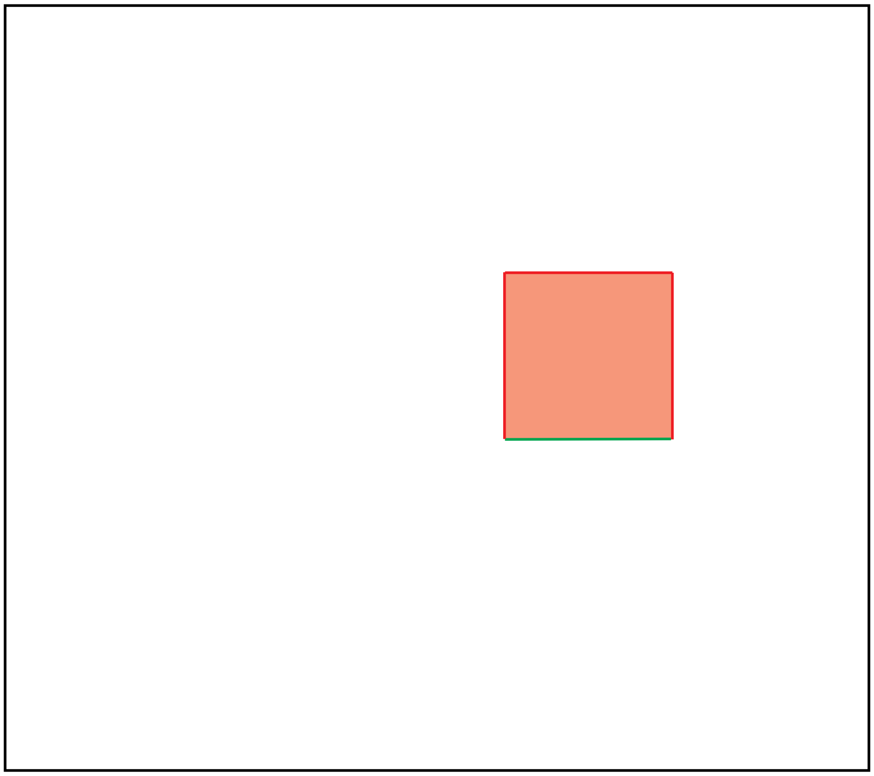
Construction 14B: Book I, Proposition 46

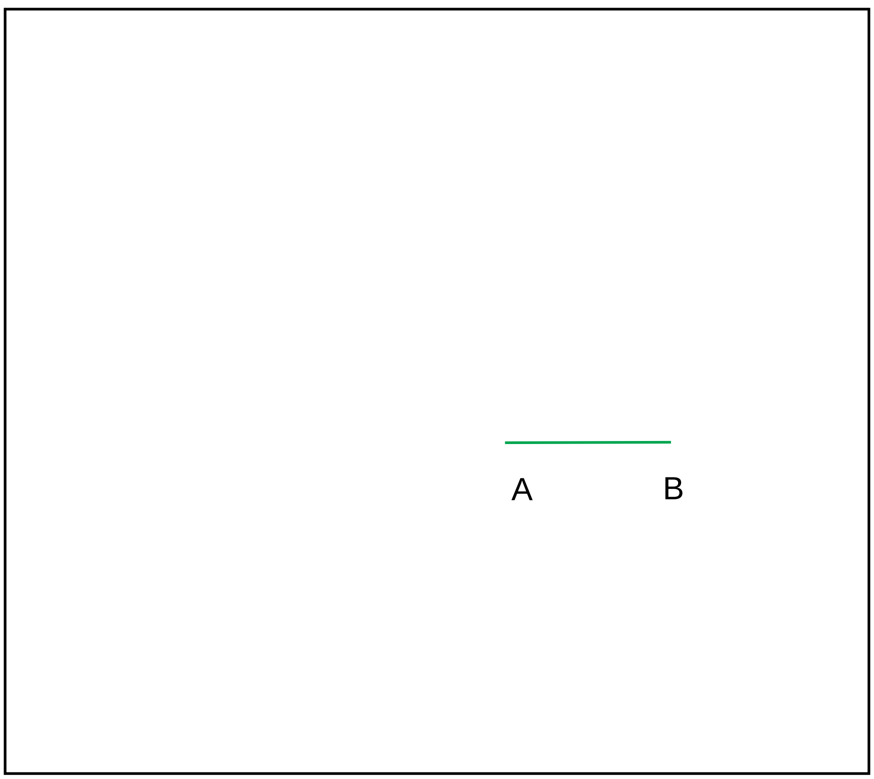
Alternate Construction

This is a short alternative to C#14, which requires only 3 swings of the same compass. First we follow C#14.

