Question 14 (Total 7 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{dx}{dy} = 18\cos 2y \Rightarrow$ $\frac{dy}{dx} = \frac{1}{18\cos 2y}$	M1	This mark is given for differentiating and inverting
	At (0, 0), $\frac{dy}{dx} = \frac{1}{18}$	A1	This mark is given for finding $\frac{dy}{dx}$ when $y = 0$
(b)(i)	$\sin 2y \approx 2y \Rightarrow x \approx 18y$	B1	This mark is given for finding an approximation for x
(b)(ii)	When x and y are small, $x = 4\sin 2y$ approximates to the line $x = 18y$ via the Taylor approximation. This is consistent with the gradient at the origin found in part (a)	B1	This mark is given for a valid explanation of the relationship between x and y when both are small
(c)	$\sin^2 2y + \cos^2 2y = 1$ $\Rightarrow \cos^2 2y = 1 - \sin^2 2y$ $x = 9\sin 2y \Rightarrow \sin^2 2y = \left(\frac{x}{9}\right)^2$	M1	This mark is given for a method to use find an expression for $\sin^2 2y$ in terms of x
	$\frac{dy}{dx} = \frac{1}{18\cos 2y} = \frac{1}{18\sqrt{1-\left(\frac{x}{9}\right)^2}}$	A1	This mark is given for a non-simplified expression for $\frac{dy}{dx}$
	$\frac{dy}{dx} = \frac{1}{2\sqrt{81-x^2}}$	A1	This mark is given for a fully correct answer as shown