Pearson Edexcel AS Mathematics 8MA0

Statistics – Statistical Sampling

Time allowed: 45 minutes

School: www.CasperYC.club

Name:

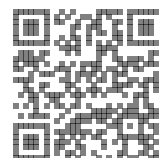**Teacher:**

How I can achieve better:

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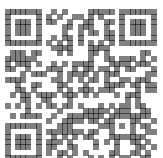| Question	Points	Score
1	5	
2	7	
3	7	
4	7	
5	9	
6	7	
7	8	
Total:	50	

1. (a) Explain what is meant by a census. [1]

   (b) Write down two disadvantages of using a census rather than a sample. [2]

   Each circuit board produced at GC Electronics is given a unique serial number. GC Electronics produces circuit boards in batches of 5000. Before selling each batch, the company tests a random sample of 20 circuit boards from the batch to check that they will fit into a standard computer slot.

   (c) Suggest a suitable sampling frame from which to obtain this sample. [1]

   (d) Identify the sampling units. [1]

   Total: 5

2. (a) Explain what is meant by the word 'population'. [1]

Jo needs to conduct a survey to investigate the type of kitchen cleaner people prefer. She wants a random sample of people who use kitchen cleaners. She decides to stand in a busy high street on a Saturday afternoon and attempt to get shoppers to answer her questions.

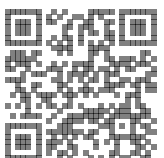(b) State the sampling technique Jo has used. [1]

Having been unsuccessful in obtaining enough data from her previous attempt, Jo decides to look at the electoral register for a town and selects a sample of 50 households to contact. She decides to select every 10th name on the electoral register to add to her sample.

(c) State the sampling technique Jo has used. [1]

(d) Give two reasons why Jo may again be unsuccessful getting the data required using this sampling technique. [2]

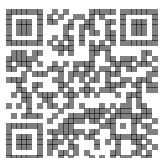(e) Suggest an alternative method for Jo to use and explain your reasons. [2]

Total: 7

3. Before redecorating the school canteen the headteacher decided to survey the opinion of staff and students.

   (a) Explain why the headteacher decided to take a stratified sample of staff and students. [1]

   (b) Suggest a suitable sampling frame. [1]

   (c) Identify the sampling units. [1]

   There are 250 students and 30 staff at the school.

   (d) Explain how the headteacher could take a stratified sample of size 60. [3]

   (e) Suggest a problem that might arise with the sampling frame when selecting the staff and students. [1]
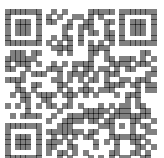
   Total: 7

4. An online newspaper has a large number of readers, some of whom subscribe to extra content that can only be viewed if they pay a monthly fee. Based on reviews on the newspaper's website, the editor of the newspaper believes that an additional publication could be introduced. Before making this change the editor decides to carry out a sample survey to obtain the opinions of the readers. He uses only those members who subscribe to the additional content.

   (a) Define the population that would be generally associated with the newspaper.   [1]

   (b) Suggest a suitable sampling frame for the survey.   [1]

   (c) Identify the sampling units.   [1]

   (d) Give one advantage and one disadvantage that would have resulted from the editor using a census rather than a sample survey.   [2]

   As a pilot study the editor took a random sample of 25 subscribers.

   (e) State two sources of uncertainty that could occur with sampling.   [2]

Total: 7

5. Graham is researching the affects a high protein diet has on the glucose level of adults aged 25 to 35. He decides to collect blood samples from 50 females and 50 males.

   (a) State the sampling technique Graham has used. [1]

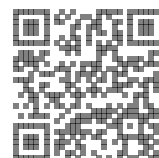   (b) Give two advantages and one disadvantage of this sampling technique. [3]

   Graham then decides to select the 50 male blood samples from an alphabetical list of 300 names of males aged 25 to 35, each of whom has agreed to supply a sample if asked.

   (c) Explain how Graham could use a calculator or a random number generator to take a simple random sample from the males aged 25 to 35. [3]

   Graham has an equivalent list of 300 females.

   (d) Explain how Graham could take a systematic sample of blood from females aged 25 to 35. [2]

Total: 9

6. A factory produces shopping bags for a large supermarket chain. The breaking load of a bag is the maximum load that it can carry before it breaks. The supermarket chain places an order for 50000 shopping bags but wishes to know the breaking load of the bags.

    (a) Suggest two reasons why a census would be unsuitable for this purpose.   [2]

    The factory tests five shopping bags and the loads required for the bags to break are shown below:
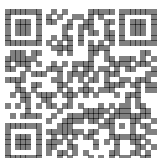
    $$17.89kg \qquad 15.24kg \qquad 9.72kg \qquad 12.31kg \qquad 13.89kg$$

    (b) The factory claims that the shopping bags can carry 12 kg of goods without breaking. Use   [2]
        the sample data to comment on this claim.

    (c) Describe any limitations to the sample the factory has collected.   [2]

    (d) Suggest one way the factory could improve the reliability of its prediction.   [1]

                                                                                            Total: 7

7. The table shows the daily mean temperatures in °C at Perth Airport for the first 20 days in May 1987. The data is taken from the large data set.

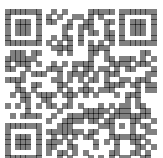| Date	Daily mean temperature (in degrees)
01/05/1987	14.9
02/05/1987	13.7
03/05/1987	15.3
04/05/1987	16.9
05/05/1987	18.4
06/05/1987	21.6
07/05/1987	20.4
08/05/1987	16.6
09/05/1987	14.6
10/05/1987	10.0
11/05/1987	11.5
12/05/1987	12.3
13/05/1987	12.9
14/05/1987	13.1
15/05/1987	13.8
16/05/1987	14.8
17/05/1987	14.5
18/05/1987	13.5
19/05/1987	14.5
20/05/1987	13.8

(a) Describe the type of data represented by daily mean temperature.   [1]

Jennifer is investigating the daily temperature at Perth. She wants to select a sample of size 5 from the daily temperatures at Perth from the first 20 days in May 1987.

(b) Describe what Jennifer could use as the sampling frame.   [1]

(c) Describe the type of sample Jennifer could take and explain how she could collect her sample.   [2]

Sally is investigating rainfall in Leeming in 1987. The large data set provides data for 184 consecutive days in 1987.

(d) Describe how Sally could take a systematic sample of 30 days from the data for Leeming in 1987. [3]

(e) Explain why Sally's sample would not necessarily give her 30 data points for her investigation. [1]

Total: 8