AQA Qualifications

GCSE

Mathematics

Unit 3 43603F

Mark scheme

43603F
June 2015

Version 1.0 Final Mark Scheme

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.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

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 …	Accept 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.

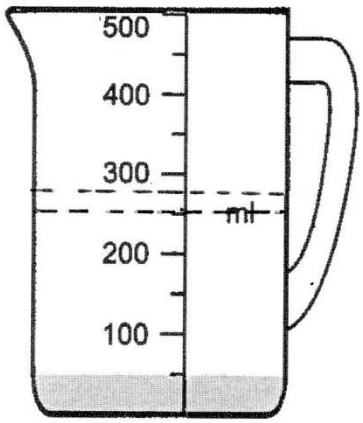
Work replaced

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)	50	B1	

1(b)	Mark above 250 and below 275 in area indicated  	B1	

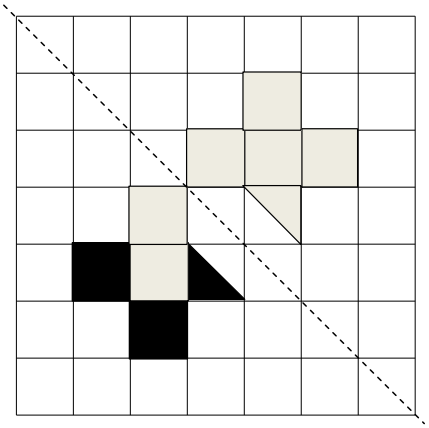
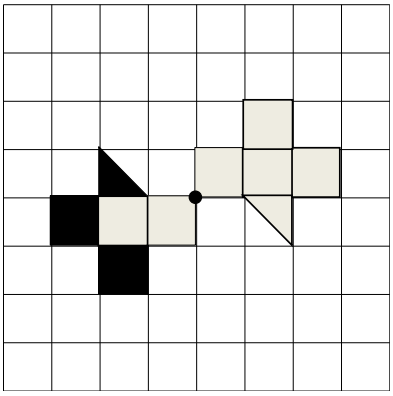
Additional Guidance	
Any clear indication	B1
Calculation shown and answer is not 260	B0

1(c)	Any equivalent percentage or $\frac{80}{100} \times 500$ or 0.8×500	M1	eg 1% is 5 (ml) 10% is 50 (ml) 20% is 100 (ml) 50% is 250 (ml) oe eg 5×80
	400	A1	

Q	Answer	Mark	Comments
2(a)	4.5 or $4\frac{1}{2}$	B1	oe
	Additional Guidance		
	Ignore additional units on the answer line		
2(b)	**Alternative method 1**		
	Works out any area	M1	eg 4 × their 4.5 7 × 7 7 (× 1) 9 × 9 5 × 3
	4 × their 4.5 + 7 + 6 or 7 × 7 – 4 × their 4.5	M1dep	oe
	31	A1ft	ft their 4.5 SC2 for 30 or 32 as final answer
	Alternative method 2		
	Attempt to count squares	M1	eg Vertical or horizontal rectangle = 7 or realise there are four triangles (4 × their 4.5) or 18 or numbering seen or 6 or 25
	25 + 6	M1dep	oe
	31	A1ft	ft their 4.5 SC2 for 30 or 32 as final answer

Q	Answer	Mark	Comments
3(a)	125 118 130 115	B3	B2 for 2 or 3 correct B1 for 1 correct 123 115 SC2 for all correct 128 SC1 for 2 or 3 correct 114
	Additional Guidance		
	3 correct and 1 incorrect		B2
	2 correct and 2 incorrect		B2

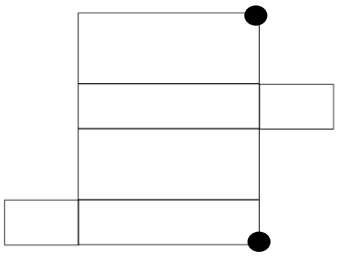
3(b)	Dan	B1ft	ft their fastest time (lowest value)
	Additional Guidance		
	Dan or fastest time (lowest value)		B1ft

Q	Answer	Mark	Comments
4(a)	Fully correct 	B2	B1 for 1 or 2 shapes in correct position
4(b)	Fully correct 	B2	B1 for 1 or 2 shapes in correct position

