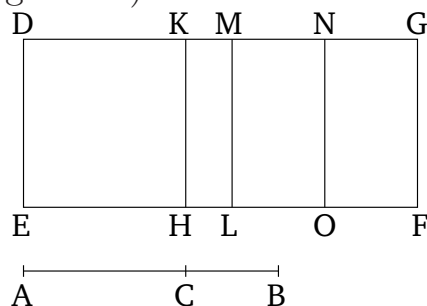


Book 10

Proposition 61

The square on a first binomial (straight-line) applied to a rational (straight-line) produces as breadth a second binomial (straight-line).



Let AB be a first binomial (straight-line) having been divided into its (component) medial (straight-lines) at C , of which AC (is) the greater. And let the rational (straight-line) DE be laid down. 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 second binomial (straight-line).

For let the same construction have been made as in the (proposition) before this. And since AB is a first binomial (straight-line), having been divided at C , AC and CB are thus medial (straight-lines) commensurable in square only, and containing a rational (area) [Prop. 10.37]. Hence, the (squares) on AC and CB are also medial [Prop. 10.21]. Thus, DL is medial [Props. 10.15, 10.23 corr.]. And it has been applied to the rational (straight-line) DE . MD is thus rational, and incommensurable in length with DE [Prop. 10.22]. Again, since twice the (rectangle contained) by AC and CB is rational, MF is

also rational. And it is applied to the rational (straight-line) ML . Thus, MG [is] also rational, and commensurable in length with ML —that is to say, with DE [Prop. 10.20]. DM is thus incommensurable in length with MG [Prop. 10.13]. And they are rational. DM and MG are thus rational, and commensurable in square only. DG is thus a binomial (straight-line) [Prop. 10.36]. So, we must show that (it is) also a second (binomial straight-line).

For since (the sum of) the squares on AC and CB is greater than twice the (rectangle contained) by AC and CB [Prop. 10.59], DL (is) thus also greater than MF . Hence, DM (is) also (greater) than MG [Prop. 6.1]. And since the (square) on AC is commensurable with the (square) on CB , DH is also commensurable with KL . Hence, DK is also commensurable (in length) with KM [Props. 6.1, 10.11]. 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 MG is commensurable in length with DE .

Thus, DG is a second binomial (straight-line) [Def. 10.6].