

Mean average from a frequency table

Starter

1. (Review of last lesson) Find the mode and median for this data:

Mark	50	100	150	200	250	300
Frequency	9	6	2	5	3	4

Working: Mode = 50 (highest frequency)

Median: Frequencies:

9 6 2 5 3 4
~~9~~ 5 6 2 5 3 ~~4~~
~~9~~ ~~5~~ 2 6 2 5 ~~3~~ ~~4~~
~~9~~ ~~5~~ ~~2~~ 6 2 ~~5~~ 3 ~~3~~ ~~4~~
~~9~~ ~~5~~ ~~2~~ ~~6~~ 3 2 ~~5~~ ~~3~~ ~~3~~ ~~4~~
~~9~~ ~~5~~ ~~2~~ ~~6~~ ~~3~~ 1 2 ~~5~~ ~~3~~ ~~3~~ ~~4~~

The remaining 1 comes the category that had 6 as its original frequency.

The median is 100

Alternatively...

Total frequency = $9 + 6 + 2 + 5 + 3 + 4 = 29$

Median is $\frac{29 + 1}{2} = 15$ th value

Running total: 9, 15, 17, 22, 25, 29

15 is in the 2nd category so the median is 100

- E.g. 1** The data table below shows the weight of eggs laid at a farm on a particular day. Calculate the mean average.

Weight	70 g	80 g	90 g	100 g	110 g	120 g
Frequency	2	7	9	11	8	3

Working: Mass of all eggs = $(70 \times 2) + (80 \times 7) + (90 \times 9) + (100 \times 11) + (110 \times 8) + (120 \times 3)$
 $= 3850$

Total frequency = $2 + 7 + 9 + 11 + 8 + 3 = 40$ eggs

Mean = $\frac{3850}{40} = 96.25$ grams per egg

- E.g. 2** The table below shows the number of goals in a series of matches one weekend. Calculate the average number of goals per game.

Number of goals	0	1	2	3	4	5
Frequency	1	3	4	5	3	2

Working: Total number of goals = $(0 \times 1) + (1 \times 3) + (2 \times 4) + (3 \times 5) + (4 \times 3) + (5 \times 2)$
 $= 48$

Total frequency = $1 + 3 + 4 + 5 + 3 + 2 = 18$ matches

Mean = $\frac{48}{18} = 2\frac{2}{3}$ goals per match

E.g. 3 State the range of this data.

Weight	70 g	80 g	90 g	100 g	110 g	120 g
Frequency	2	7	9	11	8	3

Working: Range = $120 - 70 = 50$ g

E.g. 4 The table shows the results of a survey on the number of occupants per car.

Number of occupants	1	2	3	4
Number of cars	7	11	7	x

- (a) If the mean number of occupants is $2\frac{1}{3}$, find x .
 (b) If the mode is 2, find the largest value of x .
 (c) If the median is 2, find the largest value of x .

Working: (a) **Mean is $2\frac{1}{3}$:**
$$\frac{(1 \times 7) + (2 \times 11) + (3 \times 7) + (4 \times x)}{7 + 11 + 7 + x} = 2\frac{1}{3}$$

Collect like terms:
$$\frac{50 + 4x}{25 + x} = \frac{7}{3}$$

Cross-multiply:
$$3(50 + 4x) = 7(25 + x)$$

Expand the brackets:
$$150 + 12x = 175 + 7x$$

$$5x = 25$$

$$x = 5$$

(b) The frequency of 4 must be smaller than that of the mode.
 So $x < 11 \Rightarrow$ the largest value of x is 10.

(c) The last value of 2 is the 18th value so the sum of the frequency cannot exceed twice this number i.e. 36.

Simplify:
$$7 + 11 + 7 + x < 36$$

$$25 + x < 36$$

Solve:
$$x < 11$$

The largest value of x is 10.

Video: [Mean from frequency tables](#)

[Solutions to Starter and E.g.s](#)

Exercise

- 9-1 class textbook: p472 M14.3 Qu 1-6
 A*-G class textbook: p427 M14.3 Qu 1-4
 9-1 homework book: p162 M14.3 Qu 1-4
 A*-G homework book: p119 M14.3 Qu 1-3