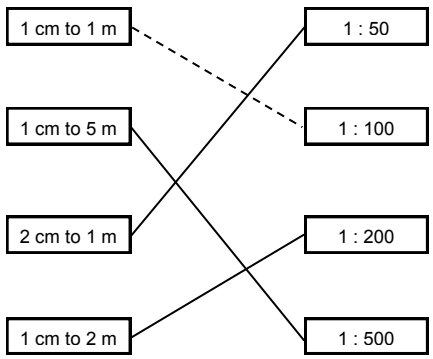
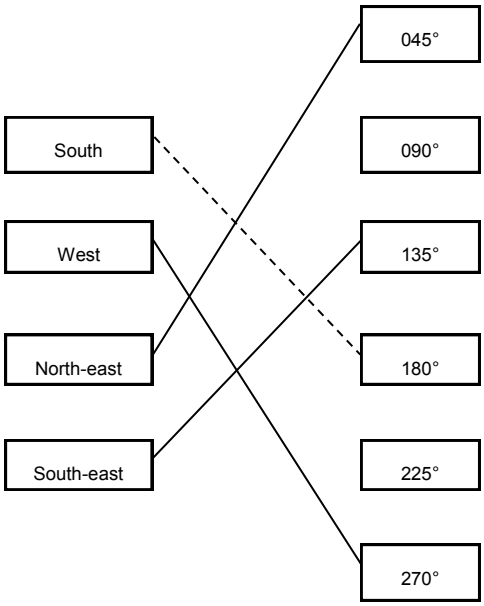
Q	Answer	Mark	Comments
5(a)	3 kg	B1	
5(b)	12 kg	B1	
6(a)	(Faces) 5	B1	
	(Edges) 9	B1	
	(Vertices) 6	B1	

Q	Answer	Mark	Comments
6(b)	Cannot tell and valid explanation	B2	eg Don't know if length too much B1 for cannot tell or for any valid statement
	Additional Guidance		
	All comments below are for "Cannot tell", Deduct 1 mark for "Yes" or "No" **Assume referring to prism unless clearly otherwise**		
	Reference to measurements of prism only		B2
	Reference to not knowing measurements of cube		B1
	The prism may be very wide or very tall and cannot fit inside the cube.		B2
	We need to know the size/dimensions of the prism.		B2
	They are not the same shape so might have different height.		B2
	Cross section of cube = $\sqrt[3]{125}$ = 5. Cross section of prism = $\sqrt[3]{45}$ = 3.4. The length of the prism is unknown.		B2
	Height of prism is not given.		B2
	No specific measurements, width could be larger than length or other way round.		B2
	You don't know the area of the end of the prism, so you don't know if the prism will fit in.		B2
	You don't know the area of the end of the cube, so you don't know if the prism will fit in.		B1
	They are not the same shape or similar so you do not know.		B1
	No measurements are given for either shape.		B1
	Cube may not be long in depth as the cube and from the volume we do not know the depth.		B1
	The volume is how much inside, you do not know whether it will fit or not.		B1
	There is no cube to judge it by.		B1
	Calculations involving π, giving radius (cube)=6.3 and r(prism) = 3.5 but then, don't know size or measurements of cube or prism.		B1
	Don't know the dimensions of the cube and if it is long enough for the prism to fit in.		B1

Q	Answer	Mark	Comments
7	*B* (12, 5)	B1	
	C (6, –5)	B1	
	D (12, –5)	B1ft	ft their 12 from *B* and their –5 from *C*
8(a)	3 × 15 or 45	M1	
	135	A1	
8(b)	180 – 84 – 49	M1	oe eg 96 – 49 or 131 – 84
	47	A1	
	Additional Guidance		
	133		M0A0

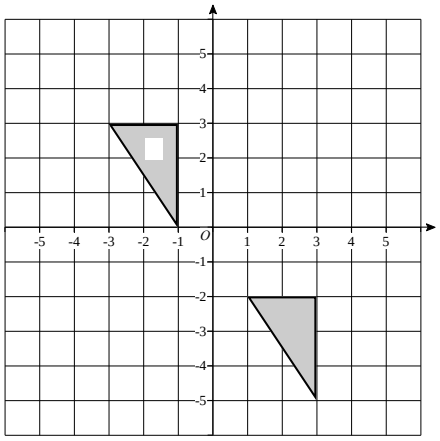
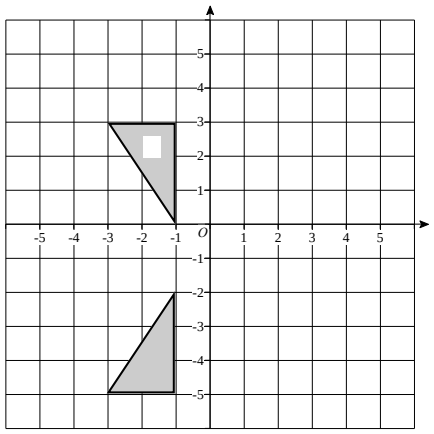
Q	Answer	Mark	Comments
8(c)	**Alternative method 1**		
	26 + 15 + 190 or 231	M1	360 – 190 – 26 – 15
	129	A1	
	Alternative method 2		
	180 – 10 – 15 or 155 or 25	M1	180 – 26 – 25 or 155 – 26
	129	A1	
	Alternative method 3		
	180 – 26 – 15 or 139 and 10 seen	M1	180 – 41 – 10 or 139 – 10
	129	A1	
9(a)		B2	B1 for one correct dot or for one correct dot and one incorrect dot
9(b)	7 × 4 or 28 seen	M1	oe
	14 × 4 or 7 × 8	M1	oe
	56	A1	SC1 63

