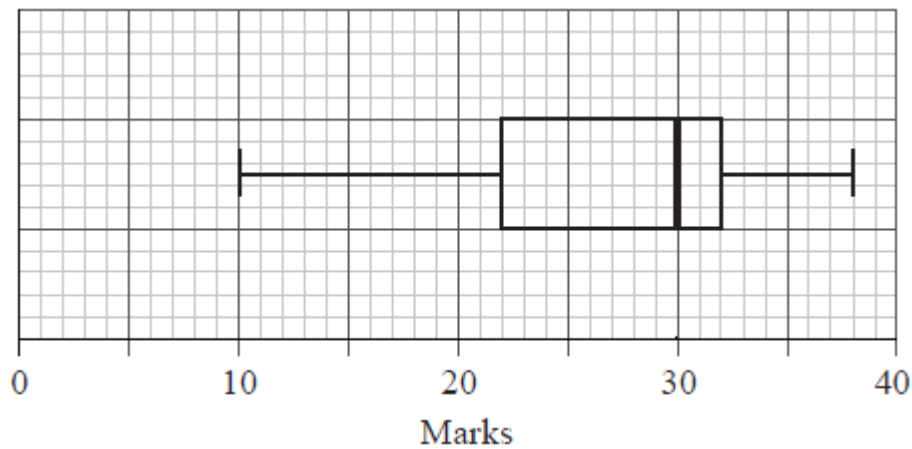**Univariate Statistics Review Packet**

1. 56 students were given a test out of 40 marks. The teacher used the following box and whisker plot to represent the marks of the students.

Marks

(a) Write down

(i) the median mark;

(ii) the 75th percentile mark;

(iii) the range of marks.

(4)

(b) Estimate the number of students who achieved a mark greater than 32.

(2)
(Total 6 marks)

2. The weights of 90 students in a school were recorded. The information is displayed in the following table.

Weight (kg)	Number of students
$40 \leq w < 50$	7
$50 \leq w < 60$	28
$60 \leq w < 70$	35
$70 \leq w < 80$	20

(a) Write down the mid interval value for the interval $50 \leq w < 60$.

(1)

(b)   Use your graphic display calculator to find an estimate for

(i)   the mean weight;

(ii)   the standard deviation.

(3)

(c)   Find the weight that is 3 standard deviations below the mean.

(2)
(Total 6 marks)

3.   The temperatures in °C, at midday in Geneva, were measured for eight days and the results are recorded below.
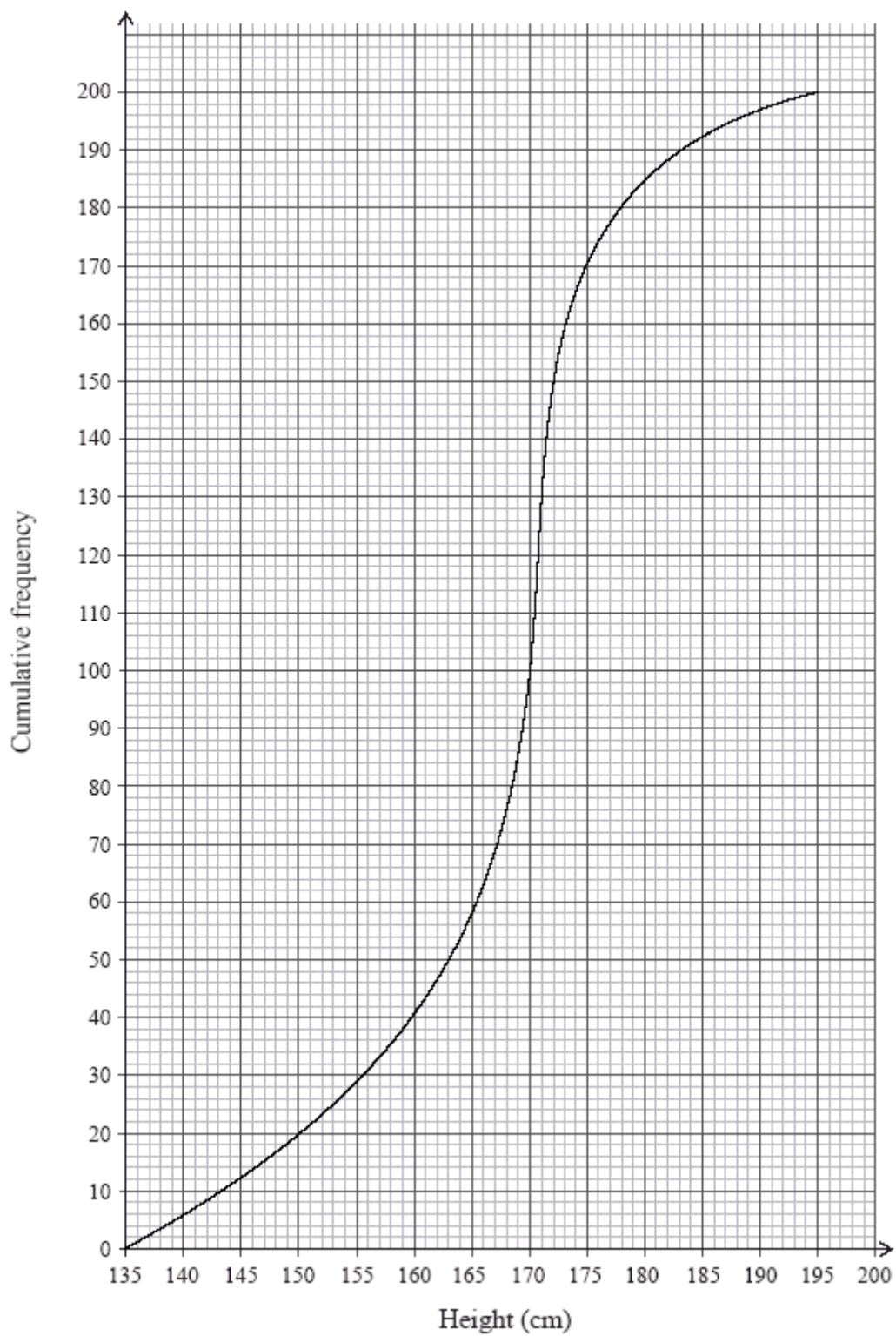
$$7, 4, 5, 4, 8, T, 14, 4$$

The mean temperature was found to be 7 °C.

