The Mean from a Frequency Table

It is easy to calculate the Mean:

Advanced

Add up all the numbers,
then **divide by how many** numbers there are.

Example: What is the Mean of these numbers?

6, 11, 7

- Add the numbers: **6 + 11 + 7 = 24**
- Divide by *how many* numbers (there are 3 numbers): **24 ÷ 3 = 8**

The Mean is 8

But sometimes we don't have a simple list of numbers, it might be a frequency table like this (the "frequency" says how often they occur):

Score	Frequency
1	2
2	5
3	4
4	2
5	1

(it says that score 1 occurred 2 times, score 2 occurred 5 times, etc)

We could list all the numbers like this:

$$\text{Mean} = \frac{1+1 + 2+2+2+2+2 + 3+3+3+3 + 4+4 + 5}{\text{(how many numbers)}}$$

But rather than do lots of adds (like 3+3+3+3) it is easier to use multiplication:

$$\text{Mean} = \frac{2\times1 + 5\times2 + 4\times3 + 2\times4 + 1\times5}{\text{(how many numbers)}}$$

And rather than count how many numbers there are, we can add up the frequencies:

$$\text{Mean} = \frac{2\times1 + 5\times2 + 4\times3 + 2\times4 + 1\times5}{2 + 5 + 4 + 2 + 1}$$

And now we calculate:

$$\text{Mean} = \frac{2 + 10 + 12 + 8 + 5}{14}$$

$$= \frac{37}{14} = \mathbf{2.64...}$$

And that is how to calculate the mean from a frequency table!

Here is another example:

Example: Parking Spaces per House in Hampton Street

Isabella went up and down the street to find out how many parking spaces each house has. Here are her results:

Parking Spaces	Frequency
1	15

2	27
3	8
4	5

What is the mean number of Parking Spaces?

Answer:

$$\text{Mean} = \frac{15\times 1 + 27\times 2 + 8\times 3 + 5\times 4}{15 + 27 + 8 + 5}$$

$$= \frac{15 + 54 + 24 + 20}{55}$$

$$= 2.05...$$

The Mean is **2.05** (to 2 decimal places)

(much easier than adding all numbers separately!)

Notation

Now you know how to do it, let's do that last example again, but using formulas.

$\sum$ This symbol (called Sigma) means "sum up"
(read more at Sigma Notation)

So we can say "add up all frequencies" this way:

$$\sum f$$

(where f is frequency)

And we can use it like this:

$$\sum f = 15 + 27 + 8 + 5 = 55$$

Likewise we can add up "frequency times score" this way:

$$\sum fx = 15 \times 1 + 27 \times 2 + 8 \times 3 + 5 \times 4 = 113$$

(where f is frequency and x is the matching score)

And the formula for calculating the mean from a frequency table is:

$$\bar{x} = \frac{\sum fx}{\sum f}$$

The $\mathbf{x}$ *with the bar on top says "the mean of* $\mathbf{x}$*"*

So now we are ready to do our example above, but with correct notation.

Example: Calculate the Mean of this Frequency Table

x	f
1	15
2	27
3	8
4	5

And here it is:

$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{15 \times 1 + 27 \times 2 + 8 \times 3 + 5 \times 4}{15 + 27 + 8 + 5} = 2.05...$$

There you go! You can use sigma notation.

Calculate in the Table

It is often better to do the calculations in the table.

Example: (continued)

From the previous example, calculate $f \times x$ in the right-hand column and then do totals:

x	f	fx
1	15	15
2	27	54
3	8	24
4	5	20
TOTALS:	**55**	**113**

And the Mean is then easy:

Mean = 113 / 55 = **2.05...**

Question 1 Question 2 Question 3 Question 4 Question 5
Question 6 Question 7 Question 8 Question 9 Question 10