A1*: Correct proof with an intermediate line such as $\sin PCQ = \dfrac{0.5\sin 0.8}{1.534}$ or $\sin PCQ = 0.233....$

If awarding for the value of $\sin PCQ$ then allow $\sin PCQ =$ awrt 0.23

There should be no incorrect statements in the proof e.g. $PCQ = \dfrac{0.5\sin 0.8}{1.534} = 0.236$

and no obvious incorrect work. E.g. although using CQ as 1.53 gives PCQ = 0.237 to 3 dp we will condone PCQ given as 0.236 if no incorrect work is seen as we assume greater accuracy for CQ has been used. If CQ is used to even less accuracy in their working e.g. 1.5 score M1A0 for otherwise correct work.

Must be 0.236 and not e.g. 0.2360

Alternative:

M1: A correct cosine rule statement following through on their CQ which may appear as $\cos PCQ = \dfrac{1.534^2 + 1.84^2 - 0.5^2}{2\times 1.534\times 1.84}$ and would also count as the intermediate step below.

A1*: Correct proof with an intermediate line such as $\cos PCQ = \dfrac{1.534^2 + 1.84^2 - 0.5^2}{2\times 1.534\times 1.84}$ or $\cos PCQ = 0.972....$

If awarding for the value of $\sin PCQ$ then allow $\cos PCQ =$ awrt 0.97

There should be no incorrect statements in the proof.

If they work in degrees and reach e.g. $PCQ = 13.5°$ it is acceptable to then state " = 0.236"

Must be 0.236 and not e.g. 0.2360

(c)

M1: Correct method for the area of major sector CQR **or** correct method for area of triangle PQC

May be seen embedded in a calculation. Condone the use of 1.8 for 1.84 as long as the intention is clear.

dM1: Fully correct method for the total area. E.g. finds area of major sector CQR and area triangle PQC and adds **or** finds (area of circle – minor sector CQR + area triangle PQC) or (area of circle + (area triangle PQC - minor sector CQR))

A1: (awrt) 7.4 (m^2)

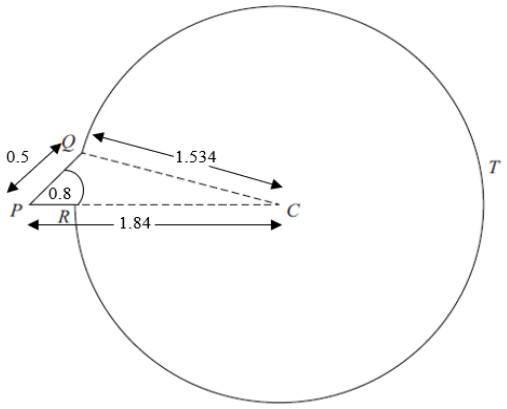
Beware: The area of just the circle is 7.39… i.e. awrt 7.4 but on its own scores no marks. There are also other incorrect methods that give awrt 7.4 so you need to check their working carefully!

(d)

M1: Attempts $r\theta = "1.534"\times\left(2\pi - 0.236\right)$ or e.g. $2\pi\times"1.534" - "1.534"\times 0.236$

A1: awrt 10.1 (m)

For reference:



Major sector area 7.114…

Minor sector area 0.277…

Triangle area 0.3299…

Angle PQC = awrt 2.11

Question Number	Scheme	Marks
10(a)	$m = \frac{4}{5}$	B1
	$y+3=\frac{4}{5}(x-4)$ or $-3=\frac{4}{5}\times 4+c \Rightarrow c=...$	M1
	$y=\frac{4}{5}x-\frac{31}{5}$	A1
		(3)
(b)	$f'(4)=\frac{4}{5} \Rightarrow \frac{k\sqrt{4}(4-3)}{5}=\frac{4}{5} \Rightarrow k=...$	M1
	$k=2$	A1
		(2)
(c)	$(f'(x)=)\frac{2\sqrt{x}(x-3)}{5}=\frac{2x^{\frac{3}{2}}}{5}-\frac{6x^{\frac{1}{2}}}{5}$	M1
	$(f(x)=)\frac{4x^{\frac{5}{2}}}{25}-\frac{4x^{\frac{3}{2}}}{5}(+c)$	M1 A1ft
	$x=4, y=-3 \Rightarrow -3=\frac{4(4)^{\frac{5}{2}}}{25}-\frac{4(4)^{\frac{3}{2}}}{5}+c \Rightarrow c=\left(-\frac{43}{25}\right)$	ddM1
	$(f(x)=)\frac{4x^{\frac{5}{2}}}{25}-\frac{4x^{\frac{3}{2}}}{5}-\frac{43}{25}$	A1
		(5)
		(10 marks)

Notes

Mark (a), (b) and (c) together

(a)

B1: States or implies that gradient of tangent (to the curve at *P*) is $\frac{4}{5}$

M1: Uses their **changed** gradient (i.e. not $-\frac{5}{4}$) with $x = 4$ and $y = -3$ where the -3 is their attempt at finding y from $y=-\frac{5}{4}x+2 \ =-\frac{5}{4}\times 4+2$ to form the equation of tangent.

E.g. $y+3=\frac{4}{5}(x-4)$ or $y=\frac{4}{5}x+c \Rightarrow -3=\frac{4}{5}\times 4+c \Rightarrow c=...$

Note that some candidates are assuming *P* lies on the *x*-axis and use (4, 0) and this scores M0

A1: $y=\frac{4}{5}x-\frac{31}{5}$ or exact equivalent in this form e.g. $y=0.8x-6.2$ but not $y=\frac{(4x-31)}{5}$ unless the correct form was seen previously then apply isw.

(b)