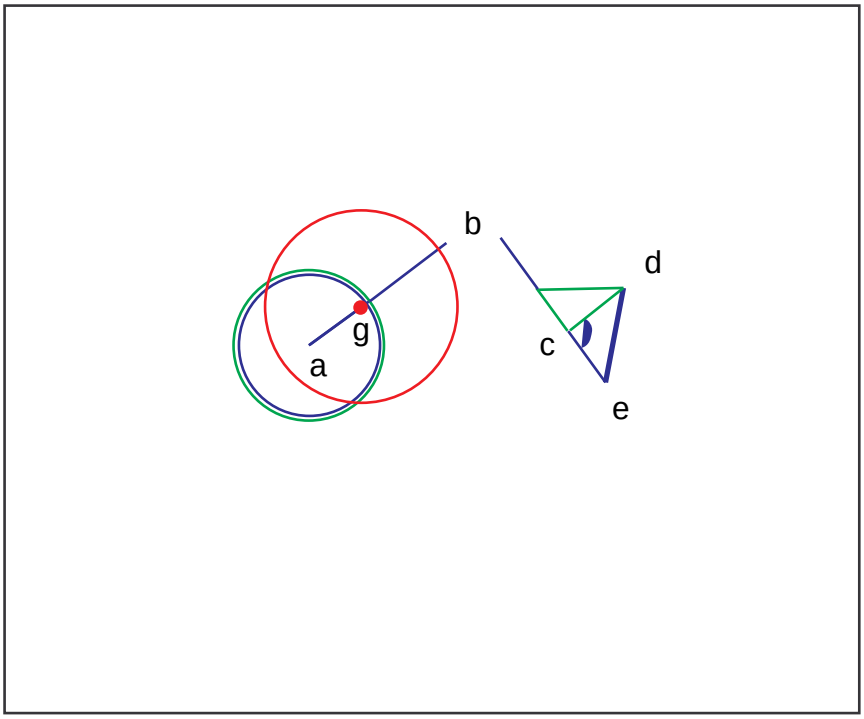
Move the base ce onto the target line ab, locating the point g, so the straight line ag is equal to the straight line ce.



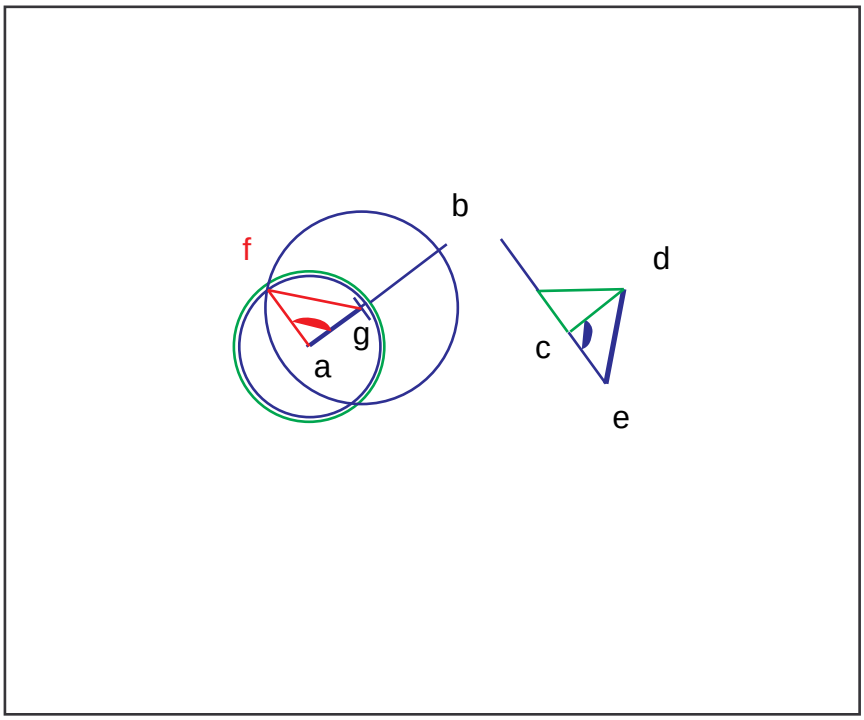
Swing the hot arm cd around the hot end a of the moved base ag.



Swing the cold arm ed around the cold end g.

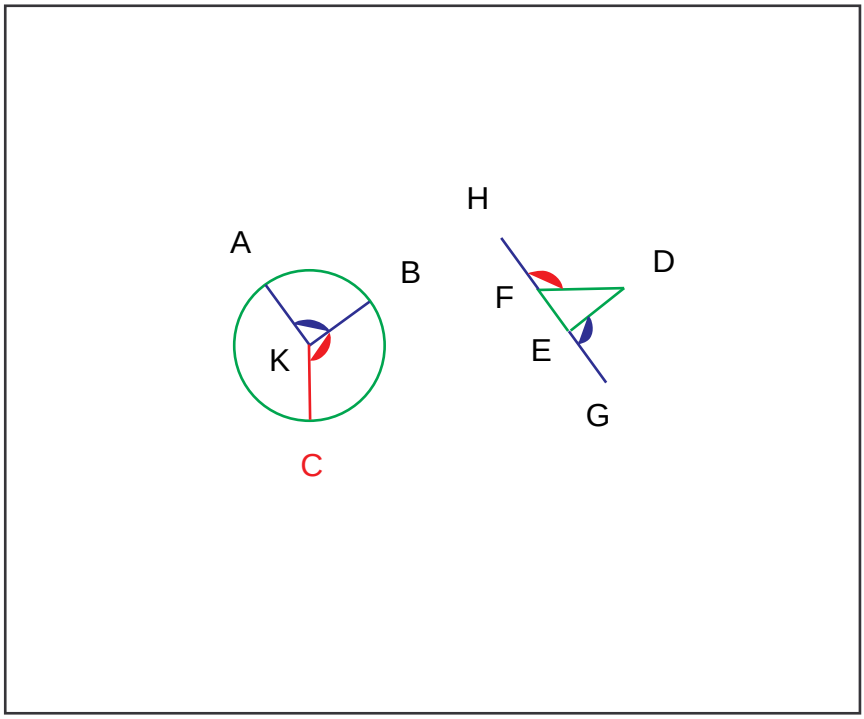


Connect the upper crossing point f to both ends of the moved base.



