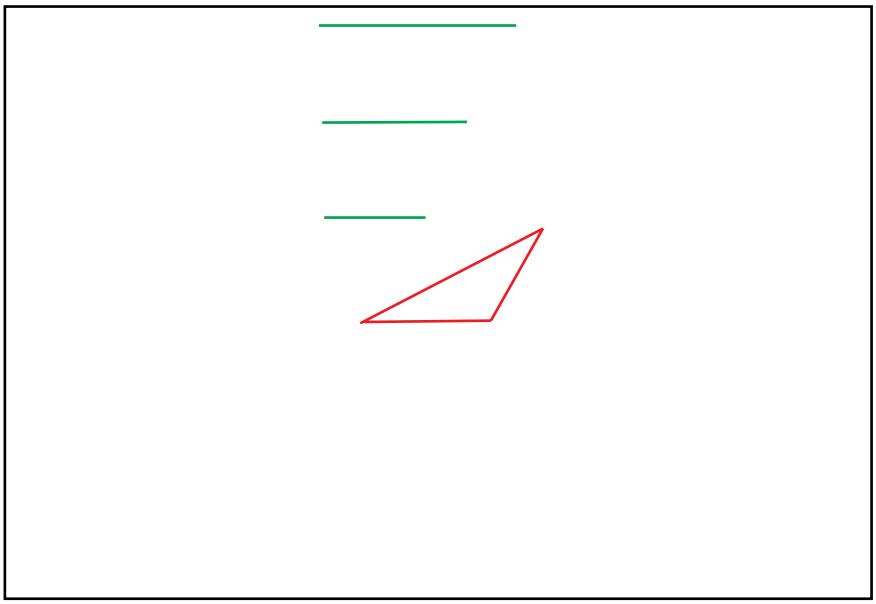
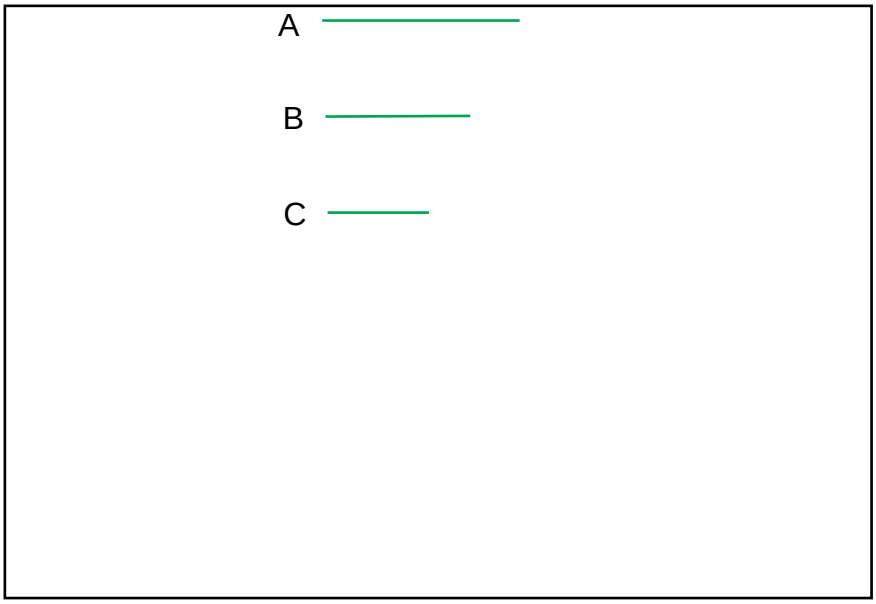
Construction 8: Book I, Proposition 22

