AQA

A Level

A Level Mathematics

Sampling Techniques (Answers)

Name:

MME

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Total Marks:

1) You want to question 100 students on how they like the new *healthy+* vending machine in comparison to the old *vendo90*. You ask the first 100 students to enter the canteen.

   i) Name the sampling technique along with an advantage and disadvantage of using this technique.

This is opportunity sampling. [1 mark]

Advantage:

- efficient in time (and cost) [1 mark]

Disadvantage:

- Potential for a biased sample [1 mark]

   ii) Write a one question survey that could be used to provide an alternate hypothesis to:

   H_0: There is no difference in preference between *healthy+* and *vendo90*.

The alternative hypothesis here is there is a difference between healthy+ and vendo90. The question needs to along the lines of "using the scale 0 to 10 rank healthy+ and vendo90". [1 mark]

NO MARKS FOR: an answer that would be a word/sentence/string. These cannot be analysed using statistics easily. Questionnaires are covered at GCSE.

2) State an advantage and a disadvantage of:

   i) Random sampling
   ii) Stratified sampling

Sampling Type	Advantage	Disadvantage
Random	More reflective of overall population and eliminates bias. [1 mark]	Difficult to obtain a sufficient size sample. [1 mark]
Stratified	Sample strongly reflects the desired population. [1 mark]	Time consuming, takes a lot of preplanning and careful selection. [1 mark]

3)

On the diagram below select five squares to illustrate:

    i)   Random sampling, using the letter R

Any number of squares makes with the letter R. In a non-systematic pattern. However, if seemingly systematically marked, justification for random occurring in ANY order should be accepted. [1 mark]

    ii)   Opportunity sampling using the letter O

The first 5 squares, top row, left to right, should be marked with O. [1 mark]

Stratified sampling, using the letter S has been completed for you. The samples run from left to right with the first sample (#1) being shown in the top left and the last sample (#225) in the bottom right.
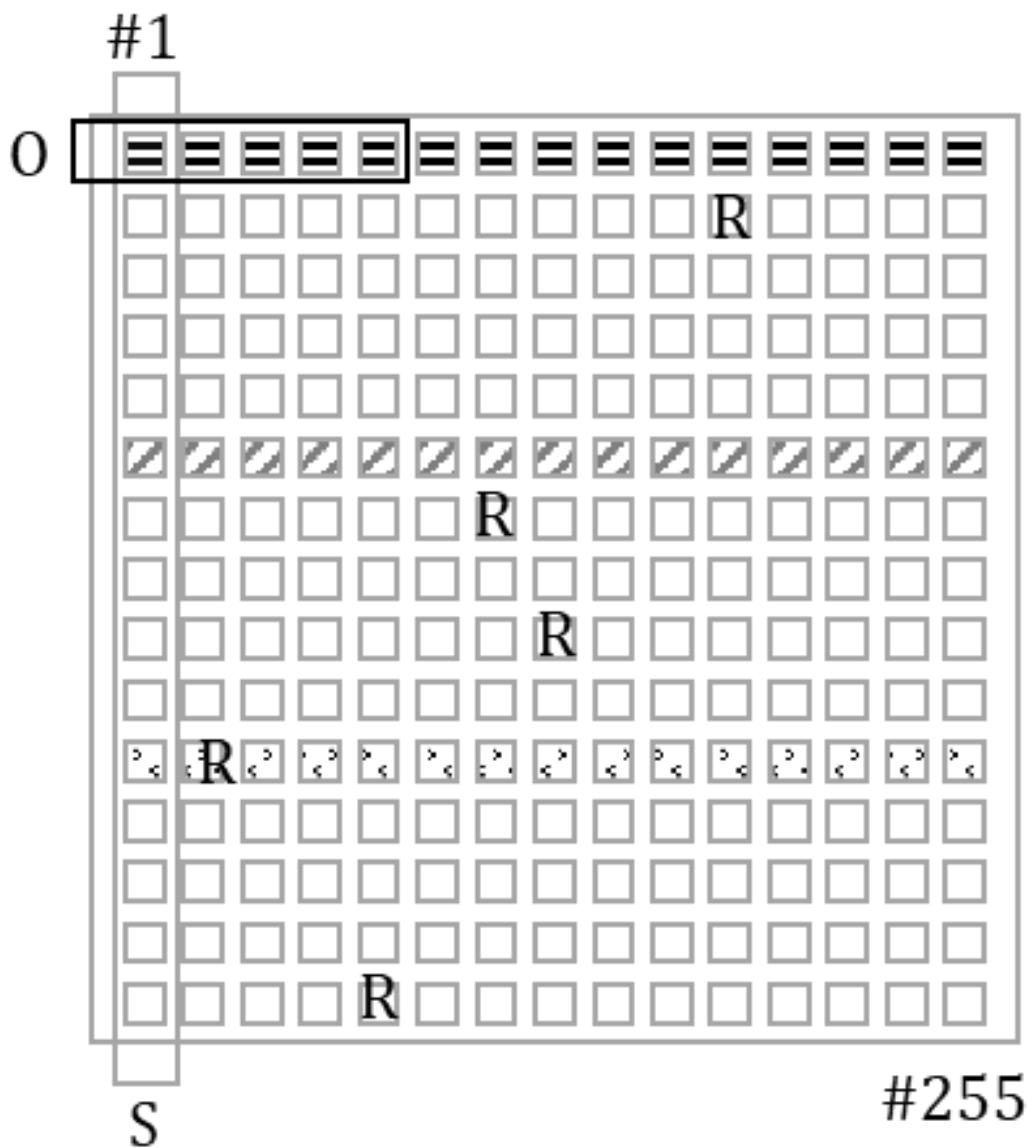
4)   Chocochocs are redesigning their family packet of *darkedence* bars. You need a sample of ten out of the twenty people. The order they give their response, the number of bars they

