Question Number	Scheme	Mark
6(a)	$R = 5$ $\tan\alpha = \left(\frac{4}{3}\right) \Rightarrow \alpha = ...$ $5\sin(x + 0.927)$	B1 M1 A1
		(3)
(b)(i) **(ii)**	Max = 529 $2x + "0.927" = \frac{7\pi}{2} \Rightarrow x = ...$ awrt 5.03	B1ft M1 A1
		(3)
		(6 marks)

(a)

B1: For $R = 5$. Not scored for just $R = -5$ but condone $R = \pm 5$ for this mark. Condone 5.00 (3sf)

M1: Attempts to find α.
Look for $\tan\alpha = \pm\frac{4}{3}$ or $\tan\alpha = \pm\frac{3}{4}$ leading to $\alpha = \ldots$ (you do not need to check their value of α) and α may come from $\sin\alpha = \pm\frac{4}{5}$ or $\cos\alpha = \pm\frac{3}{5}$
May be implied by $\alpha =$ awrt 0.927 or if working in degrees by awrt 53.1

A1: $5\sin(x + 0.927)$ Requires the expression not just correct values for R and α
May be scored if seen at the start of part (b) only if correct i.e. $5\sin(x + 0.927)$ seen not $5\sin(2x + 0.927)$
Condone 5.00 for R but not ± 5 for R and do not allow invisible brackets.

(b)(i)

B1ft: 529 following $R = 5$ or ft their (a). Look for $\left(4 \times (-R) - 3\right)^2$

(b)(ii)

M1: Sets $2x + "0.927" = \frac{7\pi}{2}$ and proceeds using a correct order of operations to a value for x
You may need to check their value if their α is incorrect.
May be seen as e.g. $x = \frac{7\pi}{4} - \frac{"0.927"}{2}$ or $x = k\pi + \frac{3\pi}{4} - \frac{"0.927"}{2}$ where $k = 1$
This mark may be withheld if it comes from clearly incorrect work, e.g., $\sin(2x + 0.927) = 1$ so $2x + "0.927" = \frac{\pi}{2}, \frac{7\pi}{2}$

A1: awrt 5.03 only following a correct equation. Answer only with no method scores no marks.
If they have more than one answer, then awrt 5.03 must be selected or the others rejected.

Question Number	Scheme	Mark
7(a)	$\left\{\frac{\mathrm{d}y}{\mathrm{d}x}=\right\}-2+5\sin\left(\frac{1}{2}x\right)\cos\left(\frac{1}{2}x\right)$	M1A1
	$-2+5\sin\left(\frac{1}{2}x\right)\cos\left(\frac{1}{2}x\right)=0\Rightarrow\frac{5}{2}\sin x=2\Rightarrow x=...$	dM1
	$x=$ awrt 2.21	A1
		(4)
(b)	$\int 1-2x+5\sin^2\left(\frac{1}{2}x\right)\mathrm{d}x\Rightarrow\int\frac{7}{2}-2x-\frac{5}{2}\cos x\ \mathrm{d}x$	M1
	$\int\frac{7}{2}-2x-\frac{5}{2}\cos x\ \mathrm{d}x=\frac{7}{2}x-x^2-\frac{5}{2}\sin x\ \ (+c)$	A1ft
	$\left(\frac{7}{2}\left(\frac{\pi}{2}\right)-\left(\frac{\pi}{2}\right)^2-\frac{5}{2}\sin\left(\frac{\pi}{2}\right)\right)-\left(\frac{7}{2}\left(\frac{\pi}{6}\right)-\left(\frac{\pi}{6}\right)^2-\frac{5}{2}\sin\left(\frac{\pi}{6}\right)\right)$	dM1
	$=\frac{7\pi}{6}-\frac{2\pi^2}{9}-\frac{5}{4}$	A1
		(4)
		(8 marks)

(a) **Note:** If you just see $-2+\frac{5}{2}\sin x$ with no previous manipulation of the given expression, then send to review.

M1: Attempts to differentiate, achieving $A+B\sin\left(\frac{1}{2}x\right)\cos\left(\frac{1}{2}x\right)$ for A, B non-zero.

Alternatively, uses the identity $\pm\cos x=\pm1\pm2\sin^2\left(\frac{1}{2}x\right)$ to replace $\sin^2\left(\frac{1}{2}x\right)$ and differentiates to the form $\left\{\frac{\mathrm{d}y}{\mathrm{d}x}=\right\}\ \alpha+\beta\sin x$ for α, β non-zero. Note that they may rearrange $\pm\cos x=\pm1\pm2\sin^2\left(\frac{1}{2}x\right)$ incorrectly but allow if an acceptable identity is seen.

A1: $-2+5\sin\left(\frac{1}{2}x\right)\cos\left(\frac{1}{2}x\right)$ o.e. e.g. $-2+\frac{5}{2}\sin x$ There is no need to see a LHS e.g. $\frac{\mathrm{d}y}{\mathrm{d}x}$

May be unsimplified e.g. $-2+\frac{10}{2}\sin\left(\frac{1}{2}x\right)\cos\left(\frac{1}{2}x\right)$

Condone slips in their constant term for this mark and penalise in the final mark: see SC1.

dM1: Sets $A+B\sin\left(\frac{1}{2}x\right)\cos\left(\frac{1}{2}x\right)=0$, uses $\sin x=2\sin\left(\frac{x}{2}\right)\cos\left(\frac{x}{2}\right)$ and proceeds to solve $A+\frac{B}{2}\sin x=0$ with $\left|\frac{2A}{B}\right|\leqslant1$ **or** solves $\alpha+\beta\sin x=0$ with $\left|\frac{\alpha}{\beta}\right|\leqslant1$ to find a value for x.

There is no need to see e.g. $\sin x=\frac{4}{5}$