Q1.   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)

Q2.   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)

Q3.   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)

Q4.   (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)

Q5.

	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)

Q6.   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)

M1.

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

M2.

	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)	$\dfrac{3}{80} \times 600 = 22.5$	22.5	2	**M1** for $\dfrac{3}{80} \times 600$ **A1** for 22.5 or 22 or 23 SC **B1** for $\dfrac{22.5}{600}$ or $\dfrac{22}{600}$ or $\dfrac{23}{600}$
				Total for Question: 3 marks

M3.

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

M4.

	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

M5.

Working	Answer	Mark	Additional Guidance
$\dfrac{399}{399 + 602 + 252 + 198} \times 70$ = 19.24	19	3	**M1** for $\dfrac{399}{399 + 602 + 252 + 198}$ or $\dfrac{399}{1451}$ or $\dfrac{\text{"}70\text{"}}{1451}$ or $\dfrac{\text{"}1451\text{"}}{70}$ or $\dfrac{\text{"}1451\text{"}}{399}$ **M1** $\dfrac{\text{"}399\text{"}}{1451} \times 70$ or $\dfrac{70}{\text{"}1451\text{"}} \times 399$ or $399 \div \dfrac{\text{"}1451\text{"}}{70}$ (= 19.2487…) **A1** for 19
			Total for Question: 3 marks

M6.

	Working	Answer	Mark	Additional Guidance
(a)	$\dfrac{26}{258} \times 50$	5	2	**M1** for $\dfrac{a}{258} \times 50$ or $50 \div \dfrac{258}{a}$ oe, $a < 258$ **or** 5.03(8…) or 26 ÷ 5.16

				A1 for 5 cao
(b)	$\dfrac{(25 + 48 + 62)}{258} \times 50$	26	2	**M1** for $\dfrac{135}{258} \times 50$ or $\dfrac{(25 + 48 + 62)}{258} \times 50$ or $\left(\dfrac{25}{258} \times 50 + \dfrac{48}{258} \times 50 + \dfrac{62}{258} \times 50\right)$ oe or 26.1(6…) **or** 5 + 9 + 12 or 135 ÷ 5.16 **A1** for 26 or 27
				Total for Question: 4 marks

##

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
$600 \div 80$ (= 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.

E5. 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.

E6.   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.