

#### Skill

### Group A - Stratified sampling

Calculate the number of members in each sample:

 The table shows the number of students attending the sixth form at a school: **2)** The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	120	100
Female	80	50

By taking a stratified sample of 175 students, calculate how many students in the sample would be Male in Year 12.

 4) The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	200	180
Female	170	150

By taking a stratified sample of 140 students, calculate how many students in the sample would be Female.

	Y12	Y13
Male	120	100
Female	80	50

By taking a stratified sample of 175 students, calculate how many students in the sample would be Female in Year 13.

**5)** The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	200	180
Female	170	150

By taking a stratified sample of 280 students, calculate how many students in the sample would be in Year 12. **3)** The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	120	100
Female	80	50

By taking a stratified sample of 175 students, calculate how many students in the sample would be Male.

6) The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	120	116
Female	132	120

By taking a stratified sample of 122 students, calculate how many students in the sample would be in each category.



7) The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	120	116
Female	132	120

By taking a stratified sample of 305 students, calculate how many students in the sample would be Female in Year 13.

**10)** The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	250	230
Female	200	170

By taking a stratified sample of 34% of students, calculate how many students in the sample would be in each category. 8) The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	150	120
Female	140	130

By taking a stratified sample of 10 students, calculate how many students in the sample would be in each category.

**11)** The table shows the number of students in the **sample** selected that attend the sixth form at a school:

	Y12	Y13
Male	80	60
Female	90	80

If there are 775 people in the population, calculate how many students are in each category in the population. **9)** The table shows the number of students attending the sixth form at a school:

	Y12	Y13
Male	122	113
Female	135	118

By taking a stratified sample of 20% of students, calculate how many students in the sample would be in each category.

12) The table shows the number of students in the sample selected that attend the sixth form at a school:

	Y12	Y13
Male	162	155
Female	140	143

If there are 3000 people in the population, calculate how many female students there are in the population.



#### Group B - Capture recapture

Use the information provided to calculate the missing value:

**1)** Estimate the population size given the following set of data:

	Frequency
Initial Sample Size	50
Second Sample Size	60
Number recaptured (marked)	10

 Estimate the population size given the following set of data:

	Frequency
Initial Sample Size	1453
Second Sample Size	1555
Number recaptured (marked)	1021

**7)** Calculate the number of marked items in the second sample:

	Frequency
Initial Sample Size	83
Second Sample Size	76
Population size	166

**10)** Calculate the number of items in the initial sample:

	Frequency
Second Sample Size	160
Number recaptured (marked)	32
Population size	270

**2)** Estimate the population size given the following set of data:

	Frequency
Initial Sample Size	51
Second Sample Size	36
Number recaptured (marked)	12

**5)** Calculate the number of marked items in the second sample:

	Frequency
Initial Sample Size	80
Second Sample Size	60
Population size	100

**8)** Calculate the number of marked items in the second sample:

	Frequency
Initial Sample Size	1100
Second Sample Size	1500
Population size	275000

**11)** Calculate the number of items in the initial sample:

	Frequency
Second Sample Size	1648
Number recaptured (marked)	824
Population size	1856

**3)** Estimate the population size given the following set of data:

	Frequency
Initial Sample Size	125
Second Sample Size	150
Number recaptured (marked)	25

**6)** Calculate the number of marked items in the second sample:

	Frequency
Initial Sample Size	144
Second Sample Size	108
Population size	972

**9)** Calculate the number of items in the initial sample:

	Frequency
Second Sample Size	64
Number recaptured (marked)	16
Population size	33

**12)** Calculate the number of items in the initial sample:

	Frequency
Second Sample Size	3432
Number recaptured (marked)	264
Population size	3913



### Group C - Systematic sampling

Calculate the missing values in each table. For each question, write the next four terms in the data set unless stated.