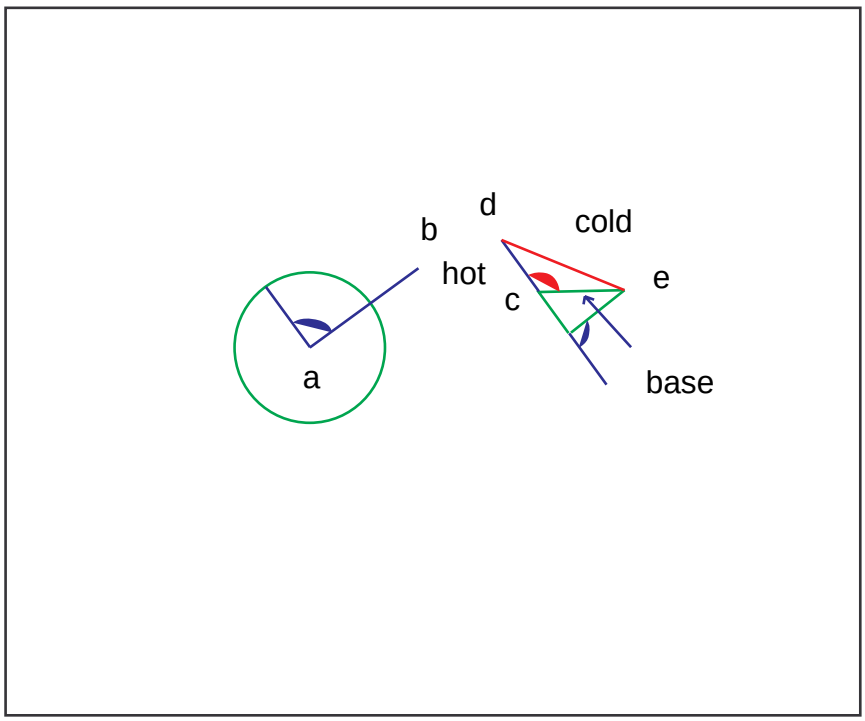
RETURN to IV.3 at line 11.
Cleanup.
Relabel.
IV.3:13. and the angle BKC

equal to the angle DFH; [I.23]



GOSUB I.23 (C#9) again.
Extend the line KB as before.
Relabel.

