AQA Qualifications

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

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.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded 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. e.g. accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
[a, b)	Accept values a ≤ value < b
3.14 …	Accept answers which begin 3.14 e.g. 3.14, 3.142, 3.1416
Q	Marks awarded for quality of written communication
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

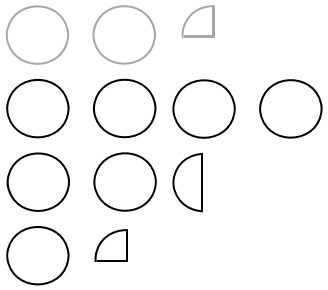
Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

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

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
	Additional Guidance		
	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 ÷ 4 × 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 (their 6000 + 2000) ÷ 4 × 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><tr><td>car</td><td>~~IIII~~ ~~IIII~~</td><td>10</td></tr><tr><td>van</td><td>IIII</td><td>4</td></tr><tr><td>lorry</td><td>~~IIII~~ I</td><td>6</td></tr></table>	B3	B2 Two rows correct or Frequency/ tally columns swapped but otherwise correct or B1 One row correct or Tallies correct or Frequencies correct
	Additional Guidance		
	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 × 2 or 12 or their 6 × 3 or 18	M1	
	their 12 × 3 or their 18 × 2 or 36 or their 12 × 2	M1dep	M2 for their 6 × 2 × 2
	24	A1ft	ft part (a) for their 6 × 4
	Additional Guidance		
	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)
	Additional Guidance		
	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
	Additional Guidance		
	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 ÷ 4 or $\frac{90}{360}$ seen or implied	M1	oe $\frac{1}{4}$ or 25% eg 1080 – 2 × ($\frac{1080}{360}$ × 135) or 1080 – 2 × 405
	270	A1	
	Additional Guidance		
	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)	**Alternative method 1** 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
	Alternative method 2 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	**Alternative method 3** 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	
	Alternative method 4 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	
	Additional Guidance		
	Only one of the reciprocal proportions eg $\frac{360}{135}$ or $\frac{800}{250}$		M0
	Accept an embedded proportion for M1 eg 1080 ÷ 360 × 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 × 2 or 14 or 9 × 3 or 27 or 10 × 4 or 40 or 6 × 5 or 30	M1	
	111	A1	
	Additional Guidance		
	Further working loses the A mark eg 14 + 27 + 40 + 30 = 111 111 ÷ 32, Answer 3.47		M1 A0
	Products seen by table but replaced by another method		M0

8	**Alternative method 1**		
	7.8 + 7.3 + 4.2 + 8.1 + 7.1 or 34.5	M1	Allow one error or omission
	their 34.5 ÷ 5 or 6.9	M1dep	Condone 7.8 + 7.3 + 4.2 + 8.1 + 7.1 ÷ 5 without brackets or 28.82 for M2
	(Amy's mean is) 6.9 and Beth	A1	
	Alternative method 2		
	7.8 + 7.3 + 4.2 + 8.1 + 7.1 or 34.5	M1	Allow one error or omission
	7(.2) × 5 or 35 or 36	M1	
	34.5 and 35 or 36 and Beth	A1	
	Additional Guidance		
	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 ÷ their 620 or 61	M1	their 620 must be in the range [440, 630]
	(75 – their 61) × their 1000 or 14 × 1000	M1	oe their 1000 must be in the range [810, 1200]
	14 000	A1	SC3 13 000 from scale misread of 610
	Additional Guidance		
	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
	Additional Guidance		
	For the Q mark: • Leaves may be unordered and/or incorrect (but need at least 11) • Leaves must be single digit • Lengths of rows need to correspond to *their* number of leaves ie row with most leaves should be longest etc		
	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
10(b)	(Thursday's median =) 60	B1	
	their 60 × 0.15 or 9 or their 60 × 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
	Additional Guidance		
	56 → 8 or 8.4 or 47.6 → answer 48 58 → 9 or 8.7 or 49.3 → answer 49 59 → 9 or 8.85 or 50.15 → answer 50 60.5 → 9 or 9.075 or 51.425 → answer 51 61 → 9 or 9.15 or 51.85 → answer 52		B0 M1 A1ft B0 M1 A1ft B0 M1 A1ft B0 M1 A1ft B0 M1 A1ft
11(a)	$\frac{1}{10}$	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
	Additional Guidance		
	Throw it a few times/ several times/ a number of times		1st B0
	Number of trials < 30		1st B0
	It should land on each side $\frac{1}{6}$ of the time		2nd B1
	A fair dice has a 1 in 6 chance of landing on each side		2nd B1
	It should land on each side once out of 6 throws		2nd B1
	If it lands on one side 4 times out of 12 it is biased		2nd B1
	If fair, it will land equally on each side		2nd B1
	If it lands on one side more than the others it's biased		2nd B1
	The probability of it landing on each side is even if it's fair (allow even → equal)		2nd B1
	It should land equally		2nd B1
	See which side is the mode		2nd B0
	The results should be random if it's fair		2nd B0

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="8">12</td><td>15 women chose A</td><td>B1</td><td>Award B0B1 if women A : C in ratio 1 : 3 and total at least 24 (6 : 18)</td></tr>
<tr><td>45 women chose C</td><td>B1</td><td></td></tr>
<tr><td>90 women and 70 men</td><td>B1ft</td><td>ft their 15 + 30 + their 45
and 160 – their 90</td></tr>
<tr><td>Total A = 53, Total B = 56
and Total C = 51</td><td>B1</td><td></td></tr>
<tr><td>38 men chose A and 6 men chose C</td><td>B1ft</td><td>ft two of
their 53 – their 15
their 51 – their 45
their 70 – 26 – their 6 or – their 38</td></tr>
<tr><td colspan="3">The correct table is
<table>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>Total</th></tr>
<tr><td>Women</td><td>15</td><td>30</td><td>45</td><td>90</td></tr>
<tr><td>Men</td><td>38</td><td>26</td><td>6</td><td>70</td></tr>
<tr><td>Total</td><td>53</td><td>56</td><td>51</td><td>160</td></tr>
</table></td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">
<table>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>Total</th></tr>
<tr><td>Women</td><td>15</td><td>30</td><td>45</td><td>90</td></tr>
<tr><td>Men</td><td>23</td><td>26</td><td>21</td><td>70</td></tr>
<tr><td>Total</td><td>38</td><td>56</td><td>66</td><td>160</td></tr>
</table>
</td><td>B1 B1 B1
B0 B1ft</td></tr>
<tr><td colspan="2">Mark the table</td><td></td></tr>
<tr><td colspan="2">Blank cell does not equal 0</td><td></td></tr>
</table>

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) **and** $\frac{4}{5} \times 45 \times 2.75$ or 99
	139.95	A1	SC3 127.8(0)
	Additional Guidance		
	9 × (3.20 + 2.75)		M1 M0 M0
	24.75		M1 M0 M1
	115.2(0)		M1 M1 M1