Quest	ion Scheme	Marks	AOs		
10	Use of $\frac{\sin(\theta+h)-\sin\theta}{(\theta+h)-\theta}$	B1	2.1		
	Uses the compound angle identity for $sin(A+B)$ with $A = \theta$, $B = h$ $\Rightarrow sin(\theta+h) = sin \theta cos h + cos \theta sin h$	M1	1.1b		
	Achieves $\frac{\sin(\theta+h) - \sin\theta}{h} = \frac{\sin\theta\cos h + \cos\theta\sin h - \sin\theta}{h}$	A1	1.1b		
	$= \frac{\sin h}{h} \cos \theta + \left(\frac{\cos h - 1}{h}\right) \sin \theta$	M1	2.1		
	Uses $h \to 0$, $\frac{\sin h}{h} \to 1$ and $\frac{\cos h - 1}{h} \to 0$				
	Hence the $\lim_{h\to 0} \frac{\sin(\theta+h)-\sin\theta}{(\theta+h)-\theta} = \cos\theta$ and the gradient of	A1*	2.5		
	the chord \rightarrow gradient of the curve $\Rightarrow \frac{dy}{d\theta} = \cos \theta *$				
		(5 n	narks)		
Notes					
B1:	ates or implies that the gradient of the chord is $\frac{\sin(\theta+h)-\sin\theta}{h}$ or similar such as				
	$\frac{\sin(\theta + \delta\theta) - \sin\theta}{\theta + \delta\theta - \theta} $ for a small h or $\delta\theta$				
M1:	ses the compound angle identity for $sin(A + B)$ with $A = \theta$, $B = h$ or $\delta\theta$				
A1:	Obtains $\frac{\sin\theta\cos h + \cos\theta\sin h - \sin\theta}{h}$ or equivalent				

$$os h-1$$

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$$\frac{\cos h - 1}{t}$$

$$\frac{\cos h - 1}{h}$$

$$\frac{\cos h - 1}{h}$$

$$\frac{\cos h - 1}{h}$$

$$f(\frac{\sin h}{h})$$
 and $\frac{\cos h - 1}{h}$

1: Writes their expression in terms of
$$\frac{\sin h}{h}$$
 and $\frac{\cos h - 1}{h}$

M1: Writes their expression in terms of
$$\frac{\sin h}{h}$$
 and $\frac{\cos h - 1}{h}$

Writes their expression in terms of
$$\frac{1}{h}$$
 and $\frac{1}{h}$

1*: Uses correct language to explain that
$$\frac{dy}{d\theta} = \cos \theta$$

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 For this method they should use all of the given state

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$$h \to 0$$
, $\frac{\sin h}{h} \to 1$,

For this method they should use all of the given state
$$\cos h - 1$$
 $\sin(\theta + h) - 1$

For this method they should use all of the given sta
$$\frac{\cos h - 1}{\cos h} \to 0 \text{ meaning that the limit}_{h\to 0} \frac{\sin(\theta + h)}{\sin(\theta + h)}$$

$$\frac{\cos h - 1}{h} \to 0 \text{ meaning that the limit}_{h \to 0} \frac{\sin(\theta + h) - \sin \theta}{(\theta + h) - \theta} = \cos \theta$$

$$\frac{\cos h - 1}{h} \to 0 \quad \text{meaning that the limit}_{h \to 0} \frac{\sin(\theta + h)}{(\theta + h)}$$

and therefore the gradient of the chord \rightarrow gradient of the curve $\Rightarrow \frac{dy}{d\theta} = \cos \theta$

$$h \to 0$$
 meaning that the $\min_{h \to 0} \frac{1}{(\theta + h) - \theta}$
and therefore the gradient of the chord \to gradient of

$$\frac{3h-1}{h} \to 0$$
 meaning that the $\lim_{h\to 0} \frac{3h-1}{h}$

Question	Scheme	Marks	AOs
10alt	Use of $\frac{\sin(\theta+h)-\sin\theta}{(\theta+h)-\theta}$	B1	2.1
	Sets $\frac{\sin(\theta+h)-\sin\theta}{(\theta+h)-\theta} = \frac{\sin\left(\theta+\frac{h}{2}+\frac{h}{2}\right)-\sin\left(\theta+\frac{h}{2}-\frac{h}{2}\right)}{h}$ and uses the compound angle identity for $\sin(A+B)$ and $\sin(A-B)$ with $A=\theta+\frac{h}{2}$, $B=\frac{h}{2}$	M1	1.1b
	Achieves $\frac{\sin(\theta + h) - \sin \theta}{h} = \frac{\left[\sin\left(\theta + \frac{h}{2}\right)\cos\left(\frac{h}{2}\right) + \cos\left(\theta + \frac{h}{2}\right)\sin\left(\frac{h}{2}\right)\right] - \left[\sin\left(\theta + \frac{h}{2}\right)\cos\left(\frac{h}{2}\right) - \cos\left(\theta + \frac{h}{2}\right)\sin\left(\frac{h}{2}\right)\right]}{h}$	A1	1.1b
	$= \frac{\sin\left(\frac{h}{2}\right)}{\frac{h}{2}} \times \cos\left(\theta + \frac{h}{2}\right)$	M1	2.1
	Uses $h \to 0$, $\frac{h}{2} \to 0$ hence $\frac{\sin\left(\frac{h}{2}\right)}{\frac{h}{2}} \to 1$ and $\cos\left(\theta + \frac{h}{2}\right) \to \cos\theta$	A1*	2.5
	Therefore the $\lim_{h\to 0} \frac{\sin(\theta+h) - \sin\theta}{(\theta+h) - \theta} = \cos\theta$ and the gradient of the chord \rightarrow gradient of the curve $\Rightarrow \frac{dy}{d\theta} = \cos\theta$ *		

(5 marks)

Additional notes:

A1*: Uses correct language to explain that $\frac{dy}{d\theta} = \cos\theta$. For this method they should use the

(adapted) given statement
$$h \to 0$$
, $\frac{h}{2} \to 0$ hence $\frac{\sin\left(\frac{h}{2}\right)}{\frac{h}{2}} \to 1$ with $\cos\left(\theta + \frac{h}{2}\right) \to \cos\theta$

meaning that the $\lim_{h\to 0} \frac{\sin(\theta+h) - \sin\theta}{(\theta+h) - \theta} = \cos\theta$ and therefore the gradient of the chord \rightarrow gradient of the curve $\Rightarrow \frac{dy}{d\theta} = \cos\theta$