

GCSE

# Mathematics

Unit 3: Foundation 43603F

Mark scheme

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43603F  
June 2016

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Version: 1.0 Final

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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](http://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.
- M dep** A method mark dependent on a previous method mark being awarded.
- 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.
- B dep** A mark that can only be awarded if a previous independent mark has been awarded.
- ft** Follow through marks. Marks awarded following a mistake in an earlier step.
- SC** Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
- 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.
- [a, b)** Accept values  $a \leq \text{value} < b$
- 3.14...** Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416

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.

***Continental notation***

Accept a comma used instead of a decimal point (for example, in measurements or currency), provided that it is clear to the examiner that the candidate intended it to be a decimal point.

Q	Answer	Mark	Comments
1(a)	[9.9, 10.1]	B1	oe
	<b>Additional Guidance</b>		
1(b)	6 + 8 + [9.9, 10.1] or 6 + 8 + their [9.9, 10.1]	M1	oe 60 + 80 + [99, 101] 60 + 80 + their [99, 101]
	[23.9, 24.1]	A1ft	[239 mm, 241 mm]
	<b>Additional Guidance</b>		
	6 × 8 ÷ 2 = 24 If length of hypotenuse seen on diagram follow through for their total		MOAO
2(a)	<i>B</i>	B1	
2(b)	<i>C and E</i>	B1	
2(c)	<i>A and D</i>	B1	
3(a)	<i>C and E</i>	B2	Any order B1 for 1 correct or for 1 correct and 1 incorrect or for 2 correct and 1 incorrect
	<b>Additional Guidance</b>		

Q	Answer	Mark	Comments
3(b)	<i>B, C and E</i>	B2	Any order B1 for 2 correct or for 2 correct and 1 incorrect or for 3 correct and 1 incorrect
	<b>Additional Guidance</b>		
3(c)	<i>A</i>	B1	
	<b>Additional Guidance</b>		
4(a)	<i>Sevilla</i>	B1	
4(b)	<i>Barcelona</i>	B1	
4(c)	[4.9, 5.1]	B1	
	their [4.9, 5.1] × 125	M1	
	[612.5, 637.5]	A1ft	ft B0 M1
	<b>Additional Guidance</b>		

Q	Answer	Mark	Comments
5(a)	350	B1	
	<b>Additional Guidance</b>		
5(b)	States or implies 1 kg = 1000 g or 0.6 kg = 600 g	M1	
	Correct combination for 600 g	A1	oe eg 400 + 200 300 + 300 combination must be in grams
	<b>Additional Guidance</b>		
	200 + 200 + 200 = 606 is a slip (answer not required as given)	M1A1	
6(a)	$\frac{1}{8}$ and $\frac{2}{16}$	B2	B1 for 1 correct or for 1 correct and 1 incorrect or for 2 correct and 1 incorrect  SC1 for $\frac{1}{7}$ and $\frac{2}{14}$ or $\frac{7}{8}$ and $\frac{14}{16}$

Q	Answer	Mark	Comments	
6(b)	8 squares shaded seen or implied or 8 squares unshaded seen or implied  or $\frac{16}{32}$ or $\frac{8}{16}$ or $\frac{4}{8}$ or $\frac{1}{2}$	M1	oe	
	50 (%)	A1		
	<b>Additional Guidance</b>			
	$\frac{12}{24} = 50\%$ or $\frac{6}{12} = 50\%$ is from incorrect working			M0A0

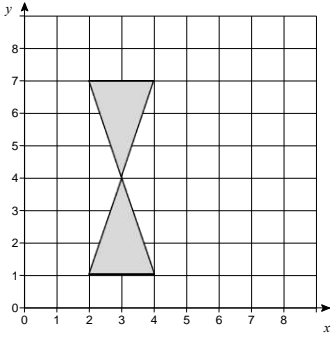
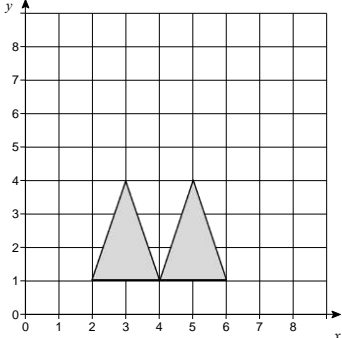
7(a)	$4 \times 45.5(0)$ or 182	M1		
	their $182 \div 26$	M1dep		
	7	A1		
	<b>Additional Guidance</b>			
	$26 \times 7 = 182$ (embedded answer)			M1M1A0

