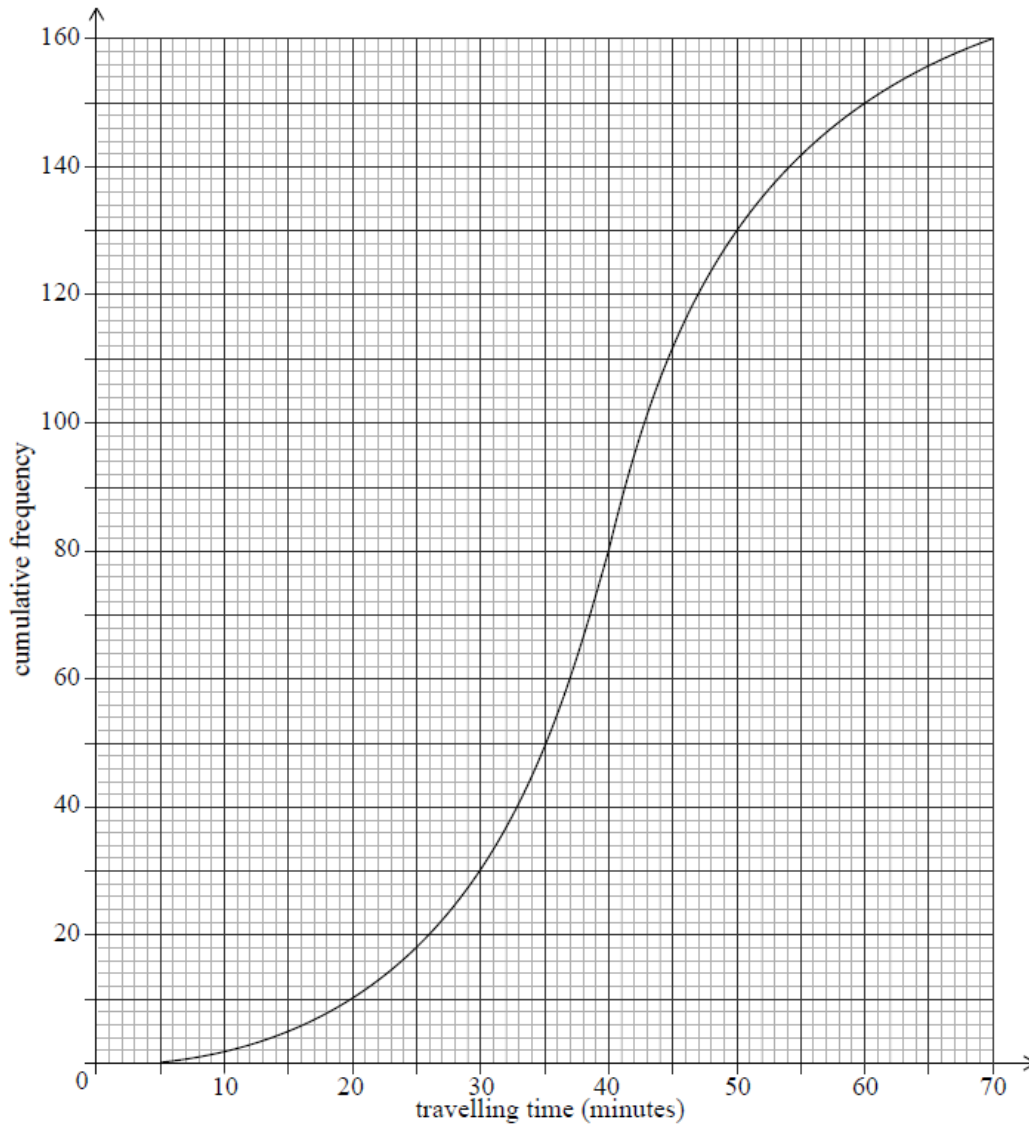# Statistics Test [63 marks]

1. [Maximum mark: 15]

