NCERT Solutions For Class 8 Maths

Chapter 12 - Tales by Dots and Lines

Ganita Prakash Part 2 - Textbook Chapter 5

5.1 The Balancing Act

Question 1: Find the mean of the following data and share your observations:
(i) The first 50 natural numbers.
(ii) The first 50-odd numbers.
(iii) The first 50 multiples of 4.

Solution:

(i) The first 50 natural numbers

The first 50 natural numbers are:

1, 2, 3, …, 50

Sum of the first n natural numbers = $n(n + 1)/2$

For n = 50:

Sum = $50 \times 51/2$
= 1275

Mean = 1275/50
= 25.5

Observation:
The mean of the first n natural numbers is $(n + 1)/2$. Therefore, the mean of the first 50 natural numbers is 25.5.

(ii) The first 50-odd numbers

The first 50-odd numbers are:

1, 3, 5, 7, …, 99

Sum of the first n odd numbers = n^2

For n = 50:

Sum = 50^2
= 2500

Mean = 2500/50
= 50

Observation:
The mean of the first n odd numbers is n. Therefore, the mean of the first 50-odd numbers is 50.

(iii) The first 50 multiples of 4

The first 50 multiples of 4 are:

4, 8, 12, 16, …, 200

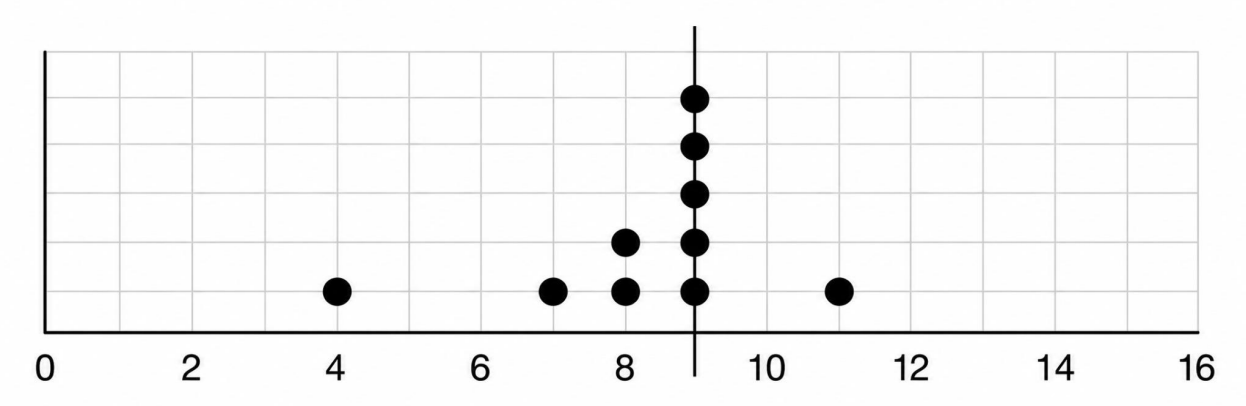
Sum = 4(1 + 2 + 3 + … + 50)
= 4 × 1275
= 5100

Mean = 5100/50
= 102

Observation:
The mean of the first 50 multiples of 4 is four times the mean of the first 50 natural numbers.

Mean = 4 × 25.5
= 102

Question 2: The dot plot below shows a collection of data and its average, but one dot is missing. Mark the missing value so that the mean is 9 (as shown below).



Solution:

The visible data values are:

4, 7, 8, 8, 9, 9, 9, 9, 9, 11 and x

Total number of observations = 11
Mean = 9

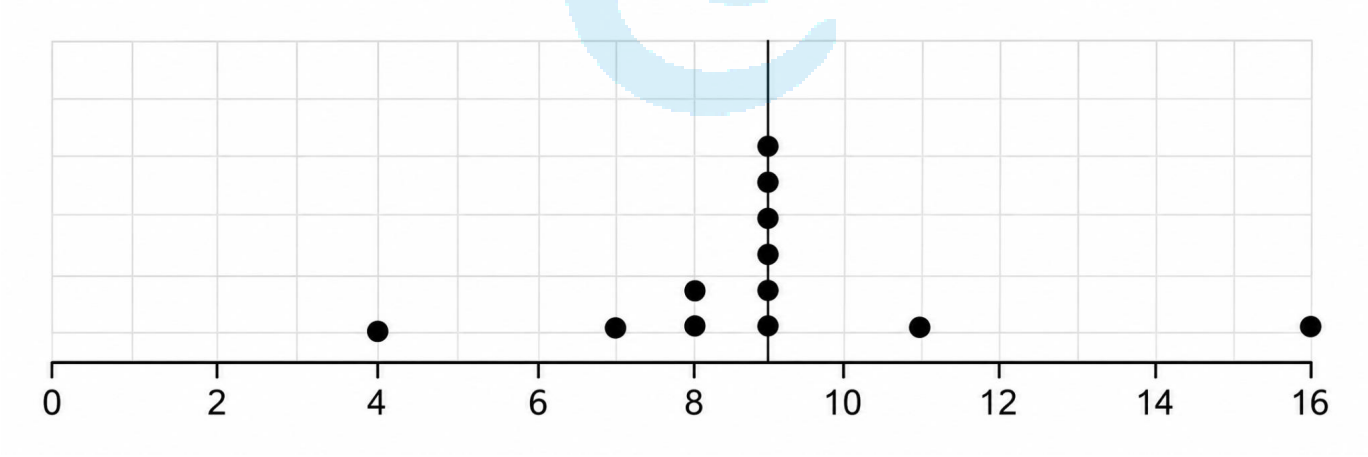
Required total sum = 9 × 11
= 99

Sum of the known values:

4 + 7 + 8 + 8 + 9 + 9 + 9 + 9 + 9 + 11 = 83

Missing value = 99 − 83
= 16

Therefore, the missing dot should be marked at **16**.



Question 3: Sudhakar, the class teacher, asks Shreyas to measure the heights of all 24 students in his class and calculate the average height. Shreyas informs the teacher that the average height is 150.2 cm. Sudhakar discovers that the students were wearing uniform shoes when the measurements were taken and the shoes added 1 cm to the height.

(i) Should the teacher get all the heights measured again, without the shoes, to find the correct average height? Or is there a simpler way?
(ii) What is the correct average height of the class?
(a) 174.2 cm
(b) 126.2 cm
(c) 150.2 cm
(d) 149.2 cm
(e) 151.2 cm
(f) None of the above
(g) Insufficient information

Solution:

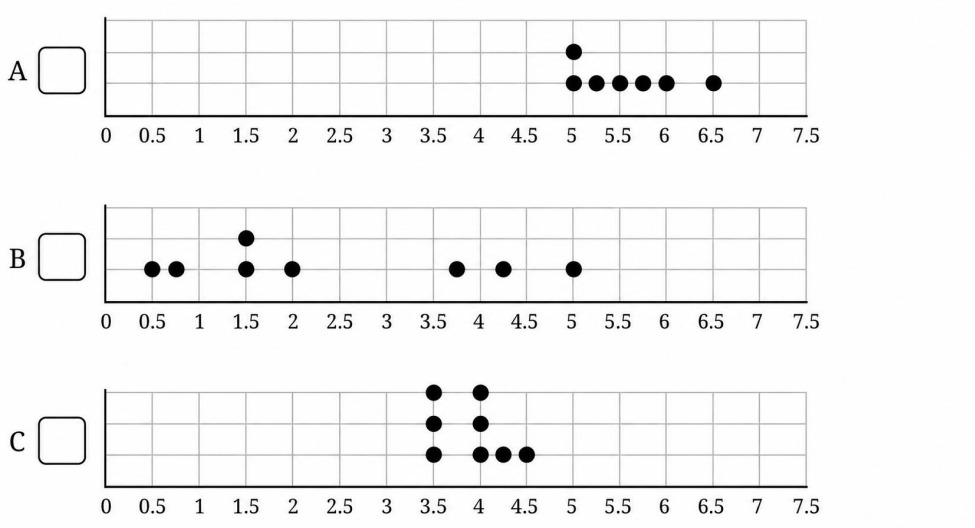
(i) The teacher does not need to measure all the students again. Since the shoes added 1 cm to every student's height, 1 cm can simply be subtracted from the calculated average.

(ii)

Correct average height = 150.2 cm − 1 cm
= 149.2 cm

Therefore, **option (d) is correct**.

Question 4: The three dot plots below show the lengths, in minutes, of songs of different albums. Which of these has a mean of 5.57 minutes? Explain how you arrived at the answer.



Solution:

The mean of each album can be calculated by adding the song lengths and dividing the sum by the total number of songs.

