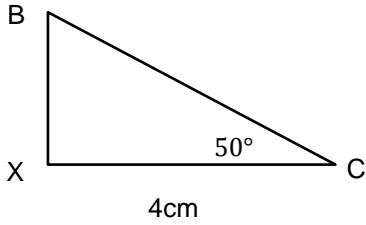
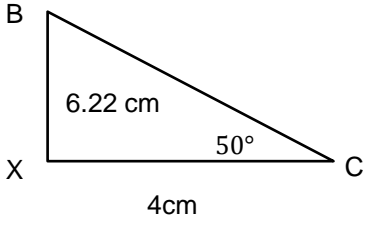


3D Pythagoras and Trigonometry Mark Scheme:		
1(a)	$CH^2 = 12^2 + 3^2 = 144 + 9 = 153$ $CH = \sqrt{153}$	[1] Pythagoras
	$CH = 12.37 \text{ cm (2dp)}$	[1] Correct answer
1(b)	$CE^2 = 12.37^2 + 4^2 = 153.01 + 16 = 169.01$ $CE = \sqrt{169.01}$	[1] Correct working even with error carry forward
	$CE = 13.00 \text{ cm (2dp)}$	[1] Correct answer
2(a)	$CA^2 = 5^2 + 7^2 = 25 + 49 = 74$ $CA = \sqrt{74}$	[1] Pythagoras
	$CA = 8.60 \text{ (2dp)}$ $XY = CA = 8.60 \text{ cm}$	[1] Correct answer
2(b)	$CX^2 = 5^2 + 8.6^2 = 25 + 73.96 = 98.96$ $CX = \sqrt{98.96}$	[1] Pythagoras
	$CX = 9.95 \text{ cm (2dp)}$	[1] Correct answer
3(a)	$AC^2 = 12^2 + 12^2 = 144 + 144 = 288$ $AC = \sqrt{288}$	[1] Pythagoras
	$AE^2 = 10^2 + \left(\frac{\sqrt{288}}{2}\right)^2 = 100 + 72.08 = 172.08$ $AE = \sqrt{172.08} = 13.11 \text{ cm (2dp)}$	[1] Allow 13.12 due to early rounding
3(b)	$\cos(A) = \frac{(13.11^2 + 13.11^2) - 12^2}{2 \times 13.11 \times 13.11} = 0.581 \dots$	[1] Cosine rule
	$A = \cos^{-1}(0.581 \dots) = 54.45^\circ$	[1] Allow 54.47° for using rounded answer to part (a)
4	$\cos(50) = \frac{4}{BC}$ $BC = \frac{4}{\cos(50)} = 6.22 \text{ cm}$ 	[1] Correct Trig rule
	$\sin(40) = \frac{6.22}{EC}$ 	[1] Correct Trig rule
	$EC = \frac{6.22}{\sin(40)} = 9.68 \text{ cm}$	[1] Correct answer

Turn over ►

5	$\cos(30) = \frac{1}{AX}$ $AX = \frac{1}{\cos(30)} = \frac{2\sqrt{3}}{3} \text{ cm}$	[1] Creation of right-angled triangle with angle 30
	$XD^2 = 2^2 - \left(\frac{2\sqrt{3}}{3}\right)^2 = 4 - \frac{4}{3} = \frac{8}{3}$	[1] Use of Pythagoras
	$XD = \sqrt{\frac{8}{3}} = 1.63 \text{ m (2dp)}$	[1] Correct answer
6	$\cos(75) = \frac{3.5}{BC}$ $BC = \frac{3.5}{\cos(75)} = 13.52 \text{ cm}$	[1] Calculation of BC as EF length same as BC
	$CF = \frac{13.53}{\tan(35)} = 19.31 \text{ cm}$	[1] Use BC length to calculate CF
	$\text{Area} = \frac{1}{2} \times 13.52 \times 7 \times \sin(75) = 45.71 \text{ cm}^2$	[1] Area of ABC = $\frac{1}{2}ab\sin(c)$
	$45.71 \times 19.31 = 882.9 \text{ cm}^3$	[1] Area of face $\times$ Length
7	$\tan(30) = \frac{AB}{4}$ $AB = 4 \times \tan(30) = \frac{4\sqrt{3}}{3}$	[1] Calculation of AD using Trig
	$AD = 2AB = 2 \times \frac{4\sqrt{3}}{3} = \frac{8\sqrt{3}}{3}$	[1] Calculation of AD from AB
	$\cos(30) = \frac{4}{AC}$ $AC = \frac{4}{\cos(30)} = \frac{8\sqrt{3}}{3}$	[1] AC answer left in surd form
	$DC^2 = \left(\frac{8\sqrt{3}}{3}\right)^2 + \left(\frac{8\sqrt{3}}{3}\right)^2 = \frac{128}{3}$ $DC = \frac{8\sqrt{6}}{3}$	[1] DC calculated
	$DX = DC \div 2 = \frac{4\sqrt{6}}{3}$ $AX = BX = DX = CX$ $a = 4$	[1] Correct value of a

END