Question Number	Scheme	Marks
6	(a)	
	At time t, vol $= \frac{1}{3}\pi\left(h\tan 30\right)^2 h, = \frac{1}{9}\pi h^3$	M1,A1
	$t = 0$ vol $= \frac{1000\pi}{9}$	B1
	$\frac{1000\pi}{9} - 2t = \frac{1}{9}\pi h^3$	M1
	$h^3 = 1000 - \frac{18t}{\pi}$	
	$h = \sqrt[3]{\left(1000 - \frac{18}{\pi}t\right)}$ *	M1A1
	(b)	
	$A = \pi r^2 = \pi\left(h\tan 30\right)^2 = \frac{\pi h^2}{3}$	B1
	$\frac{\mathrm{d}A}{\mathrm{d}h} = \frac{2\pi h}{3}$	B1
	$\frac{\mathrm{d}A}{\mathrm{d}t} = \frac{\mathrm{d}A}{\mathrm{d}h} \times \frac{\mathrm{d}h}{\mathrm{d}t} = \frac{2\pi h}{3} \times \frac{\mathrm{d}h}{\mathrm{d}t}$	M1
	$h = \left(1000 - \frac{18t}{\pi}\right)^{\frac{1}{3}}$	
	$\frac{\mathrm{d}h}{\mathrm{d}t} = \frac{1}{3}\left(1000 - \frac{18t}{\pi}\right)^{-\frac{2}{3}} \times -\frac{18}{\pi}$	M1
	$\frac{\mathrm{d}A}{\mathrm{d}t} = -\frac{2\pi}{3} \times \left(1000 - \frac{18t}{\pi}\right)^{\frac{1}{3}} \times \frac{1}{3}\left(1000 - \frac{18t}{\pi}\right)^{-\frac{2}{3}} \times \left(-\frac{18}{\pi}\right)$	
	$t = 15 \quad \frac{\mathrm{d}A}{\mathrm{d}t} = -\frac{2\pi}{3} \times \frac{1}{3} \times \frac{18}{\pi} \times \frac{1}{\left(1000 - \frac{18\times 15}{\pi}\right)^{\frac{1}{3}}}$	M1
	$= -0.412$ cm^2/s	A1

Question Number	Scheme	Marks
7	(a)	
	Grad $AB = \frac{8-5}{7-3} = \frac{3}{4}$	M1A1
	Grad $AC = \frac{1-5}{6-3} = -\frac{4}{3}$	A1
	$\frac{3}{4} \times -\frac{4}{3} = -1$	A1 cso
	$(\therefore AB \perp AC)$	
	(b)	
	Eqn AC: $y-5 = -\frac{4}{3}(x-3)$	M1A1ft
	$3y + 4x - 27 = 0$ (o.e. but must be integers)	A1
	(c) D is $(12, -7)$	B1B1
	(d)	
	Length $AD = \sqrt{\left((12-3)^2 + (-7-5)^2\right)}, \quad = 15$	M1,A1
	Length $AB = \sqrt{\left((7-3)^2 + (8-5)^2\right)}, \quad = 5$	A1
	Area $\Delta ABD = \frac{1}{2} \times 15 \times 5 = 37\frac{1}{2}$ sq.units	A1ft