

Cumulative Frequency

Cumulative Frequency Adding up the frequencies to provide a running total

The Rules:

1. Immediately add a column or row to calculate your running total
2. Cumulative frequency is always plotted using the highest value in each group of data (e.g. 151-155 would use 155.5)

Table showing the height of students in a class

Height (cm)	141-145	146-150	151-155	156-160	161-165
Frequency	2	3	4	5	6
Cumulative frequency	2	5	9	14	20
(highest value)	(145.5)	(150.5)	(155.5)	(170.5)	(175.5)

This data can be used to produce a **cumulative frequency curve**.

The Rules:

1. Cumulative frequency is **always plotted up a graph** not across it (each value increases so the curve will steadily rise and usually produce an 'S' shaped curve)

Example for the above table

- i) Height would be plotted on the horizontal ('x') axis, starting at 140.5cm
- ii) Cumulative frequency would be plotted (**up the graph**) on the vertical ('y') axis, starting at zero.

2. Find values for the median, quartiles and the interquartile range

	Definition	Definition when using cumulative frequency	Answer
Median	Total number of items (n + 1) divided by 2 Mid point of the data set Half way up the up the curve	cumulative frequency +1 divided by 2 $(20 + 1) / 2$ $21 / 2 = 10.5$ Now read up the graph to find the cumulative frequency value 10.5	The value on the 'x' axis The position! Now find the value

Lower quartile

$\frac{1}{4}$ way up the curve
The median of the lower half of the data

Draw a line across from the 'y' axis until it meets the curve

Draw a line down until it meets the 'x' axis

Read the value on the 'x' axis

$(n + 1)$ **divided by 4**

cumulative frequency +1 **divided by 4**

$$(20+1) / 4$$

$$21 / 4 = 5.25$$

Now read up the graph to find the cumulative frequency value 5.25

The value on the 'x' axis

The position!
Now find the value

Draw a line across from the 'y' axis until it meets the curve

Draw a line down until it meets the 'x' axis

Read the value on the 'x' axis

Upper quartile

$\frac{3}{4}$ way up the curve
The median of the upper half of the data

$3(n + 1)$ **divided by 4**

$3 \times$ (cumulative frequency +1) **divided by 4**

$$3(20+1) / 4$$

$$63 / 4 = 15.75$$

Now read up the graph to find the cumulative frequency value 15.75

The value on the 'x' axis

The position!
Now find the value

Draw a line across from the 'y' axis until it meets the curve

Draw a line down until it meets the 'x' axis

Read the value on the 'x' axis

Interquartile Range

upper quartile **minus** lower quartile

The range is the two points on the 'x' axis, as identified by the upper and lower quartiles.

Find the values and subtract the lower value from the higher one.

The difference between the two values on the 'x' axis