On a given straight line to describe a square.



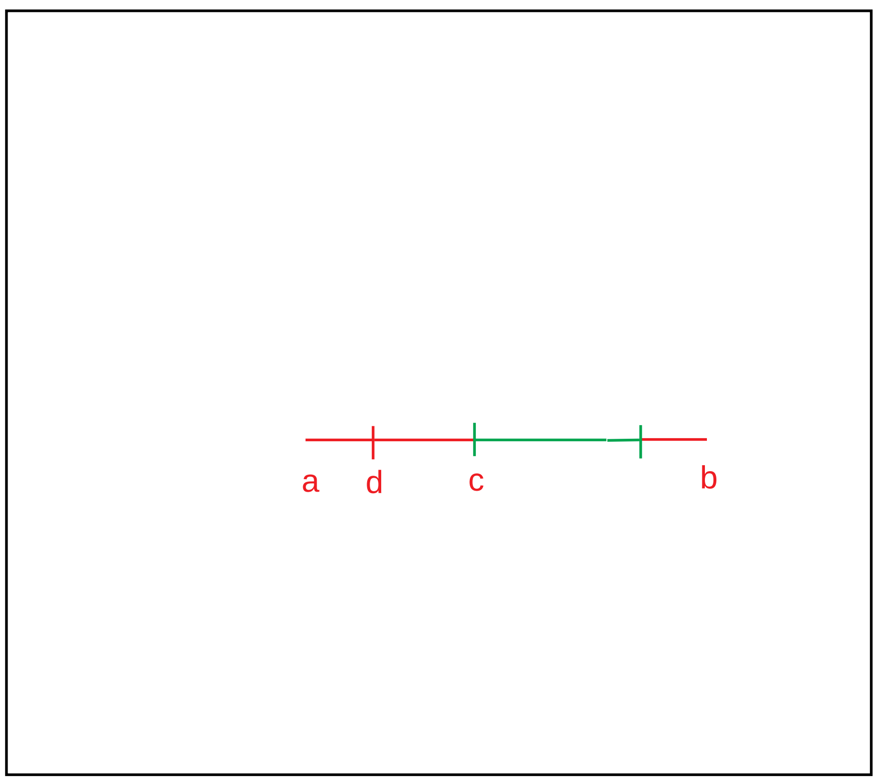
I.46:2. Let AB be the given straight line.



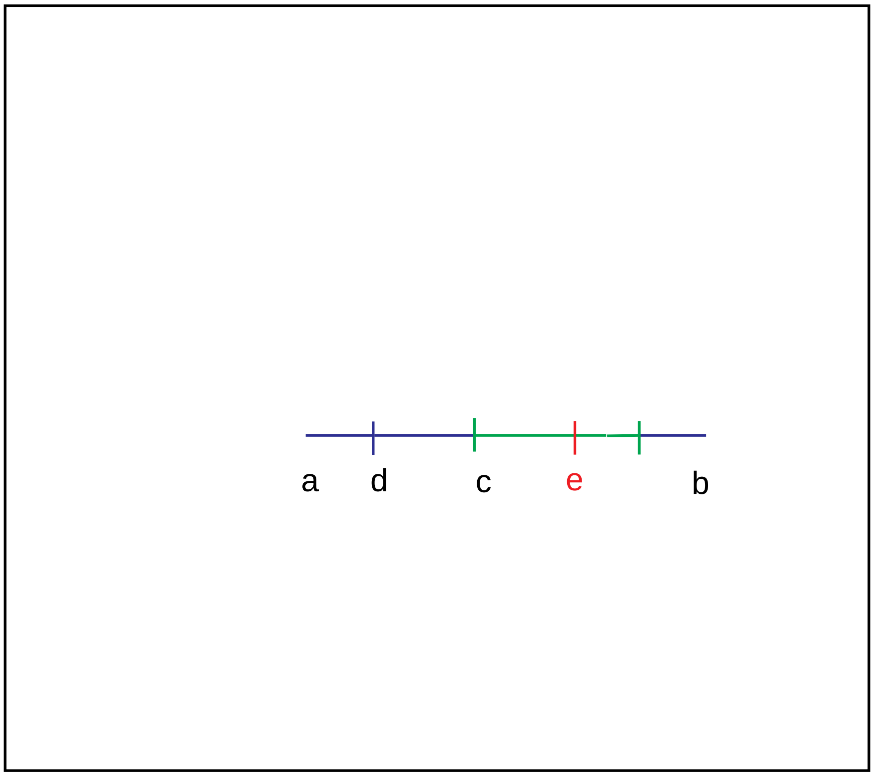
I.46:5. Let AC be drawn at right angles to the straight line AB from the point A on it [I.11],

