Scheme	Marks	AOs
$4_{11} - 2_{1}t^{2} - 12$	M1	1 1h
$\frac{dy}{dr} = \frac{5t - 12}{2t + 1}$	Δ1	1.10 1.1h
$u\lambda = 2l \pm 1$	(2)	1.10
At $P 3t^2 - 12 = 0 \Rightarrow t = +2$	(2)	
As <i>P</i> is in quadrant 1, $t = -2 \implies x =, y =$	M1	2.1
(6, 21)	A1	2.3
	(2)	
At $Q, y = 21 t^3 - 12t + 5 = 21 \Longrightarrow t^3 - 12t - 16 = 0$	M1	3.1a
$t^{3}-12t-16 = (t+2)^{2} (t \pm) = 0 \Longrightarrow t =(4)$	dM1	2.1
<i>Q</i> is (24, 21)	A1	2.2a
	(3)	
(7 marks)		
Notes		
(a)		
M1: Attempts $\frac{dx}{dt}$ and $\frac{dy}{dt}$ and then uses $\frac{dy}{dx} = \frac{dy}{dt} \div \frac{dx}{dt}$ (may be implied by their $\frac{dy}{dx}$ )		
A1: Correct expression (b)		
M1: Sets the numerator of their $\frac{dy}{dx} = 0$ , solves a quadratic equation in <i>t</i> and uses it to find the		
coordinates of <i>P</i> A1: Correct coordinates		
(c) $M_1$ : Passentises that at $Q$ , the waverdinate is equal to the waverdinate of $P$ and uses this to form		
a cubic equation in t		
M1: Uses a correct strategy to find the value of t at Q. E.g. uses the repeated root at P to factorise		
the cubic equation.		
	Scheme $\frac{dy}{dx} = \frac{3t^2 - 12}{2t + 1}$ At $P$ $3t^2 - 12 = 0 \Rightarrow t = \pm 2$ As $P$ is in quadrant 1, $t = -2 \Rightarrow x =, y =$ $(6, 21)$ At $Q, y = 21$ $t^3 - 12t + 5 = 21 \Rightarrow t^3 - 12t - 16 = 0$ $t^3 - 12t - 16 = (t + 2)^2 (t \pm) = 0 \Rightarrow t =(4)$ $Q$ is $(24, 21)$ NotesNotesstandard dy and then uses $\frac{dy}{dx} = \frac{dy}{dt} \div \frac{dx}{dt}$ (may be implied by their $\frac{dy}{dx}$ c expressionhe numerator of their $\frac{dy}{dx} = 0$ , solves a quadratic equation in $t$ and uses i as of $P$ ct coordinatesgnises that at $Q$ , the $y$ coordinate is equal to the $y$ coordinate of $P$ and us uation in $t$ a correct strategy to find the value of $t$ at $Q$ . E.g. uses the repeated root equation.	SchemeMarks $\frac{dy}{dx} = \frac{3t^2 - 12}{2t + 1}$ M1A1(2)At P 3t^2 - 12 = 0 $\Rightarrow$ t = ±2M1As P is in quadrant 1, t = -2 $\Rightarrow$ x =, y =M1(6, 21)A1(2)At Q, y = 21 t^3 - 12t + 5 = 21 $\Rightarrow$ t^3 - 12t - 16 = 0M1t^3 - 12t - 16 = (t + 2)^2 (t \pm) = 0 $\Rightarrow$ t =(4)dM1Q is (24, 21)A1(3)(3)(7NotesNotes(7Notesor pressionhe numerator of their $\frac{dy}{dx} = \frac{dy}{dt} \div \frac{dx}{dt}$ (may be implied by their $\frac{dy}{dx}$ )ct expressionhe numerator of their $\frac{dy}{dx} = 0$ , solves a quadratic equation in t and uses it to find the sol f P et coordinate is equal to the y coordinate of P and uses this to uation in t a correct strategy to find the value of t at Q. E.g. uses the repeated root at P to faequation.

A1: Deduces the correct coordinates