GCSE
STATISTICS
8382/2F

Foundation Tier Paper 2

Mark scheme

June 2020

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 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

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.

1	0.2	B1	

2	positive	B1	

3	52	B1	

4	validity	B1	

5(a)	3.9 17.9 18.6 18.8 21.4 22.2 23.7 26.1 26.8 30.5 32.4	M1	must be correct for first or last 6 but allow one error or omission
	22.2	A1	
	Additional Guidance		
	It is sufficient for data to be ordered only up to the 6th, or only from the 6th.		
	A pair of values in the wrong order is one error		

5(b)	32.4 – 3.9	M1	ft their max and min if ordered list seen in (a) has different values
	28.5	A1ft	oe

5(c)	There is a really low/extreme value	B1	oe eg there is an outlier
	Additional Guidance		
	3.9 is different (from the others)		B1

5(d)	Her median is greater so this is true	B1ft	oe ft their 5(a)
	This is not true as Asha will reach her limit (at some point)	B1	oe
	Additional Guidance		
	It is true because her scores will continue to improve with training.		B0
	It may be true because we don't know what will happen in the future.		B0

6(a)	[34, 38]	B1	

6(b)	Fewer (less) young people smoke than they used to or Smoking amongst 16–24-year-olds has halved in the last 20 years or (Slight) rise in young people smoking in last couple of years	B1	oe
	Additional Guidance		
	Condone use of numbers of people rather than percentages at this level Allow a title for the graph instead of a headline Allow a sentence which mentions young people smoking Do not allow incorrect percentages/years from the graph		

7(a)	Asking those who it is easy to get hold of	B1	oe eg asking the first n people she sees
	Additional Guidance		
	Doing the sample when it suits her		B0

7(b)	It is quick to complete	B1	oe
	Additional Guidance		
	Accept cheap		

7(c)	It is (likely to be) unrepresentative	B1	oe eg it will be biased

7(d)	"Do you think" instead of "Do you agree"	B1	oe
	Offer a "don't know" option	B1	oe

8(a)	Internet/website/social media	B1	oe

8(b)(i)	Correct plotting of all 5 points	B2	B1 3 or 4 points correctly plotted
	Additional Guidance		
	Ignore incorrect plots		

8(b)(ii)	Circles the plot for (0, 4.2)	B1	oe

8(b)(iii)	Attempts to add up the 9 star ratings and divide by 9	M1	allow one error or omission for the 9 ratings (eg including the outlier)
	$\frac{36}{9}$ (= 4)	A1ft	ft their answer excluding their outlier in (b)(ii)
	Additional Guidance		
	Do not allow calculations for only one table		
	(24, 4.6) circled in (ii) and 35.6 ÷ 9 (= 4)		M1A1ft

8(b)(iv)	Plots (19, 4)	B1	
	Draws a line of best fit through (19, 4)	B1	line must be straight and have a positive gradient

8(b)(v)	[3.6, 4.0]	B1ft	ft their straight, line of best fit with positive gradient

8(c)	The correlation is not (as high as) 0.99	B1	
	His suggestion is correct as there is positive correlation	B1	

9(a)	40.43	B1	

9(b)	It increases (slightly)	B1	oe

9(c)(i)	Very High	B1	

9(c)(ii)	Low	B1	

10(a)	0.25	B1	oe

10(b)	0.25×0.25	M1	oe ft their 0.25 in (a)
	0.0625	A1ft	

10(c)	**Alternative method 1**		
	Lists at least 10 of the 16 possible pairs of drinks in a list or table	M1	accept ticks or crosses if in a two-way table
	$\frac{3}{4}$	A1	oe
	Alternative method 2		
	1st customer can have any drink and 2nd customer must have a different drink to the 1st	M1	$\frac{4}{4} \times \frac{3}{4}$
	$\frac{3}{4}$	A1	oe
	Alternative method 3		
	$1 - 4 \times \text{their } \frac{1}{16}$	M1	ft their 10(b)
	$\frac{3}{4}$	A1ft	oe ft their 10(b)
	Additional Guidance		
	Accept any clear indication of drinks eg T C O B		

10(d)(i)	Numbers nowhere near equal (20 of each)	B1	oe eg comparison of theoretical and experimental probabilities (values to be in comparable format)
	Additional Guidance		
	They are not all the same/all 20		B0

10(d)(ii)	Using one day is not representative (of the rest of the year) or Referencing that the weather may impact sales	B1	oe eg (that day) may not be typical
	Additional Guidance		
	She hasn't got enough data to make a judgement		B1
	Reference to more customers affecting the sales figures (on the same day)		B0
	Reference to another day where she may sell equal numbers of drinks		B0

11(a)	You know no-one chose wind or You know wind was an option	B1	oe
	You know the frequencies immediately or You can work out the total number of people asked	B1	oe

