

---

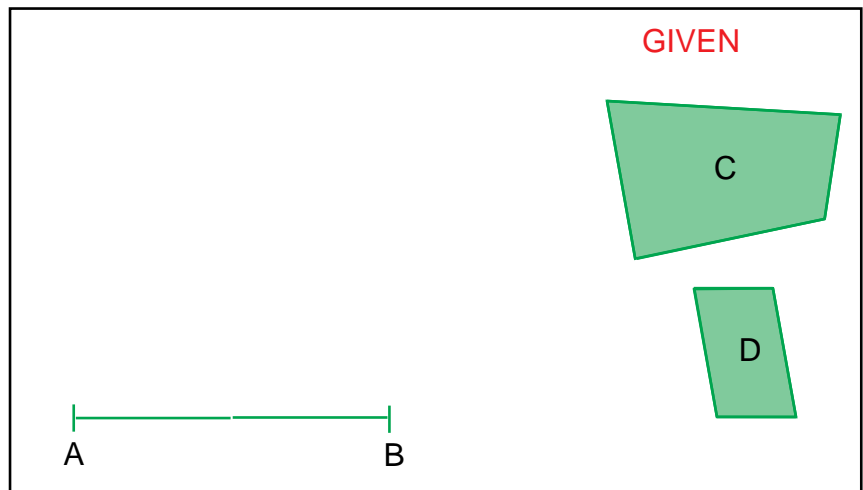
## Construction 46: Book VI, Proposition 28

---

*To a given straight line to apply a parallelogram equal to a given rectilinear figure and deficient by a parallelogrammic figure similar to a given one: thus the given rectilinear figure must not be greater than the parallelogram described on the half of the straight line and similar to the defect.*

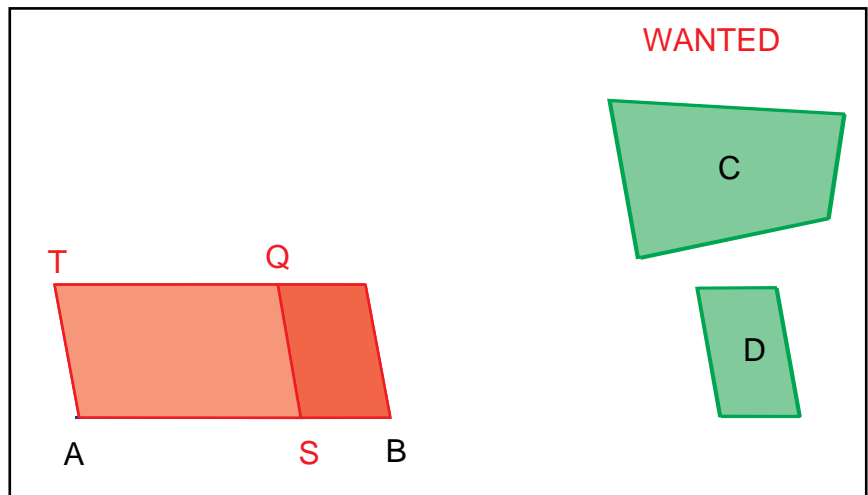
We will give only the outline of stages.

VI.28:6. Let AB be the given straight line, C the given rectilinear figure..., and D the parallelogram to which the defect is required to be similar;



VI.28:11. Thus it is required to apply to ... AB a parallelogram ST equal to ... C and deficient by a ... figure QB similar to D.

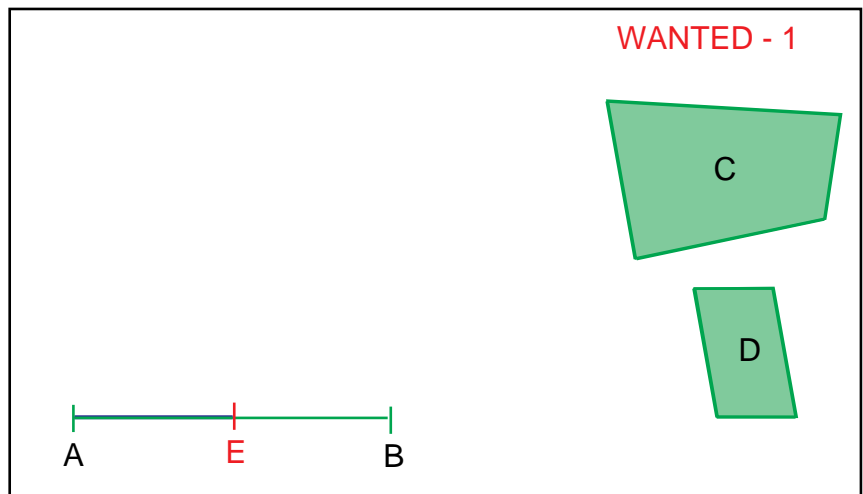
We outline the construction in 6 stages.



Stage 1.

