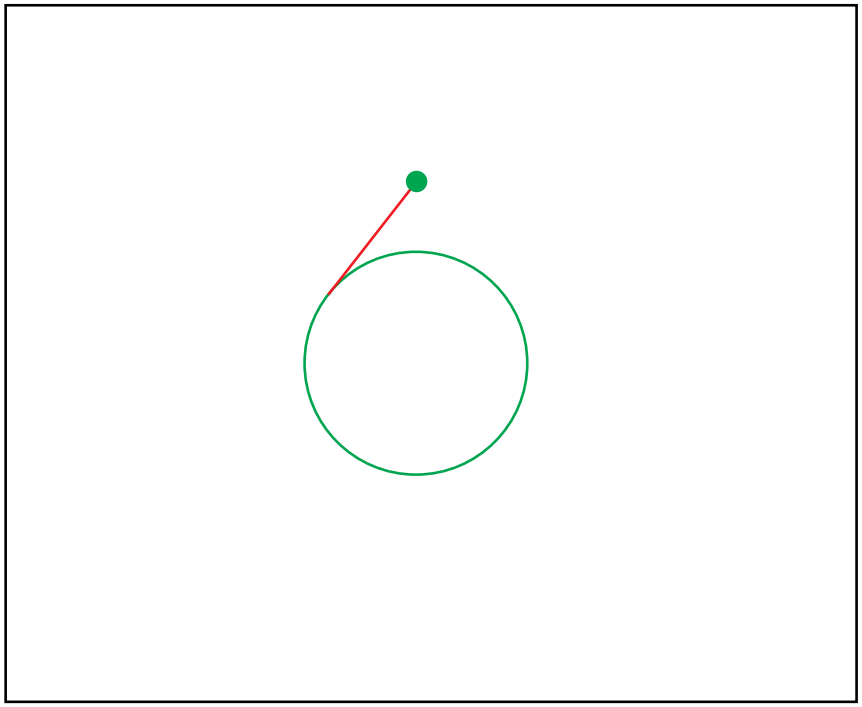
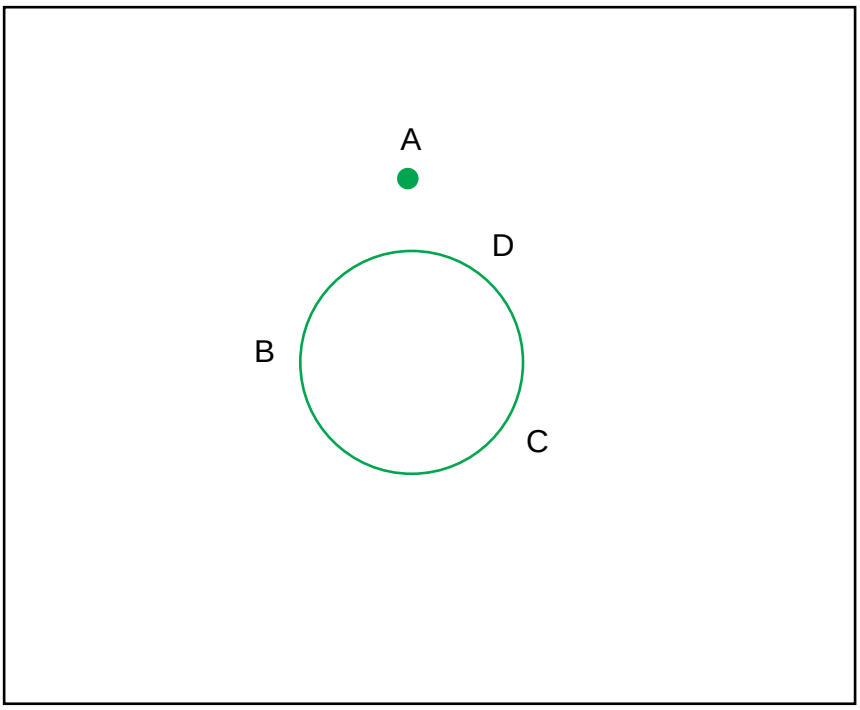
Construction 18: Book III, Proposition 17

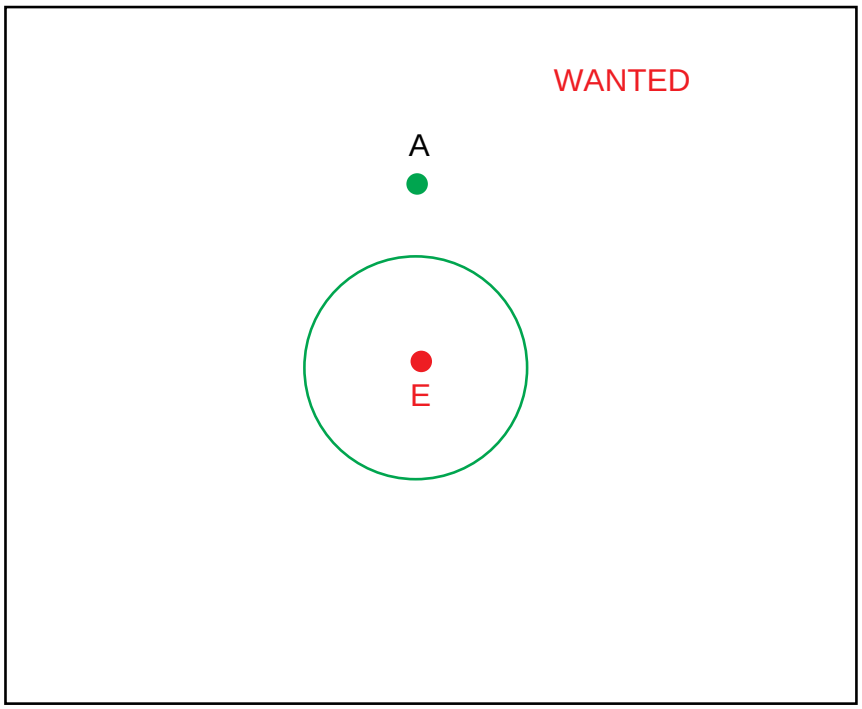
From a given point to draw a straight line touching a given circle.



