Q1: Understanding Central Tendency

A bakery tracks the daily sales of muffins (in dozens) over a week: [10, 12, 11, 15, 14, 13, 12].
What is the most representative value of their weekly sales, and why?

Calculations:

Mean = (10 + 12 + 11 + 15 + 14 + 13 + 12) / 7 = 87 / 7 = **12.43**

Solution/Insight:
The most representative value is the **Mean (≈ 12.43 dozens)**, because there are no outliers. It shows the typical daily sale volume.

Q2: Mean in Real Life

A teacher records the marks of her students in a short quiz: [12, 15, 14, 16, 18, 20, 19].
What is the mean score, and what does it tell us about the class's performance?

Calculations:

Mean = (12 + 15 + 14 + 16 + 18 + 20 + 19) / 7 = 114 / 7 = **16.29**

Solution/Insight:
The mean score is **16.29**, showing the average performance of the class.

Q3: Mode in Real Life

A store records the shoe sizes sold in one day: [7, 8, 9, 8, 8, 10, 7, 9].
What is the mode, and why is this information useful for the store manager?

Calculations:

Mode = **8** (appears 3 times)

Solution/Insight:
The mode is **8**. This helps the store manager identify the **most popular size** that needs to be stocked more often.

Q4: Median in Real Life

A car dealer notes the prices of used cars: [₹8,000, ₹9,500, ₹10,200, ₹11,000, ₹50,000].
Why is the median a better measure than the mean in this case? Calculate the median.

Calculations:

Ordered Data: [₹8,000, ₹9,500, ₹10,200, ₹11,000, ₹50,000]
Median = 3rd value = **₹10,200**

Solution/Insight:
Median = ₹10,200.
The median is better because the ₹50,000 is an **outlier** that distorts the mean. Median stays stable against extreme values.

Q5: Dispersion Introduction

A student times how long it takes to finish a puzzle each day: [25, 30, 27, 35, 40].
What does the range tell us about the variation in the student's puzzle-solving time?

Calculations:

Range = Max − Min = 40 − 25 = **15 minutes**

Solution/Insight:
The range is **15 minutes**. It tells us the **total spread** in timing — the difference between fastest and slowest attempt.

Q6: Range in Action

A farmer records the weekly weight of harvested apples (kg): [100, 105, 98, 110, 120].
Find the range. How can this help the farmer in planning his packaging?

Calculations:

Range = 120 − 98 = **22 kg**

Solution/Insight:
The range is **22 kg**. This variation helps the farmer plan **packaging and storage capacity** according to the maximum weekly yield.

Q7: Mean Deviation (Detailed Working)

The weights (in kg) of 5 students are: [50, 52, 53, 54, 51].
Find the mean deviation about the mean.

Working / Calculations:

x (Weight)	x - x̄ (where x̄ = 52)	|x − x̄|
50	-2	2
52	0	0
53	1	1
54	2	2
51	-1	1

Sum of $|x - \bar{x}| = 6$

Mean Deviation = 6 / 5 = **1.2 kg**

Solution/Insight:
Mean deviation = **1.2 kg**. The small deviation shows weights are tightly grouped around the mean — consistent and balanced.

Q8: Variance and Standard Deviation (Detailed Working)

Heights (in cm) of 4 players: [160, 165, 170, 175].
Find the variance and standard deviation.

Working / Calculations:

1. Mean ($\bar{x}$) = (160 + 165 + 170 + 175) / 4 = 670 / 4 = **167.5**

x	**$x - \bar{x}$**	**$(x - \bar{x})^2$**
160	−7.5	56.25
165	−2.5	6.25
170	+2.5	6.25
175	+7.5	56.25

$\Sigma(x - \bar{x})^2 = 125$

Variance (s^2) = 125 / (4 − 1) = 41.67
Standard Deviation (s) = $\sqrt{41.67}$ = **6.45 cm**

Solution/Insight:
The SD is **6.45 cm**, meaning players' heights vary moderately — a small, healthy difference within the group.

Q9: Combining Measures (Detailed Working)

A family records their monthly electricity usage (in kWh): [400, 420, 390, 450, 410].
Find the mean and standard deviation.

Data Set: [400, 420, 390, 450, 410], N = 5

Step 1 – Mean:

$\bar{x}$ = (400 + 420 + 390 + 450 + 410) / 5 = 2070 / 5 = **414**

Step 2 – Standard Deviation:

x	**$x - \bar{x}$**	**$(x - \bar{x})^2$**
400	−14	196
420	+6	36
390	−24	576
450	+36	1296
410	−4	16

$\Sigma(x - \bar{x})^2 = 2120$

Variance (s^2) = 2120 / 4 = 530
Standard Deviation (s) = $\sqrt{530}$ = **23.02 kWh**

Solution/Insight:
Mean = **414 kWh**, SD = **23.02 kWh**.
The small SD shows the family's energy use is **consistent**, varying little month to month.

Q10: Practical Application (Detailed Working)

A basketball player's points in 8 games: [15, 18, 20, 22, 25, 17, 19, 21].
Find the mean, median, mode, range, and standard deviation.

Data Set (Ordered): [15, 17, 18, 19, 20, 21, 22, 25], N = 8

Step 1 – Mean:
$\bar{x} = (157) / 8 = \mathbf{19.625}$

Step 2 – Median:
(4th + 5th) / 2 = (19 + 20) / 2 = **19.5**

Step 3 – Mode:
No mode (all unique)

Step 4 – Range:
25 − 15 = **10**

Step 5 – Standard Deviation:

x	$x - \bar{x}$	$(x - \bar{x})^2$
15	−4.625	21.3906
17	−2.625	6.8906
18	−1.625	2.6406
19	−0.625	0.3906
20	+0.375	0.1406
21	+1.375	1.8906
22	+2.375	5.6406
25	+5.375	28.8906

$\Sigma(x - \bar{x})^2 = 67.875$

Variance = 67.875 / 7 = 9.696
SD = $\sqrt{9.696}$ = **3.11**

Solution/Insight:
Mean = **19.625**, Median = **19.5**, SD = **3.11**.
The player's scores are **consistent**, typically within 3 points of the average. The close mean and median show the data is balanced and symmetrical.