

Question	Scheme	Marks	AOs
<b>4(a)</b>	$z^n + z^{-n} = \cos n\theta + i \sin n\theta + \cos n\theta - i \sin n\theta$	M1	2.1
	$= 2 \cos n\theta^*$	A1*	1.1b
		<b>(2)</b>	
<b>(b)</b>	$(z + z^{-1})^4 = 16 \cos^4 \theta$	B1	2.1
	$(z + z^{-1})^4 = z^4 + 4z^2 + 6 + 4z^{-2} + z^{-4}$	M1	2.1
	$= z^4 + z^{-4} + 4(z^2 + z^{-2}) + 6$	A1	1.1b
	$= 2 \cos 4\theta + 4(2 \cos 2\theta) + 6$	M1	2.1
	$\cos^4 \theta = \frac{1}{8}(\cos 4\theta + 4 \cos 2\theta + 3)^*$	A1*	1.1b
		<b>(5)</b>	

**(7 marks)**

**Notes:**

**(a)**

**M1:** Identifies the correct form for  $z^n$  and  $z^{-n}$  and adds to progress to the printed answer

**A1\*:** Achieves printed answer with no errors

**(b)**

**B1:** Begins the argument by using the correct index with the result from part (a)

**M1:** Realises the need to find the expansion of  $(z + z^{-1})^4$

**A1:** Terms correctly combined

**M1:** Links the expansion with the result in part (a)

**A1\*:** Achieves printed answer with no errors