

GCSE
STATISTICS
8382/1H

HIGHER TIER PAPER 1

Mark scheme

2019

V1.0

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' 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

Principal Examiners have prepared these mark schemes for specimen papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

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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 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 <i>a</i> and <i>b</i> inclusive.
3.14 ...	Allow 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 student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student 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	6	B1	Any indication
2	95	B1	Any indication
3	$\frac{1}{36}$	B1	Any indication
4	-1	B1	Any indication
5(a)	Carry out a check that values are consistent i.e. within the possible values for a % and/or are similar to other values in the table.	B1	oe
5(b)	115 circled and 15 stated	B1	oe
5(c)	It decreased (in 2009) and then increased (every year)	B1	
	Additional Guidance		

Q	Answer	Mark	Comments	
5(d)	0.08 or 84.1 (million)	M1	for 0.08 accept 0.075 – 0.085 for 84.1 accept 84.05 – 84.15 (million)	
	0.08×84.1 (million)	M1dep	using their values in range	
	6.728 (million)	A1	6.30375 – 7.15275 (million)	
	6.3 – 7.2 (million) (to 2 sf)	B1ft	ft their answer rounded to the nearest 100,000	
	Additional Guidance			
6(a)	0.3	B1	oe	
6(b)	their $0.3 \times$ their 0.3	M1	ft their part (a) only if it's between 0 and 1 exclusive	
	0.09	A1ft	oe ft their part (a) only if it's between 0 and 1 exclusive SC1 0.9	
	Additional Guidance			
6(c)	$1 - 0.3 - 0.18$	M1	oe	
	0.52	A1	oe	
	Additional Guidance			
6(d)	No, we don't know the probability of if being windy if it's raining	B1	oe we do not know whether rain and wind are independent	
	Additional Guidance			

Q	Answer	Mark	Comments	
7(a)	132/12	M1		
	11	A1		
	$\sqrt{1560/12} - (\text{their } 11^2)$	M1		
	3	A1 ft		
	Additional Guidance			
7(b)	$500 + (\text{their } 11)(100) (= 1600)$	M1		
	Their $1600 \div 16$	A1 ft		
	Den is right	B1ft	If M1 awarded	
	Additional Guidance			
7(c)	On average Den earns more	B1 ft		
	Peter has less variation in earnings	B1 ft		
	Additional Guidance			
7(d)	Ticked Yes and appropriate as no apparent extreme values or appropriate as all values used in calculation	B1	oe	
	Additional Guidance			

Q	Answer	Mark	Comments
8	All three sampling methods correctly named	B3	A – Quota B – Systematic C – Random B2 – two methods named correctly B1 – one method named correctly
	In A every gym is represented whereas in B and C this might not be the case.	M1	oe
	In C every trainer has an equal chance of being selected which is not true of A and B	M1	oe
	B is somewhat easier to carry out than C (A depends on the choice of selection chosen by the management)	M1	oe
	Reasoned choice of one of the methods	A1	
	Additional Guidance		

Q	Answer	Mark	Comments
9(a)	Same price	B1	oe
	Additional Guidance		
9(b)(i)	Use of $n = 9$	M1	
	$6 \times \frac{24.5}{720}$ (= 0.2042)	M1ft	
	1 – their 0.2042	M1	
	[0.7958, 0.8]	A1	Answer only (achieved on calculator) to be awarded 4 marks
	Additional Guidance		
9(b)(ii)	(High) positive agreement/association between number of pages and retail price	B1	As the number of pages increase so does the retail price of the book
	Additional Guidance		
9(c)(i)	Each additional page increases the price by 2p	B2	oe Per page increase in price B1
	Additional Guidance		
9(c)(ii)	$y = 0.02 \times 765 + 1.35$ or 16.65 <u>and</u> their 16.65 – 10.30 or 6.35	M1	1 st mark
	$x = \text{their } \frac{6.35 - 1.35}{0.02}$	M1dep	2 nd mark
	250	A1	3 rd mark

