

Please check the examination details below before entering your candidate information

Candidate surname					Other names									
<b>Pearson Edexcel</b>					Centre Number					Candidate Number				
<b>Level 3 GCE</b>					<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>					<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>				
<b>Sampling and Data Collection</b>														
<b>Statistics</b> <b>Advanced</b> <b>Topic Test</b>														
<b>You must have:</b> Statistical formulae and tables booklet Calculator										Total Marks <input type="text"/>				

**Candidates may use any calculator allowed by Pearson regulations.  
Calculators must not have retrievable mathematical formulae stored in them.**

### Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear.  
Answers without working may not gain full credit.
- Unless otherwise stated, inexact answers should be given to three significant figures.
- Unless otherwise stated, statistical tests should be carried out at the 5% significance level.

### Information

- A booklet ‘Statistical formulae and tables’ is provided.
- There are 9 questions in this question paper. The total mark for this paper is 50.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

1. The manager of a new restaurant is collecting feedback from customers about the quality of service offered from the first month of opening.

The manager decides to set up an online survey and post it to the restaurant social media page with an option for all respondents to share the survey with others.

(a) Name this method of sampling. (1)

(b) Give **one** advantage of this method of sampling. (1)

(c) Give **one** disadvantage of this method of sampling. (1)

(Total 3 marks)

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2. A researcher wants to find out what people think about the public toilet facilities in a particular town. He decides that the largest shopping centre is representative of the town's population and so conducts his survey in this shopping centre.

(a) Name this method of sampling. (1)

(b) Give **one** advantage and **one** disadvantage of this method of sampling compared with random sampling. (2)

(Total 3 marks)

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3. A sports scientist is investigating whether or not an athlete's running club has an effect on the performance in running the 100 metre sprint. Explain what data the sports scientist should collect and how they should collect it.

(2)

(Total 2 marks)

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4. Members on the audience of a politics show are invited to ask questions to the members of parliament (MPs). The 25 audience members are allocated numbers 1 to 25. The panel of MPs may be asked 8 questions.

Explain how you would use a random number generator to obtain an unrestricted random sample of size 8.

(3)

(Total 3 marks)

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5. A sixth form college has 1200 students. 720 of them are in the first year and 480 in the second year. 96 of the first year students are taking a GCSE course, but all the other students are taking A level or Applied General Vocational courses.

The students' representative council wants a systematic sample of size 60, to find out students' views on the adequacy of provision for private study.

- (a) Explain how the students' representative council can do this. (3)
- (b) Using your answer to (a) state, with a reason, whether every student has an equal chance of being selected. (2)
- (c) Using your answer to (a) state, with a reason, whether the sample selected is a random sample. (2)

**(Total 7 marks)**

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6. Some extracted molar teeth have been numbered 001 to 639. A random sample of 20 teeth is required to determine how teeth decay when submersed in a particular carbonated drink.

- (a) Explain how you would use random numbers from the calculator to obtain a simple random sample of the teeth. (3)
- (b) State whether or not there is any bias in the sampling method. (1)
- (c) State whether or not there is any bias in the data collection. (1)

**(Total 5 marks)**

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7. The management of an office wants to update its policy on smoking and vaping and decide to consult all the staff.

There were 60 people who either smoke or vape and 660 people who neither smoke or vape working in the building; an up-to-date list of staff was available, indicating the smoke or vape preference of each person.

Write down the steps in taking a stratified sample of size 72 from the staff, clearly stating the stratification method.

(7)

**(Total 7 marks)**

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8. A fast food chain operates 20 branches with different numbers of employees.

It has a total of 34 500 employees. The board of directors, concerned that employees do not stay long with the company, decided to survey 200 employees to find out their opinions on their working conditions.

The following suggestions were made as to how the sample could be chosen.

**Suggestion A** The sample is made up of some employees from each restaurant. The employees are selected at random from 5 different restaurants, the number of employees selected from each restaurant being proportional to the total number of employees at that restaurant.

**Suggestion B** The employees are numbered 1 to 34 499. Random numbers between 1 and 34 499 are generated using a spreadsheet until 200 different numbers have been found, and the corresponding employees chosen.

- (a) For **each** suggestion, name the type of sampling described. (2)
- (b) For **each** of the suggestions, state whether or not all employees have an equal chance of being included in the sample. (2)
- (c) (i) Give **one** reason for using Suggestion A in preference to Suggestion B. (1)
- (ii) Give **one** reason for using Suggestion B in preference to Suggestion A. (1)

(Total 6 marks)

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9. In a particular parliamentary constituency there are 90 000 names on the electoral register. Of the electors, 45 000 live in areas which are classified as urban, 27 000 live in areas which are classified as suburban and 18 000 live in areas which are classified as rural.

The following methods are suggested for choosing a sample of electors in order to carry out an opinion survey.

**Suggestion A** Choose 4 neighbourhoods or villages in areas which are classified as either urban, suburban or rural. Within each of these 4 neighbourhoods or villages choose 30 houses at random.

**Suggestion B** Use a random process to select 180 names from the electoral register.

**Suggestion C** Select 60 names at random from the electors living in urban areas, 36 names at random from the electors living in suburban areas and 24 names at random from those living in rural areas.

**Suggestion D** Use a random process to select one of the first 500 names on the electoral register. Using this as a starting point, select every 500th name.

- (a) For **each** of the suggestions A, B C and D:

(i) name the type of sampling method, (4)

(ii) state whether all the names on the electoral register are equally likely to be included in the sample. (4)

- (b) State, giving a reason, whether **Suggestion C** will produce a random sample of electors from this constituency. (2)

- (c) State briefly whether the method in **Suggestion C** produces a sample which proportionally represents the population or not.

What is the advantage of a proportionally represented sample compared with a disproportionately represented sample? (2)

- (d) Compare the usefulness of the sampling methods given by **Suggestion B** and **Suggestion C** if the questions to be asked concern issues related to urban areas. (2)

(Total 14 marks)

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**TOTAL FOR PAPER: 50 MARKS**