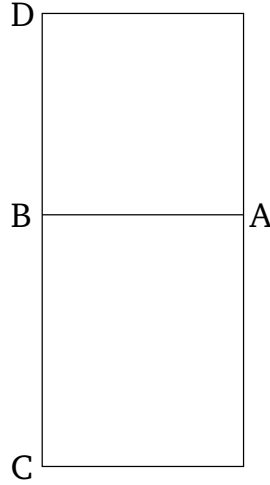# Book 10
# Proposition 20

If a rational (area) is applied to a rational (straight-line) then it produces as breadth a (straight-line which is) rational, and commensurable in length with the (straight-line) to which it is applied.



For let the rational (area) $AC$ have been applied to the rational (straight-line) $AB$, producing the (straight-line) $BC$ as breadth. I say that $BC$ is rational, and commensurable in length with $BA$.

For let the square $AD$ have been described on $AB$. $AD$ is thus rational [Def. 10.4]. And $AC$ (is) also rational. $DA$ is thus commensurable with $AC$. And as $DA$ is to $AC$, so $DB$ (is) to $BC$ [Prop. 6.1]. Thus, $DB$ is also commensurable (in length) with $BC$ [Prop. 10.11]. And $DB$ (is) equal to $BA$. Thus, $AB$ (is) also commensurable (in length) with $BC$. And $AB$ is rational. Thus, $BC$ is also rational, and commensurable in length with $AB$ [Def. 10.3].

Thus, if a rational (area) is applied to a rational (straight-line), and so on . . . .