GCSE
STATISTICS
8382/2H

Higher Tier Paper 2

Mark scheme

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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	bivariate	B1	

2	1.5	B1	

3(a)	0.4	B1	

3(b)	0.14	B1	

4(a)	20–39 years	B1	

4(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

4(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

5(a)(i)	Quota (sampling)	B1	

5(a)(ii)	Two different reasons, eg Reason type 1: Problems connected with location of data collection eg The people using the supermarket may not all live in the town eg The people using this supermarket may not be representative of all people in the town Reason type 2: Problems connected with interviewer selection bias eg The interviewer may approach people who are more likely to answer eg The interviewer is not choosing randomly Reason type 3: Problems connected with whether the proportions of males/females and/or different age groups is representative of population eg There may not be equal numbers of males and females in the town	B2	oe reasons should come from different categories B1 for one reason

Additional Guidance

2 marks can be awarded for a single sentence if it contains 2 valid reasons. Accept 'the age profile of supermarket shoppers may not be the same as the age profile of library users' as an alternative Type 3 reason.	
The age categories are very big so the sample may not be representative	B1
The results will be biased towards people who visit that one supermarket	B1
Asking people outside of a supermarket are likely to be older people, so younger people may not be represented	B1
She only sampled one week	B0
Some people may have never been to the library	B0
The sample selected does not represent the population/ sample too small	B0

5(b)	Assign a number to every house in the town	B1	accept reference to obtaining/using a sampling frame
	Select 120 numbers (from the list of random numbers) ignoring repeats (and numbers greater than 8000).	B1	must include reference to ignoring repeats for this mark.
	Select the houses matching the numbers chosen.	B1	
	Additional Guidance		
	each of the 120 (random) numbers should correspond to a house on the list		3rd B1
	He can allocate each house a number. Then he can use a random number generator to select each house to put in the sample		B1B0B0
	He can number all the houses differently, then randomly select 120 numbers and question the houses chosen		B1B0B1

5(c)(i)	People not in or People don't want to take part	B1	oe
	Additional Guidance		
	People are not comfortable answering face to face		B1
	People don't want to answer honestly		B0
	Face-to-face is time consuming		B0

5(c)(ii)	Any suitable suggestion of overcoming the difficulty the student raised in **(c)(i)**, eg <u>Ways linked to 'people not in':</u> • Ask someone else from the same house • Call back at a different time • Select another house at random • He could leave his contact details <u>Ways linked to 'people don't want to take part'</u> • Give an incentive to take part • Choose someone from a neighbouring property • Select another house at random	B1	oe
	Additional Guidance		
	This mark can only be scored if a credit worthy problem has been identified in 5(c)(i).		
	To overcome the difficulty, it must not change from face-to-face interviewing: Select more than 120 houses randomly, but only visit 120 Phone them to arrange when to see them Phone them instead		B1 B1 B0

6(a)(i)	Females (aged 14–15) eat more (fruit and vegetables) on average (than males) (aged 14–15)	B1	oe
	Additional Guidance		
	Females eat on average 0.3 more (portions of fruit and vegetables) Females eat on average 0.2 more (portions of fruit and vegetables)		B1 B0
	Males eat less portions than females		B0
	The mean amount of fruit and vegetables eaten by females is larger The mean for females is larger		B1 B0

6(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

6(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	

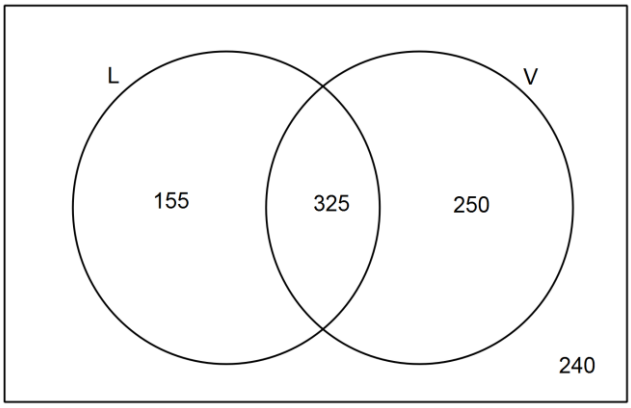
6(c)	$\frac{99}{99+121}\left(=\frac{99}{220}\right)$ or 0.45 or $\frac{40}{99+121}\left(=\frac{40}{220}\right)$ or $\frac{2}{11}$ or $\frac{99+121}{40}\left(=\frac{220}{40}\right)$ or $\frac{11}{2}$	M1	oe
	$\frac{99}{99+121} \times 40$ and 18 or $\frac{40}{99+121} \times 99$ and 18 or $99 \div \frac{99+121}{40}$ 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 $\frac{121}{99+121}$ (× 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		