1)		2)		3)	
Population Size	1000	Population Size	1600	Population Size	504
Sample Size	100	Sample Size	80	Sample Size	42
Interval		Interval		Interval	
Term 1	7	Term 1	11	Term 1	2
Next 4 Terms		Next 4 Terms		Next 4 Terms	

4)

т) 		
Population Size	200	
Sample Size		
Interval	25	
Term 1	22	
Next 4 Terms		

5)	
Population Size	824
Sample Size	
Interval	8
Term 1	3
Next 4 Terms	

6)	
Population Size	420
Sample Size	
Interval	21
Term 1	16
Next 4 Terms	

7)

<u>'</u>	
Population Size	
Sample Size	50
Interval	6
Term 1	5
Next 4 Terms	

8	8)	
	Population Size	
	Sample Size	10
	Interval	14
	Term 1	4
	Next 4 Terms	

9)	
Population Size	
Sample Size	200
Interval	16
Term 1	10
Next 4 Terms	

10)

•			
Population Size	500		
Sample Size			
Interval			
Term 1			
Next 4 Terms	16, 26, 36, 46		

11)		12)		
Population Size		Population Size		
Sample Size	42	Sample Size	200	
Interval		Interval		
Term 1		Term 1		
Next 4 Terms	10, 16, 22, 28	Next 4 Terms	487, 847, 1207, 1567	



### Applied

**1)** Below is a table showing the number of students in each year group at the high school:

Year Group	7	8	9	10	11
Number of students	224	250	248	198	205

- (a) In a stratified sample containing 200 students, how many students in the sample will be in Year 9?
- (b) Which year group will have the lowest number of students in the sample, regardless of the sample size?
- **2)** Greg is carrying out a customer service study for his gym. He has a list of all 540 members and would like to sample 60 people.
  - (a) Describe how Greg could use a random sampling technique to obtain his sample.
  - (b) Describe how Greg could use a systematic sampling technique to obtain his sample.
- **3)** Taylor would like to find out how many ants are in his formicarium. He sets up a trap that collects and marks ants with UV paint before releasing them back into the colony. He manages to capture 78 ants in sample 1. He repeated the experiment 2 days later. He caught 83 ants, of which 17 had the UV paint from the previous capture.
  - (a) Estimate the total number of ants in the colony.
  - (b) What is the advantage of having an enclosure when estimating population size?
- 4) Below is a table showing the number of people attending a science fair

	Male	Female
Adults	1224	1260
Children	2540	2638

- (a) Determine the number of people in each category for a stratified sample of 450people.
- (b) How many adults would be part of a stratified sample containing 165 people?

2)



## Types of Sampling - Exam Questions

(a) A pharmaceutical company is testing a new drug. 1000 people are participating in the clinical trials. 350 people will receive a placebo proportional to the population.

Age ( $x$ years)	Male	Female
18 ≤ <i>x</i> < 30	225	253
30 ≤ <i>x</i> < 50	162	134
<i>x</i> ≥ 50	121	105

How many adults over 50 years old receive the placebo?

		(3)
(b)	How many females between 18 and 30 years old will receive the new drug for the trial?	
		(2) (5 marks)
(a)	A supermarket would like to find out how much money their customers spend on average per week. On average, they have 12,000 customers per week. They decide to ask a sample of 1500 customers as they enter the store, chosen using a systematic sampling technique. Calculate the interval to select each data entry for the research.	
(b)	What are the disadvantages of using this type of sampling technique with customers entering the store?	(1)
		(1) (2 marks)



## Types of Sampling - Exam Questions

3) (a) A private golf club would like to find out how many times their members play golf per week. The club has three types of memberships: Bronze, Silver, and Gold. They decide to take a stratified sample of 500 members proportional to their type of membership.

	Bronze	Silver	Gold
Frequency	440	612	348

How many members will be chosen from each type of membership?

(5)

(b) The members are selected using a systematic sample within each category. Calculate the interval for the sample for the Bronze membership category.

(1) (6 marks)

7

4)



## Types of Sampling - Exam Questions

A flower shop sold 325 bouquets of flowers for Valentine's Day. They take a sample of their customers, stratified by the feature flowers in their bouquets. The table below shows some of the information about the sample.

	Roses	Lilies	Carnations	Total
Number Sold	200			325
Number in Sample	8	4		

(a) Complete the table.

.....(5)

(b) Will the sample give an accurate representation of the population? Explain your answer.

