# Statistics (सांख्यिकी):

- **The science of collecting and analyzing data.**

# UNGROUPED DATA
## (अवर्गीकृत आंकड़े)

# CONCEPTS:

25, 9, 14, 80, 14, 25, 13, 47, 25

Average (औसत)

1. **Mean (माध्य)** $= \dfrac{Sum\ of\ values}{No\ of\ values} = \dfrac{252}{9} = 28$

2. **Median (माध्यिका)** $= \left(\dfrac{n+1}{2}\right)^{th} = \left(\dfrac{9+1}{2}\right)^{th} = 5^{th} = 25$

9, 80

3. **Mode (बहुलक)** $= Maximum\ time = 25$

$9, 13, 14, 14, \boxed{25}, 25, 25, 47, 80$

4. **Range (परिसर)** $= Max - Min = 80 - 9 = 71$

4        4

5. **Mean Deviation (माध्य विचलन)**

$9, 13, \underline{12}, 13, 17, \underline{12}, 21$     $\dfrac{10+1}{2} = 5.5^{th}$

6. **Variance (विचरण / प्रसार / प्रसरण)**

7. **Standard Deviation (मानक विचलन)**

$Mode = 12, 13$     $\dfrac{5^{th} + 6^{th}}{2}$

8. **Coefficient of Variation (विचलन गुणांक)**

$9, 13, 17, 38, 25, 32$

$\rightarrow \dfrac{SD}{M} \times 100$     का

$Mode = X$

3
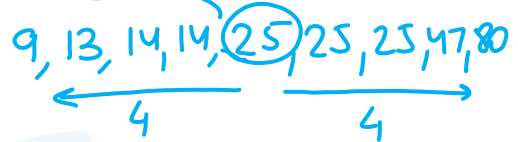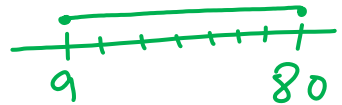
Average

⑤ Mean Deviation (माध्य विचलन):

25, 9, 14, 80, 14, 25, 13, 47, 25

→ About mean: 28

→ 3, 19, 14, 52, 14, 3, 1, 19, 3

$= \dfrac{\text{Sum of deviations about mean}}{\text{No of values}}$

$= \dfrac{128}{9}$

→ About median: 25 → 0, 16, 11, 55, 11, 0, 12, 22, 0

$= \dfrac{\text{Sum of deviations about median}}{\text{No of values}}$

$= \dfrac{127}{9}$

4

⑥ Variance (विचरण)'
(वि०)

$x_i$

25, 9, 14, 80, 14, 25, 13, 47, 25

Mean = 28   $|\bar{x}-x_i|$   3, 19, 14, 52, 14, 3, 15, 19, 3
$\bar{x}$

$$= \frac{9+171+156+2704+196+9+225+361+9}{9}$$

$$= \frac{\sum|\bar{x}-x_i|^2}{N}$$

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# ⑦ Standard deviation (मानक विचलन):

$$25, 9, 14, 80, 14, 25, 13, 47, 25$$

$$SD = \sqrt{Variance} \qquad = \sqrt{\frac{n}{No}}$$

⑧ Coefficient of Variation (विचलन का गुणांक):

$$= \frac{SD}{M} \quad \text{(fraction)}$$

$$= \frac{SD}{M} \times 100 \quad (\%)$$

Mnemonic: SDM

Variance
Stand Devi
Coeff of Variation

# CONCEPTS:

1, 0, 2, 3, 1, 1, 2, 15, 0, 2

1. Mean (माध्य) $= \dfrac{27}{10} = 2.7$

0, 0, 1, 1, 1, 2, 2, 2, 3, 15

2. Median (माध्यिका) $= \left(\dfrac{n+1}{2}\right)^{th} = \left(\dfrac{10+1}{2}\right)^{th} = 5.5^{th} = \dfrac{5^{th}+6^{th}}{2} = \dfrac{1+2}{2} = 1.5$

3. Mode (बहुलक) $= 1, 2$

4. Range (परिसर) $= 15 - 0 = 15$

1.7, 2.7, .7, .7, 1.7, 1.7, .7, 12.3, 2.7, .7

5. Mean Deviation (माध्य विचलन) $= \dfrac{19 + 5.6 + .6}{10}$

6. Variance (विचरण / प्रसार / प्रसरण)

7. Standard Deviation (मानक) $\sqrt{V}$

8. Coefficient of Variation (विचलन गुणांक) $\dfrac{SD}{M} \times 100$

१. **What is the mode of the given data?**
$5, 7, 9, 7, 3, 7, 5, 7, 8, 6, 7$
**दिए गए आंकड़ों का बहुलक क्या है?**
$5, 7, 9, 7, 3, 7, 5, 7, 8, 6, 7$
a) 6          b) 5          c) 7          d) 3