A large company surveyed 160 of its employees to find out how much time they spend traveling to work on a given day. The results of the survey are shown in the following cumulative frequency diagram.
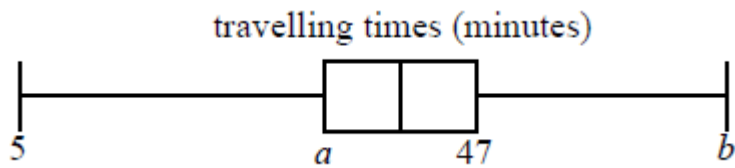

(a) Find the median number of minutes spent traveling to work. [2]

(b) Find the number of employees whose travelling time is within 15 minutes of the median. [3]

Only 10% of the employees spent more than k minutes traveling to work.

(c)   Find the value of k.   [3]

The results of the survey can also be displayed on the following box-and-whisker diagram.

travelling times (minutes)

(d)   Write down the value of b.   [1]

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

(e.ii) Hence, find the interquartile range.   [2]

(f)   Travelling times of less than p minutes are considered outliers.

        Find the value of p.   [2]

2. [Maximum mark: 6]

A random sample of nine adults were selected to see whether sleeping well affected their reaction times to a visual stimulus. Each adult's reaction time was measured twice.

The first measurement for reaction time was taken on a morning after the adult had slept well. The second measurement was taken on a morning after the same adult had not slept well.

The box and whisker diagrams for the reaction times, measured in seconds, are shown below.

Key:
☐ first reaction time (slept well)
▨ second reaction time (not slept well)
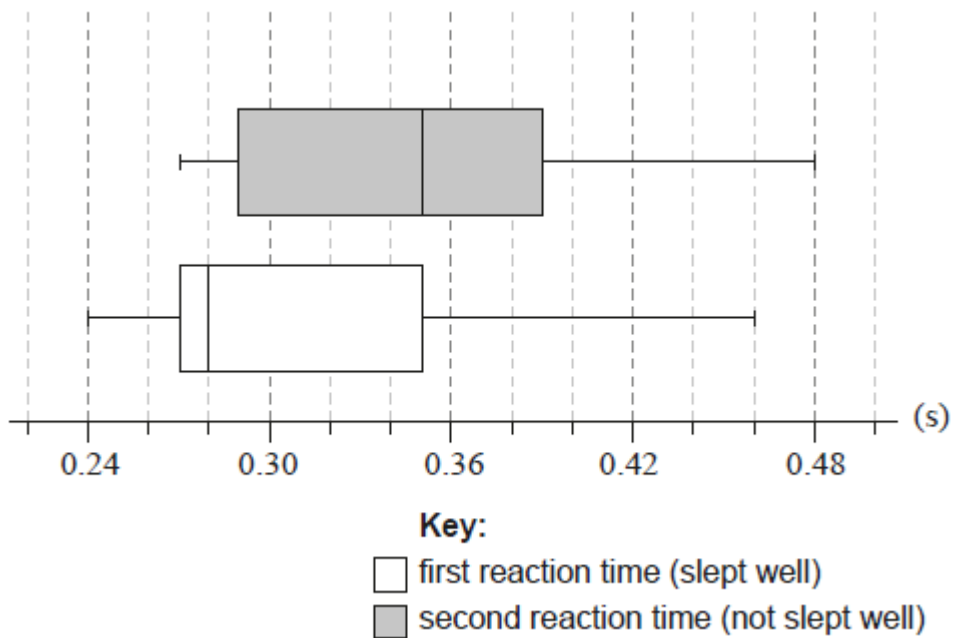
Consider the box and whisker diagram representing the reaction times after sleeping well.

(a) State the median reaction time after sleeping well. [1]

(b) Verify that the measurement of 0.46 seconds is not an outlier. [3]

(c) State why it appears that the mean reaction time is greater than the median reaction time. [1]

(d) Now consider the two box and whisker diagrams.