	•	•	•	•	•	•	•	•	•	•
(2)										
marks)		7	ľ	(						



	Question					Answer			
	Skill Questions								
Group A	Calculate the nu	alculate the number of members in each sample.							
	<b>1)</b> The table sho sixth form at a so	ows the numbe	er of st	udents	attending the	<b>1)</b> 60			
			Y12	Y13					
		Male							
		Female	80	50					
	By taking a strat many students ir	ified sample or In the sample v	f 175 s vould k	s, calculate how e in Year 12.	<b>a</b> ) ar				
	sixth form at a so	ws the numbe chool:	rorsu	udents	attending the	<b>2)</b> 25			
			Y12	Y13					
		Male	120						
		Female	80						
	By taking a strat many students ir <b>3)</b> The table sho	ified sample o n the sample v ws the numbe	f 175 s vould k er of stu	tudent be Fem udents	s, calculate how ale in Year 13. attending the	<b>3)</b> 110			
	sixth form at a so	chool:							
			Y12	Y13					
		Male	120	100					
		Female	80	50					
	By taking a strat many students ir	ified sample o n the sample v	f 175 s vould k	tudent be Male	s, calculate how e.				
	<b>4)</b> The table sho sixth form at a se	<b>4)</b> The table shows the number of students attending the sixth form at a school:							
		Male	200	180					
		Female	170	150					
	By taking a strat many students ir	ified sample o n the sample v	f 140 s vould k	tudent be Fem	s, calculate how ale.				







Group A	9) The table shows the number of students attending the sixth							9)		
contd	form at a school:				<b>`</b>		24	23		
			Y12	Y13			27	24		
		Male	122	113			<u> </u>		J	
		Female	135	118						
	By taking a stratifi many students in t	By taking a stratified sample of 20% of students, calculate how many students in the sample would be in each category.								
	10) The table show	1	0)							
	form at a school:		85	78	ך					
			Y12	Y13			69	БО		
		Male	250	230			68	58	J	
		Female	200	170						
	By taking a stratified sample of 34% of students, calculate how many students in the sample would be in each category.									
	<b>11)</b> The table shows the number of students in the <b>sample</b> selected that attend the sixth form at a school:							150	ו	
			Y12	Y13			200	150	-	
		Male	80	60			225	200	J	
		Female	90	80						
	If there are 775 people in the population, calculate how many students are in each category in the population.									
	<b>12)</b> The table show selected that atter	ws the number nd the sixth for	<sup>.</sup> of stu m at a	dents i school	in the <b>sample</b> l:	1	<b>2)</b> 141	5		
			Y12	Y13						
		Male	162	155						
		Female	140	143						
	If there are 3000 p female students th									







Group B	7) Calculate the n	<b>7)</b> 38								
contd			Frequency							
		Initial Sample Size	83	]						
		Second Sample Size	76							
		Population size	166	]						
	8) Calculate the n	<b>8)</b> Calculate the number of marked items in the second sample:								
			Frequency							
		Initial Sample Size	1100							
		Second Sample Size	1500							
		Population size	275000	J						
	9) Calculate the n	<b>9)</b> 8 (0 <i>dp</i> )								
			Frequency							
		Second Sample Size	64							
		Number recaptured (marked)	16							
		Population size	33	J						
	<b>10)</b> Calculate the	<b>10)</b> 54								
			Frequency	]						
		Second Sample Size	160							
		Number recaptured (marked)	32							
		Population size	270	J						
	<b>11)</b> Calculate the	<b>11)</b> 928								
			Frequency							
		Second Sample Size	1648							
		Number recaptured (marked)	824							
		Population size	1856	J						
	<b>12)</b> Calculate the r	<b>12)</b> 301								
			Frequency	]						
		Second Sample Size	3432							
		Number recaptured (marked)	264							
		Population size	3913	J						





