

1. The table shows information about the weekly earnings of 20 people who work in a shop.

Weekly earnings (£ x)	Frequency
$150 < x \leq 250$	1
$250 < x \leq 350$	11
$350 < x \leq 450$	5
$450 < x \leq 550$	0
$550 < x \leq 650$	3

Midpoint

200

300

400

500

600

- (a) Work out an estimate for the mean of the weekly earnings.

$$\begin{aligned}
 &= 1 \times 200 + 11 \times 300 + 5 \times 400 + 3 \times 600 \\
 &= 200 + 3300 + 2000 + 1800 \\
 &= 7300
 \end{aligned}$$

$$\begin{array}{r}
 3300 \\
 2000 \\
 1800 \\
 200+ \\
 \hline
 7300
 \end{array}$$

$$\begin{array}{r}
 7300 \\
 \hline
 20
 \end{array}$$

$$= 730 \div 2$$

$$= 365$$

$$\begin{array}{r}
 \text{£ } 365 \\
 (3)
 \end{array}$$

Nadiya says,

“The mean may **not** be the best average to use to represent this information.”

- (b) Do you agree with Nadiya?
You must justify your answer.

Yes, because outliers will affect the mean

(1)

(Total for Question is 4 marks)

2. The table shows information about the heights of 80 children.

Height (h cm)	Frequency
$130 < h \leq 140$	4
$140 < h \leq 150$	11
$150 < h \leq 160$	24
$160 < h \leq 170$	22
$170 < h \leq 180$	19

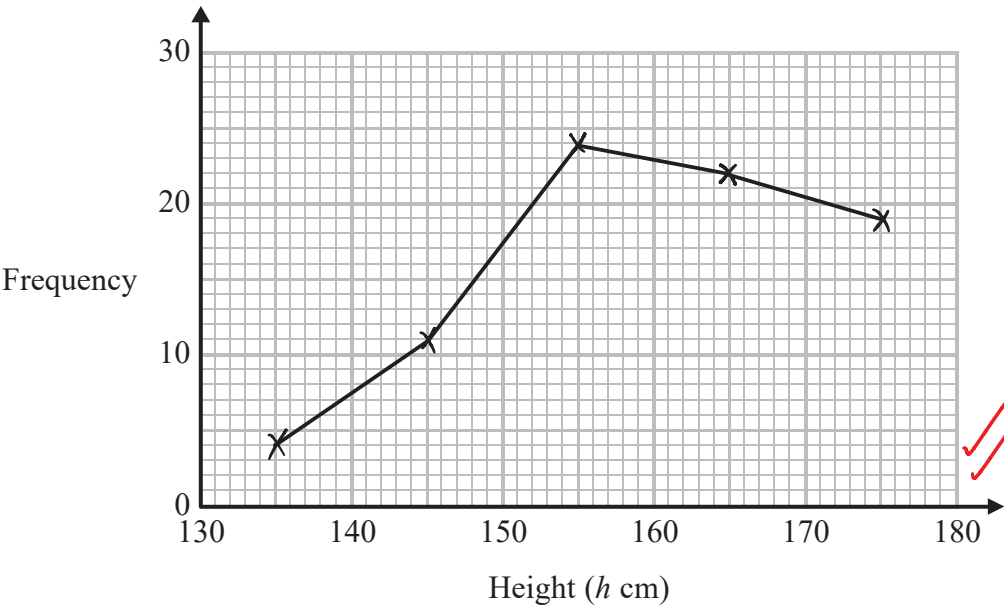
15 $130 < h \leq 140$
39 $130 < h \leq 160$
61 $130 < h \leq 170$

(a) Find the class interval that contains the median.

median = middle value when arranged in ascending order

160 < h ≤ 170 ✓
(1)

(b) Draw a frequency polygon for the information in the table.