6(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

6(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 $82.5(\%)$

6(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		
	Special cases: 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

6(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
	Ask the questions over a period of time to see what the long-term mean is		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

7(a)			
	325 and 250	B1	
	155	B1	
	240	B1ft	ft for 970 – (their 155 + their 325 + their 250) provided this is a positive whole number

7(b)	**Alternative 1**		
	360 – 208 – 86 or 66(°)	M1	condone measuring ±2°
	$\frac{\text{their } 66}{208} \times 312$	M1dep	
	99 and William made more teapots in 2019	A1	oe
	Alternative 2		
	$\frac{86}{208} \times 312$ or 129 or $\frac{360}{208} \times 312$ or 540	M1	oe
	$\frac{360}{208} \times 312 - \frac{86}{208} \times 312 - 312$ or 540 – 312 – 129	M1dep	oe
	99 and William made more teapots in 2019	A1	oe
	Additional Guidance		
	If the angle for teapots is measured, allow [96, 102] for the calculated number of teapots in 2019.		

8	<u>Comparison of life expectancy in the two countries</u>		
	The life expectancy in the UK is higher than in Brazil (in each year and for both males and females)	B1	oe
	<u>Comparing gender differences in life expectancy</u>		
	The life expectancy for females is higher than for males (in both countries)	B1	oe
	The difference in life expectancy between males and females is smaller in the UK (in 2010) than in Brazil or The difference in life expectancies between males and females in the UK has narrowed or The difference in life expectancies between males and females in Brazil has widened	B1	oe
	<u>Comparing trends</u>		
	Life expectancies have increased (in both countries)	B1	oe
	Life expectancies in Brazil have increased at a faster rate (than in the UK)	B1	oe
	Additional Guidance		
	Reference to figures from the graph must be correct		
	For 1st B1 Allow this mark to be awarded for a statement that the life expectancy in the UK is longer even if this is made for a single year or for a single gender, eg Life expectancy for UK males in 2010 is greater than the life expectancy of Brazilian males (in 2010)		B1

	Life expectancy for UK females in 2010 is greater than the life expectancy of males in Brazil in 2010 (inconsistent comparison) Do not allow statements that just quote figures without comparing eg In the UK in 1960 the life expectancy for a male was 68 and for a female it was 74 whereas in Brazil in 1960 the life expectancy was 52 and for a female it was 56.	B0 B0
	For 3rd B1 Life expectancies have increased for both males and females (in both countries)	B1

9(a)	England has more houses (than other parts of the UK) or The population of England is greater (than other parts of the UK)	B1	oe
	Additional Guidance		
	More houses are sold in England (than other parts of the UK)		B1
	England is bigger (than other parts of the UK)		B1
	There is a greater proportion of houses in England (than other parts of the UK)		B1
	The house index for England went up the most (than other parts of the UK)		B0

9(b)	$177\,000 \times \frac{100}{101.7}$ or 174 041(.29…) or $177\,000 \times \frac{105.2}{100}$ or 186 204 or $\frac{177\,000}{101.7}$ or 1740.41(29…) or 177 000 × 105.2 or 18 620 400	M1	oe allow 174 041(.29…) or 1740.41(29…) or 186 204 or 18 620 400 to be rounded to 3 or more significant figures
	their 174 041(.29…) $\times \frac{105.2}{100}$ or their 186 204 $\times \frac{100}{101.7}$ or $177\,000 \times \frac{105.2}{101.7}$ or their 1740.41(29…) × 105.2 or their $\frac{18\,620\,400}{101.7}$	M1dep	oe
	183 000 or [183 048, 183 100]	A1	

9(c)	105.7 × 84 or 105.7 × 0.84 or 105.2 × 4 or 105.2 × 0.04 or 100.6 × 10 or 100.6 × 0.1 or 103.4 × 2 or 103.4 × 0.02	M1	oe
	(105.7 × 84) + (105.2 × 4) + (100.6 × 10) + (103.4 × 2) or (105.7 × 0.84) + (105.2 × 0.04) + (100.6 × 0.1) + (103.4 × 0.02)	M1dep	oe implied by 10512.4
	105.1(24)	A1	
	Additional Guidance		
	May work with 1.057, 1.052, 1.006 and 1.034 instead which is acceptable		