Comment on whether these box and whisker diagrams provide any evidence that might suggest that not sleeping well causes an increase in reaction time.

[1]

3. [Maximum mark: 6]

Hafizah harvested 49 mangoes from her farm. The weights of the mangoes, w, in grams, are shown in the following grouped frequency table.

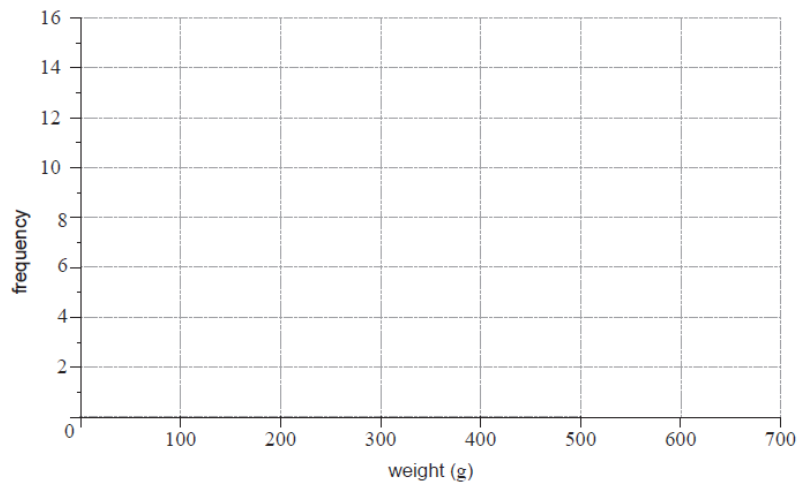| Weight (g)	$100 \leq w < 200$	$200 \leq w < 300$	$300 \leq w < 400$	$400 \leq w < 500$	$500 \leq w < 600$
Frequency	4	7	14	16	8

(a)   Write down the modal group for these data. [1]

(b)   Use your graphic display calculator to find an estimate of the standard deviation of the weights of mangoes from this harvest. [2]

(c)   On the grid below, draw a histogram for the data in the table.

[3]

4. [Maximum mark: 6]

The fastest recorded speeds of eight animals are shown in the following table.

| Animal	Speed $(km\,h^{-1})$
Golden eagle	300
Swordfish	97
Hare	80
Lion	80
Horse	71
Zebra	64
Komodo dragon	21
Tiger beetle	6

(a)   State whether **speed** is a continuous or discrete variable.   [1]

(b)   Write down the median speed for these animals.   [1]

(c)   Write down the range of the animal speeds.   [1]

(d.i)   For these eight animals find the mean speed.   [2]

(d.ii)   For these eight animals write down the standard deviation.   [1]

5. [Maximum mark: 6]

A health inspector analysed the amount of sugar in 500 different **snacks** prepared in various school cafeterias. The collected data are shown in the following box-and-whisker diagram.

11.5 12   13   18   20

Amount of sugar per snack in grams
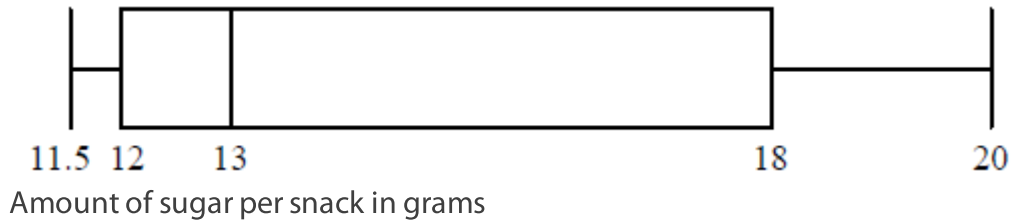
(a)   State what 13 represents in the given diagram.   [1]

(b.i)   Write down the interquartile range for this data.   [2]

(b.ii)   Write down the approximate number of snacks whose amount of sugar ranges from 18 to 20 grams.   [1]

