Q1. Poppy wants to find out for how much time people use their computer.

She uses this question on a questionnaire.

For how much time do you use your computer?

0–1 hours ☐ 3–4 hours ☐

1–2 hours ☐ 4–5 hours ☐

2–3 hours ☐ 5–6 hours ☐

(a) Write down **two** things that are wrong with this question.

1 .....

.....

2 .....

.....

(2)

Poppy gives her questionnaire to all the students in her class.

Her sample is biased.

(b) Give **one** reason why.

.....

.....

(1)
(Total 3 marks)

Q2. The table below shows the population of each of three villages.

Village	Population
Ashley	243
Brigby	370
Irton	127

Mr Akhtar carries out a survey of the people living in these three villages.
He uses a sample stratified by village population.

There are 50 people from Brigby in his sample.

Work out the number of people from Irton in his sample.

.....

(Total 2 marks)

Q3. A factory makes 600 laptops.
Mrs Green is responsible for checking these laptops.
She is going to take a random sample of 80 of the laptops.

(a) Describe a method she could use to select the sample.

.....

.....

(1)

Mrs Green finds that 3 of the 80 laptops are faulty.

(b) Work out an estimate for how many of the 600 laptops are faulty.

.....

(2)
(Total 3 marks)

Q4. 182 students go to an outdoor activity centre for a day.
Each student chooses one activity, climbing or sailing.

The table shows information about the activities the students chose.

	Activity chosen	
	Climbing	**Sailing**
Male	34	57
Female	26	65

The manager of the centre gives a questionnaire to some of the students.
He takes a sample of 50 students stratified by gender and the activity chosen.

Work out the number of male students who chose climbing he should have in his sample.

.....

(Total 2 marks)

Q5. (a) Dan is doing a survey to find out how much time students spend playing sport. He is going to ask the first 10 boys on the register for his PE class.

This may **not** produce a good sample for Dan's survey.

Give **two** reasons why.

Reason 1

.....

.....

.....

Reason 2

.....

.....

.....

(2)

(b) Design a suitable question for Dan to use on a questionnaire to find out how much time students spend playing sport.

(2)
(Total 4 marks)

Q6. (a) Explain what is meant by

(i) a random sample,

.....

.....

(1)

(ii) a stratified sample.

.....

.....

(1)

A Sixth Form College has 850 students.
The table shows some information about these students.

	Number of female students	**Number of male students**
Year 12	184	241
Year 13	222	203

Linda is going to do a survey of the students in the college.
She uses a sample of 50 students stratified by year group and by gender.

(b) Work out the number of Year 12 female students in her sample.

.....

(2)
(Total 4 marks)

Q7. Charles wants to find out how much people spend on sweets.

He will use a questionnaire.

(a) Design a suitable question for Charles to use in his questionnaire.

(2)

Charles asks the people in his class to do his questionnaire.

(b) Give a reason why this may not be a suitable sample.

.....

.....

(1)
(Total 3 marks)

Q8.

	Male	**Female**
First year	399	602

Second year	252	198

The table gives information about the numbers of students in the two years of a college course.

Anna wants to interview some of these students.
She takes a random sample of 70 students stratified by year and by gender.

Work out the number of students in the sample who are male and in the first year.

.....

(Total 3 marks)

Q9. 258 students each study one of three languages.
The table shows information about these students.

	Language studied		
	German	**French**	**Spanish**
Male	45	52	26
Female	25	48	62

A sample, stratified by the language studied and by gender, of 50 of the 258 students is taken.

(a) Work out the number of male students studying Spanish in the sample.

.....

(2)

(b) Work out the number of female students in the sample.

.....

(2)
(Total 4 marks)

Q10. Laura and Jaz were worried about the amount of traffic in their town.

The town council aims to reduce the percentage of lorries to 25% of the total number of vehicles.

Laura and Jaz carried out a survey of the types of vehicles passing Laura's house during 10 minutes one Saturday morning.

