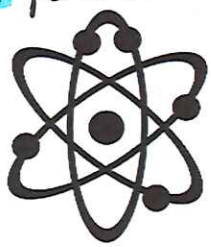
MATHSDIY

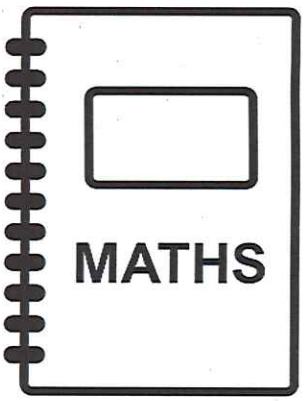
SOLUTIONS

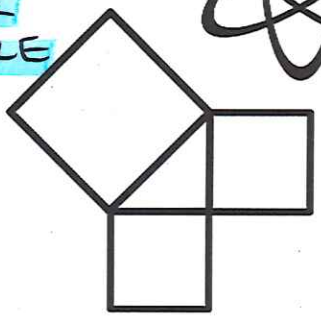
GCSE TOPIC BOOKLET
CUMULATIVE FREQUENCY

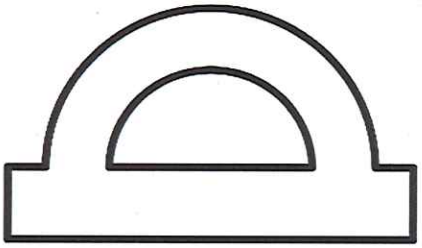
- MEDIAN - value at ½ way point.
- LOWER QUARTILE - value at ¼ way point.
- UPPER QUARTILE - value at ¾ way point.