(c)   The health inspector visits two school cafeterias. She inspects the same number of **meals** at each cafeteria. The data is shown in the following box-and-whisker diagrams.
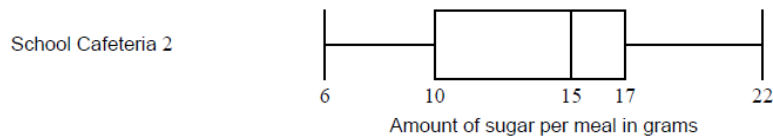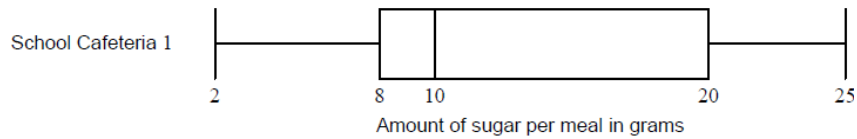
Meals prepared in the school cafeterias are required to have less than 10 grams of sugar.

State, giving a reason, which school cafeteria has more meals that **do not** meet the requirement.   [2]

6. [Maximum mark: 6]

University students were surveyed and asked how many hours, h, they worked each month. The results are shown in the following table.

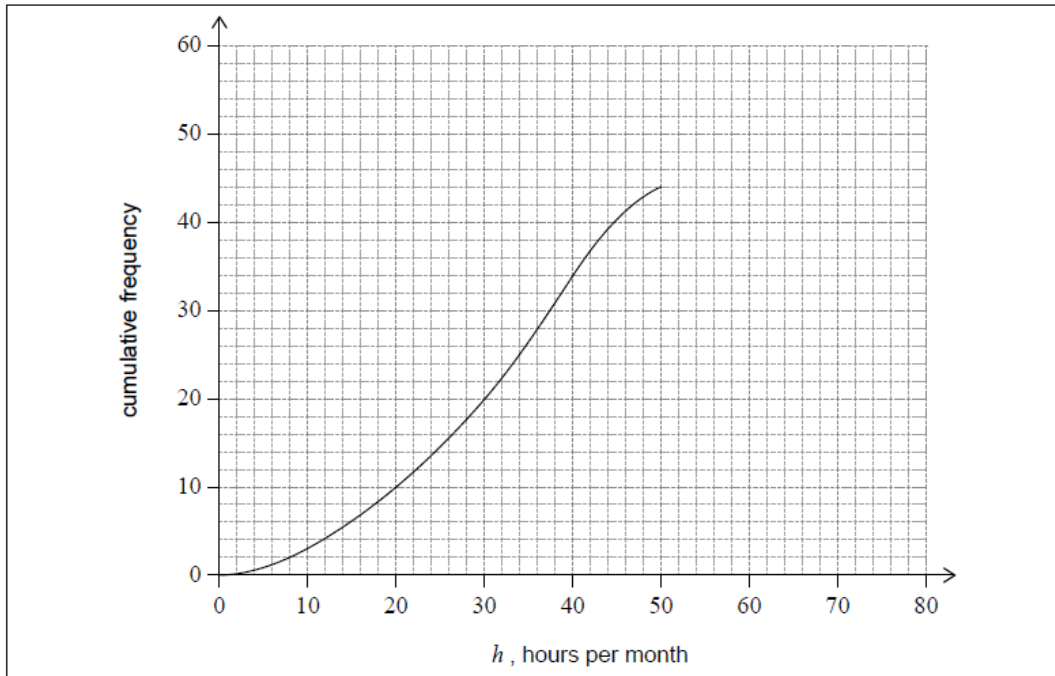| Hours per month, h	Frequency	Cumulative frequency
$0 < h \leq 10$	3	3
$10 < h \leq 20$	7	10
$20 < h \leq 30$	10	20
$30 < h \leq 40$	14	34
$40 < h \leq 50$	p	44
$50 < h \leq 60$	6	50
$60 < h \leq 70$	4	54
$70 < h \leq 80$	2	q

Use the table to find the following values.

