(b)	Attempts $\frac{1}{2}\times 8.83^2\times(2\pi-1.65)=(180.__)$	M1
	Total area = $\frac{1}{2}\times 8.83^2\times(2\pi-1.65)+30=...$	dM1
	awrt 210 (m^2) or 211 (m^2)	A1
		(3)
(c)	"6.03"$\times 1.65=(9.95)$ **or** $8.83\times(2\pi-1.65)=(40.91)$	M1
	Full method for perimeter = "6.03"$\times 1.65+8.83\times(2\pi-1.65)+2.8\times 2$	dM1
	= awrt 56 (m)	A1
		(3)
		(9 marks)

Notes

Allow equivalent correct work in degrees.

(b)

M1: Attempts $\frac{1}{2}\times 8.83^2\times(2\pi-1.65)$ or equivalent e.g. $\pi\times 8.83^2-\frac{1}{2}\times 8.83^2\times 1.65$

May be implied by awrt 180 or awrt 181 provided no incorrect working is seen.

dM1: Attempts $\frac{1}{2}\times 8.83^2\times(2\pi-1.65)+30=...$

Adds 30 to a correct attempt at the area of the major sector of the larger circle.

A1: awrt 210 (m^2) or awrt 211 (m^2)

No requirement for units but if any are given they must be correct.

Correct answer only scores no marks.

(c)

M1: Attempts "6.03"$\times 1.65$ which may be implied by awrt 9.95 or 3sf accuracy for their 6.03 provided no incorrect working is seen.

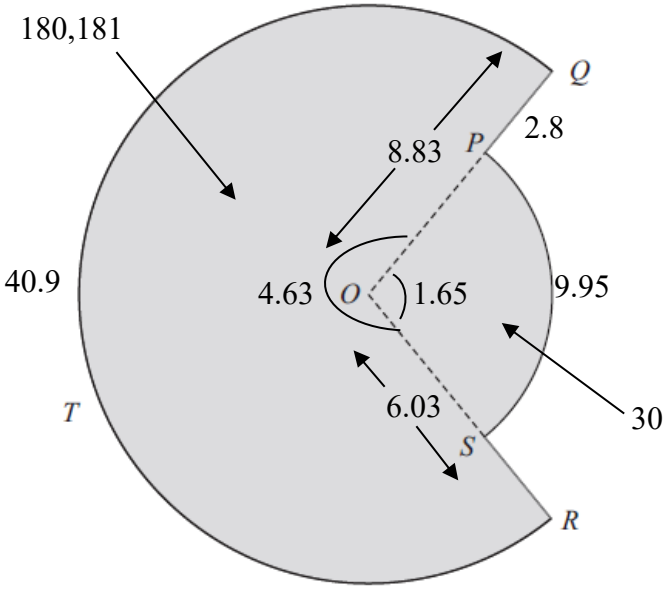
OR

Attempts $8.83\times(2\pi-1.65)$ which may be implied by awrt 40.9 provided no incorrect working is seen.

dM1: Full method for perimeter = "6.03"$\times 1.65+8.83\times(2\pi-1.65)+2.8\times 2$

A1: awrt 56 (m) . No requirement for units but if any are given they must be correct.

Correct answer only scores no marks.



Question Number	Scheme	Marks
8(a)	$f'\left(\sqrt{2}\right)=5 \Rightarrow\ 2\sqrt{2}+\frac{8}{2}+k=5 \Rightarrow k=...$	M1
	$1-2\sqrt{2}$	A1
		(2)
(b)	$x=\sqrt{2} \Rightarrow y=5\sqrt{2}-3\sqrt{2}\left(=2\sqrt{2}\right)$ So $y-"2\sqrt{2}"=-\frac{1}{5}\left(x-\sqrt{2}\right)$ **or** $y=-\frac{1}{5}x+c \Rightarrow "2\sqrt{2}"=-\frac{1}{5}\sqrt{2}+c \Rightarrow c=...$ $\Rightarrow y=-\frac{1}{5}x+\frac{11\sqrt{2}}{5}$	M1A1
		(2)

Notes

Mark all parts together.

(a)

M1: Substitutes $x=\sqrt{2}$ into $f'(x)$, sets = 5 and solves for *k*.

Condone slips in evaluating $f'\left(\sqrt{2}\right)$ as long as the intention is clear.

A1: Correct exact value $k=1-2\sqrt{2}$ oe e.g. $1-\sqrt{8}$

(b)

M1: Correct attempt at the equation of the normal using a gradient of $-\frac{1}{5}$, $x=\sqrt{2}$ and y from substituting $x=\sqrt{2}$ into $y=5x-3\sqrt{2}$

If they use $y = mx + c$ then they must reach as far as $c = \ldots$

A1: Correct equation in any form e.g. $y-2\sqrt{2}=-\frac{1}{5}\left(x-\sqrt{2}\right)$ or $5y+x=11\sqrt{2}$ or $y=-\frac{1}{5}x+\frac{11\sqrt{2}}{5}$

Apply isw as soon as a correct equation is seen.

(c)	$f'(x) = 2x + \frac{8}{x^2} + k \Rightarrow \quad \left(f(x) =\right) x^2 - \frac{8}{x} + kx \left(+c\right)$	M1A1ft
	$\left(\sqrt{2}, 2\sqrt{2}\right) \Rightarrow 2\sqrt{2} = 2 - \frac{8}{\sqrt{2}} + \left(1 - 2\sqrt{2}\right)\sqrt{2} + c \Rightarrow c = ...\left(2 + 5\sqrt{2}\right)$	dM1
	$\left(f(x) =\right) x^2 - \frac{8}{x} + \left(1 - 2\sqrt{2}\right)x + 2 + 5\sqrt{2}$	A1
		(4)
		(8 marks)

Notes

Mark all parts together.

(c)

M1: Integrates with two terms having a correct index. Allow indices unprocessed.

It is for 2 from: $2x \rightarrow ...x^2 \left(\text{or } x^{1+1}\right)$, $\frac{8}{x^2} \rightarrow \frac{...}{x} \left(\text{or } ...x^{-1} \text{ or } ...x^{-2+1}\right)$, $k \rightarrow ...x \left(\text{or } ...x^{0+1}\right)$

A1ft: Correct integration in any form with indices processed.

$\left(f(x)\right) = x^2 - \frac{8}{x} + kx \left(+c\right)$ but follow through on their k which may be a decimal and allow the letter k. $"f(x) ="$ is **not** required and "+ c" is **not** required.

Brackets are required around their $1 - 2\sqrt{2}$ but they may be implied by their attempt to find "c" so you may need to check their calculation for c.

dM1: Uses $x = \sqrt{2}$ and their attempt at y using $x = \sqrt{2}$ in $y = 5x - 3\sqrt{2}$ in their integrated function and finds the value of c.

A1: Correct simplified exact expression $\left(f(x) =\right) x^2 - \frac{8}{x} + \left(1 - 2\sqrt{2}\right)x + 2 + 5\sqrt{2}$ or e.g.

$\left(f(x) =\right) x^2 - \frac{8}{x} + x - 2\sqrt{2}x + 2 + 5\sqrt{2}$. $"f(x) ="$ is **not** required.

Brackets are required around their $1 - 2\sqrt{2}$ if written as in the first example above.

Do not allow $1x^2$ or e.g. $\frac{2}{2}x^2$ for x^2 but allow $\sqrt{8}$ for $2\sqrt{2}$.

Apply isw once a correct function is seen.