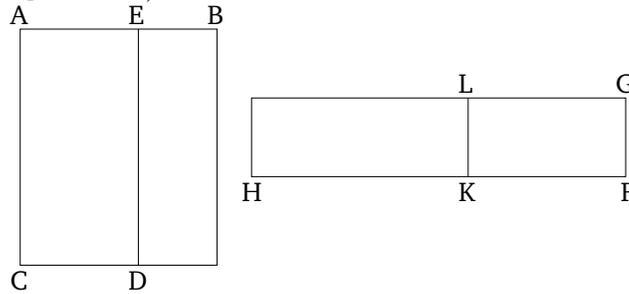


# Book 10

## Proposition 108

A medial (area) being subtracted from a rational (area), one of two irrational (straight-lines) arise (as) the square-root of the remaining area—either an apotome, or a minor (straight-line).



For let the medial (area)  $BD$  have been subtracted from the rational (area)  $BC$ . I say that one of two irrational (straight-lines) arise (as) the square-root of the remaining (area),  $EC$ —either an apotome, or a minor (straight-line).

For let the rational (straight-line)  $FG$  have been laid out, and let the right-angled parallelogram  $GH$ , equal to  $BC$ , have been applied to  $FG$ , and let  $GK$ , equal to  $DB$ , have been subtracted (from  $GH$ ). Thus, the remainder  $EC$  is equal to  $LH$ . Therefore, since  $BC$  is a rational (area), and  $BD$  a medial (area), and  $BC$  (is) equal to  $GH$ , and  $BD$  to  $GK$ ,  $GH$  is thus a rational (area), and  $GK$  a medial (area). And they are applied to the rational (straight-line)  $FG$ . Thus,  $FH$  (is) rational, and commensurable in length with  $FG$  [Prop. 10.20], and  $FK$  (is) also rational, and incommensurable in length with  $FG$  [Prop. 10.22]. Thus,  $FH$  is incommensurable

in length with  $FK$  [Prop. 10.13].  $FH$  and  $FK$  are thus rational (straight-lines which are) commensurable in square only. Thus,  $KH$  is an apotome [Prop. 10.73], and  $KF$  an attachment to it. So, the square on  $HF$  is greater than (the square on)  $FK$  by the (square) on (some straight-line which is) either commensurable, or not (commensurable), (in length with  $HF$ ).

First, let the square (on it) be (greater) by the (square) on (some straight-line which is) commensurable (in length with  $HF$ ). And the whole of  $HF$  is commensurable in length with the (previously) laid down rational (straight-line)  $FG$ . Thus,  $KH$  is a first apotome [Def. 10.1]. And the square-root of an (area) contained by a rational (straight-line) and a first apotome is an apotome [Prop. 10.91]. Thus, the square-root of  $LH$ —that is to say, (of)  $EC$ —is an apotome.

And if the square on  $HF$  is greater than (the square on)  $FK$  by the (square) on (some straight-line which is) incommensurable (in length) with ( $HF$ ), and (since) the whole of  $FH$  is commensurable in length with the (previously) laid down rational (straight-line)  $FG$ ,  $KH$  is a fourth apotome [Prop. 10.14]. And the square-root of an (area) contained by a rational (straight-line) and a fourth apotome is a minor (straight-line) [Prop. 10.94]. (Which is) the very thing it was required to show.