OCR
Oxford Cambridge and RSA

AS Level Mathematics B (MEI)

H630/02 Pure Mathematics and Statistics

Question Set 6

1 A student measures the upper arm lengths of a sample of 97 women. The results are summarised in the frequency table in Fig. 1.1.

Arm length in cm	30 –	31 –	32 –	33 –	34 –	35 –	36 –	37 –	38 –	39 –	40 – 41
Frequency	1	4	5	9	13	19	17	17	4	3	5

Fig. 1.1

The student constructs two cumulative frequency diagrams to represent the data using different class intervals. These are shown in Fig. 1.2.

One of these diagrams is correct and the other is incorrect.

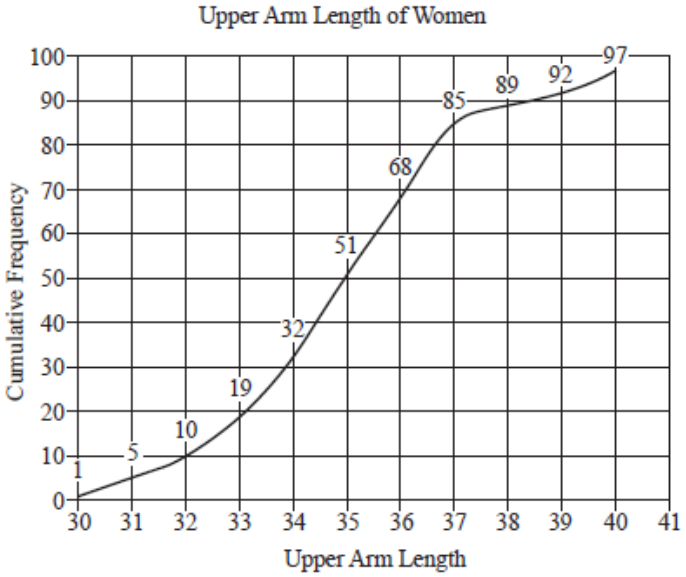

Diagram A

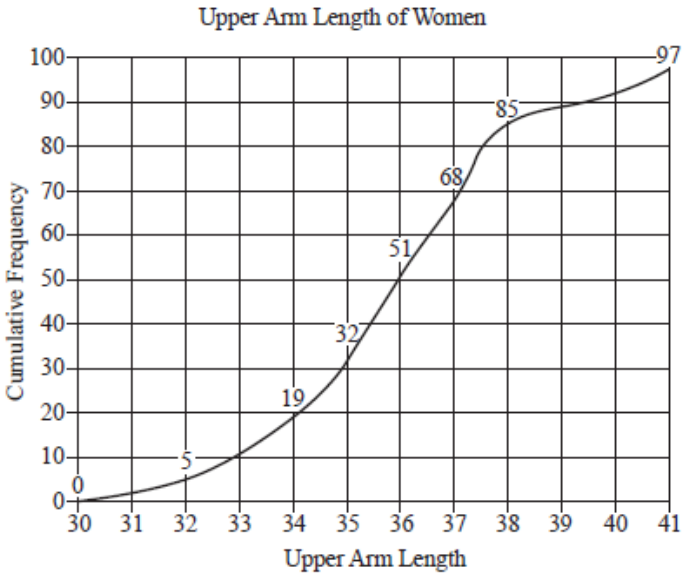

Diagram B

Fig. 1.2

(a) State which diagram is incorrect, justifying your answer. **[2]**

(b) Use the correct diagram in Fig. 1.2 to find an estimate of the median. **[1]**

2 A researcher is conducting an investigation into the number of portions of fruit adults consume each day. The researcher decides to ask 50 men and 50 women to complete a simple questionnaire.

(a) State the type of sampling procedure the researcher is using. **[1]**

(b) Write down one disadvantage of this sampling procedure. **[1]**

The researcher represents the data in Fig. 2.1.

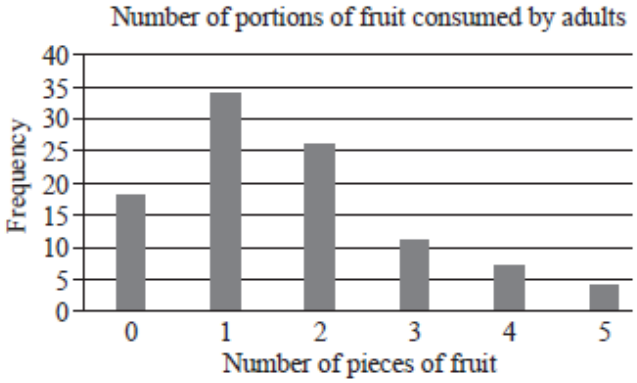

Fig. 2.1

(c) Describe the shape of the distribution. **[1]**

The data are summarised in the frequency table in Fig. 2.2.

