

5

CONNECTING THE DOTS...

Statistics helps us understand data and make sensible conclusions.

In this chapter

- Statistical questions & statements
- Representative values (Mean)
- Data collection & organisation
- Bar graphs
- Line graphs
- Interpreting graphs & data



Discuss, think, and share your ideas using data around you!



Scan to Learn More!

1. STATISTICAL QUESTIONS & STATEMENTS

A **statistical statement** is a claim or summary about some phenomenon, expressed in terms of numbers, proportions, probabilities or predictions.

A **statistical question** is a question that can be answered by collecting and analysing data.

Examples of Statistical Statements

- Jemimah's batting has been very consistent over the past year.
- I take about 15 minutes to cycle from school to home.
- The population of their village has reduced by about 100 in the last decade.
- Since I started to eat fruits & vegetables more frequently, I can run 2 km more each day.
- David spends about 7 hours daily in the school.



Examples of Statistical Questions

- How tall are Grade 7 students in our school?
- Typically, are onions costlier in Yahapur or Wahapur?
- How old are the dogs that live on this street?
- What fraction of students in your class like walking up a hill?
- What was the rainfall pattern in Barmer last year?



2. REPRESENTATIVE VALUES – THE MEAN (AVERAGE)

To compare a group of numbers, we can use one number that represents the group. The most commonly used representative value is the **AVERAGE** or **ARITHMETIC MEAN (A.M.)**.

Formula

$$\text{Mean} = \frac{\text{Sum of all the values in the data}}{\text{Number of values in the data}}$$

It balances out high and low values and shows the typical or fair-share value.

Example:

Runs scored in a cricket series

Player	M1	M2	M3	M4	M5	Total	Matches	Mean (Avg. runs)
Shubman	23	07	10	52	18	110	5	$110 \div 5 = 21$
Yashasvi	26	53	02	–	15	96	4	$96 \div 4 = 24$

Conclusion: Yashasvi performed better in this series (average runs $24 > 21$).

Average as Fair-Share

Shreyas' friends collected: 3, 8, 10, 5, 4 (Total = 30) → Mean = $30 \div 5 = 6$
 Parag's friends collected: 5, 7, 9, 3, 6, 10 (Total = 40) → Mean = $40 \div 6 \approx 6.67$
 On average, each of Parag's friends collected more guavas.



3. COLLECTING & ORGANISING DATA

Ways to Collect Data

- Surveys, interviews
- Observation
- Questionnaires
- Experiments
- Records

Types of Data

1. **Qualitative (Categorical):**
Based on qualities or categories.
Example: Favourite fruit (mango, banana, apple)
2. **Quantitative (Numerical):**
Based on numbers.
Example: Height, marks, number of books

Organising Data

- **Tally Marks:** |||| = 5 (helps in counting)
- **Frequency Table:** Shows how many times each value occurs.

Example: Favourite Colour of Students

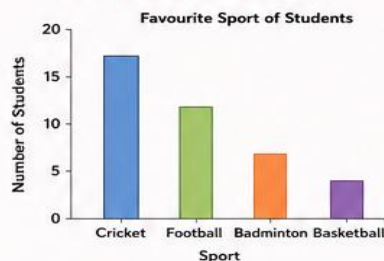
Colour	Tally Marks	Frequency
Blue		8
Green		7
Red		4
Yellow		2
Total		21

Always write labels, titles, units and source of data.

4. BAR GRAPHS

- Used to compare quantities using rectangular bars.
- Bars can be vertical or horizontal.
- Bars are of equal width and have gaps between them.

Example: Favourite Sport



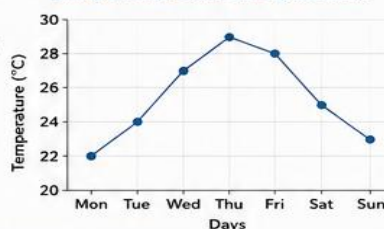
How to Read?

- More height → more quantity.
- Read the scale before comparing.

5. LINE GRAPHS

- Used to show how a quantity changes over time.
- Points are plotted and joined by straight lines.
- Useful for showing trends.

Example: Temperature of a City in a Week



How to Read?

- Each point shows value at a time.
- Upward line → increase.
- Downward line → decrease.
- Flat line → no change.