III.17:3. Let A be the given point, and BCD the given circle;



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

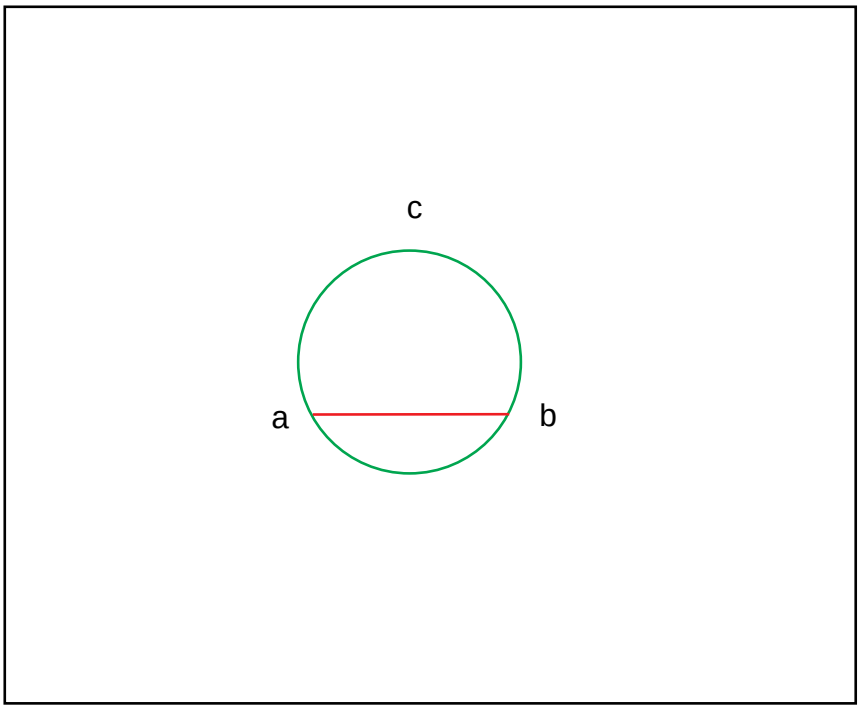


GOSUB III.1

(C#17, 7 steps)

Relabel.

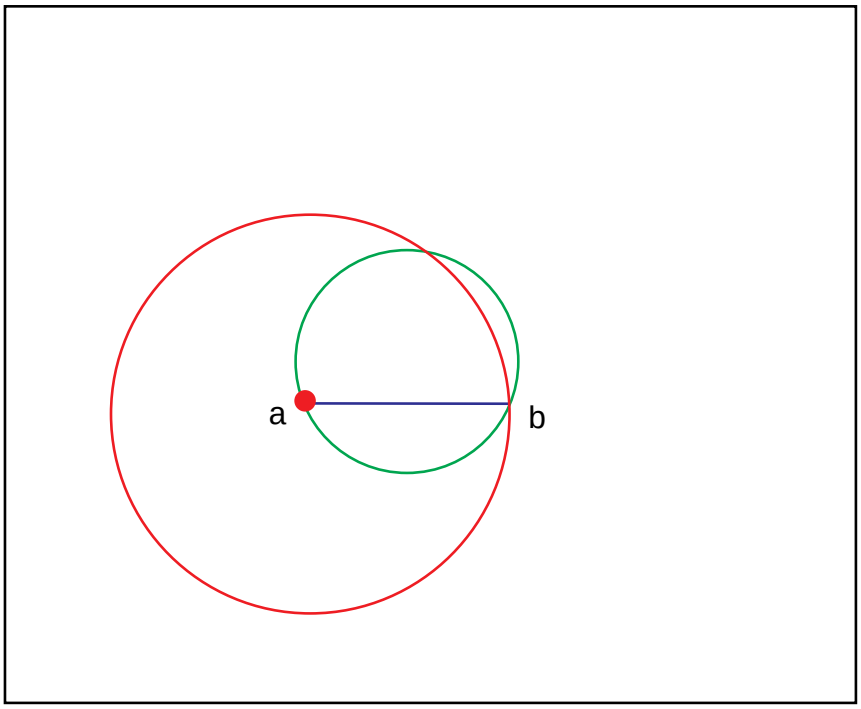
III.1:4. Let a straight line ab be drawn through it at random,



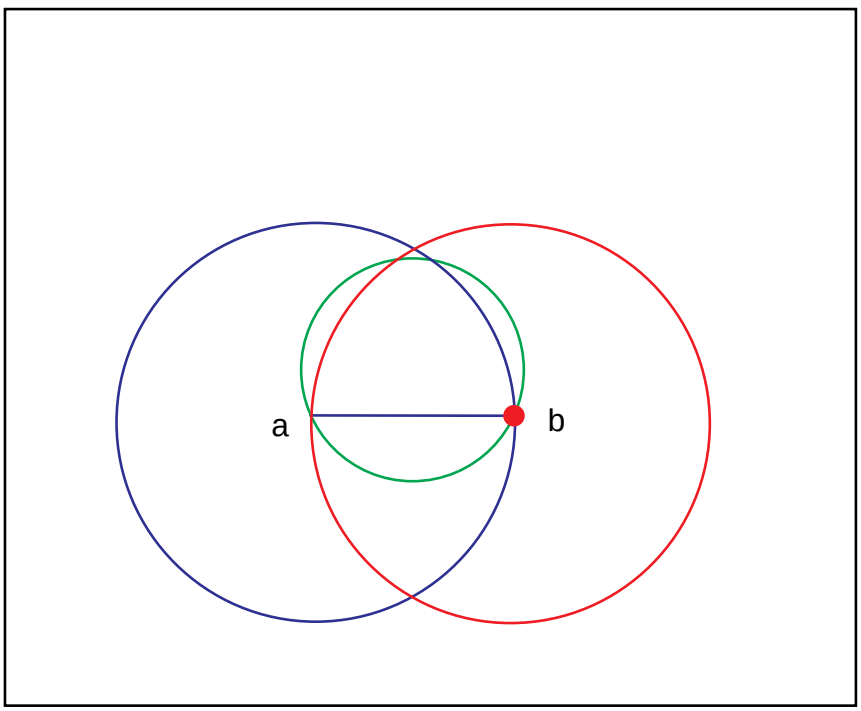
III.1:5. and let it be bisected at the point d; ([I.10])

