

GCSE

# Mathematics

43601F Unit 1: Foundation

Mark scheme

---

4360

November 2016

---

Version/Stage: 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](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.

<b>M</b>	Method marks are awarded for a correct method which could lead to a correct answer.
<b>A</b>	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>B</b>	Marks awarded independent of method.
<b>ft</b>	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
<b>SC</b>	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
<b>M dep</b>	A method mark dependent on a previous method mark being awarded.
<b>B dep</b>	A mark that can only be awarded if a previous independent mark has been awarded.
<b>oe</b>	Or equivalent. Accept answers that are equivalent. e.g. accept 0.5 as well as $\frac{1}{2}$
<b>[a, b]</b>	Accept values between $a$ and $b$ inclusive.
<b>[a, b)</b>	Accept values $a \leq \text{value} < b$
<b>3.14 ...</b>	Accept answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
<b>Q</b>	Marks awarded for quality of written communication
<b>Use of brackets</b>	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***

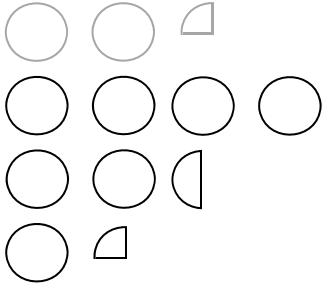
Erased or crossed out work that has been replaced is not awarded marks.

***Premature approximation***

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

***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)		B2	B1 one or two correct rows Accept any orientation for the part circles
	<b>Additional Guidance</b>		
	Ignore any variation of symbol size		
	Allow any alignment		
	Mark intention for part circles		

Q	Answer	Mark	Comments
1(b)	1000 + 2500 + 1500 + 1000 or $5 + \frac{1}{2} + \frac{1}{2}$ or 6	M1	Allow one error or omission if adding totals
	6000	A1	
	$\frac{6000}{8000}$ and Yes or states 6000 is three-quarters of 8000 or states 2000 is a quarter of 8000 or $8000 \div 4 \times 3 = 6000$ and Yes or $\frac{\text{their } 6000}{\text{their } 6000 + 2000}$ correctly evaluated and correct decision or states their 6000 is not three-quarters of 2000 + their 6000 or states 2000 is not a quarter of 2000 + their 6000 or $(\text{their } 6000 + 2000) \div 4 \times 3$ correctly evaluated and correct decision	Q1ft	oe Strand (iii) ft M1A0

Q	Answer	Mark	Comments
---	--------	------	----------

2(a)	evens	B1	
------	-------	----	--

2(a)	unlikely	B1	
------	----------	----	--

3(a)	<table border="1"> <tr> <td>car</td> <td>### ##</td> <td>10</td> </tr> <tr> <td>van</td> <td>IIII</td> <td>4</td> </tr> <tr> <td>lorry</td> <td>### I</td> <td>6</td> </tr> </table>	car	### ##	10	van	IIII	4	lorry	### I	6	B3	B2 Two rows correct or Frequency/ tally columns swapped but otherwise correct  or  B1 One row correct or Tallies correct or Frequencies correct
	car	### ##	10									
	van	IIII	4									
	lorry	### I	6									
	<b>Additional Guidance</b>											
Tallies may be in frequency column for B1												
Frequencies may be in tally column for B1												
Incorrect use of the five bar gate		max B2										

3(b)	their $6 \times 2$ or 12 or their $6 \times 3$ or 18	M1	
	their $12 \times 3$ or their $18 \times 2$ or 36 or their $12 \times 2$	M1dep	M2 for their $6 \times 2 \times 2$
	24	A1ft	ft part (a) for their $6 \times 4$
	<b>Additional Guidance</b>		
	36 on the answer line (not from wrong working)		M1 M1 A0
	12 (lorries) seen even if not used		M1

Q	Answer	Mark	Comments
4(a)	0.076923(...)	B1	
4(b)	0.077	B1ft	ft any value with at least 4 decimal places
4(c)	$\frac{48}{52}$ or $\frac{12}{13}$ or 0.923...	B1ft	oe ft 1 – their decimal (< 1) from (a) or (b)
	<b>Additional Guidance</b>		
	Ignore probability words eg likely		
	Correct or ft		
5	10 10 20 30	B2	Any order B1 four numbers with total 70, mode 10 or total 70, median 15 or mode 10, median 15
	<b>Additional Guidance</b>		
	If answer line blank, mark the working but follow the usual rules for choice		
	10 10 15 35		B1
	10 10 10 40		B1
	10 15 15 30		B1
	10 10 20 40		B1
	10 10 15 15		B0
	10 10 10 10		B0