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Group C	6)	Population Size	420	6)	Pop Size	420
contd		Sample Size		1	Sample Size	20
		Interval	21	1	Interval	21
		Term 1	16	]	Term 1	16
		Next 4 Terms		]	Next 4 Terms	37, 58, 79, 100
	7)	Population Size		7)	Pop Size	300
		Sample Size	50		Sample Size	50
		Interval	6		Interval	6
		Term 1	5		Term 1	5
		Next 4 Terms			Next 4 Terms	11, 17, 23, 29
	8)	Population Size		8)	Pop Size	140
		Sample Size	10	1	Sample Size	10
		Interval	14	1	Interval	14
		Term 1	4		Term 1	4
		Next 4 Terms		J	Next 4 Terms	18, 32, 46, 60
	9)	Population Size		9)	Pop Size	3200
		Sample Size	200	1	Sample Size	200
		Interval	16	1	Interval	16
		Term 1	10	]	Term 1	10
		Next 4 Terms		]	Next 4 Terms	26, 42, 58, 74
	10)	Population Size	500	10)	Pop Size	500
		Sample Size			Sample Size	50
		Interval			Interval	10
		Term 1			Term 1	6
		Next 4 Terms	16, 26, 36, 46		Next A Terms	16 26 36 46



11)	Population Size		11)	Population Size	250
	Sample Size	42		Sample Size	42
	Interval			Interval	6
	Term 1			Term 1	4
	Next 4 Terms 10, 16			Next 4 Terms	10, 16, 22, 28
12)	Population Size		12)	Pop Size	72000
	Sample Size	200		Sample Size	200
	Interval			Interval	360
	Term 1			Term 1	127
	Next 4 Terms	487, 847, 1207, 1567		Next 4 Terms	487, 847,
	12)	Sample Size Interval Term 1 Next 4 Terms 12) Population Size Sample Size Interval Term 1 Next 4 Terms	Sample Size 42 Interval Term 1 Next 4 Terms 10, 16, 22, 28 12) Population Size Sample Size 200 Interval Term 1 Next 4 Terms 487, 847, 1207, 1567	Sample Size42Interval1Term 11Next 4 Terms10, 16, 22, 2812)Population SizeSample Size200Interval1Term 11Next 4 Terms487, 847, 1207, 1567	Sample Size42IntervalIntervalTerm 1Term 1Next 4 Terms10, 16, 22, 2812)Population SizeSample Size200IntervalIntervalIntervalIntervalTerm 1Next 4 TermsNext 4 Terms487, 847, 1207, 1567



	Question	Question         pplied Questions         elow is a table showing the number of stude         each year group at the high school:         Year Group       7       8       9       10       3         Number of students       224       250       248       198       2         Image: Provide the students of students       224       250       248       198       2         Image: Provide the students       248       198       2       200       200       200       200         Image: Provide the students       200       248       198       2       200				A	nswer
	Applied Question	6					
1)	Below is a table sh in each year group	nowing the r at the high	numbe school	r of stı .:	udents		
	Year Group	7 8	9	10	11		
	Number of students	224 250	248	198	205		
	<b>a)</b> For a stratified students, how will be in Year	sample con many stude 9?	nple	a)	Population = 1125 Year 9 = 200 $\times \frac{248}{1125} = 44$		
	<b>b)</b> Which year gro number of stuc of the sample s	up will have ents in the s ize?	e the lo sample	owest e, rega	rdless	b)	Year 10
2)	Greg is carrying out a customer service study for his gym. He has a list of all 540 members and would like to sample 60 people.						
	<ul> <li>a) Describe how Greg could use a random sampling technique to obtain his sample.</li> </ul>					a)	Give each member in the list a unique reference number. Use a random number generator to generate the sample of 60 people
	b) Describe how Greg could use a systematic sampling technique to obtain his sample.						Give each member in the list a unique reference number. Interval = $540 \div 60 = 9$ . Select the first term at random from 1-9. Select the remaining 59 people with the interval of 9 between them.



