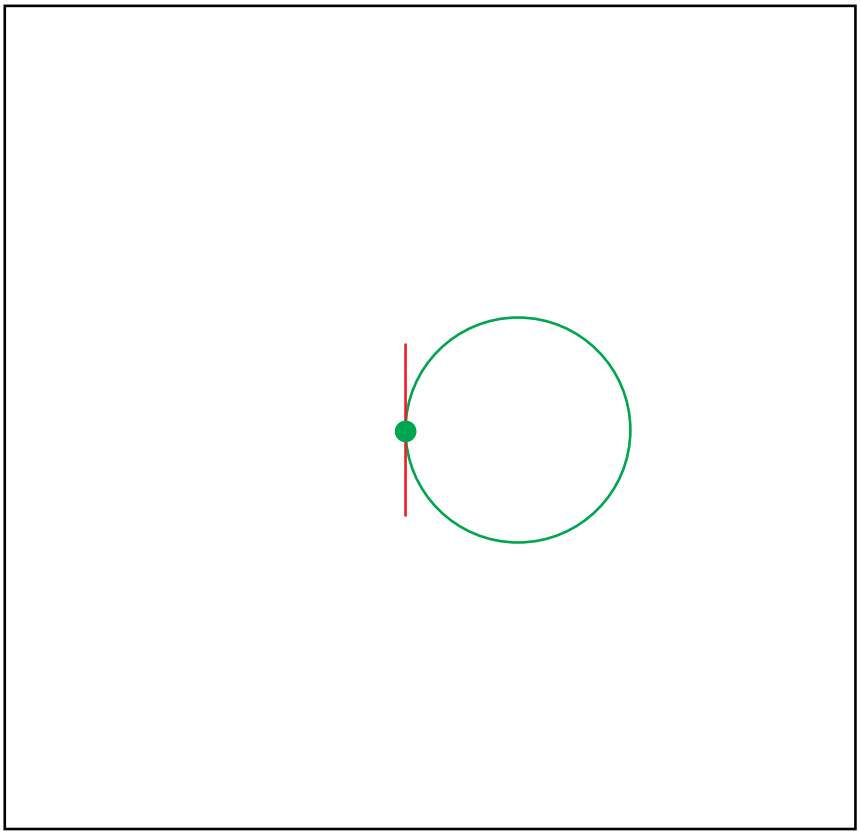
Construction 18B: Book III, Proposition 17

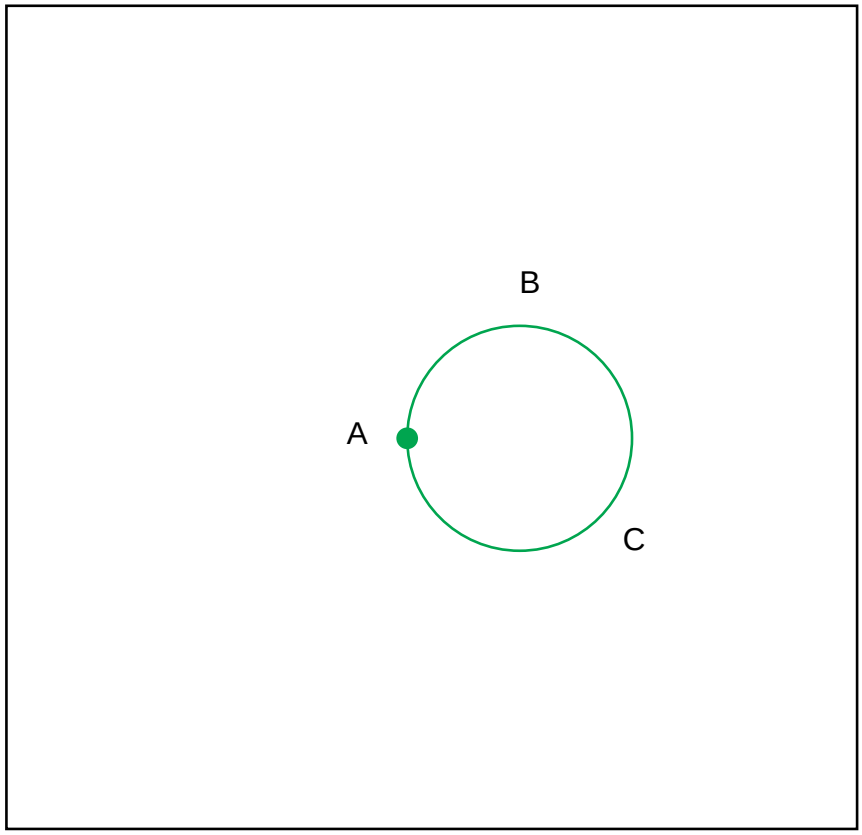
Alternate Construction

From a given point to draw a straight line touching a given circle.

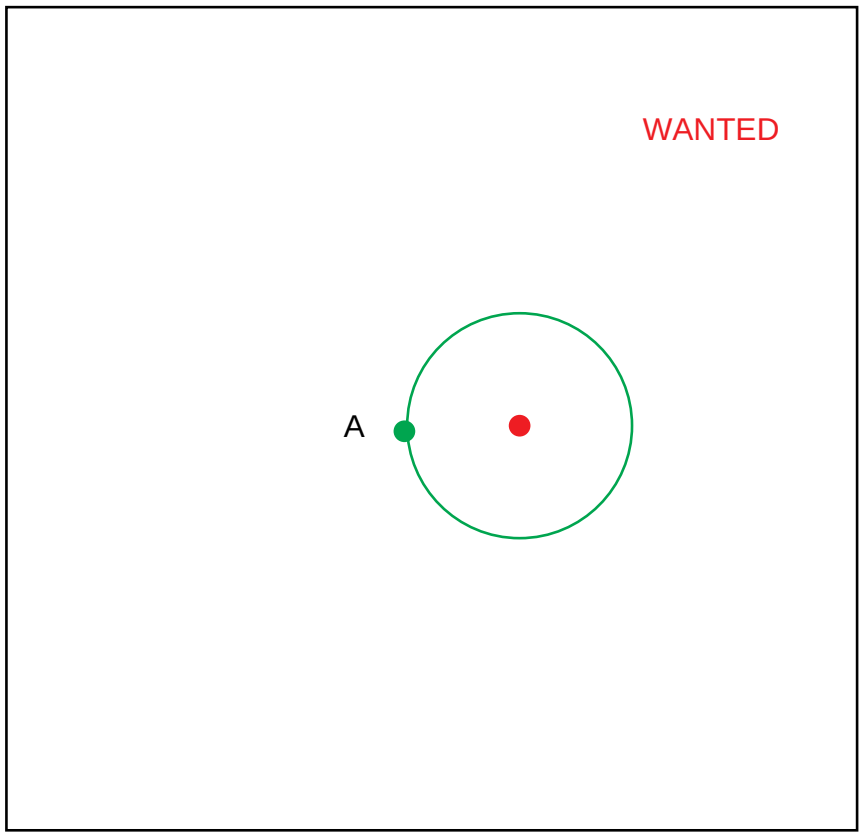
Special case in which the point lies on the circumference of the circle. (cf. C#22)



III.17:3. Let ABC be the given circle, and A the point to be touched.

