Question Number	Scheme	Marks
7.(a)	Attempts to use $\frac{1}{2}r^2\theta$ with $r=6$ and any allowable angle θ	M1
	Full method to find area $\frac{1}{2}\times6^2\times(2\pi-0.7)$ or $\pi\times6^2-\frac{1}{2}\times6^2\times0.7$	M1
	$=100.5\,\text{cm}^2$ (awrt)	A1
		(3)
(b)	Attempts $\frac{\sin\angle ADO}{6}=\frac{\sin 0.7}{5}\Rightarrow \sin\angle ADO=0.77...$	M1 A1
	$\angle ADO=2.258$ (awrt)	A1
		(3)
(c)	Attempts arc length $ABC=6\times(2\pi-0.7)$ 33.50	M1
	Attempts length OD $\frac{\sin(\pi-0.7-"2.258")}{OD}=\frac{\sin 0.7}{5}\Rightarrow OD=...$ 1.42	M1
	Full method to find perimeter = "33.50"+5+ 6−"1.42"	ddM1
	= 43.1 cm	A1
		(4)
		(10 marks)
Alt (c)	Alternative for arc length $ABC=12\pi-6\times0.7$	M1
	Alternative for finding OD using the cosine rule $OD^2=6^2+5^2-2\times6\times5\cos(\pi-0.7-"2.258")\Rightarrow OD$	M1
	Solutions where candidate changes to degrees	
	Look for angle AOD = awrt $40°$ to score M marks	
7.(a)	Attempts to use $\frac{\theta}{360}\pi r^2$ with $r=6$ and angle $\theta=$ awrt 40 or 320	M1
	Full method to find area $\frac{(360-\text{awrt }40)}{360}\times\pi6^2$ or $\pi\times6^2-\frac{\text{awrt }40}{360}\times\pi6^2$	M1
	$=100.5\,\text{cm}^2$ (awrt)	A1
		(3)
(b)	Attempts $\frac{\sin\angle ADO}{6}=\frac{\sin 40°}{5}\Rightarrow \sin\angle ADO=0.77...$	M1 A1
	$\angle ADO=129.4°$ (awrt)	A1
		(3)
(c)	Attempts arc length $ABC=\frac{(360-40)}{360}\times2\pi6$ 33.50	M1
	Attempts length OD $\frac{\sin(180-40-"129.4")}{OD}=\frac{\sin 40}{5}\Rightarrow OD=...$ 1.42	M1
	Full method to find perimeter = "33.50"+5+ 6−"1.42"	ddM1
	= 43.1 cm	A1
		(4)
		(10 marks)

Notes

(a)

M1 Attempts to use $\frac{1}{2}r^2\theta$ with $r=6$ and any angle allowable angle θ

Allowable angles are; 0.7 $\pi-0.7=$ allow awrt 2.4 $2\pi-0.7=$ allow awrt 5.6

M1 A correct attempt to find the area of sector *ABCOA*. See scheme Accept awrt 100 or 101 for this mark

A1 awrt $100.5(\text{cm}^2)$ The units are not required

(b)

M1 Attempts the sine rule with the lengths and angles in the correct positions $\frac{\sin\angle ADO}{6}=\frac{\sin 0.7}{5}$

A1 Correct value for $\sin\angle ADO=0.77...$. Be careful here! $\angle ADO=0.77...$ is A0
May be implied by either a correct answer or awrt 0.88

A1 awrt $\angle ADO=2.258$ or 129.4°

(c)

M1 A correct method to find arc length *ABC* May be implied by sight of $6\times$ awrt 5.6 or awrt 33.5 or 33.6

M1 A correct method to find length *OD* using either the sine rule or cosine rule. The angle *OAD* must be attempted using a correct method $(\pi-0.7-"2.258")$.