GOSUB I.10
(C#5B)

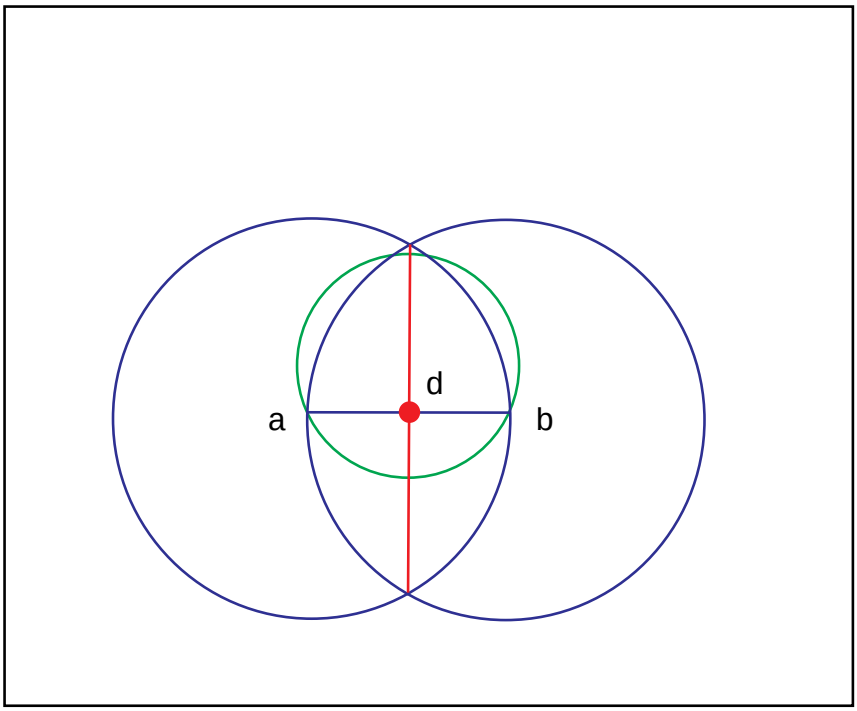
Swing ab around a.



Swing ba around b.



Connect the crossings. Mark the point d.



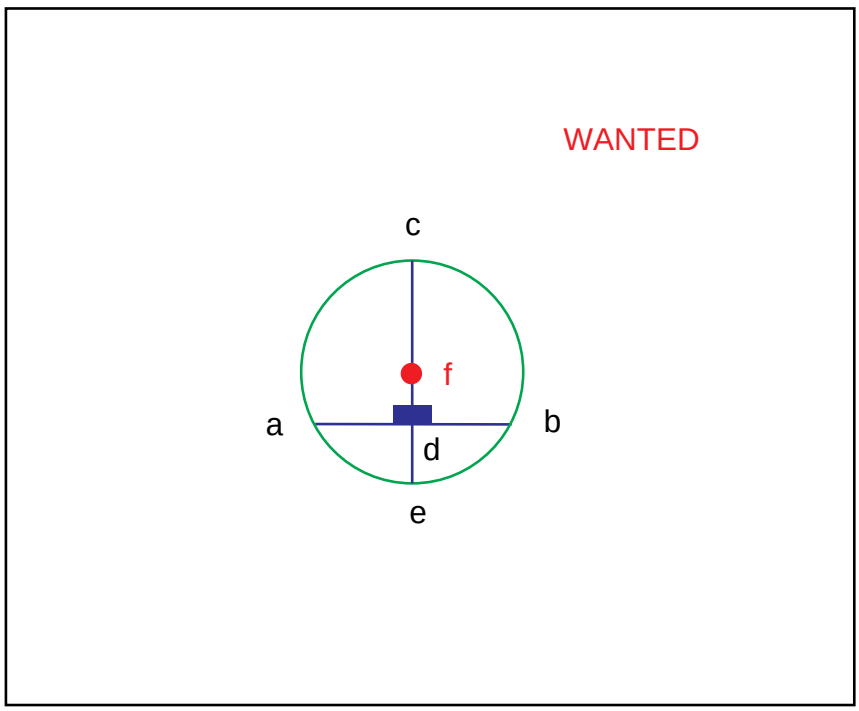
Cleanup.
RETURN to III.1 at line 5.

III.1:7. from the point d let dc be drawn at right angles to ab.

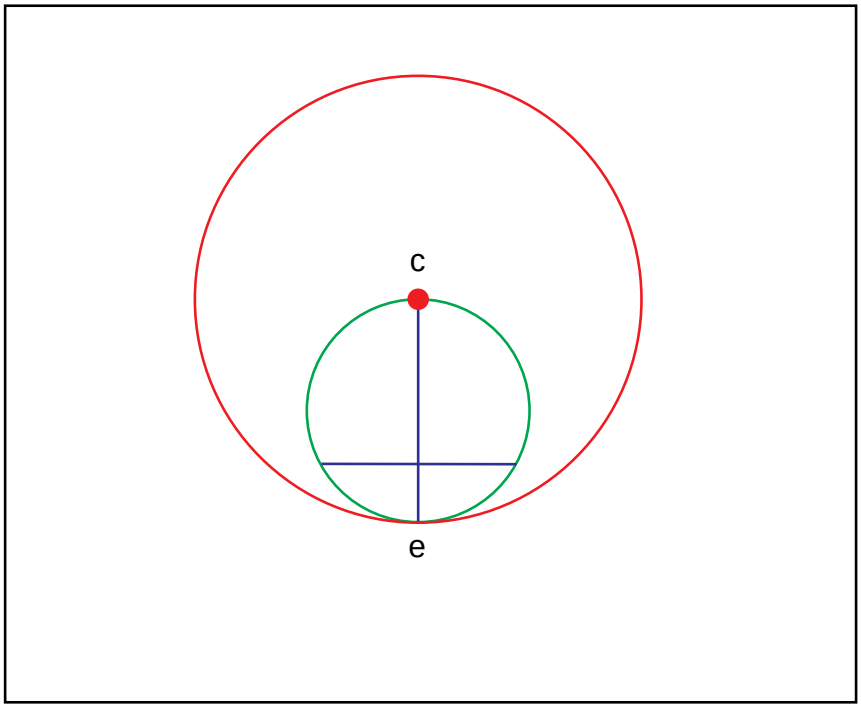
But we have this line in the pre-ceeding step. Call it ce.