6. INTERPRETING GRAPHS & DATA

Steps to Interpret

- ✓ 1. Read the title of the graph.
- ✓ 2. Check the labels and units.
- ✓ 3. Understand the scale.
- ✓ 4. Compare values carefully.
- ✓ 5. Draw conclusions or predictions.

Example 1: Bar Graph

From the Favourite Sport graph:

- Most students like Cricket.
- Least students like Basketball.
- Football is more popular than Badminton.

Example 2: Line Graph

From the Temperature graph:

- Temperature increases till Thursday.
- Highest on Thursday (29°C).
- Then it decreases till Sunday.

Real-Life Use

- Weather forecasting
- Sports performance
- Population & census
- Business & sales trends
- Health & fitness tracking

KEY DEFINITIONS

- **Statistical Statement:** A claim or summary about data.
- **Statistical Question:** A question that can be answered using data.
- **Mean (Average):** Sum of all values ÷ Number of values.
- **Qualitative Data:** Based on qualities or categories.
- **Quantitative Data:** Based on numerical values.

IMPORTANT FORMULAS

- **Mean (Average):**
$$\text{Mean} = \frac{\text{Sum of all values in data}}{\text{Number of values in data}}$$
- **Total (Sum):** Add all the values.
- **Frequency:** Number of times a value occurs.
- **Range:** Highest value – Lowest value.

KEY TAKEAWAYS

- ✓ Statistics helps us make sense of data.
- ✓ Average (Mean) gives a fair picture.
- ✓ Organise data using tables for clarity.
- ✓ Bar graphs compare quantities.
- ✓ Line graphs show changes over time.
- ✓ Always read graphs carefully before drawing conclusions.

THINK & DISCUSS

- Find data around you (e.g., heights, marks, time taken).
- Organise it in a table.
- Find the mean.
- Draw bar or line graph.
- What patterns do you observe?

CONNECTING THE DOTS...

WORKSHEET-1

Section A: MCQs(Part-1) ($10 \times 1 = 10$ marks)

1. The formula for Arithmetic Mean is:
(A) $\text{Sum} \div \text{Largest value}$ (B) $\text{Sum of all values} \div \text{Number of values}$
(C) $\text{Largest value} \div \text{Smallest value}$ (D) $\text{Middle value} \times 2$
2. The arithmetic mean of 3, 8, 10, 5, 4 is:
(A) 5 (B) 6 (C) 7 (D) 8
3. In ancient Indian mathematics, the term used for arithmetic mean meaning 'equal' is:
(A) samavay (B) samamiti (C) samanvay (D) samatva
4. The median of 118, 165, 170, 173, 175 is:
(A) 165 (B) 168 (C) 170 (D) 173
5. An outlier is a value that:
(A) Is the largest in the data (B) Significantly deviates from the rest of the values
(C) Equals the mean (D) Is repeated most often
6. In Poovizhi's family heights (170, 173, 165, 118, 175), the outlier is:
(A) 170 (B) 175 (C) 173 (D) 118
7. Mean and Median are called measures of:
(A) Central tendency (B) Dispersion (C) Variation (D) Probability
8. In a Grade 5 class, boys' average height is 142.94 cm and girls' is 146.9 cm. This means:
(A) Every girl is taller than every boy
(B) Girls are taller than boys on average in this class
(C) Boys will never be taller
(D) The data is incorrect
9. If 40 is an outlier (high end), removing it will:
(A) Increase the mean (B) Decrease the mean
(C) Not affect the mean (D) Increase the median significantly
10. What does a dot plot help us observe?
(A) Only the mean (B) Variability and patterns in data
(C) Only outliers (D) Only the maximum value

MCQs(Part-2) ($10 \times 1 = 10$ marks)

11. Which of the following is a statistical question?

- (a) What is your roll number? (b) Who is the class monitor?
(c) How many hours do Grade VII students study daily? (d) What is the date today?

