Past Papers Questions - Cumulative Frequency

17. Rana did a survey about the heights of 120 Year 11 students.

The Cumulative Frequency table below shows some of the information that Rana collected.

Height (h cm)	Cumulative Frequency
$0 \leqslant h < 130$	4
$0 \leqslant h < 140$	10
$0 \leqslant h < 150$	14
$0 \leqslant h < 160$	22
$0 \leqslant h < 170$	66
$0 \leqslant h < 180$	102
$0 \leqslant h < 190$	114
$0 \leqslant h < 200$	120

(a) On the grid below, draw the cumulative frequency graph for this data.

(2 marks)

(b) Use the cumulative frequency graph to give an estimate for the median.

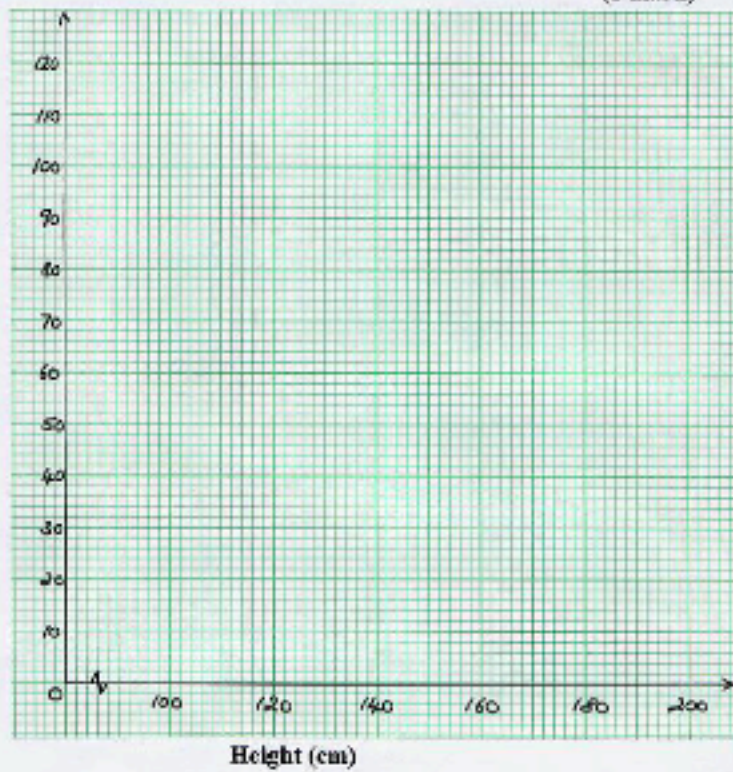..cm

(2 marks)

A survey of the heights of 200 Year 11 students from a different school gave a median height of 175 cm.

(c) Compare the heights of Year 11 students from Rana's school with the Heights of Year 11 students from the other school.

....

....

(1 mark)

Cumulative frequency

Height (cm)

16. During an athletics competition 100 students ran in a mini-marathon.

The table below shows information about the time (*t* minutes) it took for each student to finish the mini-marathon.

Time (*t* minutes)	Frequency
0 < t ≤ 10	14
10 < t ≤ 20	30
20 < t ≤ 30	38
30 < t ≤ 40	15
40 < t ≤ 50	3

(a) In the table below complete the cumulative frequency column.

Time (*t* minutes)	Cumulative frequency
0 < t ≤ 10	14
10 < t ≤ 20	
20 < t ≤ 30	
30 < t ≤ 40	
40 < t ≤ 50	

(b) On the grid below, draw a cumulative frequency graph to show this information.
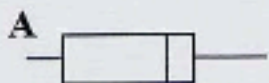
Cumulative frequency