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

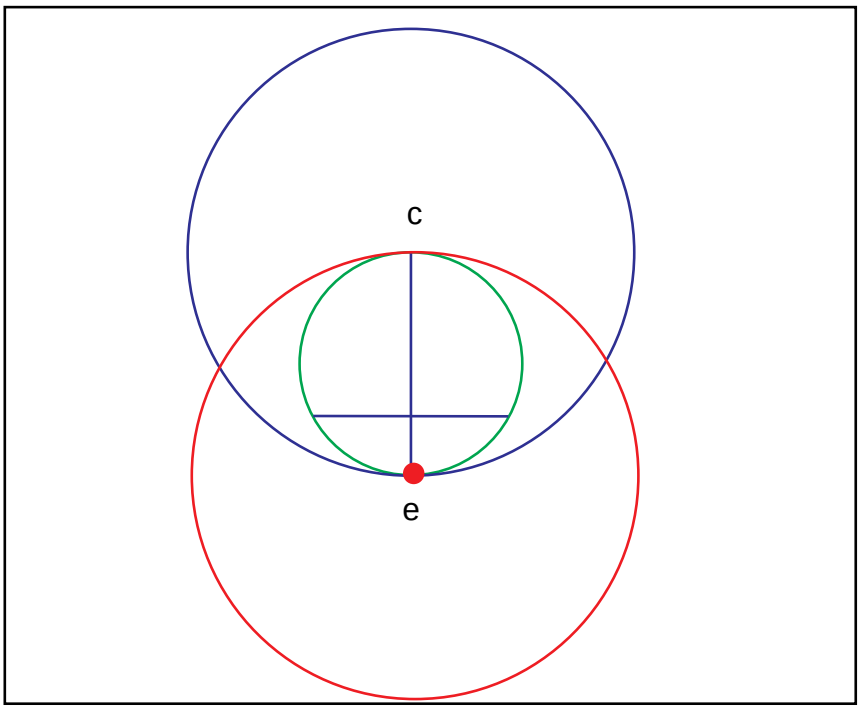
GOSUB I.10
(C#5B, again)



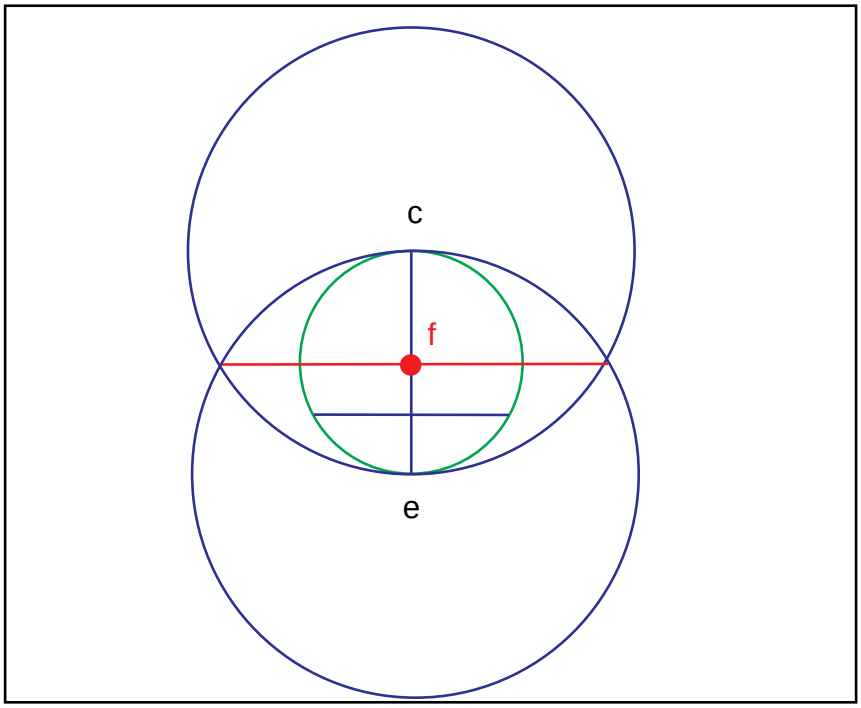
Swing ce around c.



Swing ec around e.



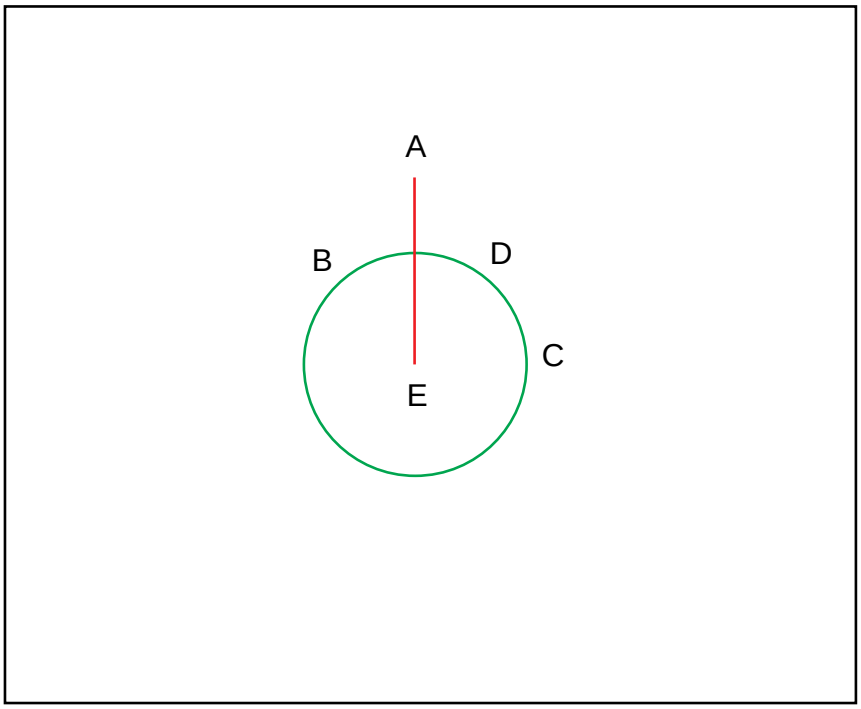
Connect the crossings. Mark the point f.



