1	**Alternative method 1**		
	(sin 30° =) $\frac{1}{2}$ or (cos 30° =) $\frac{\sqrt{3}}{2}$ or (tan 30° =) $\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$ or $\left(\frac{1/2}{\sqrt{3}/2}\right)$	M1	may be seen beside question
	$5\left(\frac{1}{2}\right) \times \frac{\sqrt{3}}{2} \times 8\left(\frac{1}{\sqrt{3}}\right)$ or $5\left(\frac{1}{2}\right) \times \frac{\sqrt{3}}{2} \times 8\left(\frac{1/2}{\sqrt{3}/2}\right)$ or $\frac{5}{2} \times \frac{\sqrt{3}}{2} \times \frac{8\sqrt{3}}{3}$	M1dep	oe multiplication string with all correct values
	$\frac{40\sqrt{3}}{4\sqrt{3}}$ or $\frac{40\sqrt{3}\sqrt{3}}{12}$	M1dep	oe single fraction with roots rationalised or able to be cancelled
	10 from correct working	A1	
	Alternative method 2: substituting $\frac{\sin}{\cos}$ for tan and cancelling		
	$5\sin 30° \times \cos 30° \times 8\frac{\sin 30°}{\cos 30°}$	M1	
	$40\sin^2 30°$	M1dep	oe cancels cos 30°
	$40\left(\frac{1}{2}\right)^2$	M1dep	oe
	10 from correct working	A1	

Question	Answer	Mark	Comments
2	**Alternative method 1**		
	$\sin 30 = \frac{x}{10}$ or $(x =)\ 10 \sin 30$	M1	oe eg $\frac{x}{\sin 30} = \frac{10}{\sin 90}$
	$\sin 30 = 0.5$	M1	oe may be seen in a table $0.5 = \frac{x}{10}$ oe scores M1M1
	5	A1	
	Alternative method 2		
	Correct trigonometric method to show that the length of the missing side is $5\sqrt{3}$	M1	oe
	$\sqrt{(5\sqrt{3})^2 + x^2} = 10$	M1dep	oe
	5	A1	
	Additional Guidance		
	Accept use of cos 60 instead of sin 30		

Q	Answer	Mark	Comment
3	(cos 30 =) $\frac{\sqrt{3}}{2}$ or (sin 45 =) $\frac{\sqrt{2}}{2}$ or $\frac{1}{\sqrt{2}}$ or (tan 60 =) $\sqrt{3}$	M1	oe correct trig function may be implied by position in multiplication string may be seen in a table
	$\left(\frac{\sqrt{3}}{2}\times\frac{\sqrt{2}}{2}\times\sqrt{3}\right)^2$ or $\left(\frac{\sqrt{3}}{2}\right)^2\times\left(\frac{\sqrt{2}}{2}\right)^2\times\left(\sqrt{3}\right)^2$ or $\frac{3\sqrt{2}}{4}$ or $\frac{3}{2\sqrt{2}}$ or $\frac{\sqrt{18}}{4}$	M1dep	oe with all values correct oe single term not squared
	$\left(\frac{3\sqrt{2}}{4}\right)^2$ or $\left(\frac{3}{2\sqrt{2}}\right)^2$ or $\left(\frac{\sqrt{18}}{4}\right)^2$ or $\frac{3}{4}\times\frac{1}{2}\times 3$ or $\frac{\sqrt{324}}{16}$	M1dep	oe with all values correct oe single term squared oe multiplication string without surds oe single fraction with one surd
	$\frac{9}{8}$ or $1\frac{1}{8}$ or 1.125	A1	oe fraction, mixed number or decimal
	Additional Guidance		
	Ignore an incorrect attempt to simplify or convert a correct answer eg $\frac{9}{8}$ = 1.8		M1M1M1A1