eat, and the number of people in their family (House size) are shown below.

Order	Bars Eaten	House Size	Order	Bars Eaten	House Size
1	0	1	11	0	2
2	2	3	12	3	3
3	0	3	13	4	4
4	4	1	14	10	5
5	1	2	15	2	1
6	2	2	16	4	4
7	3	4	17	6	3
8	2	2	18	4	4
9	1	1	16	4	6
10	2	3	20	2	5

Choose and justify a sampling method (random, opportunity or stratified) to recommend the new size of the family pack based on the average amount of *darkedence* bars consumed. You must state clearly:

    i)   **The mean, median, mode and range of *darkedence* bars consumed.**

Mean	Median	Mode	Range
2.8	2	2	10

[1 mark for each correct average]

Here, the mean is the number of bars eaten, we assume that family size is an individual reading. There is no requirement to do a *fx* column to obtain mean. This would result in a mean of 3.89, which is the number of bars consumed per person. Not the value we are looking for.

ii)   The sampling method used along with justification.

[1 mark]

Stratified sampling.

[1 mark]

This is the only method that allows us to choose adequately sized families. House size must be greater than two for a family packet. This must be inferred from text passage.

	Random Sampling		Opportunity Sampling		Stratified Mean	
	Darkedence	Family	*Darkedence*	Family	*Darkedence*	Family
Mean	2.3	2.8	1.7	2.2	4.1	4.1

[1 mark]

The means number of bars of *Darkedence* consumed and Family size is shown in the table above. Here, we see that the stratified sampling mean gives us a family size packet of four, for a family size of four.

[Full marks can be awarded for]

Any sufficiently justified use of statistic. i.e mode, median.

iii)   Your recommendation for the new size pack

[1 mark]

Four.

5)   Seventy-six young males actively seek out and participate in surveys for money. The surveys involve trialling a product then being interviewed by a market-researcher about the product. Sixty-five of the group, agreed the sauce was the best they had tasted that year. The company are pleased with the results and now run with the tagline:

"9/10 people say it's the tastiest sauce this year".

Write four points criticising any of the processes that led up producing the tagline.
[1 mark per point] [4 marks total]

- The sample is biased as it only contains males
- The sample is biased as it only contains young people
- The sample is biased towards those who receive payment for surveys, their honest opinion may be compromised
- The questioning is poor leading to: the interviewer being able to bias the respondent
- The questioning is poor leading to: the respondent not being able to give an

accurate answer i.e. it could be interpreted many ways

- 65/75 is 85.5%, which has been extrapolated to 9/10
- 75 people out of the population of sauce buyers is not a sample large enough to represent everyone
- 75 people is a size significant enough (despite all other issues) that could have any number of random errors, for whatever reason.