12. (*a*) Prove that

$$\frac{\cos 3\theta}{3\sin\theta} + \frac{\sin 3\theta}{3\cos\theta} = \frac{2}{3}\cot 2\theta, \qquad \theta \neq (90n)°, \quad n \in \mathbb{Z}.$$

(4)

(*b*) Hence solve, for $0° < \theta < 180°$, the equation

$$\frac{\cos 3\theta}{3\sin\theta} + \frac{\sin 3\theta}{3\cos\theta} = 1$$

giving any solutions to one decimal place.

(3)

(Total for Question 12 is 7 marks)