Central tendency and variation
Question Paper 3

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Representation of data
Sub Topic	Central tendency and variation
Booklet	Question Paper 3

Time Allowed: **78 minutes**

Score: **/65**

Percentage: **/100**

Grade Boundaries:

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

1 A summary of 30 values of x gave the following information:

$$\Sigma(x - c) = 234, \qquad \Sigma(x - c)^2 = 1957.5,$$

where c is a constant.

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

  (ii) Given that the mean of these values is 86, fi d the value of c. [2]

2 A summary of the speeds, x kilometres per hour, of 22 cars passing a certain point gave the following information:

$$\Sigma(x - 50) = 81.4 \qquad \text{and} \qquad \Sigma(x - 50)^2 = 671.0.$$

Find the variance of the speeds and hence find the value of Σx^2. [4]

3 The back-to-back stem-and-leaf diagram shows the values taken by two variables A and B.

	A			B	
(3)	3 1 0	15	1 3 3 5		(4)
(2)	4 1	16	2 2 3 4 4 5 7 7 7 8		(10)
(3)	8 3 3	17	0 1 3 3 3 4 6 6 7 9 9		(11)
(12)	9 8 8 6 5 5 4 3 2 1 1 0	18	2 4 7		(3)
(8)	9 9 8 8 6 5 4 2	19	1 5		(2)
(5)	9 8 7 1 0	20	4		(1)

Key: 4 $\mid$ 16 $\mid$ 7 means $A = 0.164$ and $B = 0.167$.

  (i) Find the median and the interquartile range for variable A. [3]

  (ii) You are given that, for variable B, the median is 0.171, the upper quartile is 0.179 and the lower quartile is 0.164. Draw box-and-whisker plots for A and B in a single diagram on graph paper. [3]

4   The heights, x cm, of a group of young children are summarised b

$$\Sigma(x - 100) = 72, \qquad \Sigma(x - 100)^2 = 499.2.$$

The mean height is 104.8 cm.

(i) Find the number of children in the group.   [2]

(ii) Find $\Sigma(x - 104.8)^2$.   [3]

5   A sample of 36 data values, x, gave $\Sigma(x - 45) = -148$ and $\Sigma(x - 45)^2 = 3089$.

(i) Find the mean and standard deviation of the 36 values.   [3]

(ii) One extra data value of 29 was added to the sample. Find the standard deviation of all 37 values.
                                                                                  [4]

6   Red Street Garage has 9 used cars for sale. Fairwheel Garage has 15 used cars for sale. The mean age of the cars in Red Street Garage is 3.6 years and the standard deviation is 1.925 years. In Fairwheel Garage, $\Sigma x = 64$ and $\Sigma x^2 = 352$, where x is the age of a car in years.

(i) Find the mean age of all 24 cars.   [2]

(ii) Find the standard deviation of the ages of all 24 cars.   [4]

7   The numbers of rides taken by two students, Fei and Graeme, at a fairground are shown in the following table.

	Roller coaster	Water slide	Revolving drum
Fei	4	2	0
Graeme	1	3	6

   (i) The mean cost of Fei's rides is $2.50 and the standard deviation of the costs of Fei's rides is $0. Explain how you can tell that the roller coaster and the water slide each cost $2.50 per ride.   [2]

   (ii) The mean cost of Graeme's rides is $3.76. Find the standard deviation of the costs of Graeme's rides.   [5]

8   The times in minutes for seven students to become prof cient at a new computer game were measured.

   The results are shown below.

$$15 \qquad 10 \qquad 48 \qquad 10 \qquad 19 \qquad 14 \qquad 16$$

   (i) Find the mean and standard deviation of these times.   [2]

   (ii) State which of the mean, median or mode you consider would be most appropriate to use as a measure of central tendency to represent the data in this case.   [1]

   (iii) For each of the two measures of average you did not choose in part **(ii)**, give a reason why you consider it inappropriate.   [2]

9   The heights, x cm, of a group of 82 children are summarised as follows.

$$\Sigma(x - 130) = -287, \qquad \text{standard deviation of } x = 6.9.$$

   (i) Find the mean height.   [2]

   (ii) Find $\Sigma(x - 130)^2$.   [2]

10   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.

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

Calculate the mean and standard deviation of these times taken to do the crossword.   [4]

11   The salaries, in thousands of dollars, of 11 people, chosen at random in a certain offi e, were found to be:

40,   42,   45,   41,   352,   40,   50,   48,   51,   49,   47.

Choose and calculate an appropriate measure of central tendency (mean, mode or median) to summarise these salaries. Explain briefl why the other measures are not suitable.   [3]

12   The following table shows the results of a survey to fin the average daily time, in minutes, that a group of schoolchildren spent in internet chat rooms.

Time per day (t minutes)	Frequency
$0 \leqslant t < 10$	2
$10 \leqslant t < 20$	f
$20 \leqslant t < 40$	11
$40 \leqslant t < 80$	4

The mean time was calculated to be 27.5 minutes.

(i) Form an equation involving f and hence show that the total number of children in the survey was 26.   [4]

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

13   Two cricket teams kept records of the number of runs scored by their teams in 8 matches. The scores are shown in the following table.

Team A	150	220	77	30	298	118	160	57
Team B	166	142	170	93	111	130	148	86

(i) Find the mean and standard deviation of the scores for team A.   [2]

The mean and standard deviation for team B are 130.75 and 29.63 respectively.

(ii) State with a reason which team has the more consistent scores.   [2]