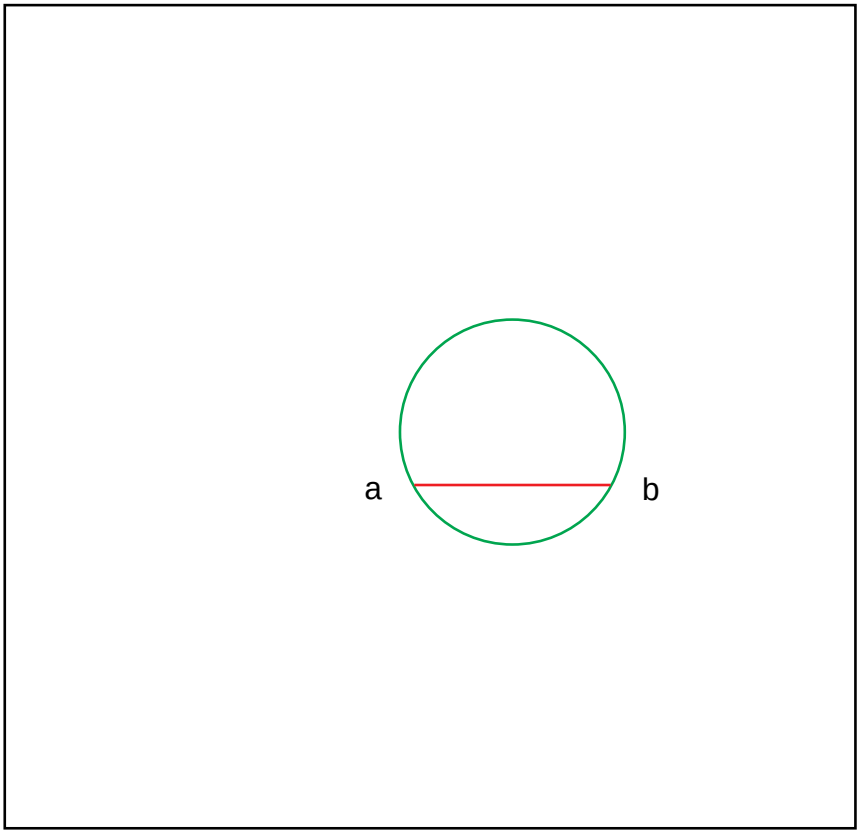


III.17:6. For let the center of the circle be taken; [III.1]



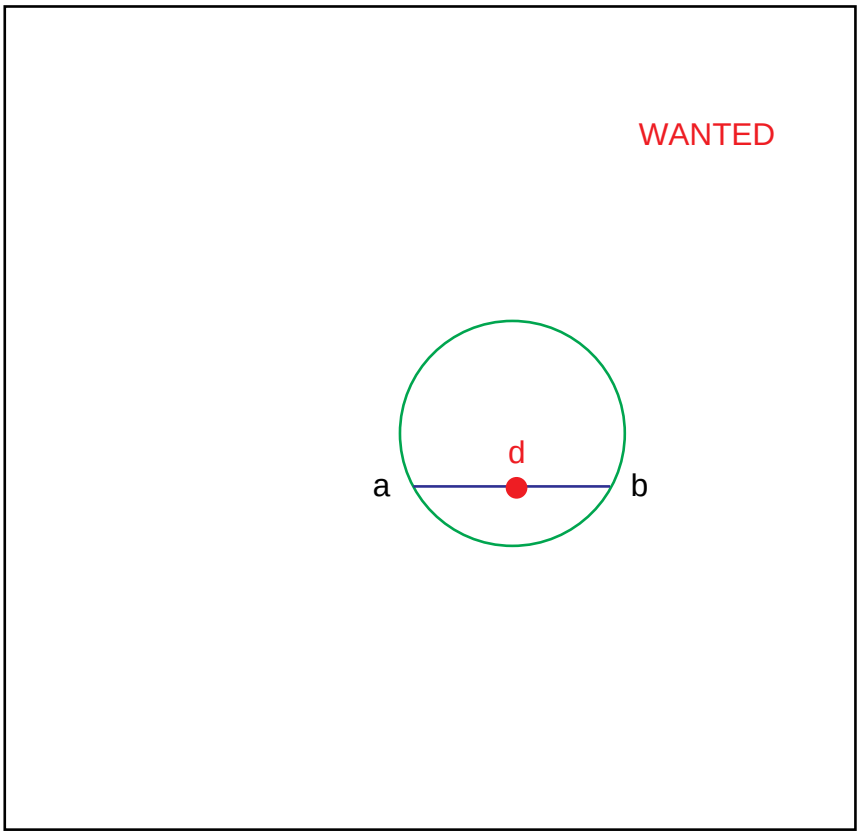
GOSUB III.1.
Relabel.

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

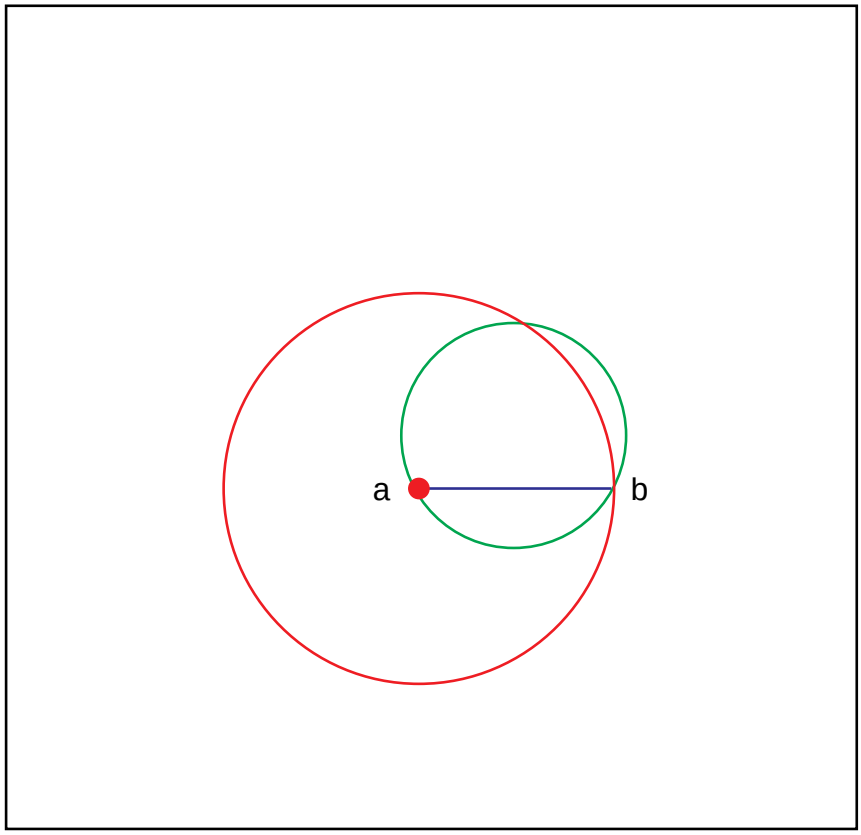


III.1:5. and let it be bisected at the point d;
([I.10])