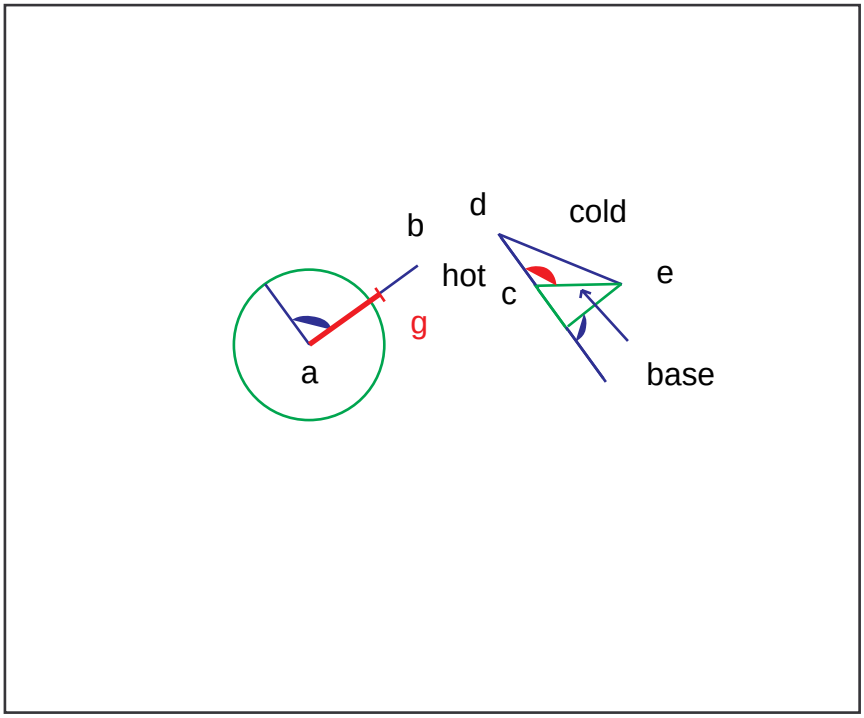
I.23:9. let de be joined,



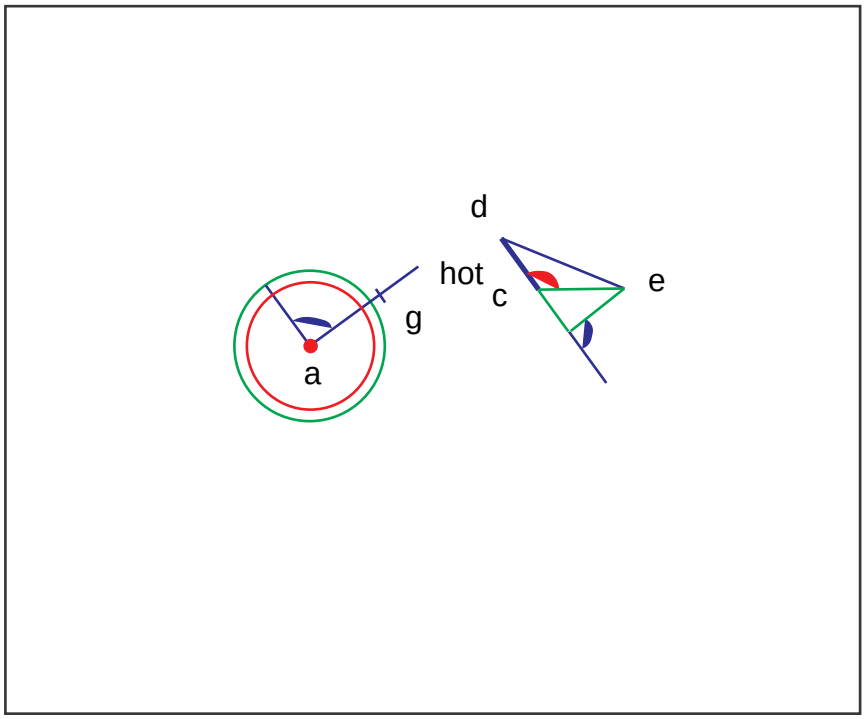
GOSUB I.22P (C#8P) to move the triangle.

Move the base ce to the target

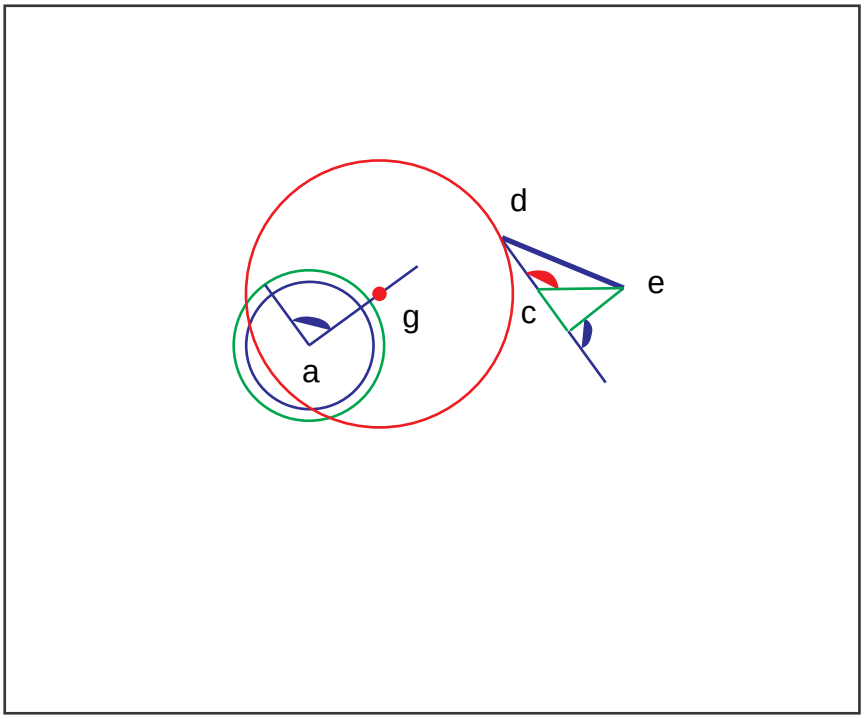
line ab, locating the point g.



Swing the hot arm cd around a.

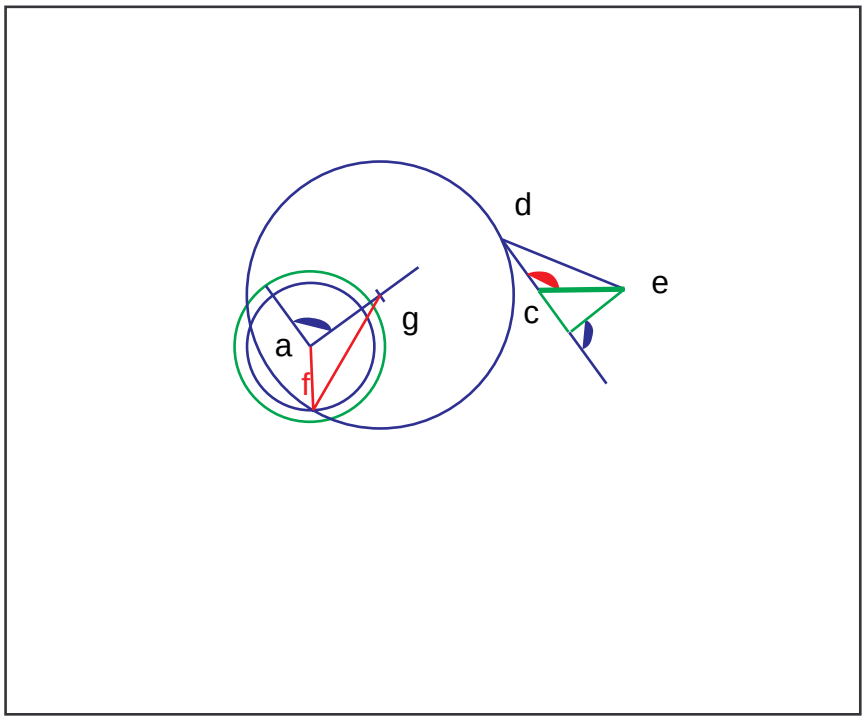


Swing the cold arm de around g.