- INTER QUARTILE RANGE = UPPER QUARTILE − LOWER QUARTILE

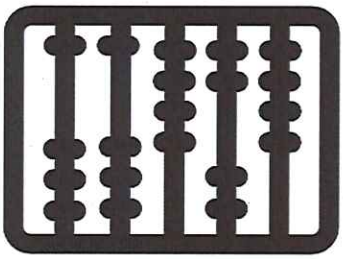


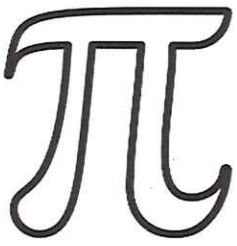


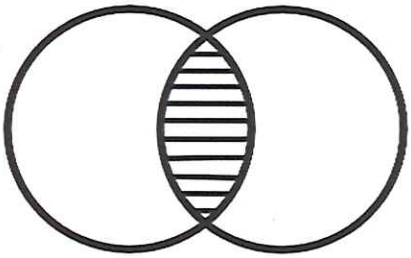


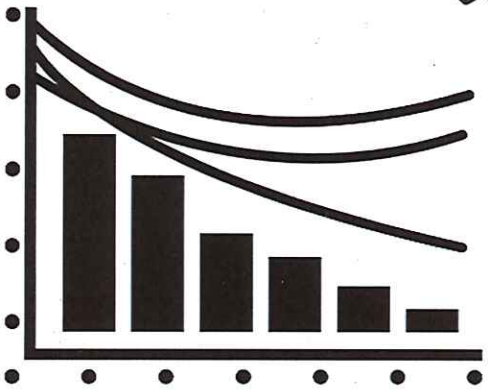


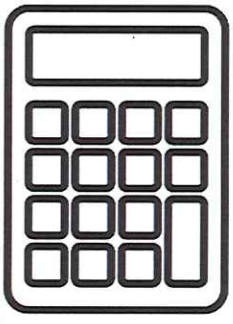
$a^2 = b^2 + c^2$

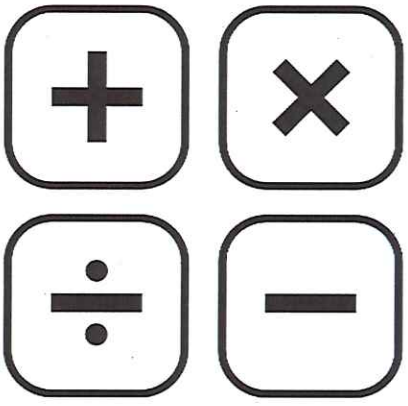




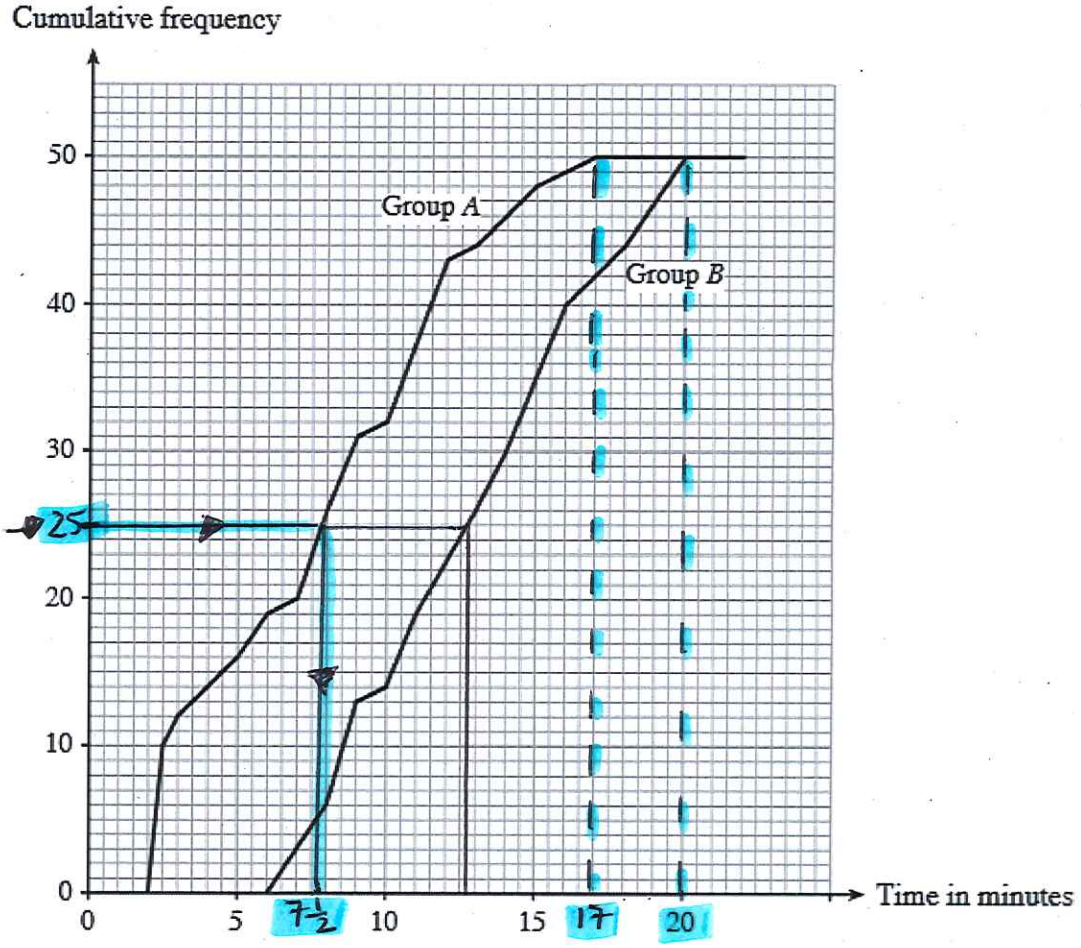








1. The cumulative frequency diagram shows the length of time taken by two different groups of 50 students, *A* and *B* to complete a task successfully.



Median = 25th student

(a) State which group of students, *A* or *B*, was quicker at successfully completing the task. Give a reason for your decision.

Group A were quicker. All 50 of group A had finished in 17 minutes, whereas the Group B students took 20 minutes before they had all finished.