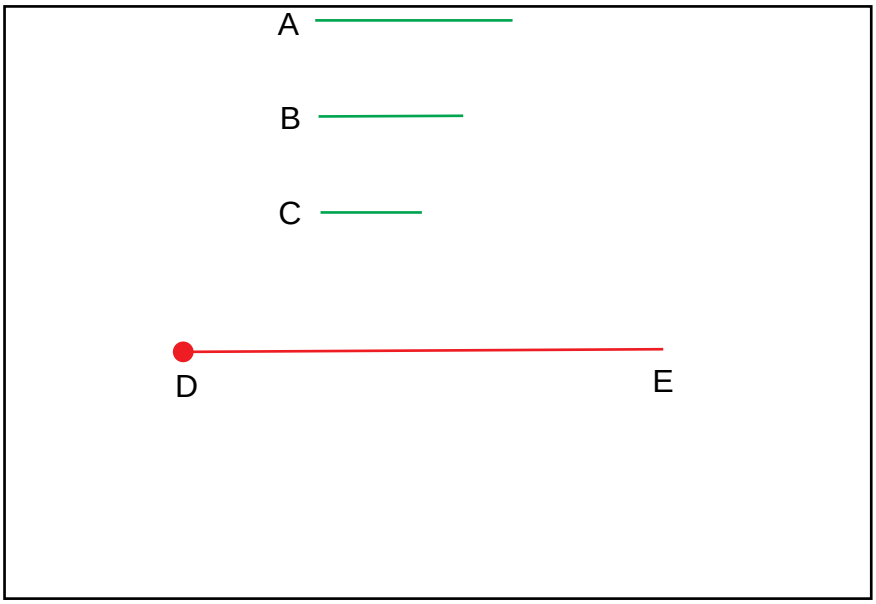
Out of three straight lines, which are equal to three given straight lines, to construct a triangle: thus it is necessary that two of the straight lines taken together in any manner should be greater than the remaining one. [I.20]



I.22:5. Let the three given straight lines be A, B, C.

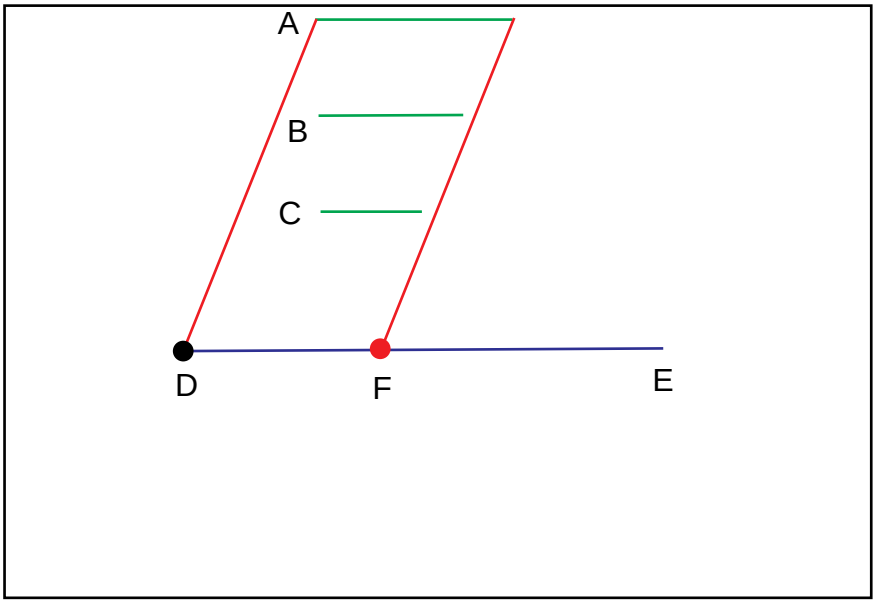


I.22:13. Let there be set out a straight line DE, terminated at D but of infinite length in the direction of E,

