**1** The table gives information about the length of time, in minutes, that each of 60 students took to travel to school on Monday.

| Length of time ($t$ minutes) | Frequency |
|---|---|
| $0 < t \leqslant 10$ | 4 |
| $10 < t \leqslant 20$ | 10 |
| $20 < t \leqslant 30$ | 15 |
| $30 < t \leqslant 40$ | 25 |
| $40 < t \leqslant 50$ | 6 |

modal class

(a) Write down the modal class interval.

Modal Class = class with highest frequency

$30 < t \leqslant 40$ (1)

.....

(1)

(b) Work out an estimate for the mean length of time taken by these 60 students to travel to school on Monday.
Give your answer correct to one decimal place.

Mean = $\frac{\Sigma fx}{\Sigma f}$

interval midpoint x frequency for each class

$$\text{Mean} = \frac{(5 \times 4) + (15 \times 10) + (25 \times 15) + (35 \times 25) + (45 \times 6)}{60} \quad (1)$$

$$= \frac{20 + 150 + 375 + 875 + 270}{60} \quad (1)$$

$$= \frac{1690}{60} \quad (1)$$

$$= 28.2 \ (1 \text{ d.p.}) \quad (1)$$

28.2 ..... minutes

(4)

**(Total for Question 1 is 5 marks)**

**2** The table shows information about the lengths of time, in minutes, 120 customers spent in a supermarket.

| Length of time ($L$ minutes) | Frequency |
|---|---|
| $20 < L \leqslant 30$ | 6 |
| $30 < L \leqslant 40$ | 26 |
| $40 < L \leqslant 50$ | 31 |
| $50 < L \leqslant 60$ | 40 |
| $60 < L \leqslant 70$ | 17 |

(a) Write down the modal class.

↳ class with highest frequency

$50 < L \leqslant 60$ (1)

.....

**(1)**

(b) Work out an estimate for the mean length of time spent by the 120 customers in the supermarket.

$$\text{mean} = \frac{\text{sum of median} \times \text{frequency}}{\text{total frequency}}$$

$$\text{mean} = \frac{(25 \times 6) + (35 \times 26) + (45 \times 31) + (55 \times 40) + (65 \times 17)}{120} \quad (1)$$

$$= \frac{150 + 910 + 1395 + 2200 + 1105}{120} \quad (1)$$

$$= \frac{5760}{120} = 48 \quad (1)\ (1)$$

48 minutes

.....

