
GCSE

Statistics

43101F: Foundation Tier
Mark scheme

43101F
June 2016

Version: 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.
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.
E	Explain marks are awarded for a full and detailed explanation
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.
3.14 ...	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416.
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
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1	Unlikely	B4	B3 for 4 correct B2 for 3 correct B1 for 1 or 2 correct
	Evens		
	Certain		
	Impossible		
	Likely		

2(a)	12	B1	
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2(b)	$(10 + 5 + 17 + 8 + 15) \div 5$	M1	oe Allow one error in the addition
	11	A1	SC1 for 43 or 41.4

2(c)	Increases	B1	
	Additional guidance		
	Circled or indicated		

2(d)	Decreases	B1	
	Additional guidance		
	Circled or indicated		

Q	Answer	Mark	Comments
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3(a)	Sight of one five bar gate	B1	
	Tallies 3, 10, 7 and 4	B1	
	All 4 frequencies correct	B1ft	ft their tallies

3(b)	Heights of all 4 bars correct	B2ft	B1ft for 2 or 3 heights correct ft their frequency column, or their tallies if their frequency column is blank ± 1 mm tolerance
	All bars of equal width and gaps of equal width	B1	
	Additional guidance		
	Mark intention, need not be ruled		
	Condone no gap before the first bar		

4(a)	2	B1	
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4(b)	6	B1	
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Q	Answer	Mark	Comments
4(c)	6	B1	
	$\frac{6}{20} (\times 100)$ or $\frac{n}{20} (\times 100)$	M1	oe n must be an integer and $1 \leq n \leq 19$
	30	A1	
	Additional guidance		
	Denominator 6, eg $\frac{20}{6}$ (unless recovered)	B1M0A0	

Q	Answer	Mark	Comments
4(d)	(Correct key) 2	B1	
	Correct alignment of circles	B1ft	Mark intention, ie approximate same size circles with Hatchback longer than Estate, and their rows lined up vertically ft their key unless 1
	5 circles for Hatchback and $1\frac{1}{2}$ circles for Saloon and $\frac{1}{2}$ circle for Sports	B2ft	B1ft for any 1 or 2 correct rows ft their key unless 1
	Additional guidance		
	Half circles can be any orientation		
	Allow open or closed half circles		
	Their circles must be consistent in size but do not have to be the same size as Estate		
	Condone any shading, patterns etc		
	Key = 1 is no marks		

Q	Answer	Mark	Comments
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4(e)	It's not numerical data or It's qualitative data or It's categorical data	B1	
	Additional guidance		
	Ignore any irrelevant, non-contradictory statements even if incorrect		
	It's words (not numbers)	B1	
	It's not the right type of data	B1	
	It's not the right type	B0	

5(a)	Stem 10, 11, 12, 13	B1	
	Leaves fully correct 5 6 7 8 5 5 6 7 9 1 3 5 8 3 4 6	B2ft	B1ft for 2 or 3 correct rows or B1ft for correct unordered leaves
	Additional guidance		
	Accept Stem 13, 12, 11, 10		
ft their stem if their stem is not in the correct order			

Q	Answer	Mark	Comments
5(b)	8.5 th or 8 th and 9 th identified or 117 and 119 identified or 7 and 9 identified	M1	
	118	A1	
	Additional guidance		
	8 th and 9 th values may be identified on the diagram or in an ordered list		

Q	Answer	Mark	Comments
5(c)	Alternative method 1		
	No and 3 (are over 130) and (one quarter =) 4	B2	B1 for 3 (are over 130) or (one quarter =) 4
	Alternative method 2		
	No and $\frac{3}{16}$ and $\frac{4}{16}$ or No and 0.18(75) and 0.25 or No and 18(.75)(%) and 25(%)	B2	B1 for $\frac{3}{16}$ or 0.18(75) or 18(.75)(%) or $(\frac{1}{4} =) \frac{4}{16}$
	Additional guidance		
	Accept 0.19 for 0.1875, accept 19(%) for 18.75(%)		
	Ignore irrelevant statements, or any relevant statements that are non-contradictory		
	If a box is not ticked no or equivalent can be in the text		
There are 16 children, only 3 of them are over 130 so if it was one quarter of the class there would only be 12 students	B2		

Q	Answer	Mark	Comments	
6(a)	She is only asking people from one supermarket	B1	oe	
	She is only asking people on one Monday morning	B1	oe	
	Additional guidance			
	Note, two different reasons can be in one statement			
	Ignore irrelevant or incorrect statements unless contradictory			
	Only her local supermarket (implies only one supermarket)		First B1	
	Better to ask 20 people each day (implies only one day)		Second B1	
	Accept she is only asking people in a morning		Second B1	
	Accept she is only asking people on Monday		Second B1	
	Not everyone goes shopping then / at that time		Second B1	
	Not a variety of people as children would be at school then		B0	
	20 isn't a large enough sample size		B0	

