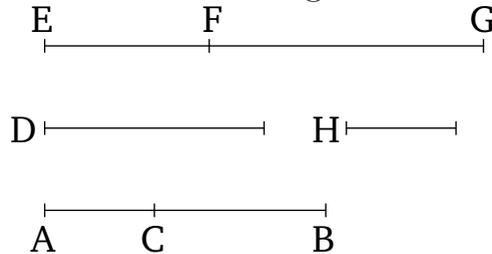


# Book 10

## Proposition 52

To find a fifth binomial straight-line.



Let the two numbers  $AC$  and  $CB$  be laid down such that  $AB$  does not have to either of them the ratio which (some) square number (has) to (some) square number [Prop. 10.38 lem.]. And let some rational straight-line  $D$  be laid down. And let  $EF$  be commensurable [in length] with  $D$ . Thus,  $EF$  (is) a rational (straight-line). And let it have been contrived that as  $CA$  (is) to  $AB$ , so the (square) on  $EF$  (is) to the (square) on  $FG$  [Prop. 10.6 corr.]. And  $CA$  does not have to  $AB$  the ratio which (some) square number (has) to (some) square number. Thus, the (square) on  $EF$  does not have to the (square) on  $FG$  the ratio which (some) square number (has) to (some) square number either. Thus,  $EF$  and  $FG$  are rational (straight-lines which are) commensurable in square only [Prop. 10.9]. Thus,  $EG$  is a binomial (straight-line) [Prop. 10.36]. So, I say that (it is) also a fifth (binomial straight-line).

For since as  $CA$  is to  $AB$ , so the (square) on  $EF$  (is) to the (square) on  $FG$ , inversely, as  $BA$  (is) to  $AC$ , so the (square) on  $FG$  (is) to the (square) on  $FE$  [Prop. 5.7 corr.]. Thus, the (square) on  $GF$  (is) greater

than the (square) on  $FE$  [Prop. 5.14]. Therefore, let  
 (the sum of) the (squares) on  $EF$  and  $H$  be equal to the  
 (square) on  $GF$ . Thus, via conversion, as the number  
 $AB$  is to  $BC$ , so the (square) on  $GF$  (is) to the (square)  
 on  $H$  [Prop. 5.19 corr.]. And  $AB$  does not have to  $BC$   
 the ratio which (some) square number (has) to (some)  
 square number. Thus, the (square) on  $FG$  does not  
 have to the (square) on  $H$  the ratio which (some) square  
 number (has) to (some) square number either. Thus,  
 $FG$  is incommensurable in length with  $H$  [Prop. 10.9].  
 Hence, the square on  $FG$  is greater than (the square  
 on)  $FE$  by the (square) on (some straight-line) incom-  
 mensurable (in length) with ( $FG$ ). And  $GF$  and  $FE$   
 are rational (straight-lines which are) commensurable in  
 square only. And the lesser term  $EF$  is commensurable  
 in length with the rational (straight-line previously) laid  
 down,  $D$ .

Thus,  $EG$  is a fifth binomial (straight-line). (Which  
 is) the very thing it was required to show.