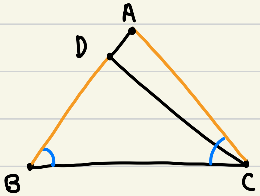
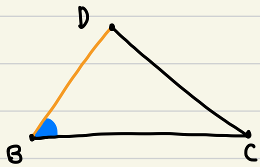
<u>Prop 6</u>, <u>Book I.</u> If a triangle has two angles equal to one another, then the sides subtending the equal angles will also be equal to one another. (AKA isoangle $\Rightarrow$ isosceles).

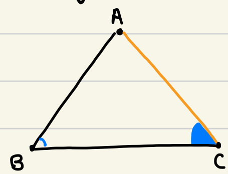
Proof. Let ABC be a triangle such that $\angle ABC = \angle ACB$, but $|AB| > |AC|$.



Pick D on AB such that $|BD| = |AC|$ and draw segment DC. By SAS, we have



is congruent to



(they share the same base BC). Thus, $\angle ABC = \angle BCD$. But,

$$\angle BCD + \angle ACD = \angle ACB$$

which implies

$$\angle ABC + \underbrace{\angle ACD}_{>0} = \angle ACB \overset{\text{hypothesis}}{=} \angle ABC \Rightarrow \angle ABC < \angle ABC$$

arriving at a contradiction.