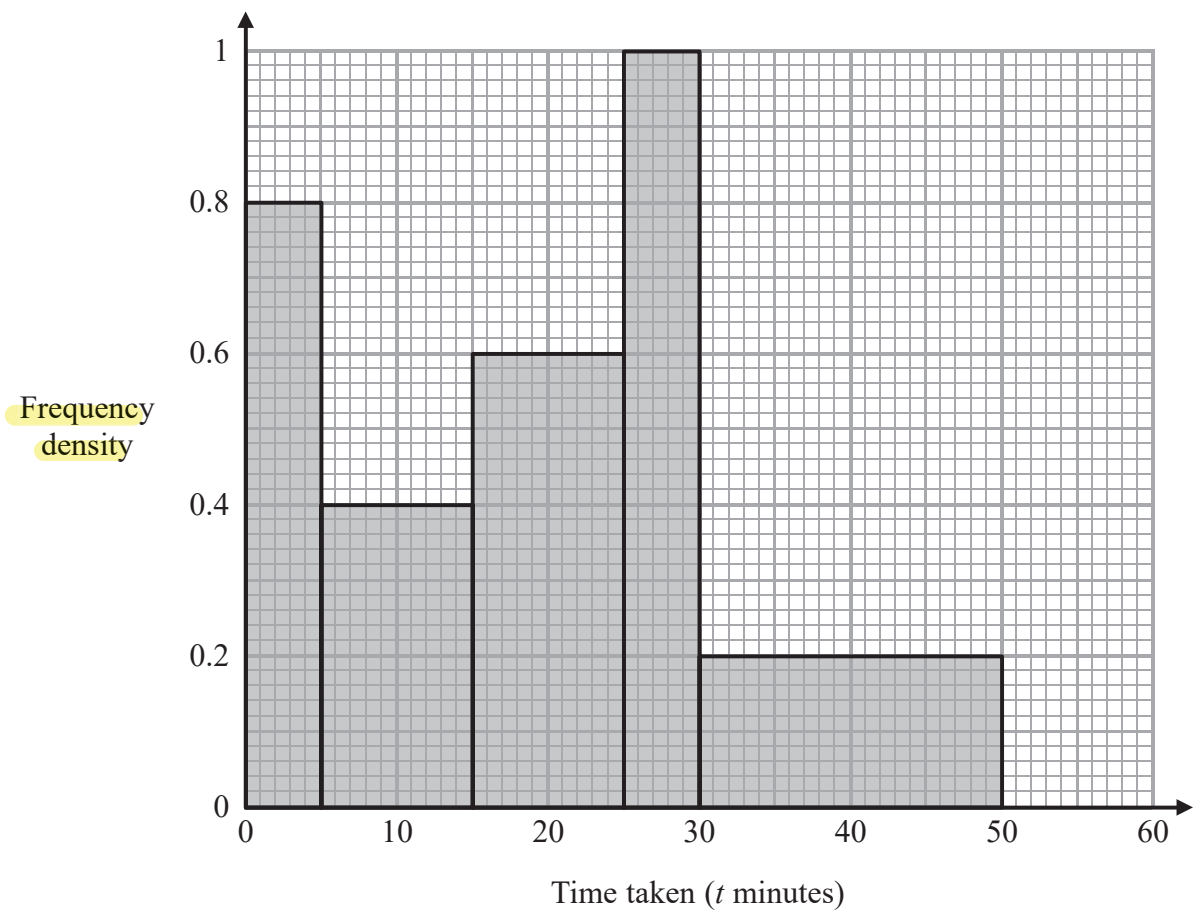


✓✓

(2)

(Total for Question 2 is 3 marks)

3. The histogram shows information about the times taken by some students to finish a puzzle.



(a) Complete the frequency table for this information.

Frequency = Frequency density × Class width

Class width = 15 - 5 = 10

Time taken (t minutes)	Frequency
$0 < t \leq 5$	4
$5 < t \leq 15$	4
$15 < t \leq 25$	6
$25 < t \leq 30$	5
$30 < t \leq 50$	4

0.4×10

0.6×10

1×5

0.2×20

(1)

(2)

(b) Find an **estimate** for the **lower quartile** of the times taken to finish the puzzle.