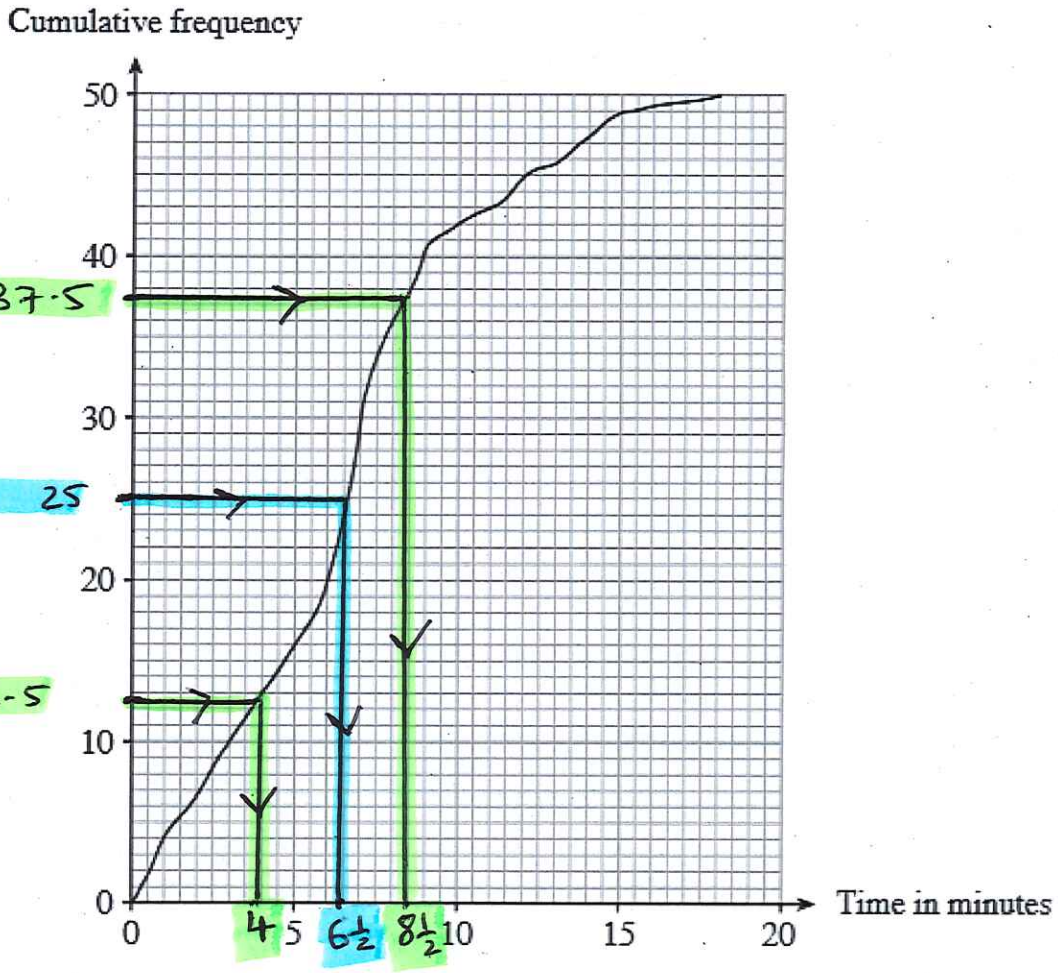
[2]

(b) State the median of the times taken for successfully completing the task for Group *A*.

7½ minutes (accept 7-8)

[1]

2. The time taken by each of 50 students to sew a button on a shirt was recorded. A summary of the results is shown in the cumulative frequency diagram.



upper quartile = 37·5

Median = 25

lower quartile = 12·5

(a) Estimate the median of the times taken by these students to sew a button on to a shirt.

6½ minutes

[1]