(a)   Find the value of T.

(3)

(b)   Write down the mode.

(1)

(c)   Find the median.

(2)
(Total 6 marks)

È4. A cumulative frequency graph is given below which shows the height of students in a school.

(a)   Write down the median height of the students.

(1)

(b)   Write down the 25th percentile.

(1)

(c)   Write down the 75th percentile.

(1)

The height of the tallest student is 195 cm and the height of the shortest student is 136 cm.

(d)   Draw a box and whisker plot on the grid below to represent the heights of the students in the school.

135 140 145 150 155 160 165 170 175 180 185 190 195 200

Height (cm)
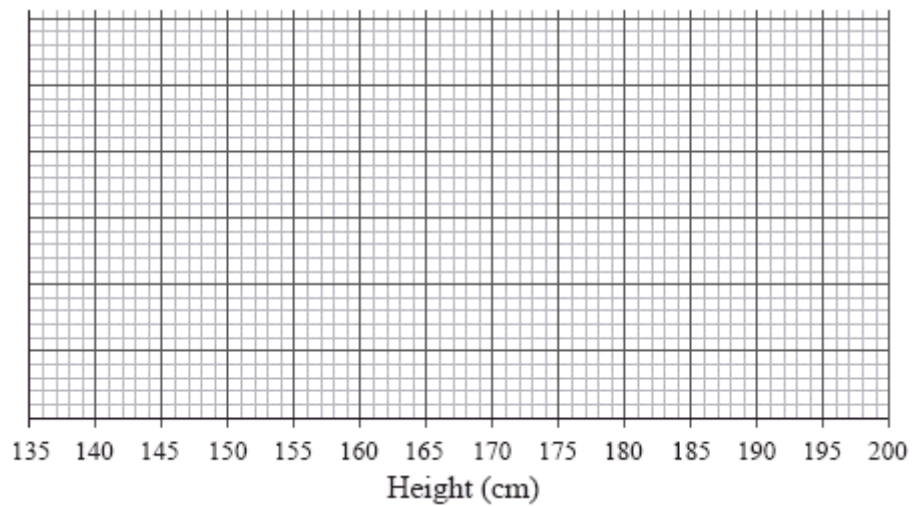
(3)
(Total 6 marks)

5. The grades obtained by a group of 20 IB students are listed below:

6	2	5	3	5	5	6	2	6	1
7	6	2	4	2	4	3	4	5	6

(a) Complete the following table for the grades obtained by the students.

Grade	Frequency
1	
2	
3	2
4	
5	4
6	
7	1

(2)

(b) Write down the modal grade obtained by the students.

(1)

(c) Calculate the median grade obtained by the students.

(2)

One student is chosen at random from the group.

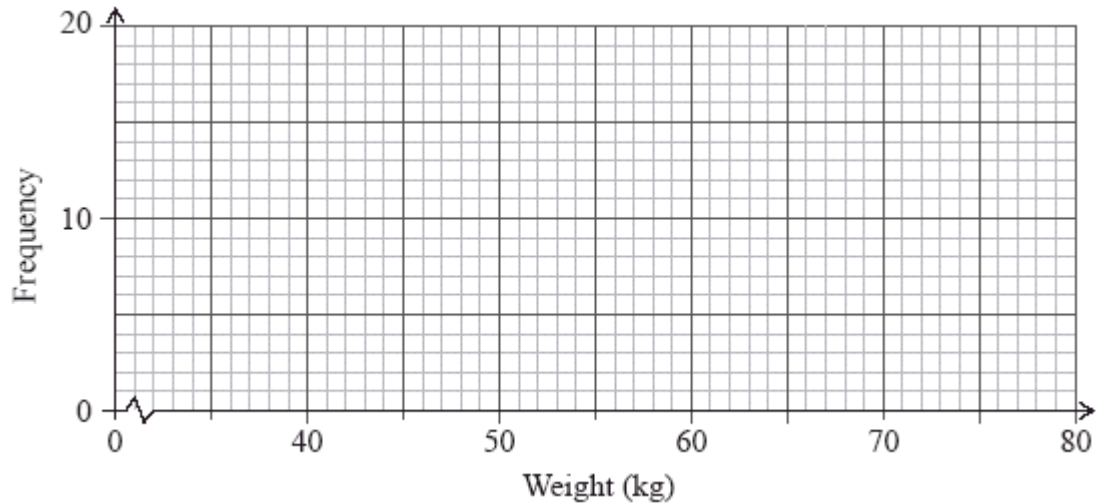(d) Find the probability that this student obtained either grade 4 or grade 5.

(1)
(Total 6 marks)

. The distribution of the weights, correct to the nearest kilogram, of the members of a football club is shown in the following table.

Weight (kg)	40 – 49	50 – 59	60 – 69	70 – 79
Frequency	6	18	14	4

(a) On the grid below draw a histogram to show the above weight distribution.

(2)

(b) Write down the mid-interval value for the 40 – 49 interval.

(1)

