

one list of numbers, summarised by where it sits and how far it spreads

Four summaries of one list

- **centre** is answered two ways. The **MEAN** is the total shared equally, the **MEDIAN** is the value in the middle once the list is sorted
- the **MODE** is simply the value that occurs most often. A list can have two modes, or none worth naming
- **spread** is answered two ways as well. The **RANGE** is largest minus smallest, and the **STANDARD DEVIATION** says how far a typical value sits from the mean
- you are never asked to compute a standard deviation by hand here, only to say which of two lists has the larger one. That is a question about the picture, not about arithmetic

The three you compute

mean of n values

$$\bar{x} = \frac{\sum x_i}{n}$$

mean from a frequency table

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$$

range

$$R = x_{\max} - x_{\min}$$

the total, recovered from a known mean

$$\sum x_i = n\bar{x}$$

the last row is the workhorse. Most mean questions here give you a mean and ask for a missing value, and they all start by turning the mean back into a total

Symmetric against skewed

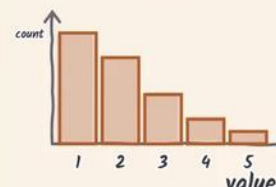
Symmetric



23 values, the tallest bar in the middle and the two sides matching

- mean and median land on the SAME value, 3 here
- moving a value from one side to its mirror on the other changes neither
- the mean is safe to quote as the typical value

Skewed to the right



23 values piled at the low end with a thin tail stretching right

- the long tail drags the **MEAN** toward it, so the mean is about 2.09
- the median barely moves and stays at 2, the middle value
- the median is the safer summary when a tail is present

the rule is short: the mean chases the tail, the median does not. Which way a distribution leans is exactly what tells you which of the two is larger

A frequency table, read three ways *

score	frequency	score times frequency
1	5	5
2	10	20
3	3	9
4	2	8
total	20	42

mean is 42 divided by 20, which is 2.1. With 20 values the median is the average of the 10th and 11th, and the running count 5 then 15 puts both of them on 2, so the median is 2. The mode is 2 as well, the tallest frequency