GCSE
STATISTICS
8382/2F

Foundation Tier Paper 2

Mark scheme

June 2024

Version: 1.0 Final

2 4 6 G 8 3 8 2 / 2 F / M S

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.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

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 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	B	B1	
	Additional Guidance		
	Accept circled on the diagram if the list is blank		

Q	Answer	Mark	Comments
2	$\frac{1}{6}$	B1	

Q	Answer	Mark	Comments
3	The weather on race day	B1	

Q	Answer	Mark	Comments
4	Population	B1	

Q	Answer	Mark	Comments
5a	Tallying method with 5 bar gates used and all correct	B2	B1 tallying method without 5 bar gates used but otherwise correct or tallying method with 5 bar gates used, allowing one error
	Correct frequencies for their tallying	B1ft	correct or ft as long as all non-zero

Q	Answer	Mark	Comments
5b	10	B1ft	correct or 11 – their frequency for sport

Q	Answer	Mark	Comments
5c	No **and** 12 or 5.5 or 1(.83…) or 0.54(…) and 0.5 or RP would have to be 5 (or less) or RTS would have to be 13 (or more)	B2ft	oe ft their frequency for RP with appropriate decision B1ft 12 or 5.5 or 1(.83…) or 0.54(…) or 11 and their 6
	Additional Guidance		
	'No' may be implied by their statement, eg 11 is less than 12 so she's wrong	B2	
	No, twice 6 is not 11 (need to see 12 or 13 to score B2) No, $2 \times 6 > 11$	B1 B1	
	Only 5 more	B0	

Q	Answer	Mark	Comments
5d	Two comparable values and Yes	B2	B1 attempts to convert both to comparable form with at least one non-given value correct eg $\frac{9}{32}$ and $\frac{8}{32}$ **or** $\frac{1}{3(.55...)}$ and $\frac{1}{4}$ or 0.28(…) (and 0.25) or 28(. …)% and 25% or (9 and) 8 or 36 and 32 or 3(.55…) and 4
	Additional Guidance		
	If there isn't a tick in a box, 'Yes' may be implied by a statement, eg 28% is more than 25%	B2	
	Must be in comparable form, eg 25% and 21% and Yes	B1	
	$\frac{9}{32}$ and $\frac{1}{4}$ and Yes	B0	

Q	Answer	Mark	Comments
6a	Apple pie	B1	
	Additional Guidance		
	Accept any unambiguous indication		

Q	Answer	Mark	Comments
6b	Chocolate cake and Eclair	B2	either order B1 (cheesecake =) 21 or summing any two totals correctly
	Additional Guidance		
	Accept any unambiguous indication		

	Readings do not have to be labelled, but must be correct if they are labelled	

Q	Answer	Mark	Comments
6c	Valid reason	B1	eg it's only one day / need to repeat / small sample or there might be other puddings that weren't ordered or they may have run out of toffee puddings partway through / not have much stock of toffee puddings
	Additional Guidance		
	There may have been an error in recording		B1
	They may sell lots of toffee on a different day		B1
	People still order it / some people still like it		B0
	Mention of another type of dessert selling a similar amount, eg Chocolate cake and ice cream were almost as bad		B0
	Toffee pudding may be the most expensive / they should reduce the price		B0
	It would reduce their takings		B0

Q	Answer	Mark	Comments
6di	It is a leading question	B1	oe
	Additional Guidance		
	Persuasive, passive aggressive, forcing answer, applying pressure, demanding, manipulative		B1
	Sarcastic, bossy, rude, complicated question, personal, biased Please note that whilst each of these alone would score B0, when written with a B1 answer, these would not count as choice		B0
	It's biased because they are suggesting the answer they want to hear		B1
	Assumes/infers they enjoyed it		B0
	Some customers don't eat dessert		B0

Q	Answer	Mark	Comments
6dii	Complete response section which has an option for everything and no upper limit and non-overlapping options	B2	B1 an option for everything and no upper limit with overlap or non-overlapping options that don't cover all options
	Additional Guidance		
	Must use at least three tick boxes		
	Response section can start at 0 or 1		

Q	Answer	Mark	Comments
7ai	Systematic (sampling)	B1	

Q	Answer	Mark	Comments
7aii	Two advantages	B2	B1 one advantage eg quick(er) / efficient or easy/easier/simple(r) or he does not directly choose who is in his sample or not biased / evenly distributed / representative or cheap(er)
	Additional Guidance		
	Ignore irrelevant but non-contradictory statements		
	May see B2 in one statement eg It's quick and easy		B2
	2 correct and 1 incorrect statement		B1
	It is reliable / convenient / accurate		B0
	'Random' alone would not score, but would not reduce a B1 answer to B0		