Connect the lower crossing point f to both ends of the moved base.

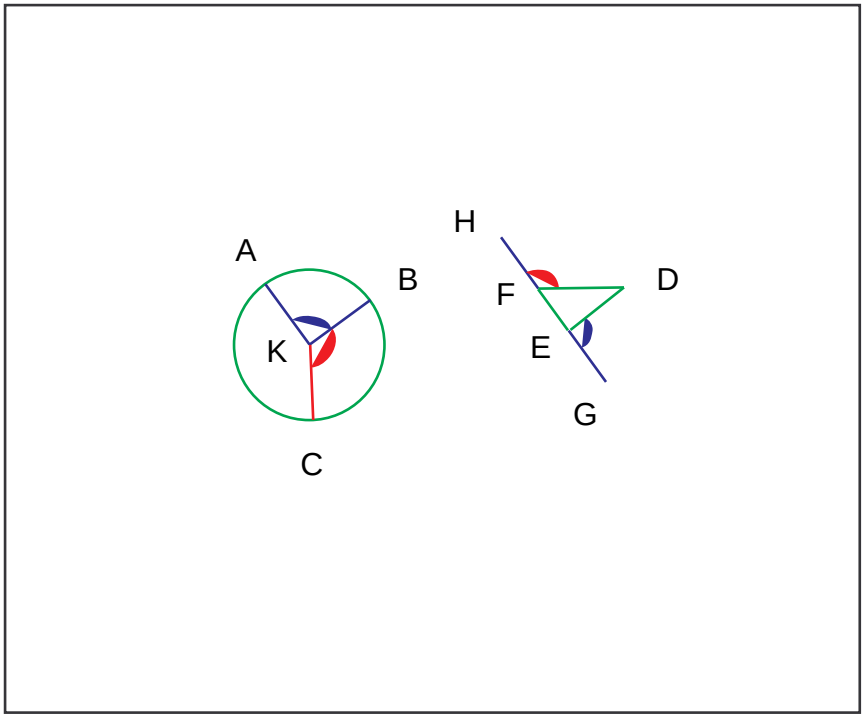
Cleanup.



Extend the line af to the given cir-

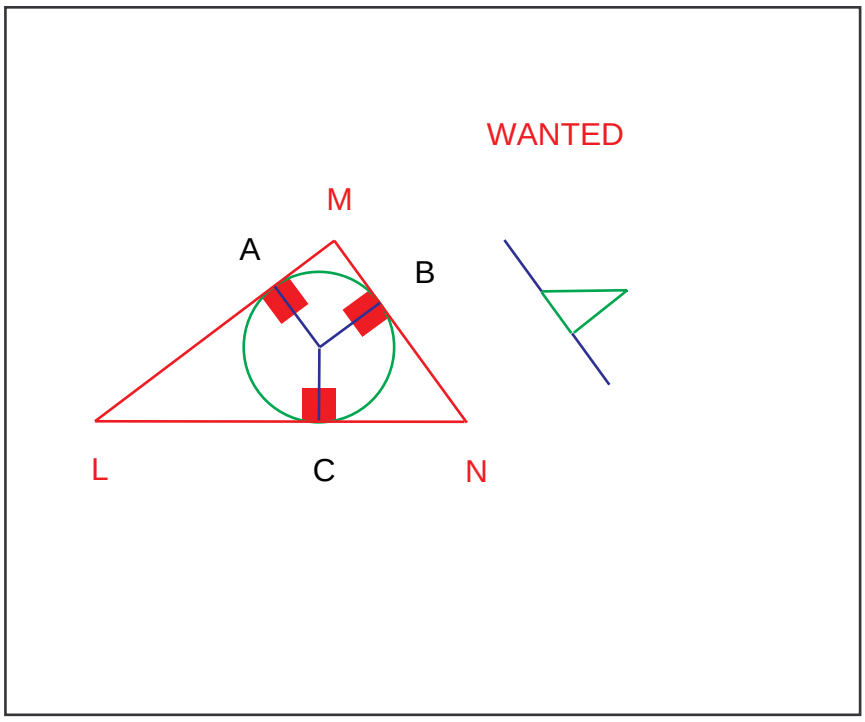
cle.

RETURN to IV.3 at line 13.
Relabel.