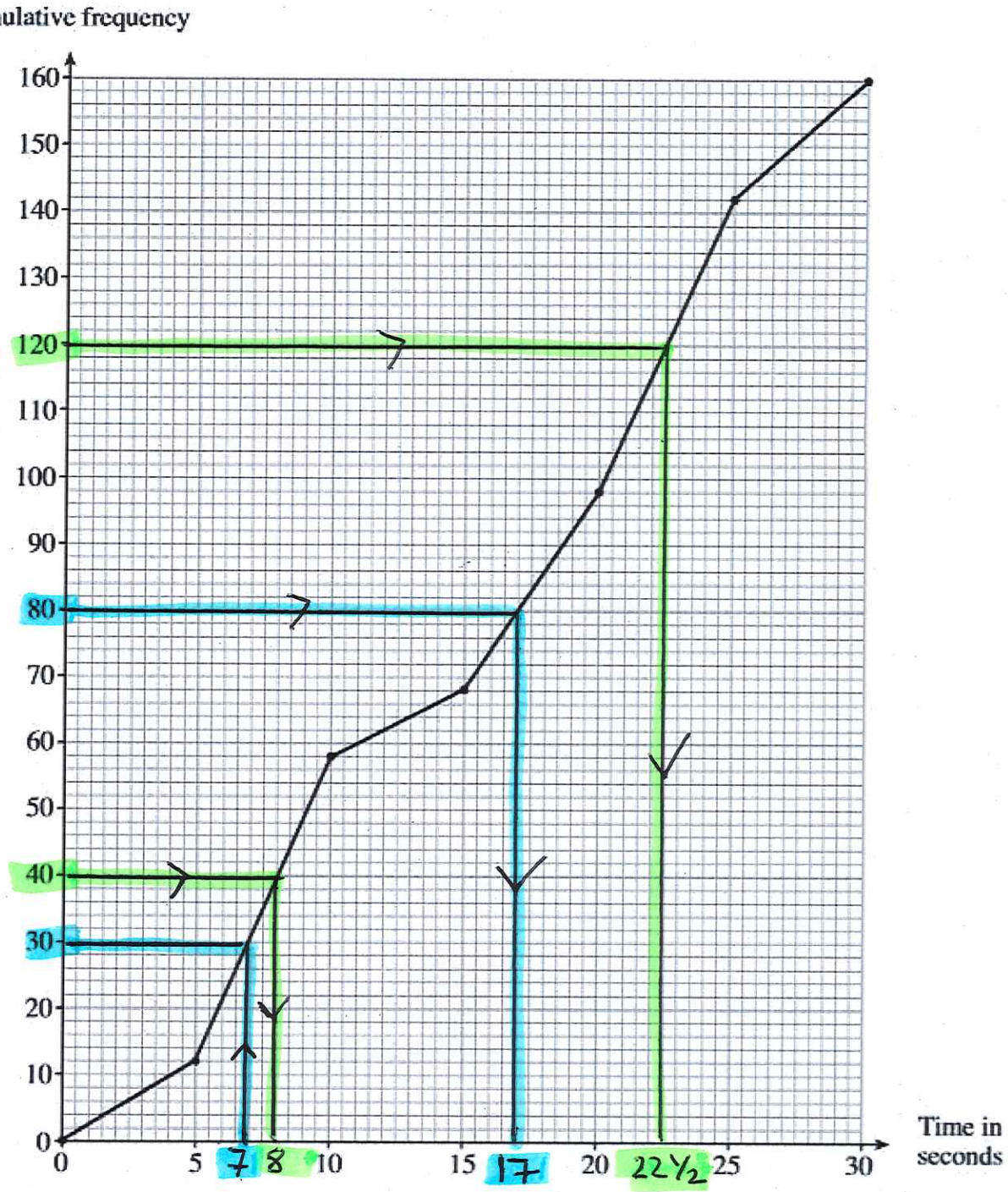
(b) Estimate the interquartile range for the times to sew a button on a shirt.

IQR = upper quartile − lower quartile

= 8½ − 4 = 4½ minutes

[2]

3. The times taken by one operator at a call centre to answer the telephone were recorded. The cumulative frequency diagram of the results is shown below.



Use the cumulative frequency diagram to find an estimate for

(a) the median,

17 seconds

[1]

(b) the inter-quartile range,

$= 22\frac{1}{2} - 8$

$= 14\frac{1}{2}$ seconds

[2]

(c) the number of calls that took longer than 7 seconds to be answered.

$= 160 - 30 =$ 130 calls

[2]

4. Customers collect reward points for shopping at a local supermarket.
The following table shows a grouped frequency distribution of the number of points collected by 60 different customers.

Number of points collected	1 - 20	21 - 40	41 - 60	61 - 80
Number of customers	4	12	34	10

(a) Complete the following cumulative frequency table.

