

Question number	Scheme	Marks
8 (a)	$2x - 75 = -31, 211$ $x = 22, 143$	M1A1 A1 (3)
(b)	$2 \frac{\sin y^\circ}{\cos y^\circ} + 5 \sin y^\circ = 0$ $\sin y^\circ \left( \frac{2}{\cos y^\circ} + 5 \right) = 0$ $\cos y^\circ = -\frac{2}{5} \quad (\sin y^\circ = 0)$ $y = 113.6^\circ$ $y = 0^\circ, 180^\circ$	M1 M1 A1 B1 (4)
(c)	$3(1 - \sin^2 \theta) - 3\sin^2 \theta + \sin \theta + 12 = 0$ $6\sin^2 \theta - \sin \theta - 15 = 0$ $(2 \sin \theta + 3)(3 \sin \theta - 5) = 0$ $\sin \theta = -\frac{3}{2} \quad \sin \theta = \frac{5}{3}$ As $-1 \leq \sin \theta \leq 1$ no such values for $\theta$ exist	M1 M1 A1 B1 (4)
		<b>[11]</b>

Part	Mark	Additional Guidance
(a)	M1	For finding at least one correct value of $(2x - 75) = -31^\circ$ or $211^\circ$ and attempting to find one value of $x \Rightarrow x = \frac{-31+75}{2}$ or $x = \frac{211+75}{2}$
	A1	For $x = 22$ or $143$
	A1	For $x = 22$ and $143$ Extra values within range – A0 Extra values outside of the range - ignore
(b)	M1	For using the identity $\tan y^\circ = \frac{\sin y^\circ}{\cos y^\circ}$
	M1	For factorising their expression and finding values for $\sin y^\circ$ and $\cos y^\circ$ $\sin y^\circ \left( \frac{2}{\cos y^\circ} + 5 \right) = 0 \Rightarrow \sin y^\circ = 0, \cos y^\circ = -\frac{2}{5} \Rightarrow y = \dots$
	A1	For $y = 113.6$ if there are extra values within range – A0
	B1	For both $y = 0$ and $180$ <b>Both required</b>
	<b>ALT</b>	
	M1	For multiplying $\sin y \times \frac{\cos y}{\cos y} \Rightarrow \tan y \cos y \Rightarrow (2 \tan y + 5 \tan y \cos y = 0)$
	M1	For factorising the above expression and finding values for $\tan y^\circ$ and $\cos y^\circ$ $2 \tan y + 5 \tan y \cos y = 0 \Rightarrow \tan y (2 + 5 \cos y) = 0$ $\Rightarrow \tan y = 0, \cos y = -\frac{2}{5} \Rightarrow y = \dots$
	A1	For $y = 113.6$ Extra values within range – A0 Extra values outside of the range - ignore
	B1	For both $y = 0$ and $180$ <b>Both required</b>
	SC	$2 \frac{\sin y}{\cos y} = -5 \sin y \Rightarrow \cos y = -\frac{2}{5} \Rightarrow y = 113.6$ no evidence of factorising – award M1M0A1B0 only ( unless there is later recovery)
(c)	M1	For using the identity $\cos^2 \theta + \sin^2 \theta = 1 \Rightarrow 3(1 - \sin^2 \theta) - 3 \sin^2 \theta + \sin \theta + 12 = 0$ to form a 3TQ in terms of $\sin \theta$ Minimally acceptable attempt is $6 \sin^2 \theta \pm \sin \theta \pm 15 = 0$
	M1	For an attempt to solve their 3TQ (see general guidance for the definition of an attempt) $6 \sin^2 \theta - \sin \theta - 15 = 0 \Rightarrow (2 \sin \theta + 3)(3 \sin \theta - 5) = 0 \Rightarrow \sin \theta = \dots, \dots$
	A1	$\sin \theta = -\frac{3}{2}, \frac{5}{3}$
	B1	For the conclusion; $ \sin \theta  > 1$ therefore no values exist for $\sin \theta$ Do not accept ‘undefined’ without an explanation that $ \sin \theta  > 1$
<b>Penalise rounding only once in this question</b>		