



Central Tendency

- This is concerned with identifying the most common outcome
- This is clearly useful to businesses
- It is based around the calculation of averages
- There are 3 types of average

Mean

This is the sum of all data divided by the number of pieces of data

Mode

This is the value that occurs most often in a set of data

Median

This is the middle value when the data is put in numerical order



Frequency Tables

- In reality it's not useful for a business to work with a long list of data
- As such it is usual for data to be put into a frequency table
- For example:

Points (x)	Frequency (f)	Frequency x Points (fx)
47	1	47
52	2	104
55	1	55
58	2	116
61	1	61
77	1	77
83	1	83
95	1	95
TOTAL (Σ)	$\Sigma f = 10$	$\Sigma fx = 638$



Using Frequency Tables

The frequency table makes it easier to calculate the mean mode and median with large amounts of data:

Mean

The mean (\bar{x}) can be calculated using the formula:

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

$$\bar{x} = \frac{638}{10}$$

$$\bar{x} = 63.8$$

Points (x)	Frequency (f)	Frequency x Points (fx)
47	1	47
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TOTAL (Σ)	$\Sigma f = 10$	$\Sigma fx = 638$

Mode

A quick glance at the table shows that “58” and “52” are most common

Median

Since the table is in numerical order it is easy to see that the 5th and 6th pieces of data are 58



Grouped Data

- Data is often put into convenient groups
 - E.g. market research data may group people according to their age

Age Group (x)	Frequency (f)
0-9	7
10-19	12
20-29	16
30-39	8
40-49	4
50-59	3

- It is still possible to calculate the mean, mode and median:

Mode

Calculating the mode is complicated, and is only an estimate. As such it is usually sufficient to identify the **MODAL GROUP**

In this example it would be the **Age Group 20-29**



Grouped Data - The Mean

- The mean is calculated using the same formula
- However we must identify the midpoint of each group:

Age Group	Frequency (f)	Midpoint (x)	fx
0-9	7	4.5	31.5
10-19	12	14.5	174
20-29	16	24.5	392
30-39	8	34.5	276
40-49	4	44.5	178
50-59	3	54.5	163.5
TOTAL (Σ)	50	-	1215

Mean

The mean (\bar{x}) is still calculated using the formula:

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

$$\bar{x} = \frac{1215}{50}$$

$$\bar{x} = 24.3$$



Grouped Data - The Median

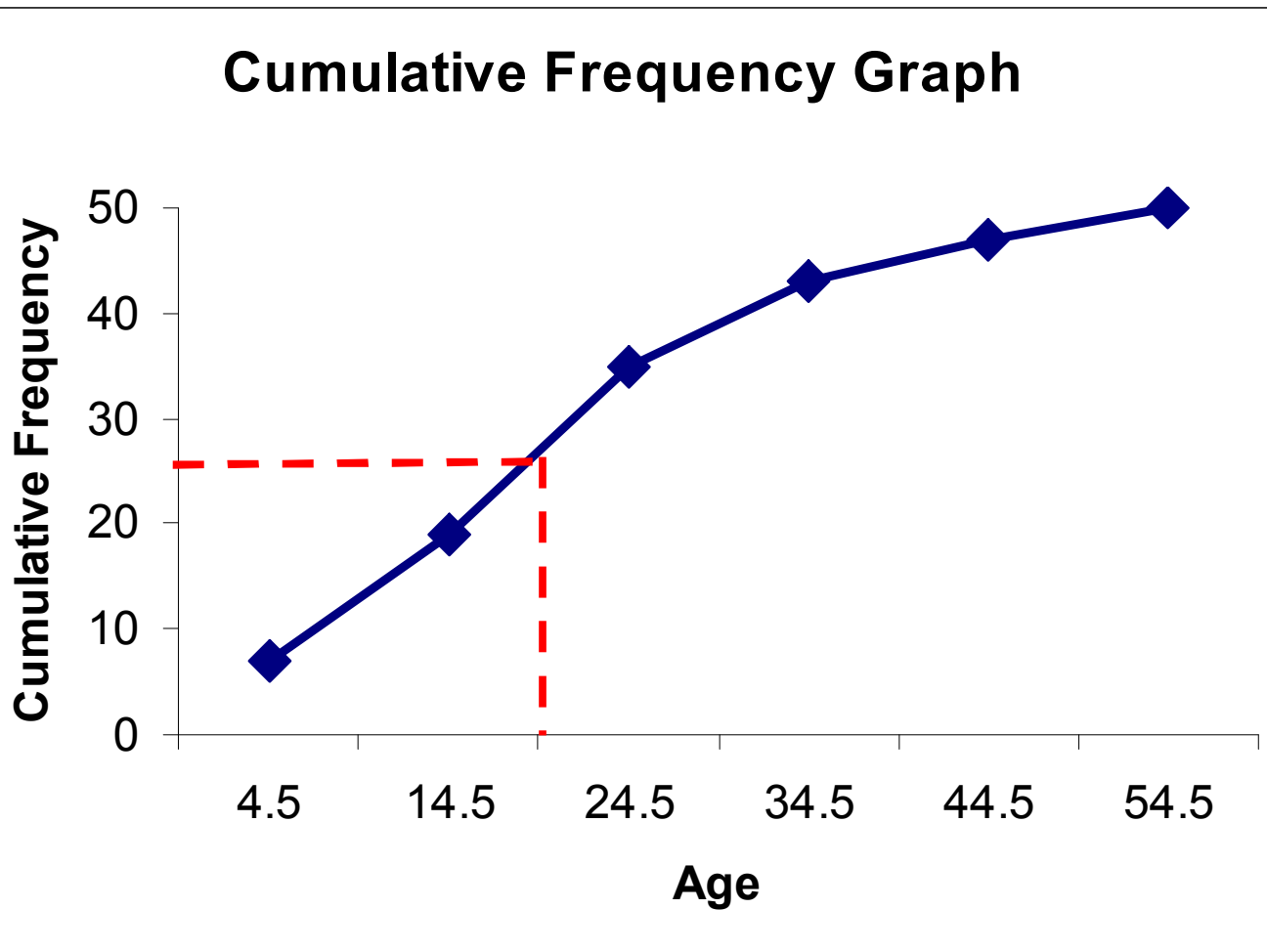
- The median is a little more complex
- It is still the middle piece of data – but since the data is in groups we do not have a corresponding value
- As such a cumulative frequency graph is required

Age Group	Frequency (f)	Mid Point (x)	fx	Cumulative Frequency
0-9	7	4.5	31.5	7
10-19	12	14.5	174	19
20-29	16	24.5	392	35
30-39	8	34.5	276	43
40-49	4	44.5	178	47
50-59	3	54.5	163.5	50
TOTAL (Σ)	50	-	1215	-



Grouped Data - The Median

- This data can then be plotted on a cumulative frequency graph:



The Median age is found by reading from the graph:

$$\text{Median Value} = \frac{50 + 1}{2}$$

$$= 25.5$$

This is then read from the graph

$$= 20 \text{ years (approx)}$$



How Useful Is The Average?

Average	Useful for:	Advantages	Disadvantages
Mean	Making comparisons, e.g. average sales in a week	<ul style="list-style-type: none">● Includes all data● Recognised measure of average	<ul style="list-style-type: none">● Affected by extreme data● Answer rarely a whole number
Mode	For stock control e.g. most commonly sold items	<ul style="list-style-type: none">● No calculations● Answer usually a whole number● Easily understood	<ul style="list-style-type: none">● Not useful for grouped data● Does not consider all data
Median	Marketing purposes e.g. product x is always one of the most 50% popular brands	<ul style="list-style-type: none">● Not influenced by extreme data● More representative than mean	<ul style="list-style-type: none">● Complex estimate from grouped data● Not as accurate with even numbers of data