AQA Qualifications

GCSE

Mathematics

Unit 3 43603F

Mark scheme

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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

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
Q	Marks awarded for Quality of Written Communication
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
3.14 …	Allow answers which begin 3.14 eg 3.14, 3.142, 3.149.
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

Questions which do not ask candidates to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q	Answer	Mark	Comments
1(a)	*E* or *DEA* or *AED*	B1	
	A or *EAB* or *BAE*	B1	
	C or *DCB* or *BCD*	B1	
1(b)	Pentagon	B1	
2	(10, 1)	B2	B1 for one correct coordinate SC1 for (4, 7)
2	**Additional Guidance**		
	(10, 2) is B1 (9, 1) is B1 (1, 10) is B0		
3(a)	neither	B1	
3(b)	similar	B1	
3(c)	similar	B1	
3(d)	congruent	B1	

4(a)	400 ÷ 2 or 400 – 200 or 200 or 400 ÷ 4 or 400 – 200 – 100 or 400 – 300 or 100 or 400 ÷ 8 or 400 – 200 – 100 – 50 or 400 – 350	M1	oe One correct step Working may be on diagram
	50	A1	

4(a)	**Additional Guidance**	
	400 – 100 – 100 – 100 = 100	is M0 A0
	100 as final answer with no working shown	is M0 A0

4(b)	400 × 2 × 2 or 400 × 4 or 800 × 2 or 400 × 4 or 1600 or 0.4	M1	oe
	1.6	A1	SC1 for a correct conversion for their 1600

4(b)	**Additional Guidance**	
	1200 ml = 1.2 l	is SC1
	1000 ml = 1 l with 1 on answer line	is M1 A0
	1 l = 1000 ml alone	is M0 A0

5(a)	23	B1	

5(b)	**Alternative method 1**		
	80 ÷ 10 or 8	M1	35 × 10 or 350
	35 – 8	M1dep	their 350 – 80 or 270
	27	A1ft	SC2 for 19
	Alternative method 2		
	80 ÷ 5 or 16	M1	oe (*BC* =) 35 –12 – 8 or *BC* = 15
	70 – their 16 or 54	M1dep	15 + 12
	27	A1ft	SC2 for 19

5(b)	**Additional Guidance**	
	80 ÷ 5 = 16, 35 – 16 = 19	is SC2

6(a)	*A* (–3, –5)	B1	
	B (2, –3)	B1	SC1 for *A* (2, –3) and *B* (–3, –5)

6(b)	*C* plotted at *x*-coordinate less than –3	B1	
	C plotted at *y*-coordinate 2 or 4 or 6	B1	SC1 for correct coordinates if no point plotted

6(b)	**Additional Guidance**
	C does not need to be labelled if intention is clear.
	The *x*-coordinate need not be an integer.
	C plotted at: (–3.5, 2) B1 B1 (–3.5, 3) B1 B0 (–4, 0) B1 B0 (2, 2) B0 B1 (–3, –2) B0 B0

7(a)	$\frac{1}{2}$ or 0.5 or 50%	B1	oe

7(b)	10 × 6 or 60 or 5 × 3 or 15	M1	
	60 and 15	A1	$2^2 : 1^2$ States Area *A* is four times Area *B* oe
	4 : 1	A1	SC2 for 1 : 4

7(b)	**Additional Guidance**
	Units given alongside answer, eg 4 cm : 1 cm M1 A1 A0 60 : 15 M1 A1 A0 15 : 60 M1 A1 A0

8(a)	Line $x = -2$ drawn	B1	

8(a)	**Additional Guidance**
	Line does not need to be full length of grid. Line can be solid or dashed.

8(b)	Line $y = x$ drawn	B1	

8(b)	**Additional Guidance**
	Line does not need to be full length of grid. Line can be solid or dashed.

8(c)	Translation	B1	Accept Translate
	9 right and 8 down or $\begin{pmatrix} 9 \\ -8 \end{pmatrix}$	B1	Accept (9, –8)

8(c)	**Additional Guidance**
	($y = -8$, $x = 9$) is B0 B0

9(a)	2700 × 8 or 21 600 or 2700 × 0.08 or 216	M1	oe
	5850 – 2700 or 3150	M1	oe
	(5850 – 2700) × 5 or their 3150 × 5 or 15750 (5850 – 2700) × 0.05 or their 3150 × 0.05 or 157.5 or digits 3735	M1dep	dependent on 2nd M1
	373.50	Q1	373.5 implies M3 Q0

9(a)	**Additional Guidance**
	373.50p is M1 M1 M1 Q0

9(b)	7 (%)	B1	

10	[7.7, 7.9]	B1	
	their 7.8 × 50	M1	
	[385, 395]	A1ft	

10	**Additional Guidance**
	7 cm = 350 km is B0 M1 A1ft

11	x + 115 + 140 + 50 = 360 or 360 – (115 + 140 + 50) or 360 – 305	M1	oe
	(x =) 55	A1	
	(x + 15 =) 70	B1ft	ft their 55 + 15
	180 – their 125 = 55	B1 ft	Angles must add up to 180
	Isosceles	Q1ft	Must see three angles for the triangle