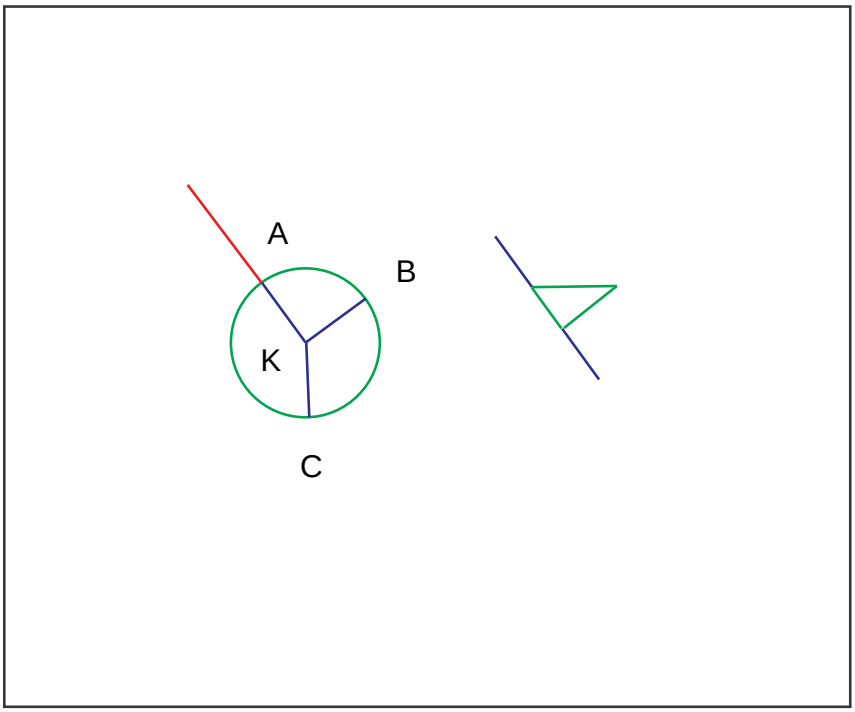
IV.3:14. and through the points A, B, C let LAM, MBN, NCL be drawn touching the circle ABC. [III.16, Por.]

GOSUB III.17
(special case, C#18B, final part, 5 steps, 3 times)



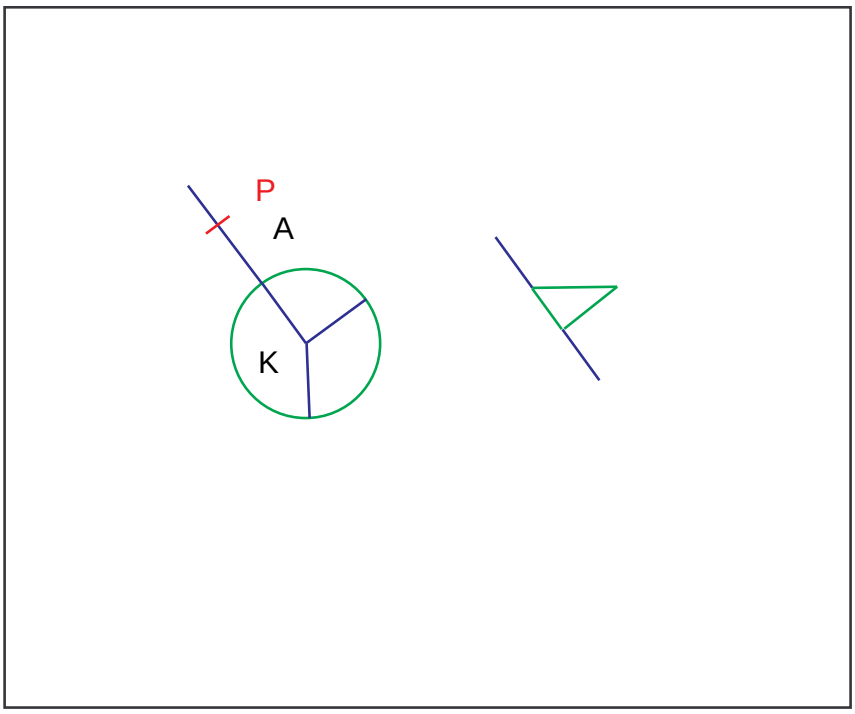
Through the point A let LAM be

drawn touching the circle ABC. Following C#8B (see C#22 after setp 9)) we construct the line through A at right angles to AK. ([I.11])

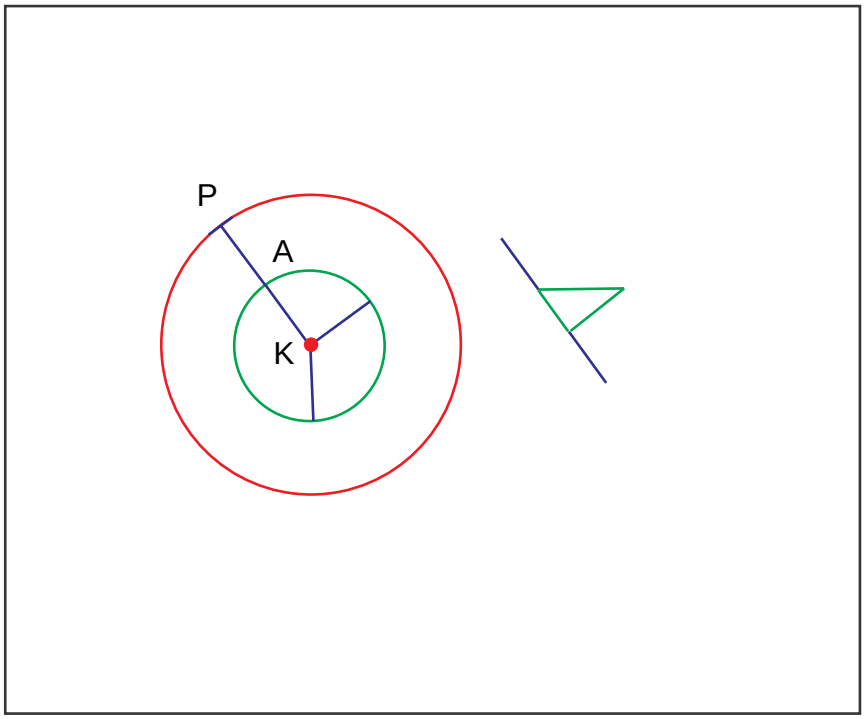


GOSUB I.11
We will use the current labels. Extend the line KA.

