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## Prove Trig Identity | Past Paper Question | C3 Edexcel June 2014 Q7(b)

(a) Show that

$$\operatorname{cosec} 2x + \cot 2x = \cot x, \quad x \neq 90n^\circ, \quad n \in \mathbb{Z} \quad (5)$$

(b) Hence, or otherwise, solve, for  $0 \leq \theta < 180^\circ$ ,  $\Rightarrow 5^\circ \leq 2\theta + 5^\circ < 365^\circ$

$$\operatorname{cosec}(4\theta + 10^\circ) + \cot(4\theta + 10^\circ) = \sqrt{3} \quad (5)$$

You must show your working.

(Solutions based entirely on graphical or numerical methods are not acceptable.)

$$\operatorname{cosec}(4\theta + 10^\circ) + \cot(4\theta + 10^\circ) = \sqrt{3}$$

$$\therefore \text{let } 2x = 4\theta + 10^\circ \Rightarrow x = 2\theta + 5^\circ$$

$$\text{then } \cot(2\theta + 5^\circ) = \sqrt{3}$$

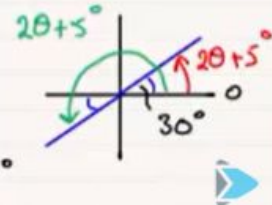
$$\therefore \tan(2\theta + 5^\circ) = \frac{1}{\sqrt{3}}$$

$$\therefore 2\theta + 5^\circ = \tan^{-1} \frac{1}{\sqrt{3}}$$

$$\therefore 2\theta + 5^\circ = 30^\circ, 210^\circ$$

$$\therefore 2\theta = 25^\circ, 205^\circ$$

$$\therefore \theta = 12.5^\circ, 102.5^\circ$$



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