



to prove $OA + OB + OC < AB + BC + CA$
 construction produce BO to intersect AC at D

proof In $\triangle ABD$

$$AB + AD > BD \dots \textcircled{i}$$

In $\triangle COD$

$$OD + DC > OC \dots \textcircled{ii}$$

[In a \triangle sum of any sides is greater than the third side]

$$\textcircled{i} + \textcircled{ii}$$

$$AB + AD + OD + DC > BD + OC$$

$$\Rightarrow AB + AD + DC + \cancel{OD} > \cancel{OB} + \cancel{OD} + OC$$

$$\Rightarrow AB + AC > OB + OC \dots \textcircled{iii}$$

Similarly $BC + AB > OC + OA \dots \textcircled{iv}$

$$AC + BC > OA + OB \dots \textcircled{v}$$

$$\textcircled{iii} + \textcircled{iv} + \textcircled{v}$$

$$\cancel{2} (AB + BC + AC) > \cancel{2} (OA + OB + OC)$$

$$\Rightarrow AB + BC + AC > OA + OB + OC$$