

1	$\pm\sqrt{13}/4$	3	B2 for (-) $\sqrt{13}/4$ or $\pm\sqrt{\frac{13}{16}}$ or M1 for $\sqrt{13}$ or $\sin^2\theta + \cos^2\theta = 1$ used	3
----------	------------------	---	--	---

2	(i)	$\left(\frac{\sin\theta}{\cos\theta}\right) = 1 \text{ oe}$ $\frac{\sin\theta}{\cos\theta}$ <p>$\sin\theta = \cos^2\theta$ and completion to given result</p>	M1 A1 [2]	www	
2	(ii)	$\sin^2\theta + \sin\theta - 1 [= 0]$ <p>$[\sin\theta =] \frac{-1 \pm \sqrt{5}}{2}$ oe may be implied by correct answers</p> <p>$[\theta =] 38.17\dots, \text{or } 38.2 \text{ and } 141.83\dots, 141.8 \text{ or } 142$</p>	M1 A1 A1 [3]	<p>allow 1 on RHS if attempt to complete square</p> <p>may be implied by correct answers</p> <p>ignore extra values outside range, A0 if extra values in range or in radians</p> <p>NB 0.6662 and 2.4754 if working in radian mode earns M1A1A0</p>	<p>condone $y^2 + y - 1 = 0$</p> <p>mark to benefit of candidate</p> <p>ignore any work with negative root & condone omission of negative root with no comment eg M1 for 0.618...</p> <p>if unsupported, B1 for one of these, B2 for both. If both values correct with extra values in range, then B1.</p> <p>NB 0.6662 and 2.4754 to 3sf or more</p>

3		$4(1 - \sin^2 \theta) = 1 + \sin \theta$ at least one interim step to $4\sin^2 \theta + \sin \theta - 3 = 0$ $[\theta =] 270^\circ, 48.59\dots^\circ, 131.4\dots^\circ$	M1 A1 B1B1B1 [5]	to nearest degree or better	ignore extra values outside range; if B3 awarded, minus 1 if extra values in range.
---	--	---	--	-----------------------------	---

4	substitution of $\sin^2 \theta = 1 - \cos^2 \theta$ $-5\cos^2 \theta = \cos \theta$ $\theta = 90$ and 270 , 102 258 101 and 259	M1 soi A1 or better A1 A1 accept 101.5(...) and 258.(46...) A1 rounded to 3 or more sf; if M0 , allow B1 for both of 90 and 270 and B1 for 102 and B1 for 258 (to 3 or more sf) SC 1	if the 4 correct values are presented, ignore any extra values which are outside the required range, but apply a penalty of minus 1 for extra values in the range if given in radians deduct 1 mark from total awarded (1.57, 1.77, 4.51, 4.71)
---	--	---	--

5	<p>rt angled triangle with $\sqrt{2}$ on one side and 3 on hyp</p> <p>Pythag. used to obtain remaining side = $\sqrt{7}$</p> <p>$\tan \theta = \frac{opp}{adj} = \frac{\sqrt{2}}{\sqrt{7}}$ o.e.</p>	<p>1</p> <p>1</p> <p>1</p>	<p>or M1 for $\cos^2 \theta = 1 - \sin^2 \theta$ used</p> <p>A1 for $\cos \theta = \frac{\sqrt{7}}{\sqrt{9}}$</p> <p>A1 for $\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\sqrt{2}}{\sqrt{7}}$ o.e.</p>	3
---	---	----------------------------	---	---

6	105 and 165	3	B1 for one of these or M1 for $2x = 210$ or 330	3
---	-------------	---	---	---

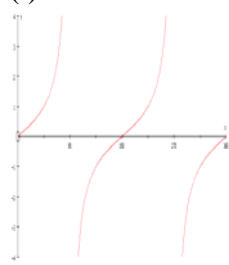
7	<p>right angled triangle with 1 and 2 on correct sides</p> <p>Pythagoras used to obtain hyp = $\sqrt{5}$</p> <p>$\cos \theta = \frac{a}{h} = \frac{2}{\sqrt{5}}$</p>	<p>M1</p> <p>M1</p> <p>A1</p>	<p>or M1 for $\sin \theta = \frac{1}{2} \cos \theta$ and M1 for substituting in $\sin^2 \theta + \cos^2 \theta = 1$</p> <p>E1 for sufficient working</p>	3
---	--	-------------------------------	--	---

8	$\sqrt{8}$ or $2\sqrt{2}$ not $\pm\sqrt{8}$	3	<p>M1 for use of $\sin^2 \theta + (1/3)^2 = 1$ and M1 for $\sin \theta = \sqrt{8}/3$ (ignore \pm)</p> <p>Diag.: hypot = 3, one side = 1 M1</p> <p>3rd side $\sqrt{8}$ M1</p>	3
---	---	---	--	---

9	<p>triangle divided into 2 rt angled tris</p> <p>$\sqrt{3}$ and 1 indicated</p> <p>60 indicated</p>	<p>H1</p> <p>S1</p> <p>A1</p>		3
---	--	-------------------------------	--	---

10	(i) sketch of correct sh correct period and amplitude	G1 G1	Not ruled lines need 1 and -1 indicated; nos. on horiz axis not needed if one period shown	5
	period halved for $y = \cos 2x$; amplitude unchanged	G1		
	(ii) 30, 150, 210,	B2	B1 for 2 of these, ignore extras outside range.	

11	(i) 66° or 66.4 or 66.5.... 293.58 to 3 or more sf cao	B1 B1	Allow 1.16 or 73.8 Lost for extras in range. Ignore extras outside the range	5
	(ii) stretch (one way) parallel to the x -axis sf 0.5	1 1 1	Horizontal, from y axis, in x axis, oe	

12	(i)	2	no numbers required on axes unless more branches shown. G1 for a correct first sweep	5
	 <p style="text-align: center;">$\tan x = \frac{3}{4}$</p>	M1		
	(ii) 36.8 6.9 and 216.8 to 216.9	A1A1	Allow 37, 217	