Free-Standing Mathematics Qualification

MATHEMATICS

4985 – Shape and Space
Mark scheme

4985
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Version/Stage: Version 1.0: Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

Key to mark scheme abbreviations

M	mark is for method
m or dM	mark is dependent on one or more M marks and is for method
A	mark is dependent on M or m marks and is for accuracy
B	mark is independent of M or m marks and is for method and accuracy
E	mark is for explanation
√or ft or F	follow through from previous incorrect result
CAO	correct answer only
CSO	correct solution only
AWFW	anything which falls within
AWRT	anything which rounds to
ACF	any correct form
AG	answer given
SC	special case
OE	or equivalent
A2,1	2 or 1 (or 0) accuracy marks
–*x* EE	deduct *x* marks for each error
NMS	no method shown
PI	possibly implied
SCA	substantially correct approach
c	candidate
sf	significant figure(s)
dp	decimal place(s)

No Method Shown

Where the question specifically requires a particular method to be used, we must usually see evidence of use of this method for any marks to be awarded.

Where the answer can be reasonably obtained without showing working and it is very unlikely that the correct answer can be obtained by using an incorrect method, we must award **full marks**. However, the obvious penalty to candidates showing no working is that incorrect answers, however close, earn **no marks**.

Where a question asks the candidate to state or write down a result, no method need be shown for full marks.

Where the permitted calculator has functions which reasonably allow the solution of the question directly, the correct answer without working earns **full marks**, unless it is given to less than the degree of accuracy accepted in the mark scheme, when it gains **no marks**.

Otherwise we require evidence of a correct method for any marks to be awarded.

Q	Solution	Mark	Total	Comment
1 (a)	4	B1	1	
1 (b)	Any two correct lines drawn	B1		
	Four correct lines and no extras	B1	2	If reasonably accurate
	Total		**3**	
2 (a)	90 (degrees)	B1	1	
2 (b)	$138 + 2y = 360$	M1		
	$2y = 222$	M1		Or implied by relevant calculations
	$y = 111$ (degrees)	A1	3	cao Alt: {540 – 138 – 2 × (their 90)}/2 M1M1 Zero marks if ∑(angles of a pentagon) = 360° is used
	Total		**4**	
3 (a)	At least one correct side	B1		± 1 mm
	Construction arcs seen	B1		At least one centred on a vertex
	All correct	B1	3	Including arcs
3 (b)	Isosceles	B1	1	
	Total		**4**	
4 (a)	$12.1 – 8.8 = 3.3$	M1		M1 if 3.3 or 1.9 seen
	$3.3 \times 7.3 + 8.8 \times 5.4$	M1		Or $1.9 \times 3.3 + 5.4 \times 12.1$ Or $12.1 \times 7.3 – 8.8 \times 1.9$
	71.61 (m^2)	A1	3	Or 71.6 or 72 with working
4 (b)	Their 71.61×2.9	M1		
	208 m^3	A1ftB1	3	Or 207.6 or 207.7 or 207.669 m^3
	Total		**6**	
5	8.8×5.6 or 49.28 or 8.8×3.4 or 29.92 or	M1		M1 for any of 38.08, 49.28 or 29.92
	$2 \times 5.6 \times 3.4$ or 38.08	M1		M1 for all three (inc. multiplying by 2)
	Their 38.08 + their 49.28 + their 29.92	M1		For adding the results of three or four calculations
	117 (m^2)	A1	4	cao
	Total		**4**	
6 (a)	Circle of radius 5.5 cm	B1		
	4 chords of length 7.8 cm	B1		
	Bars of width 0.6 cm	B1		± 1 mm
	All hidden detail (i.e. everything except the circle) shown by dotted lines	B1	4	
6 (b)	110.5 (cm)	B1		B0M0A0 if 110 (or less)is used
	$\pi \times$ their 110.5	M1		
	347 (cm)	A1	3	cao
	Total		**7**	

Q	Solution	Mark	Total	Comment
7 (a)	7.6 (cm) or 76 (mm)	B1	1	AWFW [7.4, 7.7]
7 (b)	Their 7.6 × 8	M1		
	= 60.8 (cm) or 608 (mm)	A1ft	2	
	Total		**3**	
8	$42^2 + 50^2$ (= 4264)	M1		M1 for attempt at Pythagoras
	$\sqrt{4264}$	M1		Square root of result of adding squares
	=65.3 (cm)	A1	3	
	Total		**3**	
9	$\frac{40}{50}$	M1		Alt: 50 ÷ 40 = 1.25 M1
	×28	M1		28 ÷ 1.25 M1
	22.4 (cm)	A1	3	22 with NMS scores zero
	Total		**3**	
10	An inverted right-angled triangle in the top right quadrant	B1		± 1 mm
	Diagonal line correct	B1		± 1 mm
	Vertical and horizontal lines correct	B1	3	Extras are not penalised as long as their diagram has rotational symmetry of order 2. Two triangles not joined: max B0B1B1 Rotational symmetry of order 4: SC1
	Total		**3**	
11	51.6/2 = 25.8 27.8/2 = 13.9	B1		B1 for either radius seen
	$\pi \times 25.8^2 \times 22.6$ (= 47260) $\pi \times 13.9^2 \times 22.6$ (= 13718)	M1		M1 for either cylinder volume (must use radius)
	47260 – 13718	m1		PI; dep 1st M1 Alt. Method: $\pi \times 25.8^2 - \pi \times 13.9^2$ (=1484) M1 (their) 1484 × 22.6 M1
	33500 (cm^3)	A1	4	AWRT 33500 Condone 33600
	Total		**4**	

Q	Solution	Mark	Total	Comment
12	Straight distance =			
	$0.65 + 0.9 + 1.25 + 1.8 = 4.6$ (km)	B1		Seen anywhere
	Arc $AB = (2 \times \pi \times 0.4)/4 = 0.6283$			
	Arc $EF = (2 \times \pi \times 0.2)/4 = 0.3142$			
	Arc $FG = (2 \times \pi \times 0.55)/2 = 1.728$	M1		M1 for any arc calculated correctly
	Total distance =			
	$4.6 + 0.3142 + 3 \times 0.6283 + 1.728$			
	(=8.527 km)	B1		Or 8.53
	Their $8.527 \div 1.6 = 5.329$ miles	M1		
	Their $5.329 \div 2.5 \times 60$	M1		Or $5.329 \times 2 \times 12$
	= 128 (miles per hour)	A1ft	6	
	Total		**6**	
	TOTAL		**50**	