Question number	Scheme	Marks
2. (a)	$6\left(1-\sin^2\alpha\right)-\sin\alpha=5$ or $6-6\sin^2\alpha-\sin\alpha=5$	M1
	$6\sin^2\alpha+\sin\alpha-1=0$ *	A1 (2)
(b)	$\Rightarrow\left(2\sin\alpha+1\right)\left(3\sin\alpha-1\right)=0\Rightarrow\sin\alpha=\frac{1}{3},-\frac{1}{2}\Rightarrow$ $\left(\alpha=2\theta+40\right)$	M1 A1
	$2\theta+40=19.47...,160.5287...,210$ or other correct value	M1
	$\Rightarrow\theta=60.3,\ 85$	A1A1 (5) [7]

(a)

M1 Eliminate $\cos^2\alpha$ by using the Pythagorean identity. Working must be shown.

A1cso Correct **given** answer reached.

(b)

M1 Factorise the equation given in (a), before or after using a substitution eg $\alpha=2\theta+40$

A1 Two correct values for $\sin\left(2\theta+40\right)°$ or $\sin\alpha$ or A (if substitution used)

M1 Any one correct value for $\left(2\theta+40\right)°$ (Need not lead to θ in range $0\rightarrow90$) Must be exact or at least 1 dp.

A1 Either correct value for θ 60.3 must be 1 dp

A1 Second correct value

NB Ignore additional answers outside the required range. Deduct one A mark (last 2 A marks only deducted) for each additional answer within the range.

3	$\frac{\mathrm{d}r}{\mathrm{d}t}=0.5$	B1
	$A=\pi r^2\Rightarrow\frac{\mathrm{d}A}{\mathrm{d}r}=2\pi r$	M1A1
	$\frac{\mathrm{d}A}{\mathrm{d}t}=\frac{\mathrm{d}A}{\mathrm{d}r}\times\frac{\mathrm{d}r}{\mathrm{d}t}=2\pi r\times0.5,\ \Rightarrow2\pi\times200\times0.5$	M1,
	$=200\pi=628.3185...\approx628\ (\mathrm{cm}^2/\mathrm{s})$	A1cao (5) **[5]**

B1 Correct statement, seen explicitly or used in chain rule.

M1 Attempt the differentiation

A1 Correct derivative

M1 **USE** the chain rule (ie sub their derivatives, can have *r*)

A1cao Must be 3 sf