**Stats.**

2. The mode & median of the data $\underline{8}$, 6, $\underline{8}$, 7, $\underline{8}$, 6, $\underline{8}$, 7 6, is:

$8, 6, 8, 7, 8, 6, 8, 7\ 6,$ का बहुलक और मध्यिका है:

a) 7 and 8          b) 6 and 7

c) 8 and 7          d) 6 and 8

$6, 6, 6, \ 7, \boxed{7}\ 8, 8, 8, 8$

$\left(\dfrac{9+1}{2}\right)^{th} = 5^{th}$

## 3. Find the median, <u>mode</u> and mean of 9, 5, 8, 9, 9, 7, 8, 9, 8,

9, 5, 8, 9, 9, 7, 8, 9, 8, की माध्यिका, बहुलक और माध्य क्या होंगे?

a) 9, 9, 9  b) 9, 8, 9
c) 8, 9, 8  d) 8, 9, 9

$Mode = 9$

$Median = \left(\dfrac{9+1}{2}\right)^{th} = 5^{th}$

$5, 7, 8, 8, 8, 9, 9, 9, 9$

$Mean = \dfrac{72}{9} = 8$

**४. Find the range of the data 2, 1, 2, 3, 5, 4, 7, 3, 5, 2, 4.**

2, ①, 2, 3, 5, 4, ⑦, 3, 5, 2, 4 का परिसर ज्ञात करो।

a) 5          b) 4          c) 3          d) 6

$$7 - 1 = 6$$

**5.** **The median of the data** $7, 21, 2, 17, 3, 13, 7, 4, 9, 7, 9$ **is:**

$7, 21, 2, 17, 3, 13, 7, 4, 9, 7, 9$ **की माध्यिका है:**

a) 4          b) 17          c) 7                    d) 9

$2, 3, 4, 7, 7, \boxed{7}, 9, 9, 13, 17, 21$
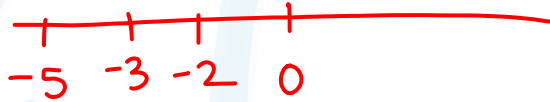
$$\left(\frac{11+1}{2}\right)^{th} = 6^{th}$$

$\overset{6}{7}, \overset{11}{21}, \overset{1}{2}, \overset{10}{17}, \overset{2}{3}, \overset{9}{13}, \overset{5}{7}, \overset{3}{4}, \overset{7}{9}, \overset{4}{7}, \overset{8}{9}$

**6.** The median of the data $-3, 4, 0, 4, -2, -5, 1, 7, 10, 5$ is:

$-3, 4, 0, 4, -2, -5, 1, 7, 10, 5$ की माध्यिका है:

a) 2  b) 2.5  c) 2.75  d) 3

$-5, -3, -2, 0, \boxed{1, 4}, 4, 5, 7, 10$

$$\left(\frac{10+1}{2}\right)^{th} = 5 \quad 5^{th} = \frac{5^{th} + 6^{th}}{2} = \frac{1+4}{2} = 2.5$$

**7.** **What is the median of the following distribution?**
$42, 65, 18, 69, 29, 42, 48, 79, 25, 24, 98, 87, 63, 27, 17$
**निम्नलिखित वितरण की माध्यिका क्या है?**
$42, 65, 18, 69, 29, 42, 48, 79, 25, 24, 98, 87, 63, 27, 17$
a) 43.5      b) 65      c) 42      d) 69

$$42, 65, 18, 69, 29, 42, 48, 79, 25, 24, 98, 87, 63,$$
$$27, 17$$

$$\left(\frac{15+1}{2}\right)^{th} = 8^{th}$$

**9.** The median of the following numbers arranged in <u>ascending</u> order is <u>2.5</u>, is so find $x$?

$0, 0, 1, 1, 2, \boxed{2, x}\, 3, 3, 4, 5, 7$

आरोही क्रम में व्यवस्थित निम्न संख्याओं की मध्यिका 2.5 है, तो $x$ ज्ञात करो:

$0, 0, 1, 1, 2, 2, x, 3, 3, 4, 5, 7$

a) 2      b) 3      c) 4      d) 0

$$\left(\frac{12+1}{2}\right)^{th} = 6.5^{th}$$

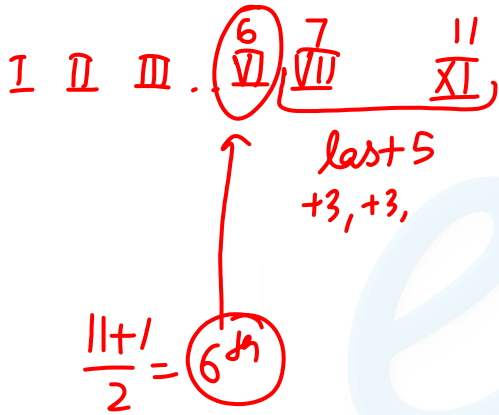$$\left(\frac{12}{2}\right)^{th} = \frac{6^{th} + 7^{th}}{2}$$

$$2 + x = 5$$

$$x = 3$$

I   II   III   .   ⑥/VI   ⑦/VII   ⑪/XI

last 5
+3, +3,

$\frac{11+1}{2} = 6th$

9. The median of a set of <u>11 distinct observations</u> is 73.2. If each of the <u>largest five observations</u> of the set is <u>increased by 3</u>, then the median of the new set:

11 भिन्न प्रेक्षणों के एक समुच्चय की माध्यिका 73.2 है| यदि समुच्चय के सबसे बड़े पांच प्रेक्षणों में से प्रतेक को 3 से बढ़ा दिया जाए, तो नए समुच्चय का माध्यक क्या होगा?

a) is increased by 3
b) is 3 times that of the original set
c) Remains the same as that of the original set
d) Is decreased by 3

Stats

**Mean** = $\dfrac{365}{5}$ = 73

**Median** = 75

**Mode** = 85

$\dfrac{233}{3}$

= $77\dfrac{2}{3}$

50, 70 (75) 85, 85

| Subject | Marks Obtained Out Of 100 | |
|---|---|---|
| English | 55 | 50 |
| Hindi | 90 | 85 |
| Mathematics | 75 | 70 |
| Science | 80 | 75 |
| Foreign language | 90 | 85 |

10. **Marks scored by student in different subjects are given in the table below. Five marks are to be deducted from each subject due to shortage of attendance. The net average of the mean, median and mode of the marks obtained is_____.**

एक छात्र द्वारा विभिन्न विषयों में प्राप्त अंक नीचे तालिका में दिए गए है| उपस्थित कम होने के कारण प्रतेक विषय में पांच अंक काटे जा रहे है| प्राप्त अंको के माध्य, मध्यिका और बहुलक का शुद्ध औसत _____ है?

a) 79.33
b) 77.67
c) 82.66
d) 73

Stats (ungrouped all)

**The mean deviation of the data** $3, 10, 10, 4, 7, 10, 5$, **is**
$3, 10, 10, 4, 7, 10, 5$ **का माध्य विचलन है:**

a) $\frac{49}{7}$  b) $\frac{19}{7}$  c) $\frac{50}{7}$  d) $\frac{18}{7}$

$$Mean = \frac{30 + 10 + 9}{7} = 7$$

$$4, 3, 3, 3, 0, 3, 2$$

$$MD = \frac{18}{7}$$

**12.** The mean deviation of the data $2, 9, 9, 3, 6, 9, 4$ from the mean is:

माध्य से आंकड़े $2, 9, 9, \underline{3, 6}, 9, 4$ का विचलन होगा:

a) $\frac{42}{7}$     b) $\frac{18}{7}$     c) $2.5$     d) $\frac{50}{7}$

Mean $= \frac{42}{7} = 6$

$4, 3, 3, 3, 0, 3, 2$

$\frac{18}{7}$

20

**13.** Find the standard deviation of $\{11, 7, 10, 13, 9\}$
$\{11, \underline{7}, 10, \underline{13}, 9\}$ का मानक विचलन ज्ञात करो।
a) 1      b) 2      c) 4      d) 5

$Mean = \dfrac{50}{5} = 10$

$1, 3, 0, 3, 1$

Square

$\underline{\quad M\ D \quad}$

Var

S. D ✓

C o.V

$SD = \sqrt{V}$

$1, 9, 0, 9, 1 \xrightarrow{avg} \dfrac{20}{5} = 4 = Variance$

$2 = \sqrt{4} = SD$

is always +ve

$$\text{Mean} = \frac{5+3+4+7}{4} = \frac{19}{4}$$

$$\frac{20}{4}, \frac{12}{4}, \frac{16}{4}, \frac{28}{4}$$

$$|\bar{x} - x_i| \qquad \frac{1}{4}, \frac{7}{4}, \frac{3}{4}, \frac{9}{4}$$

$$\frac{1 + 49 + 9 + 81}{16} = \frac{140}{16 \times 4} = V$$

$$V = \frac{\sum |\bar{x} - x_i|^2}{N}$$

$$=$$

$$SD = \sqrt{\frac{\cancel{140}\,35}{16 \times \cancel{4}}} = \frac{\sqrt{35}}{4} \approx \frac{6}{4} = 1.5$$