Cleanup.
RETURN to III.1 at line 9.

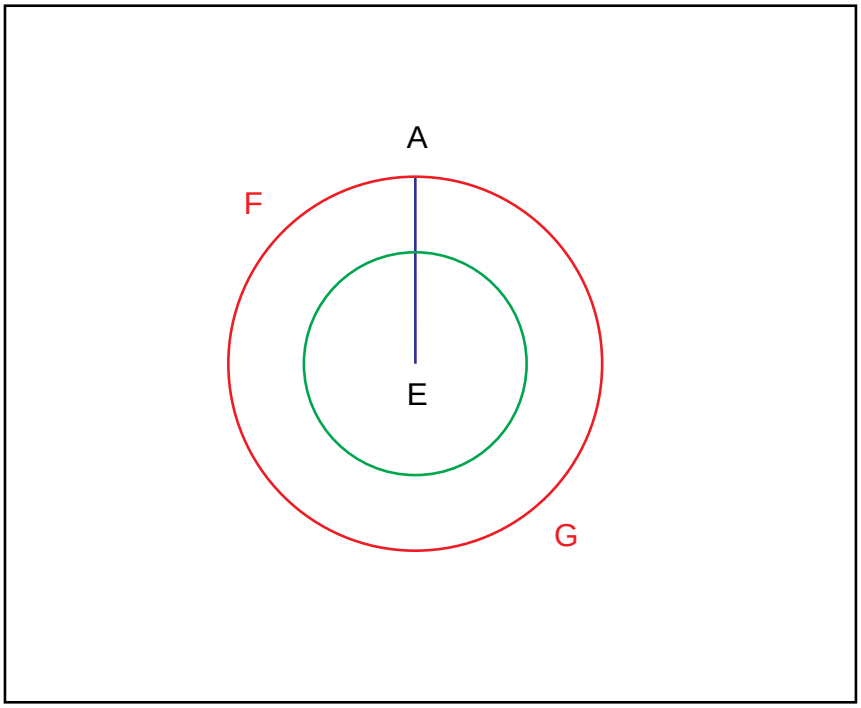
RETURN to III.17 at line 6.
Relabel.

III.17:8. let AE be joined.



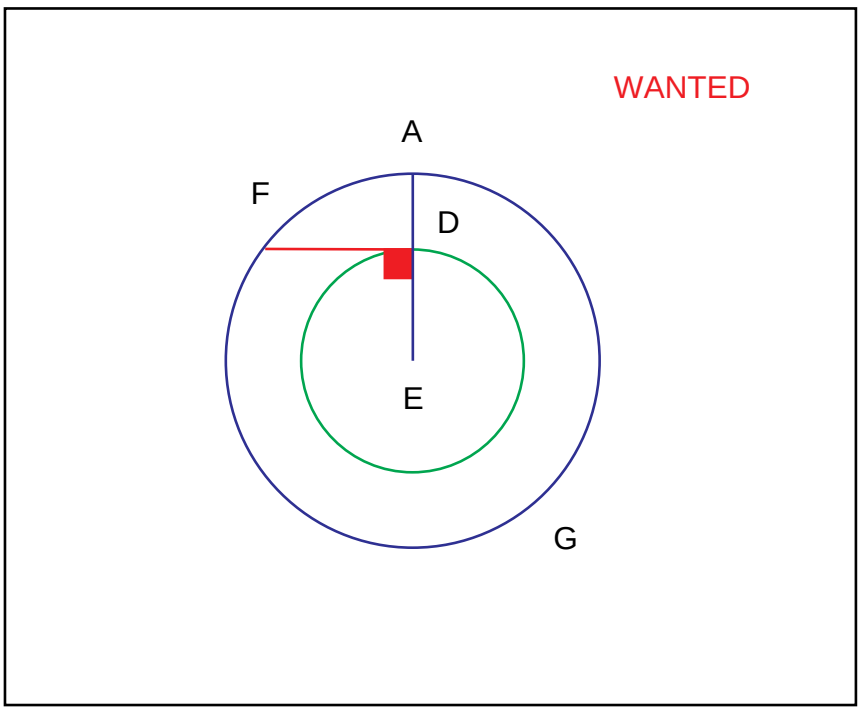
Let D now denote the point in which the line AE meets the circle BCD.

And with centre E and distance EA let the circle AFG be described;