Q	Answer	Mark	Comments
10(a)	4 or 5 points plotted correctly	M1	± ½ square
	5 points plotted correctly and points joined with a smooth curve from 20 to 60	A1	± ½ square SC1 for all coordinates reversed and a smooth curve
	Additional Guidance		
	Curve does not need to extend to zero		
10(b)	Extends graph to at least [(70, 94), (70, 103)]	B1	
	Correct reading for their graph	B1ft	tolerance ± 1

Q	Answer	Mark	Comments
11(a)		B2	B1 for 1 or 2 correct
11(b)		B3	B1 for each

Q	Answer	Mark	Comments
12	$5x + 5x + 3x + 3x$ or $16x$ or 5 + 5 + 3 + 3 or 16	M1	oe
	$5 \times 2x$ or $10x$ or 5 × 2 or 10	M1	oe
	$16x : 10x$ or 16 : 10	A1	oe eg $8x : 5x$ 1.6 : 1
	8 : 5	A1ft	Dependent on at least M1 SC3 5 : 8 SC2 $5x : 8x$
	Additional Guidance		
	10 : 16 oe		M1M1A0A0
	$16x : 12x$ 4 : 3		M1M0A0A1ft

Q	Answer	Mark	Comments
13	12 × 4 × 9	M1	0.12 × 0.04 × 0.09 120 × 90 × 40
	432	A1	0.000 432 432 000
	cm^3	B1	0.000 432 m^3 432 000 mm^3
	Additional Guidance		
	432^3 (Assume ^{3} is their units)		M1A1B0
	12 × 4 × 9 = 442 cm^3		M1A0B1
	12 + 4 + 9 = 25 cm^3		M0A0B1

Q	Answer	Mark	Comments
14(a)	Correct translation 	B2	B1 for translation 4 right or 5 down or for 3 correct points without the triangle
14(b)	Correct reflection 	B2	B1 for reflection in y = c or in x = –1 or for 3 correct points without the triangle

Q	Answer	Mark	Comments
15	$\frac{30}{100}$ × 68 or 20.4 or 20 or $\frac{70}{100}$ × 68 or 47.6 or 48	M1	oe
	0.75 × 55 or 41(.25) or 41.3	M1	oe
	15 000 ÷ 47.6 or 315.(…) or 15 000 ÷ 48 or [312, 316]	M1dep	oe Dependent on 1st M1
	12 000 ÷ 41(.25) or 12 000 ÷ 41.3 or [290, 293]	M1dep	oe Dependent on 2nd M1
	[312, 316] and [290, 293] and A	Q1	
	Additional Guidance		
	68 – 20.4 = 45.6, 15 000 ÷ 45.6 = 329 and 291 seen		M1M1M1M1 Q0

Q	Answer	Mark	Comments
16(a)	$\pi \times 0.7$ or $2 \times \pi \times 0.35$ or 2.19	M1	
	[2.198, 2.2]	A1	Accept 0.7π
16(b)	Consistent units seen or implied	B1	eg 1600 or [0.002 198, 0.002 2] seen
	their 1600 ÷ their [2.198, 2.2]	M1	oe Units need not be consistent
	727.(…)	A1	
	727	Q1ft	Strand (i) Rounding down their answer
	Additional Guidance		
	$160 \div 0.7\pi = 72.8$ so 72		B0M1A0Q1ft

Q	Answer	Mark	Comments
17(a)	$4x - 5 = 15$	M1	$4 \times 5 - 5 = 15$ or $4 \times 5 = 20$
	$4x = 15 + 5$ or $4x = 20$	M1dep	oe
	5	Q1	Strand (ii) SC2 Answer 5 without algebra shown

17(b)	$5y - 7 = y + 3$	M1	
	$5y - y = 3 + 7$ or $4y = 10$	M1	oe
	$(y =)$ 2.5	A1	
	their 2.5 + 3 or 5 × their 2.5 – 7 or 5.5 or 5.5 × 15	M1	oe ft their y if clearly shown
	82.5	A1	
	Additional Guidance		
	$4 \times 2.5 = 10$, 2.5 + 3 embedded value for y		M1M1A1M1A0

Q	Answer	Mark	Comments
18	$9^2 + 16^2$ or 81 + 256 or 337	M1	
	$\sqrt{9^2 + 16^2}$ or $\sqrt{81+256}$ or $\sqrt{337}$	M1dep	
	18.35… or 18.36	A1	
	18.4	B1ft	ft their answer to 2 dp or better
	Additional Guidance		
	18.4 on its own		M1M1A1B1
	18.40		M1M1A1B0
	18.3		M1M1A0B0