Question			Answer	Marks	AOs		Guidance
10	(a)		**DR** $\frac{dx}{dt} = -2t^{-3}$ and $\frac{dy}{dt} = -3t^{-4} + t^{-2}$ So $\frac{dy}{dx} = \frac{-3t^{-4} + t^{-2}}{-2t^{-3}}$ Multiply top and bottom by t^4 $\frac{dy}{dx} = \frac{-3 + t^2}{-2t} = \frac{3 - t^2}{2t}$	**M1** **M1** **A1** **[3]**	**2.1** **2.1** **2.1**	Attempt to differentiate both equations Combining derivatives for $\frac{dy}{dx}$ AG Correct derivative in required form.	Note that $\frac{dy}{dx} = \left(-\frac{3}{t^4} - \frac{1}{t^2}\right) \times \left(-\frac{t^3}{2}\right)$
10	(b)		**DR** tangent parallel when $\frac{dy}{dx} = -\frac{1}{4}$ $\frac{3 - t^2}{2t} = -\frac{1}{4}$ $4t^2 - 2t - 12 = 0$ roots $2, \left[-\frac{3}{2}\right]$ [but since $t > 0$ $t = 2$] When $t = 2$, $x = \frac{1}{4}$, $y = \frac{1}{8} - \frac{1}{2} = -\frac{3}{8}$ So the coordinates are $\left(\frac{1}{4}, -\frac{3}{8}\right)$	**B1** **M1** **A1** **[3]**	**3.1a** **1.1a** **1.1**	Establishing gradient $-\frac{1}{4}$ Forming and solving quadratic equation. Using the value of t for both coordinates	$y = -\frac{1}{4}x + \frac{1}{4}$ not sufficient on its own Ignore any point based on $t = -\frac{3}{2}$

Question			Answer	Marks	AOs		Guidance
10	(c)		**DR**				
			Rearrange $t = x^{-\frac{1}{2}}$	**B1**	**3.1a**	or equivalent eg $\frac{1}{t} = \sqrt{x}$	$y = \frac{1}{\left(\frac{1}{\sqrt{x}}\right)^3} - \frac{1}{\left(\frac{1}{\sqrt{x}}\right)}$
			Substitute $y = \left(x^{-\frac{1}{2}}\right)^{-3} - \left(x^{-\frac{1}{2}}\right)^{-1} = x^{\frac{3}{2}} - x^{\frac{1}{2}}$	**M1**	**1.1**	Attempt to eliminate t	
			$= x^{\frac{1}{2}}(x-1) = (x-1)\sqrt{x}$	**A1** **[3]**	**1.1**	factorised form. Allow surd or index form	Do not allow for $= \pm(x-1)\sqrt{x}$