

Averages from Frequency Tables

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (5 marks)

The table shows information about the number of children in 25 families.

Number of children	0	1	2	3	4
Frequency	4	7	9	3	2

(a) Write down the mode.

The mode is the number of children with the highest frequency.

The highest frequency is 9, for 2 children.

Answer: 2

Tip: Give the number of children (2), not the frequency (9).

(b) Find the median.

There are 25 families, so the median is the 13th value.

Add up the frequencies as you go:

0 children: families 1 to 4

1 child: families 5 to 11

2 children: families 12 to 20

So the 13th value is 2.

Answer: 2

Tip: Don't find the middle of the frequency column. Count through the frequencies to find the 13th family.

- (c) Work out the mean number of children per family.

Multiply each number of children by its frequency:

$$0 \times 4 = 0$$

$$1 \times 7 = 7$$

$$2 \times 9 = 18$$

$$3 \times 3 = 9$$

$$4 \times 2 = 8$$

$$\text{Total number of children} = 0 + 7 + 18 + 9 + 8 = 42$$

Divide by the number of families, 25:

$$42 \div 25 = 1.68$$

Answer: 1.68

Tip: Divide by the total frequency (25 families), not by 5.

Marks: 1 mark for multiplying children by frequency. 1 mark for dividing the total by 25. 1 mark for 1.68.

2 (4 marks)

A café asked 25 customers how many sugar cubes they took in their tea.
The frequency table gives information about the results.

Number of sugar cubes	0	1	2	3
Frequency	6	8	7	4

- (a) Work out the mean number of sugar cubes per customer.

Multiply each number of sugar cubes by its frequency:

$$0 \times 6 = 0$$

$$1 \times 8 = 8$$

$$2 \times 7 = 14$$

$$3 \times 4 = 12$$

$$\text{Total number of sugar cubes} = 0 + 8 + 14 + 12 = 34$$

Divide by the number of customers, 25:

$$34 \div 25 = 1.36$$

Answer: 1.36

Tip: Divide by the number of customers (25), not by 4 (the number of columns).

Marks: 1 mark for at least two correct products. 1 mark for $34 \div 25$. 1 mark for 1.36.

- (b) Jon says,

‘The median is 1.5 because 1.5 is in the middle of 0, 1, 2 and 3’

Is Jon correct?

You must give a reason for your answer.

There are 25 customers, so the median is the 13th value.

Add up the frequencies: 0 cubes: customers 1 to 6; 1 cube: customers 7 to 14

So the 13th value is 1.

The median is 1, not 1.5. Jon has ignored the frequencies.

Answer: No. The median is the 13th value, which is 1

Tip: The median must come from counting through the frequencies, not from the middle of the list of possible values.

3 (3 marks)

20 people each had some driving lessons one week.

The table shows information about the number of lessons they had.

Number of lessons	1	2	3	4	5
Frequency	6	5	4	3	2

Ali says the mean number of lessons is $\frac{1+2+3+4+5}{5} = 3$

(a) Explain what Ali has done wrong.

Ali has added the numbers of lessons 1 to 5 and divided by 5.

He has not used the frequencies (how many people had each number of lessons).

Answer: He has not used the frequencies

Tip: Say exactly what he has missed: he has not used the frequencies. "His answer is wrong" is not enough.

(b) Work out the correct mean number of lessons.

Multiply each number of lessons by its frequency.

$$1 \times 6 = 6$$

$$2 \times 5 = 10$$

$$3 \times 4 = 12$$

$$4 \times 3 = 12$$

$$5 \times 2 = 10$$

$$\text{Total lessons} = 6 + 10 + 12 + 12 + 10 = 50$$

There are 20 people.

