Question Number	Scheme	Marks
4. (a)	Area $ABCD$ is 40 cm^2 $\Rightarrow 40 = 6\times10\times\sin\theta$ oe	M1
	$\sin\theta = \frac{2}{3} \Rightarrow \theta = 180° - 41.8°$	M1
	$\angle DAB =$ awrt 138.19°	A1
		(3)
(b)	Attempts $DB^2 = 10^2 + 6^2 - 2\times10\times6\cos"138.19°"$	M1
	$DB =$ awrt 15.0 (cm)	A1
		(2)
		(5 marks)

Question Number	Scheme	Marks
9(a)	$(A=)-3$	B1
		(1)
(b)	$y = 3$	B1
	eg $x = 30+5\times180$ or $x = 210+720$ or $x = 180+2\times360+30$	M1
	$x = 930$	A1
		(3)
		Total 4

Question Number	Scheme	Marks
10ai	$(n=)$ 3	B1
ii	1080	B1
		(2)
b	(1620, −3)	B1B1
		(2)
c	e.g. $k = \frac{1}{2}\left(\frac{12}{5} - \frac{3}{5}\right) = \frac{9}{10}$	M1A1
		(2)
		(6 marks)

Question Number	Scheme	Marks
5 (a)	Attempts the sine rule $\frac{\sin\alpha}{14}=\frac{\sin 0.43}{6}$	M1
	$\Rightarrow \alpha = 1.337$ (radians) Accept awrt 1.33/1.34 or awrt 76.6/76.7 ($^\circ$)	A1
	angle $AOD = \pi - 1.337 =$ awrt 1.805 (radians)	A1
		(3)
(b)	Attempts $s = r\theta$ with $r = 6$ and an allowable θ	M1
	Arc length $ABC =$ awrt 26.9 m	A1
		(2)
(c)	Attempts $\frac{1}{2}r^2\theta$ with $r = 6$ and an allowable θ in radians (= 80.6)	M1
	Attempts area $AOD = \frac{1}{2}\times 6\times 14\times\sin("0.91")$ oe (= 33.1)	M1
	Attempts sector + triangle with correct attempt at angles	dM1
	= 113.7 (m^2)	A1
		(4)
		(9 marks)

Question	Answer	Marks	Guidance
9(a)	$6\sin 0.9 = \frac{AC}{2}$ or $AC^2 = 6^2 + 6^2 - 2\times 6\times 6\cos 1.8$	**M1**	OE Correct working in degrees is acceptable throughout.
	$AC = 9.40$	**A1**	SOI Accept 9.39 – 9.41, may be used but not seen for A1.
	Angle $CAB = ½(\pi - 1.8)$	**M1**	SOI Expect 0.6708 (or 0.671).
	Arc $CD =$ *their* 9.40 × *their* 0.6708	**M1**	Expect 6.306 (or 6.31), do not accept 6 for *their AC* or 1.8 for *CAB*.
	[Perimeter = 6 + 3.40 + 6.306 =] 15.7	**A1**	Accept 15.69 – 15.72.
		5	

Question	Scheme	Marks
2(a)	$AB = 21\,\text{cm}, BC = 13\,\text{cm}, \angle BAC = 25°, \angle ACB = x°$	
	$\frac{\sin x°}{21} = \frac{\sin 25°}{13}$ o.e	**M1**
	$\sin x° = 0.6827$ (awrt)	**A1**
		(2)
(b)	$\sin^{-1}(0.6827) = ...(43.05°)$	**M1**
	($AC < AB$ so $\angle ABC < \angle ACB$ so) required angle is $180° - \sin^{-1}(0.6827) = ...$	**M1**
	So $x =$ awrt 136.95	**A1**
		(3)
		(5 marks)
Notes:		
Condone the omission of the ° symbol. Mark (a) and (b) as one		

Question Number	Scheme	Marks
6. (a)	$(540°, -5)$	B1, B1 **(2)**
(b) (i)	$(360°, 3)$	B1, B1 **(2)**
(ii)	$(180°, 5)$	B1, B1 **(2)**
		(6 marks)

Question Number	Scheme	Marks
3(a)	$(f(x) =) -3\cos x$ or $(f(x) =) 3\sin(x - 90°)$	M1 A1
		(2)
(b)(i)	8	B1
(ii)	5	B1
		(2)
		(4 marks)

Question Number	Scheme	Marks
9(a)	π	B1
		(1)
(b)(i)	3	B1
		(1)
(ii)	5	B1
		(1)
(iii)	201	B1
		(1)
		(4 marks)

Question Number	Scheme	Marks
9. (a)	(i) 3 (ii) 101 (iii) 2	B1 B1 B1 **(3)**
(b)	$a = \frac{2\pi}{3}$ o.e.	B1 **(1)**
(c)	Attempts x coordinate of Q: $x = "\frac{2\pi}{3}" + \pi = \frac{5\pi}{3}$	M1
	Attempts both y coordinates $P\left(\frac{2\pi}{3}, \frac{\pi}{3}\right)$ $Q\left(\frac{5\pi}{3}, -\frac{2\pi}{3}\right)$	dM1
	Attempts mid-point $PQ = \left(\frac{1}{2}\left(\frac{2\pi}{3} + \frac{5\pi}{3}\right), \frac{1}{2}\left(\frac{\pi}{3} - \frac{2\pi}{3}\right)\right)$	ddM1
	$= \left(\frac{7\pi}{6}, -\frac{\pi}{6}\right)$	A1 **(4)** **(8 marks)**

