Question	Answer	Marks	Guidance
6	$\ln y = mx + c$ soi	**B1**	
	Correct method to find m e.g. $m = \frac{\ln 75 - \ln 15}{2 - 1}$ oe or $-m = \ln 15 - \ln 75$ oe OR $m = \ln 5$ oe	**M1**	**FT** *their c* if necessary
	Correct method to find c e.g. $\ln 15 =$ *their*$(\ln 5)$ [1] $+ c$ oe or $\ln 75 =$ *their*$(\ln 5)$ (2) $+ c$ oe or $\ln 75 = 2(\ln 15 - c) + c$ oe OR $c = \ln 3$ oe, soi	**M1**	**FT** *their m* if necessary
	$y = 3 \times 5^x$ nfww, mark final answer	**A1**	
7	$\frac{dy}{dx} = 1 - \frac{2x+2}{x^2+2x}$	**2**	**B1** for $\frac{d(-\ln(x^2+2x))}{dx} = \frac{1}{x^2+2x} \times f(x)$ soi
	Equates *their* first derivative to 0 and simplifies as far as $2(x + 1) = x(x + 2)$ oe	**M1**	**FT** *their* $\frac{dy}{dx}$
	$x^2 - 2 = 0$ or $x^2 = 2$	**A1**	
	$x = \sqrt{2}$ $[x = -\sqrt{2}]$	**A1**	
	Justification that the negative solution should be rejected e.g. $x = -\sqrt{2}$ results in $y = 2 - \ln(2 - 2\sqrt{2})$ which is impossible	**B1**	
8(a)(i)	[Velocity:] $\frac{(2t-3)^3}{3 \times 2}$ $(+ c)$	**M1**	Allow for $k(2t - 3)^3$
	$\frac{(2 \times 3 - 3)^3}{6} + c = 6$ $[c = \frac{3}{2}]$	**M1**	Correct calculation which can be used to find c
	[Velocity at time t] $= \frac{(2t-3)^3}{6} + \frac{3}{2}$ oe	**A1**	

Question	Answer	Marks	Guidance
8(a)(ii)	$\frac{(2t-3)^3}{6} + \frac{3}{2} = 0$	**M1**	**FT** *their* expression for v in terms of t providing of the form $\frac{(2t-3)^3}{a} + b$ where a and b are non-zero constants
	$2t - 3 = \sqrt[3]{-9}$ or $2t - 3 = -2.08[0\ldots]$oe	**A1**	
	$t = \frac{3+\sqrt[3]{-9}}{2}$ oe isw or $t = 0.46[0]$ or $0.4599[\ldots]$	**A1**	
8(a)(iii)	[Displacement:] $\frac{(2t-3)^4}{4\times2\times6} + \frac{3}{2}t\ (+d)$	**M1**	**FT** *their* expression for v in terms of t providing of the form $\frac{(2t-3)^3}{a} + b$ where a and b are non-zero constants
	$\frac{(2\times2.5-3)^4}{48} + \frac{3}{2}(2.5) + d = 4$	**M1**	Correct calculation which can be used to find d
	[Displacement:] $\frac{(2t-3)^4}{48} + \frac{3}{2}t - \frac{1}{12}$	**A1**	
	[Displacement at $t = 3$] $\frac{293}{48}$ oe isw or $6.1[0]$ oe	**A1**	
8(b)	$\frac{dv}{dt} = (2t - 3)^2$ oe, soi or $\frac{d}{dt}(\textit{their } v) = k(2t-3)^2$ where k is a non-zero constant	**B1**	**FT** *their* expression for v in terms of t providing of the form $\frac{(2t-3)^3}{a} + b$ where a and b are non-zero constants, if necessary
	Correct small changes relationship: $\frac{\delta v}{0.02} = \textit{their}(2 \times 2.5 - 3)^2$ oe	**M1**	**FT** $\textit{their}\left.\frac{dv}{dt}\right\|_{t=2.5}$
	$\delta v = 0.08$	**A1**	
9(a)	$2\sin^{-1}\left(\frac{4}{5}\right)$ or $\cos^{-1}\left(\frac{64-25-25}{-2(5)(5)}\right)$ oe	**M1**	
	1.85 or 1.854 to 1.855	**A1**	
9(b)(i)	5 × *their* 1.85 [×2]	**M1**	**FT** *their* 1.85 providing it is less than 2π
	18.5 or 18.54 to 18.55	**A1**	