

Types of Sampling - Worksheet

Skill

Group A - Stratified sampling

Calculate the number of members in each sample:

1) 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.

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 Female in Year 13.

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.

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.

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.

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.

Types of Sampling - Worksheet

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.

Types of Sampling - Worksheet

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Types of Sampling - Worksheet

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)

Population Size	1000
Sample Size	100
Interval	
Term 1	7
Next 4 Terms	

2)

Population Size	1600
Sample Size	80
Interval	
Term 1	11
Next 4 Terms	

3)

Population Size	504
Sample Size	42
Interval	
Term 1	2
Next 4 Terms	

4)

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)

Population Size	
Sample Size	50
Interval	6
Term 1	5
Next 4 Terms	

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)

Population Size	
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

Types of Sampling - Worksheet

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 450 people.
- (b) How many adults would be part of a stratified sample containing 165 people?

Types of Sampling - Exam Questions

- 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.

Age (x years)	Male	Female
$18 \leq x < 30$	225	253
$30 \leq x < 50$	162	134
$x \geq 50$	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)

- 2) (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.

.....
(1)

- (b) What are the disadvantages of using this type of sampling technique with customers entering the store?

.....
(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)

Types of Sampling - Exam Questions

- 4) 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)
(7 marks)

Types of Sampling - Answers

	Question	Answer																																				
	Skill Questions																																					
Group A	Calculate the number of members in each sample. 1) The table shows the number of students attending the sixth form at a school: <table border="1"> <tr> <th></th><th>Y12</th><th>Y13</th></tr> <tr> <td>Male</td><td>120</td><td>100</td></tr> <tr> <td>Female</td><td>80</td><td>50</td></tr> </table> By taking a stratified sample of 175 students, calculate how many students in the sample would be Male in Year 12. 2) The table shows the number of students attending the sixth form at a school: <table border="1"> <tr> <th></th><th>Y12</th><th>Y13</th></tr> <tr> <td>Male</td><td>120</td><td>100</td></tr> <tr> <td>Female</td><td>80</td><td>50</td></tr> </table> By taking a stratified sample of 175 students, calculate how many students in the sample would be Female in Year 13. 3) The table shows the number of students attending the sixth form at a school: <table border="1"> <tr> <th></th><th>Y12</th><th>Y13</th></tr> <tr> <td>Male</td><td>120</td><td>100</td></tr> <tr> <td>Female</td><td>80</td><td>50</td></tr> </table> By taking a stratified sample of 175 students, calculate how many students in the sample would be Male. 4) The table shows the number of students attending the sixth form at a school: <table border="1"> <tr> <th></th><th>Y12</th><th>Y13</th></tr> <tr> <td>Male</td><td>200</td><td>180</td></tr> <tr> <td>Female</td><td>170</td><td>150</td></tr> </table> 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		Y12	Y13	Male	120	100	Female	80	50		Y12	Y13	Male	120	100	Female	80	50		Y12	Y13	Male	200	180	Female	170	150	1) 60 2) 25 3) 110 4) 64
	Y12	Y13																																				
Male	120	100																																				
Female	80	50																																				
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Male	120	100																																				
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	Y12	Y13																																				
Male	200	180																																				
Female	170	150																																				

Types of Sampling - Answers

Group A
contd

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.

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.

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.

5) 148

6)

30	29
33	30

7) 75

8)

3	2
3	2

Types of Sampling - Answers

Group A
contd

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.

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.

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.

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.

9)

24	23
27	24

10)

85	78
68	58

11)

200	150
225	200

12) 1415

Types of Sampling - Answers

Group B

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

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

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

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

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

4) Estimate the population size given the following set of data:

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

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

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

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

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

1) 300

2) 153

3) 750

4) 2213 (0dp)

5) 48

6) 16

Types of Sampling - Answers

Group B
contd

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

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

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

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

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

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

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

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

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

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

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

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

7) 38

8) 6

9) 8 (0dp)

10) 54

11) 928

12) 301

Types of Sampling - Answers

Group C

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

1)

Population Size	1000
Sample Size	100
Interval	
Term 1	7
Next 4 Terms	

2)

Population Size	1600
Sample Size	80
Interval	
Term 1	11
Next 4 Terms	

3)

Population Size	504
Sample Size	42
Interval	
Term 1	2
Next 4 Terms	

4)

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	

1)

Pop Size	1000
Sample Size	100
Interval	10
Term 1	7
Next 4 Terms	17, 27, 37, 47

2)

Pop Size	1600
Sample Size	80
Interval	20
Term 1	11
Next 4 Terms	31, 51, 71, 91

3)

Pop Size	504
Sample Size	42
Interval	12
Term 1	2
Next 4 Terms	14, 26, 38, 50

4)

Pop Size	200
Sample Size	8
Interval	25
Term 1	22
Next 4 Terms	47, 72, 97, 122

5)

Pop Size	824
Sample Size	103
Interval	8
Term 1	3
Next 4 Terms	11, 19, 27, 35

Types of Sampling - Answers

Group C
contd

6)

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

7)

Population Size	
Sample Size	50
Interval	6
Term 1	5
Next 4 Terms	

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

6)

Pop Size	420
Sample Size	20
Interval	21
Term 1	16
Next 4 Terms	37, 58, 79, 100

7)

Pop Size	300
Sample Size	50
Interval	6
Term 1	5
Next 4 Terms	11, 17, 23, 29

8)

Pop Size	140
Sample Size	10
Interval	14
Term 1	4
Next 4 Terms	18, 32, 46, 60

9)

Pop Size	3200
Sample Size	200
Interval	16
Term 1	10
Next 4 Terms	26, 42, 58, 74

10)

