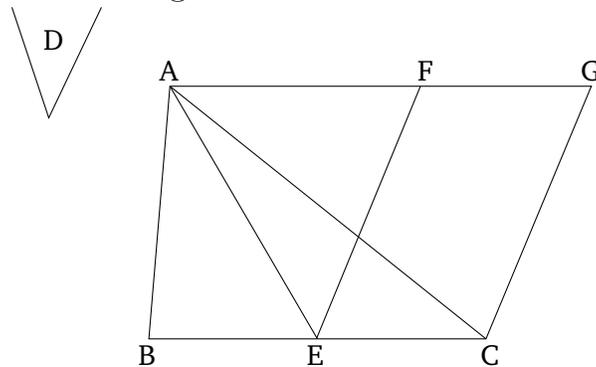


# Book 1

## Proposition 42

To construct a parallelogram equal to a given triangle in a given rectilinear angle.

Let  $ABC$  be the given triangle, and  $D$  the given rectilinear angle. So it is required to construct a parallelogram equal to triangle  $ABC$  in the rectilinear angle  $D$ .



Let  $BC$  have been cut in half at  $E$  [Prop. 1.10], and let  $AE$  have been joined. And let (angle)  $CEF$ , equal to angle  $D$ , have been constructed at the point  $E$  on the straight-line  $EC$  [Prop. 1.23]. And let  $AG$  have been drawn through  $A$  parallel to  $EC$  [Prop. 1.31], and let  $CG$  have been drawn through  $C$  parallel to  $EF$  [Prop. 1.31]. Thus,  $FECG$  is a parallelogram. And since  $BE$  is equal to  $EC$ , triangle  $ABE$  is also equal to triangle  $AEC$ . For they are on the equal bases,  $BE$  and  $EC$ , and between the same parallels,  $BC$  and  $AG$  [Prop. 1.38]. Thus, triangle  $ABC$  is double (the area) of triangle  $AEC$ . And parallelogram  $FECG$  is also double (the area) of triangle  $AEC$ . For it has the same base as ( $AEC$ ), and is between the same parallels as ( $AEC$ ) [Prop. 1.41]. Thus, paral-

lelogram  $FECG$  is equal to triangle  $ABC$ . ( $FECG$ ) also has the angle  $CEF$  equal to the given (angle)  $D$ .

Thus, parallelogram  $FECG$ , equal to the given triangle  $ABC$ , has been constructed in the angle  $CEF$ , which is equal to  $D$ . (Which is) the very thing it was required to do.