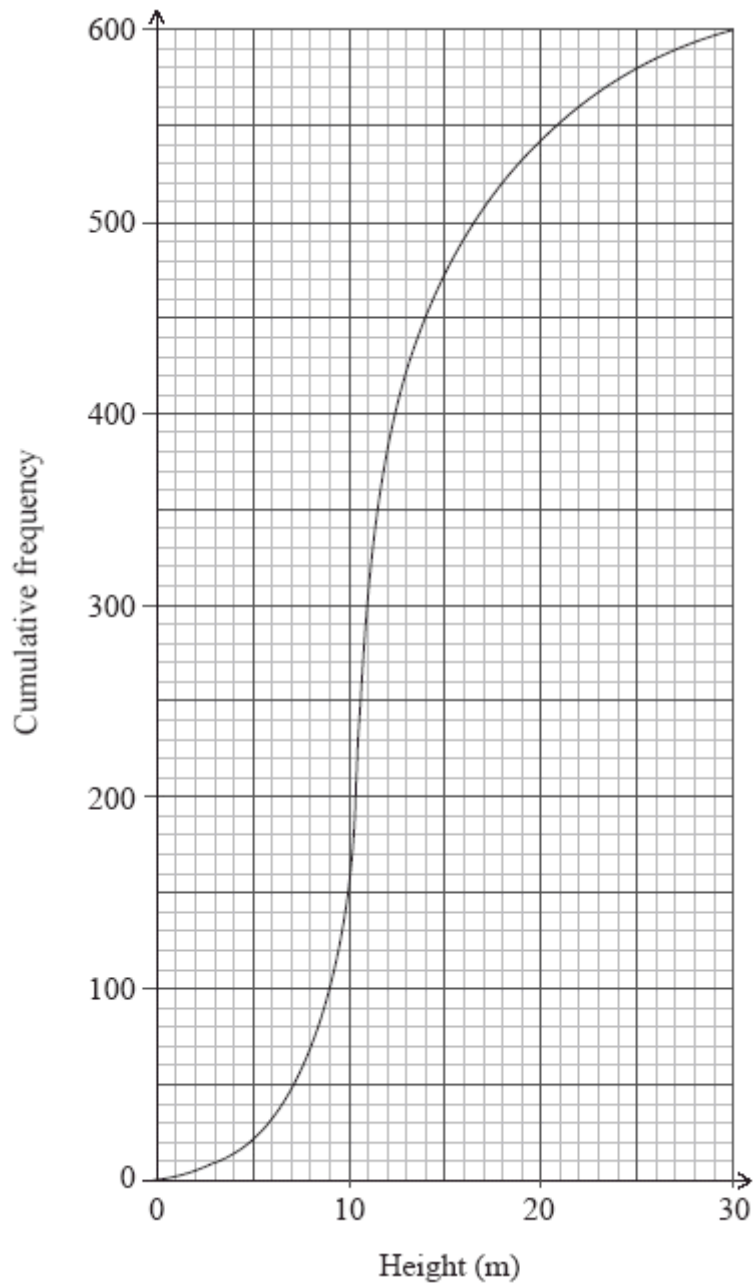(c) Find an estimate of the mean weight of the members of the club.

(2)

(d) Write down an estimate of the standard deviation of their weights.

(1)
(Total 6 marks)

7. The diagram below shows the cumulative frequency distribution of the heights in metres of 600 trees in a wood.

Height (m)

(a) Write down the median height of the trees.

(1)

(b) Calculate the interquartile range of the heights of the trees.

(2)

(c)   Given that the smallest tree in the wood is 3 m high and the tallest tree is 28 m high, draw the box and whisker plot on the grid below that shows the distribution of trees in the wood.

Height (m)
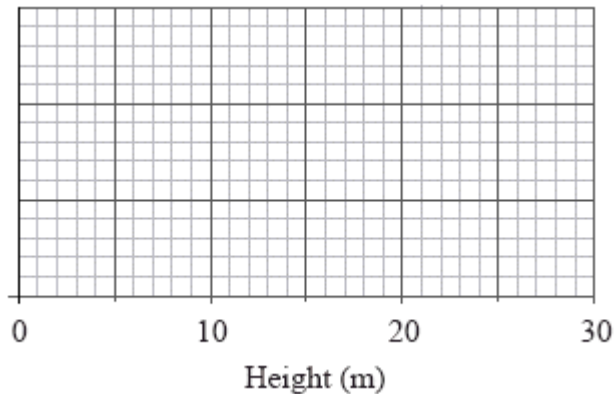
(3)
(Total 6 marks)

8.   A random sample of 167 people who own mobile phones was used to collect data on the amount of time they spent per day using their phones. The results are displayed in the table below.

Time spent per day (t minutes)	$0 \leq t < 15$	$15 \leq t < 30$	$30 \leq t < 45$	$45 \leq t < 60$	$60 \leq t < 75$	$75 \leq t < 90$
Number of people	21	32	35	41	27	11

(a)   State the modal group.

(1)

(b)   Use your graphic display calculator to calculate approximate values of the mean and standard deviation of the time spent per day on these mobile phones.

(3)

(c)   On graph paper, draw a fully labelled histogram to represent the data.

(4)
(Total 8 marks)

9. The birth weights, in kilograms, of 27 babies are given in the diagram below.

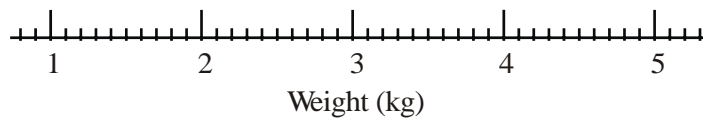| 1	7, 8, 9	key 1$\mid$7 = 1.7 kg
2	1, 2, 2, 3, 5, 5, 7, 8, 9	
3	0, 1, 3, 4, 5, 5, 6, 6, 7, 9	
4	1, 1, 2, 3, 7	

(a) Calculate the mean birth weight.

(2)

(b) Write down:
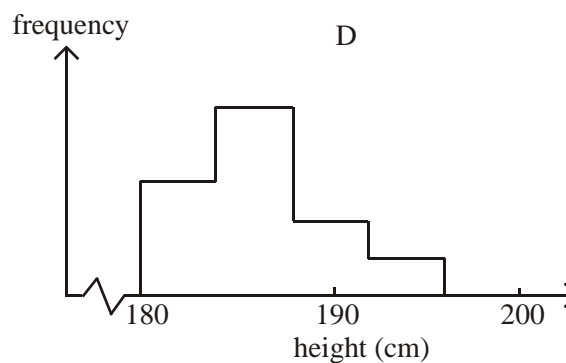
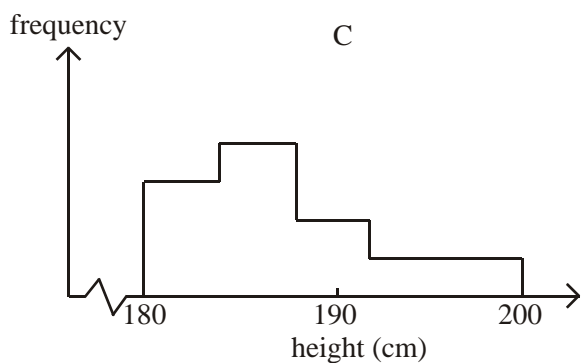(i) the median weight;

(1)

(ii) the upper quartile.

