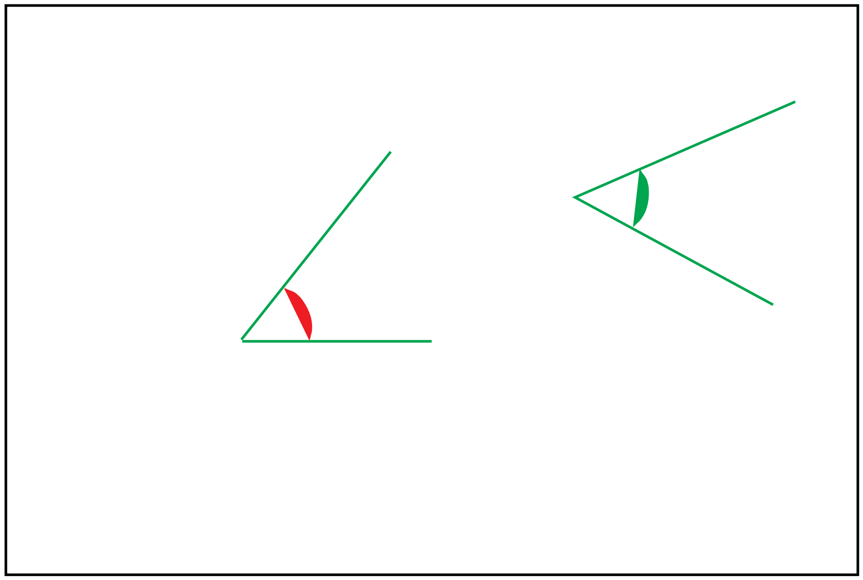
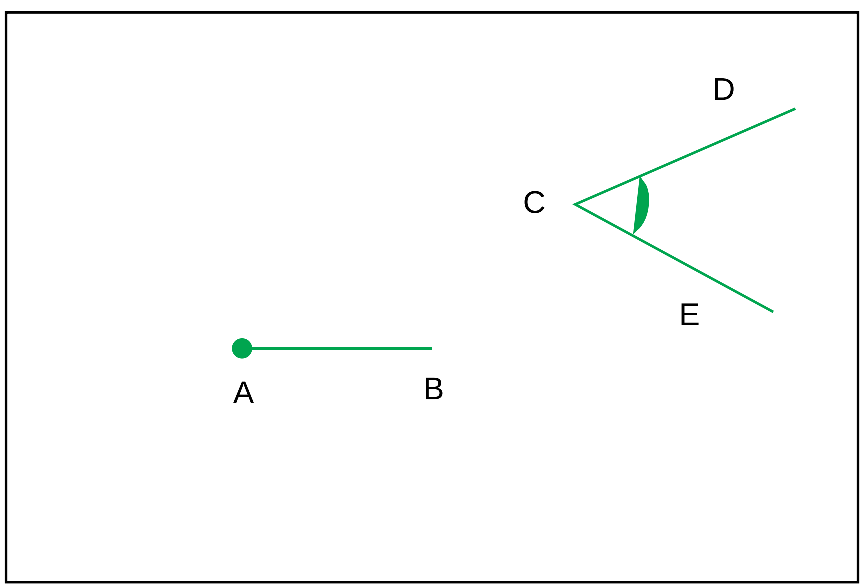
Construction 9: Book I, Proposition 23

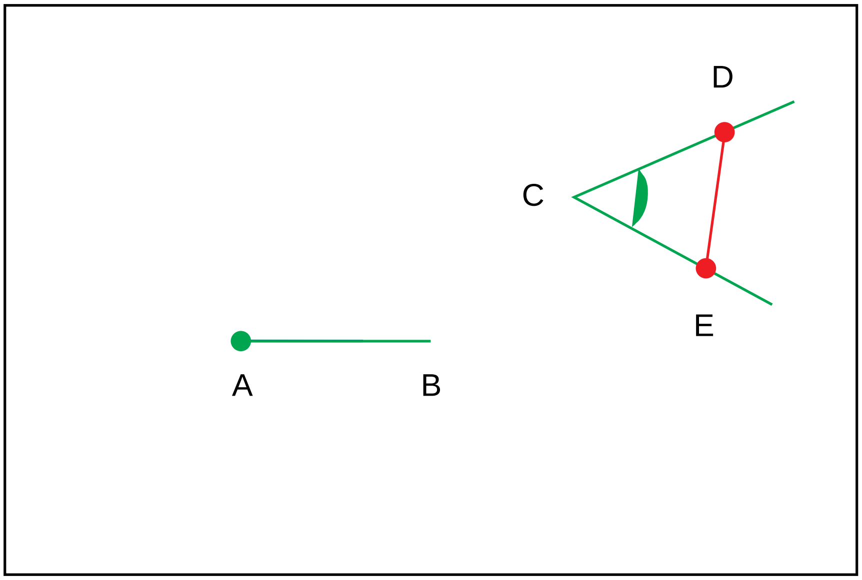
On a given straight line and at a point on it to construct a rectilineal angle equal to a given rectilineal angle.