Time taken (t minutes)	Frequency
$0 < t \leq 5$	4
$5 < t \leq 15$	4
$15 < t \leq 25$	6
$25 < t \leq 30$	5
$30 < t \leq 50$	4

$$Q_1 = \frac{n+1}{4} \text{th value}$$

CF

4

8

14

19

23

$$n = \sum f = 23$$

$$\frac{23+1}{4} = \frac{24}{4} = 6\text{th} \quad (1)$$

6th value is in the $5 < t \leq 15$ interval

$$\frac{6-4}{4} = \frac{1}{2}$$

$$15-5=10 \quad 5 + \left(\frac{10}{2}\right) = 10$$

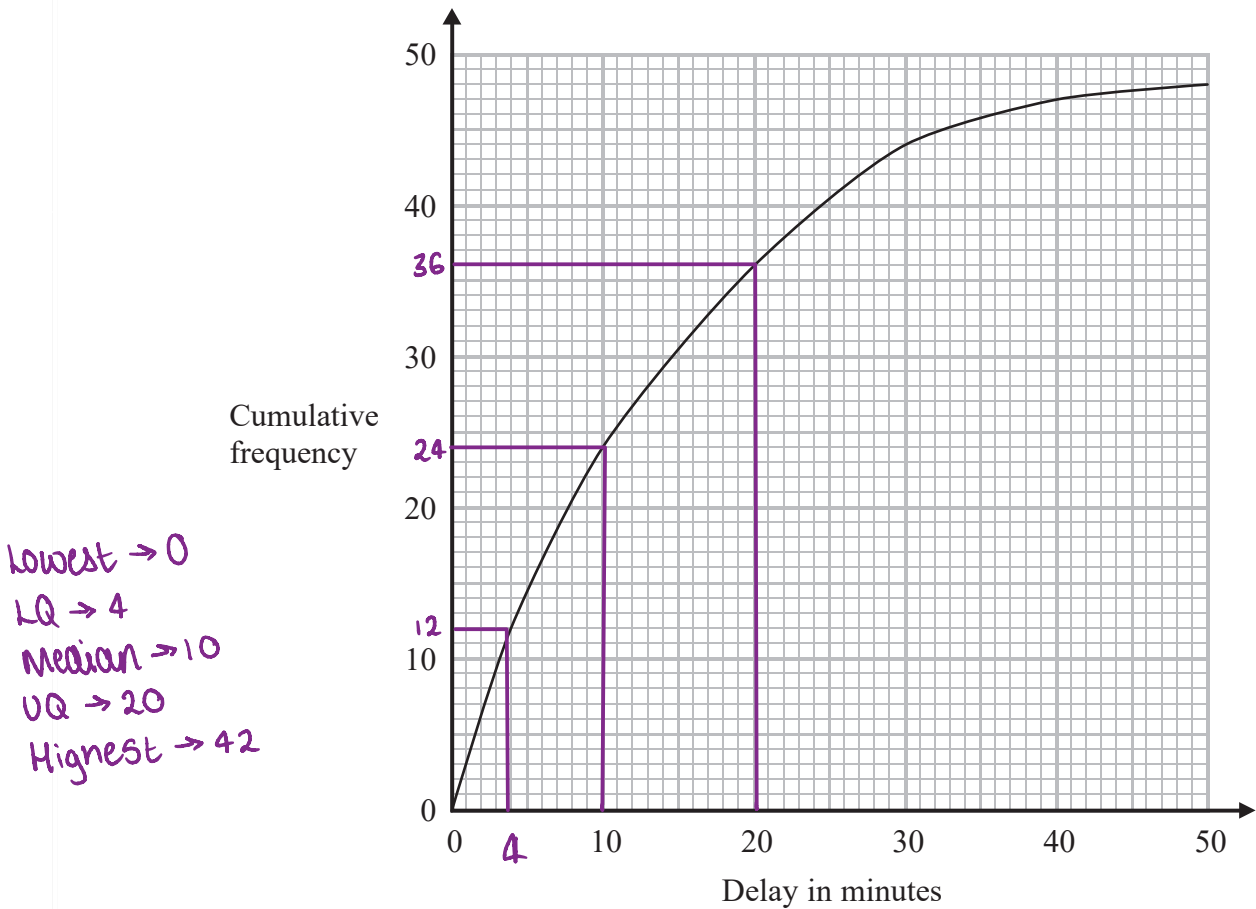
lower bound
of interval

10 minutes
(2)

(Total for Question is 4 marks)

4. The times that 48 trains left a station on Monday were recorded.

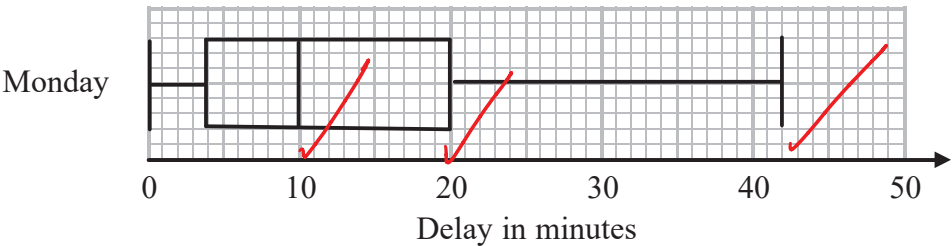
The cumulative frequency graph gives information about the numbers of minutes the trains were delayed, correct to the nearest minute.



The shortest delay was 0 minutes.

The longest delay was 42 minutes.

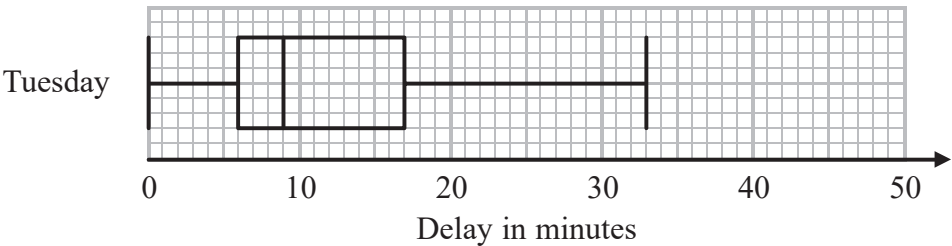
(a) On the grid below, draw a box plot for the information about the delays on Monday.



(3)

48 trains left the station on Tuesday.

The box plot below gives information about the delays on Tuesday.



- (b) Compare the distribution of the delays on Monday with the distribution of the delays on Tuesday.

Median
Measure of spread

The median on Monday is greater than on Tuesday ✓

The range on Monday is greater than on Tuesday ✓

(2)

Mary says,

“The longest delay on Tuesday was 33 minutes.

This means that there must be some delays of between 25 minutes and 30 minutes.”

- (c) Is Mary right?

You must give a reason for your answer.

No, because the upper 25% of trains may be delayed between 17 and 25 mins or 30 and 35 mins. ✓

(1)

$$\frac{x-1}{5(x-1)^2} \div \frac{(x-1)}{(x-1)} = \frac{1}{5(x-1)}$$

$$\frac{1}{5(x-1)} \checkmark$$

$$2(25 - 4^2) \checkmark$$

$$2(5-4)(5+4)$$

$$2(5-4)(5+4) \checkmark$$

5. The grouped frequency table gives information about the times, in minutes, that 80 office workers take to get to work.