(a.i) p. [1]

(a.ii) q. [1]

The first five class intervals, indicated in the table, have been used to draw part of a cumulative frequency curve as shown.
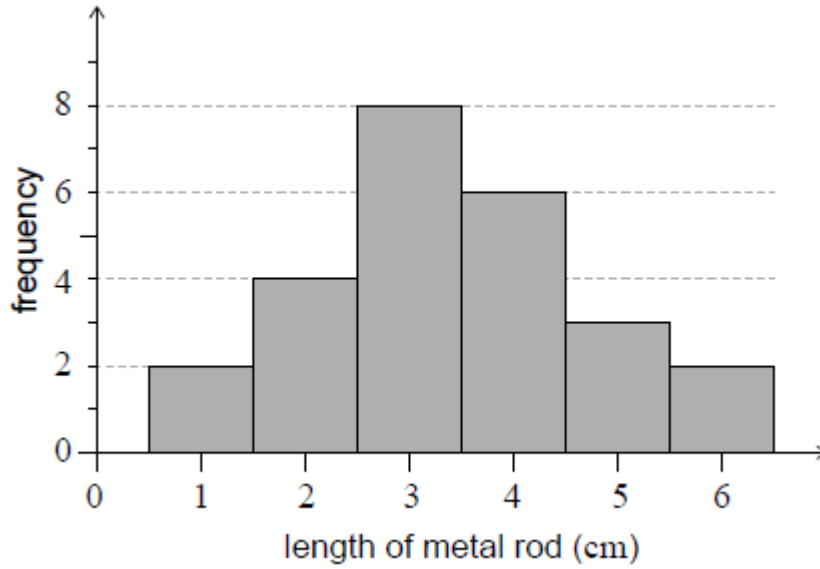
(b) On the same grid, complete the cumulative frequency curve for these data. [2]

(c) Use the cumulative frequency curve to find an estimate for the number of students who worked at most 35 hours per month. [2]

7. [Maximum mark: 6]

The histogram shows the lengths of 25 metal rods, each measured correct to the nearest cm.

length of metal rod (cm)

(a)   Write down the modal length of the rods.   [1]

(b)   Find the median length of the rods.   [3]
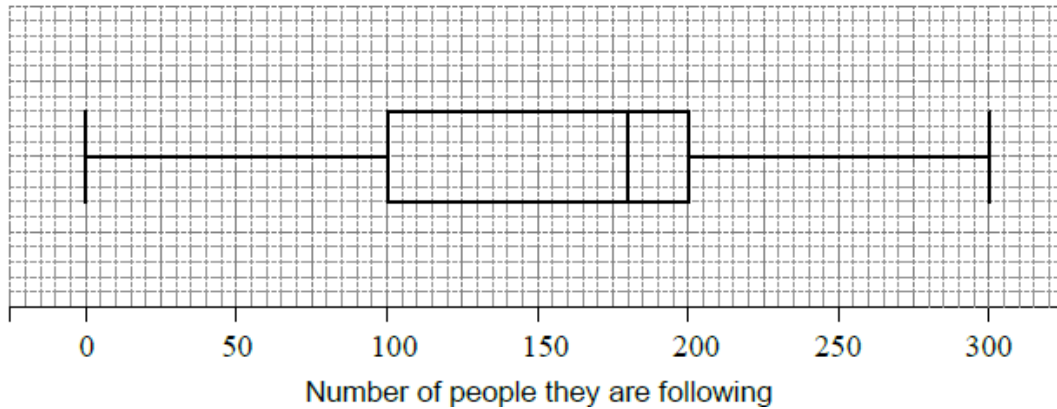
The upper quartile is 4 cm.

(c.i)   Calculate the lower quartile.   [1]

(c.ii)   Calculate the interquartile range.   [1]

8.

In a high school, 160 students completed a questionnaire which asked for the number of people they are following on a social media website. The results were recorded in the following box-and-whisker diagram.