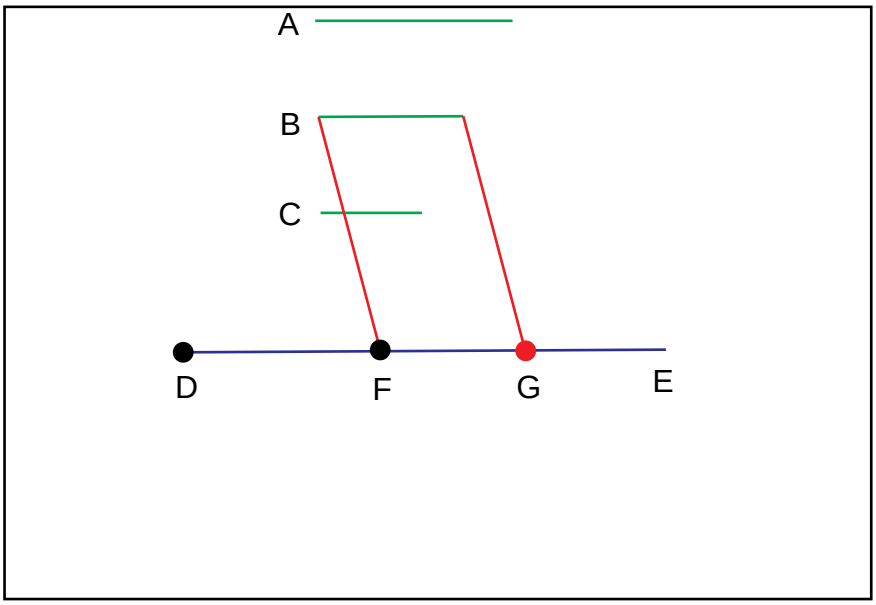


I.22:15. and let DF be made equal to A, ([I.3])

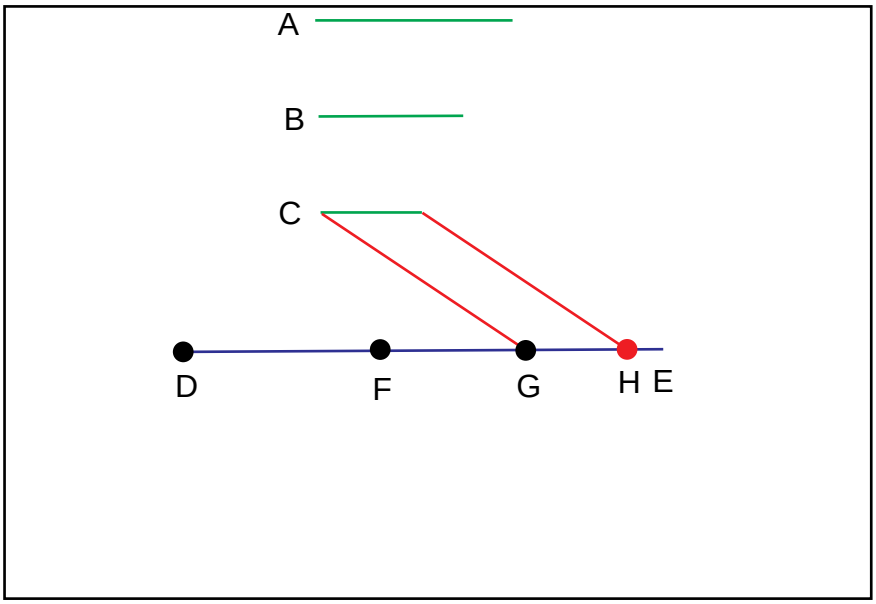
(Note: as advised in an earlier note following I.3, we are going to substitute the one-step rope trick for the many steps of I.3, to "move the line.")



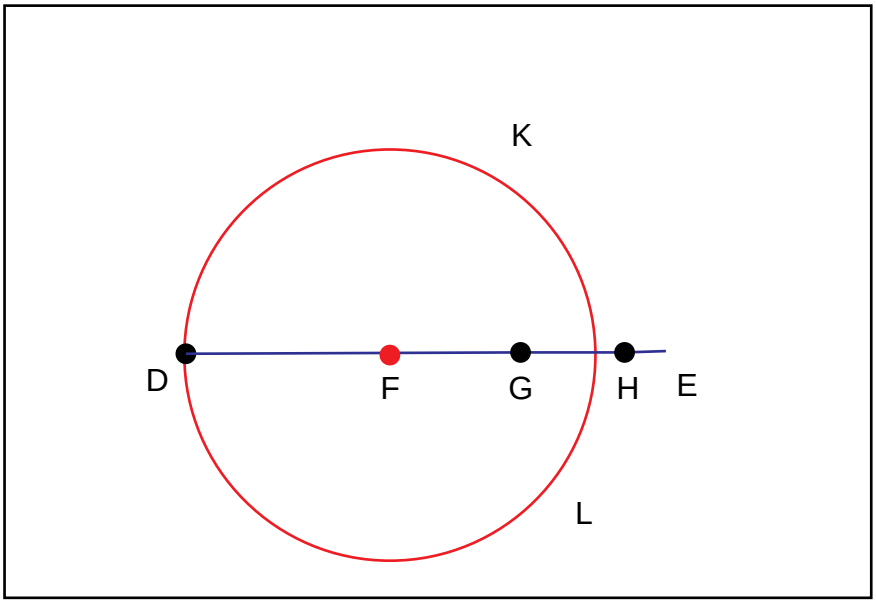
I.22:15. FG equal to B, ([I.3])