VI.28:14. Let AB be bisected at the point E, ([I.10]).

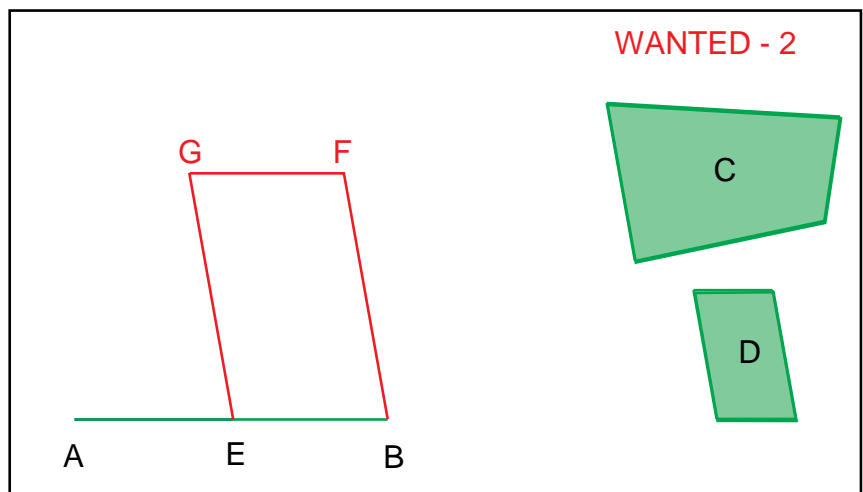
GOSUB I.10, C#5. (3 steps)



Stage 2.

VI.28:14. and on EB let EBFQ be described similar and similarly situated to D; [VI.18]

GOSUB VI.18, C#44 (17 steps)



Stage 3.

VI.28:16. let the parallelogram AG be completed. (2 steps).

VI.28:17. If then AG is equal to C, that which was enjoined will have been done;

VI.28:23. But, if not, let HE be greater than C.

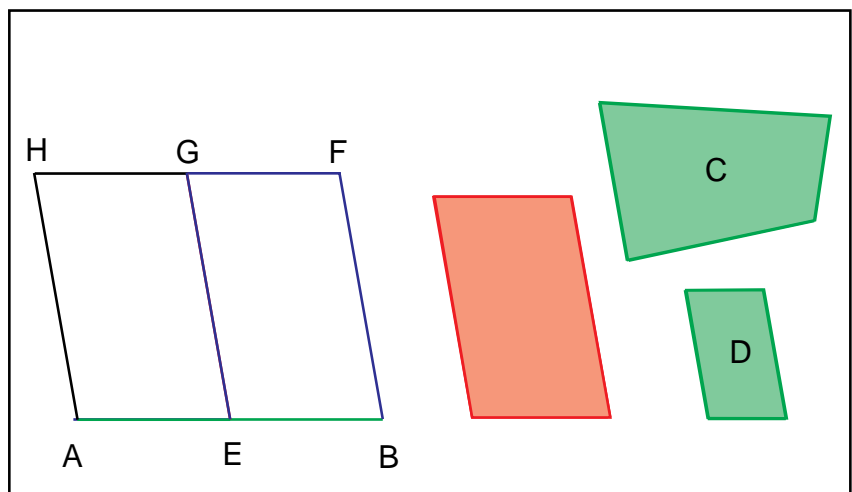
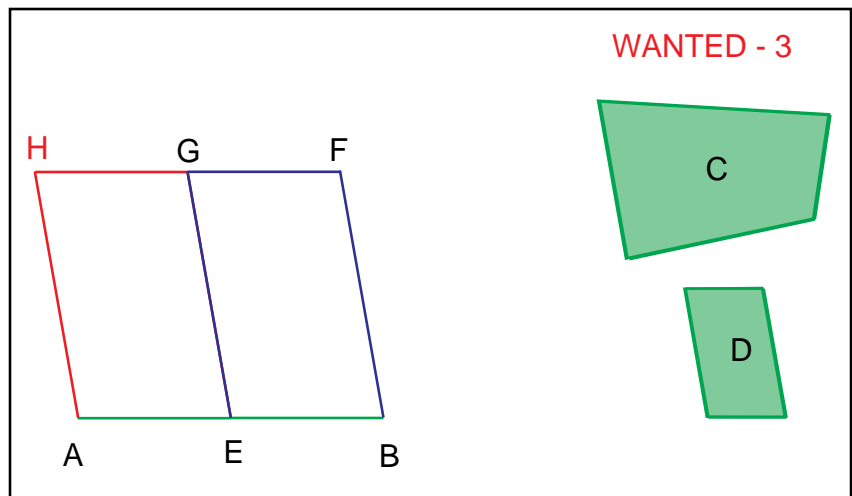
VI.28:21. - Now HE is equal to GB;

VI.28:25. Therefore GB is also greater than C.