GOSUB I.11
Extend AB, relabel.

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

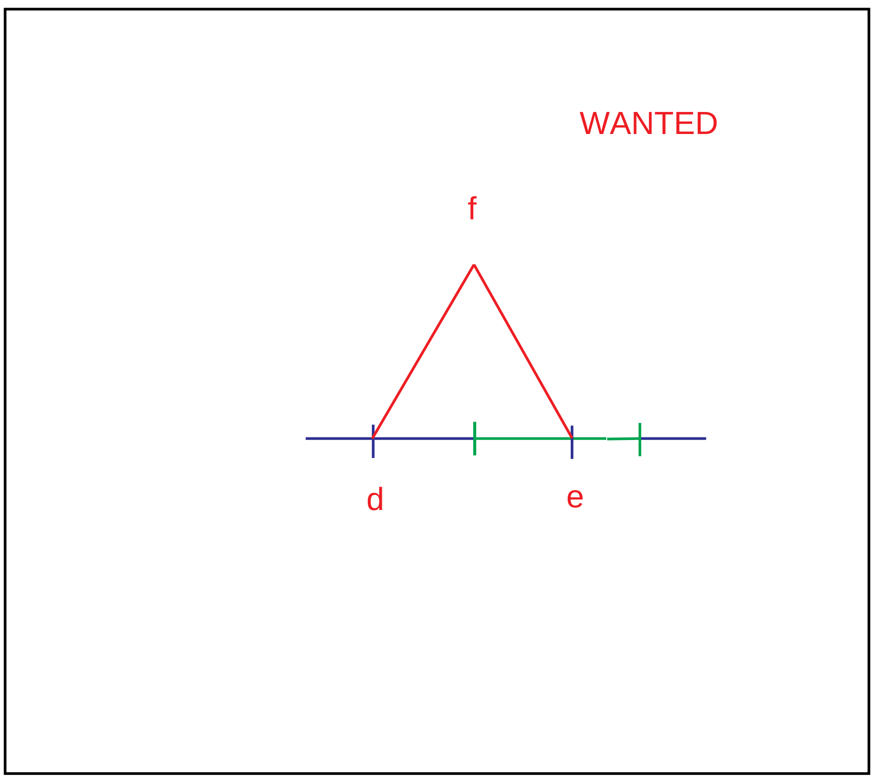


I.11:10. let ce be made equal to cd; [I.3] (dividers)