Q	Answer	Mark	Comments
7bi	Students go to more than one club	B1	accept 3, 4, 5, 6, 7 or 8 students going to more than one club
	Additional Guidance		
	Do not accept reference to incorrectly recorded values		

Q	Answer	Mark	Comments
7bii	Rugby, Tennis, Computer and Other labelled down the left-hand column	B1	any order
	Symbols in alignment with: 6 symbols for rugby 3.75 symbols for tennis 1.5 symbols for computer 2 symbols for other	B2	B1 three rows with correct numbers of symbols
	Additional Guidance		
	Half and three-quarter symbols can be any orientation but must have internal lines		
	Mark intention for shape and alignment of symbols		
	Do not accept R T C O		
	Ignore values		

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="3">8ai</td><td>One problem and a solution to that problem</td><td>B2</td><td>B1 one problem</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="3">Ignore irrelevant but non-contradictory comments
Do not accept “they may lie” with nothing further to support it
<table>
<tr><th>Problem</th><th>Way to reduce or prevent</th></tr>
<tr><td>Only surveyed on a Monday</td><td>Survey on each day of the week</td></tr>
<tr><td>Non-responses
or
might not fill it out</td><td>Ask a wide variety of visitors and/or more than you need
or
Offer an incentive
or
Make the questionnaire easy to complete/short
or
Survey at a different time, not as they are leaving</td></tr>
<tr><td>Not able to fill it out eg children</td><td>Don’t ask children under 10</td></tr>
<tr><td>If they are in a group it might mean they all have similar answers</td><td>Could nominate one person per group to complete the questionnaire and put how many people in the group on the form</td></tr>
<tr><td>Costs a lot of money</td><td>Do the survey online or ask a sample</td></tr>
<tr><td>Takes a lot of time to complete/process a questionnaire
or too much data / too many people</td><td>Do the survey online or ask a sample
or
Employ more people to collect answers</td></tr>
<tr><td>Collected face to face so not anonymous</td><td>Do the survey online</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="4">8aii</td><td>A different problem to 8ai</td><td>B1</td><td></td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Ignore any solution given</td><td></td></tr>
<tr><td colspan="2">Problem must come from a different ‘box’ in the table to the problem in part ai</td><td></td></tr>
</table>

Q	Answer	Mark	Comments
8bi	90 in frequency column	B1	
	500 in cumulative frequency column	B1	SC1 90 and 500 not in correct places

Q	Answer	Marks	Comments
8bii	Fully correct diagram • plotted at 4, 5, 6, 7 • correct heights (ft their 500 that must be >490) • points joined by line segments or a smooth curve	B3ft	B2 any two bullets satisfied or fully correct graph with (7, 500) missing B1 bullet 1 or bullet 2 satisfied SC1 3 points correctly plotted $\pm\frac{1}{2}$ small square tolerance mark intention of straight lines or smooth curve
	Additional Guidance		
	Ignore lines before first plot and after final plot		
	Condone bar chart and cf drawn		

Q	Answer	Mark	Comments
8biii	Correct reading up from h = 2.5 for their cf graph	M1	$\pm\frac{1}{2}$ small square tolerance
	465 – their reading correctly evaluated	A1ft	ft their reading from h = 2.5

Q	Answer	Mark	Comments
8biv	0.5 × 500 or 250	M1	implied by a mark on the curve or vertical axis at y = 250 or a correct reading
	ft their graph	A1ft	accept a decimal or hours and minutes $\pm\frac{1}{2}$ small square tolerance
	Additional Guidance		
	Ignore attempt to convert to hours and minutes once correct reading seen eg reading of 3.2 and answer 3 hours 2 minutes		

Q	Answer	Mark	Comments
8c	Accounts or restaurant till receipts	B1	oe
	Additional Guidance		
	Restaurant takings / total in till / look at card machine		B1
	Bankings / bank statements		B1
	Ask restaurant manager / workers / cashier		B1
	Only referencing the average		B0
	Work out the total (money)		B0
	Stock control / orders		B0

Q	Answer	Mark	Comments
8d	The more visitors, the more spent in the gift shop	B1	oe
	Additional Guidance		
	Positive/strong correlation		B0

Q	Answer	Mark	Comments
9a	Number of apps on the phone	B1	

Q	Answer	Mark	Comments
9b	Not an equal spread of ages	B1	oe eg only one person in their 30s sampled
	Additional Guidance		
	Accept comment that sample size is too small		
	Not many 20 – 40 / 20 – 30 / 30 – 40 were asked		B1
	Not many over 60s / old(er) people were asked		B1
	Asked a lot of 10 – 20		B1
	Under 10s may have apps on their phones / doesn't go below 10 / not over 90s		B1
	More young than old were asked		B1
	Some age groups had very few people		B1
	He missed out loads of ages / there's not data for every age		B0
	Nobody aged 40 was asked		B0
	Some people may have more than 45 apps		B0

