GCSE Mathematics (1MA1)

Themed papers – 3D Trigonometry

Compiled from student-friendly mark schemes

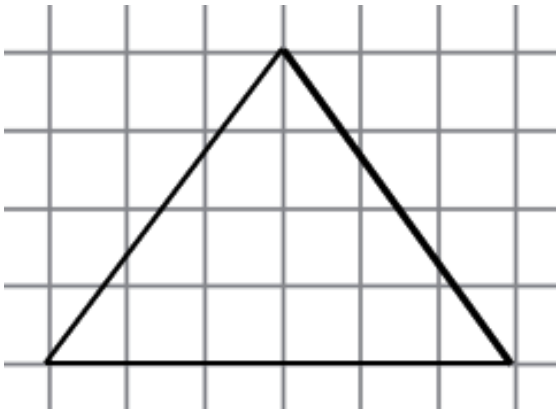
Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn't show follow-through marks (marks that are awarded despite errors being made) or special cases.

It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal mark scheme.

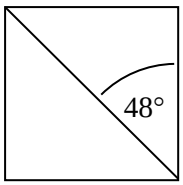
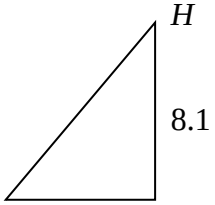
NOTES ON MARKING PRINCIPLES

Guidance on the use of codes within this mark scheme
M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect. P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question. A1 – accuracy mark. This mark is generally given for a correct answer following correct working. B1 – working mark. This mark is usually given when working and the answer cannot easily be separated. C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working. Some questions require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer).

Question 1 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		M1	This mark is given for a drawing of an isosceles diagram
		A1	This mark is given for a fully correct diagram with correct dimensions
(b)	$\frac{1}{2} \times 6 \times 5 = 15$	M1	This mark is given for a method to find the area of one triangular face
	$(4 \times 15) + (6 \times 6) = 60 + 36$	M1	This mark is given for a method to find the total surface area of the pyramid, including the base
	96	A1	This mark is given for the correct answer (96) only
	cm^3	B1	This mark is given for correct units seen

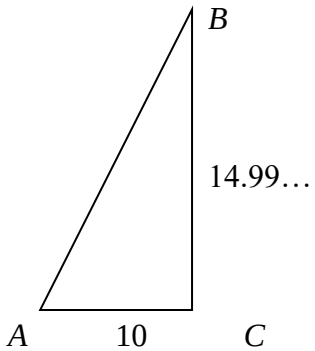
Question 2 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	A 7.3 B  D C $\sin 48° = \frac{7.3}{AC}$	P1	This mark is given for a correct trigonometric statement to find the length of AC
	$AC = \frac{7.3}{\sin 48°} = 9.82$	P1	This mark is given for a correct complete process to find the length of AC
	H  8.1 A 9.82 C $\tan CAH = \frac{8.1}{9.82}$	P1	This mark is given for a correct process to find the angle CAH
	$CAH = 39.5°$	A1	This mark is given for the correct answer only

Question 3 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$MB^2 = MA^2 + AB^2$ $MA = 15 \times \frac{3}{5} = 9$ $MB^2 = 9^2 + 15^2 = 306$ $MB = 17.49$	P1	This mark is given for a process to find the length of length *MB*
	$BE = \tan 35° \times 15 = 10.5$	P1	This mark is given for a process to find the length of length *BE*
	$\tan EMB = \frac{10.5}{17.49} = 0.6$	P1	This mark is given for a process to find the angle *EMB*
	$EMB = 30.1$	A1	This mark is given for the correct answer only

