Question	Answer	Marks	Partial Marks
	$12\sin^2(2\theta+1)+5\sin(2\theta+1)-2\,[=0]$ or $2\text{cosec}^2(2\theta+1)-5\text{cosec}(2\theta+1)-12\,[=0]$ oe	**A1**	
	$4\sin(2\theta+1)-1)(3\sin(2\theta+1)+2)\,[=0]$ or $(2\,\text{cosec}(2\theta+1)+3)(\text{cosec}(2\theta+1)-4)\,[=0]$	**M1**	Factorises or solves *their* 3-term quadratic in $\sin(2\theta+1)$ or $\text{cosec}(2\theta+1)$ **dep** on previous **M1**
	$2\theta+1 = 0.253$ or $0.2526[80\ldots]$ OR $2\theta+1 = -0.73[0]$ or $-0.7297[27\ldots]$ OR $2\theta+1 = \sin^{-1}\left(their\ \frac{1}{4}\right)$ OR $2\theta+1 = \sin^{-1}\left(their-\frac{2}{3}\right)$	**M1**	**dep** on previous **M1** **FT** providing $-1 \leqslant their\ \frac{1}{4} \leqslant 1$ and/or $-1 \leqslant their-\frac{2}{3} \leqslant 1$
	-0.374 or $-0.3736[59\ldots]$ 0.944 or $0.9444[56\ldots]$ -0.865 or $-0.8648[63\ldots]$ 1.44 or $1.435[66\ldots]$	**A2**	and no extra solutions in range **A1** for two correct solutions ignoring extras in range
9(a)	135π isw or 424 or 424.1 to 424.2	**2**	**M1** for $\frac{1}{2}\times15^2\times\frac{6\pi}{5}$ oe
9(b)	18π or 56.5 to 56.6	**2**	**M1** for $15\times\frac{6\pi}{5}$ oe
9(c)	radius = 9, height = 12	**2**	**B1** for radius = 9 OR **M1** for a correct Pythagoras' statement e.g. *their* r^2 + height^2 = 15^2
9(d)(i)	$r=\frac{3}{4}h$ oe	**B1**	

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Question	Answer	Marks	Partial Marks
9(d)(ii)	$V = \frac{1}{3}\pi\left(\frac{3}{4}h\right)^2 \times h$ oe	**B1**	**FT** *their r = kh* where *k* is a positive constant e.g. $V = \frac{1}{3}\pi\left(their\ kh\right)^2 \times h$
	$\frac{dV}{dh} = \frac{9\pi h^2}{16}$ oe	**B1**	**FT** *their k* where *k* is a positive constant e.g. $\frac{dV}{dh} = \left(their\ k\right)^2 \pi \times h^2$
	Relevant, correct chain rule **including** $\frac{dh}{dt}$ soi $\frac{dh}{dt} = \frac{dV}{dt} \times \frac{dh}{dV}$ oe	**B1**	e.g. $\frac{dh}{dt} = \frac{dV}{dt} \div \frac{dV}{dh}$
	$27 \times \frac{16}{9\pi \times 16}$ oe	**M1**	
	0.955 or 0.9549[29…]	**A1**	
10(a)(i)	$[v =] \frac{t^3}{3} - 2t \quad (+c)$	**M1**	Or $\left[\frac{t^3}{3} - 2t\right]_{[3]}^{[4]}$
	$[v =] \frac{t^3}{3} - 2t - \frac{10}{3}$	**A1**	Or substituting in limits $\left(\frac{4^3}{3} - 2\times 4\right) - \left(\frac{3^3}{3} - 2\times 3\right) - \frac{1}{3}$
	$v = 10$	**A1**	
10(a)(ii)	2 correct terms in $[s =] \frac{t^4}{12} - t^2 - \frac{10}{3}t\,(+d)$	**M1**	**FT** an expression in form $at^3 + bt$ Or 2 correct terms in $\left[\frac{t^4}{12} - t^2 - \frac{10}{3}t\right]_{[3]}^{[4]}$ 1
	$s = \frac{t^4}{12} - t^2 - \frac{10}{3}t + 12$	**A1**	**A1** substituting in limits $\left(\frac{4^4}{12} - 4^2 - \frac{10}{3}\times 4\right) - \left(\frac{3^4}{12} - 3^2 - \frac{10}{3}\times 3\right) - \frac{1}{4}$
	$s = 4$	**A1**	

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