Question	Scheme	Marks
7.(a)	$x=\frac{1}{3}t^2, y=\frac{2}{3}t \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x}=\frac{2}{3}\div\frac{2}{3}t=\frac{1}{t}$ or $y^2=\frac{4}{3}x \Rightarrow 2y\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{4}{3} \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x}=\frac{2}{3y}=\frac{1}{t}$ or $y^2=\frac{4}{3}x \Rightarrow y=\frac{2}{\sqrt{3}}\sqrt{x} \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x}=\frac{1}{\sqrt{3}\sqrt{x}}=\frac{1}{t}$	**B1**
	$y-\frac{2}{3}t=-t\left(x-\frac{1}{3}t^2\right)$	**M1**
	$3tx+3y=t^3+2t$*	**A1***
		(3)
(b)	$t=9 \Rightarrow 27x+3y=747$	**B1**
	$y^2=\frac{4}{3}x \Rightarrow x=\frac{3y^2}{4} \Rightarrow 3y+3\times9\times\frac{3y^2}{4}=729+18$ or $y^2=\frac{4}{3}x \Rightarrow \frac{1}{9}(747-27x)^2=\frac{4}{3}x \Rightarrow 729x^2-40350x+558009=0$	**M1**
	$27y^2+4y-996=0 \Rightarrow y=...$ **or** $729x^2-40350x+558009=0 \Rightarrow x=...$	**M1**
	$y=-\frac{166}{27},\ x=\frac{6889}{243}$	**A1**
		(4)
(b) ALT	$t=9 \Rightarrow 27x+3y=747$	**B1**
	$9x+y=249 \Rightarrow 3t^2+\frac{2}{3}t=249$	**M1**
	$9t^2+2t-747=0 \Rightarrow t=...\left(-\frac{83}{9}\right)$	**M1**
	$y=-\frac{166}{27},\ x=\frac{6889}{243}$	**A1**
		(Total 7 marks)

Notes

(a)

B1: Correct $\frac{\mathrm{d}y}{\mathrm{d}x}$ or $\frac{\mathrm{d}x}{\mathrm{d}y}$ in terms of t from a calculus method. Must have seen a derivative used.

M1: Correct straight line method for the normal – must be using $\frac{-1}{\text{their } m_T}$ (or other correct approach). If using $y = mx + c$ they must proceed at least as far as finding c.

A1: cso – must have seen the evidence of use of calculus.

(b) + Alt (b)

B1: Correct equation for the normal at $t = 9$

M1: Solves normal and equation of C simultaneously to obtain a quadratic equation in x or y or substitutes the parametric form to obtain a quadratic in t.

M1: Solves 3TQ in y to obtain a value (other than 6) or in x to obtain a value (other than 27) or in t to obtain a value (other than 9)