11(b)	$\frac{3}{30}$ or 360 ÷ 30 or 12	M1	oe
	$\frac{3}{30} \times 360$ (= 36) or 12 × 3 (= 36)	A1	oe

11(c)	New frequencies of Sun = 18 or Snow = 9	B1	May be implied by 216(°) or 108(°)
	30 – (their 18 + their 9 + 1) (= 2) for 'Other'	M1	
	Correct method to calculate at least one angle for their frequencies	M1	angles 216(°), 108(°), 12(°) and 24(°) for sun, snow, windy and other respectively
	One of their angles drawn correctly	M1	ft their angles as long as they total 360° in their working or follow through from their new frequencies for sun, snow, windy or other
	Fully correct and labelled pie chart	A1	
	Additional Guidance		
	Fully correct pie chart with labels		B1M1M1M1A1

12(a)(i)	Orders the data correctly 6 7 8 8 8 9 9 10 10 13 16	M1	allow one error or omission
	Upper Quartile = 10 or Lower Quartile = 8	M1dep	either correct can be identified on ordered list without naming.
	10 – 8 (= 2)	A1	with no errors seen

12(a)(ii)	Ravi is wrong – the interquartile range will not measure difficulty	B1	oe
	Additional Guidance		
	No and the length of the words are just more varied		B1
	No and IQR is a measure of spread, not difficulty		B1
	No and IQR is a measure of spread (not in context)		B0

12(b)(i)	Yes ticked and (frequency polygons are for) continuous data	B1	oe

12(b)(ii)	frequency and (length of) time (to read book) (in seconds)	B2	B1 either correct
	Additional Guidance		
	labels must be on correct axes		

12(b)(iii)	4 to 6	B1	accept any intention
	Additional Guidance		
	5		B0

12(c)(i)	Plots at correct heights 6, 18, 16, 8, (0)	B1	condone bars
	Plots at correct midpoints and joined with straight lines	B1	
	Additional Guidance		
	Ignore labels Ignore any lines drawn after first and last plot		

12(c)(ii)	Second book was quicker to read on average	B1	oe
	Second book had more consistent times to read sentences	B1	oe

13(a)	20–39 years	B1	

13(b)	Cannot tell with explanation, eg The diagram does not show the oldest ages in each region The diagram (only) shows the modal ages Region J has oldest modal age but that does not mean the oldest house is in region J	B1	
	Additional Guidance		
	The oldest house could be in any of the regions		B1
	The diagram shows the modal ages so the region with the oldest house may have more newer buildings		B1
	Just because region J has the most 60+ houses does not mean that other houses are not 60+		B0
	Although region J has the highest modal age, the building may not have been built in 1847		B0

13(c)	Buildings in the village are generally/tend to be older than buildings in the town	B1	the buildings in the village are older on average the modal age of buildings in the village is older than in the town
	Additional Guidance		
	Cannot score B1 with one correct statement and one incorrect statement		
	The village has more regions which have a modal age of 60+ years		B1
	The town has a bigger variety of different aged buildings		B0
	The village has fewer new houses		B0
	The town has a smaller proportion of old houses		B0
	The town has less old(er) houses [may not be true as the town is likely to have more buildings in total]		B0
	The ages of buildings in the village are older than in the town		B0
	The village has no areas where there are lots of new houses		B0
	The majority of the houses in the village are over 40 years old whereas in the town it is lower		B0
	The village has more older buildings		B0
	Reference to people rather than buildings		B0
	Reference to both places as villages or both places as towns		B0

<table>
<tr><td rowspan="5">14(a)(i)</td><td>Females (aged 14–15) eat more (fruit and vegetables) on average (than males) (aged 14–15)</td><td>B1</td><td colspan="2">oe</td></tr>
<tr><td colspan="4">Additional Guidance</td></tr>
<tr><td colspan="3">Females eat on average 0.3 more (portions of fruit and vegetables)
Females eat on average 0.2 more (portions of fruit and vegetables)</td><td>B1
B0</td></tr>
<tr><td colspan="3">Males eat less portions than females</td><td>B0</td></tr>
<tr><td colspan="3">The mean amount of fruit and vegetables eaten by females is larger
The mean for females is larger</td><td>B1
B0</td></tr>
</table>

14(a)(ii)	Award B2 for two correct comparisons of the number of portions of fruit and vegetables eaten by adults, eg Adults aged 65–74 eat the most fruit and veg (for both females and males) Males aged 16–24 years eat the least fruit and vegetables Males aged 45–54 eat less than males aged 35–44	B2	oe award B1 for one correct comparison of the number of portions of fruit and vegetables eaten by adults
	Additional Guidance		
	Ignore any reference to the Children's table		
	Allow any comparison statement in context to score B1 unless their other comparison contradicts it. eg Adults aged 65-74 eat the most fruit and veg. Adults aged 35-44 eat the most fruit and veg.		B0
	Adults aged 16-24 years eat the least fruit and vegetables		B1
	Young adults and the very old eat less (fruit and vegetables)		B1
	Adults aged 16-24 eat a lower amount of fruit and vegetables than the average amount eaten by adults of all ages		B1
	Females (tend to) eat more vegetables than males (except in the 65+ age group)		B1
	Females eat more fruit and vegetables than males (not true for 75+ age group)		B0
	Adults aged 25+ stay close to the mean of 3.5 (too vague)		B0
	More females eat fruit than males		B0

