Question Number	Scheme	Notes	Marks
5(a)	$xy = 64 \Rightarrow y = 64x^{-1} \Rightarrow \dfrac{\mathrm{d}y}{\mathrm{d}x} = -64x^{-2}$ or $xy = 64 \Rightarrow x\dfrac{\mathrm{d}y}{\mathrm{d}x} + y = 0 \Rightarrow \dfrac{\mathrm{d}y}{\mathrm{d}x} = -\dfrac{y}{x}$ or $x = 8p, y = \dfrac{8}{p} \Rightarrow \dfrac{\mathrm{d}y}{\mathrm{d}x} = \dfrac{-8p^{-2}}{8}$	Correct $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ This can be in any form, simplified or unsimplified. The parameter could be a different variable, e.g. t	B1
	$m_T = -\dfrac{64}{64p^2} \Rightarrow m_N = p^2$ or $m_T = -\dfrac{8/p}{8p} \Rightarrow m_N = p^2$ or $m_T = -p^{-2} \Rightarrow m_N = p^2$	Correct use of the perpendicular gradient rule and the point P to obtain the normal gradient	M1
		Correct normal gradient of p^2	A1
	$y - \dfrac{8}{p} = p^2(x - 8p)$ or $y = p^2x + c, \dfrac{8}{p} = p^2 \times 8p + c \Rightarrow c = \ldots$	Correct straight line method for normal	M1
	$p^3x - py = 8\left(p^4 - 1\right)$*	cso. (No errors, but possibly direct from the version in line 1 above)	A1*
			(5)
(b)	$p^3x - py = 8\left(p^4 - 1\right), xy = 64 \Rightarrow$ $p^3x - p\dfrac{64}{x} = 8\left(p^4 - 1\right)$ or $p^3\dfrac{64}{y} - py = 8\left(p^4 - 1\right)$	Uses both equations to obtain an equation in one variable	M1
	$p^3x^2 + 8\left(1 - p^4\right)x - 64p = 0$ or $py^2 + 8(p^4 - 1)y - 64p^3 = 0$	Correct quadratic. Must have the x^2 or y^2 term, but the x or y terms need not be combined. The terms do not need to be 'all on one side', and the coefficients could involve fractions, e.g. $p^2x^2 + \dfrac{8x}{p} - 8p^3x = 64$	A1
	$\left(x - 8p\right)\left(p^3x + 8\right) = 0 \Rightarrow x = \ldots$ or $\left(py - 8\right)\left(y + 8p^3\right) = 0 \Rightarrow y = \ldots$	Solves their 3TQ (usual rules) to obtain the <u>other</u> value of x or y. The <u>other</u> value must be picked out as a solution. This could be done by algebraic division... (see below)	dM1
	$x = -\frac{8}{p^3}$ $y = -8p^3$ or $\left(-\frac{8}{p^3}, -8p^3\right)$	Correct coordinates (ignore coordinates of P if they are also given as an answer). $-8p^{-3}$ may be seen rather than $-\frac{8}{p^3}$	A1
			(4)
			Total 9

5(b)	Rather than solving the 3TQ for the dM1, algebraic division can be used. To score the mark the division should follow the usual rules for solution by factorisation, so in the first case, e.g. if the quadratic is correct, the quotient should be $\pm p^3 x \pm 8$, then this must lead to the other value $x_2 = \cdots$

5(b)	Note that another way to find the other value for the dM1 is to use the 'sum of roots' = $-\frac{b}{a}$, e.g. $$8p + x_2 = \frac{-8(1-p^4)}{p^3} \qquad x_2 = \cdots$$

(b) **Way 2**	$p^3x - py = 8\left(p^4 - 1\right), \left(8q,\ \frac{8}{q}\right) \Rightarrow$ $p^3 8q - p\frac{8}{q} = 8\left(p^4 - 1\right)$	Uses the given normal equation and the parametric form for Q to form an equation in p and q	M1
	$p^3q^2 - p = qp^4 - q$	Correct quadratic. Must have the q^2 term, but the q terms need not be combined. The terms do not need to be 'all on one side', and the coefficients could involve fractions.	A1
	$\left(p-q\right)\left(p^3q+1\right) = 0 \Rightarrow q = ...$	Solves their 3TQ (usual rules) to obtain the value of q. This could be done by algebraic division (condition as for main scheme)	dM1
	$q = -\frac{1}{p^3} \Rightarrow x = -\frac{8}{p^3} \quad y = -8p^3$ or $\left(-\frac{8}{p^3}, -8p^3\right)$	Correct coordinates (ignore coordinates of P if they are also given as an answer). $-8p^{-3}$ may be seen rather than $-\frac{8}{p^3}$	A1
			(4)