

Q	Marking instructions	AO	Marks	Typical solution
12(a)(i)	Uses $\frac{a}{1-r}$	1.1a	M1	$S_{\infty} = \frac{1}{1 - \frac{1}{2}} = 2$
	Obtains 2	1.1b	A1	
<b>Subtotal</b>			<b>2</b>	

Q	Marking instructions	AO	Marks	Typical solution
12(a)(ii)	Deduces $a = \frac{1}{2}$ and $r = \frac{1}{2}$ or Deduces $\sum_{n=1}^{\infty} (\sin 30^{\circ})^n = \text{their part (a)(i)} - 1$ or Deduces the answer is half of their answer in part (a)(i)	2.2a	M1	$\begin{aligned} \sum_{n=1}^{\infty} (\sin 30^{\circ})^n &= \frac{1}{2} + \frac{1}{4} + \dots \\ &= \frac{\frac{1}{2}}{1 - \frac{1}{2}} \\ &= 1 \end{aligned}$
	Obtains 1	1.1b	A1	
<b>Subtotal</b>			<b>2</b>	

Q	Marking instructions	AO	Marks	Typical solution
12(b)	Forms equation $\frac{a}{1-r} = 2 - \sqrt{2}$ If the above is not seen then condone $\frac{\cos \theta}{1 - \cos \theta} = 2 - \sqrt{2}$ or Condone use of a numerical value for $a$ where $a > 0$	3.1a	M1	$\sum_{n=0}^{\infty} (\cos \theta)^n = 2 - \sqrt{2}$ $\frac{a}{1-r} = 2 - \sqrt{2}$
	Uses $a = 1$ and $r = \cos \theta$	1.1b	B1	$a = 1$ $r = \cos \theta$
	Obtains either $r = 1 - \frac{1}{2 - \sqrt{2}}$ or $-\frac{\sqrt{2}}{2}$ or $\cos \theta = 1 - \frac{1}{2 - \sqrt{2}}$ or $-\frac{\sqrt{2}}{2}$ ACF	1.1b	A1	$1 - \cos \theta = \frac{1}{2 - \sqrt{2}}$ $\cos \theta = 1 - \frac{1}{2 - \sqrt{2}}$ $\theta = \frac{3\pi}{4}$
	Deduces $\theta = \frac{3\pi}{4}$	2.2a	R1	
	<b>Subtotal</b>		<b>4</b>	
	<b>Question 12 Total</b>		<b>8</b>	