9(d)	**Alternative 1**		
	$\frac{543\ 000}{499\ 000} \times 100$ or 108.8(17…)	M1	accept £177 000 with working
	108.8(17…) and a suitable conclusion, eg • the newspaper is correct • prices in London have grown at a faster rate/by a greater percentage.	A1ft	follow through from 9(c)
	Alternative 2		
	$\frac{543\ 000 - 499\ 000}{499\ 000} \times 100$ or 8.8(17…)(%)	M1	
	8.8(17…)(%) and a suitable conclusion, eg • the newspaper is correct • prices in London have grown at a faster rate/by a greater percentage.	A1ft	follow through from 9(c) as long as their answer in 9(c) is greater than 100.
	Alternative 3		
	$499\ 000 \times \frac{\text{their } 105.1}{100}$ or [524 000, 525 000]	M1	
	[524 000, 525 000] and a suitable conclusion, eg • the newspaper is correct • prices in London have grown at a faster rate/by a greater percentage.	A1ft	follow through from 9(c) as long as their answer in 9(c) is greater than 100.
	Additional Guidance		
	Do not allow wrong interpretation of the index numbers or percentage increase		

	House prices have grown by a greater amount in London		B0
10(a)	Plaque score	B1	oe Amount of plaque

10(b)	To ensure the data are as accurate as possible or To ensure the experiment is as reliable as possible	B1	oe Otherwise patients may just guess how long they cleaned their teeth for
	Additional Guidance		
	To help people to remember (how long they cleaned their teeth)		B1
	So they have somewhere to write their results (too vague)		B0
	So they can store their recordings		B0

10(c)	The line does not pass through the (double) mean point	B1	oe eg more points lie below the line than above it.
	The line of best fit does not cover the horizontal extent of the data	B1	oe
	Additional Guidance		
	The line of best fit does not pass through the middle of the data		B1
	The line is too short		B1
	The line of best fit is not centred around his mean		B1
	The line does not go far enough		B1
	The line does not go past/beyond two of the data values		B1
	It does not have an equal amount of points on either side of the line		B1
	It does not go beyond the full set of points		B1
	Doesn’t go through the whole/entire graph		B0
	It’s too high up		B0
	It should intersect the axes		B0
	Doesn’t represent all of the data		B0
	Doesn’t go through all of the points		B0

10(d)(i)	$2.7 - 0.43 \times 4$	M1	
	0.98	A1	accept 1 if working seen
	Additional Guidance		
	SC1 1.84		

10(d)(ii)	$(1-)\ \frac{6 \times 520}{12 \times (12^2 - 1)}$	M1	
	$-0.818(1\ldots)$ or -0.82 or $-\frac{9}{11}$ or $-0.\dot{8}\dot{1}$	A1	oe
	Additional Guidance		
	Ignore any subsequent attempts to round if the correct answer is seen		

10(e)	Ticks No, with a correct reason, eg • If two variables are correlated, it does not mean that increasing one will cause the other to change • Correlation does not imply a causation	B1	oe
	Additional Guidance		
	Ticks No and 'He should have said that people who spend more time in the shower tend to have lower plaque scores'.		B1
	Both variables could be related through a third variable eg levels of hygiene		B1
	There is no proof of causation, only correlation		B1
	Spending more time in the shower is not related to plaque score		B0
	Showering is not cleaning their teeth		B0
	There is no causal relationship between time in the shower and plaque score		B0

11(a)	600 seen as Flu vaccination rate for Greater Manchester	B1	
	$\frac{171\,800}{\text{their } 600} \times 1000$	M1	
	(Number of children offered vaccine in SE =) [286 000, 286 334] and (Flu vaccination rate in SE =) 600	A1ft	ft from their 600
	Additional Guidance		
	Beware of attempts to × 100 instead of × 1000 leading to: eg Greater Manchester flu vaccination rate = 60 Number of children offered vaccine in SE = [286 000, 286 334] SE flu vaccination rate = 60		B0M1A1ft

11(b)(i)	The children receive the vaccine independently of one another or these children are representative of children across the country	B1 ft	oe
	Additional Guidance		
	The child minder does not require all children to have been vaccinated.		B1
	These children all have the same probability of being vaccinated (as children in the country)		B1
	The children are not siblings		B1
	There were no specific reasons why a child could not have the vaccine (eg medical)		B1
	One of the children has been vaccinated already		B0
	The child receives the vaccine or does not receive the vaccine (there are only two outcomes in this scenario)		B0

