

LC 2015: PAPER 2**QUESTION 5 (25 MARKS)****Question 5 (a)**

You are asked to prove an identity. You have to show that the left-hand side (LHS) is equal to the right-hand side (RHS).

Turn all trigonometric functions into sin and cos.

FORMULAE AND TABLES BOOK**Trigonometry (page 13/14)**

$$\tan A = \frac{\sin A}{\cos A}$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

LHS

$$\begin{aligned} & \tan(A + B) \\ &= \frac{\sin(A + B)}{\cos(A + B)} \\ &= \frac{\sin A \cos B + \cos A \sin B}{\cos A \cos B - \sin A \sin B} \end{aligned}$$

RHS

$$\begin{aligned} & \frac{\tan A + \tan B}{1 - \tan A \tan B} \\ &= \frac{\frac{\sin A}{\cos A} + \frac{\sin B}{\cos B}}{1 - \frac{\sin A}{\cos A} \times \frac{\sin B}{\cos B}} \\ &= \frac{\left(\frac{\sin A}{\cos A} + \frac{\sin B}{\cos B}\right) \times \cos A \cos B}{\left(1 - \frac{\sin A}{\cos A} \times \frac{\sin B}{\cos B}\right) \times \cos A \cos B} \\ &= \frac{\sin A \cos B + \cos A \sin B}{\cos A \cos B - \sin A \sin B} \end{aligned}$$

$$\therefore \tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

MARKING SCHEME NOTES**Question 5 (a) [Scale 15D (0, 4, 7, 11, 15)]**

4: • Tan function in terms of Sine and Cosine

7: • $\sin(A + B)$ or $\cos(A + B)$ expanded

• Numerator or denominator in fraction form

11: • Numerator and denominator divided by $\cos A \cos B$

• Both numerator and denominator expressed in form of a single fraction

Question 5 (b)

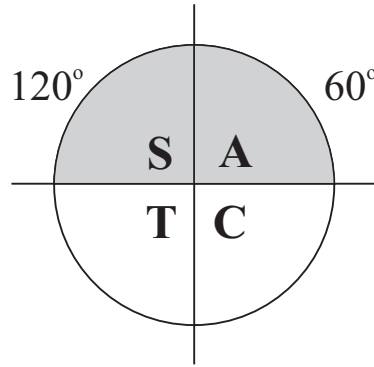
$$\sin(3x) = \frac{\sqrt{3}}{2}$$

$$\text{Reference angle } \alpha = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = 60^\circ$$

$$3x = \begin{cases} 60^\circ, 420^\circ, 780^\circ \text{ [First quadrant]} \\ 120^\circ, 480^\circ, 840^\circ \text{ [Second quadrant]} \end{cases}$$

$$x = \begin{cases} 20^\circ, 140^\circ, 260^\circ \\ 40^\circ, 160^\circ, 280^\circ \end{cases}$$

$$\therefore x = 20^\circ, 40^\circ, 140^\circ, 160^\circ, 260^\circ, 280^\circ$$

**MARKING SCHEME NOTES****Question 5 (b) [Scale 10D (0, 2, 5, 8, 10)]**

- 2:** • One value for $3x$
- 5:** • One value for x
• Two or more values for $3x$
- 8:** • Three or more values for x