Averages from Frequency Tables Exam Practice

Q1. The table below shows the number of books people who visit a local library borrowed on Sunday.

Number of books borrowed	Frequency	no. books × frequency
1	3	3
2	6	12
3	5	15
4	2	8
5	2	10
Totals:	18	48

a) On Sunday, what was the number of people who left the library having borrowed more than 3 books?

$2+2=4$

Answer: 4

(1 mark)

b) Work out the mean number of books borrowed from the library.

$$\text{mean} = \frac{48}{18}$$

$$= 2.\dot{6}$$

Answer: $2.\dot{6}$

(2 marks)

Q2. The table below shows the number of points scored by a 5-aside football team in various different games.

Number of Points	Frequency	no. points × freq.	Cumulative Frequency
1	8	8	8
2	11	22	30
3	7	21	51
4	6	24	75
Over 4	0	0	75
Totals	32	75	

a) In how many games did the team score more than 2 points?

$7 + 6 = 13$

Answer: 13

(1 mark)

b) Work out the mean number of points scored by the team.

$\frac{75}{32} = 2.34\ldots$

Answer: 2.34

(2 marks)

c) State the modal number of points scored by the team.

2

Answer: 2

(1 mark)

d) Work out the median number of points scored by the team. You must show all your working out.

- $\frac{32+1}{2} = 16.5^{th} \Rightarrow$ Median lies between 16^{th}, 17^{th} data values
- There are both 2, so the median = 2

Answer: 2

(2 marks)

Q3. Packets of sweets contain toffees and several other types of sweets. The following table shows the number of toffees in a sample of packets.

No. of Toffees	No. of Packets
6	15
7	18
8	x
9	11

a) If the total number of toffees in the sample of packets is 419, find x.

$6\times15 + 7\times18 + 8x + 9\times11 = 419$

$\Rightarrow 90 + 126 + 8x + 99 = 419$

$\Rightarrow 8x = 104$

$\Rightarrow x = 13$

Answer: 13

(1 mark)

b) Work out the mean number of toffees per packet.

- no. of packets $= 15 + 18 + 13 + 11$
  $= 57$

- mean $= \frac{419}{57}$
  $= 7.35$

Answer: 7.35

(2 marks)

c) If the sample contained 600 packets of sweets, estimate the total number of toffees there were be in total. You must show your working.

$600 \times 7.35 = 4410.5$

Answer: 4410 toffees

(2 marks)

Q4. The heights of trees in a forest are recorded in the following table.

Height h of tree (metres)	Frequency (to the nearest 10)	mid-point × frequency
$2 \leq h < 2.5$	200	$2.25 \times 200 = 450$
$2.5 \leq h < 3$	350	$2.75 \times 350 = 962.5$
$3 \leq h < 3.5$	420	$3.25 \times 420 = 1365$
$3.5 \leq h < 4$	160	$3.75 \times 160 = 600$
$4 \leq h < 6$	80	$5 \times 80 = 400$
Totals	1210	3747.5

a) Work out an estimate for the mean height of trees in the forest.

$$\text{mean} = \frac{3747.5}{1210}$$

$$= 3.097$$

Answer: 3.1m

(3 marks)

b) Give reasons why your estimate in part (a) is only an estimate.

- The data is grouped
- The frequencies are rounded

Answer: – grouped data
– frequencies are rounded

(2 marks)

c) State the modal class for the data.

$3 \leq h < 3.5$

Answer: $3 \leq h < 3.5$

(1 mark)

d) Estimate the number of trees which have a height between 3m and 5m

$$420 + 160 + \tfrac{1}{2}(40) = 600$$

Classes: 3–3.5, 3.5–4, 4–5

Answer: 600

(2 marks)

Q5. The times of some runners to complete a 5 km race are recorded in the following table.

Time t of (minutes)	No. of runners	mid-point × no. runners	Cumulative frequency
$15 \leq t < 18$	18	$16.5 \times 18 = 297$	18
$18 \leq t < 21$	37	$19.5 \times 37 = 721.5$	55
$21 \leq t < 25$	26	$23 \times 26 = 598$	81
$25 \leq t < 30$	23	$27.5 \times 23 = 632.5$	104
$30 \leq t < 50$	21	$40 \times 21 = 840$	125
$t \geq 50$	0	0	
Totals	125	3089	

a) Work out an estimate for the mean time of a runner in the race.

$\text{Mean} \simeq \frac{3089}{125}$

$= 24.712$

Answer: 24.7 mins

(3 marks)

b) Give a reason why your estimate in part (a) is only an estimate.

The data is grouped

Answer: (grouped data)

(1 mark)

c) (i) Which class contains the median? You must show your working.