Q	Answer	Mark	Comments
6(a)	$1080 \div 4$ or $\frac{90}{360}$ seen or implied	M1	oe $\frac{1}{4}$ or 25% eg $1080 - 2 \times (\frac{1080}{360} \times 135)$ or $1080 - 2 \times 405$
	270	A1	
	<b>Additional Guidance</b>		
	Answer $\frac{270}{1080}$		M1 A0
	Beware of 270 from $135 + 135$ or $360 - 90$		M0
	Answer only of 270 (people)		M1 A1
	Answer only of 270°		M0 A0

Q	Answer	Mark	Comments
6(b)	<b>Alternative method 1</b> Comparing proportions		
	$\frac{135}{360} (\times 100)$ or $\frac{405}{1080} (\times 100)$ or $\frac{3}{8}$ or $(1 - \frac{1}{4}) \div 2$ or 0.375 or $(100 - 25) \div 2$ or 37.5% or $\frac{250}{800} (\times 100)$ or $\frac{5}{16}$ or 0.3125 or 31.25%	M1	oe
	$\frac{6}{16}$ and $\frac{5}{16}$ or $\frac{3}{8}$ and $\frac{2.5}{8}$ or 0.375 and 0.3125 or 37.5% and 31.25%	A1	Values must be correct and comparable oe M1A1 $\frac{8}{3}$ and $\frac{8}{2.5}$ oe or [2.6, 2.7] and 3.2 or [266, 267]% and 320%
	Leeds and $\frac{6}{16}$ and $\frac{5}{16}$ or $\frac{3}{8}$ and $\frac{2.5}{8}$ or 0.375 and 0.3125 or 37.5% and 31.25% or $\frac{16}{6}$ and $\frac{16}{5}$ or $\frac{8}{3}$ and $\frac{8}{2.5}$ or [2.6, 2.7] and 3.2 or [266, 267]% and 320%	A1	oe
	<b>Alternative method 2</b> Working out Bradford angle		
	$\frac{250}{800} (\times 100)$ or $\frac{5}{16}$ or 0.3125 or 31.25%	M1	oe
	[112, 113]	A1	
	Leeds and [112, 113] (and 135)	A1	

Question 6 continues on next page

Q	Answer	Mark	Comments
6(b) cont	<b>Alternative method 3</b> Working out Leeds if population 800		
	$\frac{135}{360}(\times 100)$ or $\frac{405}{1080}(\times 100)$ or $\frac{3}{8}$ or $(1 - \frac{1}{4}) \div 2$ or 0.375 or $(100 - 25) \div 2$ or 37.5%	M1	oe
	300	A1	
	Leeds and 300 (and 250)	A1	
	<b>Alternative method 4</b> Working out Bradford if population 1080		
	$\frac{250}{800}(\times 100)$ or $\frac{5}{16}$ or 0.3125 or 31.25%	M1	oe
	[337, 338]	A1	
	Leeds and [337, 338] and 405	A1	
	<b>Additional Guidance</b>		
	Only one of the reciprocal proportions eg $\frac{360}{135}$ or $\frac{800}{250}$		M0
	Accept an embedded proportion for M1 eg $1080 \div 360 \times 135$		M1
	Accept $\frac{405}{1080}$ as evidence of 405 for the final A in Alt 4		

Q	Answer	Mark	Comments
7	Any two of $7 \times 2$ or 14 or $9 \times 3$ or 27 or $10 \times 4$ or 40 or $6 \times 5$ or 30	M1	
	111	A1	
	<b>Additional Guidance</b>		
	Further working loses the A mark eg $14 + 27 + 40 + 30 = 111$ $111 \div 32$ , Answer 3.47		M1 A0
	Products seen by table but replaced by another method		M0
8	<b>Alternative method 1</b>		
	$7.8 + 7.3 + 4.2 + 8.1 + 7.1$ or 34.5	M1	Allow one error or omission
	their $34.5 \div 5$ or 6.9	M1dep	Condone $7.8 + 7.3 + 4.2 + 8.1 + 7.1 \div 5$ without brackets or 28.82 for M2
	(Amy's mean is) 6.9 and Beth	A1	
	<b>Alternative method 2</b>		
	$7.8 + 7.3 + 4.2 + 8.1 + 7.1$ or 34.5	M1	Allow one error or omission
	$7(.2) \times 5$ or 35 or 36	M1	
	34.5 and 35 or 36 and Beth	A1	
	<b>Additional Guidance</b>		
	If an incorrect difference between the mean scores or totals is worked out then ignore it and treat it as further work		
6.9 and no decision or 6.9 and Amy chosen		M2 A0	