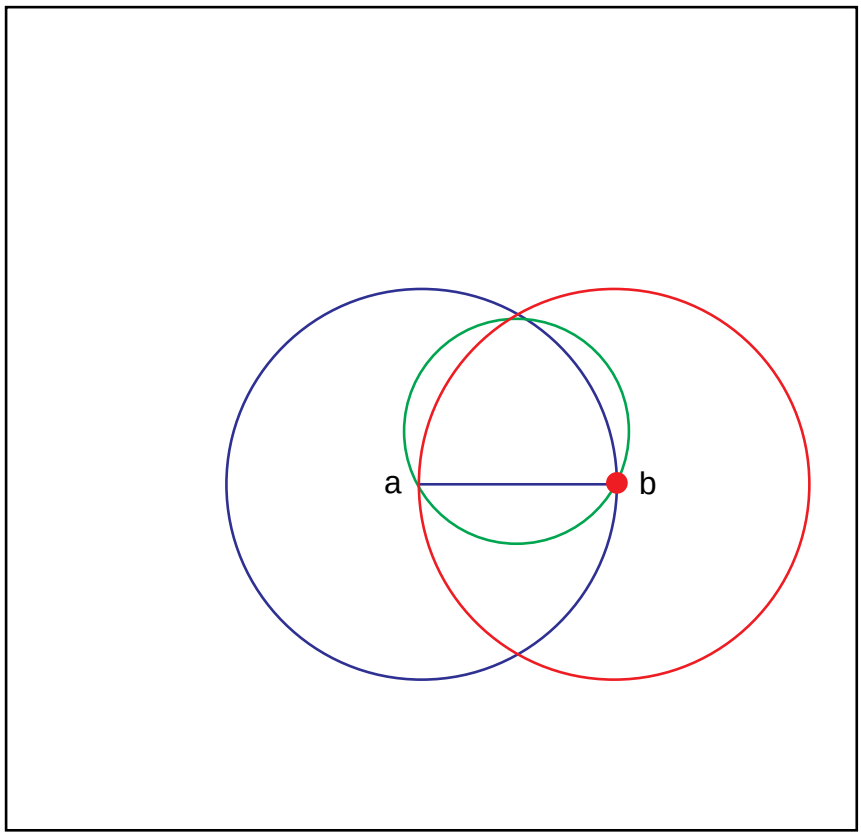
GOSUB I.10. (C#5B).



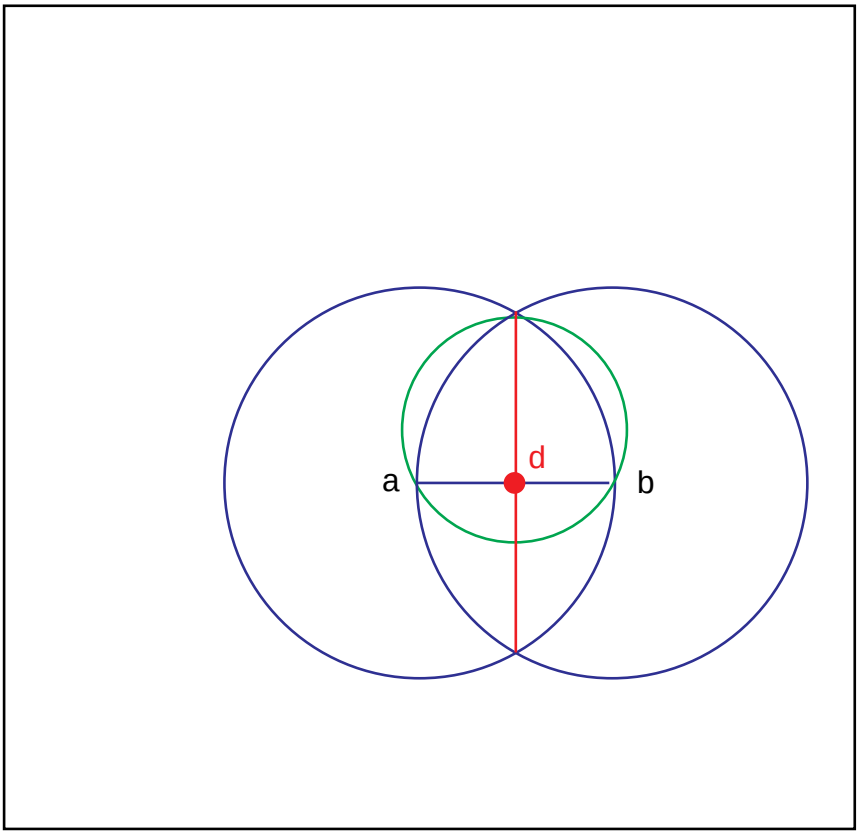
Swing ab around a.



Swing ba around b.

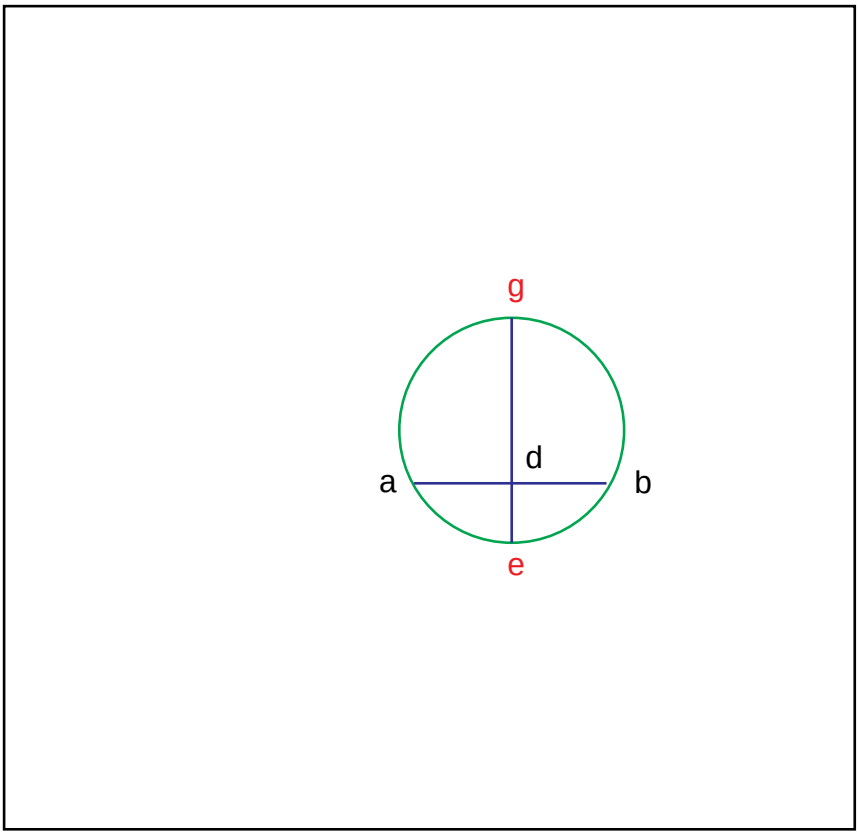


Connect the crossing points.
Mark the point d.

