Exercise 1.9 – Miscellaneous

1 The weights of 30 children in a class, to the nearest kg, were as follows.

50	45	61	53	55	47	52	49	46	51
60	52	54	47	57	59	42	46	51	53
56	48	50	51	44	52	49	58	55	45

Construct a grouped frequency table for these data such that there are five equal class intervals with the first class having a lower boundary of 41.5 kg and the fifth class having an upper boundary of 61.5 kg.

Cambridge Paper 6 Q1 N06

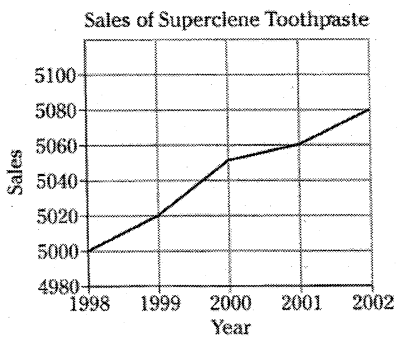
2 Rachel measured the lengths in millimetres of some leaves on a tree. Her results are recorded below.

32 35 45 37 38 44 33 39 36 45

Find the mean and standard deviation of the lengths of these leaves.

Cambridge Paper 6 Q1 N08

3 (i)



The diagram represents the sales of Superclene toothpaste over the last few years. Give a reason why it is misleading.

(ii) The following data represent the daily ticket sales at a small theatre during three weeks.

52, 73, 34, 85, 62, 79, 89, 50, 45, 83, 84, 91, 85, 84, 87, 44, 86, 41, 35, 73, 86

(a) Construct a stem-and-leaf diagram to illustrate the data.

(b) Use your diagram to find the median of the data.

Cambridge Paper 6 Q1 J03

4 In an experiment to estimate the value of π, Jon measured the circumference and diameter of several tins. He then divided the circumference by the diameter for each tin. His results are recorded below.

3.05, 3.45, 3.19, 2.98, 2.85, 3.04, 3.28, 3.45, 4.87, 3.05

(i) State the mode.

(ii) Find the median.

(iii) Calculate the mean.

(iv) What percentage of Jon's results were higher than the true value of π?

5 The marks of 25 students in a test had a mean of 74 and a standard deviation of 8.

(i) Find the total of the marks, $\sum x$.

(ii) Show that $\sum x^2 = 138\,500$.

It was later discovered that a mark of 86 had been entered incorrectly as 68.

(iii) Calculate the mean and standard deviation of the corrected set of marks.

6 A study of the ages of car drivers in a certain country produced the results shown in the table.

Percentage of drivers in each age group

	Young	Middle-aged	Elderly
Males	20	30	50
Females	35	55	10

Illustrate these results diagrammatically. Cambridge Paper 6 Q1 N05

7 The following table gives the marks, out of 75, in an examination taken by 243 students.

Marks	1–20	21–30	31–40	41–50	51–60	61–75
Frequency	24	38	72	60	34	15

(i) Draw a histogram on graph paper to represent these results.

(ii) Calculate estimates of the mean mark and the standard deviation.

8 Applicants for a job were asked to carry out a task to assess their practical skills. The times, in seconds, taken by 19 applicants were as follows:

61, 229, 164, 76, 74, 49, 67, 86, 70, 82, 48, 74, 61, 59, 72, 81, 102, 61, 73

(i) Find the mode, the median and the mean.

(ii) Find the range, interquartile range and standard deviation.

(iii) State, with a reason, which of the measures you have calculated you consider most appropriate

(a) as a measure of central tendency,

(b) as a measure of variability.

9 The pulse rates, in beats per minute, of a random sample of 15 small animals are shown in the following table.

115	120	158	132	125
104	142	160	145	104
162	117	109	124	134

(i) Draw a stem-and-leaf diagram to represent the data.

(ii) Find the median and the quartiles.

(iii) On graph paper, using a scale of 2 cm to represent 10 beats per minute, draw a box-and-whisker plot of the data.