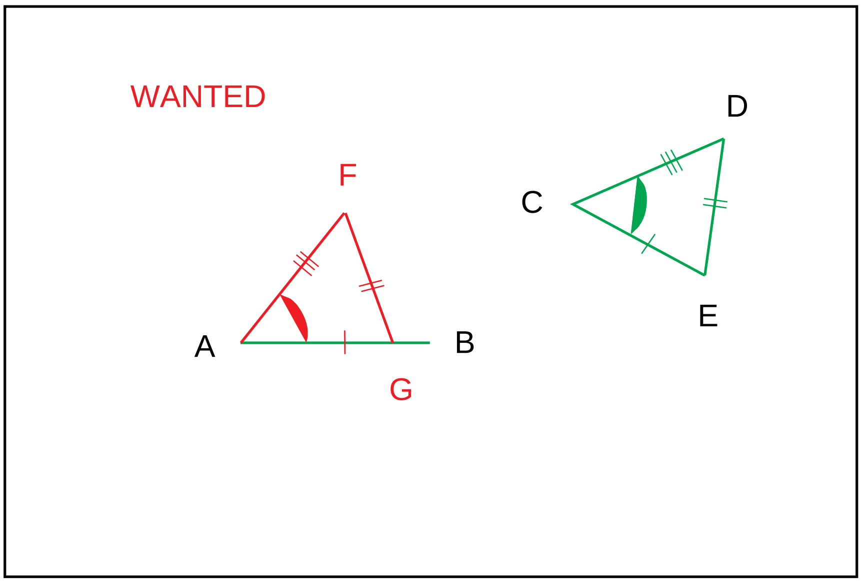
I.23:3. Let AB be the given straight line, A the point on it, and the angle DCE the given rectilineal angle;



I.23:8. On the straight lines CD, CE respectively let the points D, E be taken at random. Let DE be joined,

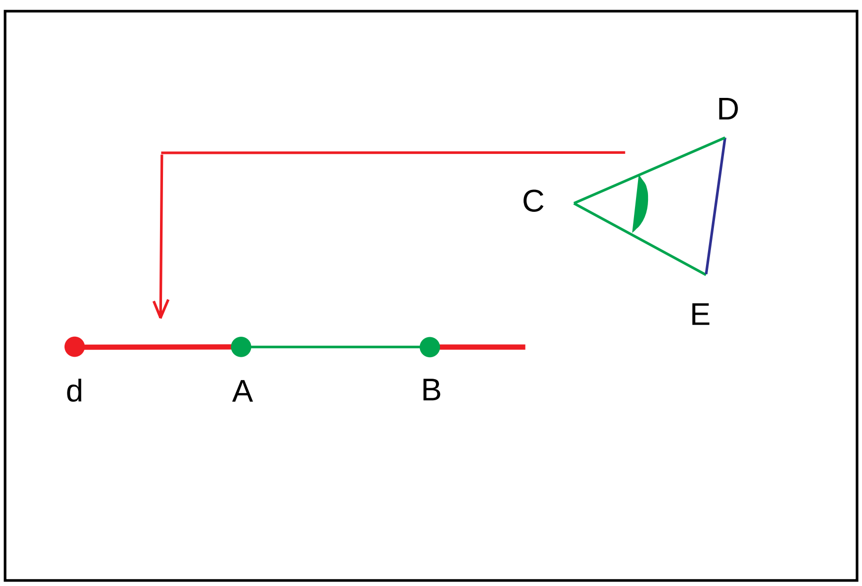


I.23:11. and out of three straight lines which are equal to the three straight lines CD, DE, CE let the triangle AFG be constructed in such a way that CD is equal to AF, CE to AG, and further DE to FG. [I.22]