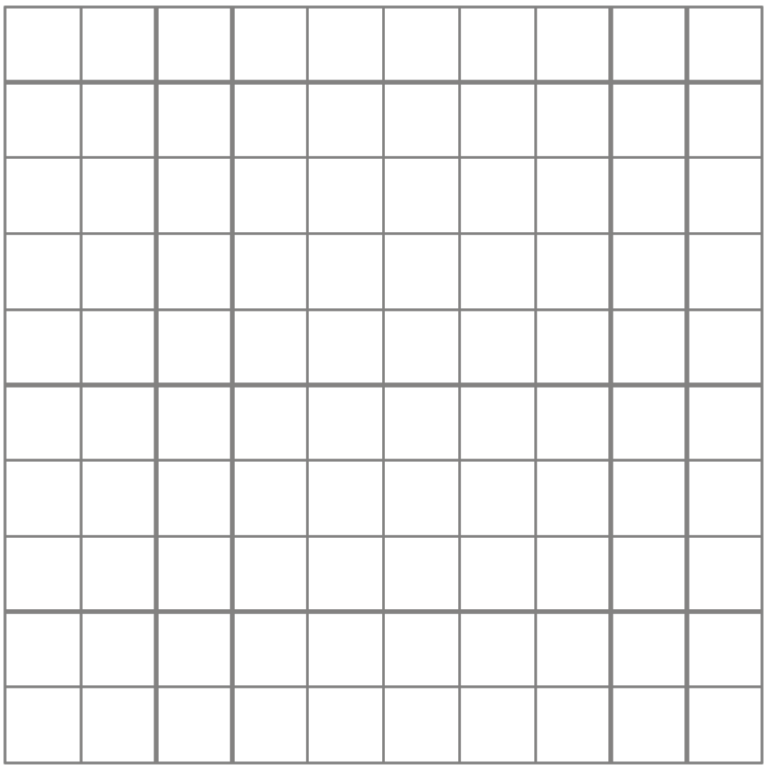
Here is a list of the vehicles they saw.

Car	Van	Lorry	Motorbike	Bus	Car
Van	Car	Car	Van	Lorry	Motorbike
Motorbike	Motorbike	Van	Lorry	Motorbike	Car
Car	Bus	Lorry	Car	Lorry	Motorbike

Laura and Jaz were going to give a talk about the results of their survey.

(a) Design a suitable chart or table Laura could use and a different chart or table that Jaz could use to make a summary of the list of vehicles they saw.

Use the space below or the grid provided.



(6)

The council's aim was to reduce the percentage of lorries in the town to be less than 25%.

(b) Did the council succeed? You must explain your answer.

.....

.....

(2)

Laura and Jaz's survey was not a good one.

(c) Explain how Laura and Jaz could design a better survey to investigate the council's plan.

.....

.....

(2)
(Total 10 marks)

M1.

	Answer	Mark	Additional Guidance
(a)	Overlapping intervals Time frame No 6+ (or none)	2	**B2** for 2 correct 731607245 (**B1** for 1 correct)
(b)	Not representative of all ages Students use computers more	1	**B1** for one acceptable reason
			Total for Question: 3 marks

M2.

Working	Answer	Mark	Additional Guidance
$\frac{127}{370} \times 50 = 17.16... = 17.1$ OR $243 + 370 + 127 = 740$ $\frac{370}{740} = 0.5$ so sample size = 100 $\frac{127}{740} \times 100 = 17.1...$	17	2	**M1** for $\frac{127}{370} \times 50$ oe **A1** for 17 (accept 18) SC B1 for $\frac{17}{127}$ or $\frac{18}{127}$ (Note: 50 ÷ 3 = 16.6(…) = 17 scores no marks)
			Total for Question: 2 marks

M3.

	Working	Answer	Mark	Additional Guidance
(a)		Correct method to choose a random sample	1	**B1** for equal chance of selection, e.g. number each laptop and then use the random number function on a calculator or pick the numbers out of a bag
(b)	$\frac{3}{80} \times 600 = 22.5$	22.5	2	**M1** for $\frac{3}{80} \times 600$ **A1** for 22.5 or 22 or 23 SC B1 for $\frac{22.5}{600}$ or $\frac{22}{600}$ or $\frac{23}{600}$
				Total for Question: 3 marks

M4.

