

Question number	Scheme	Marks
6	$\frac{dV}{dt} = 0.03$ $\tan 30 = \frac{r}{h} \Rightarrow r = h \tan 30^\circ = \left(\frac{h}{\sqrt{3}} \right)$ $V = \frac{1}{3} \pi r^2 h \Rightarrow V = \frac{1}{3} \pi \left(\frac{h}{\sqrt{3}} \right)^2 h \left(= \frac{1}{9} \pi h^3 \right)$ $\frac{dV}{dh} = \frac{1}{3} \pi h^2$ $\frac{dh}{dt} = \frac{dV}{dt} \times \frac{dh}{dV}, \Rightarrow 0.03 \times \frac{1}{\frac{1}{3} \pi 1.5^2} = 0.012732... \approx 0.0127 \text{ (m/s)}$	B1 B1 M1 dM1 M1, A1 (6) [6]
B1	For $\frac{dV}{dt} = 0.03$ seen anywhere	
B1	Correct expression for r in terms of h . Can be in any form	
M1	Obtain an expression for V in terms of h only. Must have used trig for their expression for r in terms of h . Can include a trig ratio instead of the corresponding number.	
dM1	Attempt to differentiate their expression wrt h . Depends on the M mark above.	
M1	Correct (useful) chain rule, terms in any order. (Quoted, need not be used)	
A1	Substitute for all variables and obtain the correct value for $\frac{dh}{dt}$ Must be 3 sf	
NB	The question does not define the volume to be V , so allow any other letter (inc A) provided this is used consistently throughout the question or changed to V part way through.	