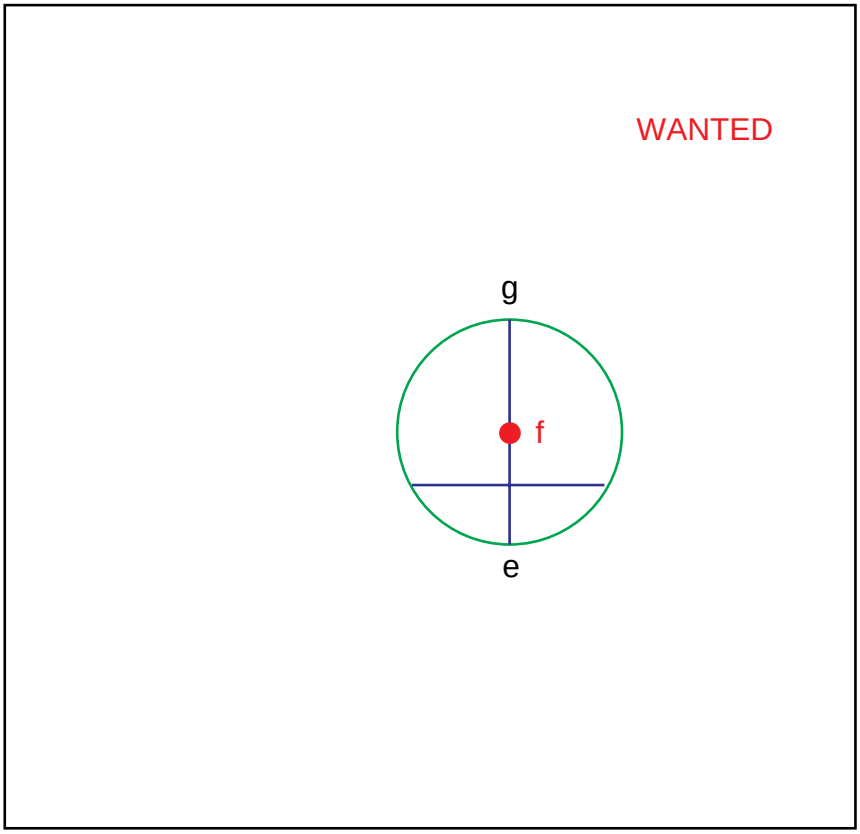


RETURN to III.1 at line 5.
Relabel.

III.1:7. From d let dg be drawn at right angles to ab and let it be drawn through to e;
This is the line drawn in step 4, so mark the points g, e.

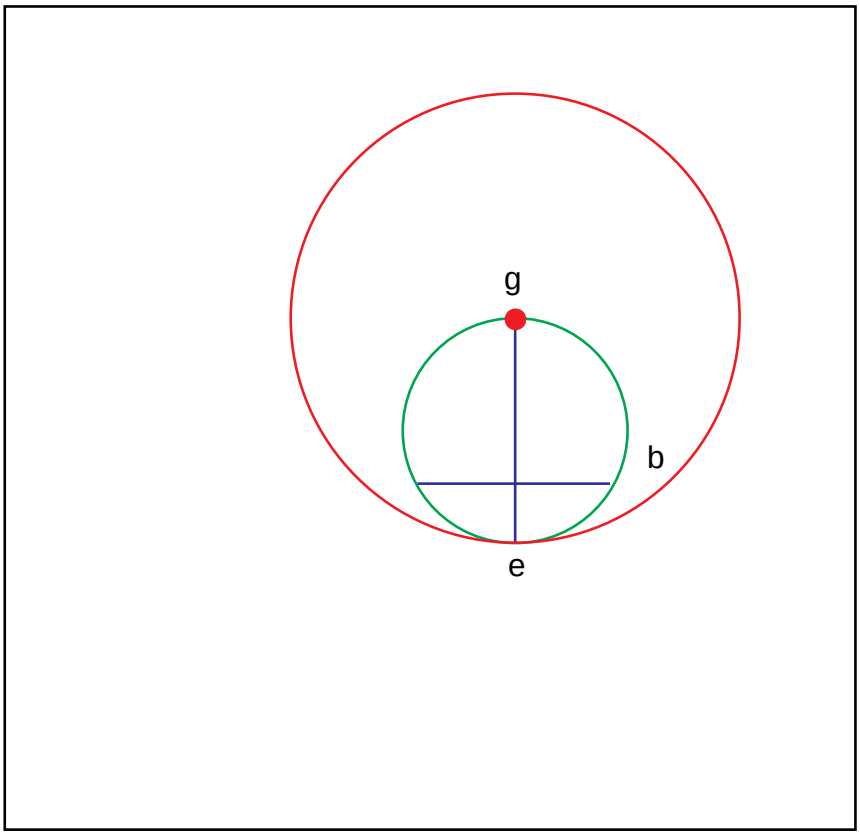


I.1:9. let de be bisected at f;
([I.10])