(1)

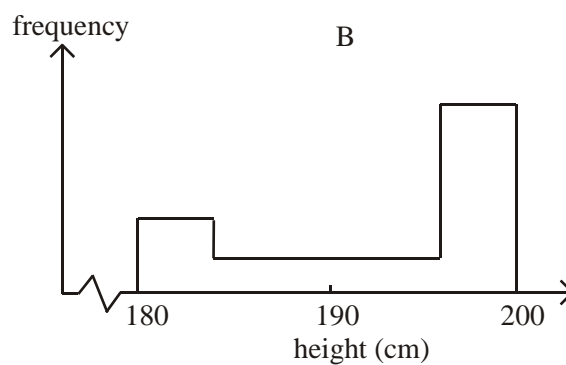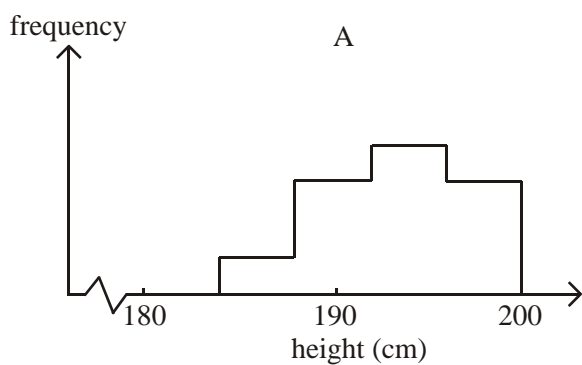The lower quartile is 2.3 kg.

(c) On the scale below draw a box and whisker diagram to represent the birth weights.

(2)

Weight (kg)

(Total 6 marks)

10. The heights in cm of the members of 4 volleyball teams A, B, C and D were taken and represented in the frequency histograms given below.

The mean $\bar{x}$ and standard deviation σ of each team are shown in the following table.

	I	II	III	IV
$\bar{x}$	194	189	188	195
σ	6.50	4.91	3.90	3.74

Match each pair of $\bar{x}$ and σ (I, II, III, or IV) to the correct team (A, B, C or D).

| $\bar{x}$ and σ	Team
I	
II	
III	
IV	

(Total 6 marks)

11.   The following stem and leaf diagram gives the weights in kg of 34 eight year-old children.

| Stem	Leaf
26	1, 2
27	2, 4, 4
28	0, 1, 6, 6
29	2, 2, 4, 4, 5
30	0, 1, 2, t, 6, 8, 8, 9
31	3, 3, 5, 6, 6
32	1, 3, 5, 5, 8
33	0, 4

Key: 26 | 1 reads 26.1kg

(a)   The median weight is 30.3 kg. Find the value of t.

(b)   Write down the lower quartile weight.

(c)   The value of the upper quartile is 31.6 kg and there are no outliers. Draw a box and whisker plot of the data using the axis below.

26   27   28   29   30   31   32   33   34   Weight (kg)
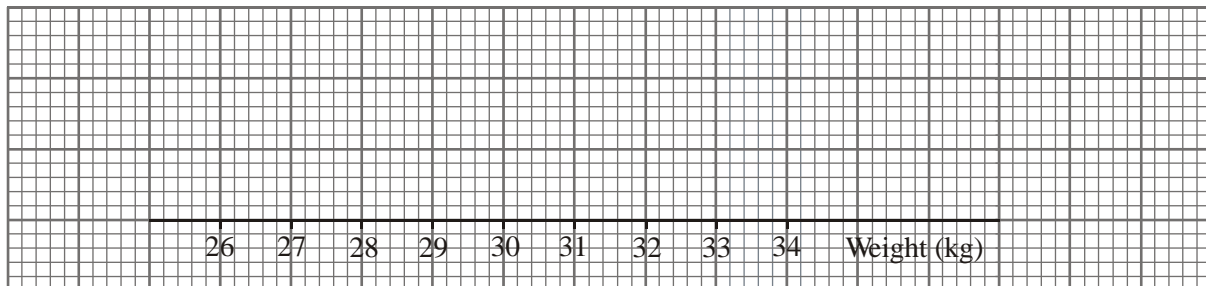
(Total 6 marks)

12. (a) The exam results for 100 boys are displayed in the following diagram:
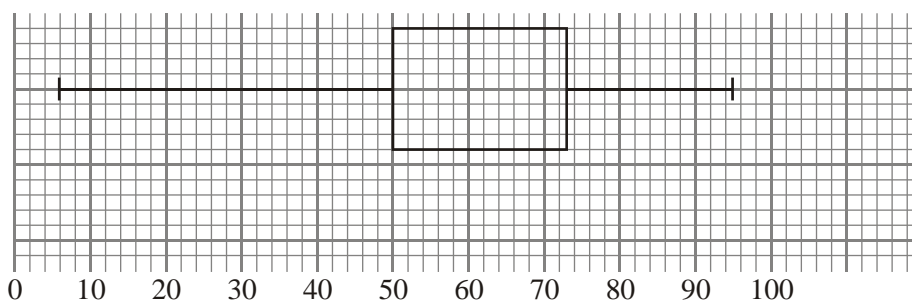
   (i) Find the range of the results.

   (ii) Find the interquartile range.

   (iii) Write down the median.

