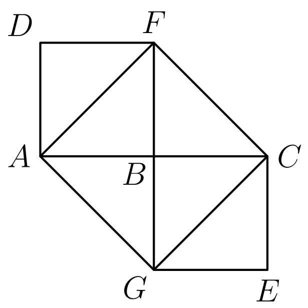
[Sir Thomas L. Heath, *The Thirteen Books of Euclid's Elements* (2nd edition), pp. 348–349 (1925).]

[Heath's commentary on Euclid, *Elements*, Book I, Proposition 46.]

1, 3, 30. Proclus (p. 423, 18 sqq.) notes the difference between the word *construct* (συστήσασθαι) applied by Euclid to the construction of a *triangle* (and, he might have added, of an *angle*) and the words *describe on* (ἀναγράφειν ἀπό) used of drawing a square on a given straight line as one side. The *triangle* (or *angle*) is, so to say, pieced together, while the describing of a square on a given straight line is the making of a figure "from" *one* side, and corresponds to the multiplication of the number representing the side by itself.

Proclus (pp. 424–5) proves that, *if squares are described on equal straight lines, the squares are equal*; and, *conversely*, that, *if two squares are equal, the straight lines are equal on which they are described.* The first proposition is immediately obvious if we divide the squares into two triangles by drawing a diagonal in each. The converse is proved as follows.

Place the two equal squares $AF$, $CG$ so that $AB$, $BC$ are in a straight line. Then, since the angles are right, $FB$, $BG$ will also be in a straight line. Join $AF$, $FC$, $CG$, $GA$.




Now, since the squares are equal, the triangles $ABF$, $CBG$ are equal.

Add to each the triangle $FBC$; therefore the triangles $AFC$, $GFC$ are equal, and hence they must be in the same parallels.

Therefore $AG$, $CF$ are parallel.

Also, since each of the alternate angles $AFG$, $FGC$ is half a right angle, $AF$, $CG$ are parallel.

Hence $AFCG$ is a parallelogram; and $AF$, $CG$ are equal.

Thus the triangles $ABF$, $CBG$ have two angles and one side respectively equal;

therefore $AB$ is equal to $BC$, and $BF$ to $BG$.