3)	Tayli in hi and then capt expe whic capt	or would like t s formicarium. marks ants with back into the ure 78 ants in eriment 2 days th 17 had the l ure.	o find out ho He sets up a th UV paint b colony. He n sample 1. He later. He cau JV paint from	w many ants a trap that coll pefore releasin nanages to e repeated the ight 83 ants, c n the previous	are ects ig of		
	a) Estimate the total number of ants in the colony.						$N = \frac{MT}{R} = \frac{78 \times 83}{17} = 380.8$ 381 ants (0 <i>dp</i> )
	<b>b)</b> What is the advantage of having an enclosure when estimating population size?						Closed population will not have migration changes
4)	Belo atter	w is a table sh nding a science	nowing the nu e fair	umber of peop	ole		
		Adulta	Male	Female			
		Children	2540	2638			
	a)	Determine the category for a people.	number of postratified sam	eople in each		a)	Population = 7662 × $\frac{450}{7662}$ 72 74 149 155
	<b>b)</b> ⊢ s	low many adu ample contain	lts would be ing 165 peop	part of a strat le?	ified	b)	Adults = 2484 $\frac{2484}{7662} \times 165 = 53 \ (0dp)$



# Types of Sampling - Mark Scheme

		Question			An	swer	
		Exam Questic	ons				
1)	(a)	A pharmaceutical company is testing a new drug. 1000 people are participating in the clinical trials. 350 people will receive a placebo proportional to the population.				Adults over $50 = 226$ $\frac{226}{1000} \times 350 = 79.1$	(1) (1)
		Age ( $x$ years)	ears) Male Female			79 adults over 50.	(1)
		$18 \le x < 30$ 225     253 $20 \le x \le 50$ 162     124					
		$30 \le x < 50$ 162     134 $x \ge 50$ 121     105		134			
		How many adul placebo?	ts over 50 years	s old receive the			
	(b)	How many fema old will receive	ales between 18 the new drug fo	3 and 30 years or the trial?	(b)	$\frac{253}{1000} \times 350 = 88.55$ 89 females	(1) (1)
2)	(a)	A supermarket with much money the per week. On av- customers per with sample of 1500 store, chosen us technique. Calcu- data entry for the	would like to fin eir customers sp verage, they hav veek. They decid customers as the ing a systematic ulate the interva- ie research.	nd out how bend on average re 12, 000 de to ask a hey enter the c sampling al to select each	(a)	$\frac{12000}{1500} = 8$	(1)
	(b)	What are the dis of sampling tech the store?	sadvantages of u	using this type tomers entering	(b)	People may not want to participate in the study and so values may be empty.	(1)



