

Question 12 (Total 7 marks)

| Part | Working or answer an examiner might expect to see | Mark | Notes |
|------|---|------|--|
| (a) | $\frac{\cos 3\theta}{3 \sin \theta} + \frac{\sin 3\theta}{3 \cos \theta} = \frac{\cos 3\theta \cos \theta + \sin 3\theta \sin \theta}{3 \sin \theta \cos \theta}$ | M1 | This mark is given for a method to form a single fraction |
| | $= \frac{\cos(3\theta - \theta)}{3 \sin \theta \cos \theta}$ | M1 | This mark is given for a method to use a compound angle formula on the numerator |
| | $= \frac{\cos 2\theta}{\frac{3}{2} \sin 2\theta}$ | M1 | This mark is given for a method to use a compound angle formula on the denominator |
| | $= \frac{2}{3} \cot 2\theta$ | A1 | This mark is given for a fully correct proof to show the answer required |
| (b) | $\frac{2}{3} \cot 2\theta = 1$ $\tan 2\theta = \frac{2}{3}$ | M1 | This mark is given for deducing that the value of $\tan 2\theta$ |
| | $\theta = \arctan \frac{2}{3}$ | M1 | This mark is given for finding an expression for a solution for θ |
| | $\theta = 16.8^\circ, 106.9^\circ$ | A1 | This mark is given for finding two correct values for θ |