11(b)(ii)	$k \times 0.91^3 \times (1-0.91)^1$ for any $k > 0$	M1	oe
	$4 \times 0.91^3 \times (1-0.91)$ or [0.27, 0.2713]	M1dep	
	their P(3) + 0.91^4	M1	provided 0 < their P(3) < 1
	[0.957, 0.95704] or 0.96	A1	

11(c)	(230 ÷ 250 =) 0.92 or 92% or (0.91 × 250 =) 227.5 or 227 or 228	B1	oe
	A suitable comment that implies that Lara might be incorrect, eg The difference between the proportions in the city and the whole of England could be due to natural variation/ sampling variability (The proportion is so close to 91% that) a different sample could have given a proportion less than 91% The children attending nursery schools may be more likely to have had the MMR vaccine than other children in the city	B1	oe the difference between the observed and expected frequencies could be due to natural variation

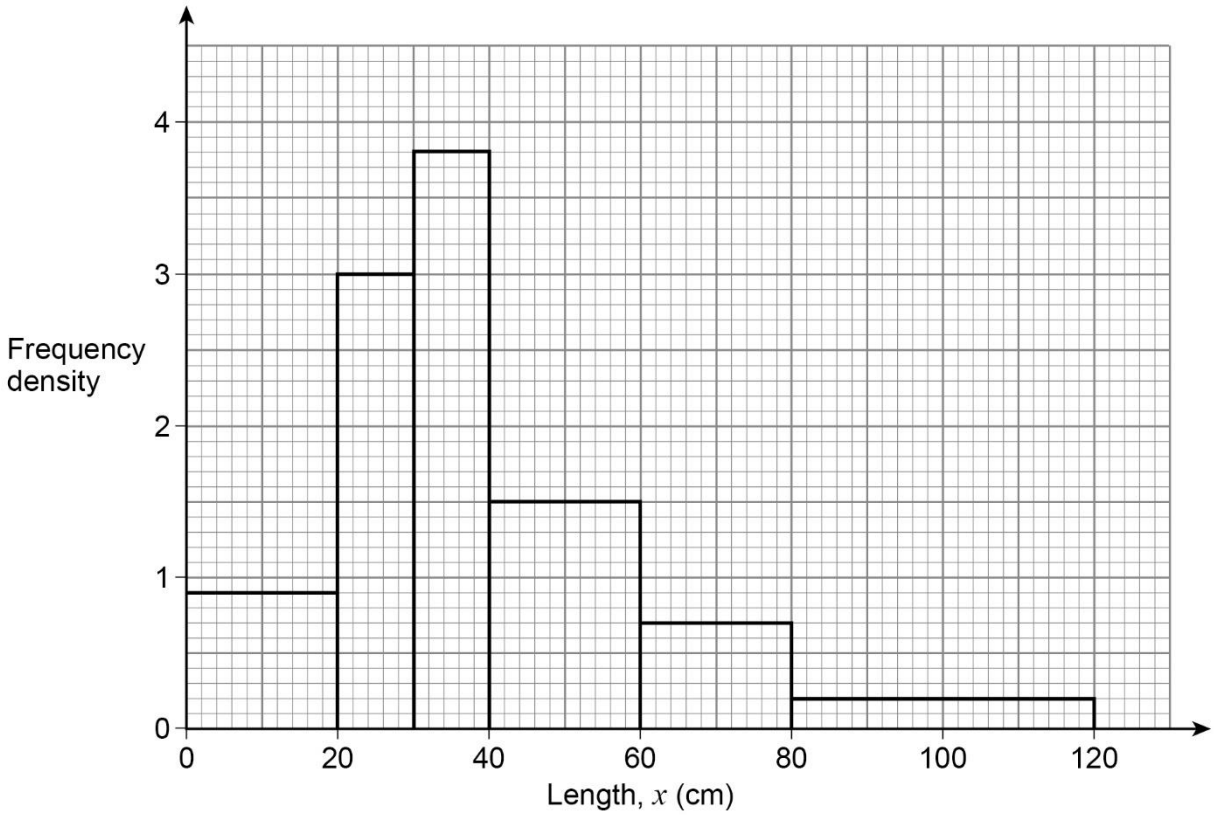
Additional Guidance	
Lara's sample is not representative of the population because she has not sampled children who don't attend nursery school	B1
The difference between the sample proportion and the figure for England is small (given the size of the sample)	B1
Some of the children attending the nursery may not live in the city	B1
The 250 children may not be representative of all young children in the city (needs an explanation why it may not be representative)	B0
The sample is biased (lacks a reason why there is bias)	B0
Lara's sample is not representative of the population (lacks reason)	B0
The sample size is too small	B0