**(4)**

**(Total for Question 2 is 5 marks)**

**3** The table shows information about the number of minutes each of 120 buses was late last Monday.

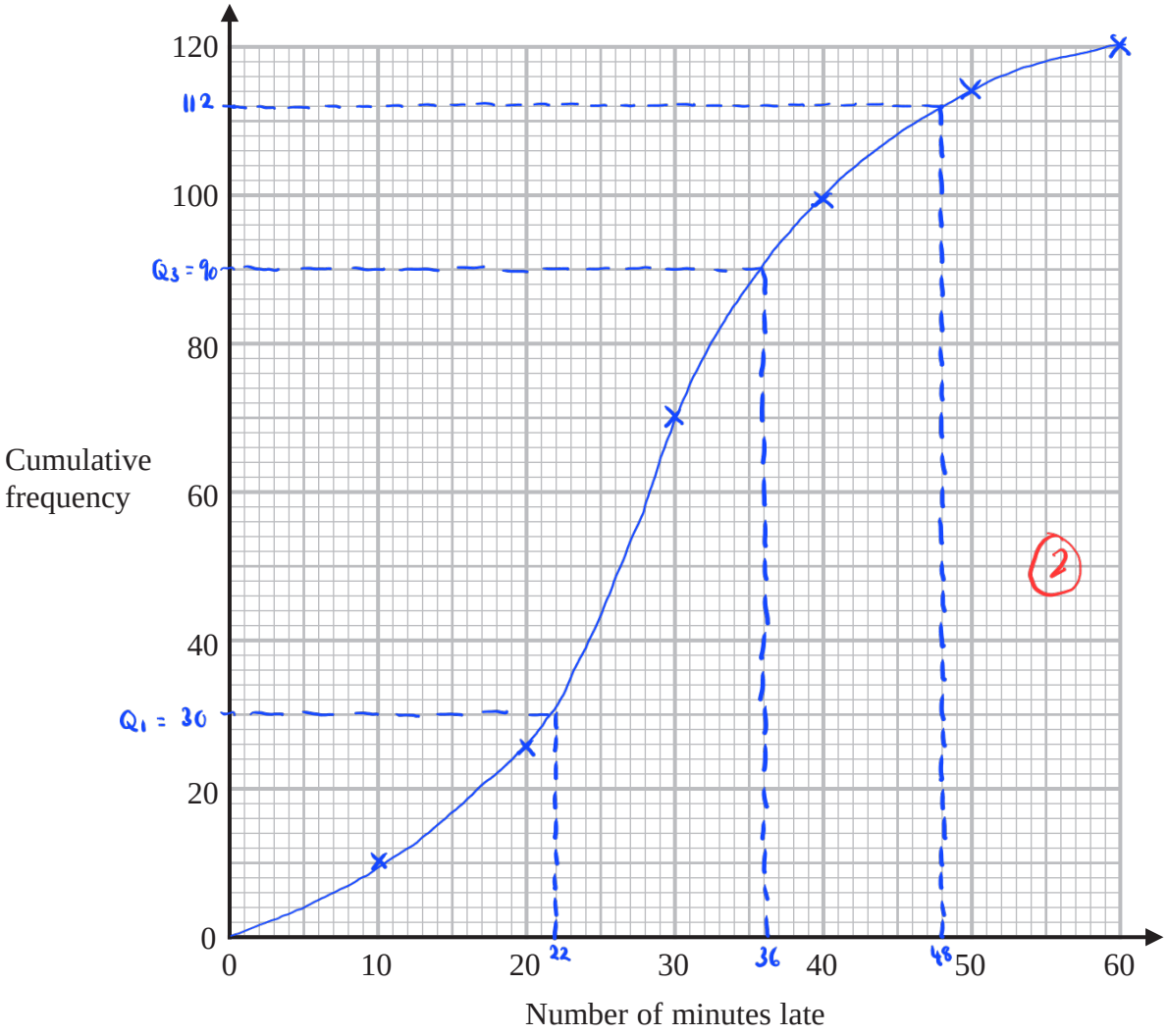
| Number of minutes late ($L$) | Frequency |
|---|---|
| $0 < L \leqslant 10$ | 10 |
| $10 < L \leqslant 20$ | 16 |
| $20 < L \leqslant 30$ | 44 |
| $30 < L \leqslant 40$ | 29 |
| $40 < L \leqslant 50$ | 15 |
| $50 < L \leqslant 60$ | 6 |

(a) Complete the cumulative frequency table below.

| Number of minutes late ($L$) | Cumulative frequency |
|---|---|
| $0 < L \leqslant 10$ | 10 |
| $0 < L \leqslant 20$ | 26 |
| $0 < L \leqslant 30$ | 70 |
| $0 < L \leqslant 40$ | 99 |
| $0 < L \leqslant 50$ | 114 |
| $0 < L \leqslant 60$ | 120 |

(1)

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




(2)

(c) Use your graph to find an estimate for the interquartile range.

$Q_1 = \frac{1}{4} \times 120 = 30$th
= 22 (from graph)

$Q_3 = \frac{3}{4} \times 120 = 90$th
= 36 (from graph) (1)

IQR = $Q_3 - Q_1$
= 36 − 22 = 14 (1)

14 minutes

(2)

(d) Use your graph to find an estimate for the number of buses that were more than 48 minutes late last Monday.

More than 48 minutes = 120 − 112 (1)
= 8 (1)

8

(2)

**(Total for Question 3 is 7 marks)**

**4** The table gives information about the amount of money, in £, that Fiona spent in a grocery store each week during 2019

| Amount spent (£$x$) | Frequency |
|---|---|
| $0 \leqslant x < 20$ | 5 |
| $20 \leqslant x < 40$ | 11 |
| $40 \leqslant x < 60$ | 8 |
| $60 \leqslant x < 80$ | 19 |
| $80 \leqslant x < 100$ | 9 |

Work out an estimate for the total amount of money that Fiona spent in the grocery store during 2019

Total estimation : $\Sigma$ midpoint × frequency for all classes

Total : $(10 \times 5) + (30 \times 11) + (50 \times 8) + (70 \times 19) + (90 \times 9)$ (1)

$= 50 + 330 + 400 + 1330 + 810$ (1)

$= 2920$ (1)

£ 2920

**(Total for Question 4 is 3 marks)**

**5** The table shows information about the weights, in kilograms, of 40 babies.

| Weight ($w$ kg) | Frequency |
|---|---|
| $2 < w \leqslant 3$ | 12 |
| $3 < w \leqslant 4$ | 16 |
| $4 < w \leqslant 5$ | 9 |
| $5 < w \leqslant 6$ | 2 |
| $6 < w \leqslant 7$ | 1 |

(a) Write down the modal class.

modal class : class with highest frequency

$3 < w \leqslant 4$ (1)

.....