12. The median of the data 3, 5, 7, 8, 10, 12, 15 is:

- (a) 7 (b) 8 (c) 10 (d) 12

13. Which measure of central tendency is least affected by outliers?

- (a) Mean (b) Total (c) Median (d) Range

14. In a dot plot, repeated values are shown by:

- (a) Different colours (b) Dots stacked above the same value
(c) Bars (d) Lines

15. The average of 18, 22, 20, 25 and 15 is:

- (a) 18 (b) 19 (c) 20 (d) 21

16. The daily number of books borrowed from a library is 12, 15, 10, 18 and 20. What is the arithmetic mean?

- (a) 14 (b) 15 (c) 16 (d) 17

17. The data set is: 9, 14, 16, 18, 20, 25. What is the median?

- (a) 16 (b) 17 (c) 18 (d) 19

18. Which measure of central tendency is most suitable when a data set contains an unusually high or low value?

- (a) Mean (b) Median (c) Total (d) Range

19. The scores of six students are 45, 48, 52, 52, 55, 58. What is the range of the scores?

- (a) 10 (b) 12 (c) 13 (d) 15

20. Which of the following data sets contains an outlier?

- (a) 15, 16, 17, 18, 19 (b) 25, 26, 27, 28, 70
(c) 31, 32, 33, 34, 35 (d) 8, 9, 10, 11, 12

WORKSHEET-2

Section B: Short Answer ($10 \times 2 = 20$ marks)

1. Shreyas bounced a ball: 6, 2, 9, 5, 4, 6, 3, 5 times in 8 attempts. Calculate the average number of bounces.

2. The monthly price of onions in Yahapur (₹): 25, 24, 26, 28, 30, 35, 39, 43, 49, 56, 59, 44. Find the mean .

3. A newspaper has 16, 18, 20, 22, 26, 16, 10 pages from Monday to Sunday. Find the median. Which value is the outlier?

4. . Player C scored 8, 11, Did Not Play, 13 in four games. Should you divide by 3 or 4 to find mean? Justify and calculate.

5. If the mean of 6 observations is 4, find their sum ?

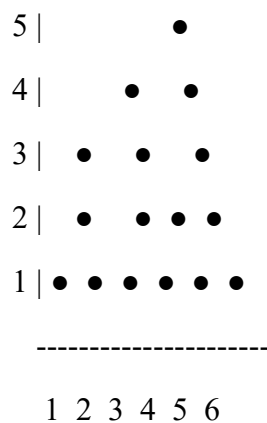
6. Do you read newspapers? Have you noticed how many pages a newspaper has on different days of the week-is it the same or different? The list below shows the number of pages for a particular newspaper from Monday to Sunday: 15, 17, 20, 23, 26, 14, 10. Draw the dot plot.

7. The heights (in cm) of five plants are 35, 42, 38, 40 and 37. Find the range of the heights.

8. Study the following **dot plot** and answer the questions.

Number of Hours Students Studied in a Week

Frequency



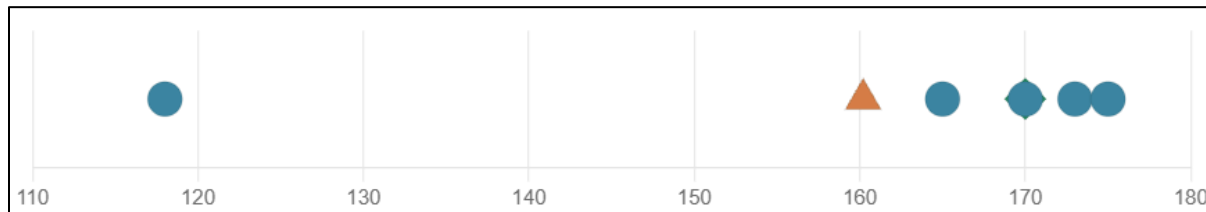
- How many students studied for **1 hour**?
- How many students studied for **2 hours**?

9. The weights (in kg) of seven bags are 8, 10, 9, 12, 11, 7 and 13. Find the median weight.

10. The number of visitors to a museum on five days was 120, 145, 130, 150 and 135. Find the range of the number of visitors.

Section C: Short Answer ($6 \times 3 = 18$ marks)

11.