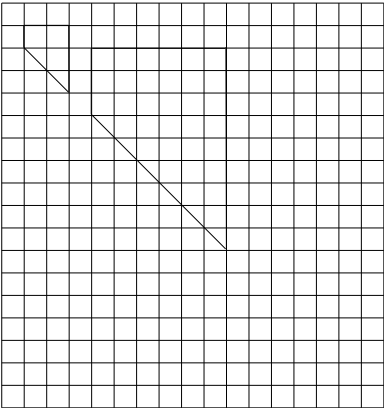


Q	Answer	Mark	Comments
7(b)	A correctly evaluated trial adding the prices of 5 tins	M1	
	3 (5-litre tins) and 2 (10-litre tins)	A1	
	<b>Additional Guidance</b>		
	Note: $5 \times 26 = 130$ $4 \times 26 + 45.5$ or $104 + 45.5 = 149.5$ $3 \times 26 + 2 \times 45.5$ or $78 + 91 = 169$ (Correct answer) $2 \times 26 + 3 \times 45.5$ or $52 + 136.5 = 188.5$ $26 + 4 \times 45.5$ or $26 + 182 = 208$ $5 \times 45.5 = 227.5$		
8(a)	(1, 1)	B2	B1 for $x$ -coordinate 1 or $y$ -coordinate 1 or $AC = 6$ or $\frac{1}{2}AC = 3$
	<b>Additional Guidance</b>		
	Check diagram for working		

Q	Answer	Mark	Comments
8(b)	(4, -7)	B2	B1 for $x$ -coordinate 4 or $y$ -coordinate -7 or $BD = 16$ or $\frac{1}{2}BD = 8$
	<b>Additional Guidance</b>		
	Check diagram for working		
9	6 × 25 × 10 or 1500	M1	
	their 1500 ÷ 30	M1dep	Fully correct method
	50	A1	Do not ignore fw
	<b>Additional Guidance</b>		
10(a)	Two correct points plotted eg (10, 12) and (20, 24)	M1	oe eg (5, 6) and (10, 12) Ignore incorrect points $\pm \frac{1}{2}$ square tolerance
	Straight ruled line through their correct points	A1	$\pm \frac{1}{2}$ square tolerance
	<b>Additional Guidance</b>		
	If line goes through (0, 0) this can be accepted as a correct point		

Q	Answer	Mark	Comments
10(b)	15	B1	
10(c)	$12 \div 10$ or 1.2 or $10 \div 12$ or 0.83(...) or 480 (square yards)	M1	Scale factor 1.2 seen or implied  or 10 to 400 is area factor 40 seen or implied
	$25 \times 480$ or $25 \times 400 \times 1.2$ or $25 \times 400 \div 0.83(\dots)$	M1dep	oe eg $25 \times 40 \times 12$
	12 000	A1	Accept [12 000, 12 050] SC1 for 10 000
	<b>Additional Guidance</b>		
	$25 \times 480$	M1M1	

Q	Answer	Mark	Comments
11(a)		B2	<p>Mark intention</p> <p>B1 for the line <math>y = 4</math> drawn</p> <p>or for any reflection in a line <math>y = c</math> or <math>x = 4</math></p> <p>or for vertices <math>(2, 7)</math> and <math>(4, 7)</math> drawn without triangle as their answer</p>
	<b>Additional Guidance</b>		
	B1		

Q	Answer	Mark	Comments
11(b)	<p>Fully correct enlargement SF = 3</p> 	B2	<p>Any position or orientation Mark intention</p> <p>B1 for enlargement scale factor 2, 4 or 5 on the grid or at least 2 correct sides or 4 correct points not joined</p>
	<b>Additional Guidance</b>		

12(a)	$a$ and $b$	B1	
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12(b)	$b$ and $c$	B1	
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12(c)	$a$ and $c$	B1	
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Q	Answer	Mark	Comments
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13	<b>Alternative method 1</b>		
	A pair of intersecting arcs of radii 4 cm	M1	
	A pair of intersecting arcs of radii 8 cm	M1	
	Fully correct kite drawn with all arcs shown	A1	SC1 for a complete kite within tolerance
	<b>Alternative method 2</b> (perpendicular bisector)		
	Two pairs of intersecting arcs of equal radii greater than 3 cm	M1	
	Perpendicular bisector constructed	M1dep	
	Fully correct kite drawn with at least one arc of radius 4 cm and one arc of radius 8 cm	A1	SC1 for a complete kite within tolerance
	<b>Additional Guidance</b>		
Kite may be drawn inverted			

