Question Number	Answer	Notes	Marks
9	(a) $s = t\left(t^2 - 6t + 5\right) = 0$ $= t\left(t-1\right)\left(t-5\right)$ $t = 0,\ 1,\ 5$ (b) $v = 3t^2 - 12t + 5$ $t = 0 \quad v = 5$ $t = 1 \quad v = 3 - 12 + 5 = -4, \quad \text{Speed} = 4$ $t = 5 \quad v = 75 - 60 + 5 = 20$ (c) $\frac{\mathrm{d}v}{\mathrm{d}t} = 6t - 12 \quad (\text{or } \frac{\mathrm{d}_2 s}{\mathrm{d}t^2} = 6t - 12)$ Max/min $\frac{\mathrm{d}v}{\mathrm{d}t} = 0 \quad t = 2$ $t = 2 \quad v = 12 - 24 + 5 = -7$ from (b) $t = 5 \Rightarrow v = 20$ $\therefore$ max speed in interval is 20 m/s	 M1 A2,1,0 M1 A1 A1, A1 A1 M1 A1 A1 A1ft	**(12)**

Notes

(a)

M1 for setting $s = 0$, taking t out as a common factor, and attempting to solve the quadratic $t^2 - 6t + 5$

A1 for a correct complete factorisation of s to give $t(t-1)(t-5) = 0$

A1 for $t = 0, 1, 5$

(b)

M1 for an attempt to differentiate $\frac{\mathrm{d}s}{\mathrm{d}t}$

A1 for a fully correct $v = 3t^2 - 12t + 5$

A1 for $v = 5$

A1 for $v = -4 \Rightarrow$ speed $= 4$

A1 for $v = 20$

Award 3 A marks for all three correct, 2 marks for two and 1 mark for only one correct speed. Order not important (One mark for each correct speed)

(c)

EITHER

M1 for differentiating their v wrt t to give $\frac{dv}{dt} = 6t - 12$ (or $\frac{d_2 s}{dt^2} = 6t - 12$)

A1 for setting their $\frac{dv}{dt} = 0$ for a max/min and solving $6t - 12 = 0$ so $t = 2$

A1 when $t = 2$ $v = -7$

A1ft therefore max speed in interval is 20 (ms^{-1}) or their '20' in part (a)

OR

M1 for an attempt at completing the square on $v = 3t^2 - 12t + 5$ (usual rules)

A1 for a fully correct expression for $v = 3(t-2)^2 - 7$

A1 for $v = -7$

A1ft therefore max speed in interval is 20 (ms^{-1}) or their '20' in part (a).