Time (*t* minutes)
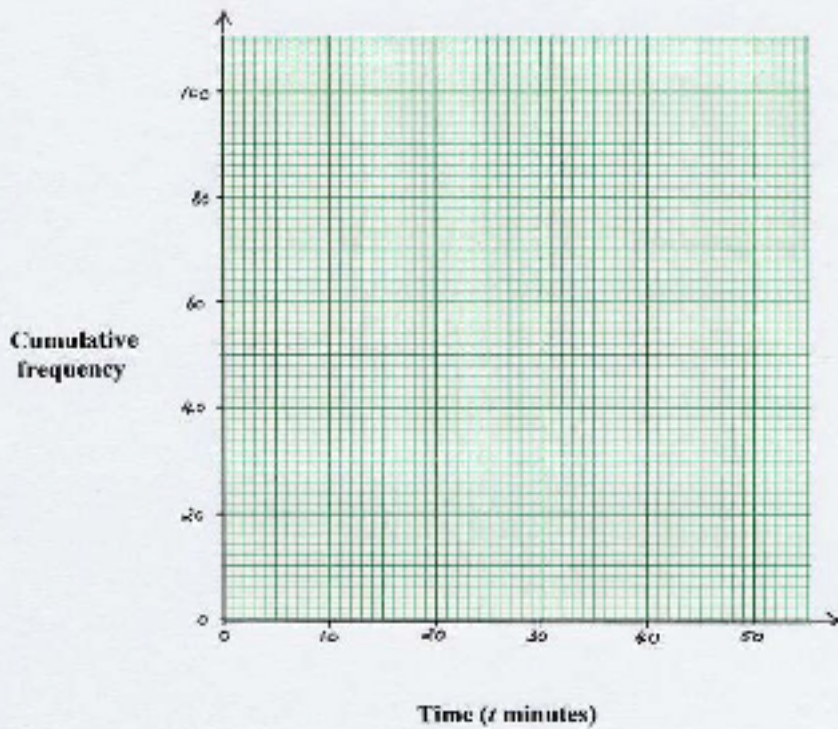
(2 marks)

(c) Use your graph to estimate the number of students who took *more* than 16 minutes to finish the mini-marathon.

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(2 marks)

16. Below are four box plots, A, B, C and D.

A

B

C

D
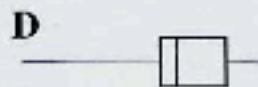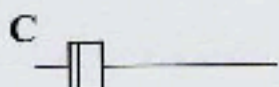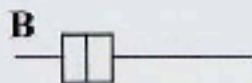
Below are four cumulative frequency diagrams, P, Q, R and S.

P

Q

R

S
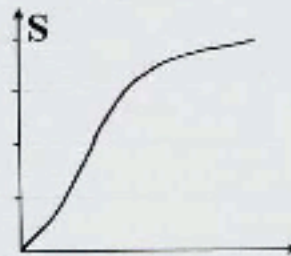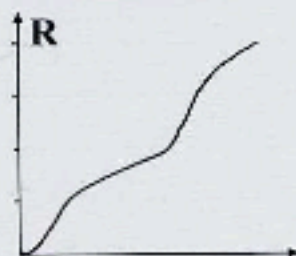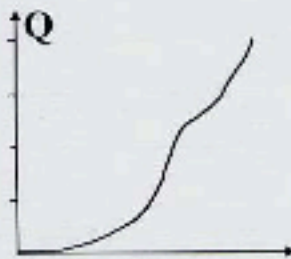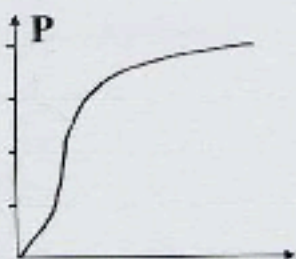
For each box plot, write down the letter of the matching cumulative frequency diagram.

A   and …………………………..

B   and …………………………..

C   and …………………………..

D   and …………………………..

(2 marks)

14. A lighting company tested 100 light-bulbs.

The table below shows how long (in hours) it took the light-bulbs to burn out.

Time (t hours)	Frequency
$500 \leqslant t < 550$	13
$550 \leqslant t < 600$	20
$600 \leqslant t < 650$	37
$650 \leqslant t < 700$	21
$700 \leqslant t < 750$	9

(a) Complete the cumulative frequency table below.

