1. Nov/2023/Paper_0444/23/No.4

The table shows the homework marks of a group of students.

Homework mark (x)	5	6	7	8
Frequency (f)	1	3	1	5

Find

(a) the range

Range = highest mark − lowest mark

= 8 − 5 = 3

3 [1]

(b) the mode

The mode is the homework mark with the highest frequency.

8 [1]

(c) the median

5 5 5 5 (7 8) 8 8 8 8

Median = $\frac{7+8}{2}$ = 7.5

7.5 [1]

(d) the mean.

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

$= \frac{(1\times 5)+(3\times 6)+(1\times 7)+(5\times 8)}{1+3+1+5}$

$= \frac{70}{10} = 7$

7 [3]

2. Nov/2023/Paper_0444/23/No.8

Rama asks a group of students how they travel to school.
The table shows the probability of how a student, chosen at random, travels to school.

	Bus	Walk	Car	Other
Probability	0.4	0.2	0.1	0.3

(a) Complete the table.

Sum of probabilities = 1
P(other) = 1 − (0.4 + 0.2 + 0.1)
= 1 − 0.7
= 0.3

[2]

(b) There are 1000 students at the school.

Find the expected number of students that walk to school.

Expected number = 1000 × p(walk)
= 1000 × 0.2
= 1000 × $\frac{2}{10}$
= 200

200 [1]

3. Nov/2023/Paper_0444/23/No.20

The following probabilities are given for events A and B.

$$P(A) = 0.2 \qquad P(B) = 0.1 \qquad P(A \text{ and } B) = 0.05$$

(a) Find $P(A \text{ or } B)$.

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$= 0.2 + 0.1 - 0.05$

$= 0.25$

0.25 [2]

(b) Show that A and B are not independent.

If A and B are independent events then

$P(A \text{ and } B) = P(A) \times P(B)$

$P(A) \times P(B) = 0.2 \times 0.1 = 0.02 \neq 0.05$

So events A and B are not independent. [1]

4. Nov/2023/Paper_0444/43/No.2

The table shows the number of each type of bird seen in a garden on Monday.

Type of bird	Frequency	Pie chart sector angle
Goldfinch	8	96°
Jay	6	$\frac{6}{30} \times 360^\circ = 72^\circ$
Starling	11	$\frac{11}{30} \times 360^\circ = 132^\circ$
Robin	5	$\frac{5}{30} \times 360^\circ = 60^\circ$

Total 30

(a) Find the percentage of the birds that are Starlings.

$\% = \frac{11}{30} \times 100\%$

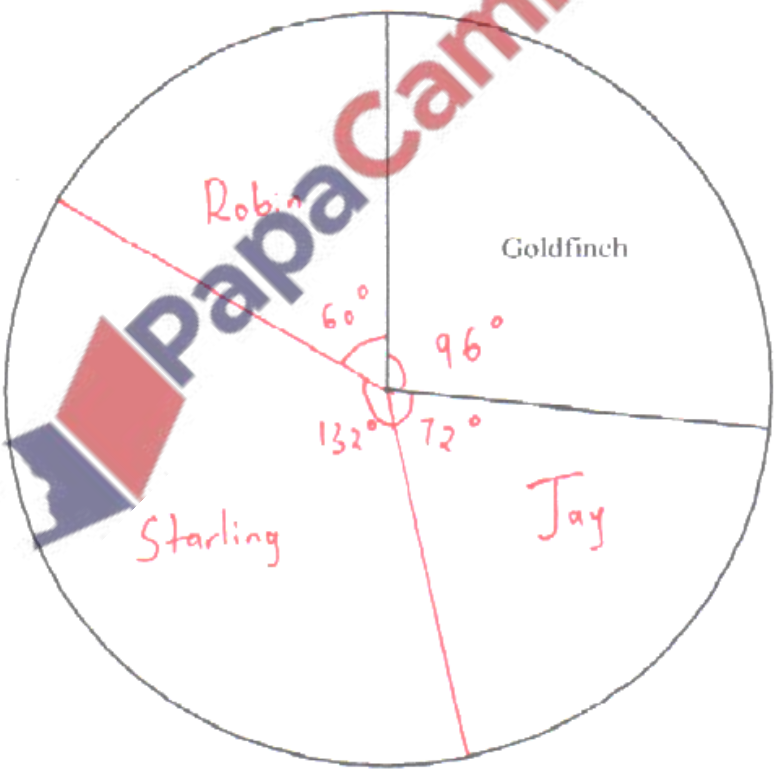
$= 36.7\%$

..... 36.7 % [2]

(b) **(i)** In the table, complete the column for the pie chart sector angle. [2]

Angles in a pie chart add up to 360°

(ii) Complete the pie chart to show the information in the table.



[2]

(c) On Tuesday, the number of Goldfinches seen in the garden increased by 262.5%.

Calculate the number of Goldfinches seen on Tuesday.

(100% + 262.5%) x 8

$\frac{362.5}{100} \times 8 = 29$

29 ..... [2]

(d) One of the most common birds in the world is the Red-Billed Quelea which lives in Sub-Saharan Africa.
There are approximately 1500 million of these birds in this area.

