GCSE
STATISTICS
8382/2F

Foundation Tier Paper 2

Mark scheme

June 2021

Version: 1.0 Final

216G8382/2F/MS

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 Examiner.

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

Copyright information

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Copyright © 2021 AQA and its licensors. All rights reserved.

Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Statistics 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. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values $a \leq$ value $< b$
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 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.

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 student intended it to be a decimal point.

Q	Answer	Mark	Comments
1	4, 4, 4, 8	B1	

Q	Answer	Mark	Comments
2	Classroom	B1	

Q	Answer	Mark	Comments
3	Scatter diagram	B1	

Q	Answer	Mark	Comments
4	6	B1	

Q	Answer	Mark	Comments
5(a)	66 000 000	B1	
	Additional Guidance		
	Accept 66 million		

Q	Answer	Mark	Comments
5(b)	(Population has gradually) increased	B1	oe
	Additional Guidance		
	Do not accept “positive”		

Q	Answer	Mark	Comments
5(c)	2005 or 2006	B1	

Q	Answer	Mark	Comments
6(a)	$\frac{1}{500}$ or 0.2% or 0.002	B1	

Q	Answer	Mark	Comments
6(b)	500 – (1 + 4 + 15) or 500 – 20 or 480	M1	oe
	$\frac{480}{500}$ or 0.96 or 96% or $1 - \frac{1}{25}$	A1	oe eg partially simplified fraction
	$\frac{24}{25}$	B1ft	ft their unsimplified fraction correctly fully simplified

Q	Answer	Mark	Comments
7(a)	Trains cannot be too close together on the line	B1	oe eg has to be a reasonable gap between trains avoid crashes insufficient demand for more trains

Q	Answer	Mark	Comments
7(b)	Fully correctly plotted bar lines	B2	B1 4 correct heights (may be a cross or a bar at correct height)
	Vertical label, eg ‘frequency’ and Horizontal label, eg number of trains	B1	

Q	Answer	Mark	Comments
7(c)	Highest frequency / most common number or Tallest line on graph	B1	oe

Q	Answer	Mark	Comments
7(d)	3.30 (pm) or 3.31 (pm)	B1	oe
	Additional Guidance		
	Condone poor time notation		

Q	Answer	Mark	Comments
7(e)	Any integer in range [1, 4]	B1	

Q	Answer	Mark	Comments
8(a)	55	B1	

Q	Answer	Mark	Comments
8(b)	Liberal Democrat Party	B1	accept abbreviations except L

Q	Answer	Mark	Comments
8(c)(i)	The percentage is higher	B1	oe

Q	Answer	Mark	Comments
8(c)(ii)	The higher percentage might be of fewer people (so fewer overall in that age group) or There may be fewer people in the 55-64 group	B1	oe

Q	Answer	Mark	Comments
8(d)	No ticked and There are other parties (who had some % of the vote)	B1	oe
	Additional Guidance		
	Yes ticked		B0
	Only references rounding		B0

Q	Answer	Mark	Comments
9(a)	Positive skew	B1	

Q	Answer	Mark	Comments
9(b)	No skew	B1	

Q	Answer	Mark	Comments
10(a)	Discrete	B1	

Q	Answer	Mark	Comments
10(b)	(Step 1) should have random starting point	B1	oe
	(Step 2) should be every 20th student	B1	oe

Q	Answer	Mark	Comments
10(c)	They must use the same people	B1	oe

Q	Answer	Mark	Comments
10(d)	Can use spreadsheet to obtain graphs/measures	B1	correct reason, eg easier to sort better presented easier to use

Q	Answer	Mark	Comments
10(e)(i)	199	B1	

Q	Answer	Mark	Comments
10(e)(ii)	Discard value or Use a value of 19 or Check the value again	B1	oe

Q	Answer	Mark	Comments
10(e)(iii)	Appears to be supported (those with better GCSEs have most post-16 lessons)	B1	oe
	Additional Guidance		
	Condone use of 'proved' (oe)		

Q	Answer	Mark	Comments
11(a)	Cumulative frequencies correct	B1	may be evidenced on graph 9, 34, 55, 72, 80
	Cumulative frequencies plotted at correct heights	B1	correct values or ft their values if shown, for example, in table
	Cumulative frequencies plotted at correct times (upper bounds)	B1	5, 10, 15, 20, 25
	• Labels 'cumulative frequency' and 'time' • Both axes have even scales, covering the data range in full • Plots, starting from (0, 0), joined with a curve or straight lines on increasing graph	B2	oe B1 two bullets correct
	Additional Guidance		
	Tolerance of half a small square		

Q	Answer	Mark	Comments
11(b)	Their median (read off from cf = 40)	B1ft	ft from an increasing graph
	Additional Guidance		
	Tolerance of half a small square		

Q	Answer	Mark	Comments
11(c)(i)	Their UQ (read off from cf = 60)	B1ft	ft from an increasing graph
	Their LQ (read off from cf = 20)	B1ft	ft from an increasing graph
	Additional Guidance		
	Tolerance of half a small square		

Q	Answer	Mark	Comments
11(c)(ii)	Their UQ – their LQ	B1ft	ft if their UQ > their LQ

Q	Answer	Mark	Comments
11(d)	Comparison of medians in context eg after new camera put in, the notifications are further apart on average	B1ft	oe
	Comparisons of IQRs in context eg after new camera put in, the notifications are less varied in their times	B1ft	oe

Q	Answer	Mark	Comments
11(e)	Only one day's data for each position	B1	oe eg data collected on different days