Time (t hours)	Cumulative frequency
$500 \leqslant t < 550$	13
$500 \leqslant t < 600$	
$500 \leqslant t < 650$	
$500 \leqslant t < 700$	
$500 \leqslant t < 750$	

(1 mark)

(b) Use your completed table to draw a cumulative frequency graph on the grid below.

(2 marks)

Cumulative frequency (y-axis, marked: 100, 80, 60, 40, 20, 0)

Time (t hours) (x-axis, marked: 500, 550, 600, 650, 700, 750, 800)
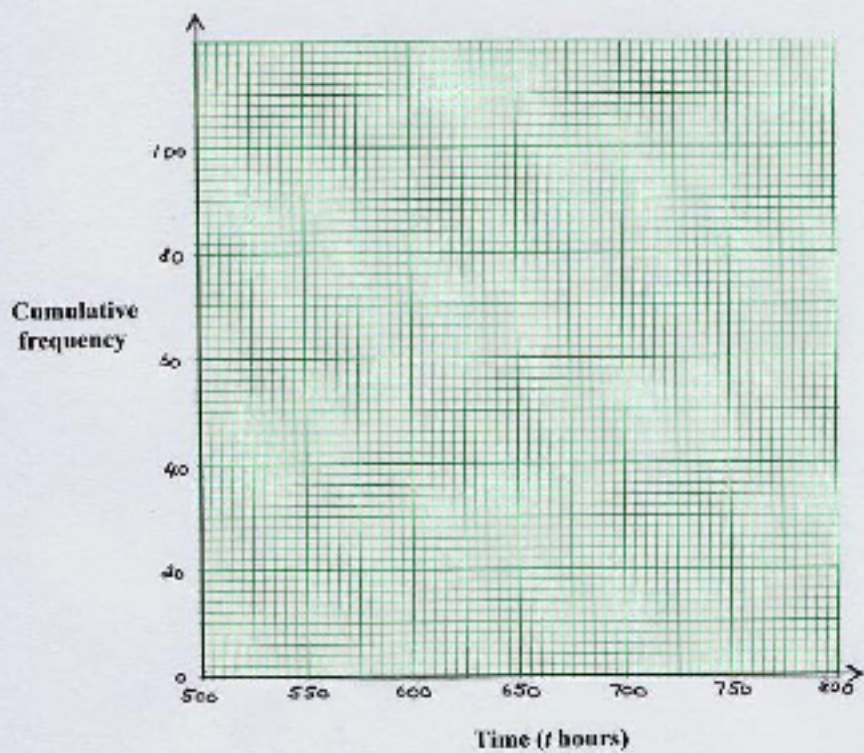
(4 marks)

(c) From your completed graph find an estimate of the median time.

........................hours.

(1 mark)

5. The table below shows information about the number of minutes that 270 pupils used their mobile phones on one day last week.

Number of minutes (m)	Frequency
$0 < m \leqslant 5$	25
$5 < m \leqslant 10$	55
$10 < m \leqslant 15$	70
$15 < m \leqslant 20$	75
$20 < m \leqslant 25$	30
$25 < m \leqslant 30$	15

(a) Calculate an estimate for the mean number of minutes that the pupils used their mobile phones.
Give your answer correct to 2 significant figures.

............................minutes

(4 marks)

(b) Complete the cumulative frequency table below.

Number of minutes (m)	Cumulative Frequency
$0 < m \leqslant 5$	25
$5 < m \leqslant 10$	
$10 < m \leqslant 15$	
$15 < m \leqslant 20$	
$20 < m \leqslant 25$	
$25 < m \leqslant 30$	

(1 mark)

(c) Using your results from part (b), draw a cumulative frequency graph on the grid below.