**14.** Find the standard deviation of the following data (rounded off to two decimal places).

5, 3, 4, 7

निम्नलिखित आंकड़ो का मानक विचलन ज्ञात कीजिये (दो दशमलव स्थान तक पूर्णांकित)

5, 3, 4, 7

a) 3.21

b) 1.48

c) 4.12

d) 2.45

**Stats**

15. **The standard deviation of the set $\{10, 11, 12, 9, 8\}$ is:**
$\{10, 11, 12, 9, 8\}$ का मानक विचलन है:

a) 1     b) $\sqrt{2}$     c) 2     d) $2\sqrt{2}$

$$\text{Mean} = \frac{10+11+12+9+8}{5}$$

$$= \frac{50}{5} = 10$$

$$|\bar{x} - x_i| \Rightarrow \quad 0, 1, 2, 1, 2$$

$$|\bar{x} - x_1|^2 \Rightarrow \quad 0, 1, 4, 1, 4$$

$$\text{Var}_1 = \frac{0+1+4+1+4}{5} = 2$$

$$SD = \sqrt{V} = \sqrt{2}$$

23

$$SD = \sqrt{V}$$

$$6.5 = \sqrt{V}$$

$$42.25 = V$$

16. **If the standard deviation of a population is 6.5, what would be the population variance?**

**यदि एक जनसंख्या का मानक विचलन 6.5 है, तो जनसंख्या का विचलन क्या होगा?**

a) 40.25         b) 42.25

c) 18.25         d) 13

24

$$SD = \sqrt{V}$$

$$9.5 = \sqrt{V}$$

$$90.25 = V$$

17. **If the standard deviation of a population is 9.5 , what would be the population variance?**

**यदि जनसंख्या का मानक विचलन 9.5 है, तो जनसंख्या का विचरण क्या होगा?**

a) 19
b) 90.25
c) 81.25
d) 93.25

**18.** The variance of a set of data is 144. Then the standard deviation of the data is:

आंकड़ो के एक सेट का विचरण 144 है| फिर डेटा का मानक विचलन है:

a) $\pm 12$      b) 12      c) 44      d) 72

$$SD = \sqrt{V}$$
$$= \sqrt{144}$$
$$= +12 \quad (Always \geq 0)$$

**19.** The variance of a set of data is 121. Then the standard deviation of the data is:

आंकड़े के एक सेट का विचरण 121 है| तो आंकड़े का मानक विचलन है:

a) $\pm 11$     b) 11     c) 21     d) 60.5

$$SD = \sqrt{V}$$

$$= \sqrt{121} = 11$$

Mean = 21

SD = 7

$$\frac{SD}{M} = \frac{7}{21} \times 100 = \frac{1}{3}$$

**20.** The mean of distribution is 21 and the standard deviation is 7. What is the value of the **coefficient of variation?**

वितरण का माध्य 21 है और मानक विचलन 7 है| विचरण गुणांक क्या होगा?

a) $16.66\%$        b) $66.66\%$

c) $33.33\%$        d) $100\%$

$$\frac{MD}{Var}$$

$$SD$$

$$100 \times \left(\frac{SD}{M}\right) = COV$$

21. The **mean** of a distribution is **15** and the standard **deviation** is **5**. What is the value of the coefficient of variation?

एक वितरण का माध्य 15 है और मानक विचलन 5 है| विचरण गुणांक का मान क्या है?

a) 16.66%  b) 66.66%
c) 33.33%  d) 22.22%

$$CoV = \frac{SD}{M} \times 100$$

$$= \frac{\overset{1}{5}}{\underset{3}{15}} \times 100$$

$$\frac{SD}{M} = \frac{5}{11} \times 100 =$$

$$= 45.45\%$$

**22.** The mean of a distribution is 11 and the standard deviation is 5. What is the value of the coefficient of variation?

एक वितरण का माध्य 11 है और मानक विचलन 5 है। विचरण गुणांक का मान क्या होगा?

a) 45.45%      b) 35.35%

c) 25.25%      d) 55.55%