• $\text{median} = \left(\frac{125+1}{2}\right)^{th}$ value

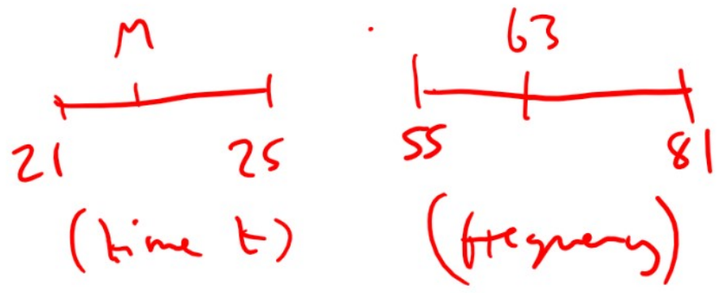
$= 63^{rd}$ value

• lies in $21 \leq t < 25$

Answer: $21 \leq t < 25$

(2 marks)

(ii) Hence estimate the median time of the runners.



$M \simeq 21 + \frac{63-55}{81-55} \times (25-21)$

$= 21 + \frac{8}{26} \times 4$

$= 22.2$

Answer: 22.2 mins

(2 marks)

Q6. Here are the weights of several pumpkins entered into a village fruit `n' veg growing competition. The heaviest pumpkin is the winner.

310g	355g	529g	604g	818g	1.21kg	1.35kg	1.40kg
1.55kg	1.59kg	1.73kg	1.92kg	2.05kg	2.28kg	2.28kg	2.49kg
2.87kg	2.92kg	2.99kg	3.02kg	3.13kg	3.78kg	4.33kg	4.84kg

a) State the mode of the data.

2.28kg

Answer: 2.28kg

(1 mark)

b) Present the data in a frequency table, using 5 classes of equal widths.

(kg) Weight (kg)	Freq.	mid × freq
$0 \leq w < 1$	5	2.5
$1 \leq w < 2$	7	10.5
$2 \leq w < 3$	7	17.5
$3 \leq w < 4$	3	10.5
$4 \leq w < 5$	2	9
Total	24	50

- 4840 − 310 = 4530 g
- 4530 ÷ 5 = 906 g

⇒ make class width 1000 g in width.

Answer: _____

(2 marks)

c) Use your frequency table to work out an estimate for the mean weight of a pumpkin.

mean ≈ $\frac{50}{24}$

= 2.083

= 2.08 kg

Answer: 2.08 kg

(3 marks)

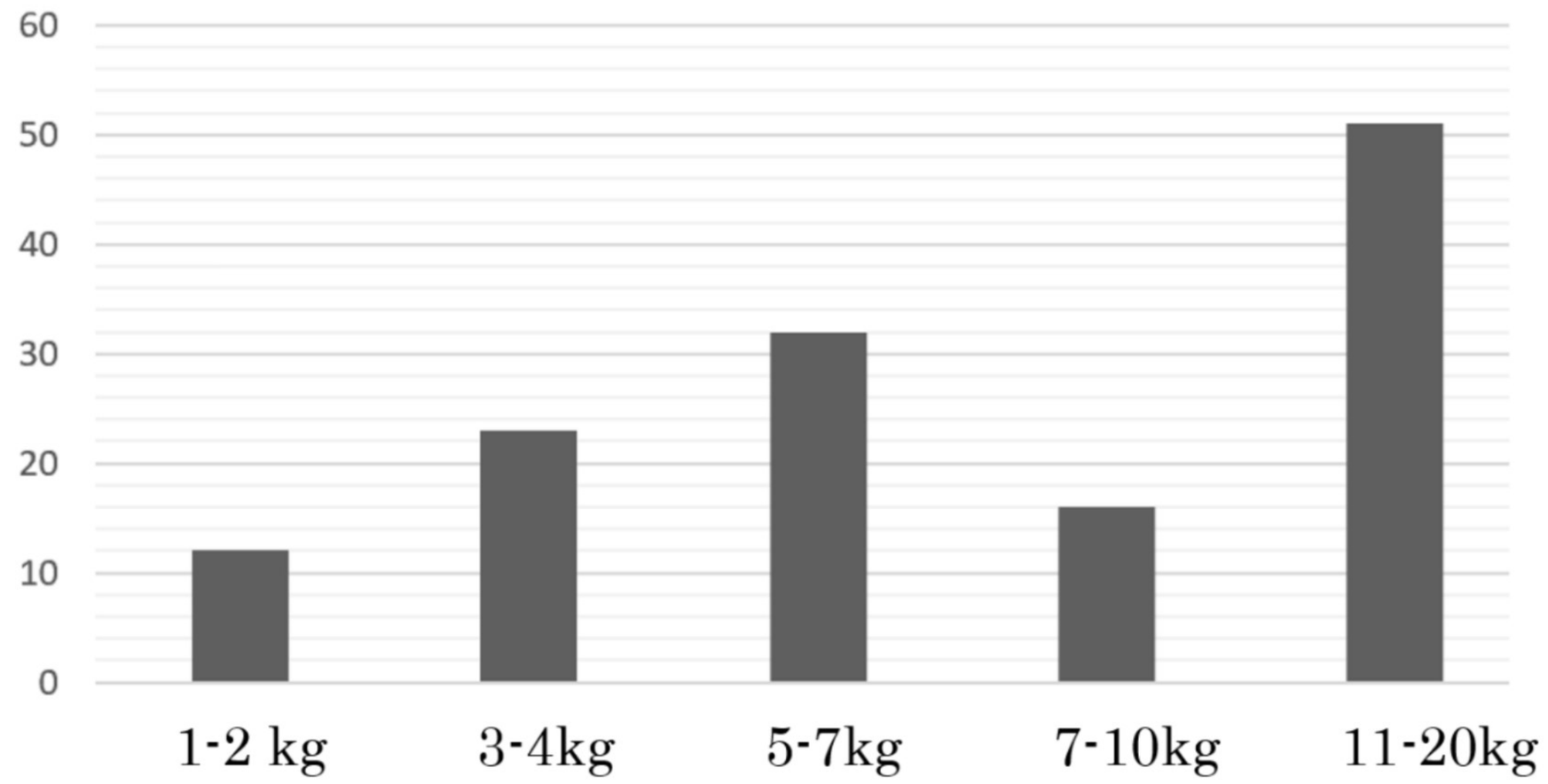
d) One regular contestant says, "None of the pumpkins this year weighed as much as the winning pumpkin from last year". Does this mean that the mean weight of the pumpkins was lower this year than last year? You must explain your reasoning.

