Question	Answer	Mark	Answer
1	47 to 47.4° with diagram and commentary	**5**	EG For triangle MXN (X midpoint of BC): MX = $\sqrt{(3.5^2 + 3^2)}$ = 4.60977 rot NX = 5 Angle NMX = $\tan^{-1}(5/4.60977)$ = 47 to 47.4°
	47 to 47.4° with no diagram and little or no commentary	**4-3**	MX (4.6) or MN (6.8) found **AND** Correct trig ratio used in the correct triangle
	MX (4.6) or MN (6.8) found **OR** Correct trig ratio for their values in the correct triangle	**2-1**	Correct triangle identified **OR** any correct attempt at Pythagoras
	No worthy work	**0**	

2	(a)	$10^2 - 7^2 - 3^2 \ [= h^2]$	M3	**M2** for $10^2 = 7^2 + 3^2 + h^2$ **Or SC2** for using 1.5 to correctly find one other length Or **M1** for $7^2 + 3^2$ soi by 58	For **M3** and **M2**, $7^2 + 3^2$ may be worked out separately
		$6.45 \le h < 6.5$ $1.5 < x \le 1.52$	A1 A1		
	(b)	40.3 to 40.6 or 41	3	**M2** for any correct trig form for the angle eg $\sin^{-1}(their6.5 \div 10)$, $\cos^{-1}(their7.6 \div 10)$, $\tan^{-1}(their6.5 \div their7.6)$ **Or M1** for sin/$their$6.5/10,cos/$their$7.6/10, tan/$their$6.5/$their$7.6	For **M1**, expression may be for any combination of the 3 terms

| 3 | (a | $\sqrt{\left(10^2 - \left(3^2 + 3^2\right)\right)}$ oe 9.05 to 9.08 | M2 A1 | **M1** for $\sqrt{\left(3^2 + 3^2\right)}$ or $\sqrt{\left(6^2 + 6^2\right)}$ | |
| | (b) | 64.8 to 65.6 | 3 | **M2** for $\sin^{-1}(9.1 \div 10)$ or better or for $\cos^{-1}(their\sqrt{18} \div 10)$ oe or for $\tan^{-1}(9.1 \div their\sqrt{18})$ oe or better Or **M1** for sight of $\sin x = \dfrac{9.1}{10}$ oe etc or for $\dfrac{\sin x}{9.1} = \dfrac{\sin 90}{10}$ oe Or **SC1** for answer 72.54.. rot | For $\sqrt{18}$ accept 4.242640687 rot For 9.1 accept 9.05538513 rot Any correct trig. equation for the appropriate triangle |

4	(a)	'The straight line distance will be shorter than going along the edges' oe	1	Allow 'the sum of height, length and width' must be more than the diagonal'	If not referring to the straight-line distance, their comment should clearly reference sum of sides/ lengths /edges and diagonal and compare correctly See appendix for exemplars
	(b)	$\sqrt{5.1^2 + 4.7^2 + 2.6^2} \left[= \sqrt{54.86} \right]$	M2	**M1** for $5.1^2 + 4.7^2 + 2.6^2$ or for the diagonal of one face found [base = $\sqrt{5.1^2 + 4.7^2}$ or 6.9(35...), front face = $\sqrt{5.1^2 + 2.6^2}$ or 5.7(24...), side face = $\sqrt{4.7^2 + 2.6^2}$ or 5.3(7...) or 5.4]	**M0** for just $5.1^2 + 4.7^2$ oe with other faces
		7.37 to 7.43	A1	Allow **B3** for 7.37 to 7.43 to 3sf or more but accept 7.4(0) only with correct method shown	NB **0** for scale drawing

5	(a)	(i)	(3, 0, 0)	1		
		(ii)	(0, 5, 2)	1		
	(b)		6.16 or 6.2	3	**M2** for $\sqrt{(3^2 + 5^2 + 2^2)}$ oe **Or M1** for $3^2 + 5^2 + 2^2$ oe Or for $\sqrt{(3^2 + 5^2)}$ or $\sqrt{(3^2 + 2^2)}$ or $\sqrt{(2^2 + 5^2)}$ oe	

| 6 | | | $\sqrt{15^2 + 35^2 + 10^2}$

 39.3 to 39.4 and no | M2

 A1 | **M1** for $15^2 + 35^2 + 10^2$ or 1550
 (may be in two steps of 2D Pythagoras)

 Ignore additional comments
 Allow 39 only after $\sqrt{15^2 + 35^2 + 10^2}$ or $\sqrt{1550}$ is shown with no premature approximation

 Allow **B3** for 39.3 to 39.4 nfww and no | If in two steps then figures are:
 15, 35 pair = 1450 sq rt = 38.0788..
 15, 10 pair = 325 sq rt = 18.0277...
 35, 10 pair = 1325 sq rt = 36.4005..
 (roots may be rot to 3sf or more)
 +   ust combine to earn **M2** or **M1**

 ie **M0** for just 2D Pythagoras |

| 7 | | | 11.6(...) | 3 | nfww

M2 for $\sqrt{6.7^2 + 6.7^2 + 6.7^2}$ oe
Or **M1** for $6.7^2 + 6.7^2 + 6.7^2$
Or **SC1** for 9.47(5...) rot to 1dp or more | |

8			$\sqrt{220^2 + 180^2 + 200^2}\left[=\sqrt{120800}\right]$	M2	**M1** for $220^2 + 180^2 + 200^2$ or for the diagonal of one face found rot to 3 sf or more [284.25..., 269.07..., 297.32...]	
			347.56..	A1	Allow **A1** for 347 to 348	NB **0** for scale drawing, except that **B1** may still be earned
			= 3.47 to 3.48 m or 3.5 m so yes	A1	Allow **B1FT** for correct conversion of *their* answer cm to m or of 3 m to 300 cm – may be e rned at start by conversion of a length to metres eg 2.2, 1.8, 2 seen on diagram	**B0** for just stating 100 cm = 1 m

9	(a)	(	(0, 5, 3)	1		
		(ii)	(6, 5, 0)	1		
		(iii)	(3, 0, 1.5)	1		
	(b)		9	2	**M1** for 6 × 3 ÷ 2 oe	
	(c)		8.36 to 8.4 or $\sqrt{70}$ final answer	3	**M2** for $6^2 + 5^2 + 3^2$ oe soi by 70 Or **M1** for $(6^2 + 5^2)$ <u>or</u> $(6^2 + 3^2)$ <u>or</u> $(5^2 + 3^2)$ soi	May be in two steps for **M2**

| 10 | | $\sqrt{35^2 + 28^2 + 15^2}$ oe | **M2** | **M1** for $\sqrt{35^2 + 28^2 + 15^2}$ oe or 2234 (may be in two steps of 2D Pythagoras') | If in two steps then figures are (35, 28) pair = 2009 sq root = 44.82…, (35, 15) pair = 1450 sq root = 38.07…, (28, 15) pair = 1009 sq root = 31.76..
 +   ust combine to score **M2** or **M1** |
| | | 47.2[65…] or 47.3 www and **no** | **A1** | Ignore additional comments after 'no'
 Allow 47 only after $\sqrt{2234}$ or $\sqrt{35^2 + 28^2 + 15^2}$ is shown with no premature approximation
 Allow **B3** for 47.2[65…] or 47.3 and no <br> www | |