Q	Answer	Mark	Comments
6(b)	A suitable question with a time frame	B1	Allow per visit
	3 or more exhaustive boxes with no overlaps where at least 1 box accepts a range	B2	B1 for 3 or more exhaustive boxes or for 3 or more boxes, no overlaps
	Additional guidance		
	If inequality signs are used they must be correct for B2 for the response section, for B1 condone poor inequality notation, mark intention		
	For the response section for B2, condone answer in just pounds, eg £0 £1-£5 £6-£10 £11+ is worth B2		
	For the response section for B2 one of the boxes must accept a range, eg £1-£5 Less than £5, more than £10, etc are not acceptable for the range box		
	For the response section for B2, condone the use of words such as less than or more than, nothing, none		
	For the response section for B2, condone a don't know box and a nothing box		
	For the response section for B2, do not allow the use of the word other		
	Other cannot be used to fulfil the exhaustive mark		
	£0 and don't know are not overlapping		
	Allow £10+ to mean £10 or more, or more than £10, etc		
	If no units are given assume in pounds		

Q	Answer	Mark	Comments
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6(c)	Any suitable factor	B1	
	Additional guidance		
	Any reference to family size, number of people you are buying for, etc		B1
	Any reference to the number of times somebody goes shopping or the number of items purchased		B1
	Any reference to budget or income or payday		B1
	Any reference to deals/offers/discounts		B1
	Any reference to how expensive the supermarket is		B1
	Any reference to shopping in non-supermarkets, eg if people buy from the local butcher, or the local baker, or the fish stall on the market, etc		B1
	Any reference to transport arrangements, eg if they have a car		B1
	Any reference to one-off purchases / buying something unusual		B1
	Distance to supermarket		B1
	How old somebody is (unless qualified)		B0
Price		B0	

7(a)	(Boys) Keyboard and (Girls) Recorder	B1	
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Q	Answer	Mark	Comments
7(b)	Any correct different comparison, eg A higher proportion of boys played Drum kit than girls The proportion of girls playing Violin is about twice the proportion of boys	B1	The least popular for boys is flute, the least popular for girls is drums More boys played Electric guitar than Violin, but it was the other way round for girls
	Additional guidance		
	Do not accept statements that simply state percentages without giving a comparison		
	It must be clear which instrument(s) the candidate is referring to		
	Overall, a greater proportion of girls played instruments than boys		B1
	Given that the numbers of boys and girls should be approximately equal, condone comparisons such as		
	More girls play the piano than boys		B1
	(Over) twice the number of girls play flute than boys		B1
	Girls tend to play more instruments than boys		B1
	A similar percentage of boys and girls play keyboard / piano / classical guitar		B1
Condone statements such as Boys play the drums a lot more than girls		B1	
Only 8% of boys play violin but 15% of girls play violin ('only' implies a comparison here)		B1	
8% of boys play violin, 15% of girls play violin		B0	

Q	Answer	Mark	Comments
7(c)	Ticks No and gives a suitable reason, eg The categories are not mutually exclusive Some children play more than one instrument Someone who plays the piano may also play the keyboard	B1	
	Additional guidance		
	No, the column doesn't add up to 100	B1	
	No, the actual percentage is $61/160 \times 100 = 38\%$	B0	

Q	Answer	Mark	Comments
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7(d)			
	Bars drawn up to 100% for each age group – bars should have equal widths and should be separated	B1	$\pm \frac{1}{2}$ square tolerance
	One bar accurately divided	B1	$\pm \frac{1}{2}$ square tolerance
	Second bar accurately divided and both bars shaded	B1	$\pm \frac{1}{2}$ square tolerance Accept equivalent labelling of parts
			SC1 for an accurate and correctly shaded multiple bar chart drawn with equal width bars provided there is a gap separating the bars for ages 5-7 from those for 8-13
Additional guidance			
For the third B1 allow inconsistent order of shading so long as the proportions are correct and the shading matches the key			

Q	Answer	Mark	Comments
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8(a)	2	2	3	4	4		B2	B1 for 9 or 10 entries filled in correctly
	2	2	3	4	4			
	3	3	4	5	5			
	3	3	4	5	5			
	4	4	5	6	6			

8(b)	$\frac{7}{25}$	B2ft	oe B1 for denominator 25 or B1ft for numerator 7 ft from part (a) for their numerator only
	Additional guidance		
	For B2 ignore fw after $\frac{7}{25}$ unless the answer is no longer a probability, eg $\frac{7}{25} = 0.16$ is B2 $\frac{7}{25} = 3.57$ is B1		
	For B2 ignore words with $\frac{7}{25}$ unless contradictory		