Album A

Data values = 5, 5, 5.25, 5.5, 5.75, 6, 6.5

Sum = 39

Mean = 39/7
= 5.57 minutes approximately

Album B

Data values = 0.5, 0.75, 1.5, 1.5, 2, 3.75, 4.25, 5

Sum = 19.25

Mean = 19.25/8
= 2.41 minutes approximately

Album C

Data values = 3.5, 3.5, 3.5, 4, 4, 4, 4.25, 4.5

Sum = 31.25

Mean = 31.25/8
= 3.91 minutes approximately

Therefore, **Album A has a mean song length of approximately 5.57 minutes**.

Question 5: Find the median of 8, 10, 19, 23, 26, 34, 40, 41, 41, 48, 51, 55, 70, 84, 91, 92.
(i) If we include one value in the data (in the given list) without affecting the median, what could that value be?
(ii) If we include two values to the data without affecting the median what could the two values be?
(iii) If we remove one value from the data without affecting the median what could the value be?

Solution:

The data is already arranged in ascending order.

Number of observations = 16

Median = Average of the 8th and 9th values

Median = (41 + 41)/2
= 41

(i) One value that can be added without changing the median is **41**.

(ii) Two values that can be included without changing the median are **40 and 42**. After adding them, the two middle values will still be 41 and 41.

(iii) One of the repeated values, **41,** can be removed. The middle value of the remaining data will still be 41.

Question 6: Examine the statements below and justify whether the statement is always true, sometimes true, or never true.
(i) Removing a value less than the median will decrease the median.
(ii) Including a value less than the mean will decrease the mean.
(iii) Including any 4 values will not affect the median.
(iv) Including 4 values less than the median will increase the median.

Solution:

(i) Never true:
Removing a value below the median may keep the median unchanged or increase it, but it will not decrease the median.

(ii) Always true:
When a value smaller than the existing mean is added, the new mean becomes lower than the original mean.

(iii) Sometimes true:
Adding four values may or may not change the median. It depends on where the new values are placed in the ordered data.

(iv) Never true:
Adding four values below the median may decrease the median or leave it unchanged, but it cannot increase the median.

Question 7: The mean of the numbers 8, 13, 10, 4, 5, 20, y, 10 is 10.375. Find the value of y.

Solution:

Total number of values = 8
Mean = 10.375

Total sum = 10.375 × 8
= 83

Sum of the given numbers:

8 + 13 + 10 + 4 + 5 + 20 + y + 10 = 70 + y

Therefore:

70 + y = 83

y = 83 − 70
= 13

Hence, **y = 13**.

Question 8: The mean of a set of data with 15 values is 134. Find the sum of the data.

Solution:

Mean = Sum of data/Number of values

Therefore:

Sum of data = Mean × Number of values
= 134 × 15
= 2010

Hence, the sum of the data is **2010**.

Question 9: Consider the data: 12, 47, 8, 73, 18, 35, 39, 8, 29, 25, p. Which of the following numbers could be p if the median of this data is 29?

(i) 10
(ii) 25
(iii) 40
(iv) 100
(v) 29
(vi) 47
(vii) 30

Solution:

Arranging the known values in ascending order:

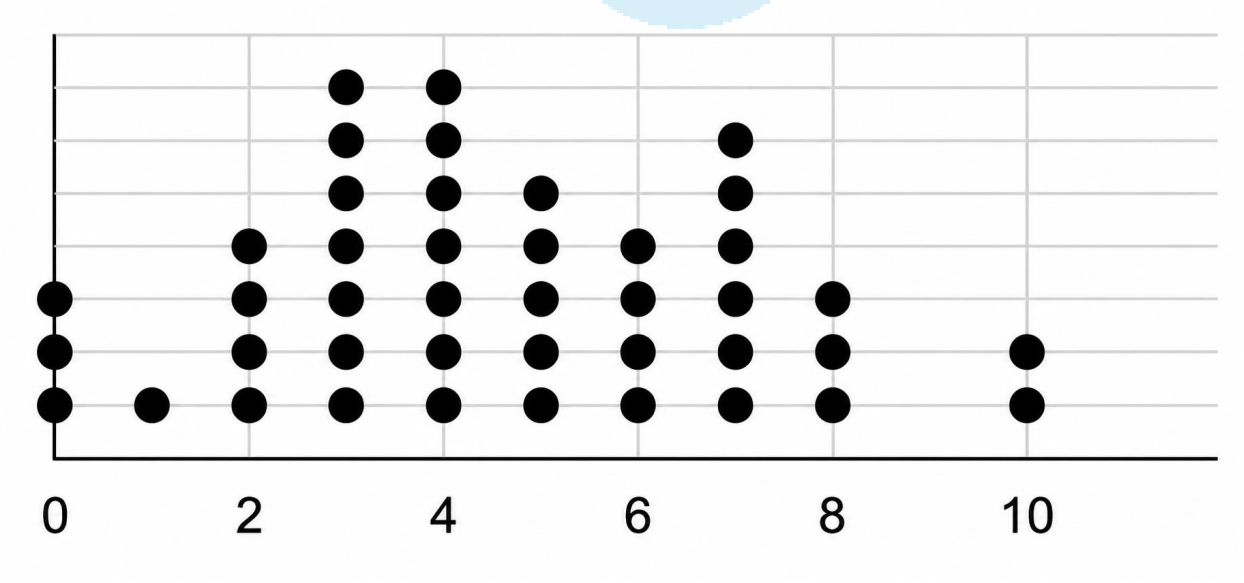
8, 8, 12, 18, 25, 29, 35, 39, 47, 73

After including p, there will be 11 observations. Therefore, the median will be the 6th value.

To keep 29 as the 6th value, p must be equal to or greater than 29.

Therefore, the possible values of p are: **(iii) 40, (iv) 100, (v) 29, (vi) 47, (vii) 30.**

Question 10: The number of times students rode their cycles in a week is shown in the dot plot below. Four students rode their cycles twice in that week.



(i) Find the average number of times students rode their cycles.
(ii) Find the median number of times students rode their cycles.
(iii) Which of the following statements are valid? Why?

(a) Everyone used their cycle at least once.
(b) Almost everyone used their cycle a few times.
(c) Some students cycled more than once on some days.
(d) Exactly 5 students have used their cycles more than once on some days.
(e) The following week, if all of them cycled 1 more time than they did the previous week, what would be the average and median of the next week's data?

Solution:

Number of times Students rode their cycles (x)	Number of students (f)
0	3
1	1
2	4
3	7
4	7
5	5
6	4
7	6
8	3
9	—
10	2

(i)

Sum of all observations:

$= (0 \times 3) + (1 \times 1) + (2 \times 4) + (3 \times 7) + (4 \times 7) + (5 \times 5) + (6 \times 4) + (7 \times 6) + (8 \times 3) + (10 \times 2)$

$= 193$

Total number of students = 42

Average = 193/42
= 4.59 times approximately

(ii)

There are 42 observations. Therefore, the median is the average of the 21st and 22nd observations.

x	f	Cumulative frequency
0	3	3
1	1	3 + 1 = 4
2	4	4 + 4 = 8
3	7	8 + 7 = 15
4	7	15 + 7 = 22
5	5	22 + 5 = 27
6	4	27 + 4 = 31
7	6	31 + 6 = 37
8	3	37 + 3 = 40
10	2	40 + 2 = 42

Both the 21st and 22nd observations are 4.

Median = (4 + 4)/2
= 4

Therefore, the median is **4 times**.

(iii)

(a) Invalid: Three students did not use their cycles even once.

(b) Valid: Most students used their cycles several times during the week.

(c) Valid: Students who cycled more than seven times must have cycled more than once on at least one day.

(d) Invalid: The graph confirms that at least five students cycled more than seven times, but it does not prove that exactly five students cycled more than once on some days.

(e) If every value increases by 1, both the mean and median also increase by 1.

New average = 4.59 + 1
= 5.59

New median = 4 + 1
= 5

Question 11: A dart-throwing competition was organised inaschool. The number of throws participants took to hit the bull's eye (the centre circle) is given in the table below. Describe the data using its minimum, maximum, mean, and median.



No. of trials	1	2	3	4	5	6	7	8	9	10
No. of students	1	0	0	1	4	9	12	15	10	10

Solution:

Minimum number of throws = 1
Maximum number of throws = 10

Total number of participants = 62

Total number of throws:

= (1 × 1) + (2 × 0) + (3 × 0) + (4 × 1) + (5 × 4) + (6 × 9) + (7 × 12) + (8 × 15) + (9 × 10) + (10 × 10)

= 473

Mean = 473/62
= 7.63 throws approximately

For 62 observations, the median is the average of the 31st and 32nd values. Both values lie in the group corresponding to 8 throws.