Working	Answer	Mark	Additional Guidance
$\frac{34}{182} \times 50 = 9.34$	9	2	**M1** for $\frac{34}{182} \times 50$ (= 9.3..) **A1** cao
			Total for Question: 2 marks

M5.

	Answer	Mark	Additional Guidance
(a)	Reason	2	**B2** for 2 acceptable reasons relating to the types below [**B1** for 1 acceptable reason] Bias relating to age. Bias relating to gender Bias relating to PE students Size of sample too small Sampling method is not random
(b)	Question and response boxes	2	B2 for a suitable question with at least 3 non-overlapping response boxes (must include a time period and units) [**B1** for a suitable question with time period or at least 3 non-overlapping response boxes with units]
			Total for Question: 4 marks

M6.

	Working	Answer	Mark	Additional Guidance
(a)(i)		Correct explanation	1	**C1** for all have equal chance of being selected **C1** for groups in the sample are in the same proportion as they are in the population
(ii)			1	

(b)		11	2	

	Total for Question: 4 marks

M7.

	Working	Answer	Mark	Additional Guidance
(a)		Question + response boxes	2	**B2** for a suitable question with at least 3 non-overlapping response boxes (must include a time period) (B1 for a suitable question with time period or non-overlapping response boxes)
(b)		Reason	1	**B1** for biased or all the students the same age or students (may) eat more sweets, etc
				Total for Question: 3 marks

M8.

Working	Answer	Mark	Additional Guidance
$\frac{399}{399+602+252+198} \times 70$ = 19.24	19	3	**M1** for $\frac{399}{399+602+252+198}$ or $\frac{399}{1451}$ or "$\frac{70}{1451}$" or "$\frac{1451}{70}$" or "$\frac{1451}{399}$" "$\frac{399}{1451}$" **M1** × 70 or $\frac{70}{"1451"} \times 399$ or

			399 ÷ $\frac{"1451"}{70}$ (= 19.2487…) **A1** for 19
			Total for Question: 3 marks

M9.

	Working	Answer	Mark	Additional Guidance
(a)	$\frac{26}{258}$ × 50	5	2	**M1** for $\frac{a}{258}$ × 50 or 50 ÷ $\frac{258}{a}$ oe, a < 258 **or** 5.03(8…) or 26 ÷ 5.16 **A1** for 5 cao
(b)	$\frac{(25+48+62)}{258}$ × 50	26	2	**M1** for $\frac{135}{258}$ × 50 or $\frac{(25+48+62)}{258}$ × 50 or $\left(\frac{25}{258}\times 50+\frac{48}{258}\times 50+\frac{62}{258}\times 50\right)$ oe or 26.1(6…) **or** 5 + 9 + 12 or 135 ÷ 5.16 **A1** for 26 or 27
				Total for Question: 4 marks

M10.

		Working	Answer	Mark	Additional Guidance
FE	(a)		Correct table **WITH EITHER** Bar chart **OR** Pictogram **OR** Pie Chart	6	**B1** Table with at least 2 columns with car, lorry, van, motorbike and bus rows **M1** tally column completed or headed frequency column with at least two entries correct **A1** correct frequencies (7, 4, 5, 6, 2) **WITH EITHER** **B1** labelled axes with a uniform scale **M1** bars labelled all the same width **A1** bars all correct (ft from a) **OR** **B1** labelled pictogram **M1** 5 classes + key **A1** all correct (ft from a) **OR** **B1** circle with 5 sectors labelled **M1** correct calculation of at least one angle **A1** all sectors correct (ft from a)
	(b)	25% of 24 = 6	Yes as 5 < 6	2	**M1** finding 25% of 24 **A1** Yes as 5 < 6, (ft from a)
	(c)		Survey at different places Survey at different times Do a bigger survey	2	**B2** 2 or more reasons (**B1** 1 reason) Ignore irrelevant reasons
					Total for Question: 10 marks

E1. In part (a), most candidates were able to score at least one mark in this question, usually for identifying the overlapping intervals. Another popular response was to identify in some way that there was not a box for more than 6 hours, e.g. “no other box”, or a box for no computer, e.g. “they may not have a computer”. A small number of candidates thought, incorrectly, that there was a problem with the grammar of the question, or with the presentation of the boxes.