Q	Answer	Mark	Comments	
9(a)	Los Angeles	B1		
9(b)	560	B2	B1 1040 or 480 chosen SC1 Answer of 220 or 140	
9(c)	620 and 1000 chosen	B1	May be implied by correct answer	
	$37\ 820 \div$ their 620 or 61	M1	their 620 must be in the range [440, 630]	
	(75 – their 61) $\times$ their 1000 or $14 \times 1000$	M1	oe their 1000 must be in the range [810, 1200]	
	14 000	A1	SC3 13 000 from scale misread of 610	
	<b>Additional Guidance</b>			
	14 000 from a scale misread			max M2

Q	Answer	Mark	Comments	
10(a)	Appropriate key	B1		
	Stem 4, 5, 6, 7	B1	or 7, 6, 5, 4	
	Leaves correct and ordered 0 7 1 2 5 6 0 1 3 4 9 2 5	B1	Must match the order of their stem if present eg if 7, 6, 5, 4 leaves should be 5 2 9 4 3 1 0 6 5 2 1 7 0	
	Appropriate alignment of leaves	Q1ft	ft their single digit leaves Strand (ii) Logical organised working so row lengths show the distribution	
	<b>Additional Guidance</b>			
	For the Q mark: <ul style="list-style-type: none"> <li>• Leaves may be unordered and/or incorrect (but need at least 11)</li> <li>• Leaves must be single digit</li> <li>• Lengths of rows need to correspond to <i>their</i> number of leaves ie row with most leaves should be longest etc</li> </ul>			
	The Q mark is independent so B0B0B0Q1ft is possible			
	Ignore lines/ commas between numbers which may be working for (b)			
If not crossed out and replaced, mark the stem-and-leaf on the grid				

Q	Answer	Mark	Comments	
<b>10(b)</b>	(Thursday's median =) 60	B1		
	their $60 \times 0.15$ or 9 or their $60 \times 0.85$	M1	oe their 60 must be in the range [40, 75]	
	51	A1ft	ft B0M1 for a correct answer rounded to the nearest integer	
	<b>Additional Guidance</b>			
	56 → 8 or 8.4 or 47.6 → answer 48		B0 M1 A1ft	
	58 → 9 or 8.7 or 49.3 → answer 49		B0 M1 A1ft	
	59 → 9 or 8.85 or 50.15 → answer 50		B0 M1 A1ft	
60.5 → 9 or 9.075 or 51.425 → answer 51		B0 M1 A1ft		
61 → 9 or 9.15 or 51.85 → answer 52		B0 M1 A1ft		
<b>11(a)</b>	$\frac{1}{10}$	B1		

Q	Answer	Mark	Comments
11(b)	Refers to a large number of trials	B1	Condone eg lots, multiple times, repeatedly, a large amount, numerous times, loads, many times, any number greater than or equal to 30
	Comments on how to decide if it is fair (or biased) by referring to matching the (theoretical) probability of $\frac{1}{6}$ or working out expected number for each score using their number of trials or stating that the frequencies of each result should be (approximately) equal	B1	oe  Assume their statement is to show it is fair unless otherwise stated
	<b>Additional Guidance</b>		
	Throw it a few times/ several times/ a number of times	1 <sup>st</sup> B0	
	Number of trials < 30	1 <sup>st</sup> B0	
	It should land on each side $\frac{1}{6}$ of the time	2 <sup>nd</sup> B1	
	A fair dice has a 1 in 6 chance of landing on each side	2 <sup>nd</sup> B1	
	It should land on each side once out of 6 throws	2 <sup>nd</sup> B1	
	If it lands on one side 4 times out of 12 it is biased	2 <sup>nd</sup> B1	
	If fair, it will land equally on each side	2 <sup>nd</sup> B1	
	If it lands on one side more than the others it's biased	2 <sup>nd</sup> B1	
	The probability of it landing on each side is even if it's fair (allow even → equal)	2 <sup>nd</sup> B1	
	It should land equally	2 <sup>nd</sup> B1	
	See which side is the mode	2 <sup>nd</sup> B0	
The results should be random if it's fair	2 <sup>nd</sup> B0		