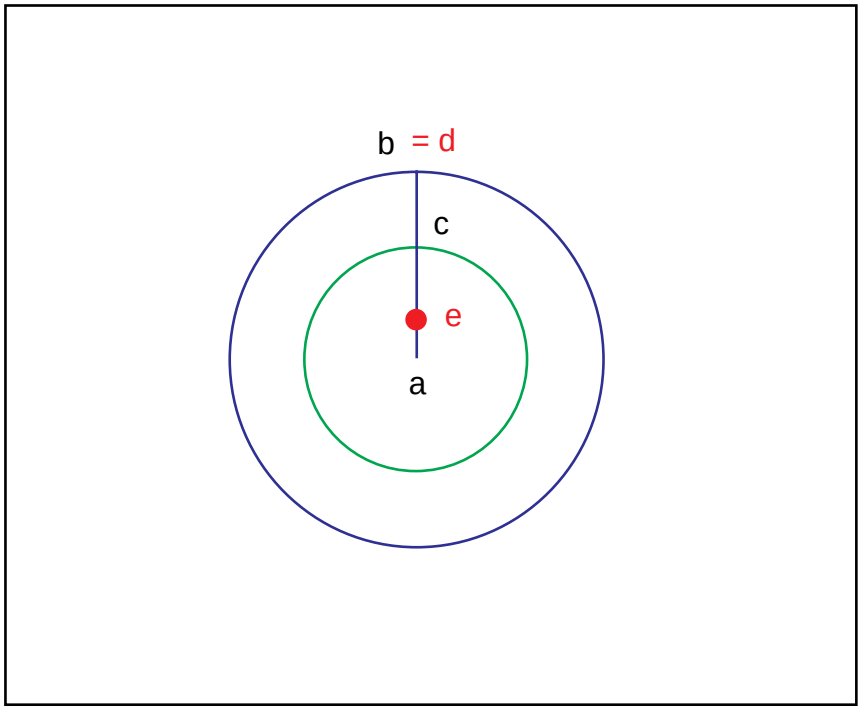
III.17:11. from D let DF be drawn at right angles to EA, ([I.11])

Relabel,
GOSUB I.11



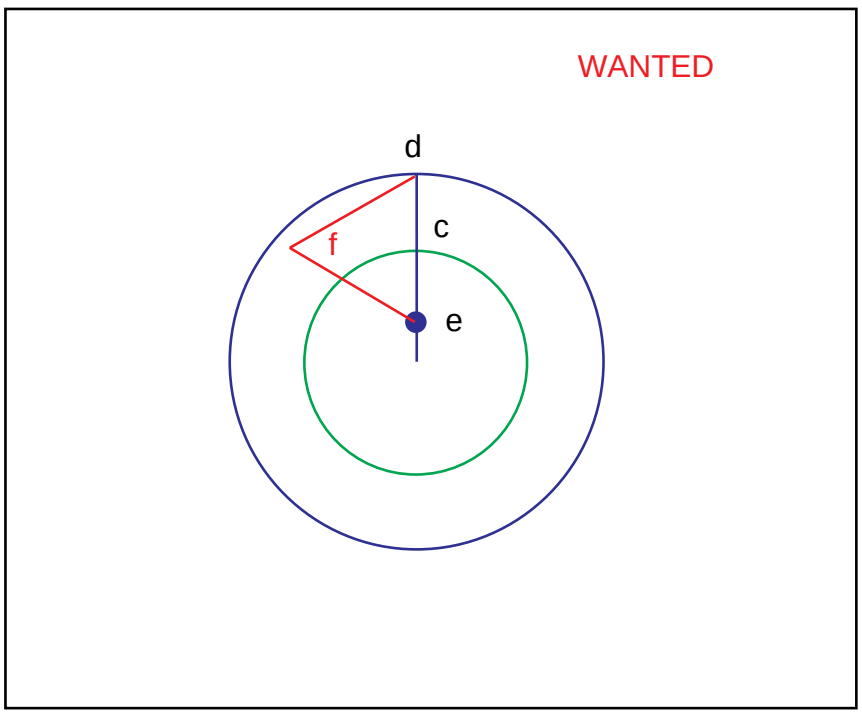
I.11:8 Let a point d be taken at random on ac;
(We take d = b).

I.11:10. let ce be made equal to cd; [I.3]
(The rope)

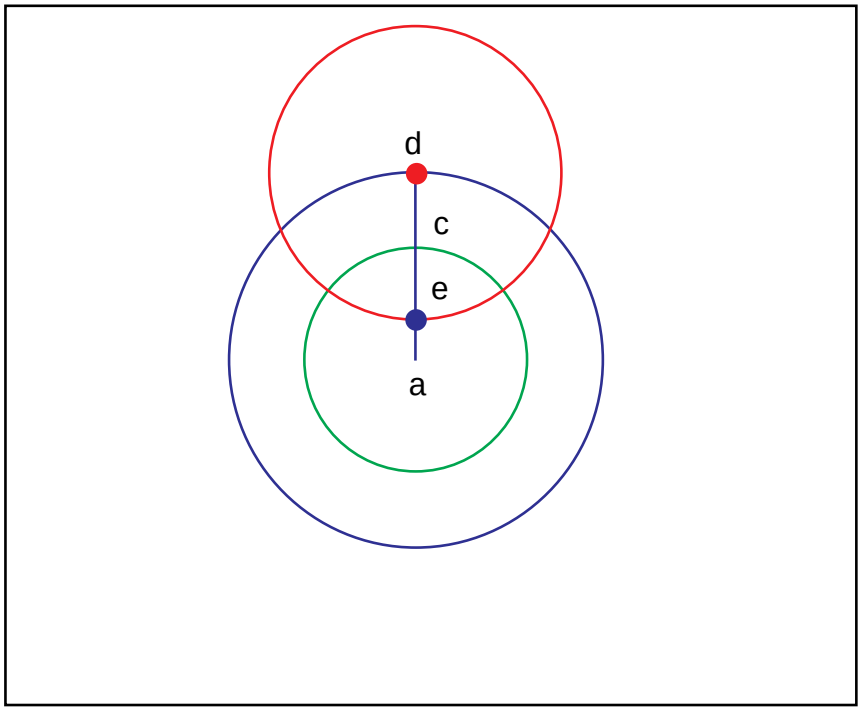


I.11:11. on de let the equilateral triangle fde be constructed, [I.1]

