Question			Answer	Marks	AO	Guidance
8	(a)		$\frac{dx}{dt} = 3t^2 - 8, \quad \frac{dy}{dt} = 2t$	M1*	1.1a	attempt to differentiate both parametric equations Only allow for a complete method for finding $\frac{dy}{dx}$ in terms of t using the cartesian equation of the curve
			$\frac{dy}{dx} = \frac{2t}{3t^2 - 8}$	M1 (dep) A1 [3]	1.1b 1.1b	Combine their derivatives to find $\frac{dy}{dx}$ Do not allow for reciprocal cao
8	(b)		**AG** $t^3 - 8t = 8$ and $t^2 = 4$ gives $t = -2$	M1	3.1a	Attempt to establish the value of t at (8, 4). Allow for ± 2 or 2 stated Allow for $y = 4$ used in $\frac{dy}{dx} = \frac{2\sqrt{y}}{3y - 8}$ for the M mark only
			$\frac{dy}{dx} = \frac{2(-2)}{3(-2)^2 - 8} = -1$	E1	1.1b	**AG** the negativity must be clearly established from correct working
			Alternative When $\frac{dy}{dx} = \frac{2t}{3t^2 - 8} = -1$ giving $3t^2 + 2t - 8 = 0$ $t = \frac{4}{3}$ or $t = -2$	M1		Uses the value of the derivative to find the value of t at P.
			When $t = -2$ the coordinates are $\left((-2)^3 - 8(-2), (-2)^2\right) = (8, 4)$ [which is P]	E1		Allow without reference to $t = \frac{4}{3}$
				[2]		
8	(c)		$\frac{dy}{dx} = \frac{2t}{3t^2 - 8} = -1$ giving $3t^2 + 2t - 8 = 0$	M1	1.1a	Equating their $\frac{dy}{dx}$ to -1 and rearranging to form quadratic equation
			$t = \frac{4}{3}$ or [$t = -2$ is the point P]	A1 [2]	3.2a	allow www –2 need not be seen but if seen must be rejected

8	**(d)**		Substitute $t^2 = y$	**M1**	**1.1a**	
			$x = t^3 - 8t \Rightarrow x^2 = t^6 - 16t^4 + 64t^2$	**A1**	**1.1b**	Allow for $x^2 = t^2\left(t^2 - 8\right)^2$
			$\Rightarrow x^2 = y^3 - 16y^2 + 64y$	**A1**	**2.1**	
			Alternative method			
			Substitute $t = \pm y^{\frac{1}{2}}$	**M1**		Substituting for *t* in their equation for *x*; allow without $\pm$
			$x = \pm\left(y^{\frac{3}{2}} - 8y^{\frac{1}{2}}\right)$	**A1**		Soi Allow without $\pm$
			$x^2 = y(y-8)^2 = \left[y^3 - 16y^2 + 64y\right]$	**A1**		must be in the form $x^2 = \ldots$ from fully correct working Need not be simplified. Do not award if $\pm$ not seen at all
				[3]		