

5		(a)	<p>DR</p> $(\cot \theta + \operatorname{cosec} \theta)^2 = \left(\frac{\cos \theta}{\sin \theta} + \frac{1}{\sin \theta} \right)^2$ <p>or $\cot^2 \theta + 2 \cot \theta \operatorname{cosec} \theta + \operatorname{cosec}^2 \theta =$</p> $\frac{\cos^2 \theta}{\sin^2 \theta} + 2 \left(\frac{\cos \theta}{\sin \theta} \right) \left(\frac{1}{\sin \theta} \right) + \frac{1}{\sin^2 \theta}$ $= \left(\frac{1 + \cos \theta}{\sin \theta} \right)^2 = \frac{(1 + \cos \theta)^2}{\sin^2 \theta} = \frac{(1 + \cos \theta)^2}{1 - \cos^2 \theta}$ <p>or $\frac{1 + 2 \cos \theta + \cos^2 \theta}{\sin^2 \theta} = \frac{1 + 2 \cos \theta + \cos^2 \theta}{1 - \cos^2 \theta}$</p> $= \frac{(1 + \cos \theta)(1 + \cos \theta)}{(1 + \cos \theta)(1 - \cos \theta)} \text{ or } \frac{1 + 2 \cos \theta + \cos^2 \theta}{(1 - \cos \theta)(1 + \cos \theta)}$ $= \frac{1 + \cos \theta}{1 - \cos \theta}$	<p>M1*</p> <p>M1dep*</p> <p>M1dep*</p> <p>A1</p> <p>[4]</p>	<p>2.1</p> <p>2.1</p> <p>1.1</p> <p>2.2a</p>	<p>Replace both cot and cosec correctly in terms of cos and sin or expands brackets and replaces all terms with correct expressions in terms of sin and cos</p> <p>Combine terms and using $\sin^2 \theta = 1 - \cos^2 \theta$ correctly in denominator</p> <p>Re-writes $1 - \cos^2 \theta = (1 + \cos \theta)(1 - \cos \theta)$</p> <p>AG - correct proof - no notational or other errors such as missing θ's or inconsistent variables – must see $(1 + \cos \theta)(1 + \cos \theta)$ or $(1 + \cos \theta)^2$ in numerator before AG</p>	<p>Allow omission of 2 if brackets expanded but must contain a $\cot \theta \operatorname{cosec} \theta$ term</p> <p>Ignore terms in numerator for this mark</p> <p>Dependent on both previous M marks</p>
		ALT	$\frac{1 + \cos \theta}{1 - \cos \theta} = \frac{(1 + \cos \theta)(1 + \cos \theta)}{(1 - \cos \theta)(1 + \cos \theta)}$	M1*		Multiplying numerator and denominator by $(1 + \cos \theta)$	
			$\frac{(1 + \cos \theta)^2}{1 - \cos^2 \theta} = \frac{(1 + \cos \theta)^2}{\sin^2 \theta}$	M1dep*		Expanding and using $\sin^2 \theta = 1 - \cos^2 \theta$ correctly in denominator	Ignore numerator for this mark
			$\left(\frac{1 + \cos \theta}{\sin \theta} \right)^2 = \left(\frac{1}{\sin \theta} + \frac{\cos \theta}{\sin \theta} \right)^2$	M1dep*		Rewrite as a single squared term and split up into two terms	Dependent on both previous M marks
			$= (\cot \theta + \operatorname{cosec} \theta)^2$	A1 [4]		AG – allow candidates to ‘meet in the middle’ but for the A1 mark they must give a conclusion (e.g. ‘LHS = RHS’ or ‘proved’)	