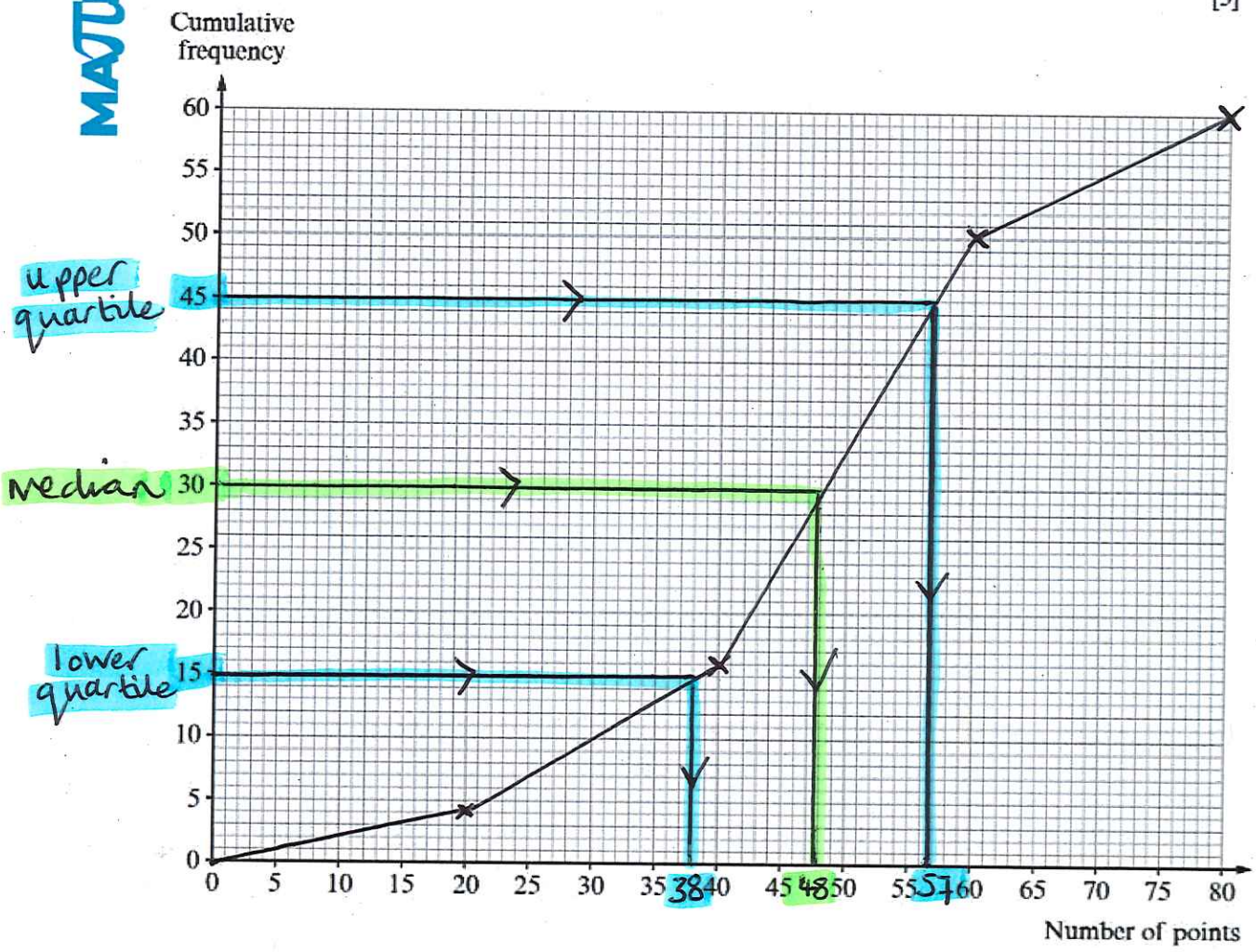
Number of points collected	$\leqslant 20$	$\leqslant 40$	$\leqslant 60$	$\leqslant 80$
Cumulative frequency	4	16	50	60

[1]

In the question we are told there are 60 customers so check your final entry is 60.

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

[3]



(c) Use your cumulative frequency diagram to find an estimate for

(i) the median,

48

(ii) the interquartile range.