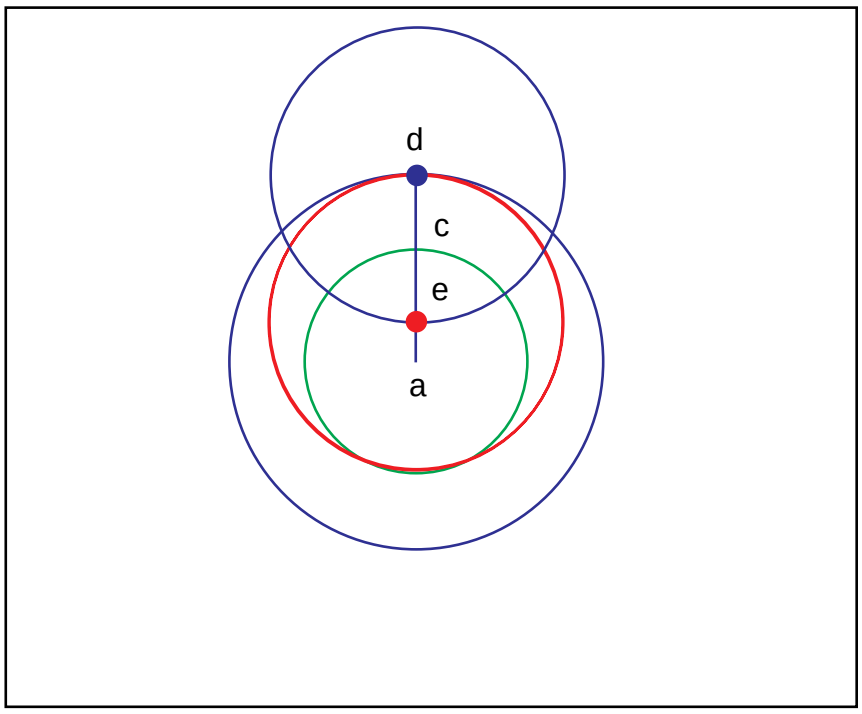
GOSUB I.1.



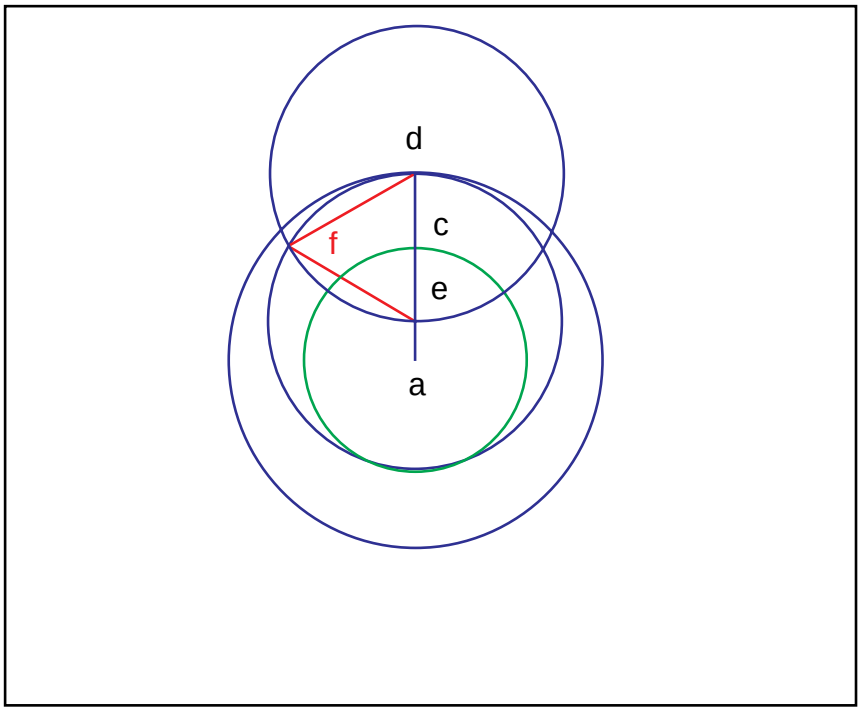
Swing de around d.



Swing ed around e.

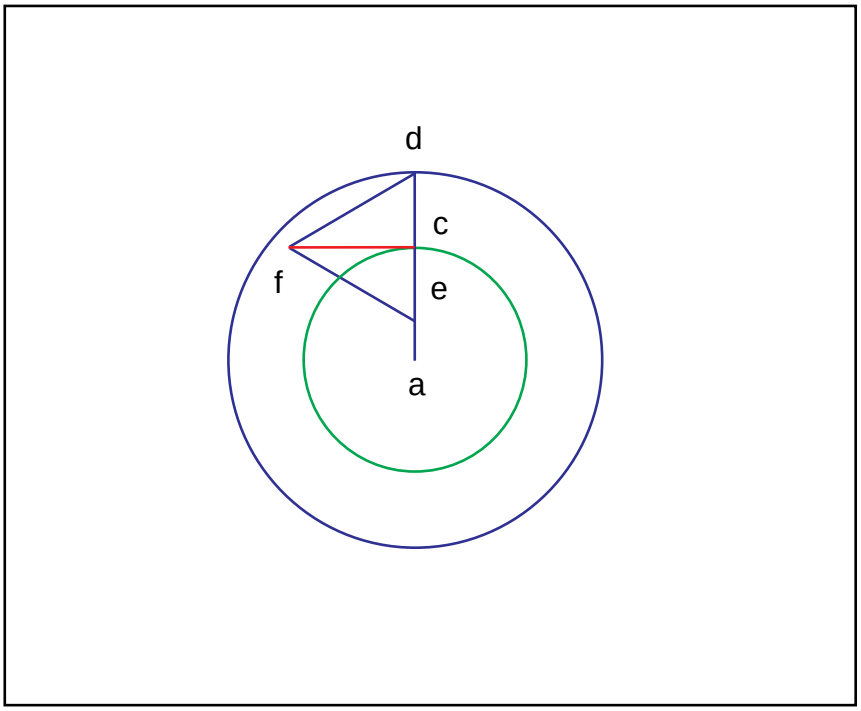


Connect the crossing point on the left, f, to d, e. (optional.)



RETURN to I.11 at line 11.
Cleanup.