Q	Answer	Mark	Comments																					
<b>12</b>	15 women chose A	B1	Award B0B1 if women A : C in ratio 1 : 3 and total at least 24 (6 : 18)																					
	45 women chose C	B1																						
	90 women and 70 men	B1ft	ft their 15 + 30 + their 45 and 160 – their 90																					
	Total A = 53, Total B = 56 and Total C = 51	B1																						
	38 men chose A and 6 men chose C	B1ft	ft two of their 53 – their 15 their 51 – their 45 their 70 – 26 – their 6 or – their 38																					
	The correct table is																							
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Women</th> <td style="text-align: center;"><b>15</b></td> <td style="text-align: center;">30</td> <td style="text-align: center;"><b>45</b></td> <td style="text-align: center;"><b>90</b></td> </tr> <tr> <th>Men</th> <td style="text-align: center;"><b>38</b></td> <td style="text-align: center;">26</td> <td style="text-align: center;"><b>6</b></td> <td style="text-align: center;"><b>70</b></td> </tr> <tr> <th>Total</th> <td style="text-align: center;"><b>53</b></td> <td style="text-align: center;"><b>56</b></td> <td style="text-align: center;"><b>51</b></td> <td style="text-align: center;">160</td> </tr> </tbody> </table>					A	B	C	Total	Women	<b>15</b>	30	<b>45</b>	<b>90</b>	Men	<b>38</b>	26	<b>6</b>	<b>70</b>	Total	<b>53</b>	<b>56</b>	<b>51</b>	160
		A	B	C	Total																			
	Women	<b>15</b>	30	<b>45</b>	<b>90</b>																			
	Men	<b>38</b>	26	<b>6</b>	<b>70</b>																			
Total	<b>53</b>	<b>56</b>	<b>51</b>	160																				
<b>Additional Guidance</b>																								
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Women</th> <td style="text-align: center;"><b>15</b></td> <td style="text-align: center;">30</td> <td style="text-align: center;"><b>45</b></td> <td style="text-align: center;"><b>90</b></td> </tr> <tr> <th>Men</th> <td style="text-align: center;"><b>23</b></td> <td style="text-align: center;">26</td> <td style="text-align: center;"><b>21</b></td> <td style="text-align: center;"><b>70</b></td> </tr> <tr> <th>Total</th> <td style="text-align: center;"><b>38</b></td> <td style="text-align: center;"><b>56</b></td> <td style="text-align: center;"><b>66</b></td> <td style="text-align: center;">160</td> </tr> </tbody> </table>					A	B	C	Total	Women	<b>15</b>	30	<b>45</b>	<b>90</b>	Men	<b>23</b>	26	<b>21</b>	<b>70</b>	Total	<b>38</b>	<b>56</b>	<b>66</b>	160	B1 B1 B1 B0 B1ft
	A	B	C	Total																				
Women	<b>15</b>	30	<b>45</b>	<b>90</b>																				
Men	<b>23</b>	26	<b>21</b>	<b>70</b>																				
Total	<b>38</b>	<b>56</b>	<b>66</b>	160																				
Mark the table																								
Blank cell does not equal 0																								

Q	Answer	Mark	Comments
13	$\frac{1}{5} \times 45$ or 9 or $\frac{1}{5} \times 2.75$ or 0.55 or $\frac{4}{5}$ seen	M1	oe
	45 – their 9 or $\frac{4}{5} \times 45$ or 36 or $\frac{4}{5} \times 3.20$ or 2.56	M1dep	oe
	$\frac{1}{5} \times 45 \times 2.75$ or 24.75 or $\frac{4}{5} \times 45 \times 3.20$ or 115.2(0)	M1	Allow $\frac{1}{5} \times 45 \times 3.20$ or 28.8(0) <b>and</b> $\frac{4}{5} \times 45 \times 2.75$ or 99
	139.95	A1	SC3 127.8(0)
	<b>Additional Guidance</b>		
	9 × (3.20 + 2.75)		M1 M0 M0
	24.75		M1 M0 M1
	115.2(0)		M1 M1 M1