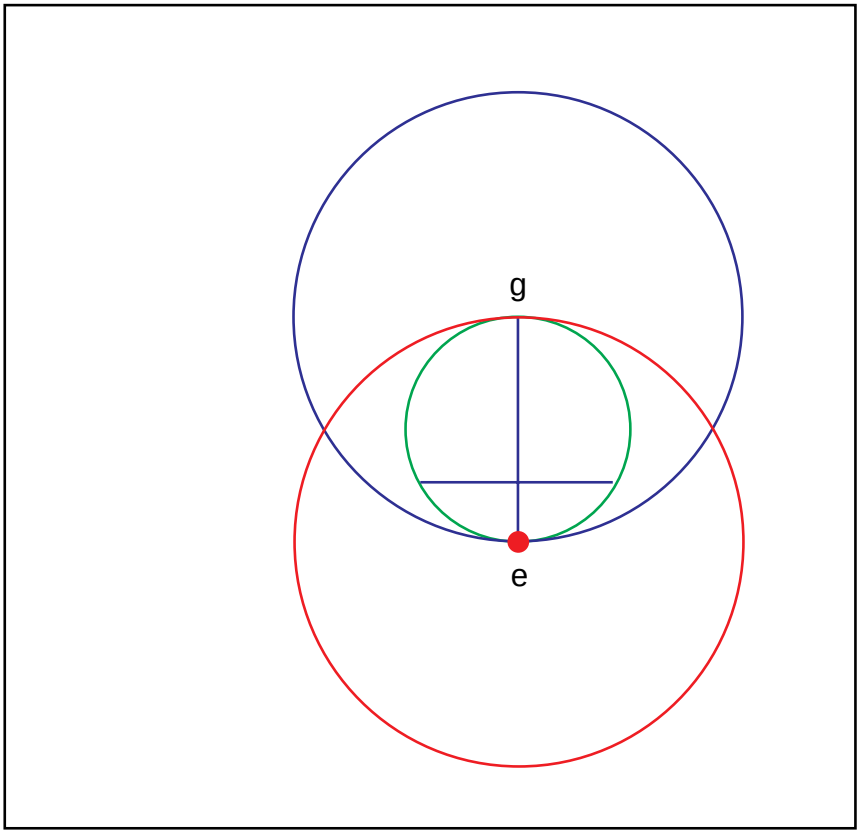


GOSUB C#5, again.

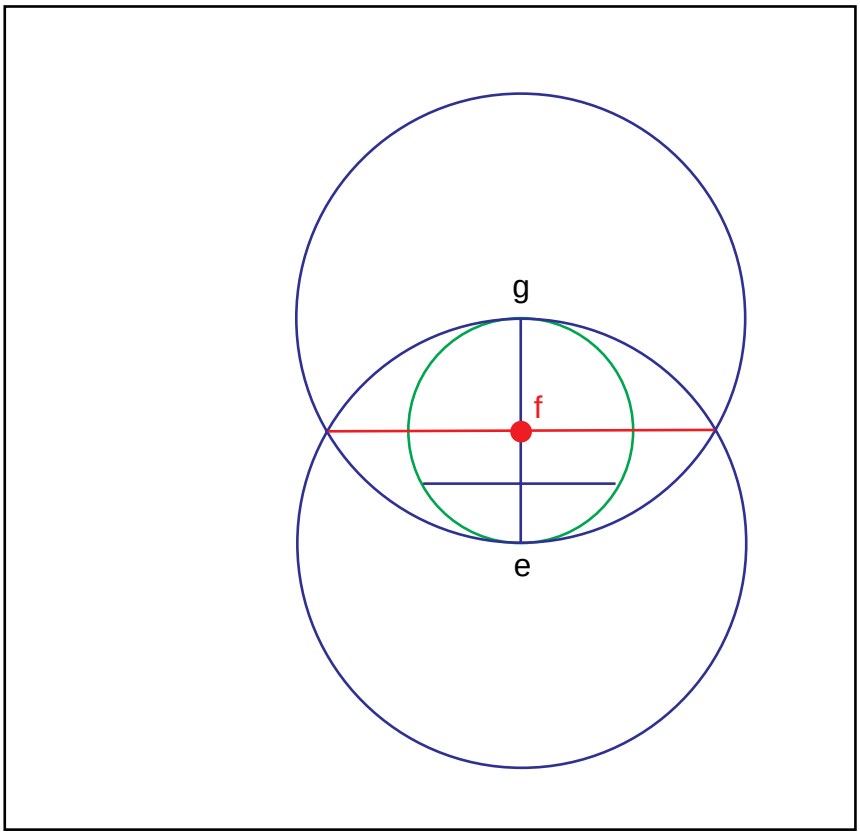
Swing ge around g.



Swing eg around e.



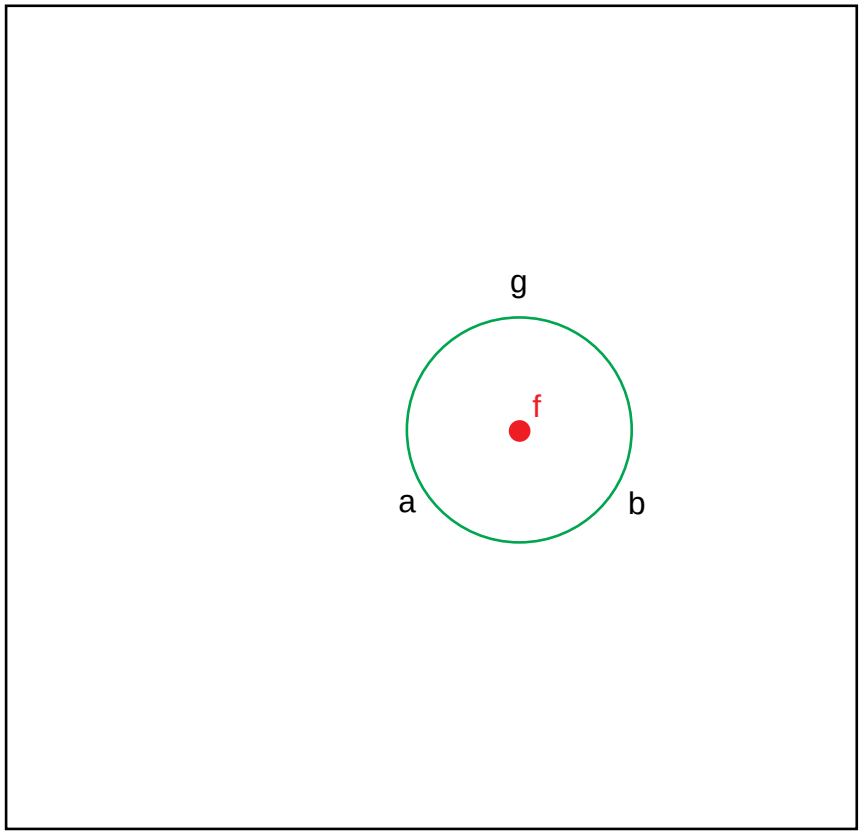
Connect the crossing points,
mark the point f.