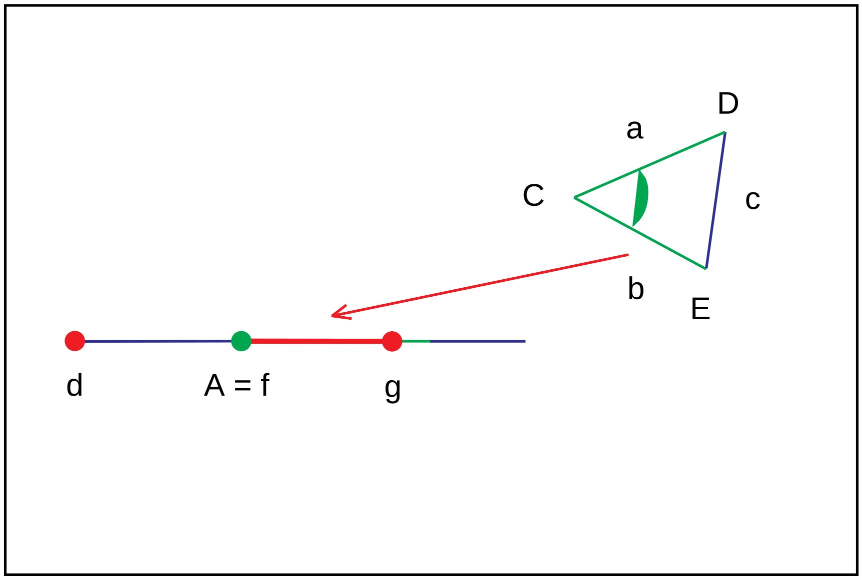


Warning: We need a variation of I.22. See Heath v.1 p. 295, Comment #2.

Interpolated step. Extend the straight line AB to the left and right . Assuming CD is the greatest of the sides of the triangle CDE and DE the least, (as shown in step 1), locate the point d so that DA is equal to CD [I.3], (the dividers).

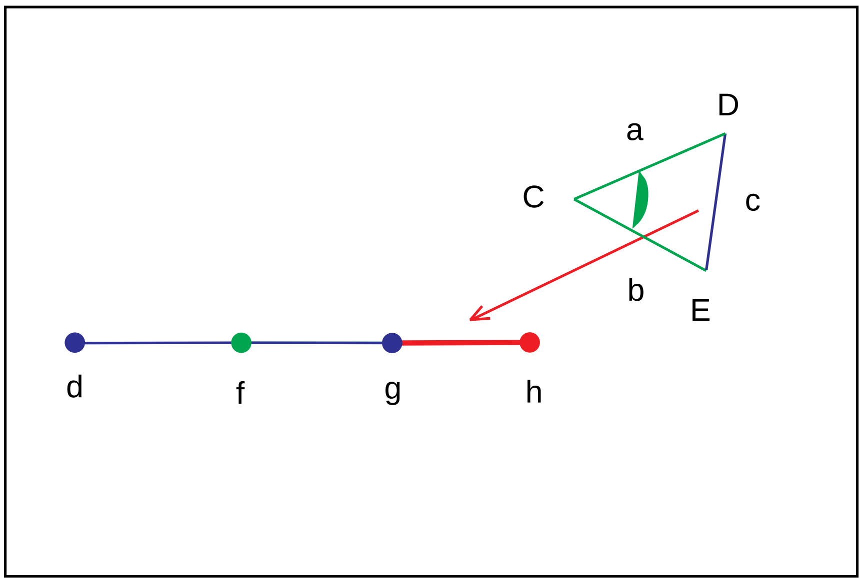


Now relabel to
GOSUB I.22.

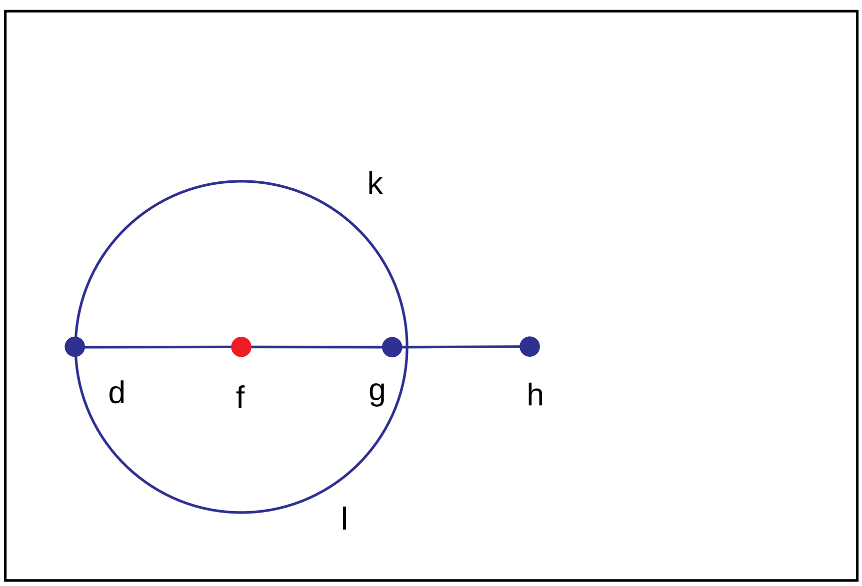


I.22:15. and let df be made equal to a, fg equal to b, [I.3] (dividers)

