Question	Scheme	Marks	AOs
8(a)	$\frac{dV}{dt} = 160\pi,\ V = \frac{1}{3}\pi h^2(75-h) = 25\pi h^2 - \frac{1}{3}\pi h^3$		
	$\frac{dV}{dh} = 50\pi h - \pi h^2$	M1	1.1b
		A1	1.1b
	$\left\{\frac{dV}{dh}\times\frac{dh}{dt} = \frac{dV}{dt} \Rightarrow\right\} \left(50\pi h - \pi h^2\right)\frac{dh}{dt} = 160\pi$	M1	3.1a
	When $h=10$, $\left\{\frac{dh}{dt} = \frac{dV}{dt} \div \frac{dV}{dh} \Rightarrow\right\} \frac{160\pi}{50\pi(10)-\pi(10)^2}$ $\left\{=\frac{160\pi}{400\pi}\right\}$	dM1	3.4
	$\frac{dh}{dt} = 0.4\ (\text{cms}^{-1})$	A1	1.1b
		(5)	
(b)	$\frac{dh}{dt} = \frac{300\pi}{50\pi(20)-\pi(20)^2}$	M1	3.4
	$\frac{dh}{dt} = 0.5\ (\text{cms}^{-1})$	A1	1.1b
		(2)	
			(7 marks)

Question 8 Notes:

(a)

M1: Differentiates V with respect to h to give $\pm\alpha h \pm \beta h^2$, $\alpha \neq 0, \beta \neq 0$

A1: $50\pi h - \pi h^2$

M1: Attempts to solve the problem by applying a complete method of $\left(\text{their } \frac{dV}{dh}\right)\times\frac{dh}{dt} = 160\pi$

M1: Depends on the previous M mark.

Substitutes $h=10$ into their model for $\frac{dh}{dt}$ which is in the form $\frac{160\pi}{\left(\text{their } \frac{dV}{dh}\right)}$

A1: Obtains the correct answer 0.4

(b)

M1: Realises that rate for of $160\pi\ \text{cm}^3\,\text{s}^{-1}$ for $0 \text{,,} h \text{,,} 12$ has no effect when the rate is increased to $300\pi\ \text{cm}^3\,\text{s}^{-1}$ for $12 < h \text{,,} 24$ and so substitutes $h=20$ into their model for $\frac{dh}{dt}$ which is in the form $\frac{300\pi}{\left(\text{their } \frac{dV}{dh}\right)}$

A1: Obtains the correct answer 0.5