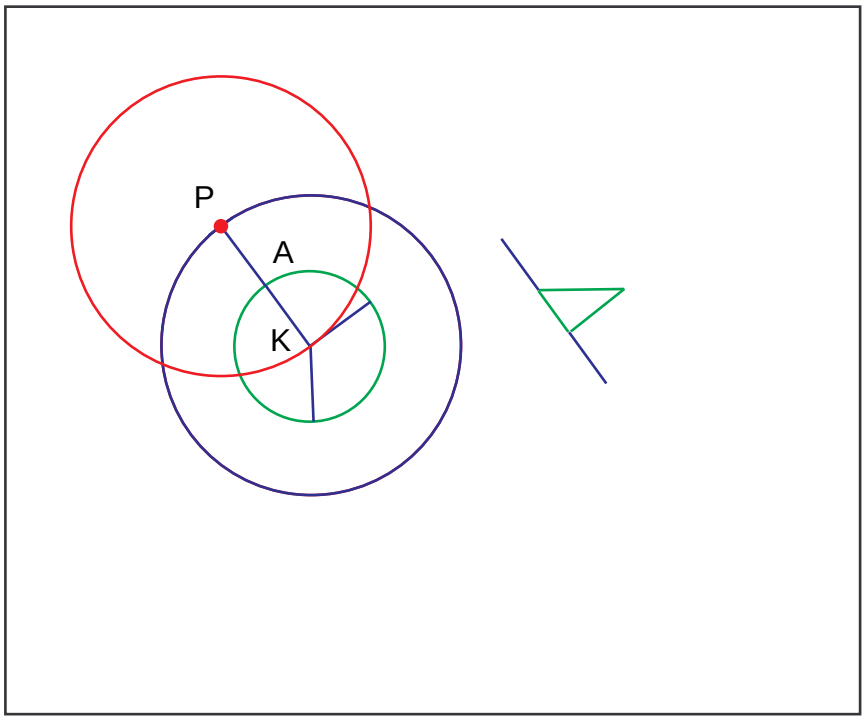
I.11:10. Determine the point P on the extended line so that PA is equal to AK.



Swing KP around K.

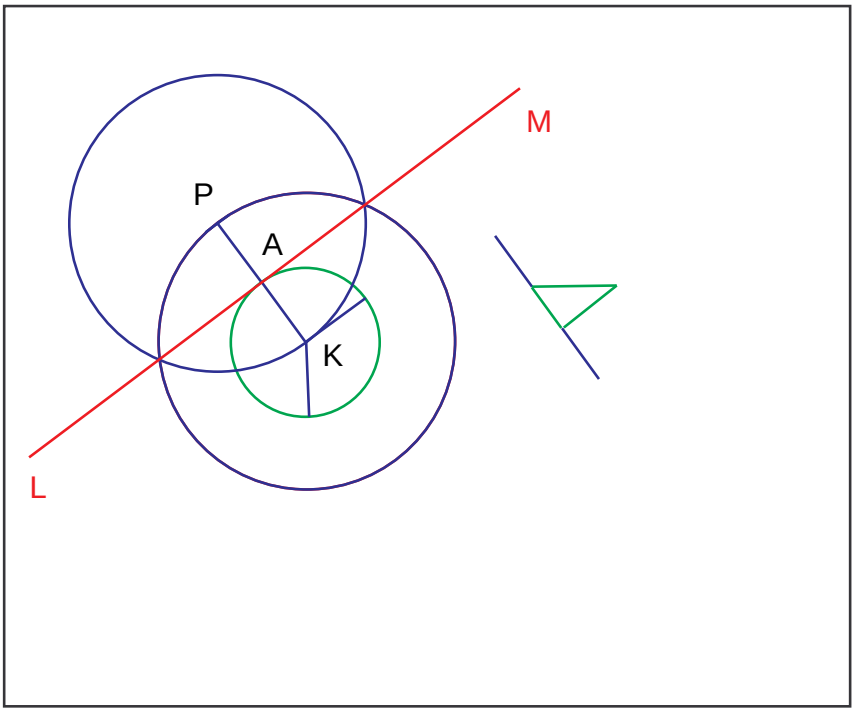


Swing PK around P.



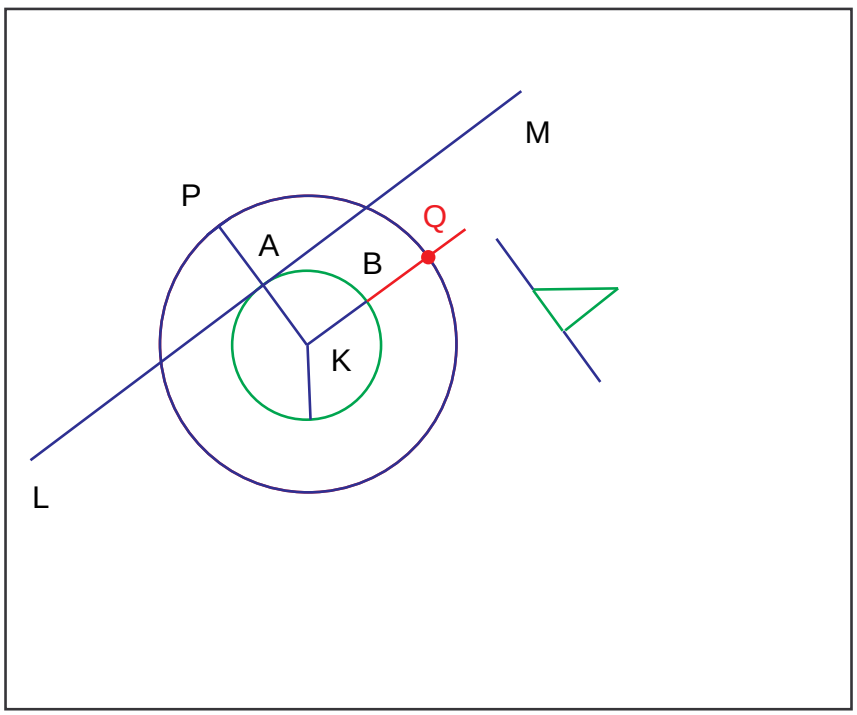
Connect the crossing points and

extend to L, M. (placed approximately).

