

A histogram showing the frequency density of time taken to complete a 100m race. The x-axis is labeled 'Time (minutes)' and ranges from 0 to 25 with major grid lines every 5 units and minor grid lines every 1 unit. The y-axis is labeled 'Frequency density' and ranges from 0 to 10 with major grid lines every 2 units and minor grid lines every 1 unit. The histogram consists of five bars with the following data:

Time Interval (minutes)	Frequency Density
2 - 5	1
5 - 10	1
10 - 12	5
12 - 15	3
15 - 18	9

### Figure 1

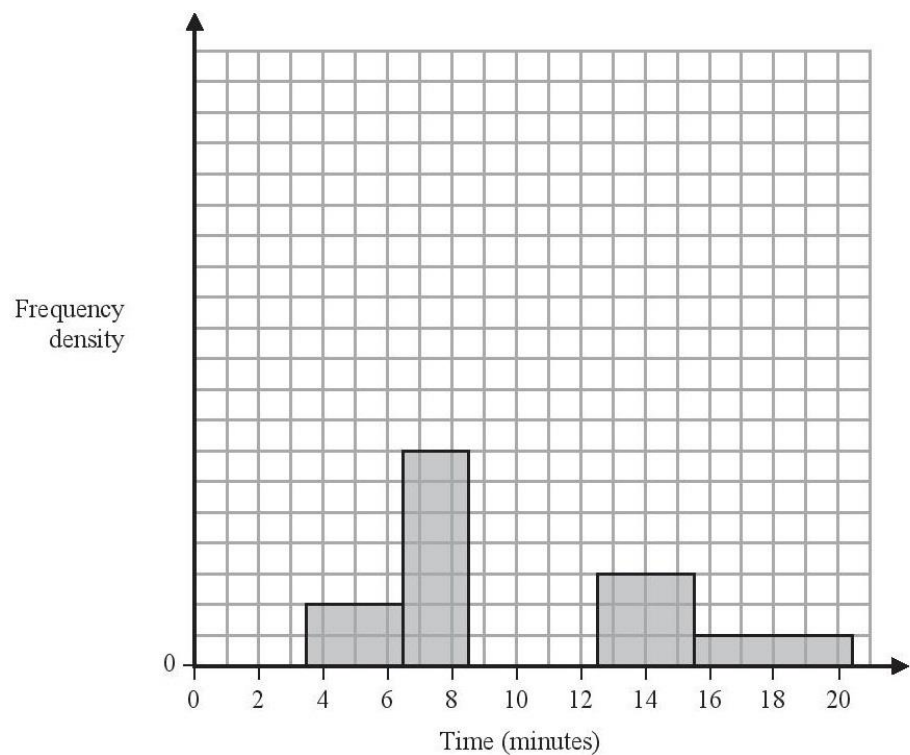
The histogram in Figure 1 shows the times taken to complete a crossword by a random sample of students.

The number of students who completed the crossword in more than 15 minutes is 78

Estimate the percentage of students who took less than 11 minutes to complete the crossword.

(4)

2. The partially completed histogram and the partially completed table show the time, to the nearest minute, that a random sample of motorists were delayed by roadworks on a stretch of motorway.