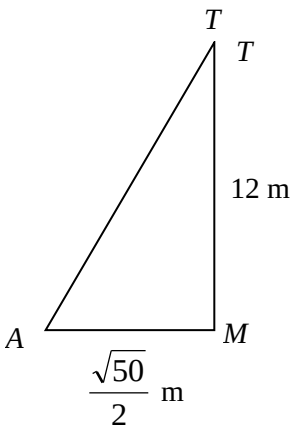
Question 12 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\pi \times 5^2 \times h = 1178$	P1	This mark is given for a correct substitution into the formula for the volume of a cylinder
	$h = \frac{1178}{25\pi} = 14.99…$	P1	This mark is given for a process to find the height of the cylinder
	 x = the angle between the road and the base of the tin $\tan x = \frac{14.99}{10} = 1.499…$	P1	This mark is given for a process to find the tangent of the angle to be found
	56.31	A1	This mark is given for an answer in the range 56 – 56.31

Question 5 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$15 \div DH = \sin 64$	P1	This mark is given for a process to find *DH*
	$15 \div DH = \sin 64$	P1	This mark is given for a process to find *AD*
	$\tan^{-1}(7.9756 \div 16.68902911)$	P1	This mark is given for a full method to find and *AHD*
	25.5	A1	This mark is given for an answer in the range of 25.5 to 25.6

Question 6 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$AC = \sqrt{5^2 + 5^5}$	P1	This mark is given for a process to find the distance *AC*
	Distance from *A* to midpoint *M* of *AC* $= \frac{\sqrt{50}}{2}$	P1	This mark is given for a process to find the distance from *A* to midpoint *M* of *AC*
	 $\tan TAC = \frac{2 \times 12}{\sqrt{50}} = 3.394$	P1	This mark is given for a process to find an expression for the tangent of angle *TAC*
	$\angle TAC = 73.6°$	A1	This mark is given for the correct answer only

Question 7 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\tan 34° = \frac{CD}{20}$, $CD = 20 \tan 34° =$ 13.49	P1	This mark is given for a process to process to find the length of *CD*
	$\cos 34° = \frac{20}{BD}$, $BD = \frac{20}{\cos 34°} =$ 24.12 or $BD^2 = 20^2 + CD^2 = 400 + 181.98 =$ 581.98 $BD = \sqrt{581.98} = 24.12$	P1	This mark is given for a process to process to find the length of *BD*
	$\frac{AD}{\sin 60°} = \frac{BD}{\sin(180 - 60 - 45)°}$ $AD = \frac{BD}{\sin 75°} \times \sin 60° = 21.63$	P1	This mark is given for using the sine rule to find the length of *AD*
	$\sin DAC = \frac{DC}{AD} = 0.624$	P1	This mark is given for a process to process to find sin *DAC*
	$\angle DAC = 38.6$	A1	This mark is given for a correct answer only answer in range 38.5 – 38.6

Mark scheme for 1MA1 Higher themed papers: 3D Trigonometry

Performance data:

Q	Taken from			Total Marks available	TOPIC	Spec Ref	AO	% Mean marks	Edexcel mean averages Marks of candidates who achieved grade:										
	Q	Series	Paper						ALL	9	8	7	6	5	4	3	2	1	U
1a	5a	June 2018	1H	2	Geometry	G2, G13	2	74	1.47	1.81	1.69	1.62	1.51	1.40	1.20	0.92	-	-	0.63
1b	5b	June 2018	1H	4	Geometry	G17, N2	1	56	2.23	3.71	3.32	2.85	2.35	1.76	1.05	0.51	-	-	0.33
2	18	June 2018	2H	4	Geometry	G20	3	26	1.03	3.29	2.38	1.48	0.78	0.33	0.11	0.03	-	-	0.01
3	19	June 2019	2H	4	Geometry	R5, G20	3	40	1.60	3.58	3.03	2.26	1.40	0.72	0.31	0.09	-	-	0.04
4	12	Mock Set 3	3H	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	12	Mock Set 4	2H	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	12	Nov 2018	3H	4	Geometry	G20	3	14	0.56	3.80	3.41	2.33	1.52	0.67	0.13	0.02	-	-	0.00
7	19	Mock Set 1	3H	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				31					**6.89**	**16.19**	**13.83**	**10.54**	**7.56**	**4.88**	**2.8**	**1.57**	**-**	**-**	**1.01**