Question Number	Scheme	Marks	Notes
3a	Use $\frac{dv}{dt}=\frac{dv}{dx}\times\frac{dx}{dt}$	M1	Use of chain rule or $\frac{d}{dx}\left(\frac{1}{2}v^2\right)$
	Correct method for $\frac{dv}{dx}$	M1	Correct quotient rule or equivalent (allow one slip)
	Correct derivative	A1	e.g. $\frac{8x}{3+x^2}\times\frac{8\left(3+x^2\right)-16x^2}{\left(3+x^2\right)^2}$
	Substitute $x=3$ into their derivative	DM1	Dependent on the first M1
	Obtain $\frac{2}{3}\left(\text{m s}^{-2}\right)$	A1	Must be positive. Accept 0.67 or better
		(5)	
3b	$\frac{dx}{dt}=\frac{8x}{3+x^2}$	M1	Use of $v=\frac{dx}{dt}$
	$\int\frac{3+x^2}{8x}dx=\int 1dt \quad \left(=\int\frac{3}{8x}+\frac{x}{8}dx\right)$	M1	Separate and attempt integration (as far as 2 terms of the correct form)
	$\frac{3}{8}\ln x+\frac{1}{16}x^2=t\left(+C\right)$	A1	Correct integration. Allow if "+ C" not seen
	Use $x=1$ when $t=2$ to obtain C	M1	In an expression containing at least 2 of $p\ln x, qx^2, rt$
	$t=\frac{5}{2}+\frac{3}{8}\ln 3$	A1	Or exact equivalent
		(5)	
		[10]	