Question Number	Scheme	Marks
2	$\frac{dA}{dt} = 8$	B1
	$\frac{dA}{dr} = 2\pi r$	M1
	$A = 50 \quad r = \sqrt{\frac{50}{\pi}} \ (3.989...)$	M1
	$\frac{dr}{dt} = \frac{dr}{dA} \times \frac{dA}{dt}, = \frac{1}{2\pi\sqrt{\frac{50}{\pi}}} \times 8, = 0.319 \ (\text{cm/s})$	M1,A1ft,A1 [6]
NB	For either method, accept *A* or *S* for area, *r* for radius. Any other letters used for area and/or radius must be defined.	
B1	$\frac{dA}{dt} = 8$ seen explicitly or used	
M1	Attempt to differentiate πr^2 to obtain $\frac{dA}{dr}$ Power of *r* must decrease	
M1	Attempt to obtain *r* when $A = 50$ cm^2 (ie solve $50 = \pi r^2$)	
M1	For a correct, useful, chain rule. Derivatives can appear in any order	
A1ft	Substitute their known quantities and rearrange to $\frac{dr}{dt} = ...$ if not in this form already.	
	All 3 M marks needed	
A1	Correct answer, **must be 3 sf**	
ALT	$\frac{dA}{dt} = 8$	B1
	$r = \sqrt{\frac{a}{\pi}}$ oe	M1
	$\frac{dr}{dA} = \frac{1}{2\sqrt{\pi}} A^{-\frac{1}{2}}$	M1
	$\frac{dA}{dt} \times \frac{dr}{dA} = \frac{dr}{dt}$	M1
	$= 8 \times \frac{1}{2\sqrt{\pi}} A^{-\frac{1}{2}} = 8 \times \frac{1}{2\sqrt{\pi}} \times \frac{1}{\sqrt{50}}$	A1ft
	= 0.3191…= 0.319 (cm/s)	A1
B1	$\frac{dA}{dt} = 8$ seen explicitly or used	
M1	Attempt to find *r* in terms of *A*	
M1	Attempt to differentiate their expression for *r* to obtain $\frac{dr}{dA}$ power of *A* must decrease	
M1	For a correct, useful, chain rule. Derivatives can appear in any order	
A1ft	Substitute their known quantities and rearrange to $\frac{dr}{dt} = ...$ if not in this form already. All 3 M marks needed	
A1	Correct answer, **must be 3 sf**	