Free-Standing Mathematics Qualification

MATHEMATICS

4982 – Using Spatial Techniques
Mark scheme

4982
June 2015

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

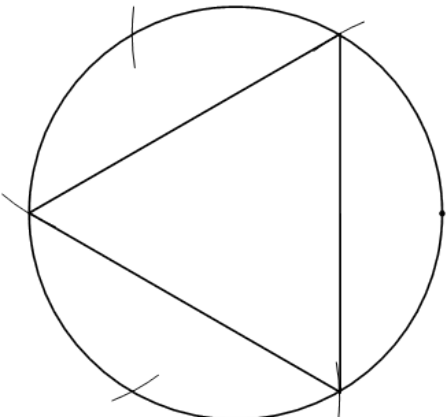|	
M	mark is for method
m or dM	mark is dependent on one or more M marks and is for method
A	mark is dependent on M or m marks and is for accuracy
B	mark is independent of M or m marks and is for method and accuracy
E	mark is for explanation
√or ft or F	follow through from previous incorrect result
CAO	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.
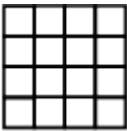
Where the permitted calculator has functions which reasonably allow the solution of the question directly, the correct answer without working earns **full marks**, unless it is given to less than the degree of accuracy accepted in the mark scheme, when it gains **no marks**.

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

Q	Solution	Marks	Total	Comments
1(a)	parallelogram: 2 square: 4	B1 B1	2	
1(b)	parallelogram: 0 square: 4	B1 B1	2	
	Total		**4**	
2(a)		B1	1	Circle radius 4 cm (± 0.2 cm)
2(b)		M1 A1$\sqrt{}$	2	At least 2 clear correct arcs Equal sides (± 0.2 cm) ft on their circle
	Total		**3**	
3(a)	isosceles	B1	1	Accept approximate spelling
3(b)	Obtuse angle $= 180° - 30° - 30°$ $= 120°$	M1 A1	2	
	Total		**3**	
4(a)	$x = 43°$	B1	1	$\pm 2°$
4(b)(i)	$AB = 10.4$ (cm)	B1	1	± 0.1 cm
4(b)(ii)	Actual length of ramp $= \dfrac{10.4 \times 50}{100}$ $= 5.2$ (m)	M1 M1 A1$\sqrt{}$	3	Use of scale Convert cm to m Follow through from their answer to **(b)(i)**
	Total		**5**	

Q	Solution	Marks	Total	Comments
5(a)	Circumference $= \pi \times 9.4$ $= 29.53...$ $= 29.5$ (m)	M1 A1	 2	SC1 for $2\pi r = 59.06$ Accept values in the range [29.5, 29.54] or 30
5(b)	Number of times $= 1000 \div$ 'their' 29.5 $= 33.8....$ $= 34$ (rounding up)	M1 A1√	 2	Follow through from their answer to **(a)** Accept 33.8 or 33.9
	Total		**4**	
6	See diagram below	B1 B1 B1 B1 B1 5	 5	Accuracy ± 0.1 cm Width of barn 8 cm Sides of barn 3 cm tall Height of front wall 5.8 cm One or both doors 2.7 cm by 1.6 cm Roof sections 5.5 cm by 0.2 cm Do not allow last B1 if centre of doors is not in line with apex or if angles between vertical and horizontal lines are not at $90° \pm 2°$ Allow SC1 for 2 dimensions given correctly but not drawn

	Total		**5**	

Q	Solution	Marks	Total	Comments
7	Area of rectangle $= 8 \times 3$ $= 24 \ (\text{m}^2)$ Height of triangle $= 5.8 - 3$ $= 2.8 \ (\text{m})$ Area of triangle $= \dfrac{8 \times 2.8}{2}$ $= 11.2 \ (\text{m}^2)$ Total area $= 24 + 11.2$ $= 35.2 \ (\text{m}^2)$	 B1 M1 A1✓ M1 A1	 5	B1 for calculation of a length M1, A1✓ for area of a triangle or trapezium Eg accept (4x2.8)/2 = 5.6 or (8.8x4)/2 = 17.6 M1 for overall method A1 for final answer Accept alternative methods
	Total		**5**	
8	Volume $= 18 \times 10 \times 7$ $= 1260$ cm^3	M1 A1 B1	 3	units
	Total		**3**	
9(a)	$r = 10$ (cm) soi Area $= \pi \times 10^2$ $= 314.159\ldots \ (\text{cm}^2)$	B1 M1 A1✓	 3	Accept use of 20 for r leading to 1256 or 1257 or 1260 Accept values in the range [314, 314.3]
9(b)	Volume = 'their' 314×7 $= 2200 \ (\text{cm}^3)$	m1 A1✓	 2	Follow through from their answer to **(a)** Accept values in the range [2198, 2200]
	Total		**5**	

Q	Solution	Marks	Total	Comments
10	Number of pieces $= 4 \times 4$ $= 16$	M1 m1 A1	 3	M1 for sight of 4 or $20/5$ m1 for 4×4 or $4 + 4 + 4 + 4$ Accept alternative methods, such as diagram: or division of areas: Number of pieces $= \dfrac{400}{25}$ M1 for one or both areas m1 for division $= 16$ A1
	Total		**3**	
	TOTAL		**40**	