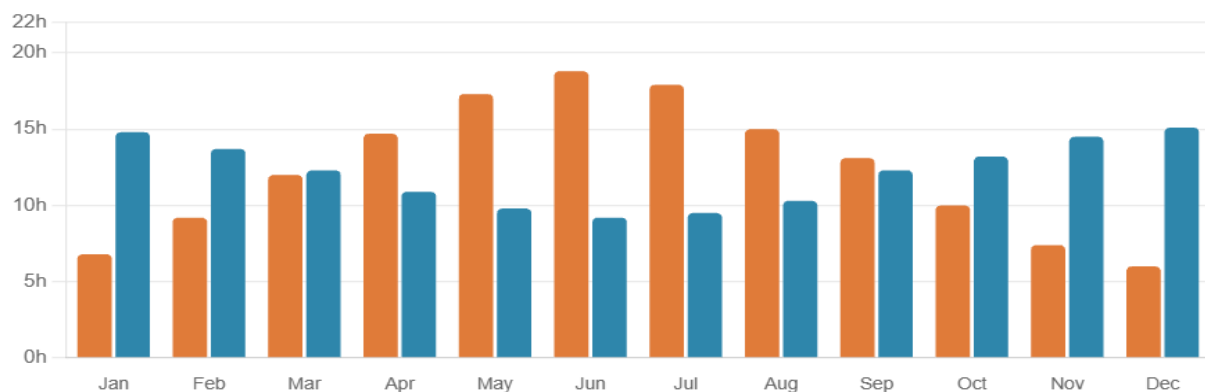


The dot plot above shows heights of Poovizhi's family members.

(a) How many family members are there? List their heights from the dot plot.

(b) The mean (160.2 cm) is marked. Is the mean higher or lower than most of the data points?

12.



Study the clustered bar graph of average daily daylight hours and answer:

- (a) What scale is used on the vertical axis? What is the maximum value shown?
- (b) In which month does City 1 have maximum daylight? In which month does City 2 have maximum daylight?

13. The daily water usage from a tap (in litres) over 9 days: 5.6, 8, 3.09, 12.9, 6.5, 12.1, 11.3, 20.5, 7.4.

- (a) Find the mean and median daily usage.
- (b) Can the mean or median lie between 25 and 30 litres? Justify using the meaning of mean and median.

14. The marks obtained by two groups in a GK quiz (out of 100):

Group 1: 85, 76, 90, 85, 39, 48, 56, 95, 81, 75

Group 2: 68, 59, 73, 86, 47, 79, 90, 93, 86

(a) Find the mean and median for each group.

(b) Which group has a potential outlier? Identify it.



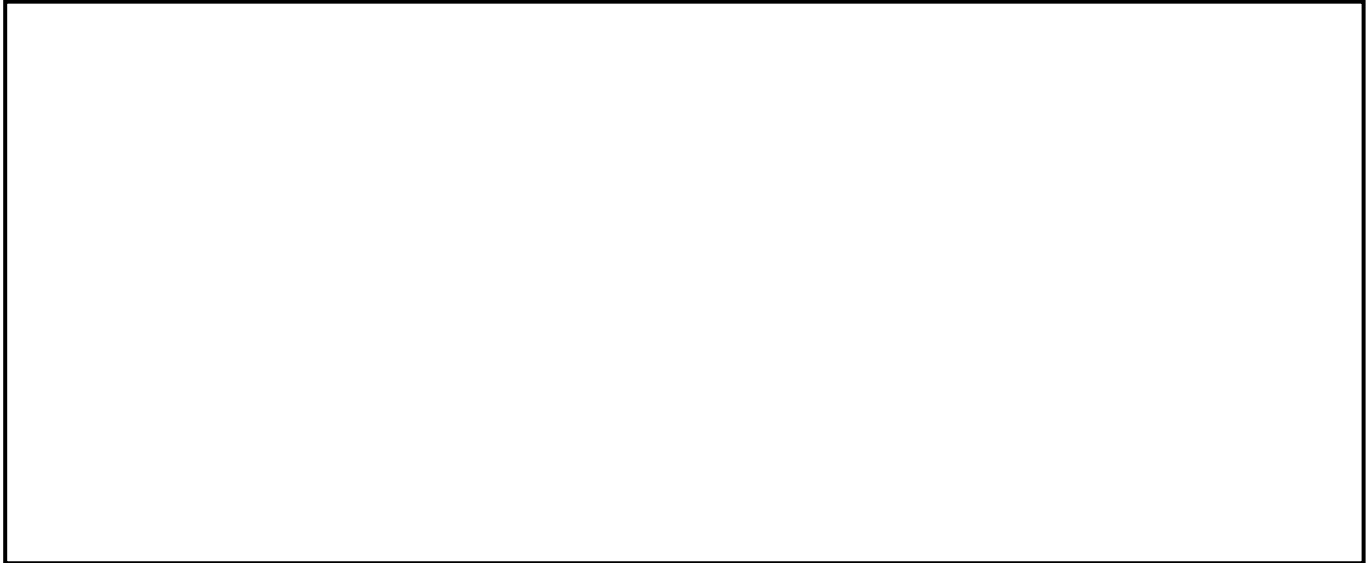
15. The table below shows the average life expectancy (in years) in five different countries during a specific decade. Represent this data with the help of a bar graph.

