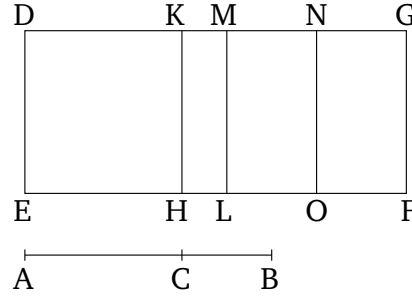


Book 10

Proposition 62

The square on a second binomial (straight-line) applied to a rational (straight-line) produces as breadth a third binomial (straight-line).[†]



Let AB be a second binomial (straight-line) having been divided into its (component) medial (straight-lines) at C , such that AC is the greater segment. And let DE be some rational (straight-line). And let the parallelogram DF , equal to the (square) on AB , have been applied to DE , producing DG as breadth. I say that DG is a third binomial (straight-line).

Let the same construction be made as that shown previously. And since AB is a second binomial (straight-line), having been divided at C , AC and CB are thus medial (straight-lines) commensurable in square only, and containing a medial (area) [Prop. 10.38]. Hence, the sum of the (squares) on AC and CB is also medial [Props. 10.15, 10.23 corr.]. And it is equal to DL . Thus, DL (is) also medial. And it is applied to the rational (straight-line) DE . MD is thus also rational, and incommensurable in length with DE [Prop. 10.22]. So, for the same (reasons), MG is also rational, and incommensurable in length with ML —that

is to say, with DE . Thus, DM and MG are each rational, and incommensurable in length with DE . And since AC is incommensurable in length with CB , and as AC (is) to CB , so the (square) on AC (is) to the (rectangle contained) by ACB [Prop. 10.21 lem.], the (square) on AC (is) also incommensurable with the (rectangle contained) by ACB [Prop. 10.11]. And hence the sum of the (squares) on AC and CB is incommensurable with twice the (rectangle contained) by ACB —that is to say, DL with MF [Props. 10.12, 10.13]. Hence, DM is also incommensurable (in length) with MG [Props. 6.1, 10.11]. And they are rational. DG is thus a binomial (straight-line) [Prop. 10.36]. [So] we must show that (it is) also a third (binomial straight-line).

So, similarly to the previous (propositions), we can conclude that DM is greater than MG , and DK (is) commensurable (in length) with KM . And the (rectangle contained) by DKM is equal to the (square) on MN . Thus, the square on DM is greater than (the square on) MG by the (square) on (some straight-line) commensurable (in length) with (DM) [Prop. 10.17]. And neither of DM and MG is commensurable in length with DE .

Thus, DG is a third binomial (straight-line) [Def. 10.7]. (Which is) the very thing it was required to show.