Q	Answer	Mark	Comments
4	**Alternative method 1**		
	tan identified	M1	oe eg $\tan^{-1}$
	$\tan x = \frac{10}{4}$ or $\tan x = \frac{5}{2}$ or $\tan x = 2.5$	M1dep	oe eg $\tan^{-1}\frac{10}{4}$ or $90 - \tan^{-1}\frac{4}{10}$
	[68, 68.2]	A1	SC1 [21.8, 22]
	Alternative method 2		
	$\sin x = \frac{10}{\sqrt{4^2+10^2}}$ or $\cos x = \frac{4}{\sqrt{4^2+10^2}}$	M2	oe eg $\sin x = \frac{10}{\sqrt{116}}$ or $\sin^{-1}\frac{10}{\sqrt{4^2+10^2}}$ or $\cos x = \frac{4}{\sqrt{116}}$ or $\cos^{-1}\frac{4}{\sqrt{4^2+10^2}}$ or $90 - \sin^{-1}\frac{4}{\sqrt{4^2+10^2}}$ or $90 - \cos^{-1}\frac{10}{\sqrt{4^2+10^2}}$
	[68, 68.2]	A1	SC1 [21.8, 22]
	Additional Guidance		
	Accept 10.77 or 10.8 or $2\sqrt{29}$ for $\sqrt{116}$		
	Tan can be identified by, for example, circling TOA in SOHCAHTOA		
	Answer from accurate drawing		M0M0A0
	$\sin x = \frac{10 \sin 90}{\sqrt{116}}$		M2
	$(x =)$ tan 2.5 or $(x =)$ tan 0.4 or $(x =) \tan\left(\frac{10}{4}\right)^{-1}$ unless recovered		M1M0A0
	$\tan = \frac{10}{4}$ or $\tan = \frac{4}{10}$ or $\tan x = \frac{4}{10}$ with no further correct working		M1M0A0

Q	Answer	Mark	Comments
5	$\sin 30 = \frac{1}{2}$ or $\tan 45 = 1$ or $\cos 30 = \frac{\sqrt{3}}{2}$	M1	oe eg $\tan 45 = \frac{\sqrt{2}}{\sqrt{2}}$ or $4 \sin 30 = 2$ or $2 \cos 30 = \sqrt{3}$ implied by position in the expression may be seen in a table
	substitution of all three correct values	M1dep	eg $\frac{4 \times \frac{1}{2} - 1}{2 \times \frac{\sqrt{3}}{2}}$ or $\frac{2-1}{2 \times \frac{\sqrt{3}}{2}}$ or $\frac{2-1}{\sqrt{3}}$
	$\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$	M1dep	
	$(\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$ =) tan 30 or $x = 30$ with full working seen for M3	A1	
	Additional Guidance		
	Allow $\sqrt{1}$ for 1 throughout		
	Reference to 30° being an acute angle is not required		

Q	Answer	Mark	Comments
6	**Alternative method 1** Works out AC and uses it in triangle ABC		
	$\cos 37 = \frac{AC}{4}$	M1	oe eg $\sin 53 = \frac{AC}{4}$ allow [0.798, 0.8] for cos 37 or sin 53
	$(AC =)\ 4 \times \cos 37$ or $(AC =)$ [3.19, 3.2]	M1dep	oe eg $(AC =)\ 4 \times \sin 53$ allow [0.798, 0.8] for cos 37 or sin 53 may be seen on diagram
	$\sin x = \frac{\text{their [3.19, 3.2]}}{9.3}$ or $(x =) \sin^{-1}$ [0.34, 0.3441]	M1dep	oe eg $\cos x = \frac{\sqrt{9.3^2 - \text{their [3.19, 3.2]}^2}}{9.3}$ or $(x =) 90 - \cos^{-1}$ [0.34, 0.3441]
	[19.87, 20.13]	A1	
	Alternative method 2 Works out angle ADC and uses it in triangle ABD		
	(angle $ADC =$) $90 - 37$ or (angle $ADC =$) 53	M1	oe eg (angle $ADC =$) $180 - 90 - 37$ may be seen on diagram
	$\frac{\sin x}{4} = \frac{\sin(90-37)}{9.3}$	M1dep	oe eg $\frac{4}{\sin x} = \frac{9.3}{\sin 53}$
	$(\sin x =) \frac{\sin(90-37)}{9.3} \times 4$ or $(x =) \sin^{-1}$ [0.34, 0.3441]	M1dep	oe
	[19.87, 20.13]	A1	

6 cont	Additional Guidance	
	Up to M3 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts	
	Allow any unambiguous notation for angles eg allow B for x	
	Alt 1 Allow any unambiguous notation for AC eg y (condone x if clearly referring to AC)	
	Alt 1 1st M1 must be an equation where AC is the only variable eg $AC^2 + (4\sin 37)^2 = 4^2$	M1
	Alt 1 A calculation that leads to AC scores M1M1 eg $\sqrt{4^2 - (4\sin 37)^2}$	M1M1
	Alt 1 3rd M1 must have $\sin x$ (or $\cos x$) as the subject or be a calculation that leads to x	
	Alt 2 53 only marked at angle BAC on diagram	M0