Number of people they are following

(a)   Write down the median.   [1]

The following incomplete table shows the distribution of the responses from these 160 students.

Number of people they are following (x)	Number of high school students
$0 \leq x \leq 50$	4
$50 < x \leq 100$	
$100 < x \leq 150$	34
$150 < x \leq 200$	46
$200 < x \leq 250$	
$250 < x \leq 300$	16

(b)   Complete the table.   [2]

(c.i)   Write down the mid-interval value for the $100 < x \leq 150$ group.   [1]

(c.ii)   Using the table, calculate an estimate for the mean number of people being followed on the social media website by these 160 students.   [2]
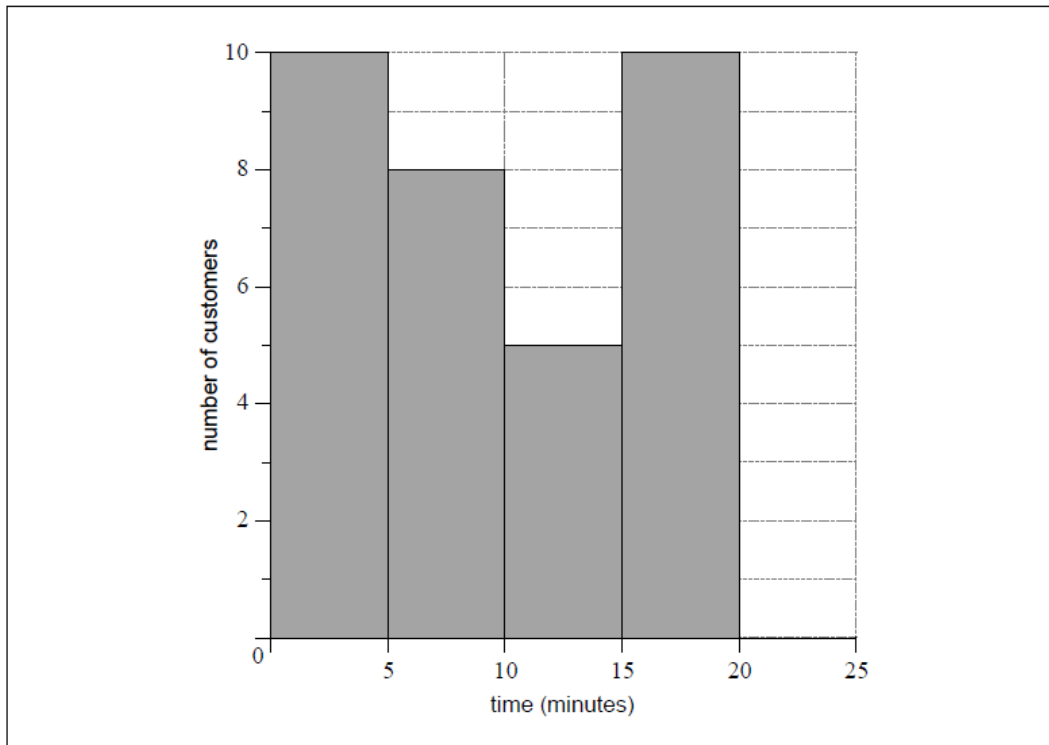
9. [Maximum mark: 6]

The histogram shows the time, t, in minutes, that it takes the customers of a restaurant to eat their lunch on one particular day. Each customer took less than 25 minutes.

The histogram is incomplete, and only shows data for $0 \leq t < 20$.

(a) Write down the mid-interval value for $10 \leq t < 15$.   [1]

The mean time it took **all** customers to eat their lunch was estimated to be 12 minutes.

It was found that k customers took between 20 and 25 minutes to eat their lunch.

(b.i) Write down the total number of customers in terms of k.   [1]

(b.ii) Calculate the value of k.   [3]

(c) Hence, complete the histogram.   [1]