Pop Size	500
Sample Size	50
Interval	10
Term 1	6
Next 4 Terms	16, 26, 36, 46

Types of Sampling - Answers

Group C
contd

11)

Population Size	
Sample Size	42
Interval	
Term 1	
Next 4 Terms	10, 16, 22, 28

11)

Population Size	250
Sample Size	42
Interval	6
Term 1	4
Next 4 Terms	10, 16, 22, 28

12)

Population Size	
Sample Size	200
Interval	
Term 1	
Next 4 Terms	487, 847, 1207, 1567

12)

Pop Size	72000
Sample Size	200
Interval	360
Term 1	127
Next 4 Terms	487, 847, 1207, 1567

Types of Sampling - Answers

	Question	Answer												
	Applied Questions													
1)	Below is a table showing the number of students in each year group at the high school: <table><tr><td>Year Group</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td></tr><tr><td>Number of students</td><td>224</td><td>250</td><td>248</td><td>198</td><td>205</td></tr></table> a) For 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?	Year Group	7	8	9	10	11	Number of students	224	250	248	198	205	a) Population = 1125 Year 9 = $200 \times \frac{248}{1125} = 44$ b) Year 10
Year Group	7	8	9	10	11									
Number of students	224	250	248	198	205									
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.	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.	b) 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.												

Types of Sampling - Answers

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?	a) $N = \frac{MT}{R} = \frac{78 \times 83}{17} = 380.8$ 381 ants (0dp) b) Closed population will not have migration changes													
4)	Below is a table showing the number of people attending a science fair <table><tr><td></td><td>Male</td><td>Female</td></tr><tr><td>Adults</td><td>1224</td><td>1260</td></tr><tr><td>Children</td><td>2540</td><td>2638</td></tr></table> a) Determine the number of people in each category for a stratified sample of 450 people. b) How many adults would be part of a stratified sample containing 165 people?		Male	Female	Adults	1224	1260	Children	2540	2638	a) Population = 7662 $\dots \times \frac{450}{7662}$ <table><tr><td>72</td><td>74</td></tr><tr><td>149</td><td>155</td></tr></table> b) Adults = 2484 $\frac{2484}{7662} \times 165 = 53$ (0dp)	72	74	149	155
	Male	Female													
Adults	1224	1260													
Children	2540	2638													
72	74														
149	155														

Types of Sampling - Mark Scheme

	Question	Answer												
	Exam Questions													
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. <table border="1"> <thead> <tr> <th>Age (x years)</th><th>Male</th><th>Female</th></tr> </thead> <tbody> <tr> <td>$18 \leq x < 30$</td><td>225</td><td>253</td></tr> <tr> <td>$30 \leq x < 50$</td><td>162</td><td>134</td></tr> <tr> <td>$x \geq 50$</td><td>121</td><td>105</td></tr> </tbody> </table> How many adults over 50 years old receive the placebo?	Age (x years)	Male	Female	$18 \leq x < 30$	225	253	$30 \leq x < 50$	162	134	$x \geq 50$	121	105	(a) Adults over 50 = 226 $\frac{226}{1000} \times 350 = 79.1$ 79 adults over 50.
Age (x years)	Male	Female												
$18 \leq x < 30$	225	253												
$30 \leq x < 50$	162	134												
$x \geq 50$	121	105												
(b)	How many females between 18 and 30 years old will receive the new drug for the trial?	(b) $\frac{253}{1000} \times 350 = 88.55$ 89 females												
2) (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.	(a) $\frac{12000}{1500} = 8$												
(b)	What are the disadvantages of using this type of sampling technique with customers entering the store?	(b) People may not want to participate in the study and so values may be empty.												

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. <table><tr><td></td><td>Bronze</td><td>Silver</td><td>Gold</td></tr><tr><td>Frequency</td><td>440</td><td>612</td><td>348</td></tr></table> How many members will be chosen from each type of membership?		Bronze	Silver	Gold	Frequency	440	612	348	(a)	Population = 1400 $\frac{500}{1400} = \frac{5}{14} = 0.357...$ $440 \times \frac{5}{14} = 157$ $612 \times \frac{5}{14} = 219$ $348 \times \frac{5}{14} = 124$ <table><tr><td>B</td><td>S</td><td>G</td></tr><tr><td>157</td><td>219</td><td>124</td></tr></table>	B	S	G	157	219	124	(1) (1) (1) (1) (1)									
	Bronze	Silver	Gold																								
Frequency	440	612	348																								
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. <table><tr><td></td><td>Roses</td><td>Lilies</td><td>Carnations</td><td>Total</td></tr><tr><td>Number Sold</td><td>200</td><td></td><td></td><td>325</td></tr><tr><td>Number in Sample</td><td>8</td><td>4</td><td></td><td></td></tr></table> Complete the table		Roses	Lilies	Carnations	Total	Number Sold	200			325	Number in Sample	8	4			(a)	<table><tr><td>200</td><td>100</td><td>25</td><td>325</td></tr><tr><td>8</td><td>4</td><td>1</td><td>13</td></tr></table> $\frac{200}{8} = 25$ $4 \times 25 = 100 \text{ Lilies}$ $325 - (200 + 100) = 25 \text{ Carnations}$ $25 \div 25 = 1 \text{ Carnation in sample}$ $8 + 4 + 1 = 13 \text{ Total in sample}$	200	100	25	325	8	4	1	13	(1) (1) (1) (1) (1)
	Roses	Lilies	Carnations	Total																							
Number Sold	200			325																							
Number in Sample	8	4																									
200	100	25	325																								
8	4	1	13																								
(b)	Will the sample give an accurate representation of the population? Explain your answer.	(b)	No The sample is too small.	(1) (1)																							

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