

1. The following frequency distribution of marks has mean 4.5.

Mark	1	2	3	4	5	6	7
Frequency	2	4	6	9	x	9	4

- (a) Find the value of x .

(4)

- (b) Write down the standard deviation.

(2)

(Total 6 marks)

2. The following table gives the examination grades for 120 students.

Grade	Number of students	Cumulative frequency
1	9	9
2	25	34
3	35	p
4	q	109
5	11	120

- (a) Find the value of

(i) p ;

(ii) q .

(4)

- (b) Find the mean grade.

(2)

- (c) Write down the standard deviation.

(1)

(Total 7 marks)

3. A standard die is rolled 36 times. The results are shown in the following table.

Score	1	2	3	4	5	6
Frequency	3	5	4	6	10	8

- (a) Write down the standard deviation.

(2)

- (b) Write down the median score.

(1)

- (c) Find the interquartile range.

(3)

(Total 6 marks)

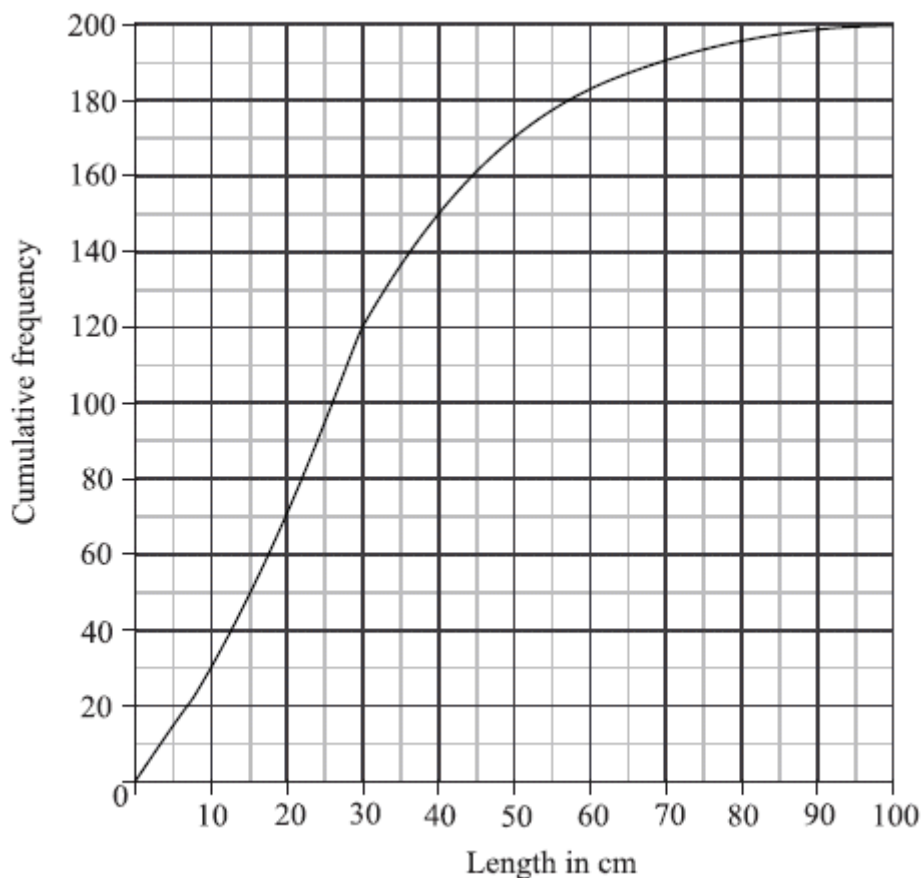
4. A fisherman catches 200 fish to sell. He measures the lengths, l cm of these fish, and the results are shown in the frequency table below.

Length l cm	$0 \leq l < 10$	$10 \leq l < 20$	$20 \leq l < 30$	$30 \leq l < 40$	$40 \leq l < 60$	$60 \leq l < 75$	$75 \leq l < 100$
Frequency	30	40	50	30	33	11	6

- (a) Calculate an estimate for the standard deviation of the lengths of the fish.

(3)

(b) A cumulative frequency diagram is given below for the lengths of the fish.



Use the graph to answer the following.

- (i) Estimate the interquartile range.
- (ii) Given that 40 % of the fish have a length more than k cm, find the value of k .

(6)

In order to sell the fish, the fisherman classifies them as small, medium or large.

Small fish have a length less than 20 cm.