(b) The exam results for 100 girls are displayed in the diagram below:
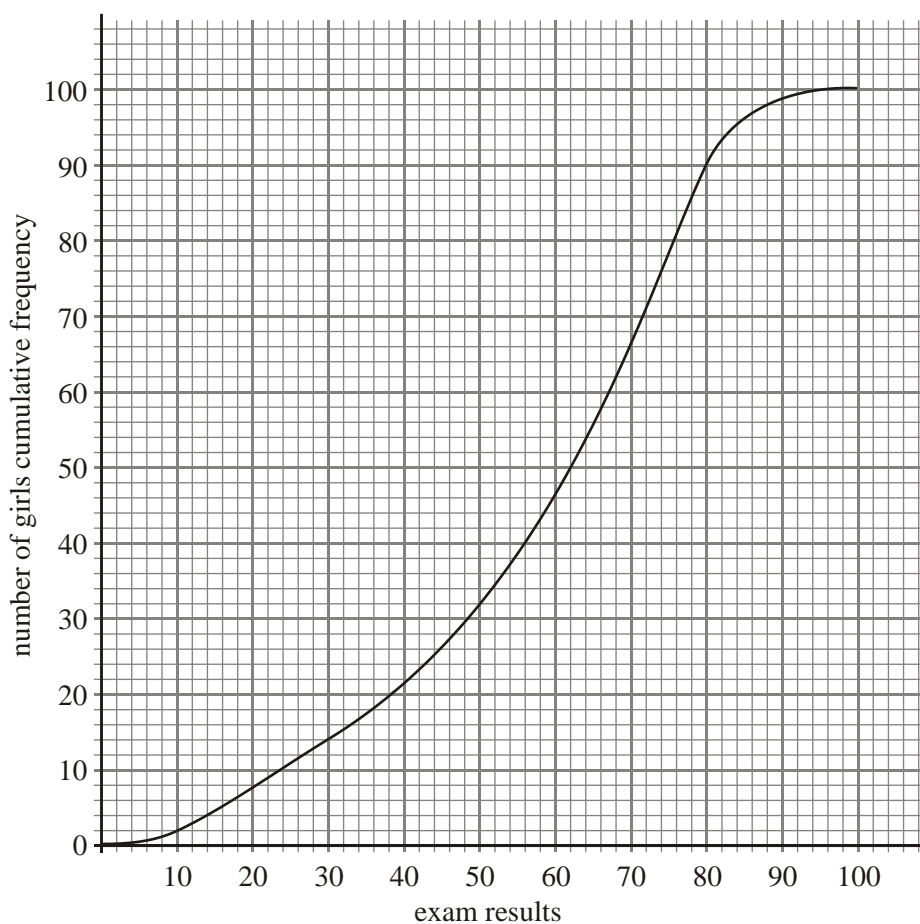
   (i) Write down the median.

   (ii) Find the inter quartile range.

(c) Write down the set of results that are the most spread out and give a reason for your answer.

(Total 6 marks)

13. The following results give the heights of sunflowers in centimetres.

180	184	195	177	175	173	169	167	197	173	166	183	161
195	177
192	161	165

Represent the data by a stem and leaf diagram.

(Total 6 marks)

14. The age in months at which a child first starts to walk is observed for a random group of children from a town in Brazil. The results are

$$14.3, \quad 11.6, \quad 12.2, \quad 14.0, \quad 20.4, \quad 13.4, \quad 12.9, \quad 11.7, \quad 13.1.$$

(a) (i) Find the mean of the ages of these children.

    (ii) Find the standard deviation of the ages of these children.

(b) Find the median age.

(Total 6 marks)

15. The following histogram shows the house prices in thousands of Australian dollars (AUD) of a random sample of houses in a certain town in Australia.
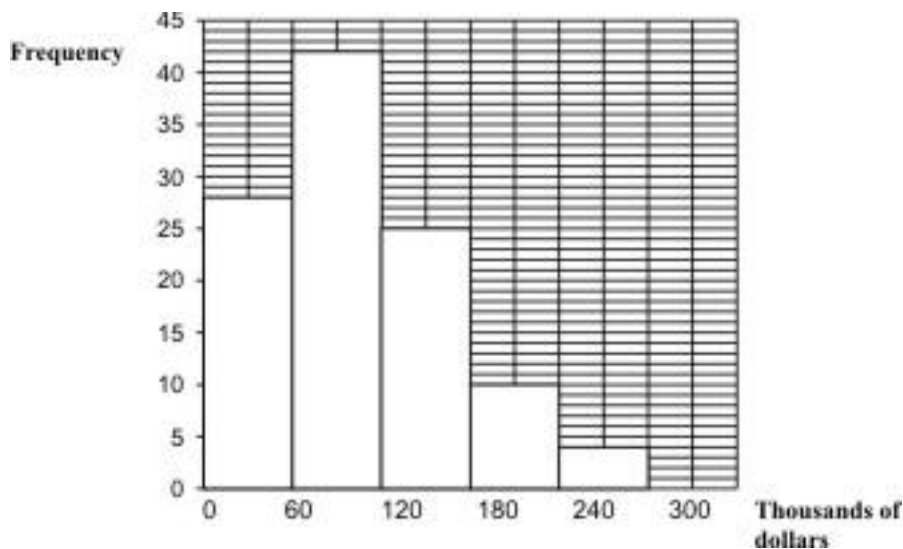

(a) How many houses are there in the sample?

(b) Write down the modal group for house prices.

(c) Find the probability of choosing a house at random that costs less than 60 000 AUD or more than 240 000 AUD.

(d) Given that a house costs more than 120 000 AUD, find the probability that it costs between 180 000 and 240 000 AUD.

(Total 6 marks)

16. The following stem and leaf diagram gives the heights in cm of 39 schoolchildren.

Stem	Leaf
13	2, 3, 3, 5, 8,
14	1, 1, 1, 4, 5, 5, 9,
15	3, 4, 4, 6, 6, 7, 7, 7, 8, 9, 9,
16	1, 2, 2, 5, 6, 6, 7, 8, 8,
17	4, 4, 4, 5, 6, 6,
18	0,

Key | 2 represents 132
13 | cm.

(a) (i) State the lower quartile height.

  (ii) State the median height.

  (iii) State the upper quartile height.