Cumulative Frequency

270
240
200
160
120
80
40

O   5   10   15   20   25   30
Number of minutes (*m*)
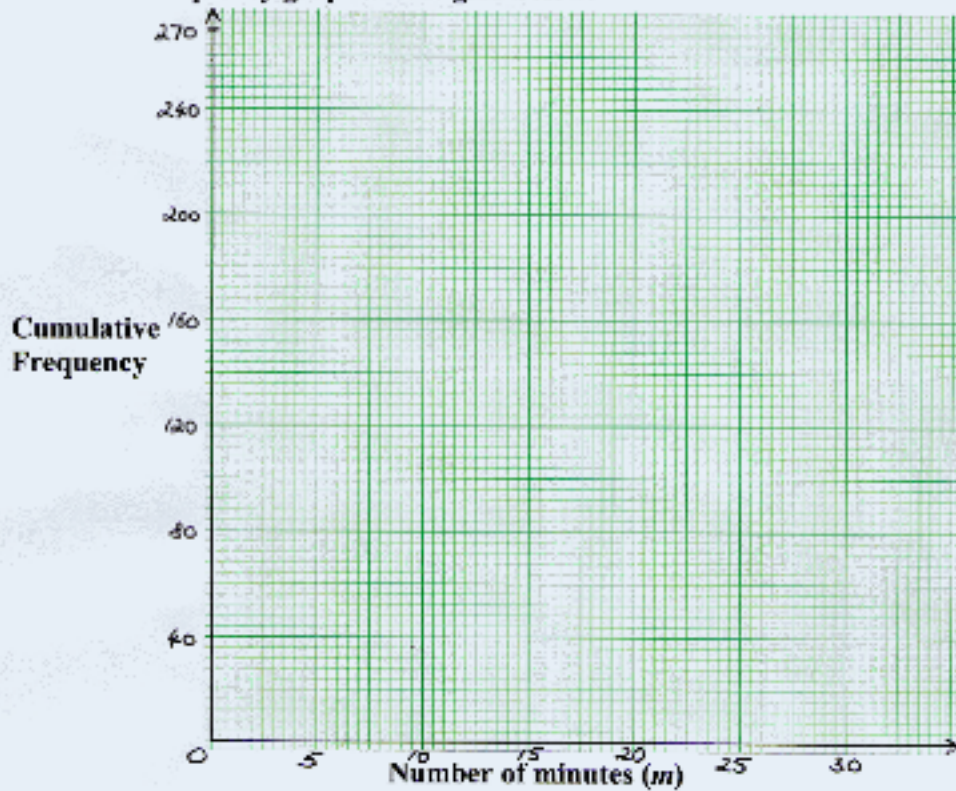
(2 marks)

(d) Use your graph to find an estimate of the number of pupils who used their mobile phones for more than 20 minutes on the day last week.

....

(2 marks)

13. 50 girls were each asked to record how many minutes it took them to complete a piece of maths homework.

The cumulative frequency graph below gives information about the times it took them to do this piece of homework.

Time in minutes
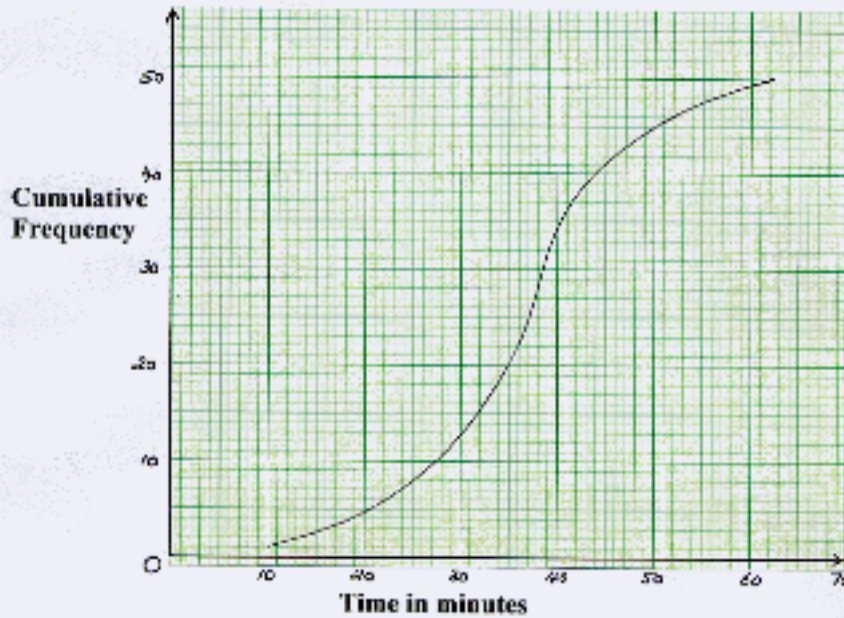
(a) Use the cumulative frequency graph to estimate the median time.