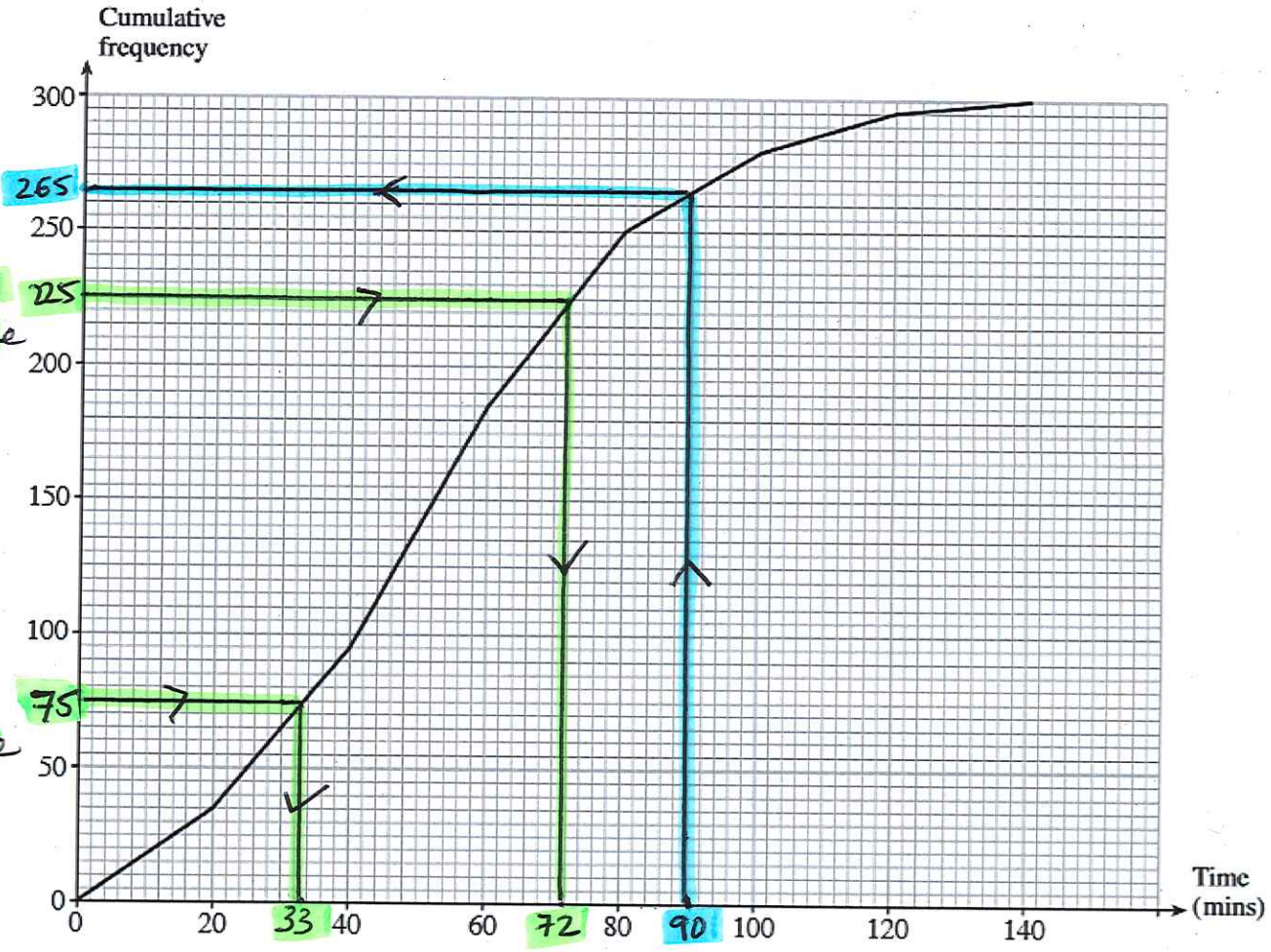
= upper quartile − lower quartile

= 57 − 38

= 19

[3]

5. The waiting times of 300 patients at an outpatients department were measured in minutes. Below is a cumulative frequency polygon of the results.



Use the cumulative frequency polygon to find an estimate for

(a) the inter-quartile range, = upper quartile − lower quartile

= 72 − 33

= 39

[2]

(b) how many patients had a waiting time greater than an hour and a half.

(90 minutes)

= 300 − 265 = 35

[2]

6. An intelligence test with a total possible score of 80 marks was given to 60 students.
The following table shows a grouped frequency distribution of their results.

Score on the test	0 - 19	20 - 39	40 - 59	60 - 79
Number of students	5	10	35	10

Notice that no student scored full marks in the intelligence test.

(a) Complete the following cumulative frequency table.