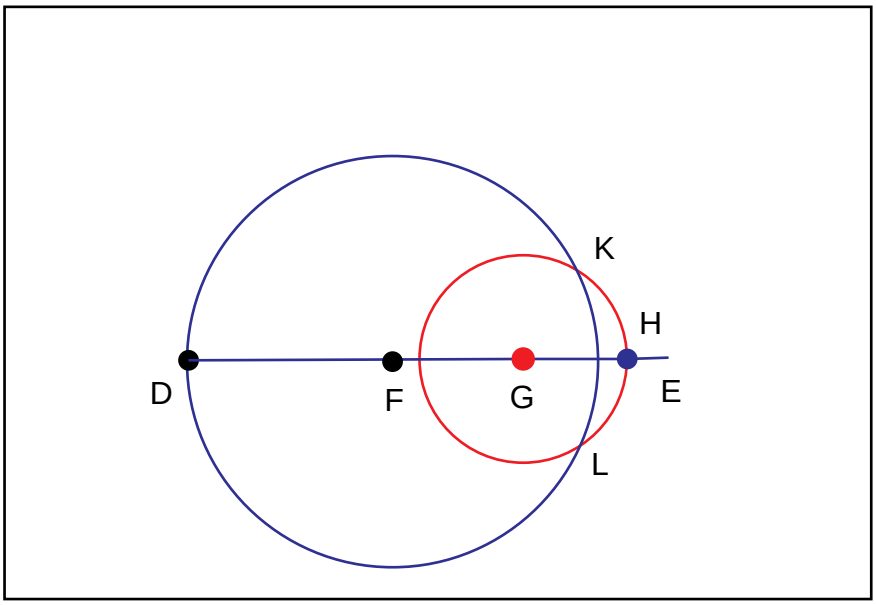
I.22:15. and GH equal to C. ([I.3])



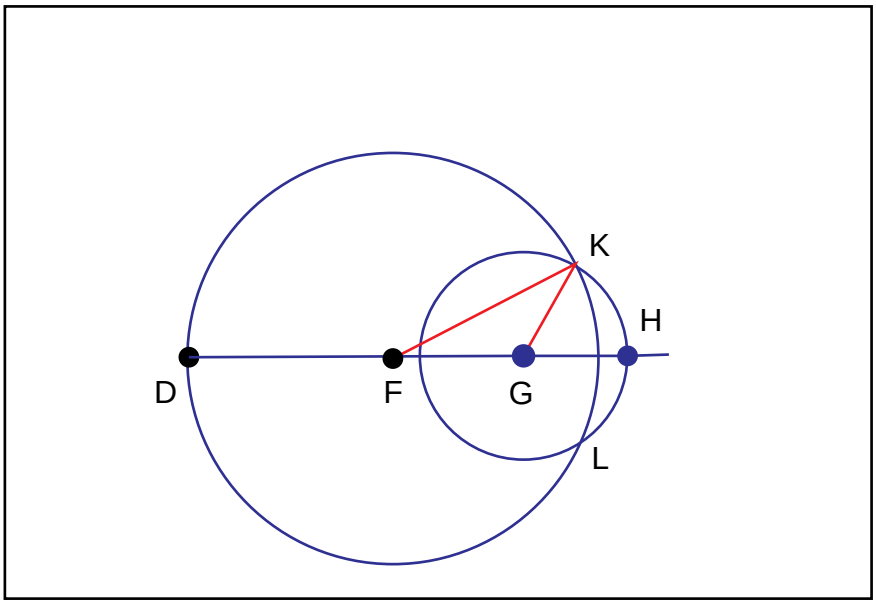
I.22:17. With centre F and distance FD let the circle DKL be described;



