Question	Answer	Marks	AO	Guidance
8	**DR**			**For all methods:** Trig identities must be correct at the point of use
	$\sec^4\theta - \tan^4\theta = (\sec^2\theta - \tan^2\theta)(\sec^2\theta + \tan^2\theta)$	**M1**	**3.1a**	• Use of difference of 2 squares to factorise
	$\sec^2\theta + \tan^2\theta = 2$	**M1***	**1.1**	• Use of correct trig identity $\sec^2\theta - \tan^2\theta = 1$ to simplify
	Alternative method for first two marks $(1 + \tan^2\theta)^2 - \tan^4\theta = 2$ oe OR $\sec^4\theta - (\sec^2\theta - 1)^2 = 2$	**M1***		• Use of correct trig identity to get an equation in **one trig function** – need not be simplified
	$1 + 2\tan^2\theta + \tan^4\theta - \tan^4\theta = 2$ oe OR $\sec^4\theta - (\sec^4\theta - 2\sec^2\theta + 1) = 2$	**M1**		• Expansion of brackets in their equation
	$2\tan^2\theta = 1$	**M1dep***	**2.2a**	• Use of correct trig identity **and** simplification to an equation in $\tan^2\theta$ OR $\sec^2\theta$ only, all terms collected • OR $2\sec^2\theta = 3$
	$\tan\theta = \pm\frac{1}{\sqrt{2}}$	**M1dep**	**1.1**	• **Dep on previous M1** • Finds values of $\tan\theta$ or $\cos\theta$ • OR $\cos\theta = \pm\sqrt{\frac{2}{3}}$ • Condone omission of $\pm$

Question	Answer	Marks	AO	Guidance
	35.3°, 144.7°, 215.3°, 324.7° nfww	**A1**	**1.1**	• For one correct value - **must** be to 1 d.p.
		A1	**1.1**	• For all correct values with no extras in interval $0° \leq \theta \leq 360°$; ignore values outside interval. • Allow A1 A0 for angles given to greater accuracy or rounded to nearest degree provided **all 4 angles found** e.g. 35°, 145°, 215°, 325°
	Full alternative method 1 $\frac{1}{\cos^4\theta} - \frac{\sin^4\theta}{\cos^4\theta} = 2$ $1 - \sin^4\theta = 2\cos^4\theta$ $(1 - \sin^2\theta)(1 + \sin^2\theta) = 2\cos^4\theta$ $\rightarrow \cos^2\theta\,(2 - \cos^2\theta) = 2\cos^4\theta$ OR $1 - \sin^4\theta = 2(1 - \sin^2\theta)^2$ $3\cos^4\theta = 2\cos^2\theta$ oe OR $3\sin^4\theta - 4\sin^2\theta + 1 = 0$ oe	**M1** **M1*** **M1dep***		• Correctly rewrites using $\sin\theta$ and $\cos\theta$ • Clears fractions and uses correct trig identity $\sin^2\theta + \cos^2\theta = 1$ to get equation in **one trig function** • Need not be simplified • Simplifies to an equation with all terms collected • OR $3\cos^2\theta = 2$ • OR $3\sin^2\theta = 1$ from $(1 - \sin^2\theta)(1 + \sin^2\theta) = 2(1 - \sin^2\theta)^2$

Question	Answer	Marks	AO	Guidance
	$\cos\theta = \pm\sqrt{\frac{2}{3}}$ OR $\sin\theta = \pm\frac{1}{\sqrt{3}}$	M1dep		• **Dep on previous M1** • Finds values of $\cos\theta$ or $\sin\theta$ • Condone omission of $\pm$ • Condone additional solutions for this mark e.g. from $\cos\theta = 0$
	35.3°, 144.7°, 215.3°, 324.7° nfww	A1		• See guidance for main scheme
		A1		

Question	Answer	Marks	AO	Guidance
	Full alternative method 2 $\frac{1}{\cos^4\theta} - \frac{\sin^4\theta}{\cos^4\theta} = 2$ $1 - \sin^4\theta = 2\cos^4\theta$ $1 - \left(\frac{1-\cos 2\theta}{2}\right)^2 = 2\left(\frac{1+\cos 2\theta}{2}\right)^2$ $4 - (1 - 2\cos 2\theta + \cos^2 2\theta)$ $= 2(1 + 2\cos 2\theta + \cos^2 2\theta)$ $\rightarrow 3 + 2\cos 2\theta - \cos^2 2\theta$ $= 2 + 4\cos 2\theta + 2\cos^2 2\theta$ $\rightarrow 3\cos^2 2\theta + 2\cos 2\theta - 1 = 0$ $(3\cos 2\theta - 1)(\cos 2\theta + 1) = 0$ $\cos 2\theta = \frac{1}{3}$ 35.3°, 144.7°, 215.3°, 324.7° nfww	**M1** **M1*** **M1dep*** **M1dep** **A1** **A1**		• Correctly rewrites using $\sin\theta$ and $\cos\theta$ • Clears $\cos^4\theta$ from the fractions and uses the trig identities $\cos 2\theta = 1 - 2\sin^2\theta$ **and** $\cos 2\theta = 2\cos^2\theta - 1$ to get equation in terms of $\cos 2\theta$ only • Simplifies to an equation in $\cos 2\theta$ with all terms collected • **Dep on previous M1** • Finds value of $\cos 2\theta$ • Condone additional solutions for this mark i.e. from $\cos 2\theta + 1 = 0$ • See guidance for main scheme
		[6]		