

Question number	Scheme	Marks
8 (a)	$k = 2$	B1 [1]
(b)	$2 + 3 \cos A - \sin A - 3 \sin 2A - 2 \cos^2 A = 3 \cos A - \sin A - 6 \sin A \cos A + 2 \sin^2 A$ $3 \cos A - \sin A - 6 \sin A \cos A + 2 \sin^2 A = 3 \cos A(1 - 2 \sin A) - \sin A(1 - 2 \sin A)$ $3 \cos A(1 - 2 \sin A) - \sin A(1 - 2 \sin A) = (1 - 2 \sin A)(3 \cos A - \sin A)$ $\Rightarrow p = 3, q = 1, r = 2$	B1  M1  A1 [3]
	<b>ALT</b>	
	$2 + 3 \cos A - \sin A - 3 \sin 2A - 2 \cos^2 A = 3 \cos A - \sin A - 6 \sin A \cos A + 2 \sin^2 A$ $(p \cos A - \sin A)(q - r \sin A) = pq \cos A - q \sin A - pr \cos A \sin A + r \sin^2 A$ $pq \cos A - q \sin A - pr \cos A \sin A + r \sin^2 A$ $\Rightarrow p = 3, q = 1, r = 2$	{B1}  {M1}  {A1} [3]
(c)	$(1 - 2 \sin 2\theta)(3 \cos 2\theta - \sin 2\theta) = 0$ $\Rightarrow 3 \cos 2\theta - \sin 2\theta = 0 \Rightarrow \tan 2\theta = 3$ $\Rightarrow 1 - 2 \sin 2\theta = 0 \Rightarrow \sin 2\theta = \frac{1}{2}$ $\tan 2\theta = 3 \Rightarrow 2\theta = 1.2490..., 4.3906... \Rightarrow \theta = 0.625, 2.20$ $\sin 2\theta = \frac{1}{2} \Rightarrow 2\theta = 0.5235..., 2.6179... \Rightarrow \theta = 0.262, 1.31 \left[ \frac{\pi}{12}, \frac{5\pi}{12} \right]$	B1  B1 M1A1  M1A1 [6]
<b>Total 10 marks</b>		
(a) B1 (b) B1 M1 A1 ALT B1 M1 A1	$k = 2$  Substituting $k = 2$ and use of $\sin^2 A + \cos^2 A = 1$ to obtain $3 \cos A - \sin A - 6 \sin A \cos A + 2 \sin^2 A$ Factorising to obtain $(1 - 2 \sin A)(3 \cos A - \sin A)$ $p = 3, q = 1, r = 2$ If $p, q$ and $r$ are stated then they must be correct (may be implied by a correct factorisation if $p, q$ and $r$ are not stated)  Substituting $k = 2$ and use of $\sin^2 A + \cos^2 A = 1$ to obtain $3 \cos A - \sin A - 6 \sin A \cos A + 2 \sin^2 A$ Expanding $(p \cos A - \sin A)(q - r \sin A)$ to obtain $pq \cos A - q \sin A - pr \cos A \sin A + r \sin^2 A$ $p = 3, q = 1, r = 2$	

<b>(c)</b>	
<b>B1</b>	$\tan 2\theta = 3$
<b>B1</b>	$\sin 2\theta = \frac{1}{2}$
<b>M1</b>	$2\theta = 1.24(90\dots), 4.39(06\dots)$
<b>A1</b>	$\theta = 0.625, 2.2(0)$
<b>M1</b>	$2\theta = 0.5235\dots, 2.61(79\dots)$ allow $\left[\frac{\pi}{6}, \frac{5\pi}{6}\right]$
<b>A1</b>	$\theta = 0.262, 1.31$ allow $\left[\frac{\pi}{12}, \frac{5\pi}{12}\right]$