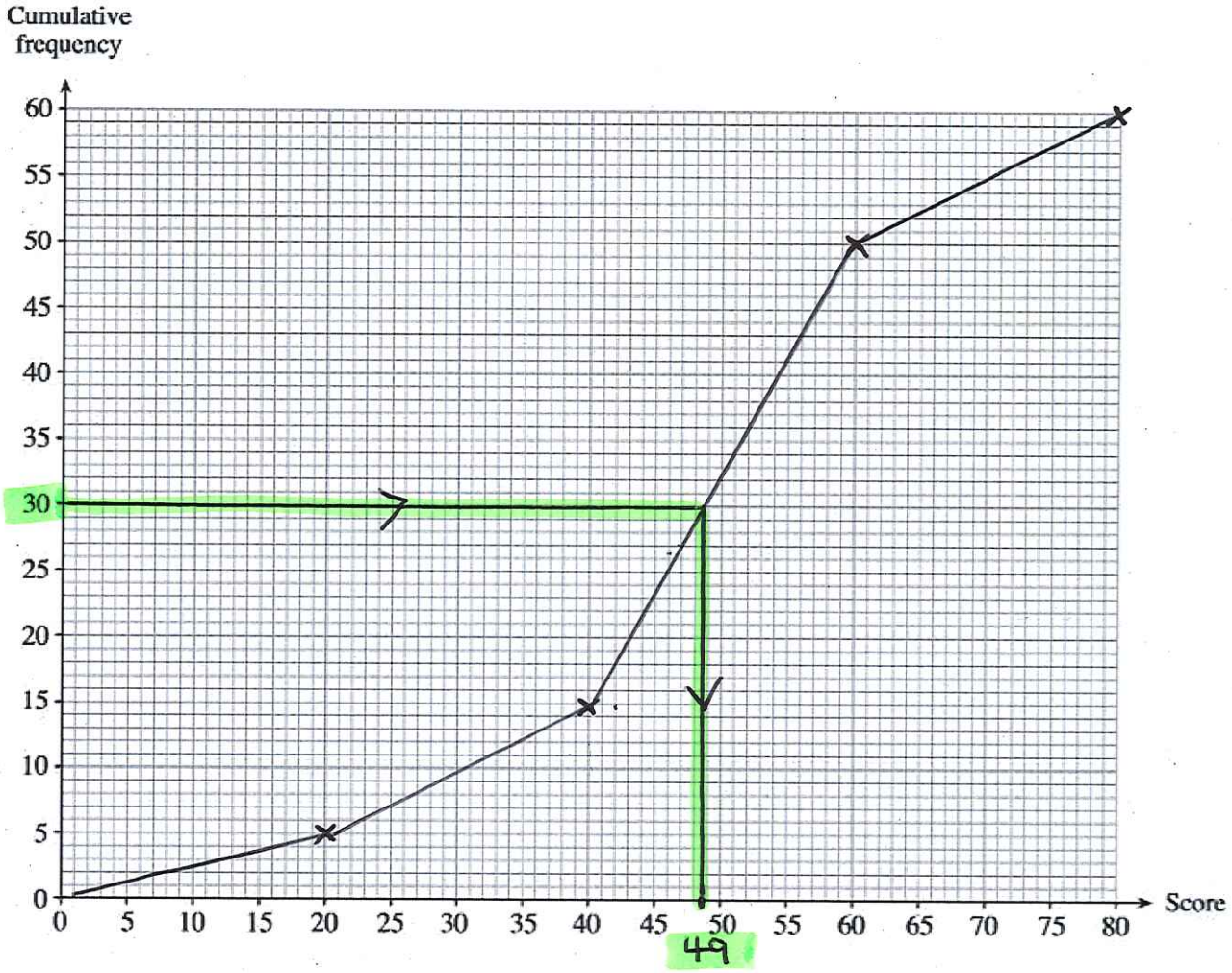
Score on the test	< 20	< 40	< 60	< 80
Cumulative frequency	5	15	50	60

check totals 60

[1]

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

[3]