No. of trials	No. of students	Cumulative frequency
1	1	1
2	0	1 + 0 = 1
3	0	1 + 0 = 1
4	1	1 + 1 = 2
5	4	2 + 4 = 6
6	9	6 + 9 = 15
7	12	15 + 12 = 27
8	15	27 + 15 = 42
9	10	42 + 10 = 52
10	10	52 + 10 = 62

Median = (8 + 8)/2 = 8

Therefore:

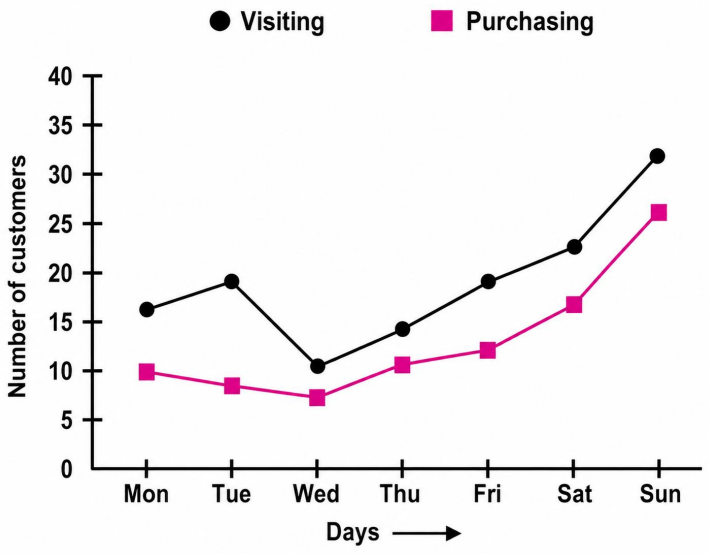
- Minimum = **1 throw**
- Maximum = **10 throws**
- Mean = **7.63 throws approximately**
- Median = **8 throws**

5.2 Visualising and Interpreting Data

Question 1: The average number of customers visiting a shop and the average number of customers actually purchasing items over different days of the week are shown in the table below. Visualise this data on a line graph.

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Visiting	16	19	10	14	20	22	35
Purchasing	10	8	7	11	12	16	26

Solution:

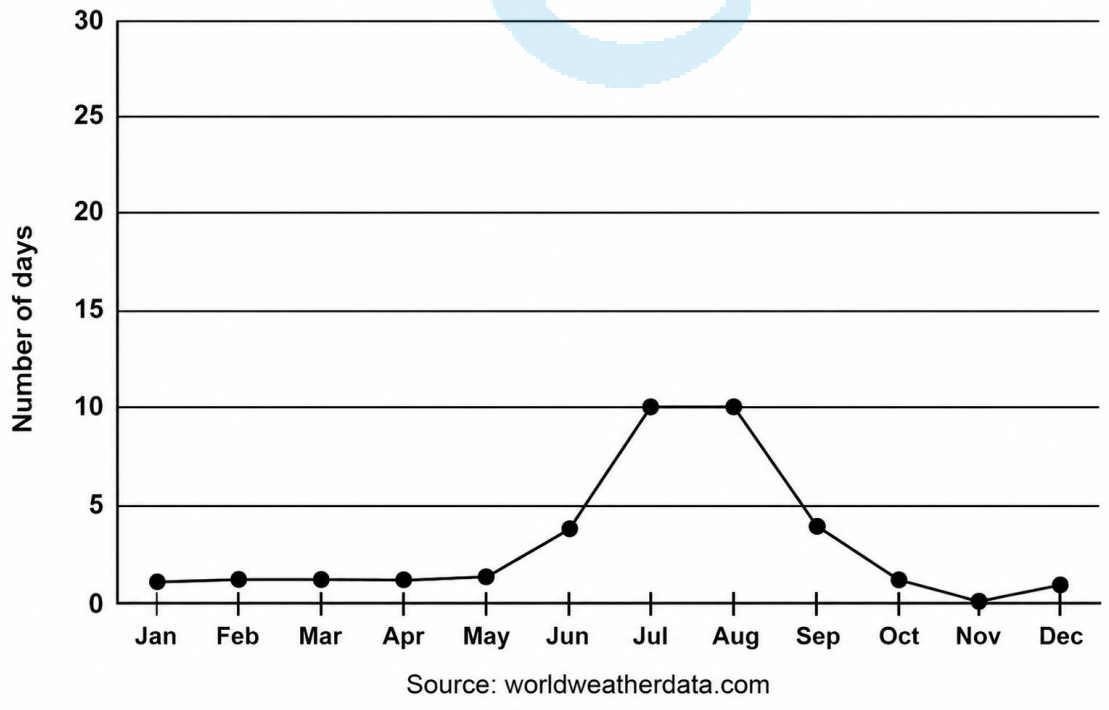


Students can draw the line graph themselves by marking the days on the horizontal axis and the number of customers on the vertical axis, using separate lines for visitors and purchasers.

