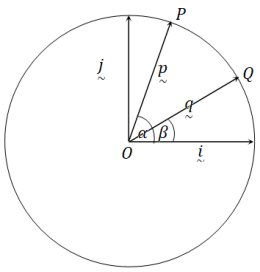
TG 5 Use vectors and the diagram of the unit circle to derive the formula for the expansion of $\cos(\alpha - \beta)$ where $0 \leq \beta \leq \alpha \leq \frac{\pi}{2}$.



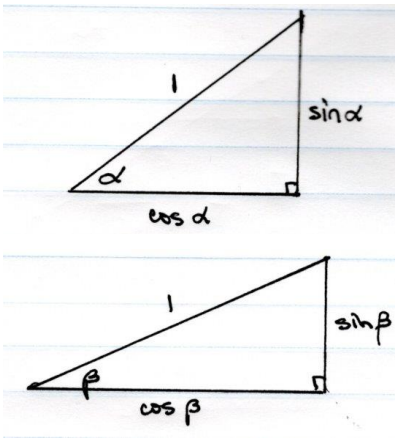
Let $\underset{\sim}{p} = \cos\alpha \underset{\sim}{i} + \sin\alpha \underset{\sim}{j}$ and

$\underset{\sim}{q} = \cos\beta \underset{\sim}{i} + \sin\beta \underset{\sim}{j}$

Now, $\cos(\alpha - \beta) = \dfrac{\underset{\sim}{p} \cdot \underset{\sim}{q}}{\left|\underset{\sim}{p}\right| \left|\underset{\sim}{q}\right|}$

$= \underset{\sim}{p} \cdot \underset{\sim}{q}$, as $\left|\underset{\sim}{p}\right| = 1$ and $\left|\underset{\sim}{q}\right| = 1$.

$= \cos\alpha \times \cos\beta + \sin\alpha \times \sin\beta$



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