**📍 Measures of Central Tendency**

These are used to describe the **center** or **average** value of a data set.

**✅ 1. Mean (Arithmetic Average)**

**📌 Definition:**

The **sum of all values divided by the number of values**.

**🧮 Formula:**

Mean=∑xn\text{Mean} = \frac{\sum x}{n}Mean=n∑x​

Where:

* ∑x\sum x∑x = sum of all data points
* nnn = total number of data points

**🧠 Example:**

Marks: 40, 50, 60

Mean=40+50+603=1503=50\text{Mean} = \frac{40 + 50 + 60}{3} = \frac{150}{3} = 50Mean=340+50+60​=3150​=50

**⚠️ Sensitive to outliers:**

e.g., 10, 20, 30, **200** → Mean is **too high**.

**✅ 2. Median**

**📌 Definition:**

The **middle value** when the data is arranged in order.

**Steps:**

1. Sort the data.
2. If **odd** number of values → middle one is median.
3. If **even** → average of the two middle values.

**🧠 Example:**

Data: 10, 20, 30  
→ Median = 20

Data: 10, 20, 30, 40  
→ Median = (20 + 30)/2 = 25

**✅ Not affected by outliers.**

**✅ 3. Mode**

**📌 Definition:**

The value that occurs **most frequently** in the data set.

**🧠 Example:**

Data: 10, 20, 20, 30, 30, 30, 40  
→ Mode = 30

* Can be:
  + **No mode** (if all values are unique)
  + **Unimodal** (one mode)
  + **Bimodal** (two modes)
  + **Multimodal** (more than two modes)

**✅ Summary Table**

| **Measure** | **Description** | **Affected by Outliers?** | **Best Used When...** |
| --- | --- | --- | --- |
| Mean | Average of values | ✅ Yes | Data is evenly distributed |
| Median | Middle value | ❌ No | Data has outliers or skewed |
| Mode | Most frequent value | ❌ No | You need most common value (e.g. votes, sales) |

**🧪 Example Set: [5, 7, 8, 8, 10, 12, 100]**

* Mean = (5+7+8+8+10+12+100)/7 = **21.4** ❗ (skewed by 100)
* Median = **8**
* Mode = **8**