(b) Draw a box and whisker plot of the data using the axis below.

height in cm
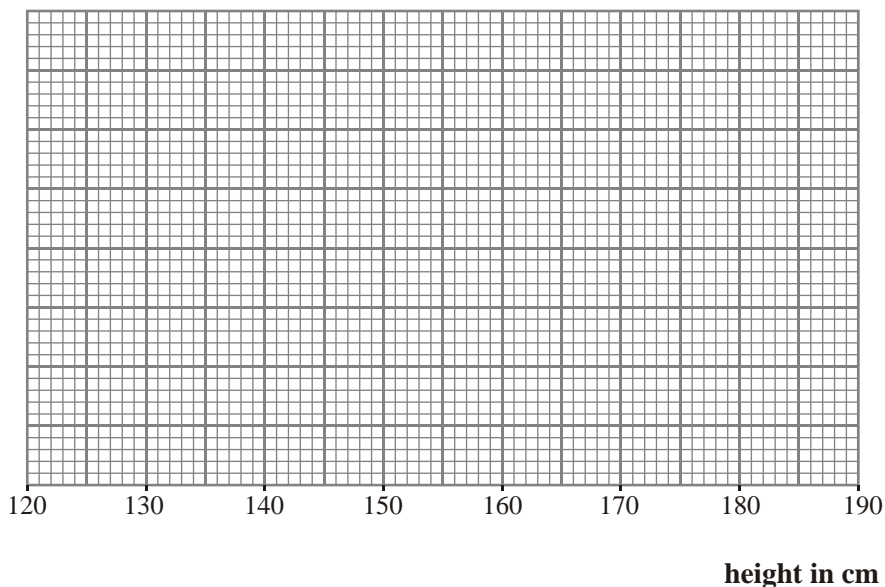
(Total 6 marks)

17. The cumulative frequency graph has been drawn from a frequency table showing the time it takes a number of students to complete a computer game.
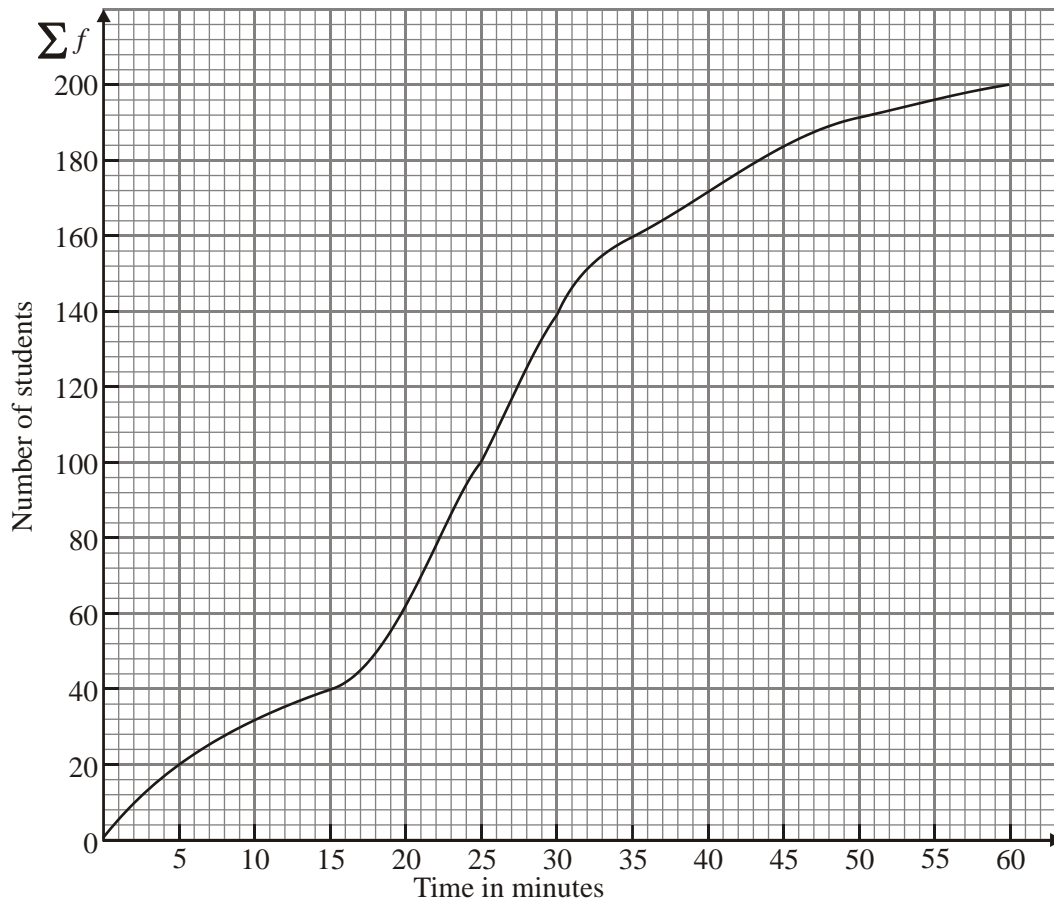
(a) From the graph find

(i) the median time;

(ii) the interquartile range.

(5)

The graph has been drawn from the data given in the table below.

Time in minutes	Number of students
$0 < x \leq 5$	20
$5 < x \leq 15$	20
$15 < x \leq 20$	p
$20 < x \leq 25$	40
$25 < x \leq 35$	60
$35 < x \leq 50$	q
$50 < x \leq 60$	10

(b)   Using the graph, find the values of p and q.

(2)

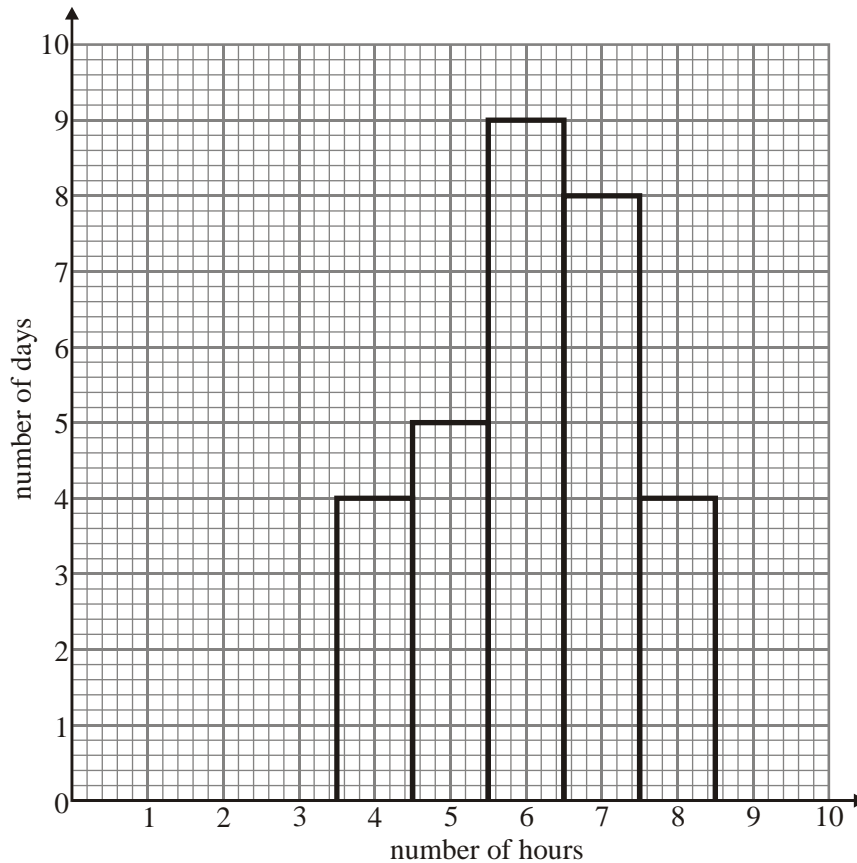(c)   Calculate an estimate of the mean time taken to finish the computer game.