**(1)**

(b) Work out an estimate for the mean weight of the 40 babies.

Estimated Total weight $= (12 \times 2.5) + (16 \times 3.5) + (9 \times 4.5) + (2 \times 5.5) + (1 \times 6.5)$ (1)

$= 30 + 56 + 40.5 + 11 + 6.5$ (1)

$= 144$

Mean $= \frac{144}{40}$ (1) $= 3.6$ kg (1)

3.6 ..... kg

**(4)**

One of the 40 babies is going to be chosen at random.

(c) Find the probability that this baby has a weight of more than 5 kg.

Baby weight more than 5 kg $= \frac{2}{40} + \frac{1}{40}$ (1)

$= \frac{3}{40}$ (1)

$\frac{3}{40}$

.....

**(2)**

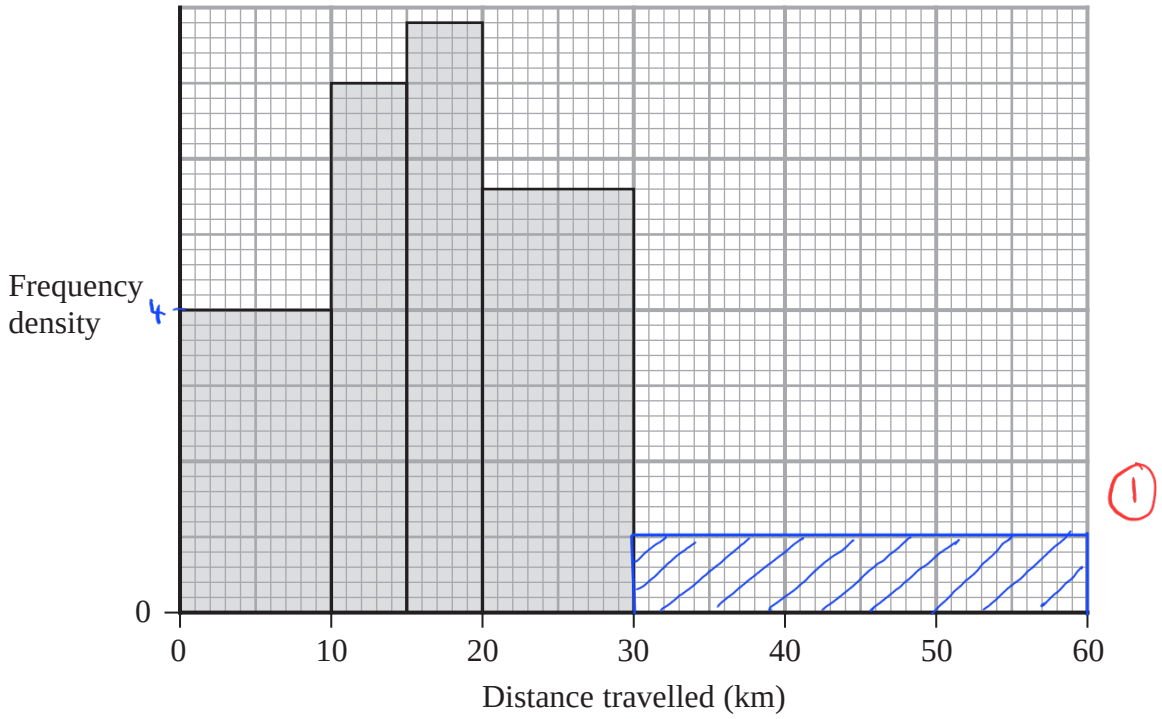
**(Total for Question 5 is 7 marks)**

**6** The table and histogram give information about the distance travelled, in order to get to work, by each person working in a large store.

| Distance ($d$ km) | Frequency |
|---|---|
| $0 \leqslant d < 10$ | 40 |
| $10 \leqslant d < 15$ | 35 |
| $15 \leqslant d < 20$ | 39 |
| $20 \leqslant d < 30$ | 56 |
| $30 \leqslant d < 60$ | 30 |

(2)

frequency = Frequency density × class width




(1)

Finding height of first bar :

$$\text{Frequency density} = \frac{40}{10} = 4$$

∴ 5 small square = 1 frequency density

2nd bar : $5 \times 7 = 35$

3rd bar : $5 \times 7.8 = 39$

4th bar : $10 \times 5.6 = 56$

Using the information in the table and in the histogram,

(a) complete the table,

**(2)**

(b) complete the histogram.

