MT 453 Elements Day 30

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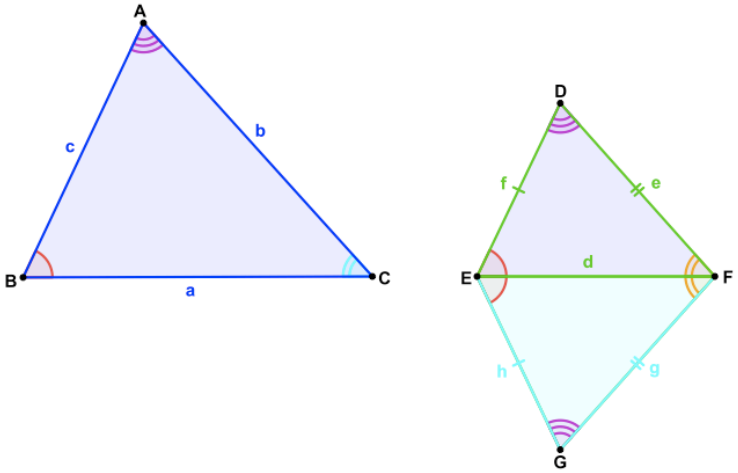
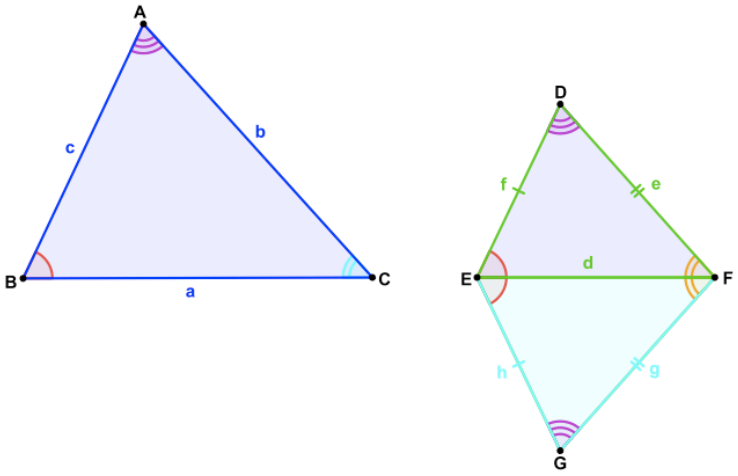
Proposition VI.5

If two triangles have their sides proportional then they will be equiangluar.



On d construct $\angle FEG = \angle ABC$ and $\angle EFG = \angle ACB$. [I.23]
This implies $\angle EGF = \angle BAC$. [I.32]
Therefore $\triangle ABC$ and $\triangle EGF$ are equiangular.
$\frac{c}{a} = \frac{h}{d}$, [VI.4]
but $\frac{c}{a} = \frac{f}{d}$.
Thus $\frac{h}{d} = \frac{f}{d}$, [V.11]
which means $h = f$. [V.9]



$\frac{b}{a} = \frac{g}{d}$, [VI.4]
but $\frac{b}{a} = \frac{e}{d}$.
Thus $\frac{g}{d} = \frac{e}{d}$, [V.11]
which means $g = e$. [V.9]
Therefore $\triangle DEF \simeq \triangle GEF$, [I.8]
since $h = f$, $g = e$, and d common.
So $\angle DEF = \angle GEF$, $\angle DFE = \angle GFE$, $\angle EDF = \angle EGF$,
but $\angle DEF = \angle ABC$, $\angle DFE = \angle ACB$, $\angle EDF = \angle BAC$.
Therefore $\triangle ABC$ and $\triangle DEF$ are equiangular.
Q.E.D.