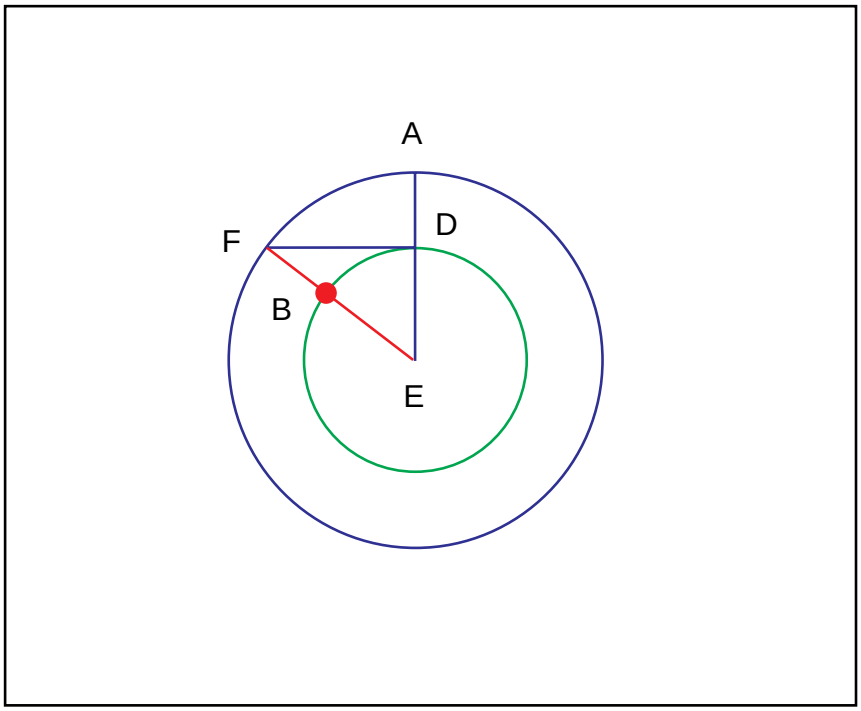
I.11:13. and let fc be joined;



Extend this line (if necessary) to contact the outer circle, locating the point F.

RETURN to III.17 at line 11.
Cleanup.
Relabel.

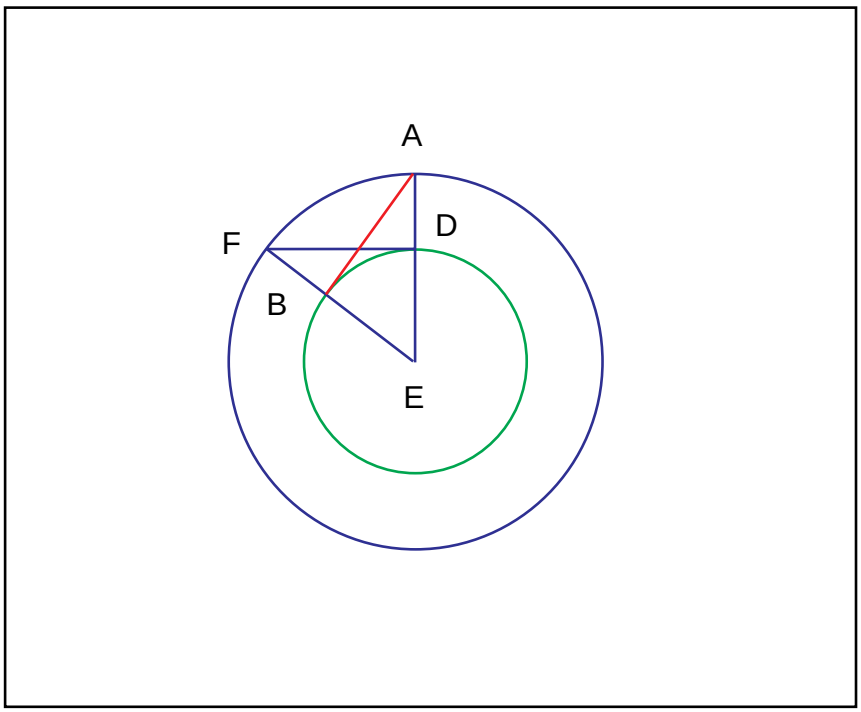
(Let B be the point on which FE meets the inner circle.)



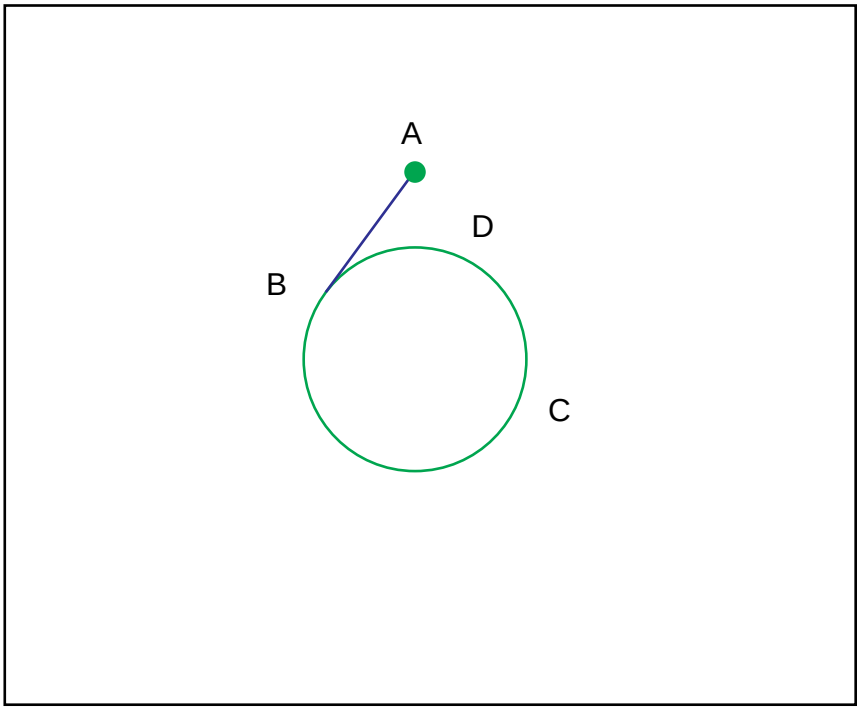
III.17:13. and let EF, AB be joined;

First join EF;

then AB.



III.17:14. I say that AB has been drawn from the point A touching the circle BCD.



Q.E.F.