In part (b), about a third of the candidates were able to identify why her sample was biased. Many simply repeated one of the reasons they gave in part (a), typically ‘they may not have a computer’, or where too, e.g. ‘she only asked the people in her class.”

##

Candidates who had a good understanding of stratified sampling found this question straightforward. However, it was not a straight forward application of the process and many different incorrect methods and answers were seen. A significant proportion of candidates worked out the number of people from Irton that would be in a sample of total size 50 if the sample was stratified by village population. Some candidates did not give an integer answer. Thirty seven per cent of candidates gained full marks.

##

In their attempt to answer part (a) of this question many candidates depended on the word “random” thereby just rephrasing the wording of the question. Other candidates defined the term “random” rather than describe a method to explain how 80 laptops could be sampled from a population of 600. One quarter of candidates were awarded the mark available. These candidates usually referred to numbering the computers and picking 80 numbers from a hat containing the numbers 1 to 600 or to using a random number generator on a calculator to generate 80 numbers between 1 and 600. Some candidates suggested taking a stratified or systematic sample. Part (b) was well answered with over 60% of candidates gaining both marks for their response. A small but significant proportion of candidates worked out
600 ÷ 80 (= 7.5) then rounded their answer to 8 before multiplying by 3.

##

There were mixed responses to this question. Some clearly knew what stratified sampling means and worked out the correct ratio 34/182 or 50/182 and then multiplied by 50 or 34 appropriately. Some unfortunately rounded at each stage and rounding errors led to an incorrect final answer.

Common errors were 50/4 = 12.5 and then rounded to 12 or 50/2. A few who used the correct method unfortunately left their final answer as 9.34 and so failed to score the final mark.

##

Foundation

Many candidates were confused in their understanding of why the proposed sampling process may not be fit for purpose. The most common unacceptable reason given related to the sporting prowess, or not, of the selected 10 boys. Many candidates thought that a time period was missing, confusing sampling with writing questions for a questionnaire.

In part (b), the most common mistakes were either to omit a time period in their question or offer overlapping response boxes or to draw a tally chart. A number of candidates failed to include response boxes in their question. Students need to be made aware that a question suitable for a questionnaire has two aspects to it; a written question and response boxes. They will not always be told this in the exam question.

Higher

In part (a), many candidates scored at least one mark here – in many cases for indicating bias involving gender. Some also mentioned the bias involving age or PE. Quite a few scored a mark for stating that the sample was not large enough but some then spoilt this by saying that the whole class or whole school should be asked. Only a few commented on the fact that the sampling method was not random. Some students made erroneous reference to the structure of the question (e.g. a missing time frame) rather than commenting on the sample being used for the survey.

Many candidates gained full marks for part (b). Many had clearly been taught not to overlap the response boxes – responses of the type 0-1hr followed by 1hr1min-2hrs were often seen. Where full marks were not gained it was often possible to award one mark which was usually for a suitable question with time period then followed by overlapping boxes or boxes with no units.

Several candidates attempted to use inequalities in their answers but many did so inaccurately creating periods of time that overlapped.

E8. There were a variety of methods used that led to a correct answer although over 75% of candidates failed to score any marks. Most candidates realised that they had to give their final answer as a whole number.

E9. The most common pair of incorrect answers seen were 26 and 135 where candidates did not appreciate that the question involved a sample rather than the whole population shown in the two-way table.

Rather than carry out a single calculation, some candidates wrote down decimal or percentage values for fractions such as 26/258.

Premature rounding of these values occasionally led to inaccuracies but the necessity to have a whole number final answer usually rescued a potential loss of accuracy marks. A number of candidates assumed that part (b) also referred to the students studying Spanish and calculated 62/258 × 50 rather than use the 135 total of female students.