.....................mins

(1 mark)

For the girls –

the *minimum* time to complete the homework was 10 mins
the *maximum* time to complete the homework was 62 mins

(b) Use this information and the cumulative frequency graph
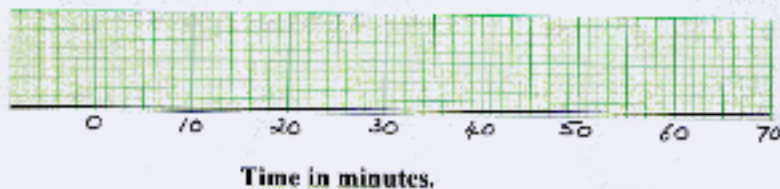to draw a box plot showing this information about the girls'
times.

Time in minutes.

(3 marks)

The box plot below shows information about the times taken
by 50 boys to complete the same piece of maths homework.

Time in minutes.
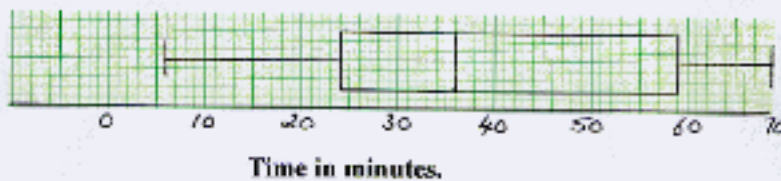
(c) Make two comparisons between the girls' times and the
boys' times.

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....

....

(2 marks)

10. The table below shows information about the lengths (in mm) of 100 earthworms.

Length (l mm) of earthworms	Frequency
$10 < l \leqslant 15$	5
$15 < l \leqslant 20$	9
$20 < l \leqslant 25$	35
$25 < l \leqslant 30$	31
$30 < l \leqslant 35$	17
$35 < l \leqslant 40$	3

(i) Which class interval contains the *median* length ?

....

(2 marks)

(ii) Complete the cumulative frequency table below.

Length (l mm) of earthworms	Cumulative Frequency
$10 < l \leqslant 15$	5
$15 < l \leqslant 20$	
$20 < l \leqslant 25$	
$25 < l \leqslant 30$	
$30 < l \leqslant 35$	
$35 < l \leqslant 40$	100

(1 mark)

(iii) On the graph paper below draw the cumulative frequency curve to represent this data.

