STRATIFIED SAMPLING

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STRATIFIED SAMPLING. MIXED QUESTIONS WITH STRATIFIED SAMPLING.

MARK SCHEME

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

Notes

)	Allow equivalent statements. Condone 'fairer', BUT 'better' /'more reliable' /'more accurate' alone are B0
(i)	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**.
(ii)	Any attempt to describe a method must use the word **random** or **randomly**.

(i)	e.g. type of book may affect length of loan OR so each book type is fairly represented	B1
(ii)	$\frac{8000}{43000} \times 60$ (= 11.16...)	M1
	= 11 cao	A1
		(3)
(e)	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)

(d)(i)	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
(ii)	cao Final answer must be an integer.
*(e)	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) (c)(i) **(ii)**	Selection: • Use of a **random number generator**Matching: • Use student corresponding to number selected For any relevant statistical problem about the sample selection Stratified (sampling) $^{240}/_{1200}$ × 40 = **8**	 B1 B1 B1 B1 (4) B1 M1A1 cao (3)
	Notes	
(a) (b) **(c)(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	

Q4.

$\frac{90}{240}\times 40\ (=15)$	B1	(1)
$\frac{7}{15}\times 90 = 42$	M1 A1	(2) [6]

Q5.

	M1 for $\frac{93}{126+874+610+93+615+208}\times n = 14.5$ A1 for 394	M1 for setting up an appropriate equation or inequality to determine minimum total sample size. M1 implied by 393.(8…) or 407.(4…) Allow for working with 15 A1 394 cao	(2)

Q6.

	B2 It is not an appropriate way to stratify because you should not stratify by the variable you are investigating	B2 for decision of not appropriate with a correct assessment as to why it is not appropriate (B1 for decision of not appropriate with any reason)	**(2)**

Q7.

	M1 $\frac{930}{6200}\times 150$ A1 22 or 23	M1 for an equivalent calculation (may be implied by a correct answer or by 22.5)	**(2)**
	B2 eg 'Method 3 is most representative since it guarantees people from all ages are included in the sample'	B2 for Method 3 and correct supporting reason (B1 for Method 3 with incomplete reasoning)	**(2)**

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(a)	M1 $\frac{4479 \times 200}{9963}$ (=89.9126…) or 0.45×200 or $45\% \times 200$ oe A1 90	Accept a correct equivalent calculation. M1 implied by 89.9 Do not award M1 for e.g. 45% of 200 alone. A1 accept either 89 or 90	(2)
(b)	B1 e.g • When the investigation only relates to one gender e.g. pregnancy, all boys schools • When a comparison is being made between genders e.g. male heights compared to female heights • If gender is not recorded in the data	B1 for a correct explanation of a **statistical situation** when it would not be appropriate to take a sample stratified by gender. Accept responses that refer to only one gender being present in the sample. Do not accept when gender is not relevant to the investigation / when gender is relevant to the investigation unless accompanied by an example of a situation.	(1)
(c)	B1 Stratify by type of school/college. (Allow stratify by gender **and** by type of school/college).	Accept maintained/independent/other and overseas only if all three listed.	(1)

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	M1 for $\frac{28\,152}{4\,174\,527} \times 10\,000 = \ldots$ OR $\frac{4\,146\,375}{4\,174\,527} \times 10\,000 = .$ A1 for 67.43…⇒ 67 17 year olds OR 9932.5⇒ A1 for 9933 18 years and older AND 67 17 year olds B1 for take a random sample within the strata oe B1 for e.g. • Would be better if more age categories were used • Two ages categories are for very different sized groups • Better if categories were chosen that were closer in size/more representative of all ages • More appropriate to stratify by another category e.g gender	Do not award the final A mark if the final answers are not integers. Do not accept comments on unfair sizes of groups by ages/more likely to be chosen if over the age of 18.	**(5)**