

Averages

i. The heights of 10 people in cm are:

150, 170, 165, 160, 142, 158, 129, 181, 160, 170

- What is the mean height of the group of people?
- What is the modal height of the group of people?
- What is the median of these people's heights?
- What is the range of these people's heights?

Solution:

- First, we'll calculate the mean. Remembering that,

$$\text{mean} = \frac{\text{sum of items}}{\text{number of items}}$$

So,

$$\text{mean} = \frac{150 + 170 + 165 + 160 + 142 + 158 + 129 + 181 + 160 + 170}{10} = \frac{1585}{10} = 158.5 \text{ cm}$$

- Secondly, we'll work out the mode. We remember:

Mode is the most common item

So,

$$\text{mode} = 160\text{cm and } 170\text{cm}$$

- Thirdly, we'll work out the median. We remember:

Median is the middle item, when the items are in order

So, first we must write out the item in ascending (increasing) order:

129, 142, 150, 152, 160, 160, 165, 170, 170, 181

We can then start crossing out items from each end until we get to the middle:

~~129~~, ~~142~~, ~~150~~, ~~152~~, 160, 160, ~~165~~, ~~170~~, ~~170~~, ~~181~~

But, we have two middle items. In this case, we work out the average of the two items:

$$\text{median} = \frac{160 + 160}{2} = 160\text{cm}$$

- Finally, we'll work out the range. We have:

Range = largest item – smallest item

So,

$$\text{range} = 181 - 129 = 52\text{cm}$$

ii. The table below shows the number of tracks on 25 CD:

Number of Tracks	Frequency
1	5
2	5
3	3
4	9
5	3

- What is the mean number of tracks on the CDs?
- What is the modal number of tracks on the CDs?
- What is the median number of tracks on the CDs?

Solution:

- We'll calculate the mean number of tracks. To do this we need to add a third column to the table, which is the product of the values in the first two columns. We also add another row with the totals of the last two columns:

Number of Tracks (n)	Frequency (f)	$n \times f$
1	5	5
2	5	10
3	3	9
4	9	36
5	3	15
Total	25	75

The mean is given by the total of the $n \times f$ column divided by the total of the frequency column. So,

$$\text{mean} = \frac{75}{25} = 3 \text{ tracks}$$

- The mode of our data is just the number of CDs with the greatest frequency. So in our case, the greatest frequency is 9, which is for CDs with 4 tracks. Hence,

$$\text{mode} = 4 \text{ tracks}$$

- The median is the number which sits in the middle of all the data. To calculate this, we first need to work out where that middle slot will be:

$$\text{middle slot} = \frac{25}{2} = 12.5$$

We cannot have a 12.5th slot, so we round it **up** to 13. Now, we can work out what value will sit in the 13th slot. We can see from the table that 5 slots are taken up with CDs of 1 track, another 5 slots are taken up with CDs of 2 tracks, and 3 slots are taken up with CDs of 3 track. We have reached our 13 slot, so:

$$\text{median} = 3 \text{ tracks}$$