Cumulative Frequency

Length of earthworms (*l* mm)
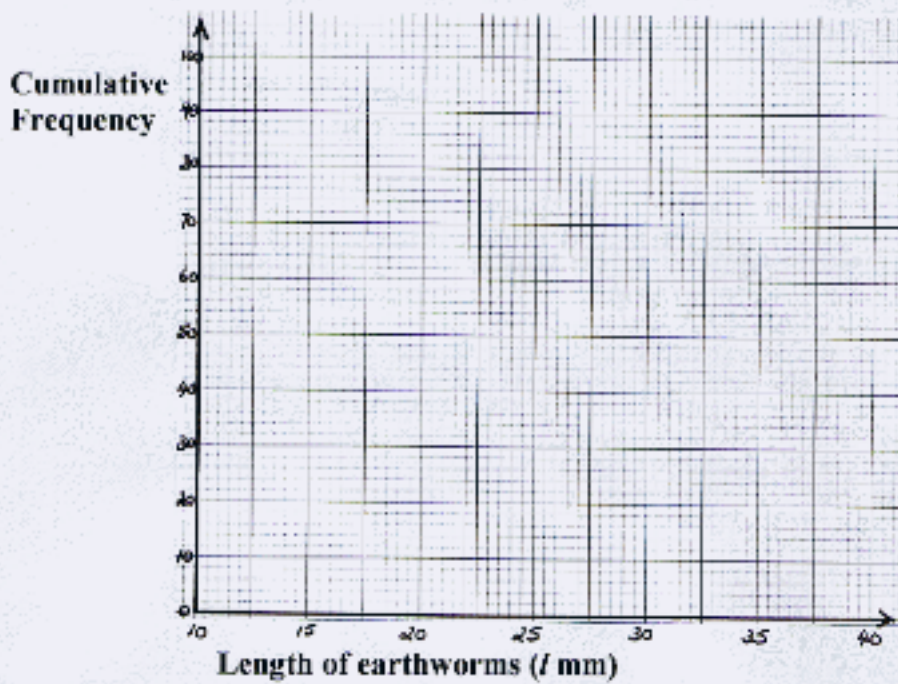
(iv) From your graph find an estimate for the interquartile range.

..................mm.

(v) From your graph estimate the number of earthworms with lengths less than 32.5 mm.

....

(3 marks)

7. Below is a grouped frequency table.
   It shows information about the lengths, in millimeters,
   of 200 earthworms.

Lengths (l) in mm	Frequency
$0 < l \leqslant 30$	1
$30 < l \leqslant 40$	3
$40 < l \leqslant 50$	17
$50 < l \leqslant 60$	69
$60 < l \leqslant 70$	80
$70 < l \leqslant 80$	30

(i) By using the above table, find an estimate of the
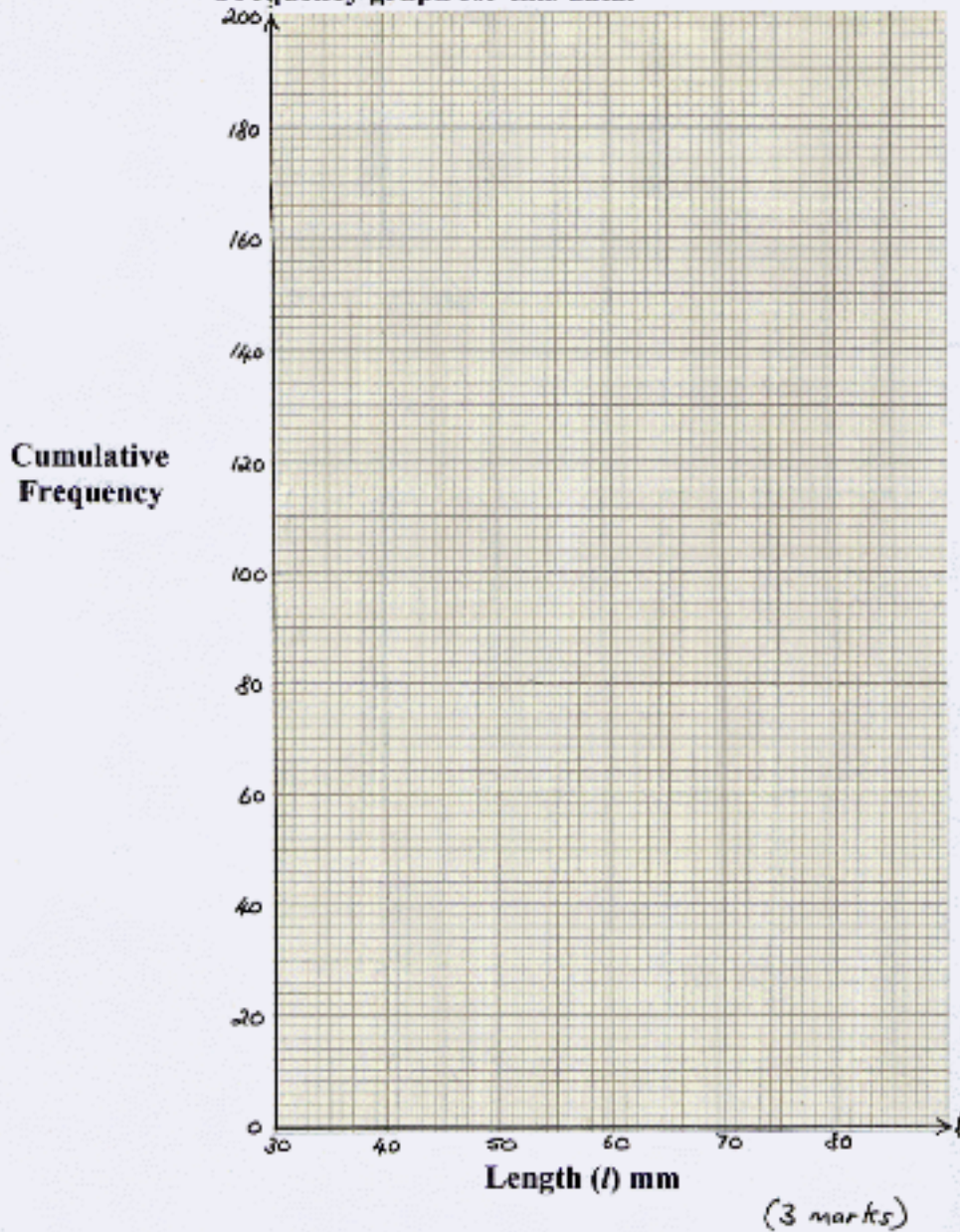   mean length of an earthworm.