(4)
(Total 11 marks)

18.   The number of hours that a professional footballer trains each day in the month of June is represented in the following histogram.

(a)   Write down the modal number of hours trained each day.

(b)   Calculate the mean number of hours he trains each day.

(Total 8 marks)

19. The heights of 200 students are recorded in the following table.

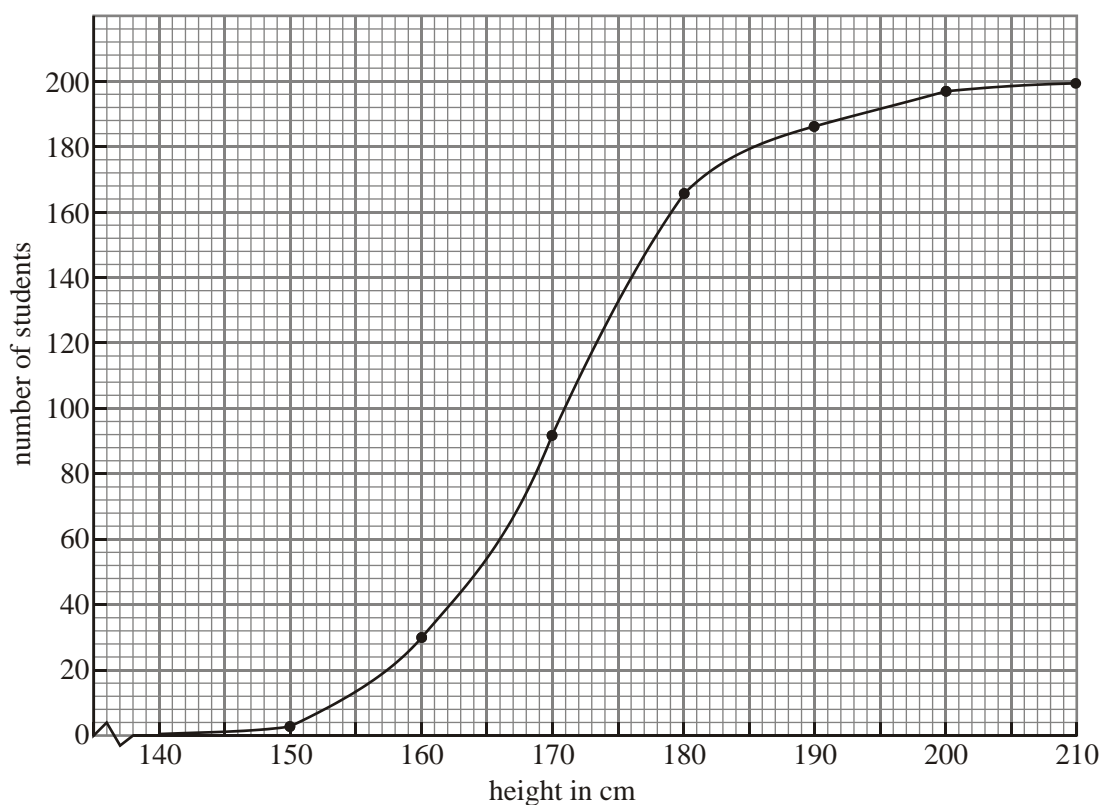| Height (h) in cm	Frequency
$140 \le h < 150$	2
$150 \le h < 160$	28
$160 \le h < 170$	63
$170 \le h < 180$	74
$180 \le h < 190$	20
$190 \le h < 200$	11
$200 \le h < 210$	2

(a) Write down the modal group.

(1)

(b) Calculate an estimate of the mean and standard deviation of the heights.

(4)

The cumulative frequency curve for this data is drawn below.

(c) Write down the median height.

(1)

(d) The upper quartile is 177.3 cm. Calculate the interquartile range.

(2)

(e) Find the percentage of students with heights less than 165 cm.

(2)
(Total 10 marks)

20. The cumulative frequency graph below shows the examination scores of 80 students.
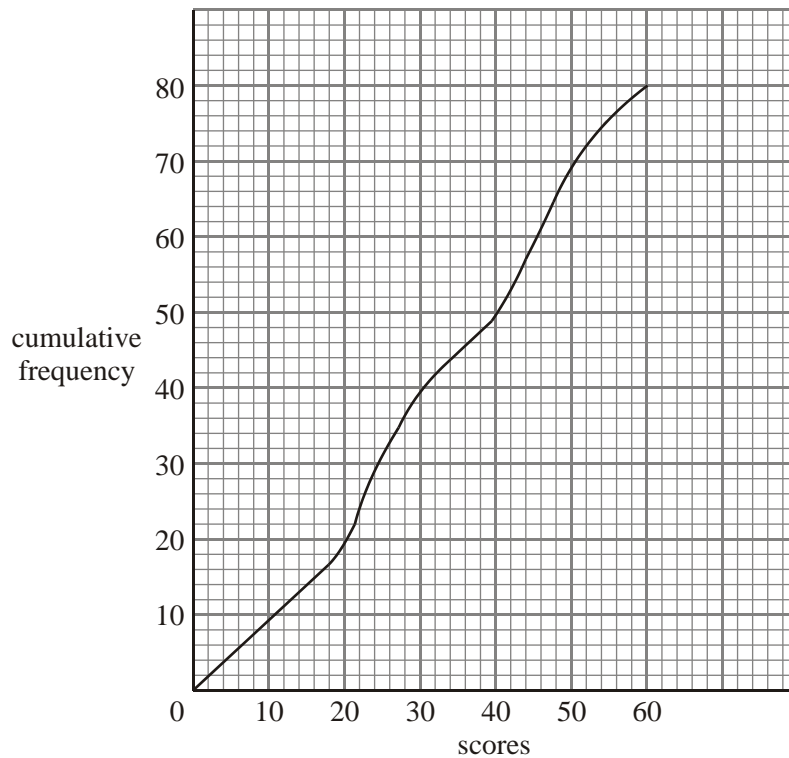
From the graph find

(a) the median value;

(b) the interquartile range;

(c) the 35th percentile;

(d) the percentage of students who scored 50 or above on this examination.

