

- 1 Last season, Gander United played 30 hockey matches away from home. The table gives information about the distances travelled to away matches.

Distance, $d$ (miles)	Frequency
$0 < d \leq 20$	6
$20 < d \leq 40$	12
$40 < d \leq 60$	7
$60 < d \leq 80$	4
$80 < d \leq 100$	1

- a Draw a histogram to display this information.  
b Draw a frequency polygon to display this information.

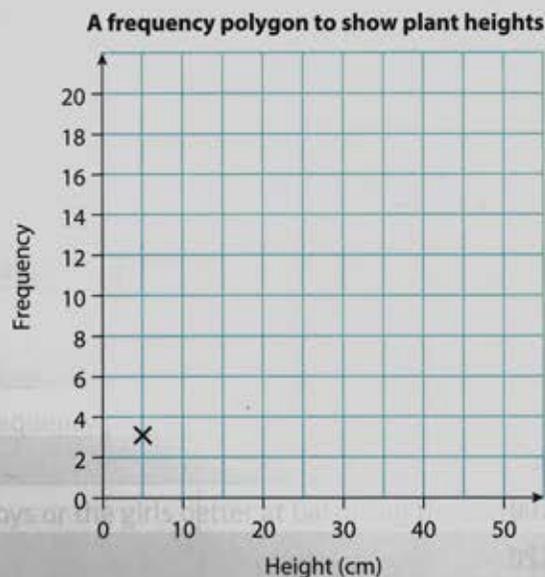
- 2 Amy decided to measure the height of 50 plants of the same variety after they had been growing for a month. The table gives information about the heights of her plants.

Height (cm)	Frequency
up to, but not including 10	3
10 up to, but not including 20	12
20 up to, but not including 30	19
30 up to, but not including 40	10
40 up to, but not including 50	6

### Q2 hint

You can draw a frequency polygon without first drawing the histogram. Plot the frequency at the midpoint of the class interval.

Copy and complete the frequency polygon to display this information.

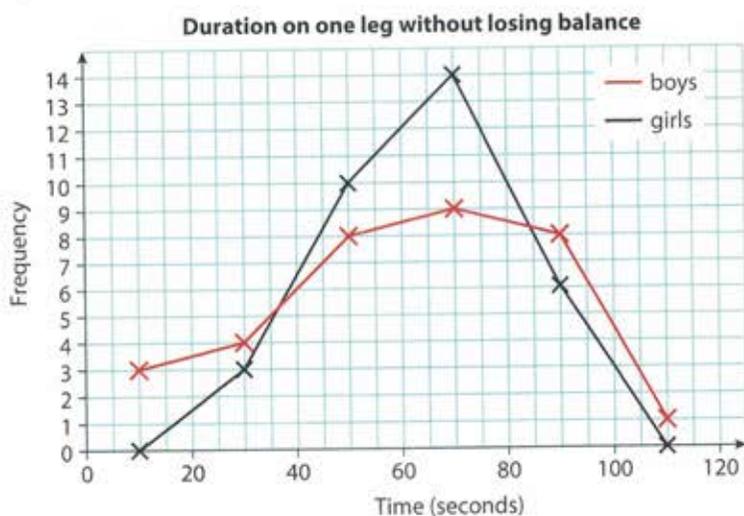


- 3 This table shows information about the heights of some Year 7 and 8 students.

Height, $h$ (cm)	Year 7 frequency	Year 8 frequency
$120 < h \leq 130$	1	0
$130 < h \leq 140$	5	3
$140 < h \leq 150$	18	12
$150 < h \leq 160$	20	22
$160 < h \leq 170$	8	19
$170 < h \leq 180$	2	6

- Draw a histogram to show the Year 7 heights.
- Draw a histogram to show the Year 8 heights.
- Draw frequency polygons for this data.

- 4 Students were asked to stand on one leg for as long as possible. The frequency polygon gives information about the performance of boys and girls in this task.