Q	Answer	Mark	Comments
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8(c)	60 total Small	B1																						
	30 total Cola	B1																						
	All 9 remaining values correct	B3ft	B2ft 5-8 remaining values correct B1ft 2-4 remaining values correct																					
	<table border="1"> <thead> <tr> <th></th> <th>Fruit juice</th> <th>Cola</th> <th>Lemonade</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Small</td> <td>25</td> <td>8</td> <td>27</td> <td>60</td> </tr> <tr> <td>Large</td> <td>20</td> <td>22</td> <td>18</td> <td>60</td> </tr> <tr> <td>Total</td> <td>45</td> <td>30</td> <td>45</td> <td>120</td> </tr> </tbody> </table>					Fruit juice	Cola	Lemonade	Total	Small	25	8	27	60	Large	20	22	18	60	Total	45	30	45	120
		Fruit juice	Cola	Lemonade	Total																			
	Small	25	8	27	60																			
Large	20	22	18	60																				
Total	45	30	45	120																				
Additional Guidance																								
ft their 60 for total Small and their 30 for total Cola, do not allow negative or decimal answers																								

9(a)	6 700 000 or 6.7 million	B1	
	Additional guidance		
	Do not allow 6.7 or 6.7 m or 6.7 mil		

9(b)	6 000 000 or 6 million	B1	
	Additional guidance		
	Do not allow 6 or 6 m or 6 mil		

9(c)	Due to rounding	B1	
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Q	Answer	Mark	Comments
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9(d)	Manufacturing	B1	
	Additional guidance		
	Condone poor spelling		

9(e)	12 (million) or 12 000 000 or 0.21 or 21	B1	oe
	12 × 0.21 or 12 000 000 × 0.21	M1	oe
	2.52 (million) or 2 520 000	A1	SC1 for digits 252
	Additional guidance		
	Digits 252 means 252 000, 2520, 0.252, etc		
	B1 for 21 and no other value from the Type of job table used, so 21 + 14 = 35 is B0 for example		

10(a)	15 ÷ 5 or sight of $\frac{1}{5}$ oe	M1	
	3	A1	
	Additional guidance		
	Likely equivalents of $\frac{1}{5}$ include $\frac{2}{10}$, $\frac{3}{15}$, 0.2 or 20%		
	6, 6, 3 or 3, 6, 6 or 6, 3, 6 or 12, 3 or 6 : 6 : 3 etc		M1

Q	Answer	Mark	Comments
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10(b)	<table border="1"> <tr> <td>6</td><td>2</td><td>1</td><td>4</td><td>9</td><td>6</td><td>7</td><td>5</td><td>0</td><td>2</td><td>3</td><td>1</td><td>7</td><td>4</td><td>0</td> </tr> <tr> <td>L</td><td>S</td><td>S</td><td>L</td><td>B</td><td>L</td><td>L</td><td>L</td><td>S</td><td>S</td><td>S</td><td>S</td><td>L</td><td>L</td><td>S</td> </tr> </table>	6	2	1	4	9	6	7	5	0	2	3	1	7	4	0	L	S	S	L	B	L	L	L	S	S	S	S	L	L	S	B2	B1 for 12 additional simulated values filled in correctly.
	6	2	1	4	9	6	7	5	0	2	3	1	7	4	0																		
L	S	S	L	B	L	L	L	S	S	S	S	L	L	S																			

10(c)	(S) 7 (L) 7 (B) 1	B1ft	Follow through from their part (b)	
	Additional guidance			
	In this part you must follow through from part (b)			
	Do not accept tallies unless the total is given			

10(d)	Fewer baskets (than expected) or More small/ large trolleys (than expected)	B1ft	oe Ignore any numbers saying how many fewer baskets there were than expected etc Follow through from previous parts
	Additional guidance		
	The number of people choosing a small trolley is not twice the number choosing a basket		B1
	Only 1 B (should be 3)		B1
	He had 1 B		B0
	Fewer people choose baskets than (small/large) trolleys		B0
ft totals or tallies from their part (c), if part (c) is blank ft their part (b)			

Q	Answer	Mark	Comments
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10(e)	There are equal numbers of small trolleys and large trolleys	B1ft	oe Follow through from previous parts
	Additional Guidance		
	Fewer people choose baskets than (small/large) trolleys		B1
	If part (c) contains an error, follow through can be given from part (c) if statements are true for their results eg 6S, 8L, 1B There are similar numbers of small trolleys and large trolleys There are 6 small trolleys which is as expected		B1ft B1ft
	Number of people asked is 15		B0
	ft totals or tallies from their part (c), if part (c) is blank ft their part (b)		
	If part c is incorrect, eg 6 small trolleys and 8 large trolleys, if a mark has been given in part (d) for noting a difference in those numbers, do not allow a mark in part (e) for noting they are similar		

