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

| midpoints: | **Length of time ($t$ minutes)** | **Frequency** |
|---|---|---|
| 5 | $0 < t \leqslant 10$ | 4 |
| 15 | $10 < t \leqslant 20$ | 10 |
| 25 | $20 < t \leqslant 30$ | 15 |
| 35 | $30 < t \leqslant 40$ | 25 |
| 45 | $40 < t \leqslant 50$ | 6 |

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 = $\frac{\text{sum of entries}}{\text{no. of entries}}$ "estimate" so work out the midpoints of each range

sum of entries = $5 \times 4 + 15 \times 10 + 25 \times 15 + 35 \times 25 + 45 \times 6$
= 1690 (2)

mean = $\frac{1690}{60}$ (1) = 28.166... = 28.2 (1 d.p)

given in question

.6 > .5 so round up

28.2 (1) ..... minutes

**(Total for Question 1 is 4 marks)**

**2** Paula asks 16 members of her class the number of pets they each have.
Here are her results.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 2 | 4 | 0 | 1 | 2 | 1 |
| 3 | 3 | 4 | 1 | 1 | 0 | 3 | 2 |

(a) Complete the frequency table for her results.

| Number of pets | Tally | Frequency |
|---|---|---|
| 0 | II | 2 |
| 1 | ~~HHT~~ | 5 |
| 2 | IIII | 4 |
| 3 | III | 3 |
| 4 | II | 2 |

(2)

(b) Write down the mode for the number of pets.

↘ most frequency

1 (1)

.....

(1)

(c) Work out the range for the number of pets.

↘ highest no. of pets - lowest no. of pets

5 - 1 = 4

4 (1)

.....

(1)

**(Total for Question 2 is 4 marks)**

**3** 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.

$$\text{mean} = \frac{\text{midpoint} \times \text{frequency}}{\text{total frequency}}$$

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

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

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

48 minutes

.....

**(4)**

**(Total for Question 3 is 5 marks)**

**4** Egor rolled a dice 24 times.
Here are his results.

| | | | | | |
|---|---|---|---|---|---|
| 2 | 3 | 5 | 4 | 6 | 2 |
| 1 | 3 | 3 | 5 | 1 | 3 |
| 3 | 5 | 5 | 6 | 2 | 5 |
| 4 | 3 | 4 | 3 | 3 | 4 |

(a) Complete the frequency table for Egor's results.

| Number on dice | Tally | Frequency |
|---|---|---|
| 1 | II | 2 |
| 2 | III | 3 |
| 3 | 𝍸 III | 8 |
| 4 | IIII | 4 |
| 5 | 𝍸 | 5 |
| 6 | II | 2 |

(2)

(b) Write down the mode of the numbers that Egor rolled.

mode : number with most frequency

3 (1)

(1)

Egor thinks the dice he rolled is biased.

(c) Give a reason why the results could show that the dice is biased.

The dice lands on 3 too many times. (1)

(1)

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

**5** 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 5 is 3 marks)**

**6** 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 6 is 7 marks)**

**7** There are 25 pens in a packet.

7 of the pens are green.
10 of the pens are black.
The rest of the pens are red.

Jurgen takes at random a pen from the packet.

(a) Find the probability that

(i) the pen is black,

$\frac{10}{25}$ (1)

.....

**(1)**

(ii) the pen is red.

Red = 25 - 7 - 10
= 8

$\frac{8}{25}$ (1)

.....

**(1)**

Heidi records the number of packets of pens sold in her shop to each customer last Friday.
The table shows information about her results.

| Number of packets | Frequency |
|---|---|
| 1 | 14 |
| 2 | 17 |
| 3 | 15 |
| 4 | 12 |
| 5 | 9 |

(b) Write down the mode of the number of packets.

mode = class with highest frequency

2 (1)

.....

**(1)**

(c) Work out the total number of packets of pens sold last Friday.

$(1 \times 14) + (2 \times 17) + (3 \times 15) + (4 \times 12) + (5 \times 9)$

$= 14 + 34 + 45 + 48 + 45$ (1)

$= 186$ (1)

186

.....