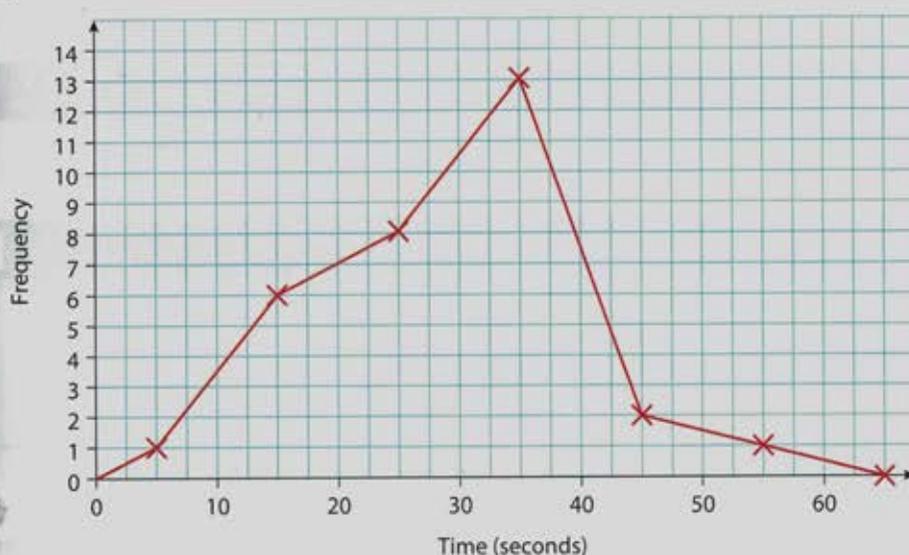


- How many girls were able to stand on one leg for between 20 and 40 seconds without losing balance?
- How many boys lost their balance in less than or equal to 40 seconds?
- One student balanced for longer than the others. Was this a boy or a girl?
- Copy and complete this frequency table.

Time, $t$ (s)	Girls' frequency	Boys' frequency
$0 < t \leq 20$		
$20 < t \leq 40$		
$40 < t \leq 60$		
$60 < t \leq 80$		
$80 < t \leq 100$		
$100 < t \leq 120$		

- e Were there more boys or girls in the experiment?
- f Were boys or girls better at balancing? Explain your answer.
- g Draw a histogram to represent the boys' data.
- h Explain why it is easier to compare data using frequency polygons than histograms.

- 5 Members of a youth club recorded the length of time that each member could balance a dictionary on their head. The frequency polygon shows the results for boys.



- a John said, 'The frequency polygon shows that 13 boys balanced the dictionary for exactly 35 seconds.' Explain why he is wrong.
- b Design and complete a frequency table to show this data, using the intervals  $0 < T \leq 10$  etc.
- c This table shows similar results for the girls at the youth club.

Time, $T$ (s)	Frequency
$0 < T \leq 10$	3
$10 < T \leq 20$	10
$20 < T \leq 30$	14
$30 < T \leq 40$	5
$40 < T \leq 50$	2
$50 < T \leq 60$	1

Copy the frequency polygon and then draw the polygon for girls on the same axes.

- d Were the boys or the girls better at balancing the dictionary? Explain your answer.

- 1 The lengths of 62 songs by Median and the Meanies are represented in the frequency table.

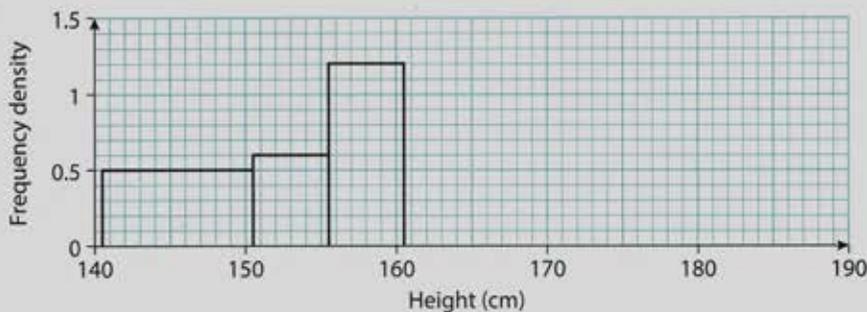
Draw a histogram to display this data.

Song length, $L$ (s)	Frequency
$0 < L \leq 100$	5
$100 < L \leq 180$	8
$180 < L \leq 210$	12
$210 < L \leq 240$	15
$240 < L \leq 300$	12
$300 < L \leq 500$	10

- 2 Alice measures the heights of 23 students in her class to the nearest centimetre. The data is shown in the table.

Height, $h$ (cm)	Frequency
$140.5 < h \leq 150.5$	5
$150.5 < h \leq 155.5$	3
$155.5 < h \leq 160.5$	6
$160.5 < h \leq 165.5$	3
$165.5 < h \leq 180.5$	6

This incomplete histogram shows some information about this data.



Use the information given to copy and complete the histogram.

- 3 Justin conducted an experiment to see how far 33 snails would move in 10 minutes. The results are shown in this frequency table.

