| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| 15(a) | Recalls the identity for $\sin 2\theta = 2\sin\theta\cos\theta$ or an identity for $\cos 2\theta$ eg<br>$\cos 2\theta = 2\cos^2\theta - 1$<br>$\cos 2\theta = 1 - 2\sin^2\theta$<br>$\cos 2\theta = \cos^2\theta - \sin^2\theta$<br>This mark could be scored later if compound angle formula is used with a completely correct argument. | 1.2 | B1 | $\sin 2\theta\,\text{cosec}\,\theta + \cos 2\theta\sec\theta$<br>$= 2\sin\theta\cos\theta\,\text{cosec}\,\theta + \left(2\cos^2\theta - 1\right)\sec\theta$<br>$= 2\sin\theta\cos\theta\,\text{cosec}\,\theta + 2\cos^2\theta\sec\theta - \sec\theta$<br>$= 2\cos\theta + 2\cos\theta - \sec\theta$<br>$= 4\cos\theta - \sec\theta$ |
| | Substitutes $A\sin\theta\cos\theta$ and a correct identity for $\cos 2\theta$<br>OR<br>Substitutes $2\sin\theta\cos\theta$ and an identity for $\cos 2\theta$ with sign errors condoned provided $\cos 2\theta$ is not replaced with an expression equivalent to a constant. | 3.1a | M1 | |
| | Simplifies $B\sin\theta\,\text{cosec}\,\theta$ to $B$<br>*Or*<br>$D\cos^2\theta\sec\theta$ to $D\cos\theta$ | 1.1a | M1 | |
| | Completes reasoned argument to obtain $4\cos\theta - \sec\theta$ | 2.1 | R1 | |
| | **Subtotal** | | **4** | |

| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| 15(b)(i) | Explains that $\text{cosec}\,\theta$ is undefined when $\cos\theta = 1$<br>Or<br>explains $\cos\theta = 1$ would mean that $\sin\theta = 0$<br>or uses $\sin\theta \neq 0$ to show that $\cos\theta = 1$ should be rejected | 2.4 | E1 | $\cos\theta \neq 1$ as $\text{cosec}\,\theta$ is undefined |
| | **Subtotal** | | **1** | |

| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| 15(b)(ii) | Obtains 104.5, 255.5<br>CAO | 2.2a | B1 | $\therefore \theta = 104.5^\circ, 255.5^\circ$ |
| | **Subtotal** | | **1** | |

| | | | | |
|---|---|---|---|---|
| | **Question 15 Total** | | **6** | |