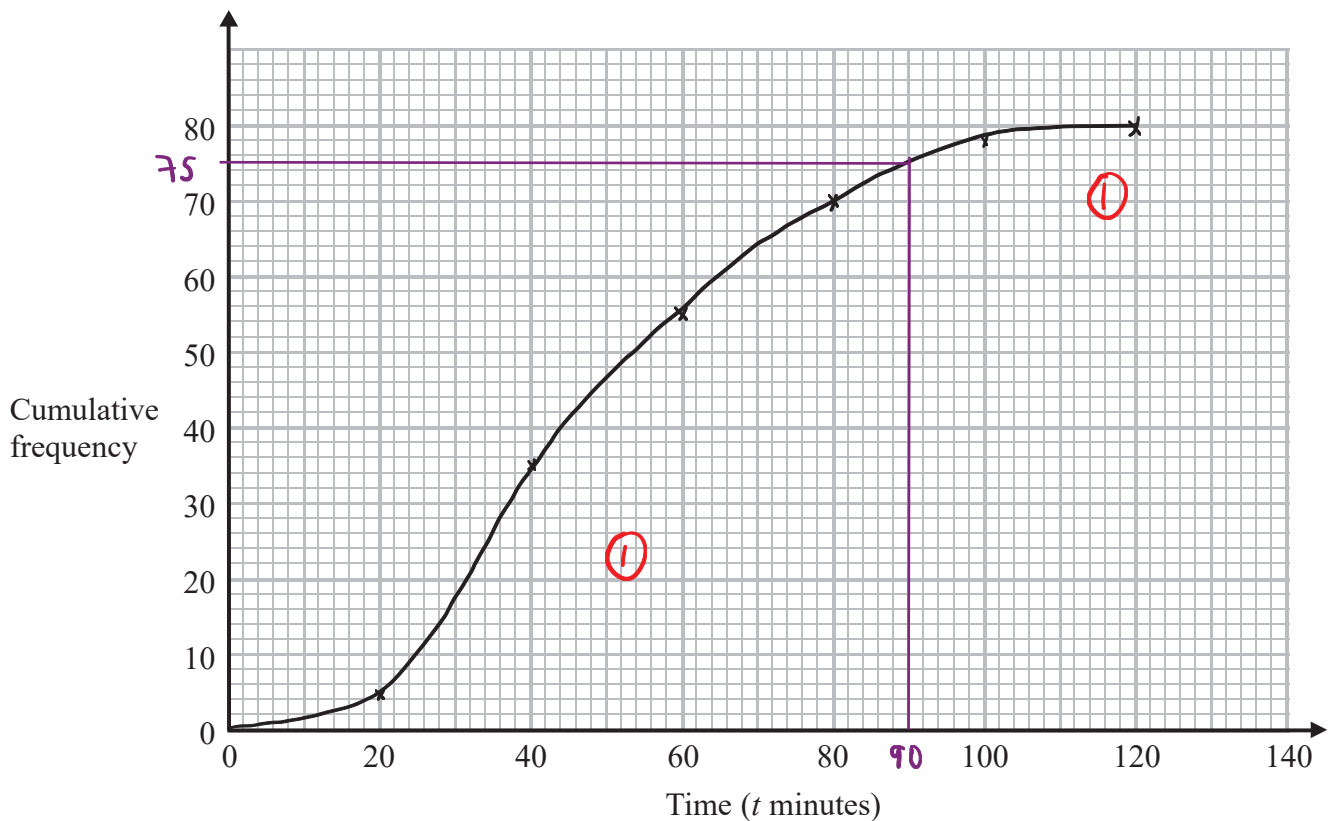
Time (t minutes)	Frequency
$0 < t \leq 20$	5
$20 < t \leq 40$	30
$40 < t \leq 60$	20
$60 < t \leq 80$	15
$80 < t \leq 100$	8
$100 < t \leq 120$	2

- (a) Complete the cumulative frequency table.

Time (t minutes)	Cumulative frequency
$0 < t \leq 20$	5
$0 < t \leq 40$	35
$0 < t \leq 60$	55
$0 < t \leq 80$	70
$0 < t \leq 100$	78
$0 < t \leq 120$	80

①

(b) On the grid, draw the cumulative frequency graph for this information.



(2)

(c) Use your graph to find an estimate for the **percentage** of these office workers who **take more than 90 minutes to get to work**.