Medium fish have a length greater than or equal to 20 cm but less than 60 cm.

Large fish have a length greater than or equal to 60 cm.

- (c) Write down the probability that a fish is small.

(2)

The cost of a small fish is \$4, a medium fish \$10, and a large fish \$12.

- (d) Copy and complete the following table, which gives a probability distribution for the cost \$X.

Cost \$X	4	10	12
$P(X = x)$		0.565	

(2)

- (e) Find $E(X)$.

(2)

(Total 15 marks)

5. In a school with 125 girls, each student is tested to see how many sit-up exercises (sit-ups) she can do in one minute. The results are given in the table below.

Number of sit-ups	Number of students	Cumulative number of students
15	11	11
16	21	32
17	33	p
18	q	99
19	18	117
20	8	125

- (a) (i) Write down the value of p .

- (ii) Find the value of q .

(3)

- (b) Find the median number of sit-ups.

(2)

- (c) Find the mean number of sit-ups.

(2)

(Total 7 marks)

6. A set of data is

18, 18, 19, 19, 20, 22, 22, 23, 27, 28, 28, 31, 34, 34, 36.

The box and whisker plot for this data is shown below.



- (a) Write down the values of A, B, C, D and E.

A = B = C = D = E =

- (b) Find the interquartile range.

(Total 6 marks)

7. There are 50 boxes in a factory. Their weights, w kg, are divided into 5 classes, as shown in the following table.

Class	Weight (kg)	Number of boxes
A	$9.5 \leq w < 18.5$	7
B	$18.5 \leq w < 27.5$	12
C	$27.5 \leq w < 36.5$	13
D	$36.5 \leq w < 45.5$	10
E	$45.5 \leq w < 54.5$	8

- (a) Show that the estimated mean weight of the boxes is 32 kg.

(3)

- (b) There are x boxes in the factory marked “Fragile”. They are all in class E. The estimated mean weight of all the other boxes in the factory is 30 kg. Calculate the value of x .

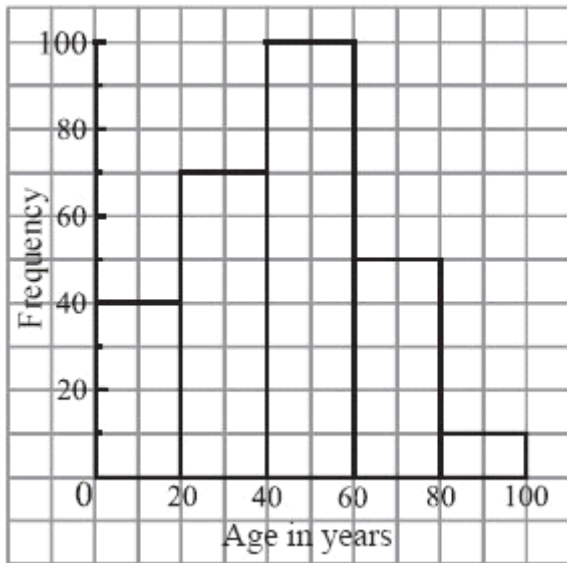
(4)

- (c) An additional y boxes, all with a weight in class D, are delivered to the factory. The total estimated mean weight of **all** of the boxes in the factory is less than 33 kg. Find the largest possible value of y .

(5)

(Total 12 marks)

8. The histogram below represents the ages of 270 people in a village.



- (a) Use the histogram to complete the table below.

Age range	Frequency	Mid-interval value
$0 \leq \text{age} < 20$	40	10
$20 \leq \text{age} < 40$		
$40 \leq \text{age} < 60$		
$60 \leq \text{age} < 80$		
$80 \leq \text{age} \leq 100$		

(2)

- (b) Hence, calculate an estimate of the mean age.

(4)

(Total 6 marks)

10. The number of hours of sleep of 21 students are shown in the frequency table below.

Hours of sleep	Number of students
4	2
5	5
6	4
7	3
8	4
10	2
12	1

Find

- (a) the median;
- (b) the lower quartile;
- (c) the interquartile range.

Working:

Answers:

- (a)
- (b)
- (c)

(Total 6 marks)

11. Given the following frequency distribution, find

- (a) the median;
- (b) the mean.