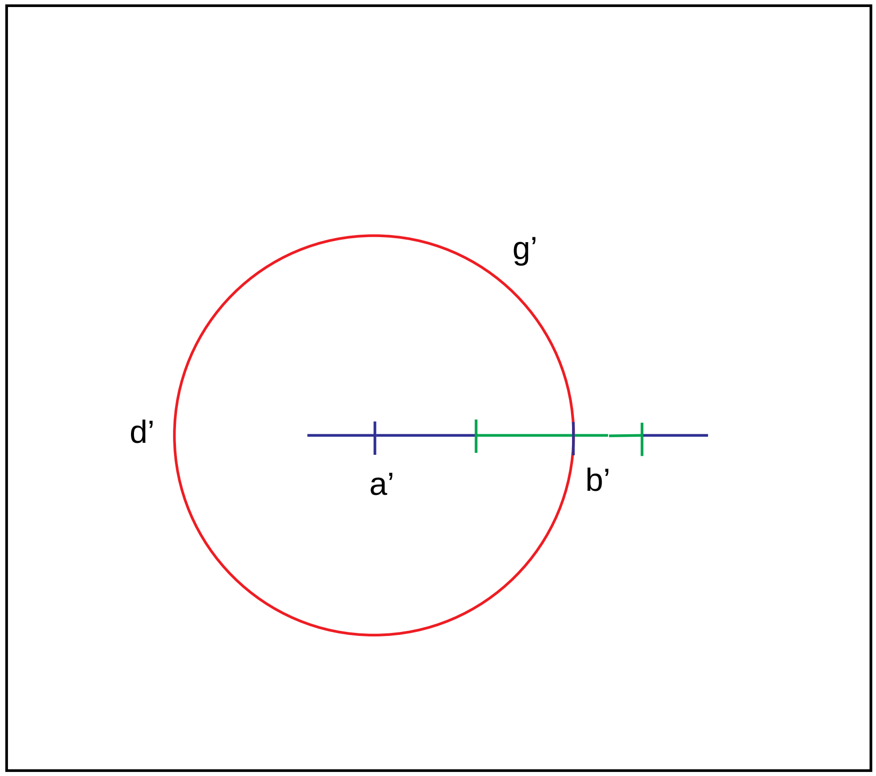


I.11:11. on de let the equilateral triangle fde be constructed, [I.1]

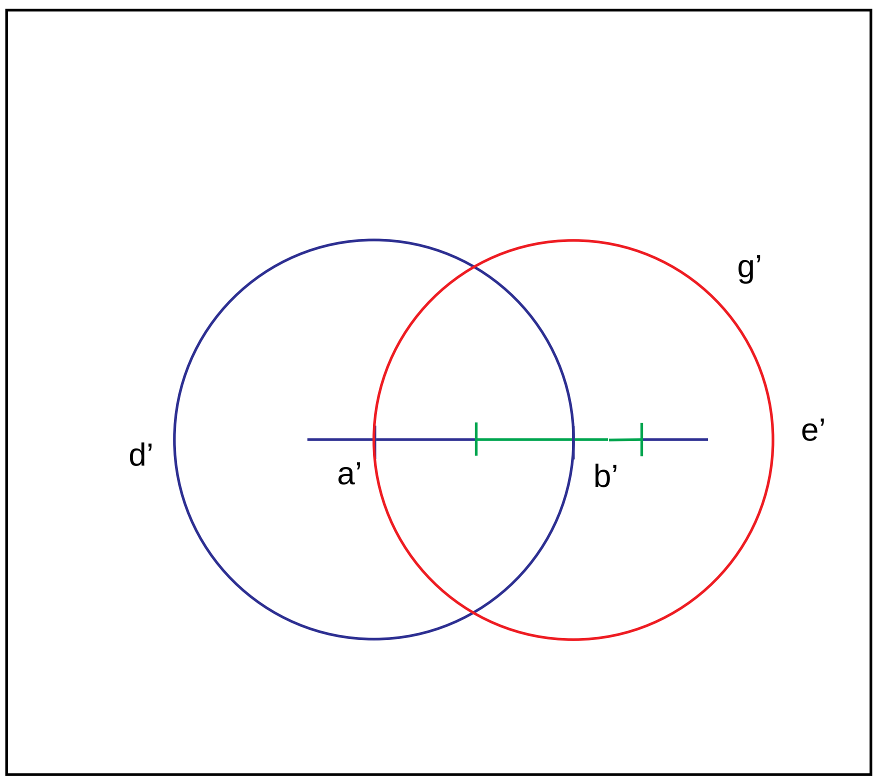
GOSUB I.1.
Relabel.