Number of people who take less than 90 mins = 75 ✓ (1)

\therefore Number of people who take more than 90 mins = $80 - 75 = 5$

% of people who take more than 90 mins

$$= \frac{5}{80} \times 100 = \underline{\underline{6.25\%}}$$

(1)

(1)

6.25 %

(3)

(Total for Question is 6 marks)

* Since this question involves reading from a graph, there is a range of acceptable answers for the no. of people who take < 90 mins. Mark scheme accepts 71-76.

6. The table gives information about the times taken, in seconds, by 18 students to run a race.

$$\frac{5+10}{2} = 7.5$$

Time (t seconds)	Frequency	x	frequency $\times x$
$5 < t \leq 10$	1	7.5	$1 \times 7.5 = 7.5$
$10 < t \leq 15$	2	12.5	$2 \times 12.5 = 25$
$15 < t \leq 20$	7	17.5	$7 \times 17.5 = 122.5$
$20 < t \leq 25$	8	22.5	$8 \times 22.5 = 180$

Work out an estimate for the mean time.

Give your answer correct to 3 significant figures.

$$\text{mean} = \frac{\text{total}}{n} \quad \leftarrow \text{(how many 'things' there are)}$$

$$\text{Mean} = \frac{335}{18} = 18.611\ldots = 18.6 \text{ (3sf)}$$

$$\begin{aligned} \text{Total} &= \\ 7.5 + 25 + 122.5 \\ + 180 &= 335 \end{aligned}$$

..... 18.6 seconds

7. The table gives information about the weekly wages of 80 people.

Wage (£ w)	Frequency
$200 < w \leq 250$	5
$250 < w \leq 300$	10
$300 < w \leq 350$	20
$350 < w \leq 400$	20
$400 < w \leq 450$	15
$450 < w \leq 500$	10

- (a) Complete the cumulative frequency table.

Wage (£ w)	Cumulative frequency
$200 < w \leq 250$	5
$200 < w \leq 300$	15
$200 < w \leq 350$	35
$200 < w \leq 400$	55
$200 < w \leq 450$	70
$200 < w \leq 500$	80

(1)

- (b) On the grid opposite, draw a cumulative frequency graph for your completed table.

↳ for grouped data, plot end point of group

(2)

Juan says

"60% of this group of people have a weekly wage of £360 or less."

