15 (a) Show that the expression

$$\sin 2\theta \operatorname{cosec} \theta + \cos 2\theta \sec \theta$$

can be written as

$$4 \cos \theta - \sec \theta$$

where $\sin \theta \neq 0$ and $\cos \theta \neq 0$ **[4 marks]**

15 (b) A student is attempting to solve the equation

$$\sin 2\theta \operatorname{cosec} \theta + \cos 2\theta \sec \theta = 3 \text{ for } 0° \leq \theta \leq 360°$$

They use the result from part **(a)**, and write the following **incorrect** solution:

$$\sin 2\theta \operatorname{cosec} \theta + \cos 2\theta \sec \theta = 3$$

Step 1 $4 \cos \theta - \sec \theta = 3$

Step 2 $4 \cos \theta - \dfrac{1}{\cos \theta} - 3 = 0$

Step 3 $4 \cos^2 \theta - 3 \cos \theta - 1 = 0$

Step 4 $\cos \theta = 1$ or $\cos \theta = -0.25$

Step 5 $\theta = 0°, 104.5°, 255.5°, 360°$

15 (b) (i) Explain why the student should reject one of their values for $\cos \theta$ in Step 4. **[1 mark]**

15 (b) (ii) State the correct solutions to the equation

$$\sin 2\theta \operatorname{cosec} \theta + \cos 2\theta \sec \theta = 3 \text{ for } 0° \leq \theta \leq 360°$$

[1 mark]