Box plots & Cumulative Frequency graphs

Question Paper 1

| Level	A Level
Exam Board	Edexcel
Subject	Mathematics
Module	Mechanics and Statistics
Topic	Representations of data
Sub-Topic	Box plots & Cumulative Frequency graphs
Booklet	Question paper 1

Time Allowed: **36 minutes**

Score: **/30**

Percentage: **/100**

Grade Boundaries:

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

1. Charlie is studying the time it takes members of his company to travel to the office. He stands by the door to the office from 08 40 to 08 50 one morning and asks workers, as they arrive, how long their journey was.

Taruni's results are summarised by the box plot and summary statistics below.

Journey time (minutes)
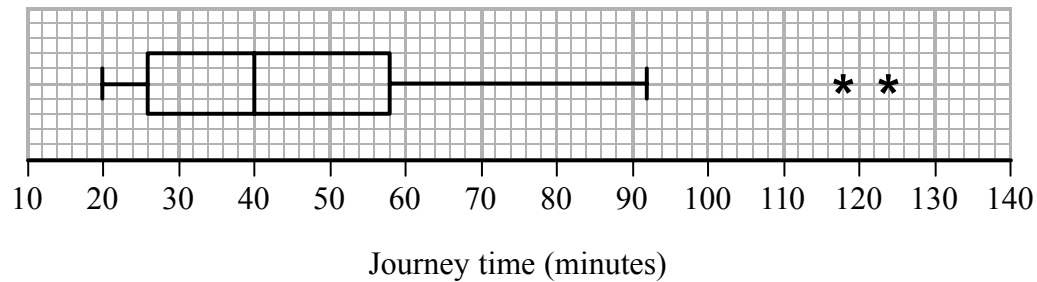
$$n = 95 \quad \sum x = 4133 \quad \sum x^2 = 202\,294$$

(a) Write down the interquartile range for these data.

(1)

(b) Calculate the mean and the standard deviation for these data.

(3)

(c) State, giving a reason, whether you would recommend using the mean and standard deviation or the median and interquartile range to describe these data.

(2)

Rana and David both work for the company and have both moved house since Taruni collected her data.

Rana's journey to work has changed from 75 minutes to 35 minutes and David's journey to work has changed from 60 minutes to 33 minutes.

Taruni drew her box plot again and only had to change two values.

(d) Explain which two values Taruni must have changed and whether each of these values has increased or decreased.

(3)

(Total 9 marks)

2.   The students in a class were each asked to write down how many CDs they owned. The student with the least number of CDs had 14 and all but one of the others owned 60 or fewer. The remaining student owned 65. The quartiles for the class were 30, 34 and 42 respectively.

Outliers are defined to be any values outside the limits of $1.5(Q_3 - Q_1)$ below the lower quartile or above the upper quartile.

On graph paper draw a box plot to represent these data, indicating clearly any outliers.

(Total 7 marks)

3.   A restaurant owner is concerned about the amount of time customers have to wait before being served. He collects data on the waiting times, to the nearest minute, of 20 customers. These data are listed below.

15,   14,   16,   15,   17,   16,   15,   14,   15,   16,

17,   16,   15,   14,   16,   17,   15,   25,   18,   16

(*a*) Find the median and inter-quartile range of the waiting times.

(5)

An outlier is an observation that falls either $1.5 \times$ (inter-quartile range) above the upper quartile or $1.5 \times$ (inter-quartile range) below the lower quartile.

(*b*) Draw a boxplot to represent these data, clearly indicating any outliers.

(7)

(*c*) Find the mean of these data.

(2)

(Total 14 marks)