**(2)**

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

**8** 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 8 is 5 marks)**

**9** 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 9 is 5 marks)**

**10** The frequency table shows information about the number of cookies made by each of the 21 people in a cookery class.

| Number of cookies made | Frequency | |
|---|---|---|
| 10 | 1 | 1 |
| 11 | 7 | 8 |
| 12 | 2 | 10 |
| 13 | 5 | 15 |
| 14 | 4 | 19 |
| 15 | 2 | 21 |

(a) Write down the mode of the number of cookies made.

11 (1)

.....

(1)

(b) Find the median number of cookies made.

$\frac{21}{2} = 10.5$

= 11th cookies (1)

13 (1)

.....

(2)

(c) Find the total number of cookies made by the 21 people in the cookery class.

$10 \times 1 + 7 \times 11 + 2 \times 12 + 5 \times 13 + 4 \times 14 + 2 \times 15$

$= 10 + 77 + 24 + 65 + 56 + 30$ (1)

$= 262$ (1)

262

.....

(2)

**(Total for Question 10 is 5 marks)**

**11** Ivor asks 20 children in his class to name their favourite fruit.
Here are his results.

| | | | | |
|---|---|---|---|---|
| apple | orange | grape | peach | grape |
| banana | apple | orange | grape | peach |
| apple | apple | banana | peach | orange |
| grape | orange | apple | orange | orange |

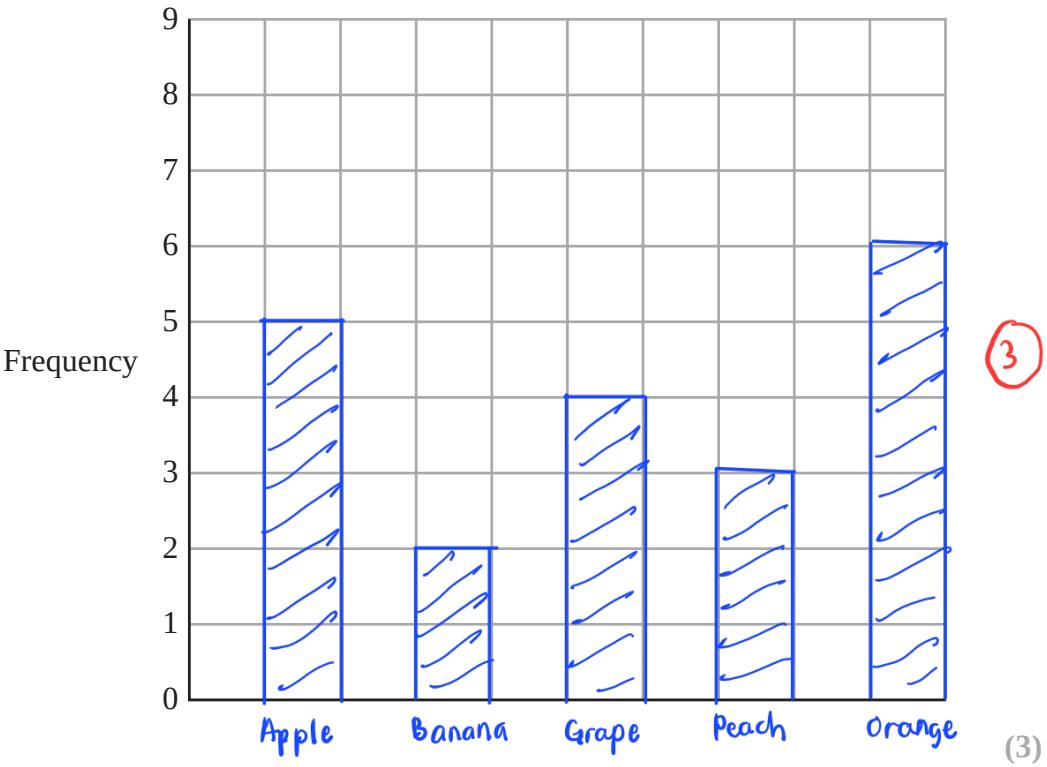
(a) Complete the frequency table to show this information.

| Fruit | Tally | Frequency |
|---|---|---|
| apple | 𝍸 | 5 |
| banana | II | 2 |
| grape | IIII | 4 |
| peach | III | 3 |
| orange | 𝍸 I | 6 |

(1) (1)

**(2)**

(b) Complete the bar chart for the information in your table.




(3)

**(Total for Question 11 is 5 marks)**

**12** 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 12 is 3 marks)**