

S4b Part 2 Mean from frequency table © BossMaths



Warm-up activity

Find the mean of these sets of numbers

a) 3, 3, 5, 6, 8, 8, 9

$$\frac{3 + 3 + 5 + 6 + 8 + 8 + 9}{7} = \frac{42}{7} = 6$$

b) 4, 7, 9, 10, 11, 13

$$\frac{4 + 7 + 9 + 10 + 11 + 13}{6} = \frac{54}{6} = 9$$

c) 9, 3, 6, 9, 2, 8, 7, 8

$$\frac{9 + 3 + 6 + 9 + 2 + 8 + 7 + 8}{8} = \frac{52}{8} = 6.5$$



Alpha Exercise

The number of items purchased one day by 25 customers in a shop is shown in the table.

- (a) How many customers bought exactly two items? **3**
- (b) How many customers bought five or more items? **7**
- (c) What is the mean number of items purchased?

Items purchased	Frequency	Items purchased \times Frequency
1	6	6
2	3	6
3	5	15
4	4	16
5	3	15
6	3	18
7	1	7
	25	83

Mean number of items purchased

$$= \frac{83}{25} = 3.32 \text{ items}$$

↑
Total number of customers

↑
Total number of items purchased by all 25 customers

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Beta Exercise 1

100 archers take part in an archery contest. Each archer gets a score out of 6. What is the mean score achieved by the archers?

Score	Frequency	Score \times Frequency
0	7	0
1	10	10
2	14	28
3	20	60
4	22	88
5	19	95
6	8	48
	100	329

$$\begin{aligned} \text{Mean score} \\ &= \frac{329}{100} = \underline{3.29} \end{aligned}$$



Number of archers \nearrow

\nwarrow Total of all 100 scores

Beta Exercise 2

200 students sat a test. The results are shown in the table. What was the mean score achieved by the students?

Score	Frequency	Score \times Frequency
0	0	0
1	1	1
2	0	0
3	4	12
4	14	56
5	36	180
6	48	288
7	42	294
8	30	240
9	17	153
10	8	80
	200	1304

$$\begin{aligned} \text{Mean score} \\ &= \frac{1304}{200} \\ &= \underline{6.52} \end{aligned}$$

Number of students \nearrow

\nwarrow Total of all 200 scores

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Gamma Exercise

The heights of 80 people are measured. The results are shown in the table. Work out an estimate for the mean height of the people.

Height, h cm	Frequency	Mid-point	Mid-point \times Frequency
$120 \leq h < 130$	1	125	125
$130 \leq h < 140$	4	135	540
$140 \leq h < 150$	8	145	1160
$150 \leq h < 160$	16	155	2480
$160 \leq h < 170$	20	165	3300
$170 \leq h < 180$	23	175	4025
$180 \leq h < 190$	8	185	1480
	80		13,110 cm

Total number
of people \nearrow

Estimated \nearrow
total heights of the 80 people

$$\text{Estimated mean height} = \frac{13,110}{80}$$

$$= 163.875 \text{ cm}$$

$$\approx 164 \text{ cm}$$

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Explain the mistake

The frequency table shows the number of crisps found in 20 packs of crisps.

Erica uses the table to work out the mean number of crisps in a packet is 12.8 crisps.

How can you tell Erica is wrong without even doing any calculations?

Number of crisps	Frequency
14	6
15	7
16	5
17	1
18	1
	20

Erica must be wrong because all the packets contained between 14 and 18 crisps. Therefore the mean must be between 14 and 18.

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Exam-style question 1

The table shows information about the shopping bills of 100 customers at a shop one day. Work out an estimate for the mean amount spent in the shop by the 100 customers.

Bill total, £x	Frequency	Mid-point	Mid-point × Frequency
$0 < x \leq 5$	19	2.5	47.5
$5 < x \leq 10$	33	7.5	247.5
$10 < x \leq 15$	27	12.5	337.5
$15 < x \leq 20$	17	17.5	297.5
$20 < x \leq 25$	4	22.5	90
	100		£ 1020

$$\text{Estimated mean} = \frac{1020}{100} = \text{£}10.20$$

Remember, this is money, so the answer is £10.20, NOT £10.2

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Exam-style question 2

Mr Sanderson's class has 24 students. 23 of them have sat a test. Their scores are shown in the table.

Jim sits the test later. Once his score is included, the mean mark achieved by the class is exactly **6.125**.

What score did Jim achieve?

Score	Frequency	Score × Frequency
0	1	0
1	0	0
2	0	0
3	1	3
4	3	12
5	1	5
6	5	30
7	6	42
8	4	32
9	2	18
10	0	0
	23	142

Total of 23 scores
(whole class EXCLUDING Jim).

$$\text{Mean} = \frac{\text{Total of all 24 scores (once Jim's is included)}}{24} = 6.125$$

$$\Rightarrow \text{Total of all 24 scores (once Jim's is included)} = 6.125 \times 24 = 147$$

$$\therefore \text{Jim scored } 147 - 142 = \underline{5}$$