Number of portions of fruit	0	1	2	3	4	5
Number of adults	18	34	26	11	7	4

Fig. 2.2

(d) For the data in Fig. 2.2, use your calculator to find

- the mean,
- the standard deviation.

Give your answers correct to 2 decimal places. **[2]**

A second researcher chooses a proportional stratified sample of 100 children from years 5 and 6 in a certain primary school. There are 220 children to choose from. In year 5 there are 125 children, of whom 81 are boys.

(e) How many year 5 girls should be included in the sample? **[1]**

The second researcher found that the mean number of portions of fruit consumed per day by the children in this sample was 1.61 and the standard deviation was 0.53.

(f) Comment on the amount of fruit consumed per day by the children compared to the amount of fruit consumed per day by the adults. **[2]**

3 In a certain country it is known that 11% of people are left-handed.

(a) Calculate the probability that, in a random sample of 98 people from this country, 5 or fewer are found to be left-handed, giving your answer correct to 3 significant figures. **[1]**

An anthropologist believes that the proportion of left-handed people is lower in a particular ethnic group.

The anthropologist collects a random sample of 98 people from this particular ethnic group in order to test the hypothesis that the proportion of left-handed people is less than 11%.

The anthropologist carries out the test at the 1% level.

(b) Determine the critical region for this test. **[3]**

4 A company needs to appoint 3 new assistants. 8 candidates are invited for interview; each candidate has a different surname. The candidates are to be interviewed one after another. The personnel officer randomly selects the order in which the candidates are to be interviewed by drawing their names out of a hat. One of the candidates is called Mr Browne and another is called Mrs Green.

(a) Calculate the probability that Mr Browne is interviewed first and Mrs Green is interviewed last. **[2]**

5 of the 8 candidates invited for interview are women and the other 3 are men. The chief executive can't make up his mind who to appoint so he randomly selects 3 candidates by drawing their names out of a hat.

(b) Determine the probability that more women than men are selected. **[4]**

5 Fig. 5.1 shows a sample collected from the large data set.

BMI is defined as $\frac{\text{mass of person in kilograms}}{\text{square of person's height in metres}}$.

Sex	Age in years	Mass in kg	Height in cm	BMI
Male	38	77.6	164.8	28.57
Male	17	63.5	170.3	21.89
Male	18	68.0	172.3	22.91
Male	18	57.2	172.2	19.29
Male	19	77.6	191.2	21.23
Male	24	72.7	177.0	23.21
Male	25	92.5	177.9	29.23
Male	26	70.4	159.4	27.71
Male	31	77.5	174.0	25.60
Male	34	132.4	182.2	39.88
Male	38	115.0	186.4	33.10
Male	40	112.1	171.7	38.02

Fig. 5.1

(a) Calculate the mass in kg of a person with a BMI of 23.56 and a height of 181.6 cm, giving your answer correct to 1 decimal place. **[2]**

Fig. 5.2 shows a scatter diagram of BMI against age for the data in the table. A line of best fit has also been drawn.

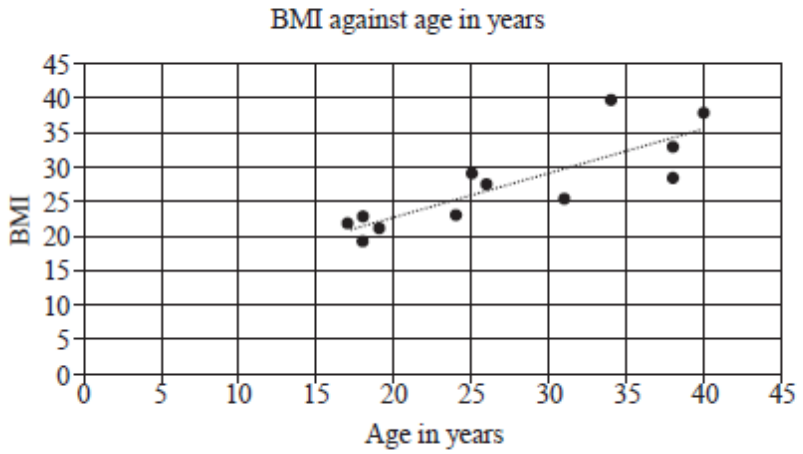

Fig. 5.2

(b) Describe the correlation between age and BMI. **[1]**

(c) Use the line of best fit to estimate the BMI of a 30-year-old man. **[1]**

(d) Explain why it would not be sensible to use the line of best fit to estimate the BMI of a 60-year-old man. **[1]**

(e) Use your knowledge of the large data set to suggest **two** reasons why the sample data in the table may not be representative of the population. **[2]**

(f) Once the data in the large data set had been cleaned there were 196 values available for selection. Describe how a sample of size 12 could be generated using systematic sampling so that each of the 196 values could be selected in the sample. **[2]**

Total Marks for Question Set 6: 30 marks