Country	Average Life Expectancy (in years)
Country A	72
Country B	68
Country C	55
Country D	78
Country E	62



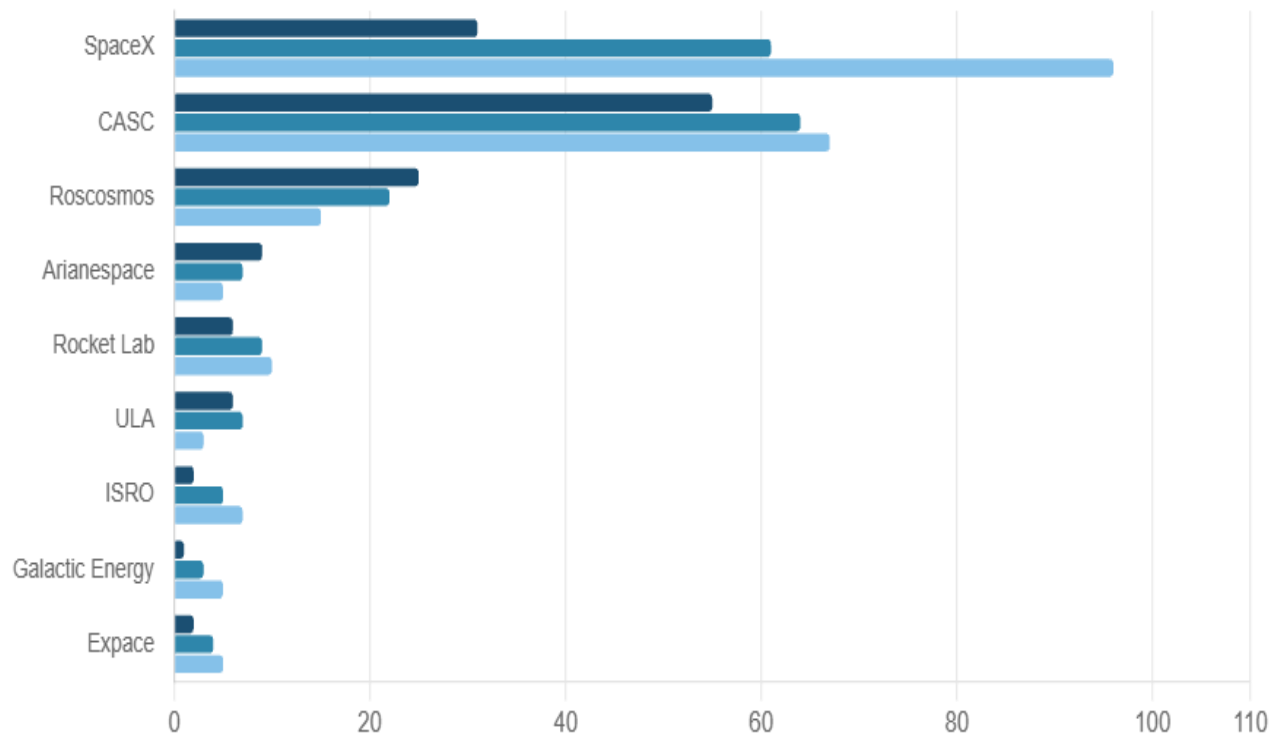
16. Do you read newspapers? Have you noticed how many pages a newspaper has on different days of the week-is it the same or different?

The list below shows the number of pages for a particular newspaper from Monday to Sunday: 15, 17, 20, 23, 26, 14, 10. Draw the dot plot. Mark the mean and median on the dot plot.