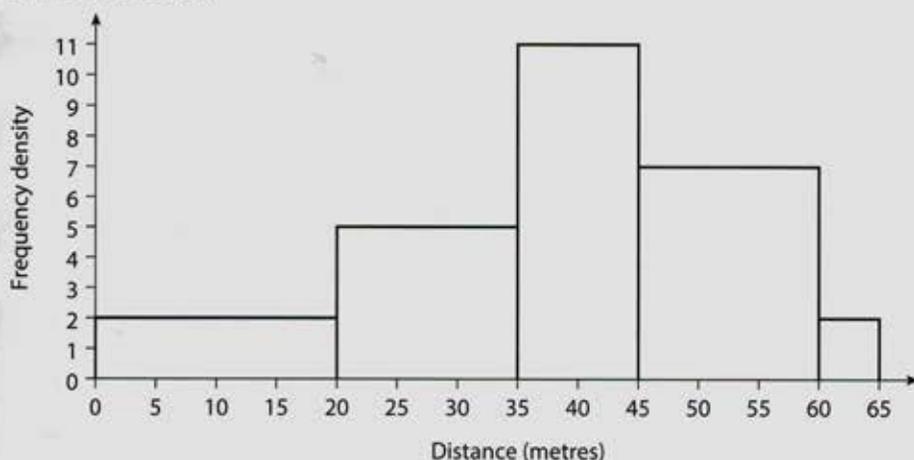
Distance moved, $d$ (cm)	Frequency
$0 < d \leq 5$	3
$5 < d \leq 7$	5
$7 < d \leq 8$	4
$8 < d \leq 9$	6
$9 < d \leq 10$	3
$10 < d \leq 15$	6
$15 < d \leq 25$	6

Construct a histogram to display this information.

### Q2 hint

Remember to use the actual class limits in the question, even though they are not whole numbers.

- 4 This histogram gives information about the distances (in metres) thrown in a javelin competition.



- Design and complete a frequency table for the data.
- Calculate an estimate for the number of throws over 40 metres.
- Explain why your answer to part **b** is an estimate.

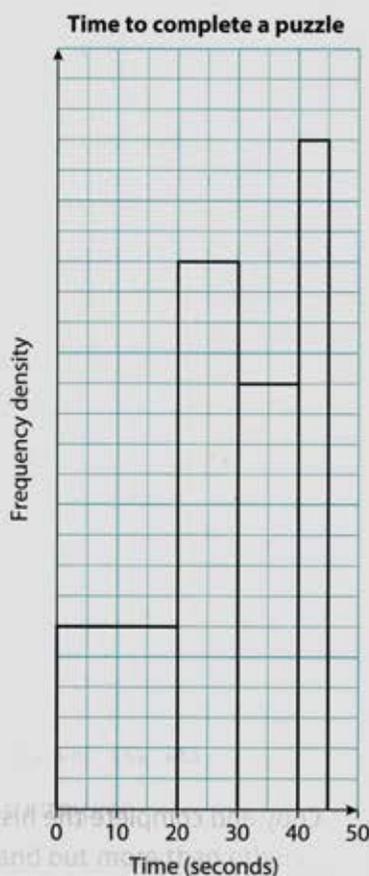
### Q4b hint

Do you know exactly how many people threw the javelin 35–40 metres and how many threw it 40–45 metres?

- 5 This table and histogram give information about the times some students took to complete a puzzle.

Time, $t$ (s)	Frequency
$0 < t \leq 20$	12
$20 < t \leq 30$	
$30 < t \leq 40$	
$40 < t \leq 45$	

- Use frequency density =  $\frac{\text{frequency}}{\text{class width}}$  to calculate the frequency density for the first bar.
- Use your answer from part **a** to help you label the vertical scale.
- Calculate the other frequencies using frequency = frequency density  $\times$  class width. Copy and complete the frequency table.

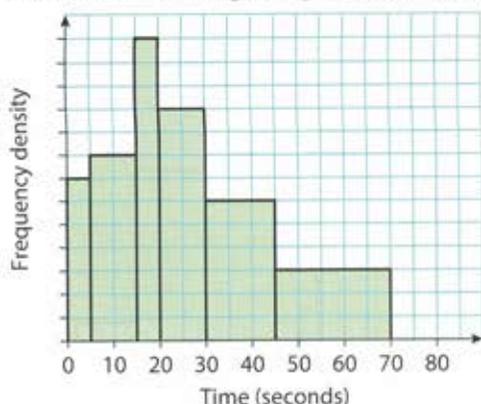


### Q5 hint

There is sometimes more than one way to calculate answers to a question.



- 6 A group of children timed how long (in seconds) they could bounce a tennis ball on a racket. This histogram gives information about their times.



Time, $t$ (s)	Frequency
$0 < t \leq 5$	56
$5 < t \leq 15$	
$15 < t \leq 20$	
$20 < t \leq 30$	
$30 < t \leq 45$	
$45 < t \leq 70$	
$70 < t \leq 80$	24

- Copy and complete the frequency table.
- Copy and complete the histogram for the final class.
- Estimate how many children bounced the ball for less than 10 seconds.

