Sampling and Data Collection Exam Questions

[Note: Questions 1-3 are from AQA Level 3 Mathematical Studies, Analysis of Data Practice Questions]

1. Freshly cut wood is full of moisture and needs to dry out.
George cuts some silver birch logs and weighs one over a period of drying.

The table gives the mass of the log whilst drying in the garage.

Number of days since being cut	0	3	7	10	14	17	21
Mass (g)	1925	1775	1710	1640	1570	1525	1480

Source: George

(a) What was the mass of the log on the day it was cut?

[1 mark]

(b) What type of data has George collected?
Circle the **two** correct answers.

[2 marks]

Primary Secondary Discrete Continuous Qualitative

Q2.

John collects stamps from all over the world.

Decide whether each of the following variables is discrete, continuous or qualitative.
In each case, circle the correct word.

a) The length of a stamp.

[1 mark]

Discrete Continuous Qualitative

b) The number of stamps in his collection.

[1 mark]

Discrete Continuous Qualitative

c) The country the stamp is from.

[1 mark]

Discrete Continuous Qualitative

Q3.

A flight from Heathrow to Sydney has 400 passengers.

Seats on the plane are numbered

01 – 10 for first class
11 – 70 for business class
and **71 – 400** for economy class passengers.

The airline needs to conduct an in-flight survey to find out what passengers think about the food served on the plane.

Interviews will be carried out when all seats are occupied and it is planned to conduct 80 interviews in total.

Two alternative sampling methods have been suggested.

Method A
Select at random

- 2 passengers from first class
- 12 passengers from business class
- 66 passengers from economy class.

Method B

- Choose a simple random sample of 80 different passengers from those on the plane.

(a) For **Method A.**

(i) Name the sampling method suggested

[1 mark]

(ii) Show how the numbers 2, 12 and 66 were calculated for the sample sizes in this case.

[2 marks]

(b) For **Method B,** describe how random numbers could be used to select the sample.

[3 marks]

[Q4 & 5 Removed]
[Q4 and 5 Removed]

Q6, (AQA Level 3 Mathematical Studies, Specimen Paper 1, Q1)

The table shows the numbers of staff working in each area of a department store.

Sales	Administration	Management
130	58	9

The owner wants to find out the opinions of the staff about the store.

He chooses two staff from each area to ask.

(a) Give **two** reasons why this is **not** a good sample of staff to take.

[2 marks]

(b) Give a full description of a better sampling method the owner could use.

[4 marks]

Q7, (AQA Level 3 Mathematical Studies, Jun 2016, Paper 1, Q4)

There are 85 girls and 65 boys in Year 12 of a school.

A sample of students is to be taken.

(a) The headteacher decides to choose a sample stratified by gender.

Is this a suitable sampling method to use?
Give reasons for your answer.

[2 marks]

(b) There will be 34 girls in the sample.

Describe how random numbers could be used to select a sample of the 34 girls.

[3 marks]

(c) For a different sample, the headteacher decides to choose all the girls in the two tutor groups closest to her office.

What type of sampling method is this?

[1 mark]

Q8, (AQA Level 3 Mathematical Studies, Jun 2017, Paper 1, Q5)

(a) Carin is investigating house prices in London.

Describe how she could collect data to use as her sample in her investigation.

[2 marks]

(b) Carin decides to use the data from her sample to estimate the average house price for the rest of England.

Is this sensible?
Give a reason for your answer.

[1 mark]

Q9, (OCR 4768, Jan 2011, Q2a)

(i) What is stratified sampling? Why would it be used? **[4]**

(ii) A local authority official wishes to conduct a survey of households in the borough. He decides to select a stratified sample of 2000 households using Council Tax property bands as the strata. At the time of the survey there are 79 368 households in the borough. The table shows the numbers of households in the different tax bands.

Tax band	A – B	C – D	E – F	G – H
Number of households	32 298	33 211	9739	4120

Calculate the number of households that the official should choose from each stratum in order to obtain his sample of 2000 households so that each stratum is represented proportionally. **[2]**

Q10, (OCR 4768, Jan 2013, Q4i)

At a college, two examiners are responsible for marking, independently, the students' projects. Each examiner awards a mark out of 100 to each project. There is some concern that the examiners' marks do not agree, on average. Consequently a random sample of 12 projects is selected and the marks awarded to them are compared.

(i) Describe how a random sample of projects should be chosen. **[2]**

Q11, (OCR 4733, Jan 2007, Q2)

A school has 900 pupils. For a survey, Jan obtains a list of all the pupils, numbered 1 to 900 in alphabetical order. She then selects a sample by the following method. Two fair dice, one red and one green, are thrown, and the number in the list of the first pupil in the sample is determined by the following table.

		Score on green dice					
		1	2	3	4	5	6
Score on red dice	1, 2 or 3	1	2	3	4	5	6
	4, 5 or 6	7	8	9	10	11	12

For example, if the scores on the red and green dice are 5 and 2 respectively, then the first member of the sample is the pupil numbered 8 in the list.

Starting with this first number, every 12th number on the list is then used, so that if the first pupil selected is numbered 8, the others will be numbered 20, 32, 44, … .

(i) State the size of the sample. [1]

(ii) Explain briefly whether the following statements are true.

(a) Each pupil in the school has an equal probability of being in the sample. [1]

(b) The pupils in the sample are selected independently of one another. [1]

(iii) Give a reason why the number of the first pupil in the sample should not be obtained simply by adding together the scores on the two dice. Justify your answer. [2]