Q	Answer	Mark	Comments
9c	Double mean plotted at (35, 26)	M1	$\pm\frac{1}{2}$ small square tolerance may be implied by lobf going through this point
	Acceptable line of best fit through (35, 26)	A1	must have negative gradient for age values from 10 to 90
	Additional Guidance		
	Mark intention of straight line and accept dashed line		

Q	Answer	Mark	Comments
9d	Negative correlation	B1	

Q	Answer	Mark	Comments
9e	Correct reading for age = 70 from their line	B1ft	$\pm\frac{1}{2}$ small square tolerance
	Additional Guidance		
	ft their graph even if it was not awarded A1 in part c		

Q	Answer	Mark	Comments
10a	$5 < t \leqslant 10$	B1	

Q	Answer	Mark	Comments
10b	At least three of 4, 9, 13, 12, 2	M1	may be seen on the diagram
	40	A1	

Q	Answer	Mark	Comments
10c	2.5 and 7.5 and 12.5 and 17.5 and 22.5	B1	condone 1 missing or incorrect midpoint
	$2.5 \times 4 + 7.5 \times 9 + 12.5 \times 13 + 17.5 \times 12 + 22.5 \times 2$ or 495	M1	condone 1 missing or incorrect product their 'midpoints' may be anywhere in the interval but must be consistent 495 implies B1M1
	12.375 or 12.38 or 12.37 or 12.4	A1ft	accept 12 if full working seen ft ÷ their 40 from part b ft their midpoints if M1 awarded SC2 [9.8, 9.9] or [14.8, 14.9]
	Additional Guidance		
	13 with no or incorrect working (13 is median)		B0M0A0
	2.5 + 7.5 + 12.5 + 17.5 + 22.5 = 62.5 62.5 ÷ 5 = 12.5		B1M0A0

Q	Answer	Mark	Comments
10d	Grouped data	B1	oe eg don't have the actual data points
	Additional Guidance		
	One correct and one incorrect statement		B0
	Only the midpoints have been used		B1
	We don't have exact times		B1
	We don't have exact times because they've been rounded to the nearest minute / nearest 5 minutes		B0
	It was rounded		B0

Q	Answer	Mark	Comments
11a	$\frac{43.07}{32.71}(\times 100)$ or $\frac{43.07-32.71}{32.71}(\times 100)$	M1	oe
	131.67(2…) = 131.7	A1	
	Additional Guidance		
	43.07 – 32.71 = 10.36, 10.36 ÷ 32.71 × 100 = 31.67 100 + 31.67 = 131.67 answer 131.7		M1 A1

Q	Answer	Mark	Comments
11b	No and valid reason	B1	eg a decrease in price below 32.71 will result in a number less than 100
	Additional Guidance		
	'Yes' indicated		B0
	Prices may drop below 32.71 or price may drop below 2019		B1
	Prices may drop		B0

Q	Answer	Mark	Comments
12	Full method to get the number of cars for one fuel type for 2021 or full method to get an angle for a pie chart for 2019	M1	eg $\frac{162}{360} \times 1\,650\,000$ or $\frac{69300}{(1478400+577500+184800+69300)} \times 360$
	742 500 or 165 000 or 495 000 or 247 500 or 230.4 or 90 or 28.8 or 10.8	A1	accept 230 or 29 or 11
	742 500 and 165 000 and 495 000 and 247 500	A1	may be implied by correct differences in a comment
	Correct comparison for petrol	B1ft	ft their calculation for petrol eg their 742 500 (and 1 478 400) and fewer in 2021 or their 230.4 (and 162) and more in 2019
	Correct comparison for diesel	B1ft	ft their calculation for diesel eg their 165 000 (and 577 500) and fewer in 2021 or their 90 (and 36) and more in 2019
	Correct comparison for electric	B1ft	ft their calculation for electric eg their 495 000 (and 184 800) and more in 2021 or their 28.8 or 30 (and 108) and less in 2019
	Correct comparison for other	B1ft	ft their calculation for other eg their 247 500 (and 69 300) and more in 2021 or their 10.8 or 11 (and 54) and less in 2019 SC1 comparison of totals of new cars if no B marks awarded

Additional guidance for Q12 is on the next page

	Additional Guidance	
	M1 must have been scored to access B marks	
	For B marks we must see their value and then follow through, comparing to the given value	
	Can score B4ft in one sentence, if at least M1 scored and all their final values seen eg There are fewer petrol and diesel cars sold in 2021 but more electric and other sold in 2021	B4

