1. Differentiate $y = \cos x$ from first principles. [6]

END OF QUESTION paper

Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			$\frac{dy}{dx} = \underset{h \to 0}{\text{Lim}} \frac{\cos(x+h)-\cos x}{h}$	M1(AO1.1)	Or any letter, or δx, for h; or y' for $\frac{dy}{dx}$ Correct use of cos(A + B) formula
			$\frac{\cos(x+h)-\cos x}{h} = \frac{\cos x \cos h - \sin x \sin h - \cos x}{h}$	M1(AO1.1)	
			$= \cos x \frac{\cos h - 1}{h} - \sin x \frac{\sin h}{h}$	M1(AO2.1) M1(AO2.4)	
			As $h \to 0$, $\frac{\sin h}{h} \to 1$	M1(AO2.1)	
			As $h \to 0$, $\frac{\cos h - 1}{h} \to 0$	M1(AO2.1)	allow M1M0 for "As $h \to 0$, sin $h \to h$ & cos $h \to 1$"
			$\Rightarrow \frac{dy}{dx} = -\sin x$	[6]	Dependent on at least M4
			Total	6	