

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

[6]

END OF QUESTION paper

Mark scheme

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