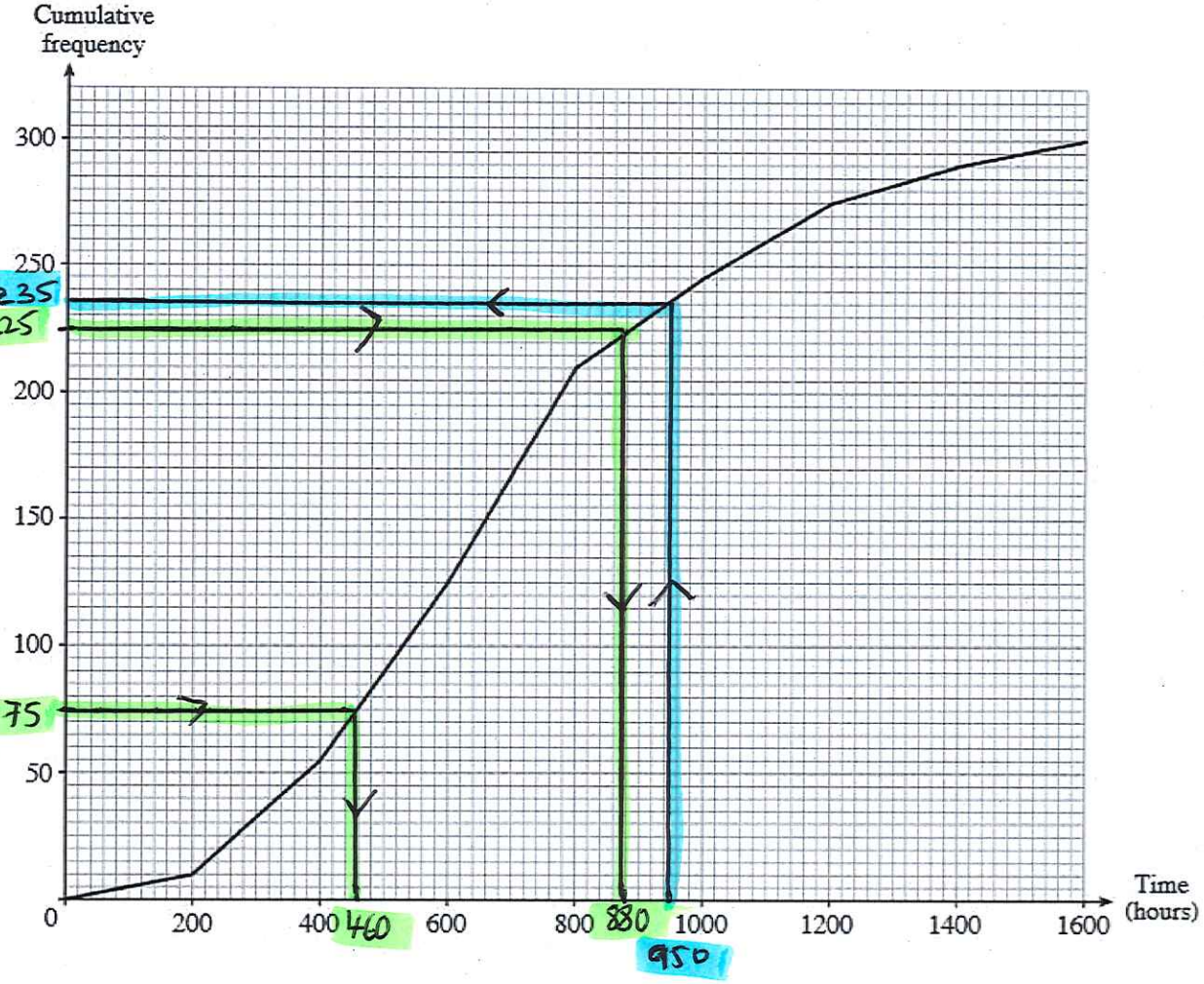


(c) The estimated median score for a second group of students who took this intelligence test was 40 marks. Which group of students had the higher estimated median score, and by how much?

In first group median = 30th student = 49 marks, so the first group had a higher estimated mean score.

[2]

7. A sample of 300 light bulbs of a certain type were tested to find how long they lasted. The time, in hours, that each of 300 light bulbs lasted was measured.
Below is the cumulative frequency polygon for the times that the bulbs lasted.



Use the cumulative frequency polygon to answer the following questions.

(a) What is the value of the interquartile range for the bulbs?

= upper quartile − lower quartile

= 880 − 460 = 420

[2]

(b) Estimate the number of bulbs that lasted longer than 950 hours.

= 300 − 235 = 65 light bulbs

[2]