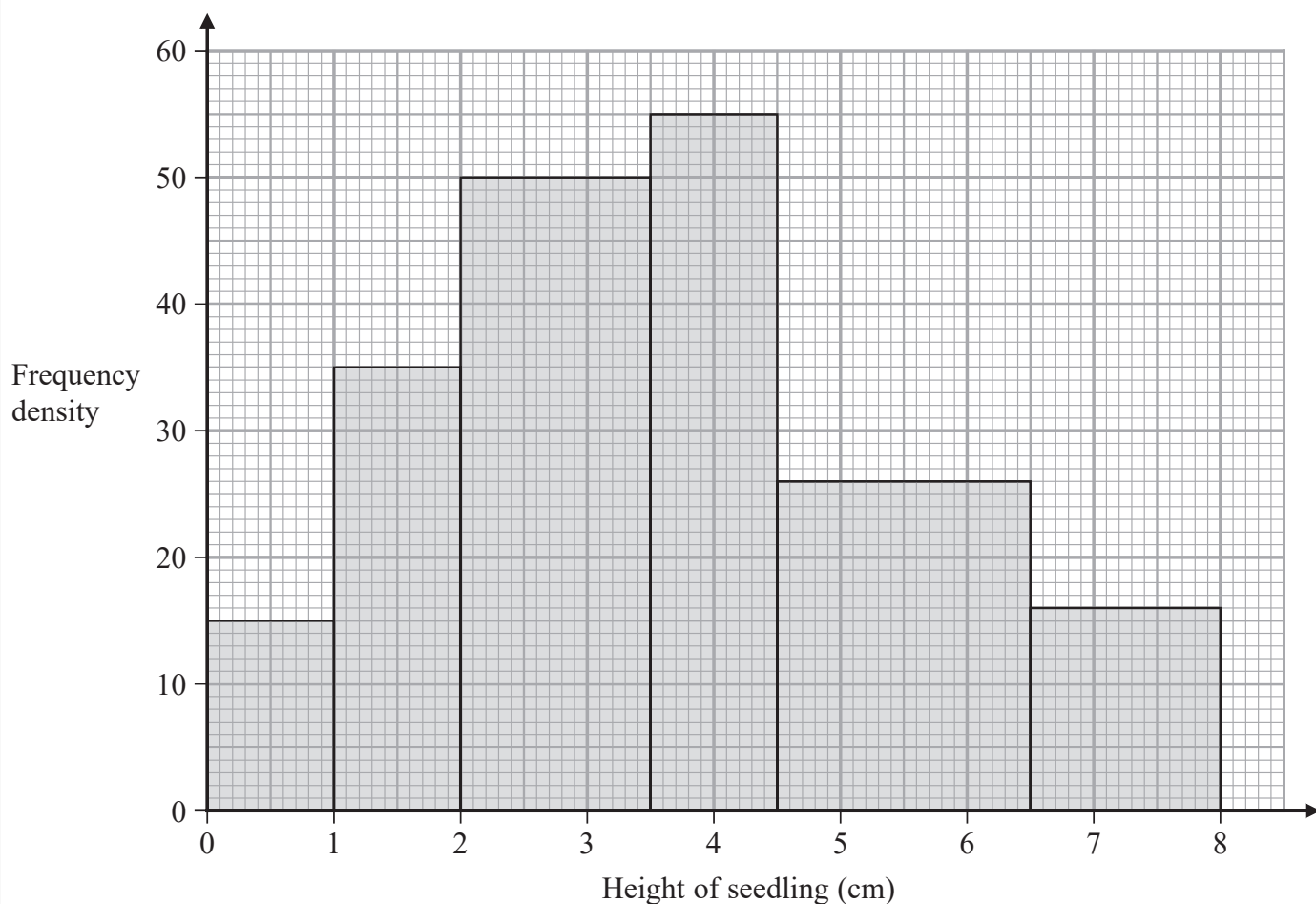
Delay (minutes)	Number of motorists
4 – 6	6
7 – 8	
9	17
10 – 12	45
13 – 15	9
16 – 20	

Estimate the percentage of these motorists who were delayed by the roadworks for between 8.5 and 13.5 minutes.

(5)



4. The histogram summarises the heights of 256 seedlings two weeks after they were planted.



- (a) Use linear interpolation to estimate the median height of the seedlings.

(4)

Chris decides to model the **frequency density** for these 256 seedlings by a curve with equation

$$y = kx(8 - x) \quad 0 \leq x \leq 8$$

where  $k$  is a constant.

- (b) Find the value of  $k$

(3)

Using this model,

- (c) write down the median height of the seedlings.