11(a)	30	B1	
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11(b)	$55 \times 3 + 75$ or 240	M1	oe
	60	A1	SC1 116.25 or 183.75 or 198.75

11(c)	Convenience or Opportunity	B1	
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Q	Answer	Mark	Comments
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11(d) Alt 1 or 2	Alternative method 1		
	$\frac{321}{800}$ or 0.401(25) or 40.1(25%) or $\frac{800}{321}$ or 2.492(...) or 2.5	M1	oe
	$\frac{321}{800} \times 40$ or their 0.401(25) $\times 40$ or $40 \div \frac{800}{321}$ or 40 \div their 2.492(...) or 16.05	M1dep	oe
	16	A1	SC2 for 18 or 4 or 2 SC1 for 3.6 or 2.35

11(d) Alt 2 of 2	Alternative method 2		
	$\frac{800}{40}$ or 20 or $\frac{40}{800}$ or 0.05	M1	oe
	$\frac{321}{\text{their } 20}$ or 321 \times their 0.05 or 16.05	M1dep	oe
	16	A1	SC2 for 18 or 4 or 2 SC1 for 3.6 or 2.35
	Additional guidance		
16 from no clearly incorrect working		M1M1A1	

Q	Answer	Mark	Comments
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12(a)	B	B1	
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12(b)	To see the range of answers people give or To see if the questionnaire works/ questions are clear or To see if there are any errors/ problems or To see how many people respond	B1	oe
	Additional guidance		
	To test the questions		B1
	To see if it is effective (it refers to the questionnaire)		B1
	To make sure that the questions give him the information/data/answers that he wants		B1
	To see if his questionnaire would give the right answers		B1
	To see how big the sample size needs to be		B1
	To test the data collection method		B1
	To see if it is worthwhile to carry out the (full) study		B1
	To see if the answers are right		B0
	It's a test run (attempt at a definition, not a reason)		B0
	To check results will be accurate/reliable (not specific enough)		B0
	To see if questions are biased		B0
	To get better results (detail lacking as to why results will be better)		B0
	To see if he should open the stall		B0

Q	Answer	Mark	Comments
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12(c)(i)	A closed question has response boxes/ a choice of answers	B1	oe An open question does not have response boxes
	Additional guidance		
	Any correct difference mentioned is B1 unless accompanied by a clearly incorrect or contradictory statement, eg		
	An open question allows you to write in your own words, a closed question is yes/no (correct statement about open questions)		B1
	A closed question has response boxes, an open question allows you to give an opinion (correct statement about closed questions)		B1
	A closed question is multiple choice, an open question is yes/no (correct statement about closed questions, but statement about open questions is clearly incorrect)		B0
	Closed questions have pre-chosen answers such as Yes/No		B1
	Closed questions are multiple choice / have set answers		B1
	Closed questions have a response section (unless qualified)		B0
	Closed questions have only one short answer / a specific answer		B0
Closed questions are answered either Yes/No		B0	
A closed question is one where there are only a few answers		B0	

Q	Answer	Mark	Comments	
12(c)(ii)	<p>Two different reasons:</p> <p>Ease at answering/collecting Easier to answer / collect the data / carry out a survey Quicker to answer / collect the data Response options can help clarify meaning of questions</p> <p>Ease of Analysis Makes analysis of data simpler/quicker/cheaper Limits possible answers / people stick to the point Problems due to poor handwriting lessened Easier to make comparisons Easier to graph</p> <p>Response Rate Improves response rate Less likely to miss out questions</p>	B2	<p>oe</p> <p>B1 for each advantage</p> <p>Advantages should come from different categories</p>	
	Additional Guidance			
	Note, two different reasons can be in one statement			
	Ignore irrelevant or incorrect statements unless contradictory			
	People are more willing to tell you information		B1	
	Smaller amount of data to work with (lacks detail)		B0	
	It's quicker / easier (unless they explain why)		B0	
	Answers to the questionnaire are more accurate/reliable (unless more detail is given explaining why)		B0	

Q	Answer	Mark	Comments
12(d)	Include a pre-paid envelope / collect questionnaires in person or Give an incentive to answer (eg prize draw, donation to charity) or Interview people (face-to-face, by telephone)	B1	oe Make the questionnaire shorter Allow people to answer online Sending a reminder
	Additional Guidance		
	Give a deadline for returning the questionnaire	B1	
	Interview people in the market	B1	
	Give it out to people using the market	B0	