SAMPLING METHODS

SAMPLING METHODS. ADVANTAGES AND DISADVANTAGES OF SAMPLING METHODS.

MARK SCHEME

Q1. AtoZrevision.com

Any sensible problem with small sample size. e.g. may not be representative may be biased results may not be reliable results may not be accurate	B1	(1)
Cluster	B1	
Stratified	B1	(2)
Method 2 is…. • More representative • Random/allows all members of population equal chance of selection • Not/less biased • More reliable	B2	(2)
At least 3 quantitative response boxes which 1) do not overlap 2) are exhaustive 3) include units	B2	(2) **[8]**

Notes

'No one has done the survey before' B1
'The data required is specific to his investigation' B1
'It's more reliable/accurate/up to date' B0

Any one problem identified (ignore extraneous non-contradictory responses)

B2 for any 2 reasons
(B1 for any one reason)

Just repeating wording in method 2 on its own is B0
e.g. selecting residents in proportion B0

Must have at least 3 response boxes
B2 for all 3 criteria
(B1 for at least 1 criteria)
Condone a useable table for response boxes

Note: For exhaustive allow
e.g. 0 – 1, 2 – 3, 4+
Allow correct use of inequalities

Will be more <u>representative</u>, or will have correct <u>proportions</u> of each house size.	B1 (1)
$\frac{140}{1200} \times 60$	B1
Randomly	B1 (2) **[4]**

Notes

Allow equivalent statements. Condone 'fairer', BUT 'better' /'more reliable' /'more accurate' alone are B0 Allow equivalent calculation. e.g. $1200 \div 60 = 20$ <u>and</u> $140 \div 20$ $(= 7)$ <u>or</u> any rearrangement of $\frac{140}{1200} = \frac{7}{60}$ Note: allow 0.11(666…) for 140/1200 and 8.5(714…) for 1200/140 ***Answer 7 is given**. Any attempt to describe a method must use the word **random** or **randomly**.	

e.g. type of book may affect length of loan OR so each book type is fairly represented	B1
$\frac{8000}{43000} \times 60$ (= 11.16...)	M1
= 11 cao	A1 (3)
Use **random** numbers (ignoring any repeats/out of range)	B1
Select corresponding book (from numbered sampling frame)	B1
Repeat sampling for each stratum	B1 (3) [10]

Accept equivalent reasons that recognise either:

- that loan length may vary with book type/section, OR
- the **different numbers** … of each type / in each section

cao Final answer must be an integer.

1st B1 for any mention of 'random', eg RAN# on calculator, random sample, etc
2nd B1: clear matching of number to **book**
3rd B1: for indicating that a separate sample is needed for each book type/stratum
(e.g. by describing a number to select from **each** stratum)
Note use of 'hats' can score max B0B0B1. Sampling **people** can score max B1B0B0.
Description of simple random or selective sampling scores max 2/3

SC: If no marks scored award B1 for ...
numbering books OR ignoring repeats OR ignoring numbers out of range.

	5ST1H_01 Scheme	**Marks**
***(a)** **(b)(i)** **(ii)**	Students numbered - either of: • **number** the students OR use a **list/database/register** of students Selection: Matching: • Use student corresponding to number selectedFor any relevant statistical problem about the sample selection Stratified (sampling) $^{240}/_{1200} \times 40$ = **8**	 B1 B1 B1 B1 (4) B1 M1A1 cao (3) **[8]**
	Notes	
(a) **(b)(ii)**	*For QWC: 1st B1 and 2nd B1 use of words in bold (oe) required *1st B1 for **number/list/data base/register/sampling frame/spreadsheet** *2nd B1 for use of a suitable **random number generator** e.g. **random number table**, **calculator**, **computer** oe (B0 for put the names/numbers in a hat) 3rd B1 for matching number to student. 4th B1 e.g. 'do not use repeats' 'discard numbers out of range' 'may be difficult to obtain a register of all 1200 students' 'register of students may not be up-to-date' 'students may be absent/may refuse to participate,' etc. M1 for any equivalent method A1 cao	

Q5. AtoZrevision.com

Sample is (any two from): • Quicker • Cheaper / uses less resources • Easier (to do / to calculate ... etc) • Less data to handle	B1B1 (2)
All people/items have same/equal chance of selection	B1 (1)

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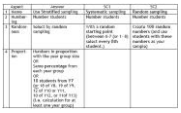
		Working	Answer	Mark	Notes
	(a) (b) (c)		Any two of: • It is quick to do. • It is easier to do. • It is cheap to do. • It is convenient • There is less data **A list/register/database of the students** (at the university) OR A register of the university Stratified It helps to check whether the effects felt is due to **cocoa** or is **psychological** oe. OR Comparing a group having cocoa with one not having **cocoa** (the control group) helps to assess the effect of having **cocoa**.	2 1 1 1	B0 if written as a question B1 B1 Accept equivalent statements. Accept the opposites if the word census is included. e.g. A census is slower. May get two reasons in one comment. B1 Any equivalent answer accepted. Note: Do not give this mark if it refers to the sample. e.g. A list of the students in the sample B0 B1 B1 Equivalent answers that suggest comparing a group with and without cocoa makes assessment easier is acceptable Allows you to compare genders is B0

