

Question	Answer	Marks	Guidance
(a)	For attempt at integration	*M1	The power of t must increase by 1 with a change of coefficient in at least 1 term. Allow if k is omitted.
	$k\left(t^3 - \frac{1}{2}t^4\right)[+C]$	A1	Allow unsimplified
	$k\left(8 - \frac{1}{2} \times 16\right)[-0]$	DM1	For use of limits 0 and 2 or substituting $t = 2$ OR equate to 0, then solve a quartic equation in t . Allow if k is omitted.
	0	A1	AG, CWO including stating $C = 0$ if not using limits
		4	

Question	Answer	Marks	Guidance
(b)	$v = 0$ when $k(3t^2 - 2t^3) = 0$	M1	For solving for t
	Leading to $t = 1.5$ [or $t = 0$]	A1	A0 for other solutions not discarded
	$a = k(6t - 6t^2)$	M1	For differentiation, the power of t must decrease by 1 with a change of coefficient in at least 1 term. Allow if k is omitted
	$[-13.5 = k(6 \times 1.5 - 6 \times 1.5^2) \Rightarrow -13.5 = k(9 - 13.5) \Rightarrow] k = 3$	A1	
	Distance from $t = 0$ to $t = 1.5$ is $\left[3 \left(t^3 - \frac{1}{2} t^4 \right) \right]_0^{1.5} = 3 \left(1.5^3 - \frac{1}{2} \times 1.5^4 \right) - 0$	DM1	For use of limits. $2 \times \int_0^{1.5} \dots$ or $2 \times \int_{15}^2 \dots$ or both integrals. Dependent on first M in part (a), unless they restart
	[= 2.53125] So total distance = $2 \times 2.53125 = 5.06$ m	A1	Allow distance = $\frac{81}{16} = 5\frac{1}{16}$ If DM0 then SCB1 for 5.06 without working
		6	