(i) Write 1500 million in scientific notation. (standard form)

1500 000 000 = 1.5×10^9

1.5×10^9 ..... [1]

(ii) The land area of Sub-Saharan Africa is approximately 21.2 million square kilometers.

Work out the average number of these birds per square kilometer.

Average number = $\frac{\text{number of birds}}{\text{Total area}}$

$= \frac{1500 \text{ million}}{21.2 \text{ million}}$

$= 70.75$ birds / km^2

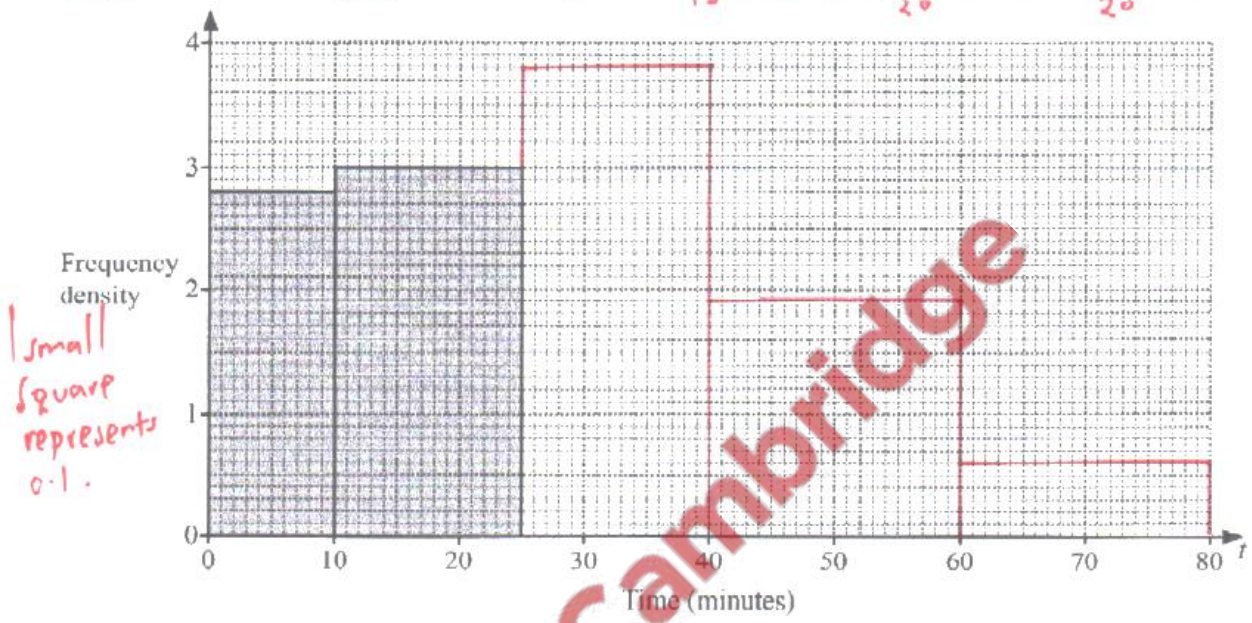
≈ 70.8 birds / km^2

70.8 ..... birds/km^2 [2]

5. Nov/2023/Paper_0444/43/No.5

Midpoint 5 17.5 32.5 50 70

Time (t minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 25$	$25 < t \leqslant 40$	$40 < t \leqslant 60$	$60 < t \leqslant 80$
Frequency	$2.8 \times 10 = 28$	$3 \times 15 = 45$	57	38	12
FD	2.8	3	$\frac{57}{15} = 3.8$	$\frac{38}{20} = 1.9$	$\frac{12}{20} = 0.6$



1 small square represents 0.1.

(a) Complete the table and the histogram.

Frequency density $= \frac{\text{frequency}}{\text{class width}}$ $\Rightarrow$ frequency = FD × CW

[5]

(b) Calculate an estimate of the mean time.

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{\Sigma \text{ frequency } (f) \times \text{midpoint } (x)}{\Sigma \text{ frequency}}$$

$$\text{Mean} = \frac{(28 \times 5) + (45 \times 17.5) + (57 \times 32.5) + (38 \times 50) + (12 \times 70)}{28 + 45 + 57 + 38 + 12}$$

$= \frac{5520}{180} = 30.67$ min ≈ 30.7 min (3sf)

30.7 ..... min [4]

(c) Rashid says:

"The longest time that any of these workers take to travel to work is 80 minutes."

Give a reason why Rashid may be wrong.

Exact values are unknown

..... [1]

(d) Indira picks three workers at random from those who take longer than 25 minutes to travel to work.

Calculate the probability that one worker takes 60 minutes or less and the other two each take more than 60 minutes.

Number of workers who took longer than 25 minutes
= 57 + 38 + 12 = 107

Number of workers who took more than 25 minutes but less than 60 minutes
= 38 + 57 = 95

More than 60 minutes = 12

Probability $= \left(\frac{95}{107} \times \frac{12}{107-1} \times \frac{12-1}{107-1-1} \right) \times 3$

$= \left(\frac{95}{107} \times \frac{12}{106} \times \frac{11}{105} \right) \times 3$

$= \frac{1254}{39697}$ ..... [4]