14(a)	52 + 75 + 59 or 186 or 360 – 52 – 75 – 59	M1	oe $x + 52 + 75 + 59 = 360$
	174	A1	
	<b>Additional Guidance</b>		
	52 + 75 + 59 may be embedded within an incorrect calculation 360 – 52 + 75 + 59 = 174 (recovered) 360 – 52 + 75 + 59 (= 442)		M1 M1A1 MOA0

Q	Answer	Mark	Comments	
14(b)	$AED = 100$ or $E = 100$ or $ADE = 40$ or $D = 40$ or $DAE = 40$ or $A = 40$	B1	May be on diagram in the correct place	
	(BAD =) 180 – 117 or 63 seen or implied	M1	oe May be on diagram in the correct place	
	103	A1		
	<b>Additional Guidance</b>			
	Beware of contradictions between diagram and working shown $BAD$ shown as 63 on diagram in correct position 180 – 117 with nothing marked on diagram and no contradiction 180 – 117 = 63, 63 only marked at C on diagram			M1 M1 M0
	Condone assumption for symmetry of trapezium $(360 - 2 \times 117) \div 2$			M1

Q	Answer	Mark	Comments	
<b>15 Alt 1 of 2</b>	<b>Alternative method 1</b>			
	$\frac{15}{100} \times 49.8(0)$ or 7.47	$49.8(0) \div 5$ or 9.96	M1	oe 0.85 seen
	$49.8(0) - \text{their } 7.47$ or 42.33	$\frac{15}{100} \times \text{their } 9.96$ or 1.49(4)	M1dep	oe $49.8(0) \times 0.85$ or 42.33
	their $42.33 \div 5$ or their $9.96 - \text{their } 1.49$  or 8.466 or 8.46 or 8.47	M1dep		
8.466 or 8.46 or 8.47 and 5 litres	Q1ft	Strand (iii) ft only for M1M1M0		



Q	Answer	Mark	Comments	
<b>15 Alt 2 of 2</b>	<b>Alternative method 2</b>			
	$\frac{15}{100} \times 49.8(0)$ or 7.47	$49.8(0) \div 5$ or 9.96	M1	oe $8.75 \times 5$ or 43.75 or $1 \div 8.75$ or 0.114... or 0.11
	$49.8(0) - \text{their } 7.47$ or 42.33	$\frac{15}{100} \times \text{their } 9.96$ or 1.49(4)	M1dep	oe
	$49.8(0) - \text{their } 7.47$ or 42.33 and 43.75	$8.75 + \text{their } 1.49(4)$ or 10.24(4)	M1dep	$1 \div 8.75$ or 0.114... or 0.11 and $5 \div \text{their } 42.33$ or 0.118... or 0.12
	42.33 and 43.75 and 5 litres	9.96 and 10.24(4) and 5 litres	Q1ft	0.114... and 0.118... and 5 litres or 0.11 and 0.12 and 5 litres Strand (iii) ft only for M1M1M0
	<b>Additional Guidance</b>			
	Allow £49.80 or £42.33 or large can or second can or B for Q mark			
Do not accept £50 for £49.80 unless recovered				

Q	Answer	Mark	Comments	
16	95 ÷ 38 or 2.5(0)	M1	oe	
	7 + their 2.5(0) or 9.5(0) or 2 hours 30 minutes seen	M1dep	oe Allow 2.30 or 2:30	
	9.30 (am) or 0930	A1	oe	
	<b>Additional Guidance</b>			
	Answer 9 hours 30 minutes			M1M1A0
	9.30 pm or 2130			M1M1A0
17(a)	$c^2 = a^2 + b^2$ and $c = \sqrt{a^2 + b^2}$	B2	B1 for 1 correct or 1 correct and 1 incorrect or 2 correct and 1 incorrect	

Q	Answer	Mark	Comments	
17(b)	$22^2$ and $8^2$ seen or 484 and 64 or 420	M1	oe	
	$\sqrt{22^2 - 8^2}$ or $\sqrt{484 - 64}$ or $\sqrt{420}$ or $2\sqrt{105}$	M1dep		
	20.4(9...)	A1		
	20.5	B1ft	ft any 2 dp or better SC2 for final answer of 23.4 only from incorrect use of Pythagoras' theorem	
	<b>Additional Guidance</b>			
	20.5 on its own		4 marks	
	Trigonometry method could gain marks: M1 for gaining an equation in terms of $y$ , M1dep for full method that would lead to an answer of 20.4(9...)			