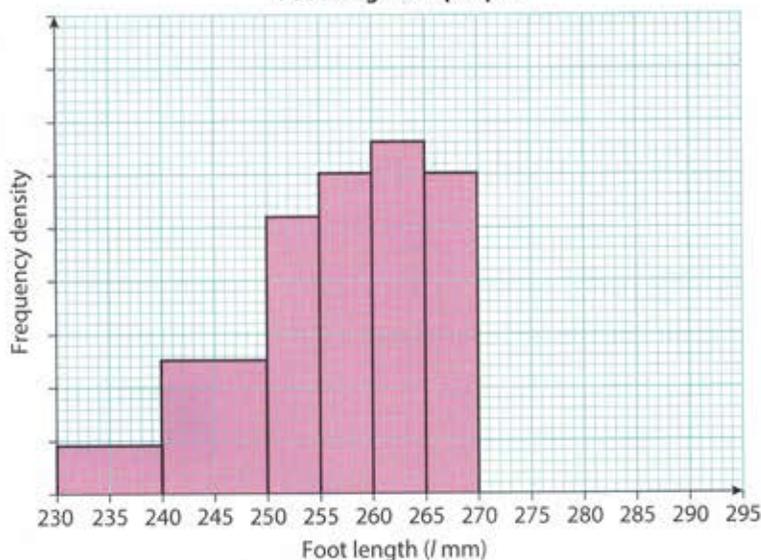
### Exam-style question

- 7 A shoe manufacturer measured the length ( $l$  mm) of 200 people's feet. The results are summarised in the table.

Length ( $l$ mm)	Frequency
$230 \leq l < 240$	9
$240 \leq l < 250$	25
$250 \leq l < 255$	26
$255 \leq l < 260$	30
$260 \leq l < 265$	33
$265 \leq l < 270$	30
$270 \leq l < 280$	29
$280 \leq l < 295$	18

The incomplete histogram shows information about the data.

Foot lengths of people



Copy and complete the histogram.

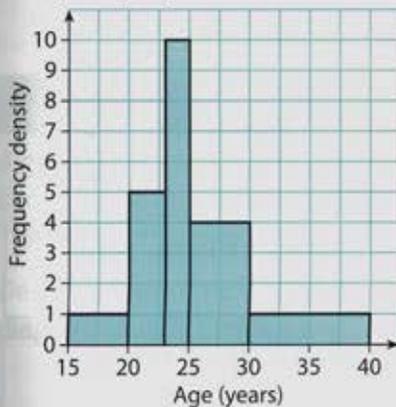
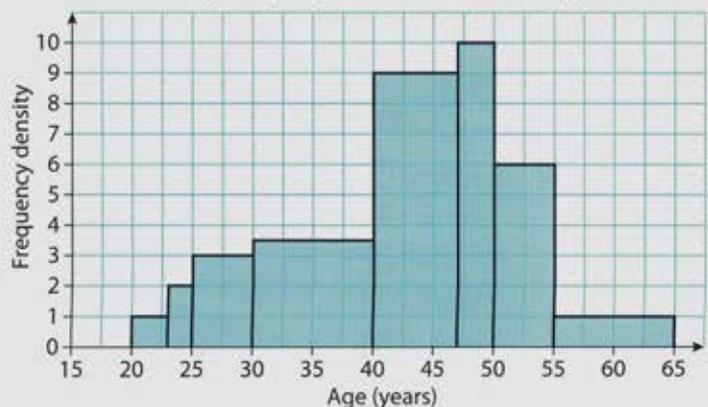
(3 marks)

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**Key point 3**

You can compare data from histograms if they have the same class intervals and the same frequency density scales.

- 8 The histograms show the ages of people on an adventure holiday and a coach tour holiday.

**Ages of people on adventure holiday****Ages of people on coach tour holiday**

- Explain why you can compare the data from these two histograms.
- Compare the distributions of the ages for the two holidays.

**Q8 hint**

Describe the shape of each distribution. Compare the ages of most of the people on each holiday.

## 2.14 Misleading diagrams

**Learning objectives**

- Recognise when graphs are misleading.

Sometimes graphs and charts are drawn deliberately to be misleading. Other graphs are unintentionally misleading.

- Scales that do not start at zero, or have parts of them missed out, give a misleading impression of the heights of bars, etc.
- Scales that do not increase uniformly distort the shape of anything plotted on them.
- Lines on a graph that are drawn too thick make it difficult to read information.
- Axes without labels prevent you from knowing what the data represents.
- Graphs and charts without keys may be impossible to interpret.
- Colours may make some parts of a graph or chart stand out more than others.

