

Q	Marking instructions	AO	Marks	Typical solution
16(a)	Explains that the sum of the angles in a triangle is π (radians) and verifies $BAC = \frac{2\pi}{3} - x$ Eg $\pi = \frac{2\pi}{3} - x + \frac{\pi}{3} + x \text{ OE}$	2.4	E1	The angles in a triangle add up to π radians. $\text{Angle } BAC = \pi - \frac{\pi}{3} - x = \frac{2\pi}{3} - x$
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
16(b)(i)	Forms an equation using the sine rule using any two of $\frac{AC}{\sin \frac{\pi}{3}} = \frac{BC}{\sin A} = \frac{AB}{\sin x} \quad \text{OE}$ Could use corresponding lowercase letters or letters defined or on the diagram throughout.	3.1a	M1	$\frac{BC}{\sin\left(\frac{2\pi}{3} - x\right)} = \frac{AB}{\sin x}$ $\sin\left(\frac{2\pi}{3} - x\right) = \sin \frac{2\pi}{3} \cos x - \cos \frac{2\pi}{3} \sin x$ $= \frac{\sqrt{3}}{2} \cos x - \left(-\frac{1}{2}\right) \sin x$ $= \frac{\sqrt{3}}{2} \cos x + \frac{1}{2} \sin x$ $\frac{BC}{AB} = \frac{\frac{\sqrt{3}}{2} \cos x + \frac{1}{2} \sin x}{\sin x}$ $= \frac{\sqrt{3} \cot x + 1}{2}$
	Obtains $\frac{BC}{\sin\left(\frac{2\pi}{3} - x\right)} = \frac{AB}{\sin x}$ Accept $\frac{BC}{\sin\left(\pi - \left(\frac{\pi}{3} + x\right)\right)} = \frac{AB}{\sin x}$ OE	1.1b	A1	
	Uses compound angle formula to expand $\sin\left(\frac{2\pi}{3} - x\right)$ or $\sin\left(\frac{\pi}{3} + x\right)$ Condone one sign error	3.1a	M1	
	Substitutes correct exact values for $\sin\left(\frac{2\pi}{3}\right)$ and $\cos\left(\frac{2\pi}{3}\right)$ Or for $\sin\left(\frac{\pi}{3}\right)$ and $\cos\left(\frac{\pi}{3}\right)$ into their expanded compound angle	1.1a	M1	
	Completes reasoned argument to obtain $\frac{BC}{AB} = \frac{\sqrt{3} \cot x + 1}{2}$ Accept $\frac{a}{c} = \frac{\sqrt{3} \cot x + 1}{2}$	2.1	R1	
	Subtotal		5	

Q	Marking instructions	AO	Marks	Typical solution
16(b)(ii)	Deduces $\frac{\pi}{4}$ from $\frac{\sqrt{3}\cot x + 1}{2}$	2.2a	R1	$\frac{\pi}{4}$
	Subtotal		1	

	Question 16 Total		7	
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