Question	Scheme	Marks	AOs
11(a)	200 (miles)	B1	3.4
		(1)	
(b)	$\frac{dy}{dx} = \frac{3}{250}x^2 - \frac{6}{5}x + 24$	M1 A1	3.4 1.1b
	$\frac{dy}{dx} = 0 \Rightarrow \frac{3}{250}x^2 - \frac{6}{5}x + 24 = 0 \Rightarrow x = ...$	M1	1.1b
	$x =$ awrt 27.6 only	A1	2.3
		(4)	
(c)	$\left(\frac{d^2y}{dx^2} =\right) \frac{3}{125}x - \frac{6}{5} = \frac{3}{125}("27.6") - \frac{6}{5}$	M1	1.1b
	$\frac{d^2y}{dx^2} = (-0.5...) < 0 \Rightarrow$ Hence y is maximised	A1	2.4
		(2)	
(d)	Maximum distance $= \frac{1}{250}("27.6")^3 - \frac{3}{5}("27.6")^2 + 24("27.6")$	M1	3.4
	Maximum distance = awrt 289 (miles)	A1	1.1b
		(2)	
			(9 marks)

Notes

(a)

B1: 200 (miles)

(b)

M1: Attempts to differentiate $y = \frac{1}{250}x^3 - \frac{3}{5}x^2 + 24x$ (decreases the power by one on at least one of their terms)

A1: $\frac{3}{250}x^2 - \frac{6}{5}x + 24$

M1: Sets their derivative = 0 and attempts to solve their 3TQ to find a value for x

A1: awrt 27.6 only (they must reject 72.4 if found)

(c)

M1: Attempts to differentiate their quadratic to achieve a linear expression and substitutes in their value for x or considers the sign of the second derivative.

A1: Correct derivative, calculation and conclusion

(d)

M1: Substitutes in their value for x into the original equation to find a value for y

A1: awrt 289