Averages from a frequency table

40 cars are observed driving along a particular road, and the number of passengers (excluding the driver) in each car is recorded in the following table:

Passengers	Frequency
0	15
1	10
2	5
3	2
4	7
5	0
6	1
	40

This means there were 15 cars with no passengers

If this information were written out in a list

0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 3, 3, 4, 4, 4, 4, 4, 4, 4, 6

This is the total frequency (total number of cars)

To find the **mean average** from a frequency table, you need to first multiply each number by the frequency:

Passengers	Frequency	Passengers x Freq	
0	15	0 x 15 =	0
1	10	1 x 10 =	10
2	5	2 x 5 =	10
3	2	3 x 2 =	6
4	7	4 x 7 =	28
5	0	5 x 0 =	0
6	1	6 x 1 =	6
	40		**60**

If this information were written out in a list we

0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 1 + 1 + 1 + 1 + 1 + 1 + …
… + 1 + 1 + 1 + 1 + 2 + 2 + 2 + 2 + 2 + 3 + 3 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 6 **= 60**

This is the total number of passengers in all cars

$$Mean = \frac{Total\ Passengers}{Total\ Cars} = \frac{60}{40} = \mathbf{1.5\ passengers\ per\ car}$$

To find the **median average** from a frequency table, you need to first calculate the cumulative frequency (the running total of the frequency):

Passengers	Frequency	Cumulative Freq	
0	15	15 =	15
1	10	15 + 10 =	25
2	5	25 + 5 =	30
3	2	30 + 2 =	32
4	7	32 + 7 =	39
5	0	39 + 0 =	39
6	1	39 + 1 =	40

This means that there were 30 cars

This is the total number of passengers. We need this to

$$Median\ will\ be\ the\ \frac{40+1^{th}}{2}\ number: \mathbf{20.5^{th}}\ (between\ 20^{th}\ and\ 21^{st})$$

Since there are 15 cars with no passengers and 25 with 0 or 1, the 20th and 21st in the list must be 1.

Median= 1 passenger per car

To find the **modal average** from a frequency table, you need to identify the value with the highest frequency (if more than one are joint highest, all of them are modes):

Passengers	Frequency
0	15
1	10
2	5
3	2
4	7
5	0
6	1

The largest frequency is 15, so more cars had 0

*Mode is the **value** with the highest frequency (**not** the frequency itself)*

Mode = 0