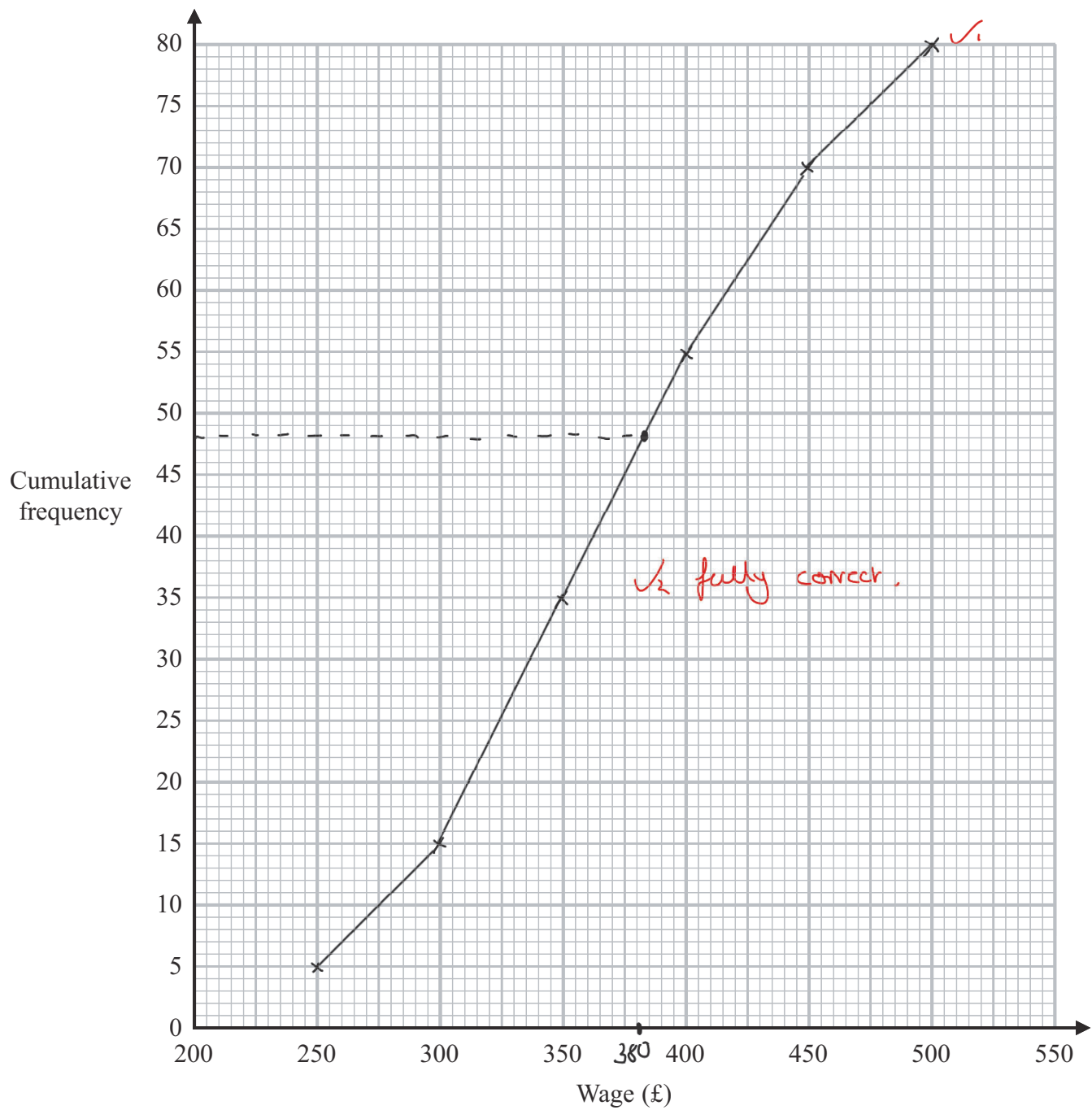
- (c) Is Juan correct?

You must show how you get your answer.

$$\begin{aligned}
 60\% \text{ of group} &= 60\% \text{ of } 80 \text{ people} \\
 &= \frac{60}{100} \times 80 \text{ ppl} \\
 &= \frac{60 \times 80}{100} = 48 \text{ ppl}
 \end{aligned}$$

from graph, 60% make
£380. £380 > £360
∴ No, he is wrong.

(3)



(Total for Question is 6 marks)

8. The grouped frequency table gives information about the time, in minutes, taken by 50 people to solve a puzzle.

Time (t minutes)	Frequency
$0 < t \leq 10$	5
$10 < t \leq 20$	8
$20 < t \leq 30$	12
$30 < t \leq 40$	15
$40 < t \leq 50$	7
$50 < t \leq 60$	3

Brian was asked to draw a cumulative frequency table for this information.

This is the table that Brian drew.

Time (t minutes)	Cumulative frequency
$0 < t \leq 10$	5
$10 < t \leq 20$	13
$20 < t \leq 30$	25
$30 < t \leq 40$	40
$40 < t \leq 50$	47
$50 < t \leq 60$	50

$0 < t \leq 20 \leftarrow$

$0 < t \leq 30 \leftarrow$

$0 < t \leq 40 \leftarrow$

$0 < t \leq 50 \leftarrow$

$0 < t \leq 60 \leftarrow$

Write down **one** thing that is wrong with this cumulative frequency table.

Error in the inequalities, they should all start $0 < t$
for example $0 < t \leq 20$ instead of $10 < t \leq 20$ (1)