a and **b** are vectors.
Show that $|\boldsymbol{a} \times \boldsymbol{b}|^2 + |\boldsymbol{a} \cdot \boldsymbol{b}|^2 = (\boldsymbol{ab})^2$

$$|\boldsymbol{a} \times \boldsymbol{b}| = \boldsymbol{ab} sin\theta$$

$$= (\boldsymbol{ab} sin\theta)^2$$

$$|\boldsymbol{a} \times \boldsymbol{b}|^2$$

$$|\boldsymbol{a} \times \boldsymbol{b}|^2 = (\boldsymbol{ab})^2 sin^2\theta$$

$$|\boldsymbol{a} \cdot \boldsymbol{b}| = \boldsymbol{ab} cos\theta$$

$$|\boldsymbol{a} \cdot \boldsymbol{b}|^2 = (\boldsymbol{ab} cos\theta)^2$$

$$|\boldsymbol{a} \cdot \boldsymbol{b}|^2 = (\boldsymbol{ab})^2 cos^2\theta$$

$$|\boldsymbol{a} \times \boldsymbol{b}|^2 + |\boldsymbol{a} \cdot \boldsymbol{b}|^2 = (\boldsymbol{ab})^2 sin^2\theta + (\boldsymbol{ab})^2 cos^2\theta$$

$$= (\boldsymbol{ab})^2 (sin^2\theta + cos^2\theta) \qquad sin^2\theta + cos^2\theta \equiv 1$$

$$= (\boldsymbol{ab})^2$$