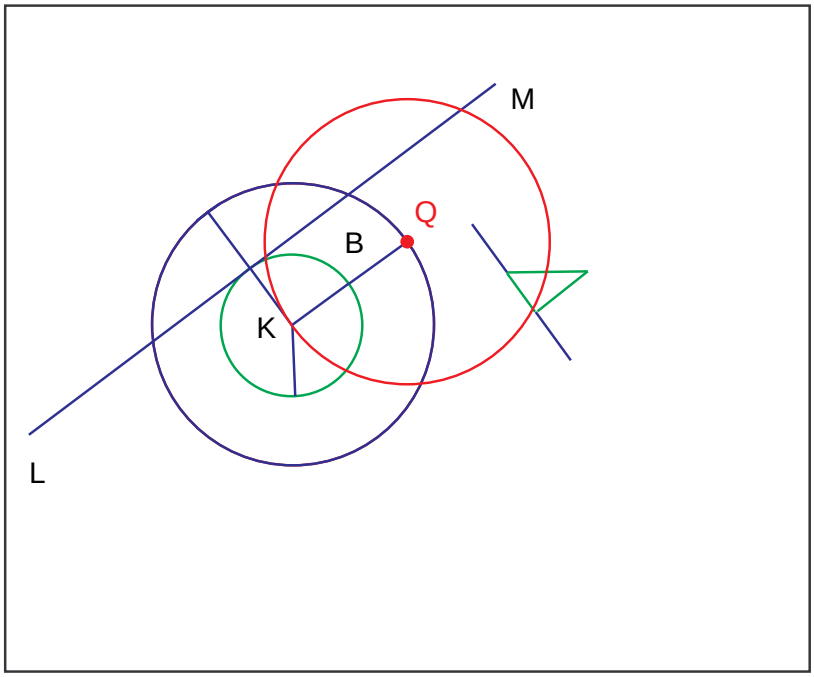


Cleanup. Preserve the circle through P.
RETURN to IV.3 at line 14.

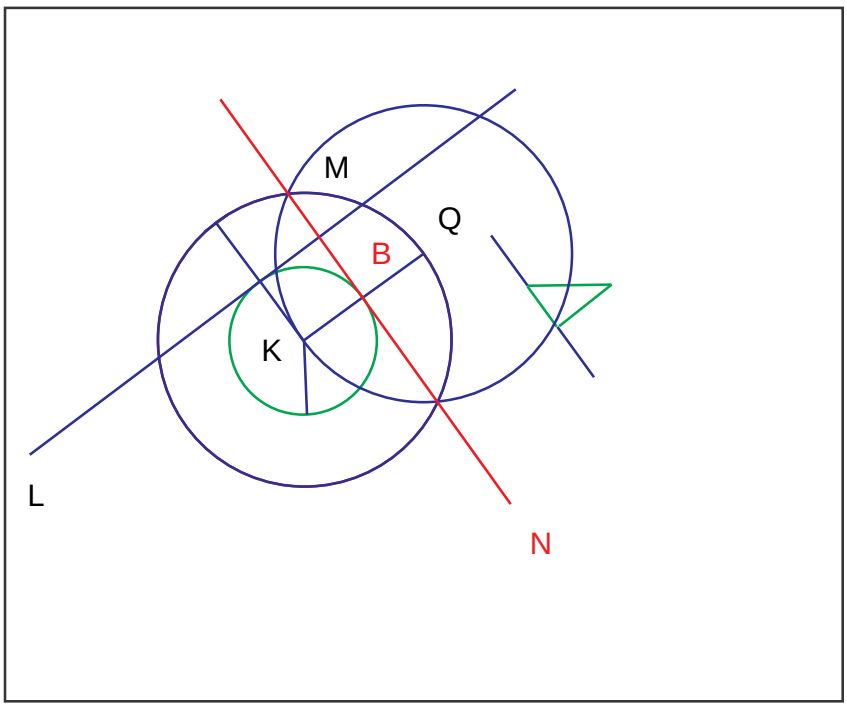
Through the point B let MBN be drawn touching the circle ABC. Extend KB. Locate the point Q so QB is equal to BK.



Swing QK around Q.