$$\text{Mean} = 50 \div 20 = 2.5$$

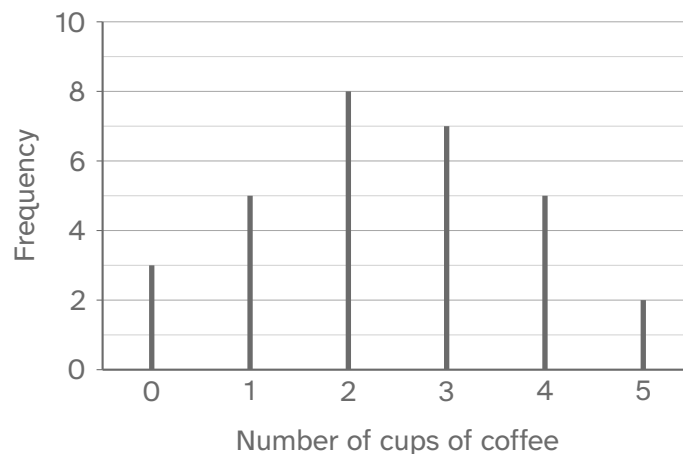
Answer: 2.5

Tip: Divide by the total frequency (20 people), not by the number of rows (5).

Marks: 1 mark for finding the total number of lessons (50). 1 mark for 2.5.

4 (5 marks)

30 office workers each recorded the number of cups of coffee they drank on Monday. The vertical line chart shows information about the results.



(a) Find the median number of cups of coffee.

Read the frequencies: 3, 5, 8, 7, 5, 2

Total = 30 workers

The median is halfway between the 15th and 16th values.

Add up the frequencies as you go:

0 cups: workers 1 to 3

1 cup: workers 4 to 8

2 cups: workers 9 to 16

So the 15th and 16th values are both 2.

Median = 2

Answer: 2

Marks: 1 mark for finding the 15th and 16th values (or the 15.5th). 1 mark for 2.

- (b) Work out the mean number of cups of coffee.

Multiply each number of cups by its frequency:

$$0 \times 3 = 0$$

$$1 \times 5 = 5$$

$$2 \times 8 = 16$$

$$3 \times 7 = 21$$

$$4 \times 5 = 20$$

$$5 \times 2 = 10$$

$$\text{Total} = 0 + 5 + 16 + 21 + 20 + 10 = 72$$

$$\text{Mean} = 72 \div 30 = 2.4$$

Answer: 2.4

Tip: Read the heights of the lines carefully from the scale, then divide by the total frequency (30), not by 6.

Marks: 1 mark for at least three correct products. 1 mark for $72 \div 30$. 1 mark for 2.4.

5 (3 marks)

The table shows the number of tickets bought by each customer at a cinema one evening.

Number of tickets	1	2	3	4
Frequency	12	x	9	4

There were 40 customers.

Work out the total number of tickets bought.

First find x : $12 + x + 9 + 4 = 40$

$25 + x = 40$, so $x = 15$

Total tickets = tickets $\times$ frequency, added up:

$$1 \times 12 + 2 \times 15 + 3 \times 9 + 4 \times 4$$

$$= 12 + 30 + 27 + 16$$

$$= 85$$

Answer: 85

Tip: x is a number of customers. Find it first, then multiply it by 2 tickets.

Marks: 1 mark for $x = 15$. 1 mark for at least three correct products. 1 mark for 85.

6 (3 marks)

The table shows information about the number of goals a team scored in some football matches.

Goals	0	1	2	3
Frequency	3	y	3	4

The mean number of goals scored per match is 1.4

Work out the value of y .

$$\text{Total goals: } 0 \times 3 + 1 \times y + 2 \times 3 + 3 \times 4 = y + 18$$

Number of matches: $3 + y + 3 + 4 = y + 10$

$$\text{Mean} = \frac{y + 18}{y + 10} = 1.4$$

Multiply both sides by $(y + 10)$: $y + 18 = 1.4(y + 10)$

$$y + 18 = 1.4y + 14$$

Subtract y and 14: $4 = 0.4y$

$$y = 10$$

$$\text{Check: } \frac{28}{20} = 1.4 \quad \checkmark$$

Answer: 10

Marks: 1 mark for $y + 18$ or $y + 10$. 1 mark for $\frac{y + 18}{y + 10} = 1.4$ (or equivalent). 1 mark for 10.
