Central tendency and variation
Question Paper 2

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Representation of data
Sub Topic	Central tendency and variation
Booklet	Question Paper 2

Time Allowed: **74 minutes**

Score: **/61**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1   The following are the times, in minutes, taken by 11 runners to complete a 10 km run.

   48.3   55.2   59.9   67.7   60.5   75.6   62.5   57.4   53.4   49.2   64.1

   Find the mean and standard deviation of these times.   [3]

2   Anita made observations of the maximum temperature, t °C, on 50 days. Her results are summarised by $\Sigma t = 910$ and $\Sigma(t - \bar{t})^2 = 876$, where $\bar{t}$ denotes the mean of the 50 observations. Calculate $\bar{t}$ and the standard deviation of the observations.   [3]

3   Esme noted the test marks, x, of 16 people in a class. She found that $\Sigma x = 824$ and that the standard deviation of x was 6.5.

   (i) Calculate $\Sigma(x - 50)$ and $\Sigma(x - 50)^2$.   [3]

   (ii) One person did the test later and her mark was 72. Calculate the new mean and standard deviation of the marks of all 17 people.   [3]

4   Delip measured the speeds, x km per hour, of 70 cars on a road where the speed limit is 60 km per hour. His results are summarised by $\Sigma(x - 60) = 245$.

   (i) Calculate the mean speed of these 70 cars.   [2]

   His friend Sachim used values of $(x - 50)$ to calculate the mean.

   (ii) Find $\Sigma(x - 50)$.   [2]

   (iii) The standard deviation of the speeds is 10.6 km per hour. Calculate $\Sigma(x - 50)^2$.   [2]

5   Rachel measured the lengths in millimetres of some of the 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.   [3]

6 A summary of 24 observations of x gave the following information:

$$\Sigma(x - a) = -73.2 \quad \text{and} \quad \Sigma(x - a)^2 = 2115.$$

The mean of these values of x is 8.95.

 (i) Find the value of the constant a. [2]

 (ii) Find the standard deviation of these values of x. [2]

7 A group of 10 married couples and 3 single men found that the mean age x_w of the 10 women was 41.2 years and the standard deviation of the women's ages was 15.1 years. For the 13 men, the mean age x_m was 46.3 years and the standard deviation was 12.7 years.

 (i) Find the mean age of the whole group of 23 people. [2]

 (ii) The individual women's ages are denoted by x_w and the individual men's ages by x_m.

   By f rst findin Σx_w^2 and Σx_m^2, fin the standard deviation for the whole group. [5]

8 The ages, x years, of 18 people attending an evening class are summarised by the following totals: $\Sigma x = 745, \Sigma x^2 = 33\,951.$

 (i) Calculate the mean and standard deviation of the ages of this group of people. [3]

 (ii) One person leaves the group and the mean age of the remaining 17 people is exactly 41 years. Find the age of the person who left and the standard deviation of the ages of the remaining 17 people. [4]

9 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. [4]

10 The table shows the mean and standard deviation of the weights of some turkeys and geese.

	Number of birds	Mean (kg)	Standard deviation (kg)
Turkeys	9	7.1	1.45
Geese	18	5.2	0.96

(i) Find the mean weight of the 27 birds. [2]

(ii) The weights of individual turkeys are denoted by x_t kg and the weights of individual geese by x_g kg. By f rst f nding Σx_t^2 and Σx_g^2, f nd the standard deviation of the weights of all 27 birds. [5]

11 120 people were asked to read an article in a newspaper. The times taken, to the nearest second, by the people to read the article are summarised in the following table.

Time (seconds)	1 – 25	26 – 35	36 – 45	46 – 55	56 – 90
Number of people	4	24	38	34	20

Calculate estimates of the mean and standard deviation of the reading times. [5]

12 The heights, x cm, of a group of 28 people were measured. The mean height was found to be 172.6 cm and the standard deviation was found to be 4.58 cm. A person whose height was 161.8 cm left the group. [2]

(i) Find the mean height of the remaining group of 27 people.

(ii) Find Σx^2 for the original group of 28 people. Hence f nd the standard deviation of the heights of the remaining group of 27 people. [4]