Question	Scheme	Marks
4(a)	$a = \dfrac{\mathrm{d}v}{\mathrm{d}t} = 4t - 16 \quad [t = 5] \quad a = 4\times 5 - 16 = 4$	M1A1 [2]
(b)	$v = 0 \Rightarrow 2t^2 - 16t + 30 = 0 \Rightarrow (t-5)(2t-6) = 0$ $\Rightarrow t_1 = 3, \ \ t_2 = 5$ Displacement $= \int_3^5 \left(2t^2 - 16t + 30\right) \mathrm{d}t = \left[\dfrac{2t^3}{3} - \dfrac{16t^2}{2} + 30t\right]_3^5$ $= \left[\dfrac{2\times 5^3}{3} - 8\times 25 + 30\times 5\right] - \left[\dfrac{2\times 3^3}{3} - 8\times 9 + 30\times 3\right] = \dfrac{100}{3} - 36 = -\dfrac{8}{3}$ Distance $= \dfrac{8}{3}$ (m)	M1 A1A1 M1A1 M1A1 A1ft [8]
		Total 10 marks

Part	Mark	Notes
(a)	**M1**	For an attempt to differentiate the given expression and substitute $t = 5$ See General Guidance for the definition of an attempt. Do not accept an expression with any terms integrated.
	A1	Obtains the value 4
(b)	**M1**	Sets $v = 0$ and attempts to solve the equation using a correct method. Please check their work carefully. See General Guidance for acceptable ways to solve a quadratic. If they use a calculator and only $t = 3, 5$ are seen with no working – award M1A1A1
	A1	For either $t_1 = 3$ or $t_2 = 5$
	A1	For both $t_1 = 3$ and $t_2 = 5$
	No working seen to find the distance.	
	SC: If a final answer of $\frac{8}{3}$ is seen with no evidence of algebraic integration, **award the final A mark only.**	
	M1	For an attempt to integrate the given expression for v with or without limits. Ignore poor or absent notation. [ie. No integral sign] See General Guidance for the definition of an attempt. Note: Do not accept an integrated expression with any **algebraic** terms differentiated.
	A1	For the correct integrated expression unsimplified or simplified. isw incorrect simplification following a correctly integrated expression. Accept for this mark the inclusion of $+ c$ Ignore limits for this mark.
	M1	Substitutes their values of $t_1 = 3$ or $t_2 = 5$ into their integrated expression and attempts to evaluate. Allow the subtraction either way around. Their integral must be a changed expression. Accept even if they have differentiated it. If the final answer is not $\pm\frac{8}{3}$ and there is no explicit substitution seen, award M0.
	A1	For the correct value of $-\frac{8}{3}$ You must see the negative value for this mark. Accept awrt -2.67 for this mark.
	A1ft	For the correct distance of $\frac{8}{3}$ (m) or exact equivalent. Do not accept 2.67 (m) but accept $2.\dot{6}$ **Note:** This is a ft mark. We will only award this mark if their value for the displacement is **negative** and the final distance is positive.