

Cambridge International AS & A Level

Mathematics 9709

Paper 1 Pure Mathematics 1

Topic 5-Trigonometry

Question No (11)

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Prove the identity $\frac{\sin x}{1 - \sin x} - \frac{\sin x}{1 + \sin x} \equiv 2 \tan^2 x$.

Solution

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d.H.S

$$\frac{\sin x}{1 - \sin x} - \frac{\sin x}{1 + \sin x}$$

$$\frac{\sin x(1 + \sin x) - \sin x(1 - \sin x)}{(1 - \sin x)(1 + \sin x)}$$

$$\frac{\sin x + \sin^2 x - \sin x + \sin^2 x}{1 - \sin^2 x}$$

$$\begin{aligned} &= (a-b)(a+b) \\ &= a^2 - b^2 \end{aligned}$$

$$\frac{2 \sin^2 x}{1 - \sin^2 x}$$

$$\frac{2 \sin^2 x}{\cos^2 x}$$

$$2 \tan^2 x$$

$$\begin{aligned} &\sin^2 x + \cos^2 x = 1 \\ &\cos^2 x = 1 - \sin^2 x \end{aligned}$$