14(b)	To make sure that the proportions of males and females in the sample match the proportions in the population.	B1	oe
	Additional Guidance		
	The health survey suggests there is a difference between genders		B1
	To ensure that males and females are fairly represented		B1
	Males and females differ in the amount of fruit and vegetables they eat		B1
	The numbers of males and females are not close to being equal		B1
	There are more females than males		B1
	Her sample will be (more) representative of the year group		B1
	Her sample will be (more) representative of the population		B1
	So that there is an even/equal amount of males and females		B0
	To get more accurate results		B0

14(c)	$\frac{99}{99+121}$ $\left(=\frac{99}{220}\right)$ or 0.45 or $\frac{40}{99+121}$ $\left(=\frac{40}{220}\right)$ or $\frac{2}{11}$ or $\frac{99+121}{40}$ $\left(=\frac{220}{40}\right)$ or $\frac{11}{2}$	M1	oe
	$\frac{99}{99+121} \times 40$ and 18 or $\frac{40}{99+121} \times 99$ and 18 or $99 \div \frac{99+121}{40}$ and 18	A1	
	Additional Guidance		
	May also calculate how many females selected and use this to show the number of males selected is 18 eg $\frac{121}{99+121}$ $(\times 40)$ $40 - \frac{121}{99+121} \times 40$ and 18	M1 A1	
	May also work from 18 to show that there are 99 males in the year group		

14(d)	People who eat school dinners may eat more vegetables/fruit/more healthily than people who do not eat school dinners	B1	oe
	Additional Guidance		
	Reasons relating to fruit and vegetables being controlled rather than chosen: You may be restricted as to how much fruit and vegetables you can have if you eat school dinners School dinners may contain more/less fruit and vegetables (than a packed lunch) There will be different things on the menu		B1 B1 B0
	Reasons relating to the sample not being representative: (She does not have a representative sample <u>because</u>) she does not ask people who have packed lunch They may not all eat (school) dinners She is only asking people from her year group Her sample is not representative (reason required)		B1 B1 B1 B0

14(e)	$5 + 2$ or 7 or $\frac{5}{40} \times 100$ or $12.5(\%)$ or $\frac{2}{40} \times 100$ or 5	M1	implied by 0.175
	$17.5(\%)$	A1	oe SC1 $82.5(\%)$

14(f)	$(0 \times 6) + (1 \times 4) + (2 \times 10) + (3 \times 9) +$ $(4 \times 4) + (5 \times 5) + (6 \times 2)$ or $0 + 4 + 20 + 27 + 16 + 25 + 12$ or 104	M1	the first term in the sum may not be seen. Allow an error in one of the terms or one omission. if the frequencies are ignored and the 40 values are added separately then 104 should be seen
	$\frac{\text{their } 104}{40}$	M1dep	
	2.6	A1	
	(the mean for England is) 3(.0)	B1	
	Students in Natalie's year group eat less fruit and vegetables (on average) than students (of the same age) in England	B1ft	ft their average (which cannot be 40)
	Additional Guidance		
	Condone use of UK to mean England		
	<u>Special cases:</u> A correct comparison of the median (2.5) with 3(.0) with a suitable conclusion can earn B3 as a special case. A comparison of the mode (2) with 3(.0) with a suitable conclusion can earn the final two B marks. If the mean is calculated, ignore any reference to the median and mode (and range).		
	Award B1 if they refer to amount eaten/number eaten/fruit and vegetables: Students in England (of the same age) eat more fruit and vegetables than in her year group The (average) amount eaten (by students of the same age) in England is higher than in her year group The figures for England are higher than for her year group		B1 B1 B1

14(g)	Two suitable suggestions, eg • Ask more students • Compare boys and girls separately • Give students advice about what a portion is • Ask students for the number of portions they have eaten for more than one day/ keep a food diary	B2	oe award B1 for one suitable suggestion
	Additional Guidance		
	Separate her graph into male and female		B1
	Use a census instead		B1
	Collect the data over a number of days		B1
	Take a bigger sample		B1
	Make the sample of her class bigger (condone use of class)		B1
	She could have taken a bigger sample so that the whole school was represented (it was only 14-15 years the comparison was for)		B0
	Sample different age groups		B0
	Ask the same amount of boys and girls		B0