Q	Answer	Mark	Comments
7	**Alternative method 1 – using tangent of an angle**		
	tan chosen or used	M1	
	$\tan 58 = \frac{x}{46}$ or $46 \times \tan 58$ or $\tan 32 = \frac{46}{x}$ or $\frac{46}{\tan 32}$	M1dep	oe
	[73.6, 74]	A1	
	Alternative method 2 – finding hypotenuse first		
	$\frac{46}{\cos 58}$ or $\frac{46}{\sin 32}$ or 86.8(...) or 87	M1	oe
	$\sqrt{(\text{their } 86.8(...))^2 - 46^2}$ or $\sqrt{5418.(...)}$ or their 86.8(…) × sin 58 or their 86.8(…) × cos 32	M1dep	oe
	[73.6, 74]	A1	
	Additional Guidance		
	Do not accept scale drawing		
	Answer 73 after answer in range seen		M1M1A1
	$\frac{\sin 32}{46} = \frac{\sin 58}{x}$		M1

Q	Answer	Mark	Comment
8	**Alternative method 1**		
	(sin 30 =) $\frac{1}{2}$ or (tan 30 =) $\frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$ or (cos 30 =) $\frac{\sqrt{3}}{2}$	M1	oe may be implied by (4 × sin 30 =) 2 may be implied by correct position in a multiplication string
	$4 \times \frac{1}{2} \times \frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{2}$	M1dep	oe with all trig values correct condone any order unless error seen
	1 with all three values seen	A1	implied by 90 with all three values seen
	90 with M1M1A1 scored	A1	accept any angle of the form $90 + 360n$, where n is an integer
	Alternative method 2		
	$4 \times \sin 30° \times \frac{\sin 30°}{\cos 30°} \times \cos 30°$	M1	
	$4 \times \frac{1}{2} \times \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} \times \frac{\sqrt{3}}{2}$	M1dep	oe eg $4 \times \left(\frac{1}{2}\right)^2$
	1 with $\frac{\sin 30°}{\cos 30°}$ and $\frac{1}{2}$ and $\frac{\sqrt{3}}{2}$ seen	A1	if cos 30° is cancelled out only $\frac{1}{2}$ need be seen
	90 with M1M1A1 scored	A1	accept any angle of the form $90 + 360n$, where n is an integer
	Additional Guidance		
	Condone a square root sign on 1 up to M1M1		

Q	Answer	Mark	Comments
9	**Alternative method 1: substitutes values**		
	$(\sin 30° =) \frac{1}{2}$ or $6 \sin 30° = 3$ **or** $(\cos 30° =) \frac{\sqrt{3}}{2}$ or $2 \cos 30° = \sqrt{3}$ **or** $(\tan 30° =) \frac{1}{\sqrt{3}}$ or $\frac{\sqrt{3}}{3}$ or $4 \tan 30° = \frac{4}{\sqrt{3}}$ or $\frac{4\sqrt{3}}{3}$	M1	may be seen beside the given expression or in a table
	$6\left(\frac{1}{2}\right)$ and $2\left(\frac{\sqrt{3}}{2}\right)$ and $4\left(\frac{1}{\sqrt{3}}\right)$ or $6\left(\frac{1}{2}\right)$ and $2\left(\frac{\sqrt{3}}{2}\right)$ and $4\left(\frac{\sqrt{3}}{3}\right)$ or $\frac{6}{2}$ and $\frac{2\sqrt{3}}{2}$ and $\frac{4\sqrt{3}}{3}$	M1dep	oe
	Processing at least as far as $\frac{6}{2} + \frac{8\sqrt{3}}{2\sqrt{3}}$ or $\frac{6}{2} + \frac{8\sqrt{3}\sqrt{3}}{6}$ or $\frac{6}{2} + \frac{24}{6}$	M1dep	oe
	7 from correct working	A1	SC2 $4 + 4\sqrt{3}$ oe

9 cont	**Alternative method 2: uses a trig identity**		
	$6 \sin 30° + 2 \cos 30° \times 4 \dfrac{\sin 30°}{\cos 30°}$	M1	oe
	$6 \sin 30° + 8 \sin 30°$ or $14 \sin 30°$	M1dep	oe
	$14 \times \dfrac{1}{2}$	M1dep	oe
	7 from correct working	A1	SC2 $4 + 4\sqrt{3}$ oe
	Additional Guidance		
	Alt 2 is not on this specification, but may be seen if other qualifications have been studied, eg AQA Certificate – Level 2 Further Maths		
	Incorrect order of operations gives $4 + 4\sqrt{3}$ oe		SC2
	Allow $\sqrt{1}$ for 1 throughout		