Mark scheme

3-D Pythagoras and trigonometry

Mathematics 0580 · Questions from Paper 2 and Paper 4

Total marks

51

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
3	4	4	4	4	4	6	6	6	10	**51**

Question 1 **[3]**

1	28	**3**	**M2** for $24^2 + 12^2 + 8^2$ or **M1** for $24^2 + 12^2$ or $24^2 + 8^2$ or $12^2 + 8^2$

Question 2 **[4]**

2	35.3 or 35.26…	**4**	**M3** for correct numerical trig statement for angle PAC e.g. tan = $\frac{l}{\sqrt{l^2+l^2}}$ or $\frac{1}{\sqrt{2}}$ oe or sin = $\frac{l}{\sqrt{l^2+l^2+l^2}}$ or $\frac{1}{\sqrt{3}}$ oe or cos = $\frac{\sqrt{l^2+l^2}}{\sqrt{l^2+l^2+l^2}}$ or $\frac{\sqrt{2}}{\sqrt{3}}$ oe where l is a value or **M2** for a correct Pythagoras statement soi or correct trig statement for diagonal of a face with angle 45 used soi e.g. For side length k, AC shown as $k\sqrt{2}$ or **M1** for recognition of angle PAC

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Question 3 **[4]**

3	46.7 or 46.68 to 46.69	**4**	**M3** for tan […=] $\frac{9}{\frac{1}{2}\sqrt{12^2+12^2}}$ oe or **M1** for $\left[\frac{1}{2}\times\right]\sqrt{12^2+12^2}$ oe e.g. $\sqrt{\frac{12^2}{2}}$ and **M1** for identifying angle *MCE*

Question 4 **[4]**

4	55.9 or 55.85…	**4**	**M3** for tan[…] = $\frac{15.1}{\sqrt{4.5^2+9.2^2}}$ oe or **M2** for [AH^2 =] $4.5^2 + 9.2^2$ or [BH^2 =] $4.5^2 + 9.2^2 + 15.1^2$ or **M1** for recognising angle *BHA* if 0 scored **SC1** for [angle *BHD* =] 59.7[1…] or 59.72

Question 5 **[4]**

5	14.2 or 14.19 to 14.20	**4**	**M3** for tan = $\frac{4}{\sqrt{15^2+5^2}}$ oe or **M2** for 15^2+5^2 or$15^2+5^2+4^2$ or **M1** for recognition of angle *VAC*

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Question 6 **[4]**

6	16.8 or 16.80 to 16.81	**4**	**M3** for $\tan = \frac{5}{\sqrt{15^2+7^2}}$ oe or $\sin = \frac{5}{\sqrt{15^2+7^2+5^2}}$ oe or $\cos = \frac{\sqrt{15^2+7^2}}{\sqrt{15^2+7^2+5^2}}$ oe or **M2** for 15^2+7^2 or $15^2+7^2+5^2$ or **M1** for indication of correct angle

Question 7 **[6]**

7	64.9 or 64.89 to 64.90	**6**	**B5** for $[\cos =]\frac{100+72-100}{2\times10\times\sqrt{72}}$ OR **M1** for $8^2 + 6^2$ **M1** for $6^2 + 6^2$ **M2** for $\frac{(theirAF)^2+(theirAH)^2-(theirHF)^2}{2\times(theirAF)\times(theirAH)}$ or **M1** for $(theirHF)^2 = (theirAF)^2 + (their\ AH)^2 - 2\times(theirAF)\times(their\ AH)\cos(HAF)$ *AF*, *AH* etc from correct method

Question 8 **[6]**

8(a)	11.7 or 11.74 to 11.75	**3**	**M2** for $\left(\frac{14}{2}\right)^2 + 5^2 + 8^2$ oe or **M1** for $\left(\frac{14}{2}\right)^2 + 5^2$, $5^2 + 8^2$ or $\left(\frac{14}{2}\right)^2 + 8^2$
8(b)	42.9 to 43.14	**3**	**M2** for $\sin[\ldots.] = \frac{8}{their\ \textbf{(a)}}$ oe or **M1** for recognising angle *MBX* where *X* is the midpoint of *DC*

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Question 9 **[6]**

9(a)	10.1 or 10.10…	**3**	**M2** for $EF^2 + 6.4^2 + 5.1^2 = 13^2$ or better or **M1** for $6.4^2 + 5.1^2$ or $13^2 - 6.4^2$ or $13^2 - 5.1^2$
9(b)	29.5 or 29.49… to 29.54…	**3**	**M2** for $\sin[\ldots =] \frac{6.4}{13}$ oe or **M1** for identifying angle AGE

Question 10 **[10]**

10(a)	440	**2**	**M1** for $8 \times 5 \times 11$
10(b)	$\sqrt{8^2 + 5^2 + 11^2}$ oe or $8^2 + 5^2 + 11^2$ and 13^2 ALTERNATIVE $\sqrt{8^2 + 11^2}$ or $8^2 + 11^2$ and 13^2	**M3**	**M2** for $8^2 + 5^2 + 11^2$ or $8^2 + 11^2$ oe or **M1** for $8^2 + 5^2$ or $5^2 + 11^2$ oe
	Yes and 14.5 or 14.4 or 14.49… or Yes and 13.6[0…]	**A1**	Accept equivalent conclusion
10(c)(i)	32.0[…]	**2**	**M1** for $\tan[..] = \frac{5}{8}$ oe
10(c)(ii)	49.4 or 49.38 to 49.39	**2**	**M1** for $\sin[..] = \frac{11}{\textit{their } AG}$ oe

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