(1)

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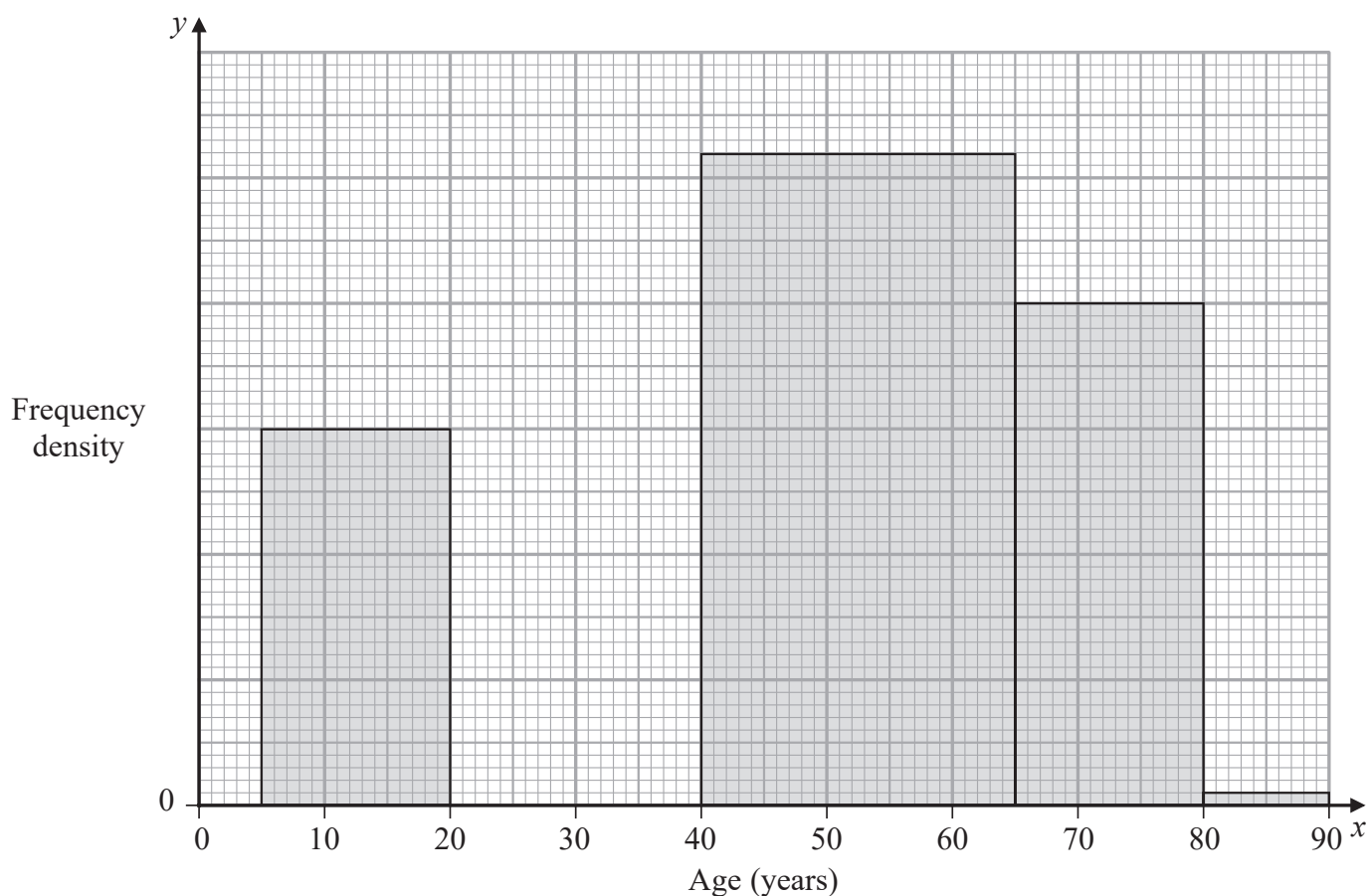
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5. The partially completed table and partially completed histogram give information about the ages of passengers on an airline.

There were no passengers aged 90 or over.

Age ( $x$ years)	$0 \leq x < 5$	$5 \leq x < 20$	$20 \leq x < 40$	$40 \leq x < 65$	$65 \leq x < 80$	$80 \leq x < 90$
Frequency	5	45	90			1



- (a) Complete the histogram. (3)
- (b) Use linear interpolation to estimate the median age. (4)

An outlier is defined as a value greater than  $Q_3 + 1.5 \times \text{interquartile range}$ .

Given that  $Q_1 = 27.3$  and  $Q_3 = 58.9$

- (c) determine, giving a reason, whether or not the oldest passenger could be considered as an outlier. (2)