Question Number	Scheme	Marks
3(a)	$\left(2\sqrt{2}\right)^2 = p^2+q^2-2pq\cos 60°$ oe $p^2+q^2-pq=8$ *	M1 A1*
		(2)
(b)	$q=p+2 \Rightarrow 8=p^2+("p+2")^2-p("p+2")$	M1
	$p^2+2p-4=0$ or $q^2-2q-4=0$	A1
	$p=\frac{-2\pm\sqrt{2^2-4\times1\times(-4)}}{2}$ or $q=\frac{2\pm\sqrt{(-2)^2-4\times1\times(-4)}}{2}$	M1
	$p=-1+\sqrt{5}$ or $q=1+\sqrt{5}$	B1 (A1 on EPEN)
	$p=-1+\sqrt{5}$ and $q=1+\sqrt{5}$ only	A1cso
		(5)
(c)	$\text{Area}=\frac{1}{2}\times("-1+\sqrt{5}")("1+\sqrt{5}")\times\sin 60°$	M1
	$\text{Area}=\sqrt{3}$ (m^2)	A1
		(2)
Alt(a)	Forming a line BX which is perpendicular to AC where X is on the line AC. $AX=p\cos 60=\frac{p}{2}$ $BX=\sqrt{p^2-\left(\frac{p}{2}\right)^2}=\frac{\sqrt{3}}{2}p$ or $BX=p\sin 60$ $\left(\frac{\sqrt{3}}{2}p\right)^2+\left(q-\frac{p}{2}\right)^2=\left(2\sqrt{2}\right)^2$ or $(p\sin 60)^2+\left(q-\frac{p}{2}\right)^2=\left(2\sqrt{2}\right)^2$	M1
	$\frac{3p^2}{4}+q^2-pq+\frac{p^2}{4}=8$ $p^2+q^2-pq=8$ *	A1*
		(9 marks)

Question	Scheme	Marks
3(a)	$\frac{1}{2}\times 3^2\times\alpha = 7.2 \Rightarrow \alpha = \ldots$ or $\frac{1}{2}\times 3^2\times 1.6 = 7.2 \Rightarrow \alpha = 1.6$ $\alpha = 1.6$*	M1 A1*
		(2)
(b)(i)	Angle $COA = \frac{1}{2}(2\pi - 1.6)(= 2.34\ldots)$ $(\approx 134°)$	M1
	Area $COA = \frac{1}{2}\times 5\times 3\sin("2.34")$ $(= 5.38\ldots)$	M1
	Total Area $= 2\times\frac{1}{2}\times 5\times 3\sin("2.34") + 7.2$	dM1
	$= 18$ (cm^2) Awrt 18 (cm^2) (Ans = 17.96)	A1
(ii)	Arc $AB = 3\times 1.6 (= 4.8)$	B1
	$(AC^2 =)\ 5^2 + 3^2 - 2\times 5\times 3\cos("2.34")$	M1
	Total perimeter $= 2\times\sqrt{5^2 + 3^2 - 2\times 5\times 3\cos("2.34")} + 3\times 1.6$	dM1
	$=$ Awrt 19.6 (cm)	A1
		(8)
Alt (b)(i)	$AB = 2\times 3\sin 0.8$	M1
	$ON = 3\cos 0.8$	M1
	Total Area $= \frac{1}{2}(5 + ON)\times AB + 7.2 - \frac{1}{2}\times 3\cos 0.8\times 2\times 3\sin 0.8$	dM1
	$= 18$ (cm^2) Awrt 18 (cm^2) (Ans = 17.96)	A1
		(10 marks)

Question Number	Scheme	Marks
7.(a)	Attempts $\frac{\sin\angle ACB}{6.5}=\frac{\sin 35}{4.7}$	M1
	$\angle ACB=$ awrt(52 or 53)° or awrt(127or128)°	A1
	$\angle ACB=127.5°$	A1
(b)	Eg $\frac{(AC)}{\sin"17.5°"}=\frac{6.5}{\sin"127.5°"}$ or $=\frac{4.7}{\sin 35°}$	M1
	$\left[\frac{(CD)}{\sin"75°"}=\frac{4.7}{\sin"127.5°"}\Rightarrow(CD)=...\Rightarrow(AC)+(CD)\right]$=awrt 8.2	A1
	Total length of wood $=8.1+6.5+4.7+4.7=$ awrt24.1	A1
		(3) **(6 marks)**
Alt1(a)	$\cos 35=\frac{AC^2+6.5^2-4.7^2}{2\times 6.5\times AC}\Rightarrow AC^2-13\cos(35)AC+20.16=0\Rightarrow AC=...$	
	$\cos\angle ACB=\frac{"AC"^2+4.7^2-6.5^2}{2\times"AC"\times 4.7}$ oe	M1