S06-test Sampling Methods: Test Pack

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 For each statement about sampling, write down whether it is True or False.

(i) A sample is a small part of a population, used to find out information about the whole population. **(1)**

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(ii) A random sample is one where every member of the population has an equal chance of being chosen. **(1)**

.....

(iii) A convenience sample, chosen because its members are easy to reach, always gives an unbiased picture of the whole population. **(1)**

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(iv) A census means collecting data from every single member of the population. **(1)**

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(Total for Question 1 is 4 marks)

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2 A sports centre with 2000 members wants to sample its members. Which of these is an example of systematic sampling?

- ☐ A) Choosing every member whose surname begins with the letter S
- ☐ B) Selecting the 30th member on the membership list, then every 30th member after that
- ☐ C) Asking members who happen to be at the gym on Monday morning
- ☐ D) Using a computer program to pick 50 completely random membership numbers

(Total for Question 2 is 1 mark)

3 A biologist divides a lake into 4 zones and chooses 2 zones at random, then records every fish caught within those 2 zones. Name this sampling method.

(Total for Question 3 is 1 mark)

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4 A council plans to survey residents of a town using names and addresses taken from the electoral register.

(a) State what is meant by a sampling frame. **(1)**

(b) Give one reason why the electoral register might not be a suitable sampling frame for finding the opinions of all town residents. **(2)**

(c) Explain how using a poor sampling frame could lead to bias in the survey's results. **(2)**

(Total for Question 4 is 5 marks)

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5 A researcher wants a sample of 20 men aged 30 to 40 and 20 women aged 30 to 40 from shoppers at a mall. She stops shoppers and interviews them until each group of 20 is filled. State the sampling method used, and give one reason it might introduce bias.

(Total for Question 5 is 2 marks)

6 A student wants to investigate whether Year 10 students (180 students) spend more time on homework each week than Year 11 students (160 students) at her school. She plans to take a stratified sample of 34 students across the two year groups.

(a) Plan: Give one reason why a stratified sample of both year groups is more appropriate than only surveying Year 10 students. **(1)**

(b) Collect: The student wants an overall sample of 34 students. Work out how many Year 10 students and how many Year 11 students should be in the sample. **(3)**

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(c) Show that these two sample sizes total 34. **(1)**

(d) Process: Describe how the student should choose which specific 18 Year 10 students to survey. **(1)**

(e) Interpret: The mean weekly homework time was 5.2 hours for the Year 10 sample and 6.8 hours for the Year 11 sample. Give one reason, other than a genuine difference between the year groups, why these means might differ. **(1)**

(Total for Question 6 is 7 marks)

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7 A factory produces 630 items per shift, numbered 1 to 630 in the order they are made. A quality controller uses systematic sampling to inspect 1 in every 30 items, with a random starting point between 1 and 30.

(a) Work out how many items will be inspected during one shift.

(b) Work out the probability that the random starting point is exactly 1.

(Total for Question 7 is 3 marks)

8 A gym has three types of membership: Standard (600 members), Premium (150 members) and Family (250 members), 1000 members in total. A stratified sample of 40 members is required.

(a) Work out how many Premium members should be sampled.

(b) Give one reason why stratified sampling is more appropriate than simple random sampling in this situation.

(Total for Question 8 is 3 marks)

Mark scheme · S06-test Sampling Methods: Test Pack

Question 1

- (i) **B1** True cao
- **(i) Answer: True**
- (ii) **B1** True cao
- **(ii) Answer: True**
- (iii) **B1** False cao
- **(iii) Answer: False**
- (iv) **B1** True cao
- **(iv) Answer: True**

Question 2

- **B1** B cao
- **Answer: B) Selecting the 30th member on the membership list, then every 30th member after that**

Question 3

- **B1** Cluster sampling cao
- **Answer: Cluster sampling**

Question 4

- (a) **B1** a list of all the members of the population from which a sample can be drawn, oe
- **(a) Answer: A sampling frame is a list of every member of the population that a sample can be selected from.**
- (b) **B1** identifies that the electoral register excludes people who are not registered to vote, oe
- (b) **B1** gives an example, e.g. residents under 18 or residents who have not registered, so these groups have no chance of being sampled, oe
- **(b) Answer: It excludes residents who are not registered to vote, such as those under 18, so their opinions could never be included in the sample.**
- (c) **B1** if certain groups of the population are missing from the frame entirely, they have no chance of being selected, oe
- (c) **B1** so the sample, and its results, may systematically differ from/not represent the true population, oe
- **(c) Answer: If whole groups are left out of the frame, they can never be chosen, so the sample - and any conclusions drawn from it - may not truly represent the whole population.**

Question 5

- **B1** Quota sampling cao
- **B1** valid reason for possible bias, e.g. the researcher chooses who to approach, so people who look unwilling to answer may be avoided oe
- **Answer: Quota sampling. Bias can occur because the researcher chooses which shoppers to approach, rather than selecting them randomly.**

Question 6

- (a) **B1** surveying only Year 10 gives no data at all for Year 11, so no fair comparison between the two year groups is possible, oe
- **(a) Answer: Surveying only Year 10 would give no information about Year 11 at all, making a fair comparison impossible.**
- (b) **M1** 34/340 (=0.1) used as the sampling fraction, oe
- (b) **A1** Year 10: 18 cao
- (b) **B1** Year 11: 16 cao
- **(b) Answer: Year 10: 18, Year 11: 16**
- (c) **B1** 18 + 16 = 34
- **(c) Answer: 18 + 16 = 34**
- (d) **B1** use a random method, e.g. a random number generator applied to the Year 10 register, to choose 18 different students, oe
- **(d) Answer: Use a random method, such as random numbers applied to the Year 10 register, to select 18 different students.**
- (e) **B1** sampling variation - a different random sample from each year group could have given different mean values, oe
- **(e) Answer: Sampling variation: a different random sample from each year group could easily have produced different mean values.**

Question 7

- **M1** correct method, 630/30
- **A1** 21 cao
- **B1** 1/30 oe cao
- **Answer: (a) 21 items. (b) 1/30**

Question 8

- **M1** correct method, (150/1000) x 40
- **A1** 6 cao
- **B1** valid reason, e.g. Premium is a small group and could be under-represented or missed entirely in a simple random sample oe
- **Answer: (a) 6. (b) Stratified sampling ensures the small Premium group is proportionally represented, which a simple random sample might miss.**