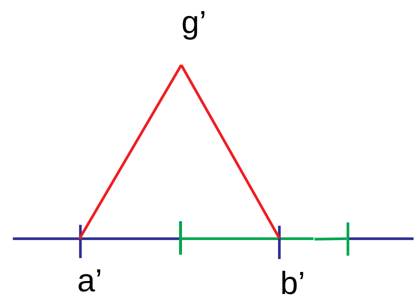
I.1:7. with centre a’ and distance a’b’ let the circle b’g’d’ be described; [Post. 3]



I.1:10. again, with centre b’ and distance b’a’ let the circle a’g’e’ be described; [Post. 3]



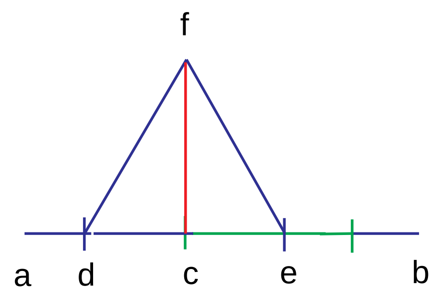
I.1:13. and from the point g’, in which the circles cut one another, to the points a’, b’, let the straight lines g’a’, g’b’ be joined.



(These two lines are not really necessary.)

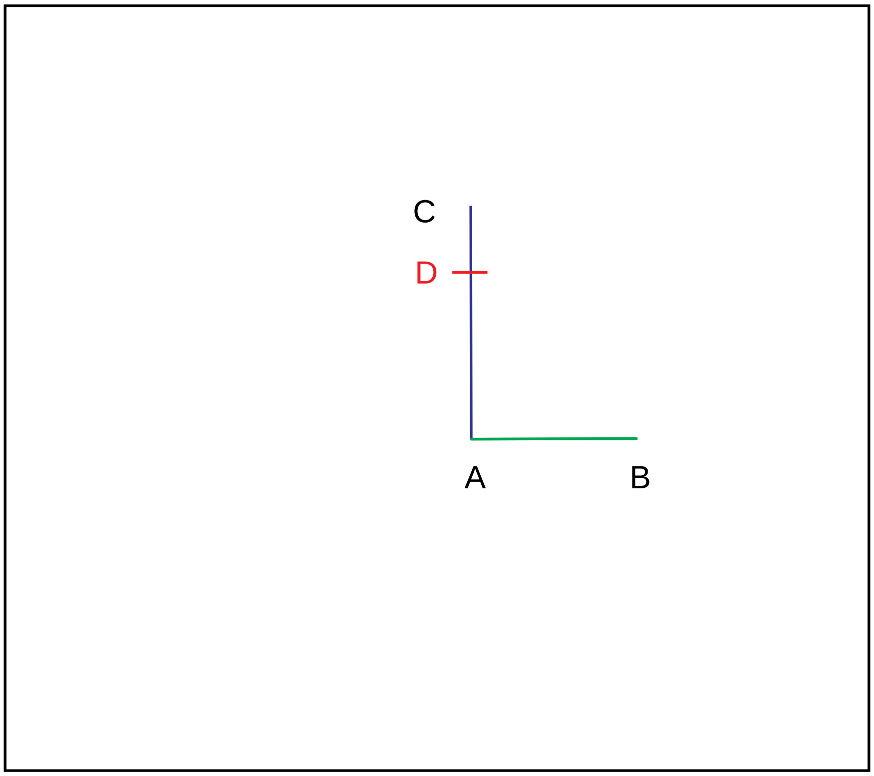
RETURN to I.11 at line 11. Relabel.