12(a)(i)	$\frac{23}{95}$ or $\frac{95}{23}$	M1	accept ratios, eg 23 : 95
	$\frac{23}{95} = \frac{138}{N}$ or $(N =)\frac{138 \times 95}{23}$	M1	oe correct equation involving, or correct expression for, population size
	570	A1	

12(a)(ii)	To enable the marked fish to mix with the remainder of the population.	B1	oe
	Additional Guidance		
	To allow the marked fish time to recover.		B1

12(b)(i)	She has not plotted frequency density (on the vertical axis)	B1	oe
	Additional Guidance		
	She should have adjusted the frequencies to take into account the different class widths		B1
	She has plotted frequency on the vertical axis		B1
	She should have used frequency density (instead of frequency)		B1

12(b)(ii)



Alternative 1 – calculating frequency density

18 ÷ 20 or 0.9 or 30 ÷ 10 or 3 or 38 ÷ 10 or 3.8 or 30 ÷ 20 or 1.5 or 14 ÷ 20 or 0.7 or 8 ÷ 40 or 0.2	M1	correct method for finding any frequency density. can be implied by graph
18 ÷ 20 or 0.9 and 30 ÷ 10 or 3 and 38 ÷ 10 or 3.8 and 30 ÷ 20 or 1.5 and 14 ÷ 20 or 0.7 and 8 ÷ 40 or 0.2	M1	correct method for finding all frequency densities. can be implied by graph.

	Suitable linear scales on horizontal and vertical axes and horizontal axis labelled 'length' and vertical axis labelled 'frequency density'.	B1	oe accept abbreviations. condone lack of title. units not needed on labels.
	Fully correct histogram	A1	condone lack of labels on axes for this mark, but axes must be numbered. condone lack of title.
	Alternative 2 – use of a standard bar width		
	One class width used as standard width and the height of one bar with a different width correctly calculated eg standard width = 10 height of $0 < x \leqslant 20$ bar calculated as 9 or height of $40 < x \leqslant 60$ bar calculated as 15 or height of $60 < x \leqslant 80$ bar calculated as 7 or height of $80 < x \leqslant 120$ bar calculated as 2	M1	the standard width may not be explicitly stated but could be inferred from histogram from bars with unchanged heights. height calculations can be implied by histogram.
	One class width used as standard width and the heights of all other bars correctly calculated eg standard width = 10 height of $20 < x \leqslant 30$ and $30 < x \leqslant 40$ bars given as 30 and 38 respectively and height of $0 < x \leqslant 20$ bar calculated as 9 and height of $40 < x \leqslant 60$ bar calculated as 15 and height of $60 < x \leqslant 80$ bar calculated as 7 and height of $80 < x \leqslant 120$ bar calculated as 2	M1	the standard width may not be explicitly stated but could be inferred from histogram from bars with unchanged heights. height calculations can be implied by histogram.
	Suitable linear scales on horizontal and vertical axes and horizontal axis labelled 'length' and vertical axis suitably labelled (eg standard frequency or frequency per 'standard width')	B1	oe accept abbreviations. condone lack of title. units not needed on labels. allow frequency density as vertical axis label.

	Fully correct histogram	A1	there must be some indication of how the frequencies can be calculated, eg a key or explicit mention of the standard width. condone lack of labels on axes for this mark, but axes must be numbered. condone lack of title.
	Alternative 3 – histogram drawn by area		
	Clear indication of how area relates to frequency and height and width of one bar correctly found	M1	eg 1 cm^2 = 5 fish and first bar drawn with an area of 3.6 cm^2 eg 5 small squares = 1 fish and first bar drawn with an area of 90 small squares
	Clear indication of how area relates to frequency and height and width of all bars correctly found	M1	
	Suitable linear scales on horizontal axis and horizontal axis labelled 'length' and clear key given linking area to frequency	B1	accept abbreviations. condone lack of title. units not needed on labels. no vertical axis label or scale needed for this mark
	Fully correct histogram	A1	horizontal axis must be numbered. condone lack of axis labels but a key must be given to link area to frequency.
	Additional Guidance		
	Alternative method 2: If the standard width is not one class widths: 1st M mark is awarded for calculating the adjusted height of any bar		

	2nd M mark is awarded for calculating the adjusted heights of all bars	

12(b)(iii)	Positive (skew)	B1ft	oe
	Additional Guidance		
	Follow through (if possible) from their histogram		