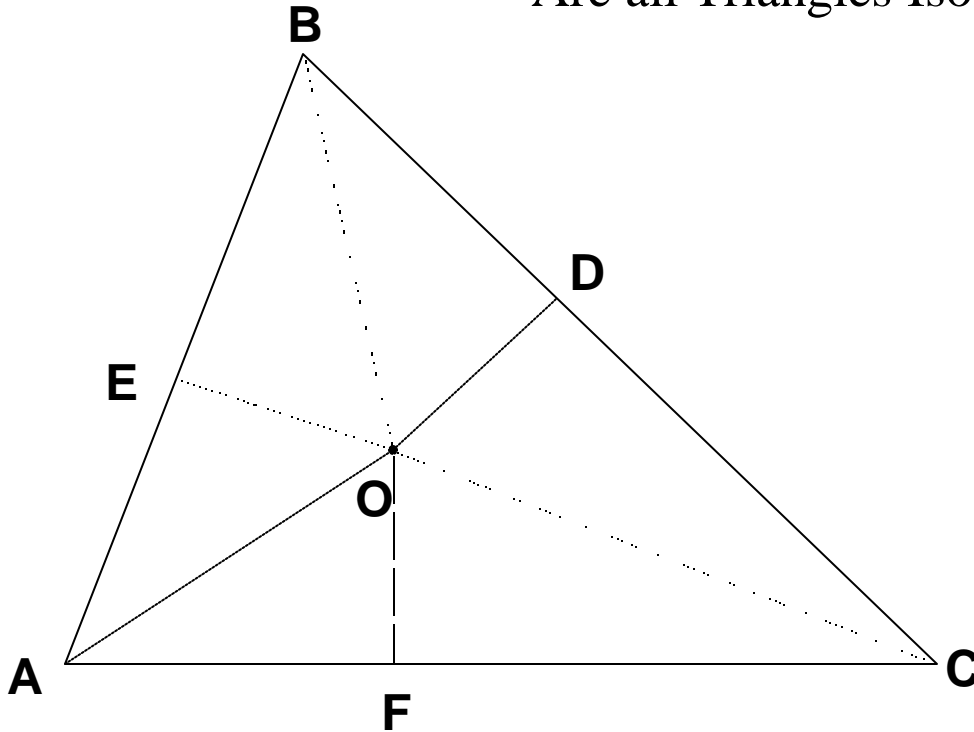


## Are all Triangles Isosceles?



Step	Justification
Draw the perpendicular bisector of side BC	Construction
Draw the bisector of the angle BAC	Construction
Denote the intersection of these two lines as O.	Construction
This gives two line segments AO and DO.	Construction
Draw OE perpendicular to side AB	Construction
Draw OF perpendicular to side AC	Construction
Draw a line segment from O to B	Construction
Draw a line segment from O to C	Construction
The angles AEO and AFO are equal	Construction (Both right angles)
The angles OAF and OAE are equal	Construction (AO is angle bisector)
The angles AOF and AOE are equal	The angles of a triangle must sum to $180^\circ$
The triangles AOF and AOE are congruent	Angle-Side-Angle (AO is a shared side)
$OE=OF$ and $AE=AF$	Corresponding parts of congruent triangles
$OB=OC$	All points on the perpendicular bisector of a line segment are equidistant from both end points.
OCF and OBE are right triangles	Construction
OCF and OBE are congruent	If any two sides of a right triangle are equal, the triangles are congruent.
$EB=CF$	Corresponding parts of congruent triangles
$AE+EB=AF+CF$	Adding equals gives equals
$AE+EB=AB=AF+CF=AC$	Construction
ABC is isosceles	Definition of isosceles