I.22:19. again, with centre G and distance GH let the circle KLH be described;

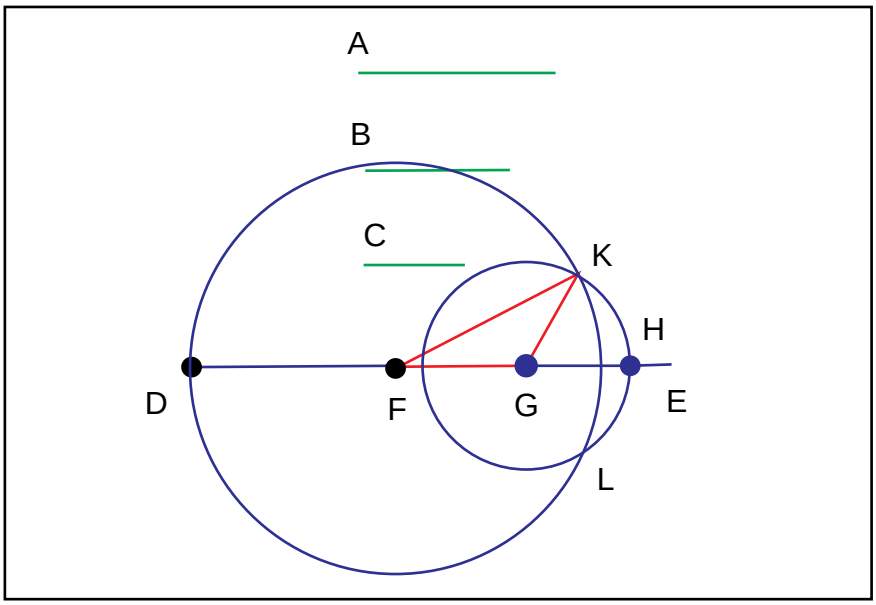
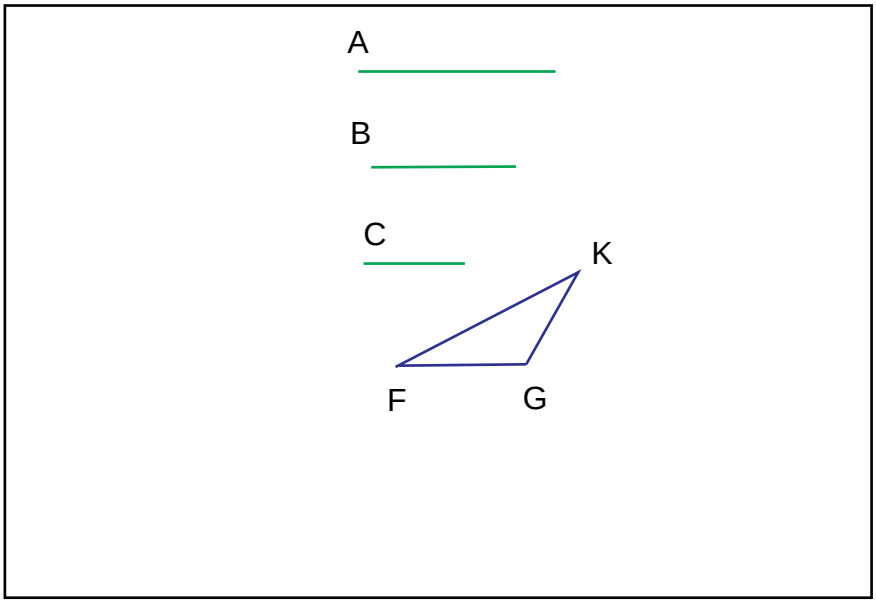


I.22:21. and let KF, KG be joined;



I.22:22. I say that the triangle KFG has been constructed out of three straight lines equal to A, B, C.

Note: If we had insisted on complete expansion, using the full construction of I.3 (13 steps) three separate times, this construction would have had 43 steps, rather than 7. Surely the extra 36 operations, including 15 circles drawn with the compass, would introduce more errors than the three substitute steps here, done with the divider.



Q.E.F.