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

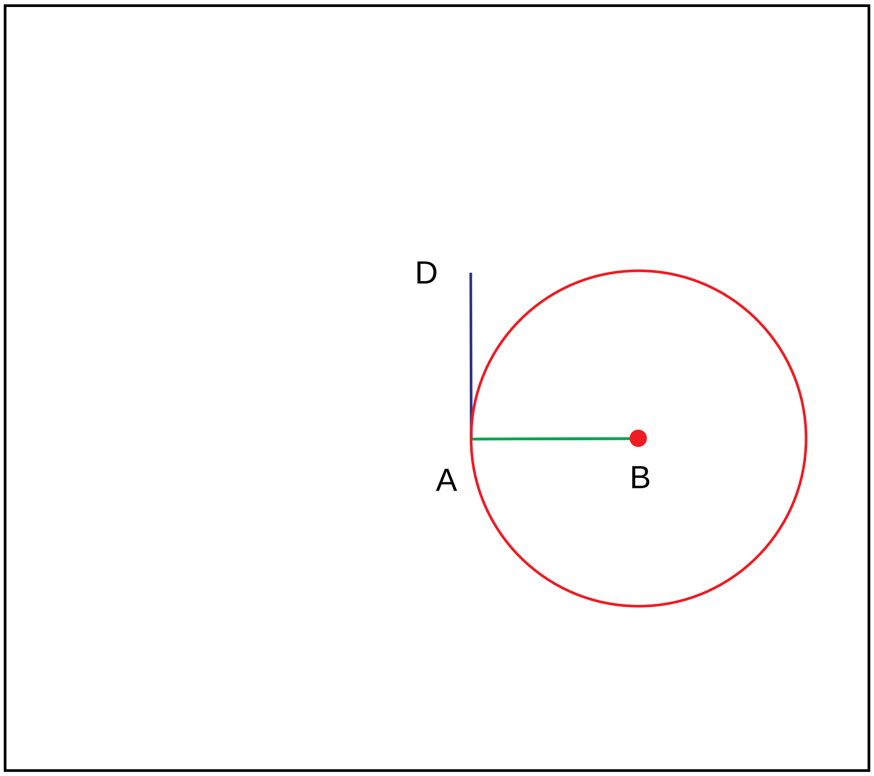


RETURN to I.46 at line 5. Cleanup, relabel.

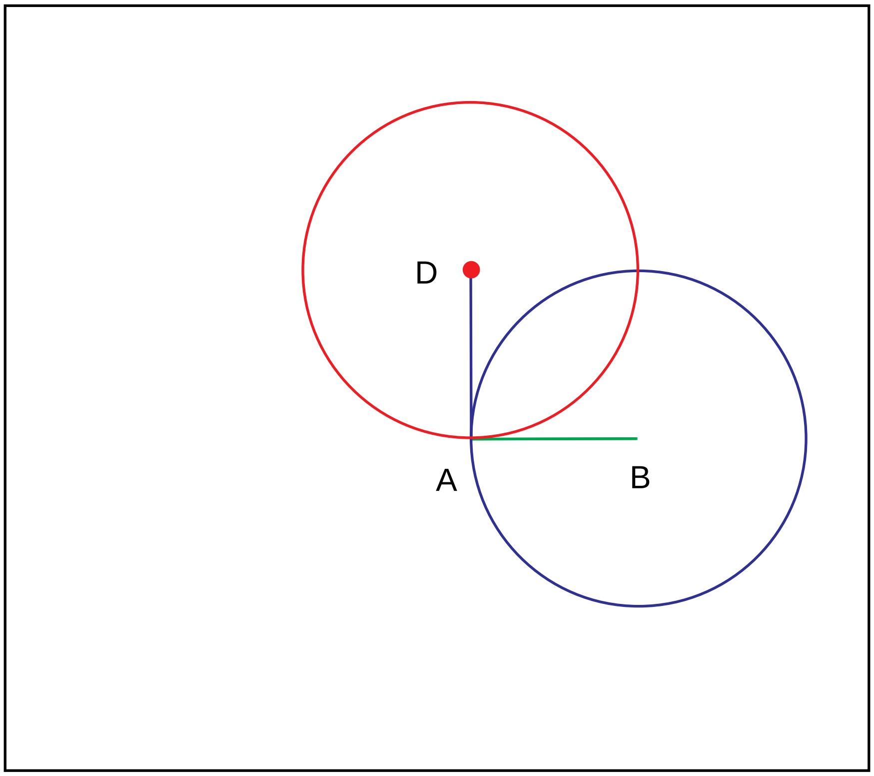
I.46:7. and let AD be made equal to AB; ([I.3], dividers)



Let the circle with centre B and distance BA be described. (Swing the old arm.)



Let the circle with centre D and distance DA be described. (Swing the new arm.)



Connect the crossing point E to the two centres.

Cleanup and we are finished in 9 steps, in place of the 16 of C#14.

It remains to prove that this is a square!.