# Types of Sampling - Mark Scheme

3) (a) A private golf club would like to find out how many times their members play golf per week. The club has three types of memberships: Bronze, Silver, and Gold. They decide to take a stratified sample of 500 members proportional to their type of membership.(a) Population = 1400(1) $1000 = \frac{5}{14} = 0.357$ (1) $1000 = \frac{5}{14} = 157$ (1) $1000 = \frac{5}{14} = 219$ (1) $1000 = \frac{5}{14} = 124$ (1) $1000 = \frac{1000}{100} = \frac{1000}{$														
many times their members play golf per weck. The club has three types of members proportional to their type of membership. $\frac{500}{1400} = \frac{5}{14} = 0.357$ (1)Momenter type of memberships. $1400 = 1500$ members proportional to their type of membership.Momenter type of membership.Momenter type of membership. $1400 \times \frac{5}{14} = 157$ Momenter type of membership? $1400 \times \frac{5}{14} = 124$ Momenter type of membership? $124 \times \frac{5}{14} = 124$ (1) $348 \times \frac{5}{14} = 124$ (1) $349 \times \frac{5}{157} = 2.8$ (1) $320 \times 100 \times 100 \times 25 \times 325$ $8 \times 1 \times 13$ $320 \times 100 \times 100 \times 25 \times 325$ $8 \times 1 \times 12$	3)	<b>(a)</b>	A private golf club would like to find out how						Population = 1400					(1)
The club has three types of memberships: Bronze, Silver, and Gold. They decide to take a stratified sample of 500 members proportional to their type of membership. $\boxed{Prequency 440 612 348}$ How many members will be chosen from each type of membership? (1) $\boxed{Prequency 440 612 348}$ How many members will be chosen from each type of membership? (1) $\boxed{Prequency 440 612 348}$ How many members are selected using a systematic sample within each category. Calculate the interval for the sample for the Bronze membership category. (4) (a) A flower shop sold 325 bouquets of flowers for Valentine's Day. They take a sample of their eustomers, stratified by the feature flowers in their bouquets. The table below shows some of the information about the sample. $\boxed{Prequency 440 612 348}$ (b) $\frac{440}{157} = 2.8$ (c) (a) $200 100 25 325$ (b) $\frac{440}{157} = 2.8$ (c) (c) $\frac{200}{8} = 25$ (c) $\frac{200}{8} = 25$ (c) $\frac{25 \div 25 = 1 \text{ Carnations in sample}}{25 \div 25 = 1 \text{ Carnation in sample}}$ (c) $\frac{10}{8} + 4 + 1 = 13 \text{ Total in sample}}$ (d) $\frac{10}{10} \text{ The sample give an accurate representation}}{10 \text{ of the population? Explain your answer.}}$ (b) No $\frac{10}{10} \text{ The sample is too small.}$ (c)			many times their members play golf per week.							500 5				
Bronze, Silver, and Gold. They decide to take a stratified sample of 500 members proportional to their type of membership. $ \begin{array}{c c c c c c c c c c c c c c c c c c c $			The club has three types of memberships:						1	$\frac{300}{1400} = \frac{3}{14} = 0.357$				
stratified sample of 500 members proportional to their type of membership. Bronze       Silver       Gold         Frequency       440       612       348         How many members will be chosen from each type of membership? $612 \times \frac{5}{14} = 219$ (1)         B       S       G $157$ $219$ $124$ (b)       The members are selected using a systematic sample within each category. Calculate the interval for the sample for the Bronze membership category.       (b) $\frac{440}{157} = 2.8$ (1)         4)       (a)       A flower shop sold 325 bouquets of flowers for Valentine's Day. They take a sample of their customers, stratified by the feature flowers in their bouquets. The table below shows some of the information about the sample.       (a) $200$ $100$ $25$ $325$ Number in somple.       Reses       Lilies       Carnations       Total $325$ (1)         Complete the table $a$ <			Bronze, Silver, and Gold. They decide to take a											
to their type of membership. $ \begin{array}{c c c c c c c c c c c c c c c c c c c $			stratified sample of 500 members proportional						4	$440 \times \frac{5}{14} = 157$				
BronzeSilverGoldFrequency440612348How many members will be chosen from each type of membership? $348 \times \frac{5}{14} = 124$ (1)BSG157219124(b)The members are selected using a systematic sample within each category. Calculate the interval for the sample for the Bronze membership category.(b) $\frac{440}{157} = 2.8$ (1)4)(a)A flower shop sold 325 bouquets of flowers for Valentine's Day. They take a sample of their customers, stratified by the feature flowers in their bouquets. The table below shows some of the information about the sample.(a) $200$ $100$ $25$ $325$ (1) $\frac{200}{8} = 25$ (1) $\frac{1000}{100} = 25$ Carnations $100$ $25 + 25 = 100$ Lilies $325 - (200 + 100) = 25$ Carnations $25 \div 25 = 1$ Carnation in sample $8 + 4 + 1 = 13$ Total in sample(1)(b)Will the sample give an accurate representation of the population? Explain your answer.(b)No The sample is too small.(1)			to their type of membership.											
Frequency440612348How many members will be chosen from each type of membership? $348 \times \frac{5}{14} = 124$ (1) <b>BSG</b> (b)The members are selected using a systematic sample within each category. Calculate the interval for the sample for the Bronze membership category.(b) $\frac{440}{157} = 2.8$ (1)(4)(a)A flower shop sold 325 bouquets of flowers for Valentine's Day. They take a sample of their customers, stratified by the feature flowers in their bouquets. The table below shows some of the information about the sample.(a) $200$ $8 = 25$ (1) $\frac{100}{100}$ $25$ $325$ (1) $\frac{200}{8}$ $225$ (1) $\frac{100}{100}$ $25$ $325$ (1) $\frac{200}{100}$ $25$ $325$ (1) $\frac{200}{8}$ $25$ (1) $325 - (200 + 100) = 25$ Carnations(1) $25 \div 25 = 1$ Carnation in sample(1)(b)Will the sample give an accurate representation of the population? Explain your answer.(b)No The sample is too small.(1)			Bronze Silver Gold						6	$612 \times \frac{5}{14} = 219$				
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