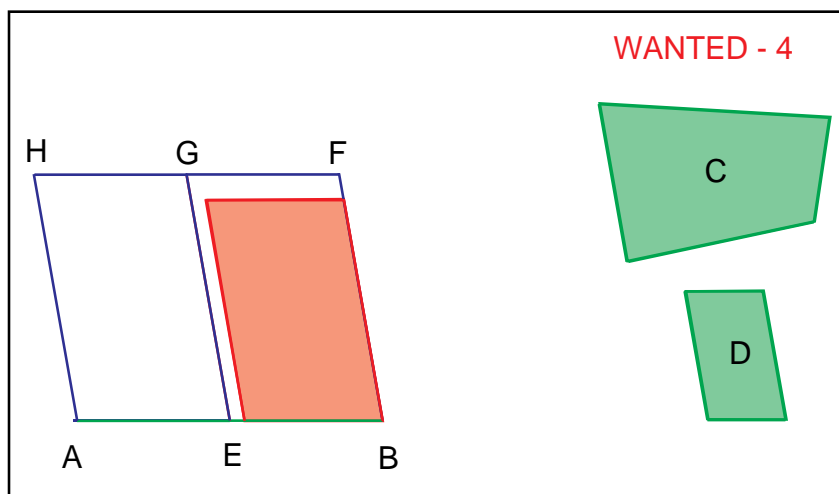
Next, in line VI.28:26, Euclid calls for the construction of a parallelogram KLMN similar to D, and satisfying the equation, for areas,  $KLMN = GB - C$ , and refers back to the preceding construction, C#45. However, C#45 must be applied twice to construct KLMN. First to draw a rectilineal figure equal in area to  $GB - C$ , and again to draw an equal parallelogram. Hence, stages 4 and 5.

Stage 4

Construct a parallelogram similar to D and equal to C. [VI.25]

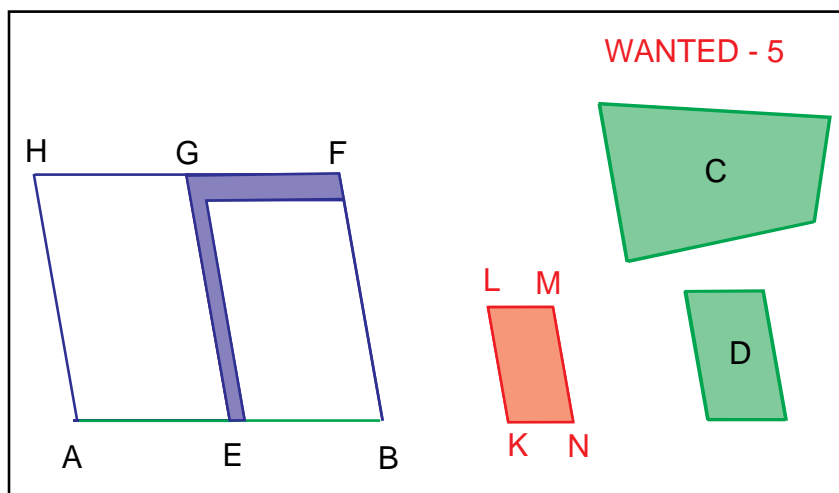


Now move this figure inside GB.



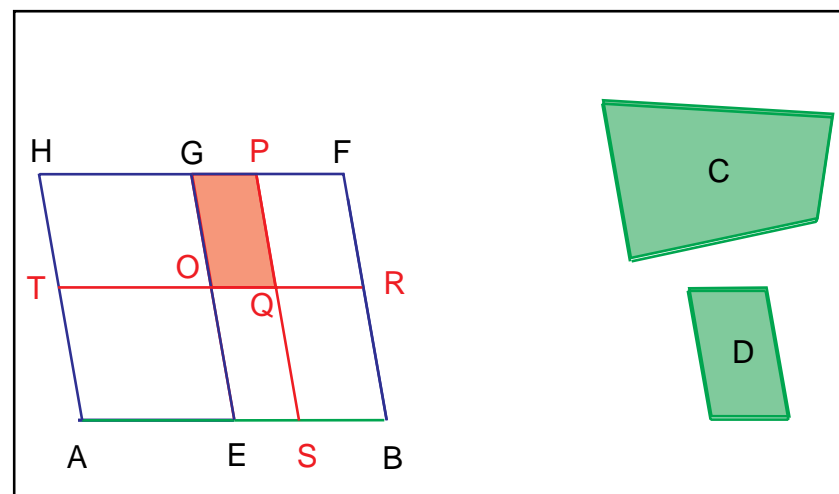
Stage 5.

Construct a parallelogram KLMN similar to D and equal to the excess of GB over C, a rectilineal figure. [VI.25]



Stage 6.

Now move this figure inside GB, and draw the sides through, PQ to TR.



Q.E.F

Therefore to the given straight line AB there has been applied the parallelogram ST equal to the given rectilineal figure C and deficient by a parallelogrammic figure QB which is similar to D.