**(1)**

One of the people working in the store is chosen at random.

(c) Work out an estimate for the probability that the distance travelled by this person, in order to get to work, was greater than 25 km.

From 25 to 30 km :

$0.5 \times 56 = 28$

From 30 to 60 km :

30

Total frequency : $40 + 35 + 39 + 56 + 30 = 200$ (1)

Probability $d > 25$ km $= \frac{30 + 28}{200} = \frac{58}{200}$ (1)

$\frac{58}{200}$

**(2)**

**(Total for Question 6 is 5 marks)**

**7** The table gives information about the speeds, in kilometres per hour, of 80 motorbikes as each pass under a bridge.

| **Speed ($s$ kilometres per hour)** | **Frequency** |
|---|---|
| $40 < s \leqslant 50$ | 10 |
| $50 < s \leqslant 60$ | 16 |
| $60 < s \leqslant 70$ | 19 |
| $70 < s \leqslant 80$ | 23 |
| $80 < s \leqslant 90$ | 12 |

(a) Write down the modal class.

$70 < s \leqslant 80$ (1)

$70 < s \leqslant 80$

**(1)**

(b) Work out an estimate for the mean speed of the motorbikes as they pass under the bridge. Give your answer correct to 3 significant figures.

$$= \frac{10(45) + 16(55) + 19(65) + 23(75) + 12(85)}{10 + 16 + 19 + 23 + 12} \quad (2)$$

$$= \frac{5310}{80} \quad (1)$$

$$= 66.375$$

$$= 66.4 \text{ (3sf)} \quad (1)$$

66.4 kilometres per hour

**(4)**

**(Total for Question 7 is 5 marks)**

**8** The table shows information about the frame size, in cm, of 60 bicycles sold in a shop.

| Frame size ($S$ cm) | Frequency |
|---|---|
| $30 < S \leqslant 36$ | 4 |
| $36 < S \leqslant 42$ | 14 |
| $42 < S \leqslant 48$ | 18 |
| $48 < S \leqslant 54$ | 19 |
| $54 < S \leqslant 60$ | 5 |

(a) Write down the modal class.

$48 < S \leq 54$ (1)

.....

**(1)**

(b) Work out an estimate for the mean frame size.

$$\frac{33 \times 4 + 39 \times 14 + 45 \times 18 + 51 \times 19 + 57 \times 5}{60} \quad (1)$$