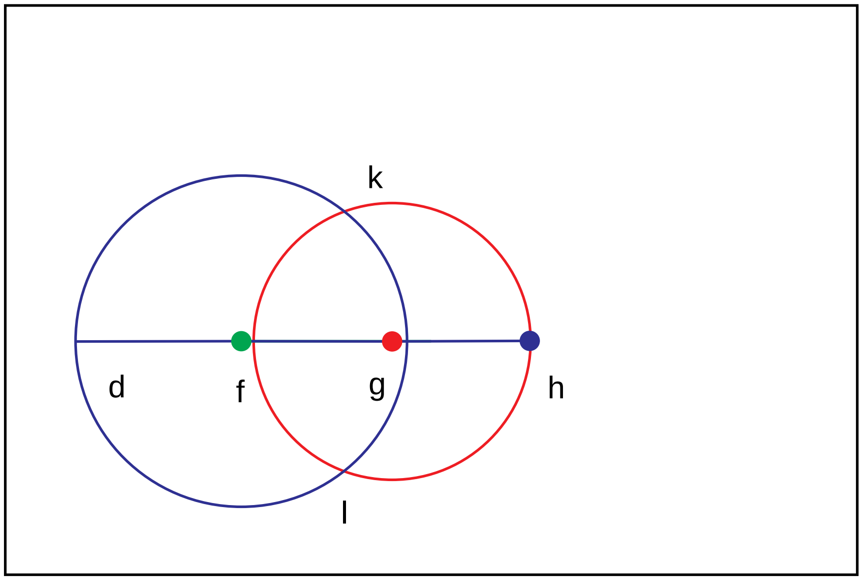
and gh equal to c. [I.3] (dividers)



I.22:24. With centre f and distance fd let the circle dkl be described;

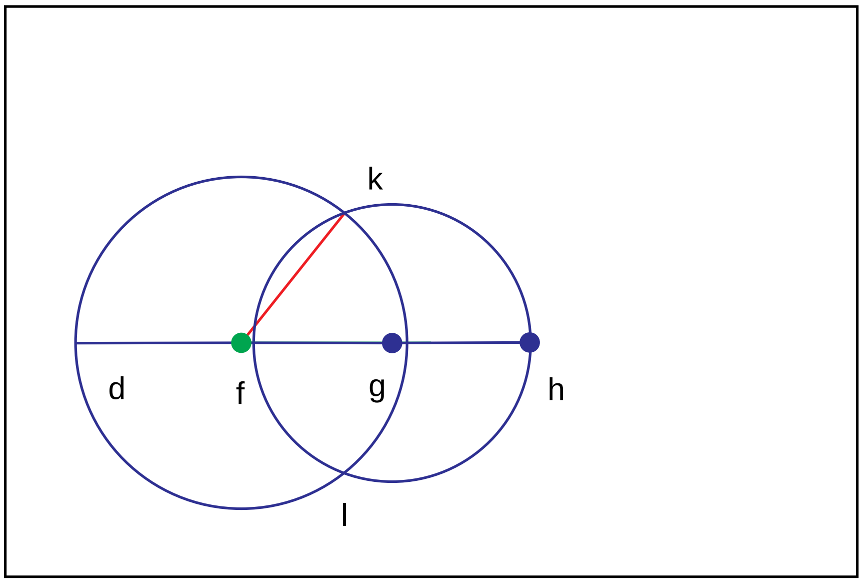


I.22:26. again with centre g and distance gh let the circle klh be described;