Number (x)	1	2	3	4	5	6
Frequency (f)	5	9	16	18	20	7

Working:

Answers:

(a)

(b)

(Total 4 marks)

12. The speeds in km h^{-1} of cars passing a point on a highway are recorded in the following table.

Speed v	Number of cars
$v \leq 60$	0
$60 < v \leq 70$	7
$70 < v \leq 80$	25
$80 < v \leq 90$	63
$90 < v \leq 100$	70
$100 < v \leq 110$	71
$110 < v \leq 120$	39
$120 < v \leq 130$	20
$130 < v \leq 140$	5
$v > 140$	0

- (a) Calculate an estimate of the mean speed of the cars.

(2)

- (b) The following table gives some of the cumulative frequencies for the information above.

Speed v	Cumulative frequency
$v \leq 60$	0
$v \leq 70$	7
$v \leq 80$	32
$v \leq 90$	95
$v \leq 100$	a
$v \leq 110$	236
$v \leq 120$	b
$v \leq 130$	295
$v \leq 140$	300

- (i) Write down the values of a and b .
- (ii) On graph paper, construct a cumulative frequency **curve** to represent this information. Use a scale of 1 cm for 10 km h^{-1} on the horizontal axis and a scale of 1 cm for 20 cars on the vertical axis.

(5)

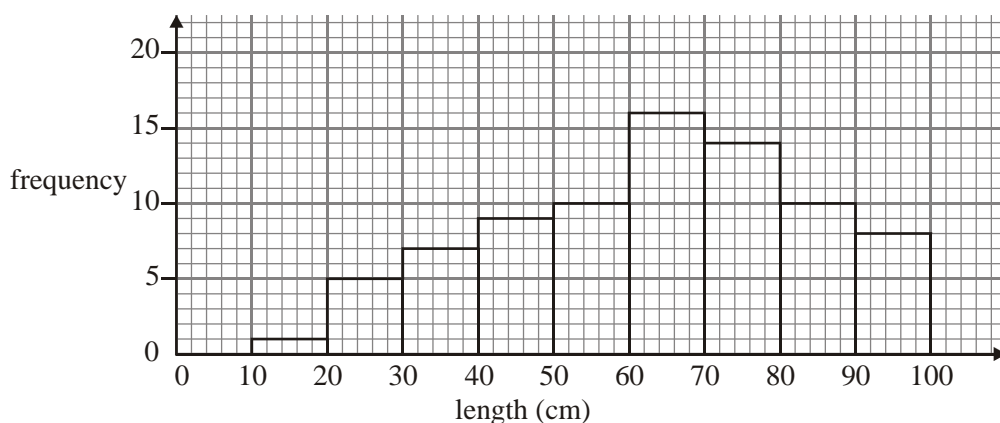
(c) Use your graph to determine

- (i) the percentage of cars travelling at a speed in excess of 105 km h^{-1} ;
- (ii) the speed which is exceeded by 15% of the cars.

(4)

(Total 11 marks)

13. The following diagram represents the lengths, in cm, of 80 plants grown in a laboratory.



(a) How many plants have lengths in cm between

- (i) 50 and 60?
- (ii) 70 and 90?

(2)

(b) Calculate estimates for the mean and the standard deviation of the lengths of the plants.

(4)

(c) Explain what feature of the diagram suggests that the median is different from the mean. (1)

(d) The following is an extract from the cumulative frequency table.

length in cm less than	cumulative frequency
.	.
50	22
60	32
70	48
80	62
.	.

Use the information in the table to estimate the median. Give your answer to **two** significant figures.

(3)
(Total 10 marks)

14. A supermarket records the amount of money d spent by customers in their store during a busy period. The results are as follows:

Money in \$ (d)	0–20	20–40	40–60	60–80	80–100	100–120	120–140
Number of customers (n)	24	16	22	40	18	10	4

(a) Find an estimate for the mean amount of money spent by the customers, giving your answer to the nearest dollar (\$). (2)

(b) Copy and complete the following cumulative frequency table and use it to draw a cumulative frequency graph. Use a scale of 2 cm to represent \$20 on the horizontal axis, and 2 cm to represent 20 customers on the vertical axis. (5)

Money in \$ (d)	<20	<40	<60	<80	< 100	< 120	< 140
Number of customers (n)	24	40					

- (c) The time t (minutes), spent by customers in the store may be represented by the equation

$$t = 2d^{\frac{2}{3}} + 3.$$

- (i) Use this equation and your answer to part (a) to estimate the mean time in minutes spent by customers in the store. (3)
- (ii) Use the equation and the cumulative frequency graph to estimate the number of customers who spent more than 37 minutes in the store. (5)

(Total 15 marks)