Cambridge Paper 6 Q5 N08

10 A computer can generate random numbers which are either 0 or 2. On a particular occasion, it generates a set of numbers which consists of 23 zeros and 17 twos. Find the mean and variance of this set of 40 numbers.

Cambridge Paper 6 Q1 N03

11 The table below shows the frequency distribution of the masses of 52 women students at a college. Measurements have been recorded to the nearest kilogram.

Mass (kg)	40–44	45–49	50–54	55–59	60–64	65–69	70–74
Frequency	3	2	7	18	18	3	1

(i) Construct a cumulative frequency table and draw a cumulative frequency graph.

(ii) Estimate how many students weighed less than 57 kg.

(iii) Estimate how many students weighed at least 61 kg.

(iv) 20% weighed at least x kg. Estimate the value of x.

(v) Estimate the median.

(vi) Estimate the interquartile range.

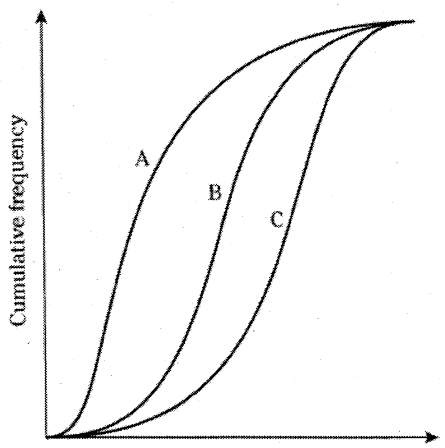
12 The length of time, t minutes, taken to do the crossword in a certain newspaper was observed on 12 occasions. The results are summarised below.

$$\sum(t - 35) = -15 \qquad \sum(t - 35)^2 = 82.23$$

Calculate the mean and standard deviation for these times taken to do the crossword.

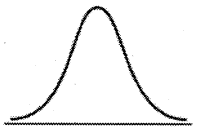
Cambridge Paper 6 Q1 J07

13 The diagram shows the cumulative frequency curves for data sets A, B and C.

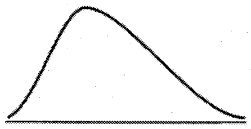


Below are the three frequency curves associated with sets A, B and C. Label each frequency curve with the appropriate letter.

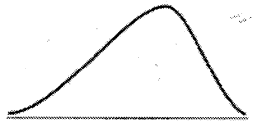
(i)



(ii)



(iii)



14 The weights in kilograms of two groups of 17-year-old males from country P and country Q are displayed in the following back-to-back stem-and-leaf diagram. In the third row of the diagram, ... 4 | 7 | 1 ... denotes weights of 74 kg for a male in country P and 71 kg for a male in country Q.

Country P		Country Q
	5	1 5
	6	2 3 4 8
9 8 7 6 4	7	1 3 4 5 6 7 7 8 8 9
8 8 6 6 5 3	8	2 3 6 7 7 8 8
9 7 7 6 5 5 5 4 2	9	0 2 2 4
5 4 4 3 1	10	4 5

(i) Find the median and quartile weights for country Q.

(ii) You are given that the lower quartile, median and upper quartile for country P are 84, 94 and 98 kg respectively. On a single diagram on graph paper, draw two box-and-whisker plots of the data.

(iii) Make two comments on the weights of the two groups.

Cambridge Paper 6 Q7 N02

15 A delivery company recorded the distance, x kilometres, driven each day by one of their drivers, over a period of 200 working days.

The mean distance driven each day by the driver was 300 km.

Given that $\sum(x - 300)^2 = 405\,000$, calculate the standard deviation.

16 Two hundred and fifty Army recruits have the following heights.

Heights (x cm)	$165 \leqslant x < 170$	$170 \leqslant x < 175$	$175 \leqslant x < 180$	$180 \leqslant x < 185$	$185 \leqslant x < 190$	$190 \leqslant x < 195$
Frequency	18	37	60	65	48	22

(a) Estimate the mean and standard deviation of the heights.

