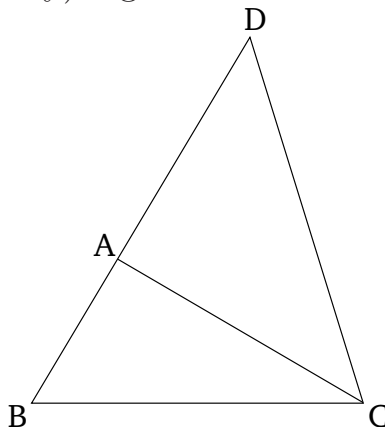


# Book 1

## Proposition 20

In any triangle, (the sum of) two sides taken together in any (possible way) is greater than the remaining (side).



For let  $ABC$  be a triangle. I say that in triangle  $ABC$  (the sum of) two sides taken together in any (possible way) is greater than the remaining (side). (So), (the sum of)  $BA$  and  $AC$  (is greater) than  $BC$ , (the sum of)  $AB$  and  $BC$  than  $AC$ , and (the sum of)  $BC$  and  $CA$  than  $AB$ .

For let  $BA$  have been drawn through to point  $D$ , and let  $AD$  be made equal to  $CA$  [Prop. 1.3], and let  $DC$  have been joined.

Therefore, since  $DA$  is equal to  $AC$ , the angle  $ADC$  is also equal to  $ACD$  [Prop. 1.5]. Thus,  $BCD$  is greater than  $ADC$ . And since  $DCB$  is a triangle having the angle  $BCD$  greater than  $BDC$ , and the greater angle subtends the greater side [Prop. 1.19],  $DB$  is thus greater than  $BC$ . But  $DA$  is equal to  $AC$ . Thus, (the sum of)  $BA$  and  $AC$  is greater than  $BC$ . Similarly, we can show

that (the sum of)  $AB$  and  $BC$  is also greater than  $CA$ , and (the sum of)  $BC$  and  $CA$  than  $AB$ .

Thus, in any triangle, (the sum of) two sides taken together in any (possible way) is greater than the remaining (side). (Which is) the very thing it was required to show.