$$= \frac{132 + 546 + 810 + 969 + 285}{60} \quad (1)$$

$$= \frac{2742}{60} \quad (1)$$

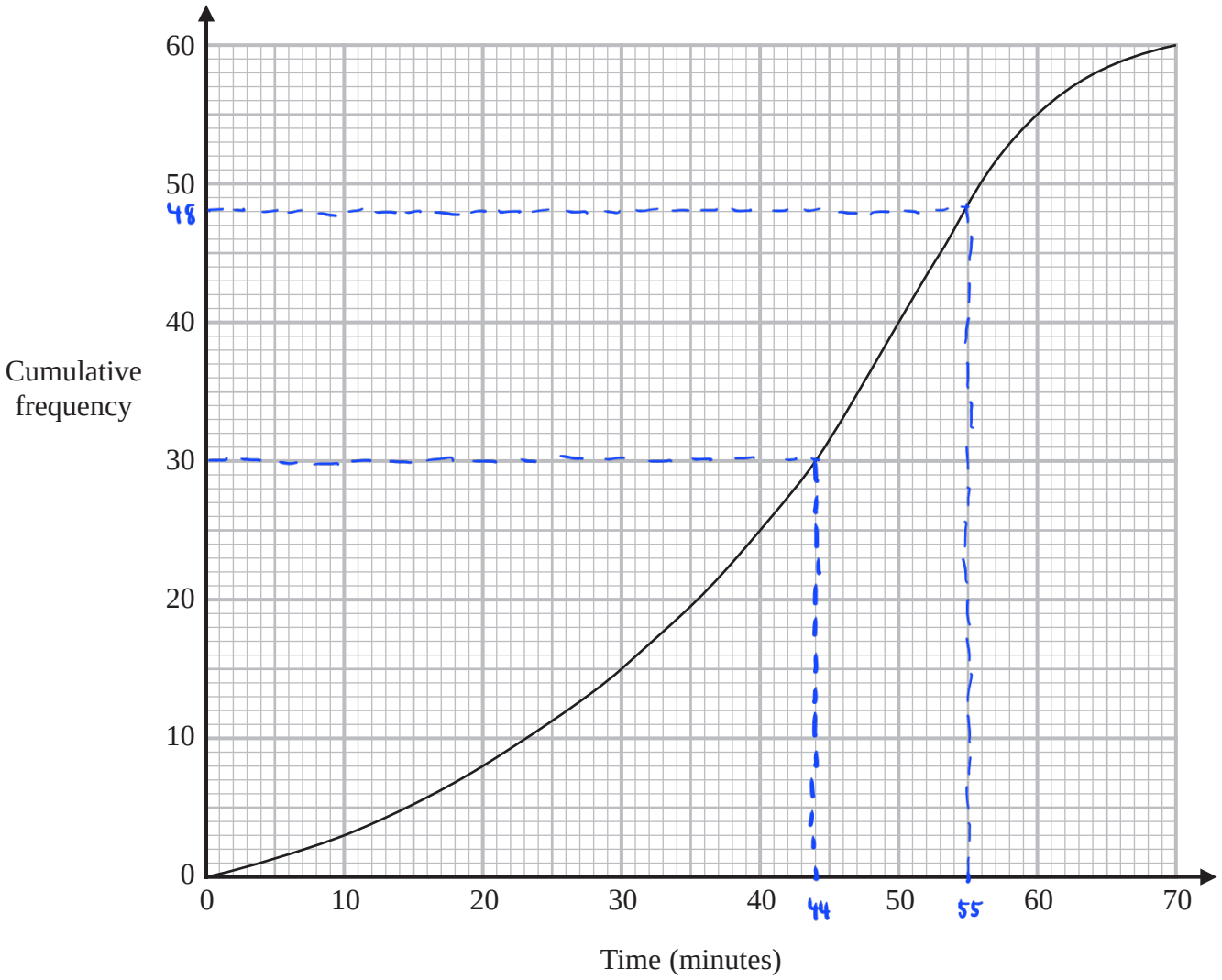
$$= 45.7 \quad (1)$$

45.7 ..... cm

**(4)**

**(Total for Question 8 is 5 marks)**

**9** The cumulative frequency graph gives information about the time, in minutes, each of 60 people took to shop in a market.




(a) Use the graph to find an estimate for the median time people took to shop in the market.

44 (1) minutes

(1)

(b) Use the graph to find an estimate for the number of people who took longer than 55 minutes to shop in the market.

60 − 48 = 12 (1) (1)

12

(2)

(c) Use the graph to complete the frequency table to give information about the time, in minutes, each of the 60 people took to shop in the market.

| Time taken to shop in the market ($m$ minutes) | Frequency |
|---|---|
| $0 < m \leqslant 10$ | 3 |
| $10 < m \leqslant 20$ | 5 |
| $20 < m \leqslant 30$ | 7 |
| $30 < m \leqslant 40$ | 10 |
| $40 < m \leqslant 50$ | 15 |
| $50 < m \leqslant 60$ | 15 |
| $60 < m \leqslant 70$ | 5 |

(2)

**(Total for Question 9 is 5 marks)**

**10** The table gives information about the number of minutes that Abby spent walking each day in September.

| Number of minutes ($M$) | Frequency |
|---|---|
| $0 < M \leqslant 30$ | 5 |
| $30 < M \leqslant 60$ | 6 |
| $60 < M \leqslant 90$ | 8 |
| $90 < M \leqslant 120$ | 9 |
| $120 < M \leqslant 150$ | 2 |

Work out an estimate for the total number of minutes that Abby spent walking in September.

Estimated total : $(15 \times 5) + (45 \times 6) + (75 \times 8) + (105 \times 9) + (135 \times 2)$ (1)

$= 75 + 270 + 600 + 945 + 270$ (1)

$= 2160$ (1)

2160 ..... minutes

**(Total for Question 10 is 3 marks)**