Q	Answer	Mark	Comments
12(a)	Camping is (not) the most popular holiday type (in England)	B1	oe

Q	Answer	Mark	Comments
12(b)(i)	Convenience (sampling)	B1	accept opportunity or judgement

Q	Answer	Mark	Comments
12(b)(ii)	(Advantage) easy to get information	B1	oe eg quick to do
	(Disadvantage) only get information from those he meets/certain type of person being asked	B1	oe eg no-one is going on holiday in England
	Additional Guidance		
	Biased (too vague)		B0

Q	Answer	Mark	Comments
12(b)(iii)	**Alternative method 1 - random sample**		
	• Number all the students in his school • Obtain random numbers • Ignore repeats and numbers too large • Match numbers obtained to students in the numbered list	B3	oe B2 any three bullets B1 any two bullets SC1 put all the student's names on paper and put in hat, select sample
	Alternative method 2 - systematic sample		
	• Number all the students in his school • Obtain a list of all the students in the school • (Use random number to) obtain a random starting point in the list • Take every n^{th} student in the list	B3	oe B2 any three bullets B1 any two bullets SC1 – put all the students' names on paper and put in hat, select sample

Q	Answer	Mark	Comments
12(c)	Any two from: • Not everyone chosen will be available or want to answer the question • Many may not know what type of holiday they are going to have • or may not be going on holiday in England • more data gives more reliable results	B2	oe B1 any one bullet

Q	Answer	Mark	Comments
12(d)	The data appears to suggest the hypothesis is not correct	B1ft	oe condone hypothesis wrong ft their valid hypothesis in (a)
	The results are unlikely to persuade Ashwen to go camping based on its popularity	B1	oe

Q	Answer	Mark	Comments
12(e)(i)	421 ÷ 1.77 = 237.8(5…)	B1	oe eg 421 000 000 ÷ 1 770 000

Q	Answer	Mark	Comments
12(e)(ii)	Spend is rounded to the nearest million pounds or Trips are rounded to the nearest ten thousand or Both values (used in the calculation) are rounded	B1	oe
	Additional Guidance		
	Do not accept that the answer has been rounded		

Q	Answer	Mark	Comments
12(e)(iii)	1802 ÷ 7.45 or 241.879…	M1	oe
	(£) 242	A1	oe

Q	Answer	Mark	Comments
12(e)(iv)	Average cost per trip is (slightly) higher in August	B1ft	oe ft their answer to (iii)
	School summer holidays make things more expensive	B1dep	oe eg people go away for longer in the summer dep on first B1
	Additional Guidance		
	Accept averages are very similar for B1(ft) but cannot score second mark		

Q	Answer	Mark	Comments
13(a)	$\frac{86\,000}{32\,000\,000}$ or 0.0026(875) or 0.0027	M1	oe
	[0.268, 0.27](%)	A1	allow 0.3% with working

Q	Answer	Mark	Comments
13(b)(i)	The risk (of being stolen) was greater in 2017	B1ft	ft from their 13(a) provided 0 < their 13(a) ≤ 100%
	Additional Guidance		
	Ignore any adjectives describing how much greater		
	The risk is 0.6% greater in 2017		B1

Q	Answer	Mark	Comments
13(b)(ii)	0.21 × 30 900 000 or 30 900 000 ÷ 100	M1	oe
	64 890 or 64 900 or 65 000	A1	

Q	Answer	Mark	Comments
14(a)(i)	Two appropriate comments	B2	B1 one appropriate comment eg the general (overall) trend is for a reduction (in conceptions) between 1992 and 2016… or there was a (large) drop (in conceptions) between about 2008 and 2016 … (however) between about 1996 and 2008 there was little change (in conceptions) or reference the small increases from 1996 to 2000
	Additional Guidance		
	Do not accept a comment relating to a single data point		
	If more than two comments given and at least one is incorrect		B1B0
	Reference to “number” rather than “number per 1000”		B0

Q	Answer	Mark	Comments
14(a)(ii)	Suitable reason	B1	eg better education about the effects of having children young contraceptive more available women having careers first

Q	Answer	Mark	Comments
14(b)	Three correct	B2	B1 one or two correct
	Additional Guidance		
	Less than 5% of women under 20 became pregnant in 2012 — Definitely correct There were fewer than 40 babies born to women under 20 in 2016 — Probably correct Fewer women **under 21** became pregnant in 2016 compared to 1992 — Definitely incorrect		B2

Q	Answer	Mark	Comments
15(a)	$\frac{5}{6}$ correctly placed on tree diagram	B1	oe

Q	Answer	Mark	Comments
15(b)	The probability Darcey goes to the gym if she is home early	B1	oe
	Additional Guidance		
	Probability she goes to the gym given that she is home early		B1
	Must refer to “home early” and “go to gym”		

Q	Answer	Mark	Comments
15(c)	$\frac{1}{3}\times\frac{1}{6}$	M1	oe
	$\frac{1}{18}$ or 0.0556 or better	A1	oe

Q	Answer	Mark	Comments
15(d)	$\frac{2}{3}\times\frac{3}{4}$ or $\frac{1}{2}$	M1	oe
	their $\frac{1}{18}$ + their $\frac{1}{2}$ or $\frac{5}{9}$	M1 dep	oe ft their value in (c) if < 0.5
	225 × their $\frac{5}{9}$	M1	their $\frac{5}{9}$ should be from the sum of two products of probabilities
	125	A1ft	ft their value in (c) if < 0.5