FSMQ
MATHEMATICS

4982 – Using Spatial Techniques
Mark scheme

4982
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Version/Stage: v0.1 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.

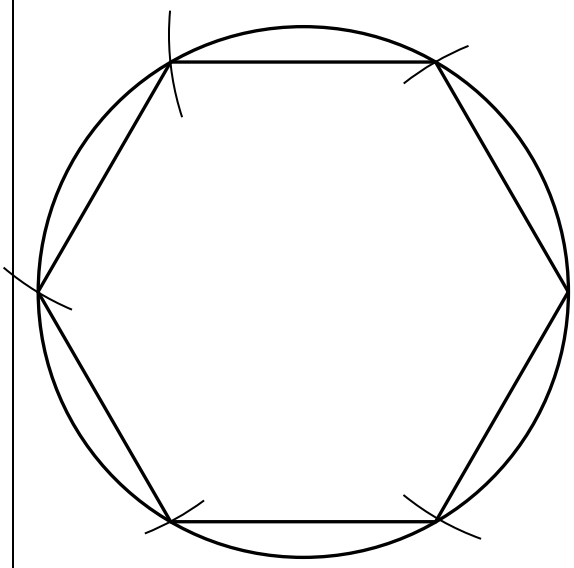
Where the answer can be reasonably obtained without showing working and it is very unlikely that the correct answer can be obtained by using an incorrect method, we must award **full marks**. However, the obvious penalty to candidates showing no working is that incorrect answers, however close, earn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

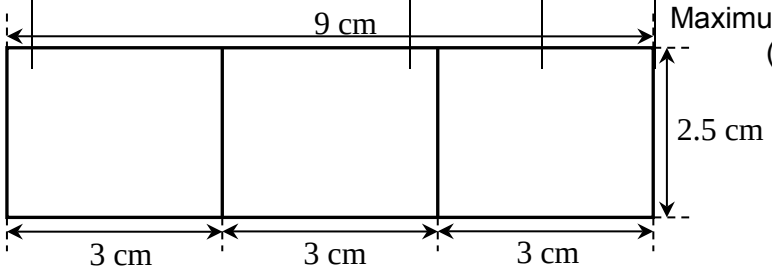
Otherwise we require evidence of a correct method for any marks to be awarded.

Question	Solution	Marks	Total	Comments
1(a)	pattern A 6 pattern B 3	B1 B1	2	
(b)	pattern A 6 pattern B 0	B1 B1	2	
(c)	rhombus	B1	1	allow approximate spelling
	Total		**5**	
2(a)	$x = \frac{360°}{12}$	M1		accept alternative methods eg $\frac{180°}{6}$ or $\frac{90°}{3}$ or $\frac{360°}{60} \times 5$
	$= 30(°)$	A1	2	SC1 for $30°$ without working
(b)	circumference $= \pi \times 7$ $= 21.991...$	M1		Or $2 \times \pi \times 3.5$ Allow M1 for use of $\pi = 3$ or 3.1
	$= 22.0$ (m)	A1	2	accept values in the range $[21.9, 22.0]$
	Total		**4**	
3(a)	$27°$	B1	1	accuracy $\pm 2°$
(b)(i)	5.8 (cm)	B1	1	accuracy ± 0.1 cm
(ii)	actual length $= 10 \times 5.8$ $=58$ (cm)	B1ft	1	follow through from answer to **(b)(i)**
(c)	isosceles	B1	1	allow approximate spelling
	Total		**4**	

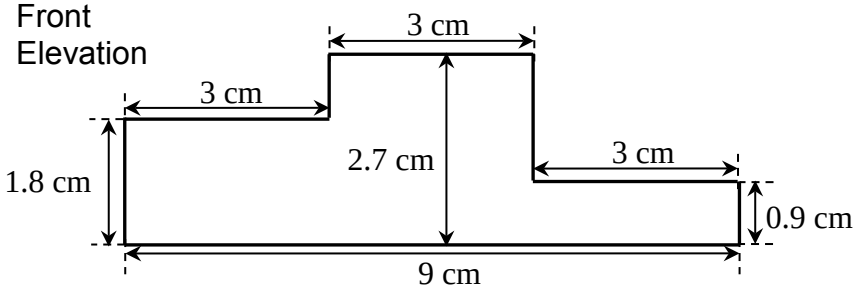
Question	Solution	Marks	Total	Comments
4(a)		B1	1	circle radius 3.5 cm ($\pm$ 0.2 cm)
(b)		M1		Arcs (4 or more)
		A1ft	2	equal sides ($\pm$ 0.2 cm)
	Total		**3**	
5	length of each piece $= \frac{5 \times 36}{20}$	M1 M1		conversion to inches dividing by 20 or equivalent
	$= 9$ (inches)	A1	3	
	Total		**3**	

Question	Solution	Marks	Total	Comments
6(a)	volume = $180 \times 50 \times 54$	M1		
	$= 486\,000$	A1		accept $490\,000$
	cm^3	B1	3	units
				allow change of units from centimetres to metres:
				$1.8 \times 0.5 \times 0.54$ M1
				$= 0.486$ A1
				(Accept 0.49)
				m^3 B1
(b)(i)	see Plan below			accuracy ± 0.2 cm
		B1		length of podium 9 cm
		B1		length of each of 3 rectangular sections 3 cm
			3	do not allow if angles are not $90° \pm 2°$
		B1		width of podium 2.5 cm
				do not allow last B1 if there are any extra lines from the front or sides.
				allow SC1 for correct sketch not to scale
(b)(ii)	see Front Elevation below	B1		left hand side height 1.8 cm
		B1		right hand side height 0.9 cm
		B1		height in centre 2.7 cm
		B1		all lengths of lines correct and no extra lines from the top or ends.
		B1	5	all angles correct ($90° \pm 2°$) and no extra angles from the top or ends.
				allow SC1 for correct sketch not to scale
				allow SC1 for 2 dimensions calculated correctly but not drawn in part **(b)(ii)**.
				Maximum mark if parts are interchanged: (b)(i) 2 marks (b)(ii) 4 marks

Plan



Front Elevation



	Total	11		
Question	**Solution**	**Marks**	**Total**	**Comments**
7(a)	$r = 22$ (mm)	B1		
	area $= \pi \times 22^2$	M1		allow use of 44
	$= 1520.5308\ldots$ $= 1520$ (mm^2)	A1ft	3	accept 484π and values in the range [1515, 1525]
(b)	volume = 'their' $1520\ldots \times 14$	M1		Or volume $=\pi \times 22^2 \times 14$
	$= 21\,287.4\ldots$. $= 21\,300$ (mm^3)	A1ft	2	accept 6776π and values in the range [21 250, 21 350]
	Total		**5**	
8(a)	height of triangle $= 46 \div 2 = 23$ (mm)	B1		
	area of triangle $= \frac{19.1 \times 23}{2}$	M1		
	$= 219.65$ $= 220$ (mm^2)	A1ft	3	ft from their height allow values in the range [219, 220]
(b)	total area =their 219.65×8	M1		ft from their triangle area
	$= 1757.2$ $= 1760$ (mm^2)	A1ft	2	allow values in the range [1750, 1760]
	Total		**5**	
	TOTAL		**40**	