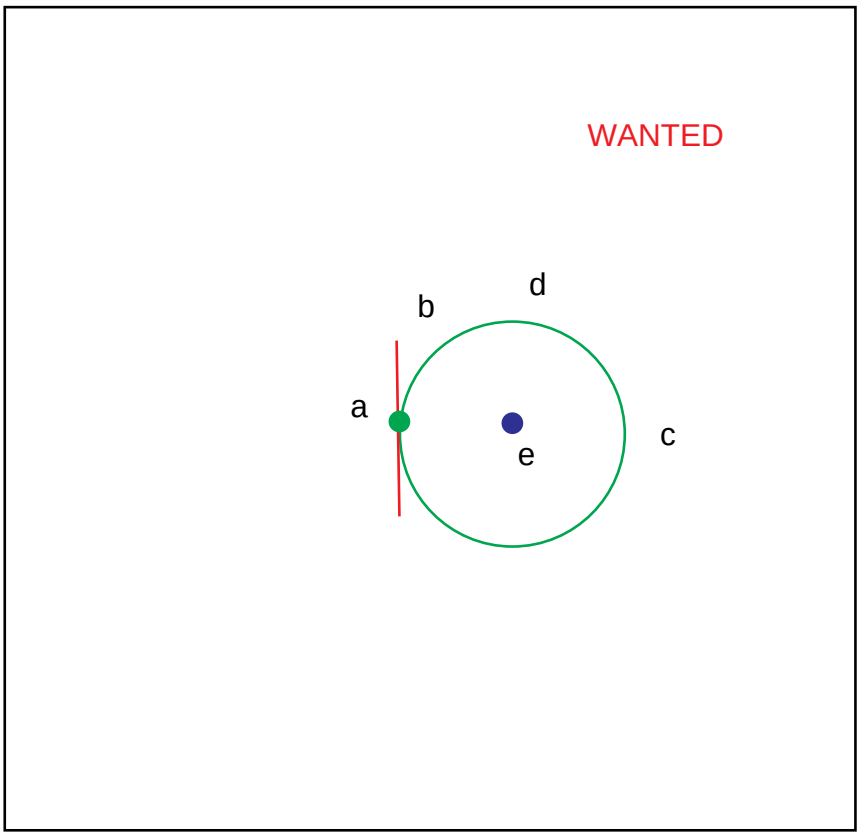
Cleanup.
RETURN to III.1 at line 9.

III.1:10. f is the center of the circle abg.

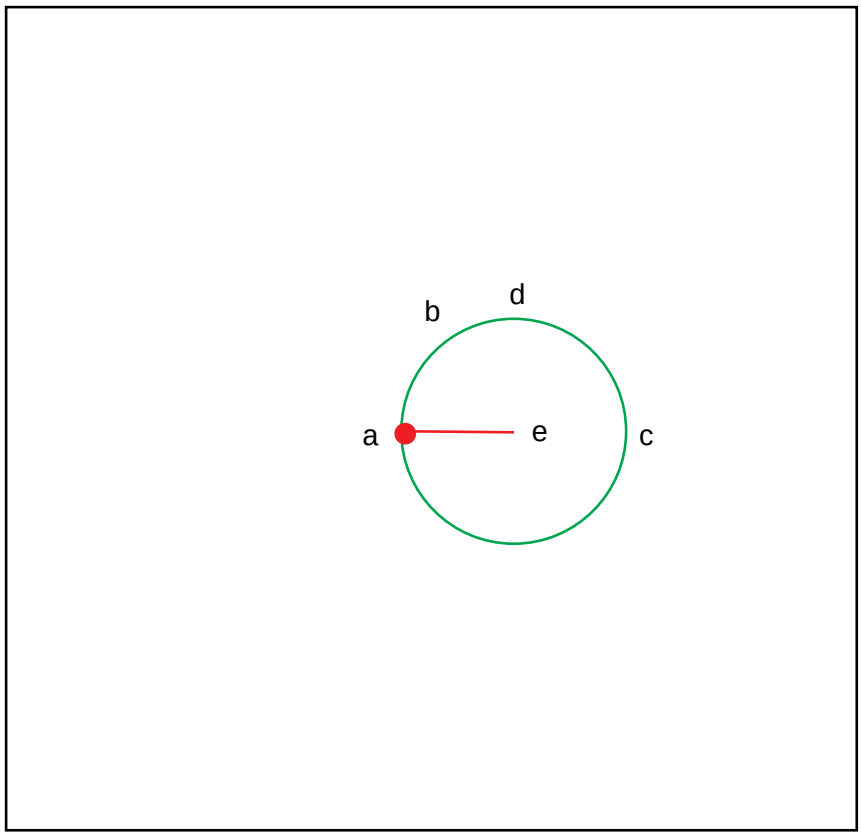
RETURN to III.17 at line 6. Relabel.



The point e is the center of the circle bcd. The point a is on the circle. Recall that this is a special case of III.17.

