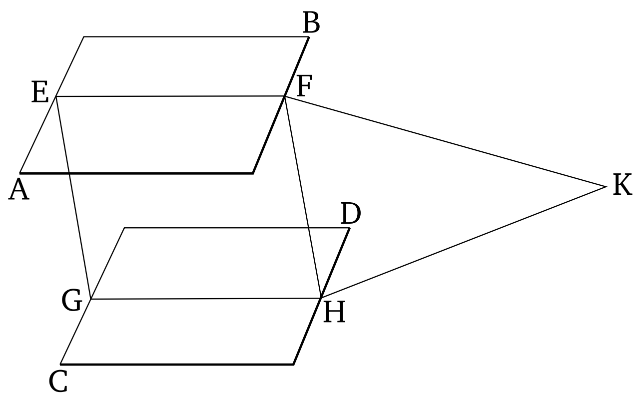
Book 11
Proposition 16

If two parallel planes are cut by some plane then their common sections are parallel.

For let the two parallel planes AB and CD have been cut by the plane $EFGH$. And let EF and GH be their common sections. I say that EF is parallel to GH.



For, if not, being produced, EF and GH will meet either in the direction of F, H, or of E, G. Let them be produced, as in the direction of F, H, and let them, first of all, have met at K. And since EFK is in the plane AB, all of the points on EFK are thus also in the plane AB [Prop. 11.1]. And K is one of the points on EFK. Thus, K is in the plane AB. So, for the same (reasons), K is also in the plane CD. Thus, the planes AB and CD, being produced, will meet. But they do not meet, on account of being (initially) assumed (to be mutually) parallel. Thus, the straight-lines EF and GH, being produced in the direction of F, H, will not meet. So, similarly, we can show that the straight-lines

EF and GH, being produced in the direction of E, G, will not meet either. And (straight-lines in one plane which), being produced, do not meet in either direction are parallel [Def. 1.23]. EF is thus parallel to GH.

Thus, if two parallel planes are cut by some plane then their common sections are parallel. (Which is) the very thing it was required to show.