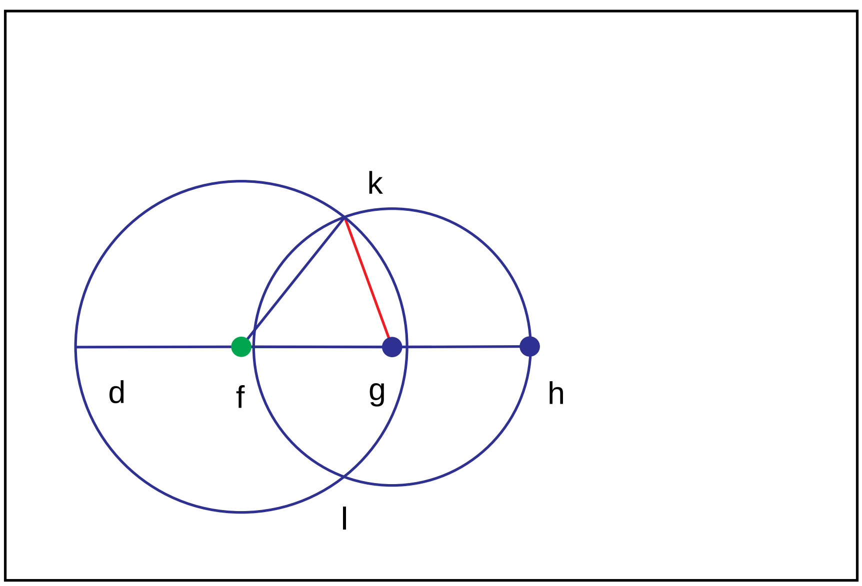


I.22:28. and let kf, kg be joined;

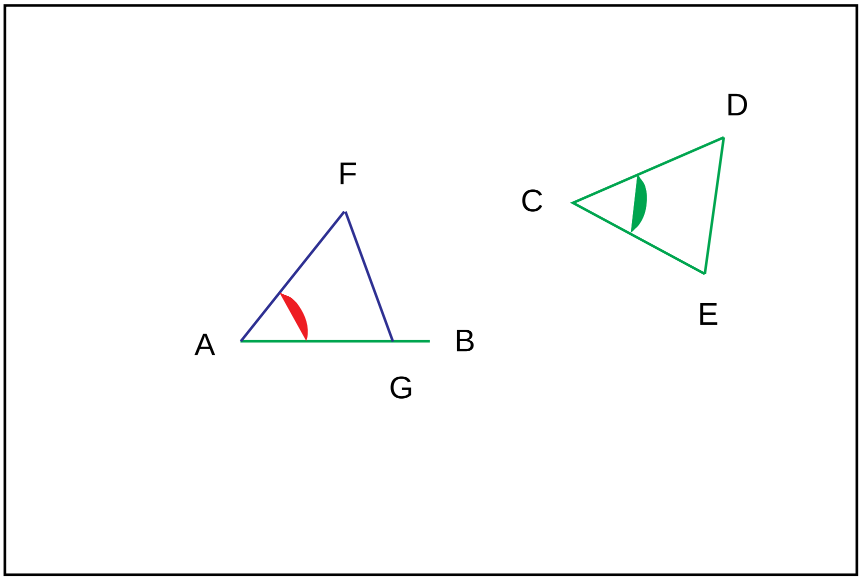
(first kf)



(then kg)

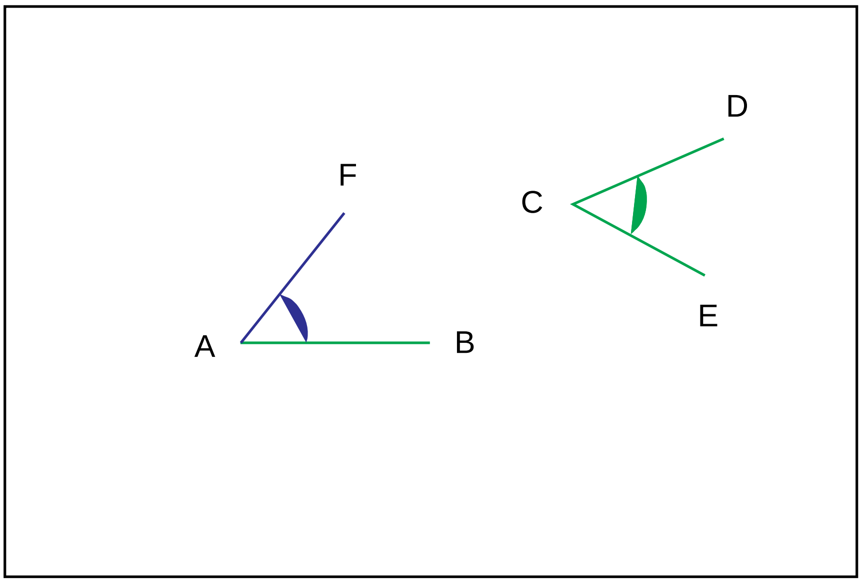


Cleanup, Relabel and RETURN to I.23 at line 11.



I.23:18. The angle DCE is equal to the angle FAG.

Q.E.F.



NOTE.

The variation of I.22 which is used here at line 22 is due to Proclus. We may denote it Construction #8P. As the proof of Euclid in Proposition I.22 applies verbatim to the Proclus Variation, we may refer to Proposition I.22P as well. Here is the statement corresponding to the amended construction.