

- TG 6** In a triangle ABC denote the displacement vectors \vec{AB} and \vec{AC} by \vec{p} and \vec{q} respectively.
Use vectors to prove that, in a triangle ABC , $a^2 = b^2 + c^2 - 2bc \cos A$.

Need to prove $|\vec{p} - \vec{q}|^2 = |\vec{p}|^2 + |\vec{q}|^2 - 2|\vec{p}||\vec{q}|\cos A$.

$$\text{RHS} = |\vec{p}|^2 + |\vec{q}|^2 - 2|\vec{p}||\vec{q}|\frac{\vec{p} \cdot \vec{q}}{|\vec{p}||\vec{q}|}$$

$$= |\vec{p}|^2 + |\vec{q}|^2 - 2\vec{p} \cdot \vec{q}$$

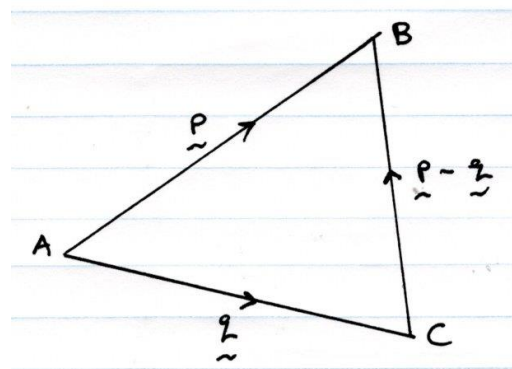
$$= |\vec{p}|^2 - 2\vec{p} \cdot \vec{q} + |\vec{q}|^2$$

$$= |\vec{p} - \vec{q}|^2$$

$$= \text{LHS}$$

$$\therefore |\vec{p} - \vec{q}|^2 = |\vec{p}|^2 + |\vec{q}|^2 - 2|\vec{p}||\vec{q}|\cos A$$

$$\therefore a^2 = b^2 + c^2 - 2bc \cos A$$



* These solutions have been provided by [projectmaths](http://projectmaths.com.au) and are not supplied or endorsed by NESA.

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