(Total 8 marks)

21. The weight in kilograms of 12 students in a class are as follows.

$$63 \quad 76 \quad 99 \quad 65 \quad 63 \quad 51 \quad 52 \quad 95 \quad 63 \quad 71 \quad 65 \quad 83$$

(a) State the mode.

(1)

(b) Calculate

    (i) the mean weight;

    (ii) the standard deviation of the weights.

(2)

When one student leaves the class, the mean weight of the remaining 11 students becomes 70 kg.

(c) Find the weight of the student who left.

(2)
(Total 5 marks)

22. The table below shows the percentage, to the nearest whole number, scored by candidates in an examination.

Marks (%)	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–100
Frequency	2	7	8	13	24	30	6	5	3	2

The following is the cumulative frequency table for the marks.

Marks (%)	Cumulative frequency
< 9.5	2
< 19.5	9
< 29.5	s
< 39.5	30
< 49.5	54
< 59.5	84
< 69.5	t
< 79.5	95
< 89.5	98
< 100	100

(a) Calculate the values of s and of t.

(2)

(b) Using a scale of 1 cm to represent 10 marks on the horizontal axis, and 1 cm to represent 10 candidates on the vertical axis, draw a cumulative frequency graph.

(3)

(c) Use your graph to estimate

    (i) the median mark;

    (ii) the lower quartile;

    (iii) the pass mark, if 40% of the candidates passed.

(4)
(Total 9 marks)

23. The bar chart below shows the number of people in a selection of families.
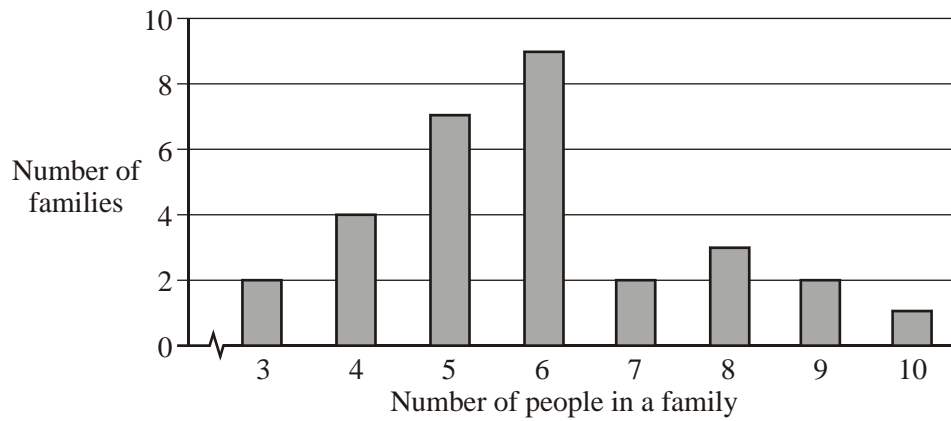
(a) How many families are represented?

(b) Write down the mode of the distribution.

(c) Find, correct to the nearest whole number, the mean number of people in a family.

(Total 4 marks)

24. The following table shows the times, to the nearest minute, taken by 100 students to complete a mathematics task.

Time (*t*) minutes	11–15	16–20	21–25	26–30	31–35	36–40
Number of students	7	13	25	28	20	7

(a) Construct a cumulative frequency table. (Use upper class boundaries 15.5, 20.5 and so on.)

(2)

(b) On graph paper, draw a cumulative frequency graph, using a scale of 2 cm to represent 5 minutes on the horizontal axis and 1 cm to represent 10 students on the vertical axis.

(3)

(c) Use your graph to estimate

(i) the number of students that completed the task in less than 17.5 minutes;

(ii) the time it will take for $\dfrac{3}{4}$ of the students to complete the task.

(2)
(Total 7 marks)

25. David looked at a passage from a book. He recorded the number of words in each sentence as shown in the following frequency table.

Class interval (number of words)	Frequency f
1–5	16
6–10	28
11–15	26
16–20	14
21–25	10
26–30	3
31–35	1
36–40	0
41–45	2

(a) Find the class interval in which the median lies.

(b) Estimate, **correct to the nearest whole number**, the mean number of words in a sentence.

(Total 4 marks)

26. For the set of {8, 4, 2, 10, 2, 5, 9, 12, 2, 6}

(a)   calculate the mean;

(b)   find the mode;

(c)   find the median.

(Total 4 marks)

27.   A marine biologist records as a frequency distribution the lengths (L), measured to the nearest centimetre, of 100 mackerel. The results are given in the table below.

Length of mackerel (L cm)	Number of mackerel
$27 < L \leq 29$	2
$29 < L \leq 31$	4
$31 < L \leq 33$	8
$33 < L \leq 35$	21
$35 < L \leq 37$	30
$37 < L \leq 39$	18
$39 < L \leq 41$	12
$41 < L \leq 43$	5
	100

(a)   Construct a cumulative frequency table for the data in the table.

(2)

(b)   Draw a cumulative frequency curve.

   Hint: Plot your cumulative frequencies at the top of each interval.

(3)

 (c)   Use the cumulative frequency curve to find an estimate, to the nearest cm for

   (i)   the median length of mackerel;

(2)

   (ii)   the interquartile range of mackerel length.

(2)
(Total 9 marks)

28. The table shows the number of children in 50 families.

Number of children	Frequency	Cumulative frequency
1	3	3
2	m	22
3	12	34
4	p	q
5	5	48
6	2	50
	T	

(a) Write down the value of T.

(b) Find the values of m, p and q.

(Total 4 marks)