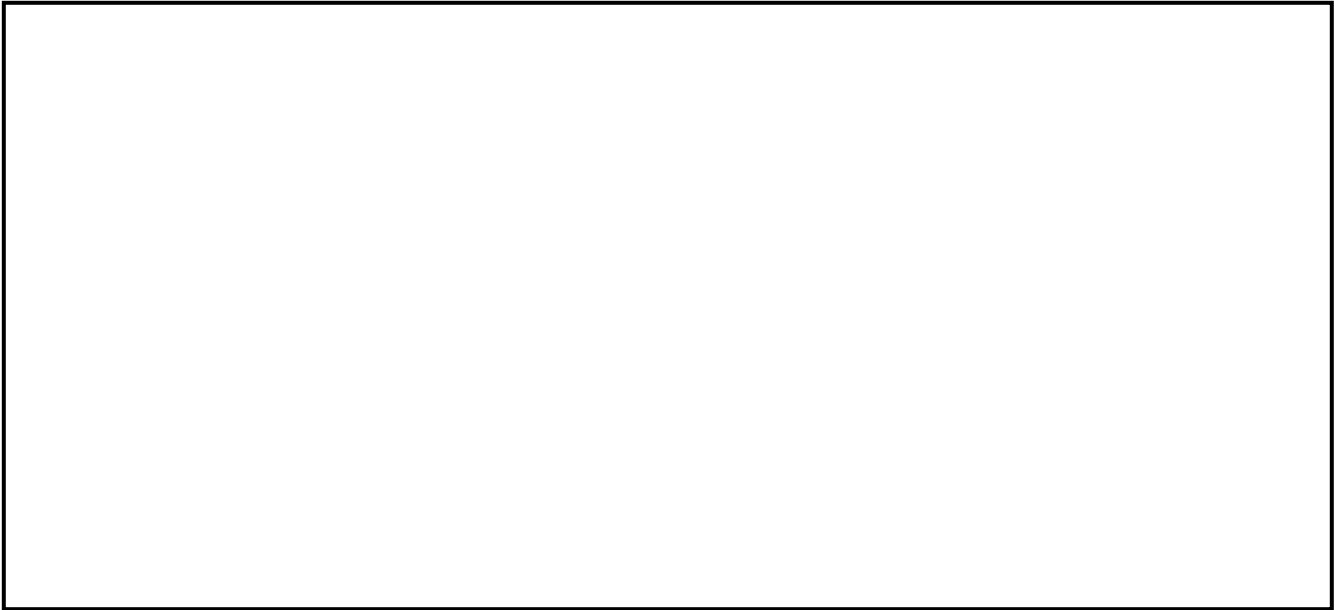
Section D: Long Answer ($4 \times 5 = 20$ marks)

17.

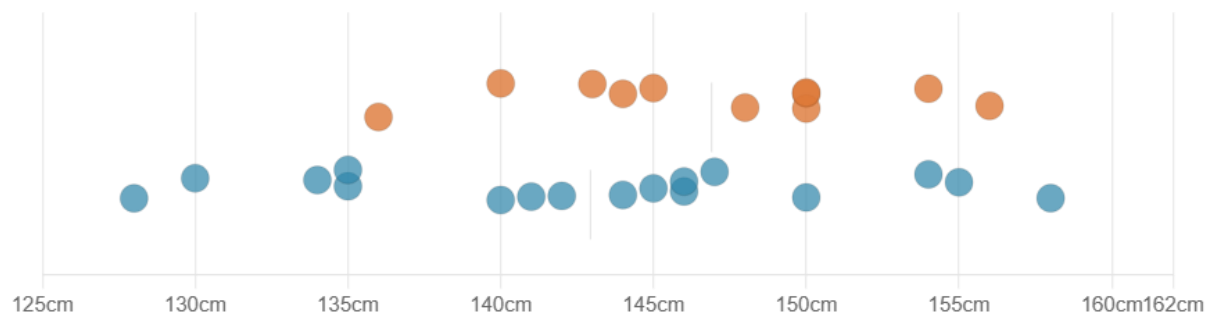


Study the rocket launch bar graph and answer:

- (a) Which organisation launched the most rockets in 2023? Approximately how many?
- (b) Which organisation's launches decreased every year from 2021 to 2023?
- (c) SpaceX approximately doubled its launches from 2021 to 2022. Estimate both values from the graph and verify.