(b) (i) Draw a cumulative frequency curve to illustrate the data.

(ii) Use the curve to estimate the median height and the lower quartile height.

The tallest 40% of the recruits are to be formed into a special squad. For the members of the special squad, estimate

(iii) the median,

(iv) the upper quartile of the heights.

17 The times, to the nearest second, for 100 athletes to cover one lap of a running track were recorded and are shown in the table below.

Recorded time, x seconds	65–69	70–74	75–79	80–84	85–89	90–94	95–99
Frequency	0	8	20	25	31	10	6

(i) Draw a cumulative frequency graph and hence estimate the interquartile range.

To qualify for an athletics meeting, a runner needs to record a lap time of 78 seconds or under.

(ii) Estimate the number of athletes who qualified and the median time for these qualifiers.

18 The lengths of time, in minutes, to swim a certain distance by the members of a class of twelve 9-year-olds and the members of a class of eight 16-year-olds are shown below:

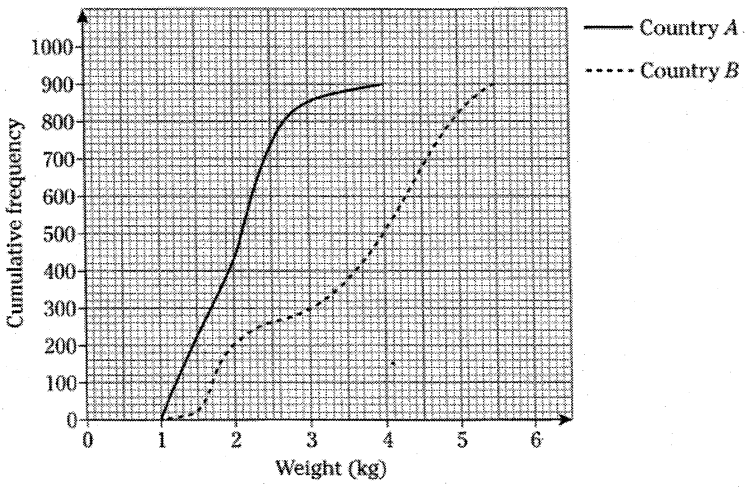
9-year-olds:	13.0	16.1	16.0	14.4	15.9	15.1	14.2	13.7	16.7	16.4	15.0	13.2
16-year-olds:	14.8	13.0	11.4	11.7	16.5	13.7	12.8	12.9				

(i) Draw a back-to-back stem-and-leaf diagram to represent the information above.

(ii) A new pupil joined the 16-year-old class and swam the distance. The mean time for the class of nine pupils was now 13.6 minutes. Find the new pupil's time to swim the distance.

Cambridge Paper 6 Q4 J07

19



The birth weights of random samples of 900 babies born in country A and 900 babies born in country B are illustrated in the cumulative frequency graphs. Use suitable data from these graphs to compare the central tendency and spread of the birth weights of the two sets of babies.

Cambridge Paper 62 Q3 J10

20 During January the numbers of people entering a store during the first hour after opening were as follows.

Time after opening, x minutes	Frequency	Cumulative frequency
$0 < x \leqslant 10$	210	210
$10 < x \leqslant 20$	134	344
$20 < x \leqslant 30$	78	422
$30 < x \leqslant 40$	72	a
$40 < x \leqslant 60$	b	540

(i) Find the values of a and b.

(ii) Draw a cumulative frequency graph to represent the information. Take a scale of 2 cm for 10 minutes on the horizontal axis and 2 cm for 50 people on the vertical axis.

(iii) Use your graph to estimate the median time after opening that people entered the store.

(iv) Calculate estimates of the mean, m minutes, and standard deviation, s minutes, of the time after opening that people entered the store.

(v) Use your graph to estimate the number of people entering the store between $(m - \frac{1}{2}s)$ and $(m + \frac{1}{2}s)$ minutes after opening.

Cambridge Paper 6 Q6 J09