Q	Answer	Mark	Comments
10(a)	The birth rate is higher than the death rate (so more are being born in the town than are dying in the town)	B1	oe
	Additional Guidance		
10(b)	More people might have moved out of the town (than the extra born)	B1	oe
	Additional Guidance		
11	Attempt to find a median	M1	May be on graph
	Both medians correct	A1	9 am median [3.9, 4.1] 2 pm median [6.9, 7.1]
	Attempt to find an IQR	M1	May be on graph
	Both IQRs correct	A1	9 am IQR [1.9, 2.1] 2 pm IQR [3.8, 4.0]
	Correct comparison of medians, e.g. the birds have a greater average mass at 2pm than at 9am	B1ft	In context ft their medians
	Correct comparison of IQRs eg the birds' masses are more widely spread at 2 pm than at 9 am	B1ft	In context ft their IQRs
	Additional Guidance		
	Beware – the 2pm IQR is approximately the same as the LQ		

Q	Answer	Mark	Comments	
12(a)	$(r^2 / 4^2) = 76468 / 54620$	M1	$\sqrt{76468 / 54620}$	
	$r^2 = 22.4$	M1	$r/4 = \sqrt{1.4}$	
	$r = 4.7329$	A1		
	$r = 4.73$	B1 ft	Any value to 3 significant figures	
	Additional Guidance			
12(b)	(126/360)	M1		
	$\times 54620$	M1		
	19117	A1		
	Additional Guidance			
	Additional Guidance			
13(a)	Attempt at bell-shaped curve	B1	With approximate symmetry	
	Curve centred at [33, 37]	B1		
	Curve shows knowledge of +/- 3 standard deviations	B1	Curve goes from approximately 5 to 65	
	Additional Guidance			
	Additional Guidance			
13(b)	Mean (40) clearly to the right of the middle of the area (median) under the curve	B1	Any general shape as long as meets the criteria for positive skew	
	Long positive tail indicating skew ie 40 to max at least 1.5 times min to 40	B1		
	Additional Guidance			
	Additional Guidance			

Q	Answer	Mark	Comments
14(a)	Any valid hypothesis relating to the distance thrown	B1	eg The competitors throw further in the 2008 qualifying round (than in the 2012 qualifying round). eg The competitors throw further in the 2012 qualifying round (than in the 2008 qualifying round). eg There is no difference between the distances thrown in 2008 and 2012, etc
	Additional guidance		

14(b)	Data are continuous	B1	
	Additional guidance		

14(c)	Any valid reason	B1	eg Reduces the number of rectangles where frequency densities are low. eg Greater number of rectangles where frequency densities are high allowing more detail to be seen
	Additional guidance		

Q	Answer	Mark	Comments
14(d)	Sensible unequal classes covering the full range	B2	B1 Sensible unequal classes covering the whole range with one error (which may be repeated)
	Justification for their choice of unequal classes	B1	eg looking at close distribution of throws in the middle
	Correct frequencies for their classes	B1 ft	ft their classes
	Axes drawn with correct scales and labels	B1	
	Frequency densities attempted for their classes and frequencies	M1	Equal or unequal classes
	All frequency densities correct for their frequencies and unequal classes	A1 ft	only if unequal classes
	Rectangles all drawn accurately.	A1 ft	ft their frequency densities, unequal classes
	Additional guidance		
Note For equal classes, maximum score is B0 B0 B1ft B1 M1 A0 A0ft 3 marks out of 8			

Q	Answer	Mark	Comments
14(e)	Full interpretation of the two histograms in context, both of which are clearly linked to the hypothesis in part (a)	B4	<p>B3 Two features from the histogram only one of which is linked to the hypothesis.</p> <p>B2 One feature of the histogram interpreted in context which is clearly linked to the hypothesis.</p> <p>B1 One feature of the histogram interpreted in context</p> <p>or</p> <p>A reference to the greatest distance or least distance thrown which is clearly linked to the hypothesis and no other mark awarded.</p> <p>or</p> <p>A clear and correct comparison of the two histograms in context based on dispersion and no other mark awarded</p>
	Additional guidance		
	<p>One feature could be the modal class.</p> <p>One feature could be the location of the histogram, this could be implied by referring to both the greatest and least distance thrown</p>		

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