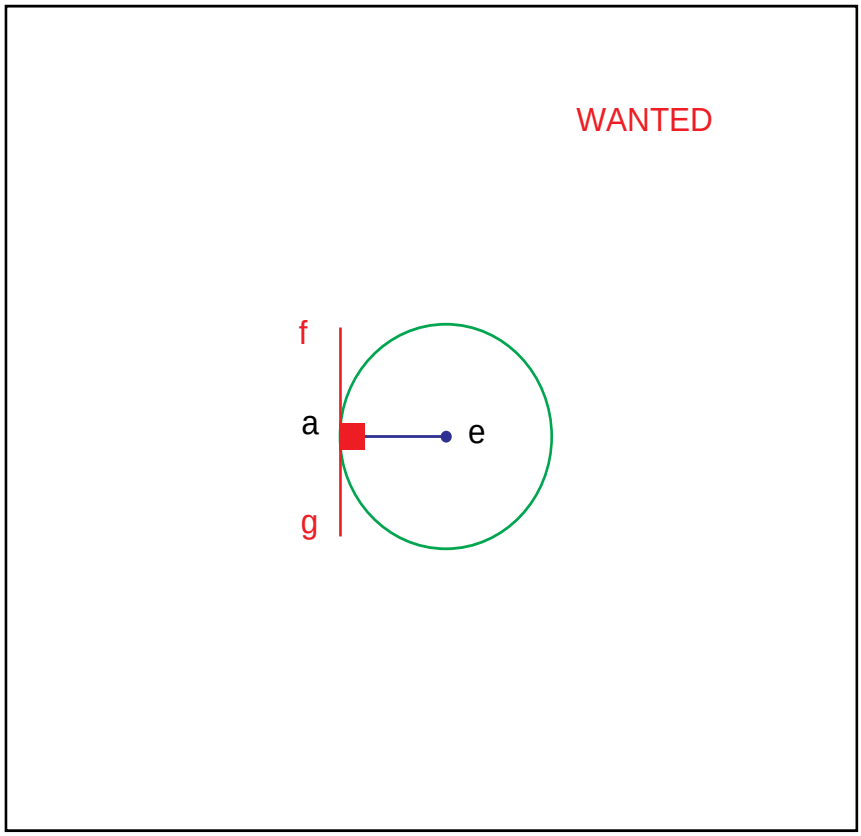


III.17:8. Let ae be joined,



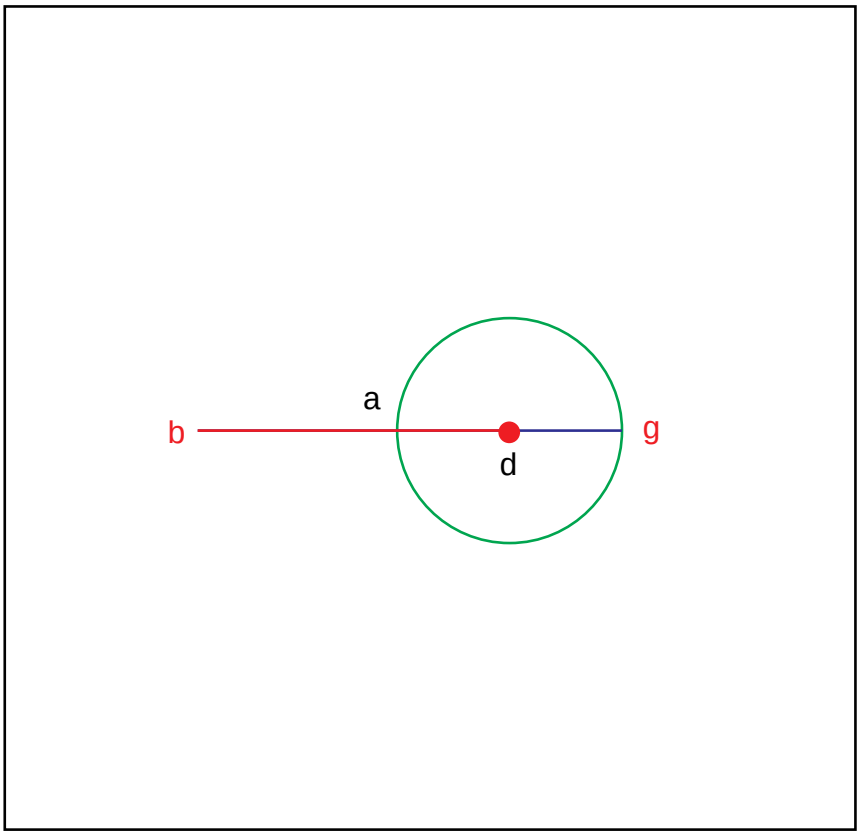
Now we diverge from III.17. The line which is wanted is the perpendicular to ae at the point a. See the Porism to III.16.

Draw a staight line fg at right angles to ae from the point a on it. ([I.11])



GOSUB I.11.

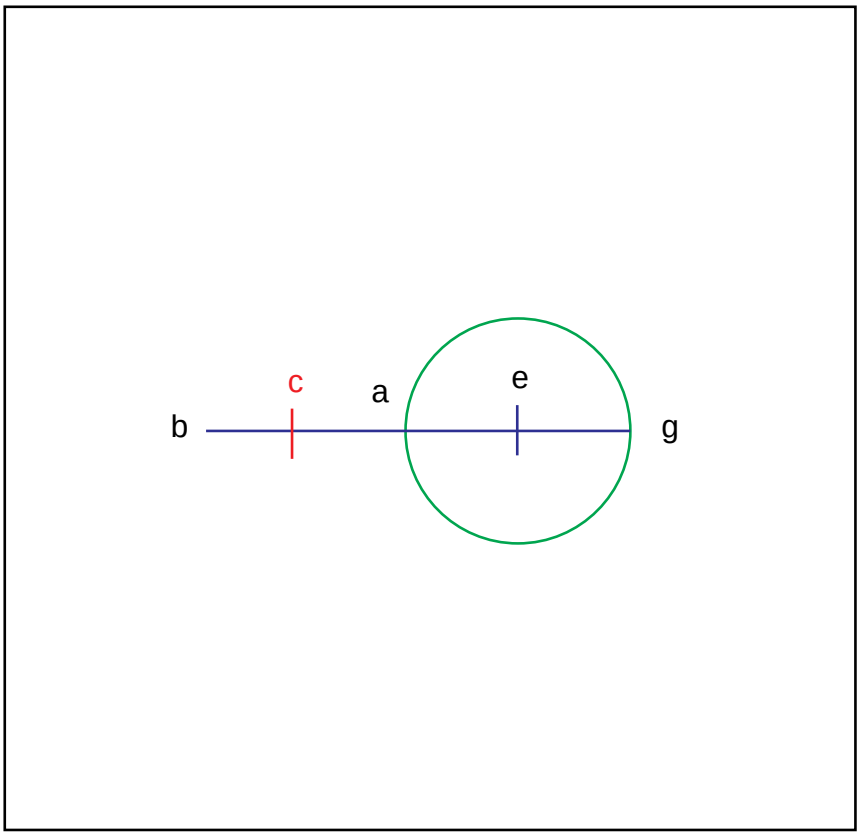
Extend the straight line ae.
Relabel.



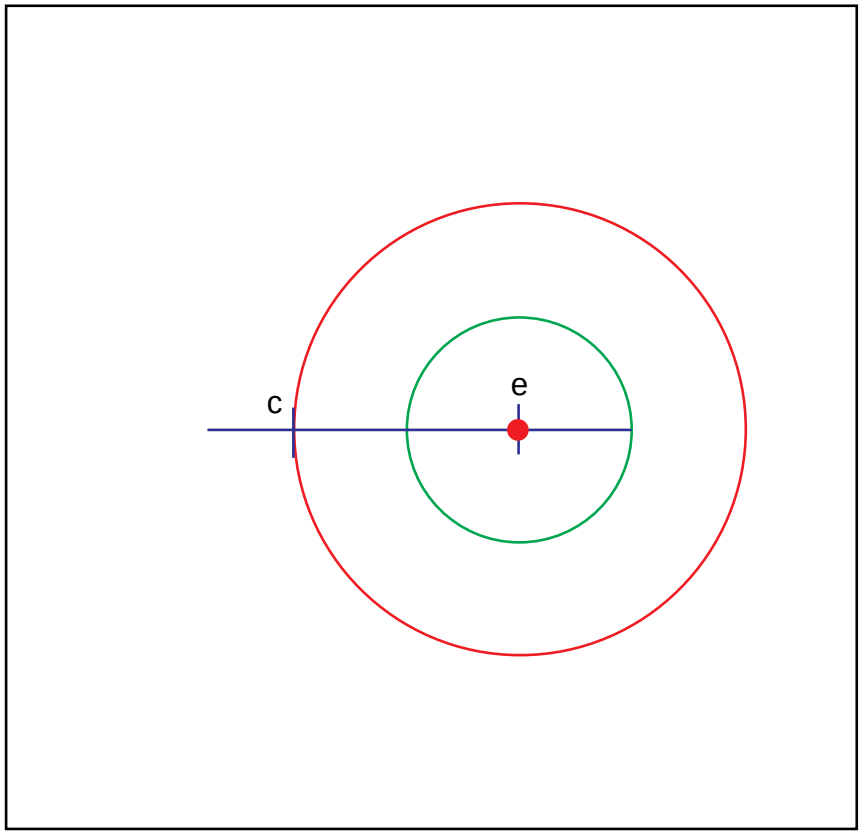
I.11:8. Let a point d be taken at random on ag.

We take d at the centre of the circle.