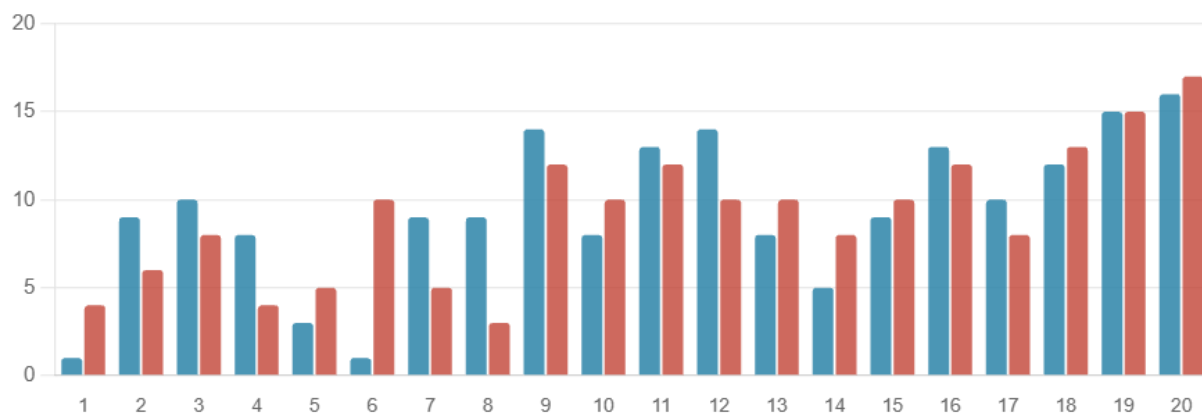
18.



The dot plot shows heights of boys and girls in a Grade 5 class.

- (a) What is the range of heights for boys? What is the range for girls?
- (b) Which group has a higher mean? Which group is taller on average?
- (c) How many students are taller than the whole class mean of 144.4 cm? (Count from boys: 147,154,155,158,146,146,145,150 and girls: 150,154,148,156,150,150)

19.



Study the cricket worm chart above carefully:

- (a) What scale is used on the vertical axis (runs per over)?
- (b) Approximately how many runs did the Blue team score in overs 10–15? Add them up from the graph.
- (c) In which over did the Red team score the least runs? How many runs did they score?

- (b) The sports teacher wants two equal groups – one with heights below a certain value and one above. What value would you recommend?

Case Study Based Questions ($4 \times 2 = 8$ marks)

21. A cricket coach needs to pick one of three batters for the final match. Their scores over the past 5 matches are:

Ravi: 45, 0, 80, 10, 65

Meera: 30, 35, 28, 40, 32

Arjun: 60, 0, 0, 90, 50

The coach says: 'I need a consistent performer who can score at least 30 runs reliably.'



(i) Calculate the mean score for Meera .

(ii) Calculate the median score for Ravi .

(iv) Based on the coach's requirement of 'consistency' and 'scoring at least 30 reliably', which player would you recommend? Justify using both mean and median.

22. EV Adoption in India

The following data shows the number of electric vehicles registered (in thousands) in 4 states over 3 years:

	2022	2023	2024
Gujarat:	69	89	78
Delhi:	62	74	81
Andhra Pradesh:	15	28	55
West Bengal:	8	30	40

A news headline reads: 'EV registrations in all states increased every year from 2022 to 2024.'



- (i) Find the mean registrations for Gujarat over the 3 years.
- (ii) Which state showed the greatest percentage increase from 2022 to 2024?
- (iii) What is the median number of registrations across all four states in 2024?

Self Assessment:

I understood all the concepts:

☐ Yes

☐ No

I need more practice:

☐ Yes

☐ No

Name of Concepts having doubts/Not Cleared: _____

Parent's Assessment:

My ward understood all the concepts:

☐ Yes

☐ No

He/She need more practice

☐ Yes

☐ No

Name of Concepts having doubts/Not Cleared: _____

Signature of Parent

Teacher's Assessment:

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Answers of Worksheet-1

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans.	b	b	b	c	b	d	a	b	b	b
Q.No.	11	12	13	14	15	16	17	18	19	20
Ans.	c	b	c	b	c	b	b	b	c	b

Answers of Worksheet-2

Q.No.	1	2	3	4	5
Ans.	5	₹38.17	18,10	10.67	24
Q.No.	6	7	8	9	10
Ans.	Dot Plot	7 cm	6,4	10 kg	30
Q.No.	11	12	13	14	15
Ans.	5 members; Mean lower	Graph	9.71,8	G1:73,78.5; G2:75.67,79; 39	Bar Graph
Q.No.	16	17	18	19	20
Ans.	Mean 17.86, Median 17	Graph	13 cm,8 cm; Girls;14	Graph	115,115
Q.No.	21	22			
Ans.	33, 45, Meera	78.67, West Bengal, 59.5			