Q	Answer	Mark	Comments
<b>18</b> <b>Alt</b> <b>1 of 4</b>	<b>Alternative method 1</b>		
	$4x + 10 + 6x - 15 + 60 = 180$ or $4x + 10 + 6x - 15 = 120$	M1	oe
	$(x =)12.5$	A1	oe
	$4 \times \text{their } 12.5 + 10$ or $6 \times \text{their } 12.5 - 15$	M1dep	Dependent on M1
	60	A1	
	$4 \times 12.5 + 10 = 60$ and $6 \times 12.5 - 15 = 60$  or $4 \times 12.5 + 10 = 60$ and $180 - 60 - 60 = 60$  or $6 \times 12.5 - 15 = 60$ and $180 - 60 - 60 = 60$	Q1	Strand (ii)  Accept 60, 60, 60 with 12.5 seen

Q	Answer	Mark	Comments
<b>18 Alt 2 of 4</b>	<b>Alternative method 2</b>		
	$6x - 15 = 4x + 10$ or $2x = 25$	M1	oe
	$(x =)12.5$	A1	oe
	$4 \times \text{their } 12.5 + 10$ or $6 \times \text{their } 12.5 - 15$	M1dep	Dependent on M1
	60	A1	
	$4 \times 12.5 + 10 = 60$ and $6 \times 12.5 - 15 = 60$  or $4 \times 12.5 + 10 = 60$ and $180 - 60 - 60 = 60$  or $6 \times 12.5 - 15 = 60$ and $180 - 60 - 60 = 60$	Q1	Strand (ii)  Accept 60, 60, 60 with 12.5 seen

Q	Answer	Mark	Comments
<b>18 Alt 3 of 4</b>	<b>Alternative method 3</b>		
	$6x - 15 = 60$ or $4x + 10 = 60$	M1	oe
	$(x =)12.5$	A1	oe
	$6 \times \text{their } 12.5 - 15$ or $4 \times \text{their } 12.5 + 10$	M1dep	Dependent on M1
	60	A1	
	$4 \times 12.5 + 10 = 60$ and $6 \times 12.5 - 15 = 60$  or $4 \times 12.5 + 10 = 60$ and $180 - 60 - 60 = 60$  or $6 \times 12.5 - 15 = 60$ and $180 - 60 - 60 = 60$	Q1	Strand (ii)  Accept 60, 60, 60 with 12.5 seen

Q	Answer	Mark	Comments
<b>18 Alt 4 of 4</b>	<b>Alternative method 4</b>		
	$6x - 15 = 60$	M1	oe
	$(x =)12.5$	A1	oe
	$4x + 10 = 60$	M1	Dependent on M1
	$(x =)12.5$	A1	oe
	Valid statement or $4 \times 12.5 + 10 = 60$ and $6 \times 12.5 - 15 = 60$  or $4 \times 12.5 + 10 = 60$ and $180 - 60 - 60 = 60$  or $6 \times 12.5 - 15 = 60$ and $180 - 60 - 60 = 60$	Q1	Strand (ii)  eg Since both $x$ values are 12.5 then all angles are 60  Accept 60, 60, 60 with both A marks awarded
	<b>Additional Guidance</b>		

Q	Answer	Mark	Comments	
19	diameter = 10 (cm) seen or implied or width of rectangle = 10 (cm) seen or implied	B1	May be on diagram	
	radius = 5 (cm) seen or implied	B1dep	May be on diagram	
	10 × 10 or 100 or 20 × 10 or 200	M1	oe	
	$\pi \times 5^2$ or $25\pi$ or [78.5, 78.6] or 79 or $2 \times \pi \times 5^2$ or $50\pi$ or [157, 157.2] or 158	M1	oe	
	100 – their $25\pi$ or [21.4, 21.5] or 200 – 2 × their $25\pi$	M1dep	oe Dependent on M1 M1	
	[42.8, 43] or 200 – $50\pi$ or $50(4 - \pi)$ or 42	A1	oe	
	<b>Additional Guidance</b>			
	200 – $50\pi = 150\pi$ does not score final A mark			5 marks
	20 × 10 or 200 implies			B1M1
	$2 \times \pi \times 5$ implies			B1B1
	$\pi d = 10\pi$ implies			B1
$10\pi$ on its own			B0	