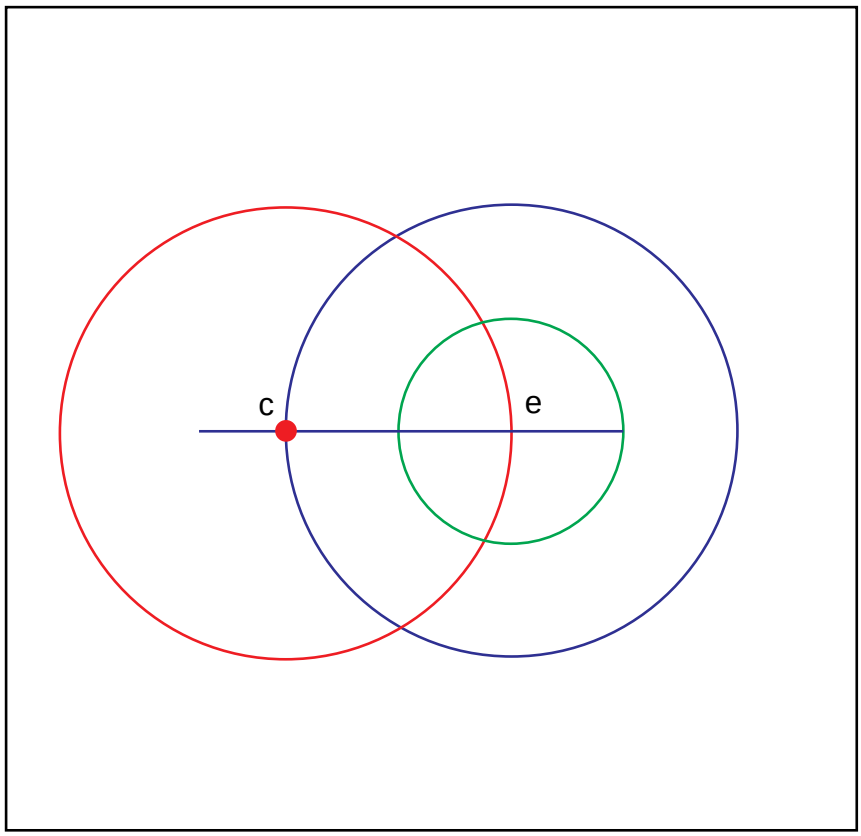
I.11:10. let ac be made equal to ae; [I.3] (the rope)



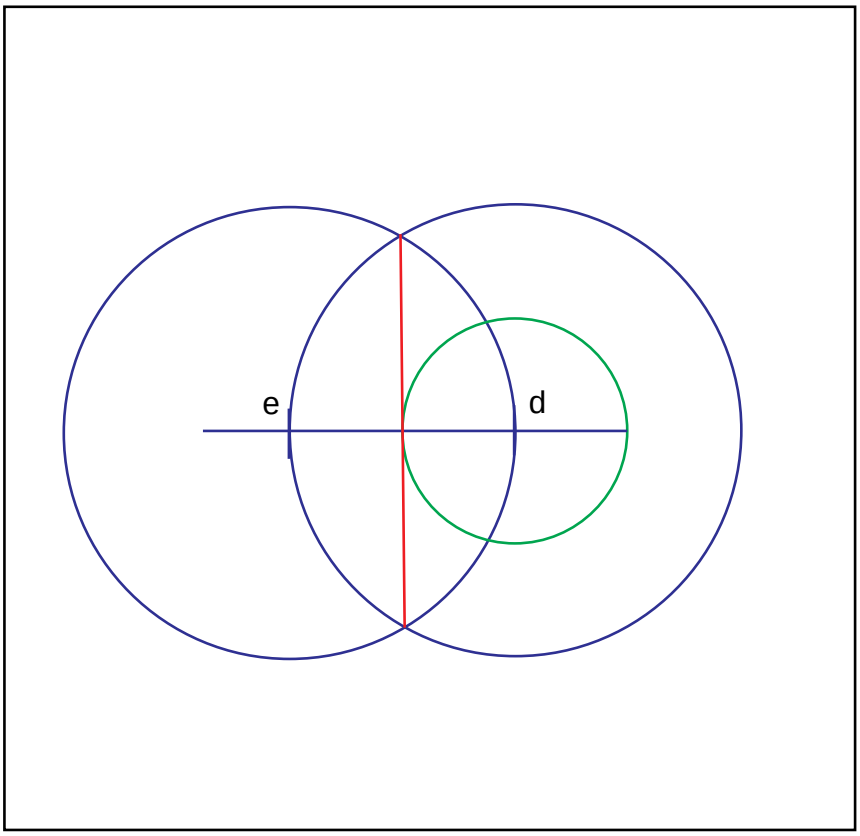
Following C#5B, swing ce around e.



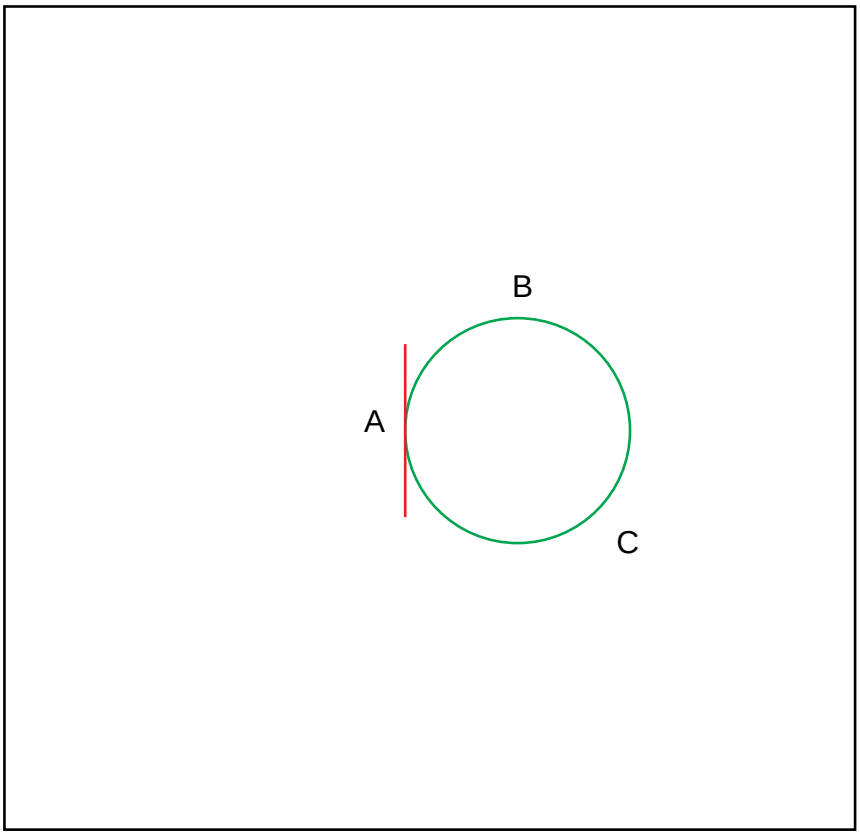
Swing ce around c.



Connect the two crossing points.



Cleanup.
RETURN to III.17 variation.



And we are done.
Q.E.F.