A triangle with equal bisectors is isosceles

Given:

In Triangle ABC

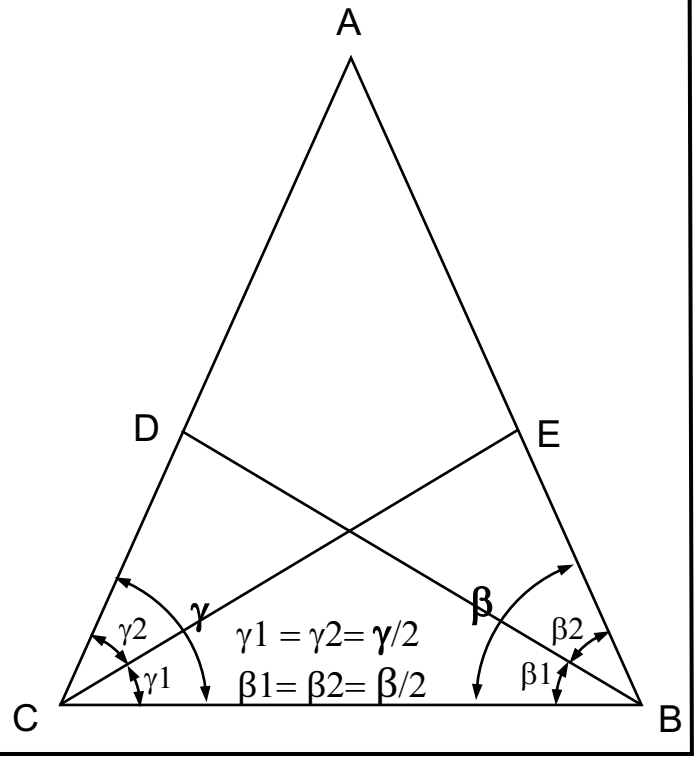
1) BD & CE are bisectors of angles ABC & BCA

[i.e., $\gamma 1 = \gamma 2 = \boldsymbol{\gamma}/2$ and $\beta 1 = \beta 2 = \boldsymbol{\beta}/2$]

2) BD = CE (bisectors are equal)

Prove:

ABC is isosceles, i.e., AB = AC, or $\gamma = \beta$



Proof **Rules**

- Use Plane Geometry rules only
  - [No trigonometry/calculus]
- Use basic triangle properties
  - If AB>AC, then $\gamma > \beta$, and vice versa
- Use basic parallelogram properties
  - DE, GF equal & parallel; and $\delta = \phi$, $\psi = \varepsilon$