.........................mm

(4 marks)

(ii) In the table below complete the column labelled
   'Cumulative Frequency'.

Length (l) in mm	Cumulative Frequency
$0 < l \leqslant 30$	1
$0 < l \leqslant 40$	
$0 < l \leqslant 50$	
$0 < l \leqslant 60$	
$0 < l \leqslant 70$	
$0 < l \leqslant 80$	

(2 marks)

(iii) On the graph paper below draw the Cumulative Frequency graph for this data.

Cumulative Frequency

Length (*l*) mm

(3 marks)

(iv) Use your graph to estimate the interquartile range of the lengths of the 200 earthworms.

...............mm

(2 marks)

14. On a week day, on a certain section of motorway, the speeds
    of 240 cars were recorded.

    The results are shown on the Cumulative Frequency
    graph opposite.

    The speed limit on this section of motorway was
    50 miles per hour.

    (i) Use the Cumulative Frequency graph to estimate
    the number of cars *over* the speed limit on this week day.

    ....

    (2 marks)

    At the week end, on the same section of motorway, the
    speed limit was changed. The speeds of another 240 cars
    were recorded and are given in the table below.

Speed (mph)	Cumulative Frequency
0 – 10	2
0 – 20	8
0 – 30	20
0 – 40	50
0 – 50	90
0 – 60	180
0 – 70	220
0 – 80	240

    (ii) On the graph paper opposite draw a Cumulative Frequency
    curve to show these results.   ....

    (2 marks)

    It was observed that the same number of cars were over
    the speed limit at the week end as were over the
    speed limit during the week.

    (iii) From your Cumulative Frequency curve estimate what the new
    speed limit was at the week end.   ....

    (2 marks)

10. Andy carried out an experiment in Biology.
He placed a mouse inside a maze and timed
how long it took to escape.
He plotted his results on the cumulative frequency
graph below.

   (i) How many times did Andy carry out the
       experiment?

       ....
       (1 mark)

   (ii) Use the cumulative frequency graph to find
        an estimate of the *median* time.

        ....mins
        (2 marks)

   (iii) Use the cumulative frequency graph to find
         what percentage of times were less than 35
         minutes.

         ....%
         (3 marks)