No. Last year, for example, every pumpkin could have been heavier than the ones above - apart from the winner. Then the mean of last years' would be higher than this years'.

Answer: No.

(1 mark)

Q7. The following bar chart shows the amount of parcels, by weight, (kg) received at a main post office branch in a year.



a) Present the above data in the form of a frequency table, and use your table to work out an estimate for the mean weight of a parcel. Give your answer to the nearest kg.

parcel weight (kg)	Frequency	weight mid-point × freq.
1-2	12	1.5×12 = 18
3-4	23	3.5×23 = 80.5
5-7	32	6×32 = 192
7-10	16	8.5×16 = 136
11-20	52	15.5×52 = 806
Totals:	135	1232.5

Mean = $\frac{1232.5}{135}$

= 9.13

Answer: 9 kg

(4 marks)

b) Estimate the number of parcels weighing between 3kg and 6 kg which the post office will process in a day.

$23 + \frac{1}{2}(32) = 23 + 16$

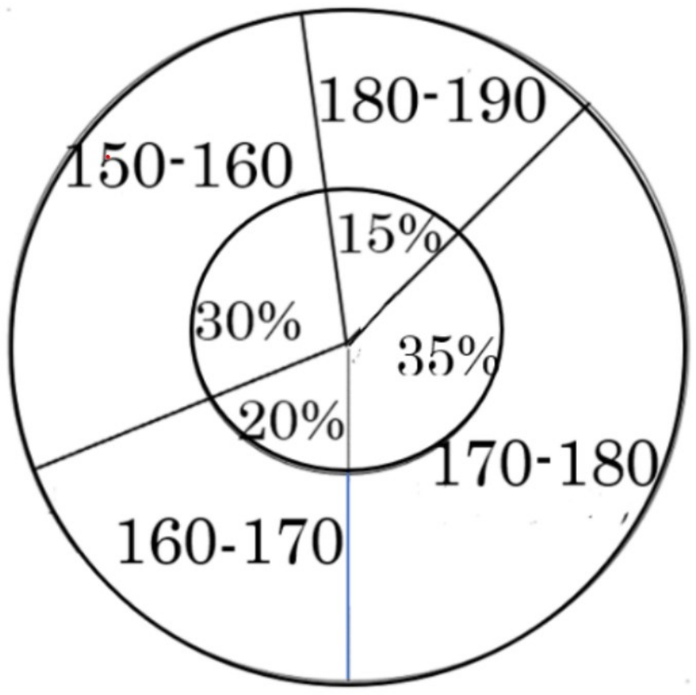
$= 49$

from 3-4 kg and 5-7 kg

Answer: 49

(2 marks)

Q8. The following pie chart shows the proportion of 3000 people of different heights (in cm).



Present the above data in the form of a frequency table, and use your table to work out an estimate for the mean height of a person. Give your answer to the nearest cm.

height (cm)	frequency	mid-point × freq
150 – 160	900	155 × 900 = 139500
160 – 170	600	165 × 600 = 99000
170 – 180	1050	175 × 1050 = 183750
180 – 190	450	185 × 450 = 83250
~~totals~~	3000	505500

mean ≈ $\frac{505,500}{3000}$

= 168.5

= 169 cm

Answer: 169 cm

(4 marks)