11	**Additional Guidance**
	'their' 55 must come from a calculation.
	55, 70, 55 isosceles M1 A1 B1 B1 Q1
	55, 80, 45 (adds up to 180) scalene M1 A1 B0 B1ft Q1ft
	360 – 305 = 65 65, 80, 35 (adds up to 180) scalene M1 A0 B1ft B1ft Q1ft

12	2.85 × 0.72 × 0.9	M1	oe 285 × 72 × 90
	1.8(468)	A1	1 846 800
	m^3	B1	cm^3

12	**Additional Guidance**
	Accept any rounding to 2 sf or more without working seen, eg 1.85 or 1 850 000

13(a)	225 – 180 or 45 or North East or NE	M1	oe
	045	A1	

13a	**Additional Guidance**
	Answer 45 is M1 A0

13(b)	285°	B1	

14(a)	$x - 3$ or $-3 + x$	B1	Do not ignore further working

14(b)	**Alternative method 1**		
	$x + x - 3 + x + x - 3$ or $4x - 6$	M1	oe
	$4x - 6 = 40$ or $4x = 46$	M1dep	Equating to 46 and collecting like terms
	11.5	A1ft	ft their (a)
	Algebraic method used Expression for perimeter shown and equation set up and solved	Q1ft	Strand (ii) Must see working for the method marks to award
	Alternative method 2		
	$x + x - 3$ or $2x - 3$	M1	oe
	$2x - 3 = 20$ or $2x = 23$	M1dep	Equating to 23 and collecting like terms
	11.5	A1ft	ft their (a)
	Algebraic method used Expression for semi-perimeter shown and equation set up and solved	Q1ft	Strand (ii) Must see working for the method marks to award

14(b)	**Additional Guidance**	
	11.5 with no working or from using trial and improvement.	M1 M1 A1 Q0
	$2x - 3 = 40$ (40 implies using Alt. Method 1)	M0 M0 A0 Q0

15(a)			
	$25 \div \pi$ or [7.9, 8] or $25 \div 2\pi$	M1	
	[3.97, 4]	A1	Accept $\frac{25}{2\pi}$

15(b)			
	32 ÷ 4 or 8	M1	32 × 2 ÷ 4 or 16
	32 ÷ 4 × 3 (× 2) or 24 (× 2) or 32 ÷ 4 × 3 × 2	M1dep	oe 64 ÷ 4 × 3
	48	A1	

15(b)	**Additional Guidance**	
	24 seen then incorrect working, eg 24 × π = 75.36	M1 M0 A0
	Answer of 64	M0 M0 A0

16	(155 – 15) ÷ 2 or 2x + 15 = 155 or 2x = 155 – 15 or 2x = 140	M1	oe
	(x =) 70	A1	
	500 – 120 – 155 (– 15) or 225 or 210 or 500 – 120 – 2 × their 70 – 2 × 15 or 2y + 15 + 120 + 155 = 500 or 2y = 500 – 15 – 120 – 155	M1	oe
	210 ÷ 2 or 2y = 210	M1dep	
	(y =) 105	A1	SC4 for correct answers reversed

17(a)	40	B1	

17(b)	360 ÷ their 40	M1	
	9	A1ft	

18	9 × 2 + 9 × 2 + 7 × 2 or 18 + 18 + 14 or 11 × 9 – 7 × 7 or 99 – 49 or 11 × 2 + 7 × 2 + 7 × 2 or 22 + 14 + 14	M1	Fully correct method for working out area *A*
	50	A1	
	$\frac{1}{2}$ (6 + 9)7 or 6 × 7 + $\frac{1}{2}$ × 3 × 7 or 42 + 10.5 or 9 × 7 – $\frac{1}{2}$ × 3 × 7 or 63 – 10.5	M1	oe Fully correct method for working out area *B*
	52.5	A1	
	B and 2.5	A1ft	dependent on M1 scored

19	Correctly evaluated trial	M1	e.g. $17^3 = 4913$
	Obtains $18 \leq x \leq 19$	M1dep	$18^3 = 5832\ldots$ $19^3 = 6859\ldots$
	Obtains $18.1 \leq x \leq 18.2$ or Two correct trials [18.15, 18.25] which bracket 6000	A1	$18.1^3 = 5929\ldots$ $18.2^3 = 6028\ldots$ $18.15^3 = 5979\ldots$ $18.25^3 = 6078\ldots$
	Test 18.15 and concludes 18.2 or Two correct trials [18.15, 18.25] which bracket 6000 and 18.2 for final answer	Q1	Strand (ii) Using 2 dp to ensure 1 dp

20	20^2 and 9^2 or 400 and 81 or 319	M1	oe
	$\sqrt{20^2 - 9^2}$ or $\sqrt{400 - 81}$ or $\sqrt{319}$	M1dep	
	17.86…	A1	
	17.9	B1ft	ft their 2 dp or more

20	**Additional Guidance**	
	17.9 without working seen	M1 M1 A1 B1
	17.86... without working seen	M1 M1 A1 B0