Question number	Scheme	Marks
8	When $(x=\pi \quad y=)2\pi^2$	B1
	$\frac{dy}{dx}=4x-\cos x$	M1
	When $x=\pi \quad \frac{dy}{dx}=4\pi-\cos\pi \quad =4\pi+1$	M1 A1
	Gradient of the normal $=-\frac{1}{"4\pi+1"}$	M1
	$y-2\pi^2=-\frac{1}{4\pi+1}(x-\pi)$ oe	M1
	$\left[(4\pi+1)(y-2\pi^2)=-x+\pi\right]$	
	$4\pi y+y-8\pi^3-2\pi^2-\pi+x=0$	dM1
	$x+(4\pi+1)y-\pi(8\pi^2+2\pi+1)=0$ *	A1 cso
		Total 8 marks

Mark	Notes
B1	For $(y=)2\pi^2$
M1	For differentiating *y* wrt *x*, to give an expression of the form $ax - \cos x$
M1	For correct substitution of $x=\pi$ into their derivative
A1	For $\frac{dy}{dx}=4\pi+1$
M1	For gradient of the normal $=-\frac{1}{"(4\pi+1)"}$
M1	For a fully correct method to find the equation of the line, using the correct *x* coordinate and their *y* coordinate and their gradient, which must be $=-\frac{1}{their(4\pi+1)}$ and must have come from differentiation. If $y = mx + c$ is the method used, *c* must be found and the line written as $y =$. If this method is used, this mark can be implied by the next method mark.
dM1	For expanding and rearranging their equation (allow one sign or algebraic error) to form an unsimplified equation = 0 Dependent on previous method mark.
A1cso	For obtaining the given expression