	5ST1F_01 Mark Scheme	**Marks**
	One mark for each of three aspects: **1.** Number all the boys/pupils (from 0 to 159) or put all names on piece of paper, oe **2.** EITHER: Generate **eight random numbers** OR: draw out **eight** numbers/names from a hat, oe **3.** Boys/pupils (with the) drawn (numbers) are selected for sample.	B1 B1 B1 **[3]**
	Notes	
	If describing a method other than simple random, then score 0/3 **e.g. mention of 'picking every 20th boy/pupil' is B0B0B0** **e.g. 'choosing the same number from each class/group' is B0B0B0**'words' in brackets not needed. For aspect **1**. allow use of a **numbered** list/**numbered** register For aspect **3**. Accept e.g. Boys drawn represent the school / boys with those numbers are used, etc. **NB**: 'eight boys are drawn from a hat' on its own scores B1 for aspect 2 (**but** without 'names put on paper' etc is B0 for aspect 1, and, without 'are used' etc is B0 for aspect 3).	

Q8. AtoZrevision.com

		Working	Answer	Mark	Notes
	*(a)	• Lots of data to handle OR harder/more work than a sample. • Difficult to be sure the whole population is used.  Note: Significance of wording in **bold** is shown in 5th B1 mark		5	B1 (aspect 2) Numbering B1 (aspect 3) Idea of randomness ('Words' in brackets not needed for this B1) B1 (aspect 4) Apply Special Cases SC1 & SC2 if not describing proportion/strata approach. B1 Work which uses the correct statistical 'wording' shown **in bold** (including that in brackets) **in any 3 aspects** for their method.

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	5ST1F_01 Mark Scheme	Marks
(a) (**b**)	Any two of: • A sample is quicker • A sample is easier • A sample is cheaper to do • A sample is convenient • A sample has less data to handleAny two of: • Not a good sample • Sample too small • Not everyone is in telephone directory • Sample not representative • Not everyone has a chance of being asked • Not random/Is biased	B1 B1 (2) B2 (2)

Q10. AtoZrevision.com

(a)	$\frac{90}{240} \times 40$ (=15)	B1	(1)
(b)	Number the (first year) students	B1	
	The (first year) students that correspond to the numbers in her list are selected for the sample, e.g use student number 47, 12, etc.	B1	
	Ignore the repeated numbers	B1	(3)

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)(i)	Sample **every** 100^{th} (firework from production line/list)	B1	
	Use a **random** starting point (between 1~100)	B1	
(ii)	Disadvantage:		
	Not random / not representative	B1	
	Period may coincide with same machine/worker	B1	(4)

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	Working	Answer	Mark	Notes
(a)		Any one of • It is biased • Only people with land lines will be included. • Not everyone has equal chance of being asked • The sample is not big enough • Only 10 towns are used PLUS It is not satisfactory/No Number all the names (from 0 to 9999 accept 1 to 10000)	2	B1 Note: Converses are acceptable. Simple reference to car performance B0 People not answering phone B0
(b)		Use random number generator/tables to generate 100 numbers The sample will be the (100) people that corresponds to the (100) numbers	3	B1 dependent on the first B. B1 for numbering – figures not required. B1 for generating 100 random numbers Note: Do not accept picking numbers out of a hat.
*(c)		Any 3 different well written comments that involve the consideration of time, cost, truthfulness and response rate. e.g. Not everyone will fill in the questionnaire. • Questionnaire could be less embarrassing • You are likely to get a response on face to face interview • Face to face offers the opportunity to explain questions/see peoples reactions. • Face to face is time consuming. • Using a questionnaire will be faster than face to face interviews. • People might not speak the truth • Face to face could be more expensive than a questionnaire. • The costs will be different.	3	B1 for explaining correspondence B1 B1 B1 Other satisfactory comments are possible Make sure that the same statement written twice in different format does not get credit twice. This is a QWC question so statistical expressions should be used if appropriate..

(a)	(Simple) random (sample)	B1 (1)
(b)*	QWC Use random numbers OR random number table/generator Plus any **two** points from: • Number the customers OR get a list o.e. (ignore incorrect numbers here) • Use the customers with corresponding numbers • Ignore repeats OR ignore numbers out of range	B1 B1B1 (3) **[4]**
	Notes	
(a)	B1 for 'random' but 'stratified random' is B0	
(b)	Allow equivalent wording. 1st B1 is for appropriate use of random numbers. 2nd/3rd B1B1 for any two from the three options (each point once only). Condone each point within description of stratified sampling (up to 3 marks) BUT if describing systematic sampling award maximum 2 marks out of 3 Names in hat method is 0/3	