Q	Answer	Mark	Comments
13a	Cross-hatching on field F	B1	
	Additional Guidance		
	Mark intention		

Q	Answer	Mark	Comments
13b	Reason for the statement	B1ft	eg fields B and G had most fertiliser and excellent crops or field A had least fertiliser and poor crops
	Reason against the statement	B1ft	eg field C had most fertiliser but poor crops or field D had good crops and the least fertiliser
	Additional Guidance		
	If field F has the incorrect shading in part a, follow through their reasons		
	Ignore irrelevant but non-contradictory statements		
	Must mention the amount of fertiliser and the crop yield		
	Do not allow a correct statement with an incorrect statement		
	Fields must be named but condone “both excellent” or “the two excellent” to refer to B and G		

Q	Answer	Mark	Comments
13c	Smaller areas or More specific labels	B1	oe eg increase the number of categories or give actual measurements of fertiliser used or actual amount of crops grown
	Additional Guidance		
	Ignore irrelevant but non-contradictory statements		
	Reference to “completing the key”		B0
	Comment referring to new choropleth maps / type of crop		B0

Q	Answer	Mark	Comments
13d	One possible variable	B1	eg weather/season or water or pests/diseases or shade/sun or soil conditions / type of fertiliser or drainage
	Additional Guidance		
	Ignore irrelevant but non-contradictory statements		
	Overcrowding leads to poorer quality		B1
	Public access (trampling crops)		B1

Q	Answer	Mark	Comments
14a	$\frac{1902}{3272}$ or [0.58, 0.5813]	B1	oe fraction, decimal or percentage
	Additional Guidance		
	Ignore attempt to convert after correct answer seen		

Q	Answer	Mark	Comments
14b	$\frac{1390}{3272}$ or [0.42, 0.425]	B2	oe fraction, decimal or percentage B1 numerator of $3272 - 1882$ or $969 + 421$ or 1390 oe or denominator of 3272 or $\frac{941}{1636}$ or [0.575, 0.58]
	Additional Guidance		
	[0.42, 0.425] must come from correct working		
	Ignore attempt to convert after correct answer seen		

Q	Answer	Mark	Comments
14c	numerator of 116 or denominator of 1370	M1	
	$\frac{116}{1370}$ or [0.08, 0.085]	A1	oe fraction, decimal or percentage
	Additional Guidance		
	Allow working in thousands		
	Ignore attempt to convert after correct answer seen		

Q	Answer	Mark	Comments
15a	Cannot tell and acceptable reason	B1	eg 1020 could be using it / week 1 people may be using it too or may have downloaded and not used it or table doesn't show the number of people using it or could be downloaded to more than one device / had to re-download it
	Additional Guidance		
	'Cannot tell' may be implied by their statement		
	'Yes' or 'No' indicated		B0
	It's only downloads		B0

Q	Answer	Mark	Comments
15b	$\frac{680+720+600+840}{4}$ or $\frac{2840}{4}$	M1	oe
	710	A1	accept if not in table but not contradicted
	Additional Guidance		
	Answer in table takes priority over answer in workings		
	Ignore numbers in shaded boxes		

Q	Answer	Mark	Comments
15c	Plots all five points correctly (2.5, 550), (3.5, 595), (4.5, 645), (5.5, 650), (6.5, their 710)	B2ft	ft their 710 B1ft three or four points plotted correctly or all correct heights plotted at a consistently incorrect point in the interval $\pm\frac{1}{2}$ small square tolerance
	Draws appropriate trend line	B1ft	mark intention of straight line
	Additional Guidance		
	Must have plotted five points and line must span at least their five points in order to score trend line mark		
	Ignore plots before first plot and after last plot		

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="9">15d</td><td>Upward trend in the number of downloads</td><td>B1</td><td>oe comment, in context
eg
downloads are increasing (over time)
as weeks go on, downloads increase</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Comment must reference downloads to be in context</td><td></td></tr>
<tr><td colspan="2">Any quoted values must be correct</td><td></td></tr>
<tr><td colspan="2">Ignore a non-contradictory reason with a correct reason</td><td></td></tr>
<tr><td colspan="2">As weeks get higher so do number of downloads</td><td>B1</td></tr>
<tr><td colspan="2">Increasing</td><td>B0</td></tr>
<tr><td colspan="2">Comments should be about the whole graph and not just consecutive weeks
eg Goes up except for week 6 – 7</td><td>B0</td></tr>
<tr><td colspan="2">Positive trend/correlation in the number of downloads</td><td>B0</td></tr>
</table>