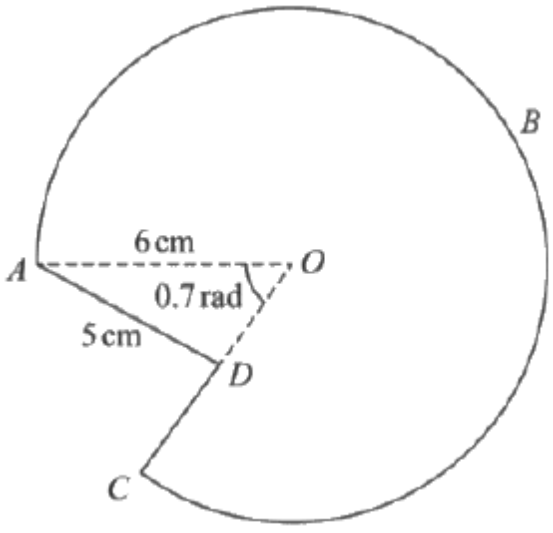
Eg. For the sine rule $\frac{OD}{\sin(\pi-0.7-"2.258")}=\frac{5}{\sin 0.7}=\frac{6}{\sin"2.258"}\Rightarrow OD=...$

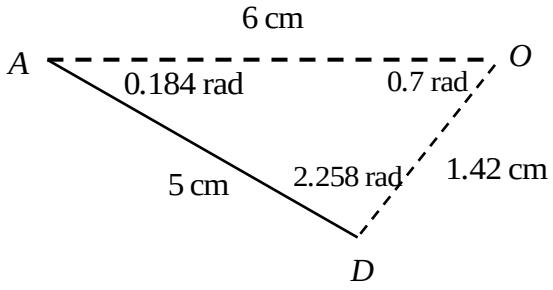
For cosine rule it could be $5^2=6^2+x^2-2\times6\times x\times\cos(0.7)\Rightarrow$ 3TQ in *x* which must be solved by correct methods

ddM1 Both previous M's must have been scored. It is for a correct method to find the perimeter of the shape.
Look for " 33.5'' +5 + 6 – ''1.42''. It is implied by awrt 43

A1 cso and cao 43.1 cm. Units are not required

Handy Diagrams





Question Number	Scheme	Marks
8.(a)	Substitutes $x=4$ in $f'(4)=4\times2-2-\dfrac{8}{3\times4^{2}}=\left(\dfrac{35}{6}\right)$	M1
	Attempts to find the gradient of the perpendicular = $-\dfrac{6}{35}$	dM1
	Attempts the normal $y-1=-\dfrac{6}{35}\times(x-4)\Rightarrow 6x+35y-59=0$	M1A1
		(4)
(b)	$f'(x)=4x^{\frac{1}{2}}-2-\dfrac{8}{3x^{2}}\Rightarrow f(x)=\dfrac{8}{3}x^{\frac{3}{2}}-2x+\dfrac{8}{3x}(+c)$	M1 A1 A1
	$x=4, f(x)=1\Rightarrow\ 1=\dfrac{8}{3}\times8-8+\dfrac{2}{3}+c\Rightarrow c=...(-13)$	dM1
	$f(x)=\dfrac{8}{3}x^{\frac{3}{2}}-2x+\dfrac{8}{3x}-13$	A1
		(5) **(9 marks)**

Notes

Points for marking:

- If all a candidate does is integrate, then mark as though they are attempting (b) even though their solution may have part (a) marked in the margin
- If a candidate differentiates $f'(x)$ in (a) and integrates $f''(x)$ in (b) getting back to the same or similar expression it is 0 marks in (b)
- See Practice items. Read annotations carefully to understand how to apply these principles.
- If in any doubt ask your TL for advice

(a)

M1 Attempts $f'(4)=4\times2-2-\dfrac{8}{3\times4^{2}}$.

If you do not see embedded values

1) award if the candidate has two of the three terms correct. Eg two of $8-2-"0.166"$

2) award for sight of $\dfrac{35}{6}$ or awrt 5.83 if the candidate just offers a value

dM1 Attempts perpendicular gradient using the correct rule. The M1 must have been awarded

M1 Attempts to find the equation of the normal using $(4,1)$ and a **changed** gradient.

If the candidate differentiates $f'(x)$ they can be awarded this mark

Condone one sign slip when using the $(4,1)$

A1 $6x+35y-59=0$

Accept any $\pm k(6x+35y-59)=0$ where $k\in\mathbb{N}$