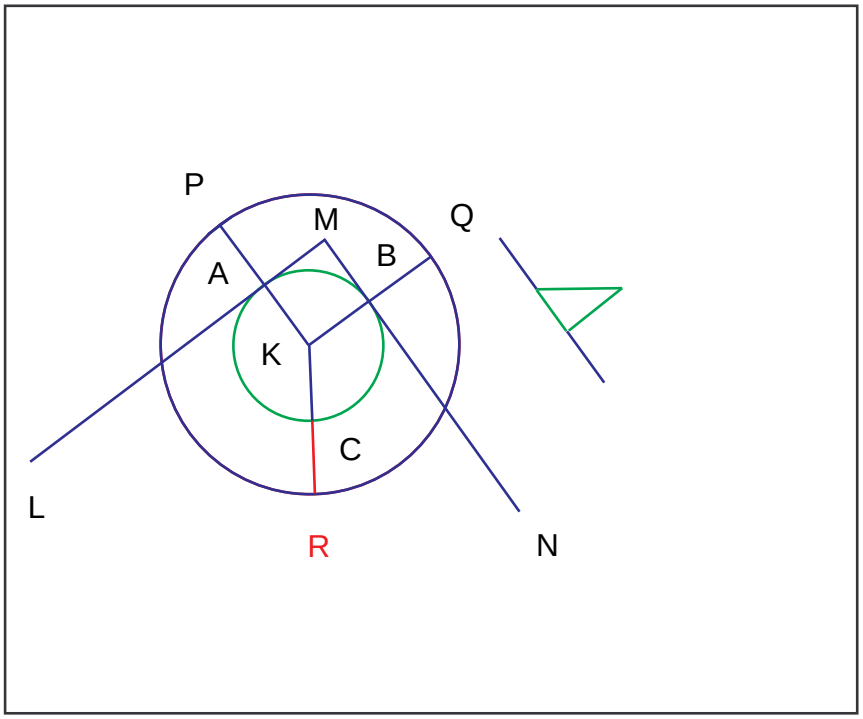


Connect the crossing points and extend. The point M is now located exactly.

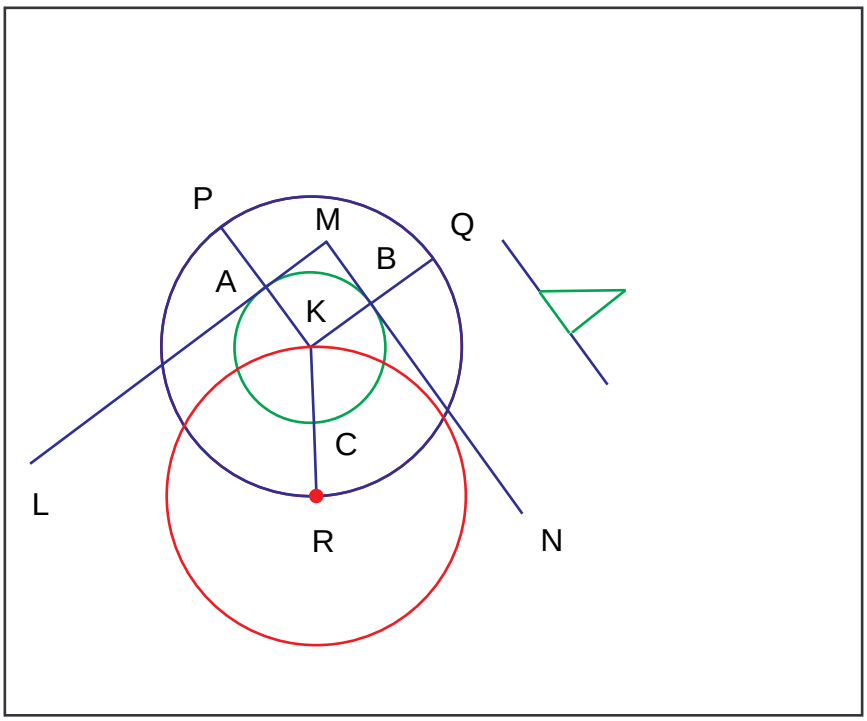


Cleanup. Preserve the circle through P and Q.
Extend KC to meet this circle at

R.

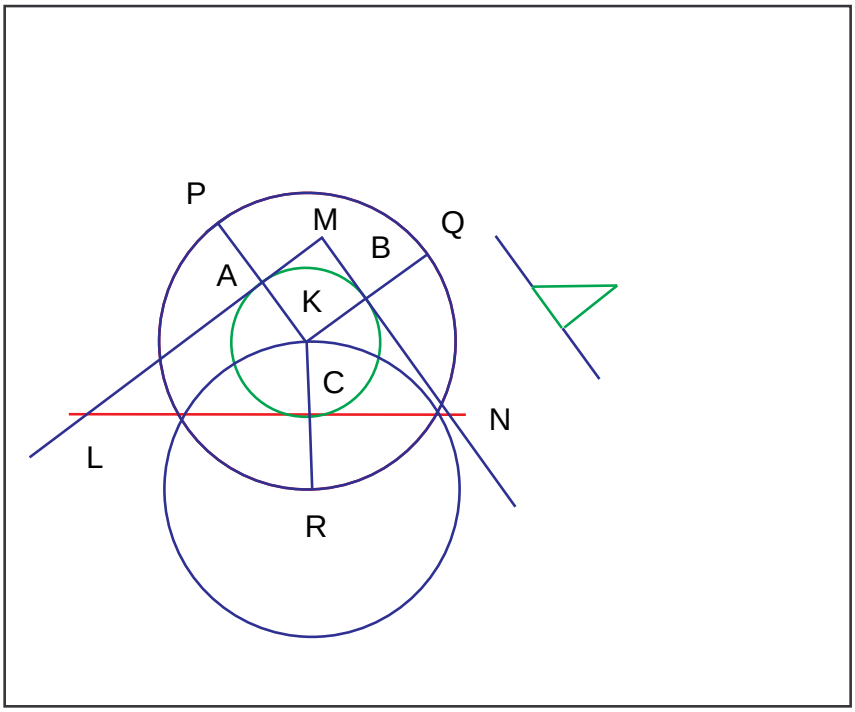


Swing RK around K.



Connect the crossing points and

extend, determining L, N exactly.



Cleanup.

DONE.