Question 2: The average number of days of rainfall in each month for a few cities is shown in the table below:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mangaluru	0.1	0	0.1	1.8	6.2	24.1	27.7	24.5	14	8.8	3.9	0.9
New Delhi												
Port Blair	2.4	1.3	0.9	3.3	15.5	18.7	17.3	18.8	16.8	14.1	11.3	5.4
Rameswaram	2.6	1.3	1.9	3.4	2.5	0.4	1	1	1.9	8.1	10.4	7.8

(i) What could be the possible method to compile this data?
(ii) Mark the data for Mangaluru, Port Blair, and Rameswaram in the line graph shown below. You can round off the values to the nearest integer.

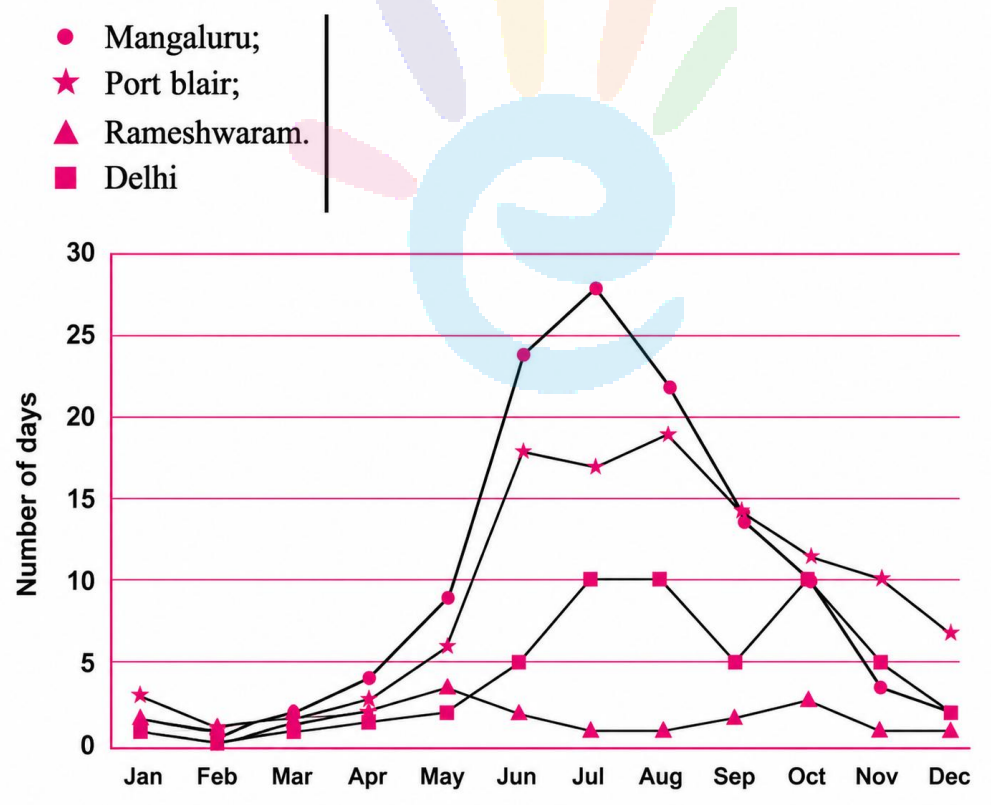


(iii) Based on the line for New Delhi in the graph, fill in the data in the table.
(iv) Which city among these receives the most number of days of rainfall per year? Which city gets the least number of days of rainfall per year?
(v) Looking at the table, when is the rainy season in New Delhi and Rameswaram?

Solution:

(i) The data may have been compiled using rainfall records collected over several years. The total rainy days recorded for each month can be divided by the number of years to find the monthly average.

(ii)



Students can plot the rounded monthly rainfall values for Mangaluru, Port Blair and Rameswaram on the given line graph.

(iii)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mangaluru	0.1	0	0.1	1.8	6.2	24.1	27.7	24.5	14	8.8	3.9	0.9
New Delhi	1.6	1.7	1.7	1.1	2.0	4.1	9.8	9.8	4.5	0.9	0.1	1.2
Port Blair	2.4	1.3	0.9	3.3	15.5	18.7	17.3	18.8	16.8	14.1	11.3	5.4
Rameswaram	2.6	1.3	1.9	3.4	2.5	0.4	1	1	1.9	8.1	10.4	7.8

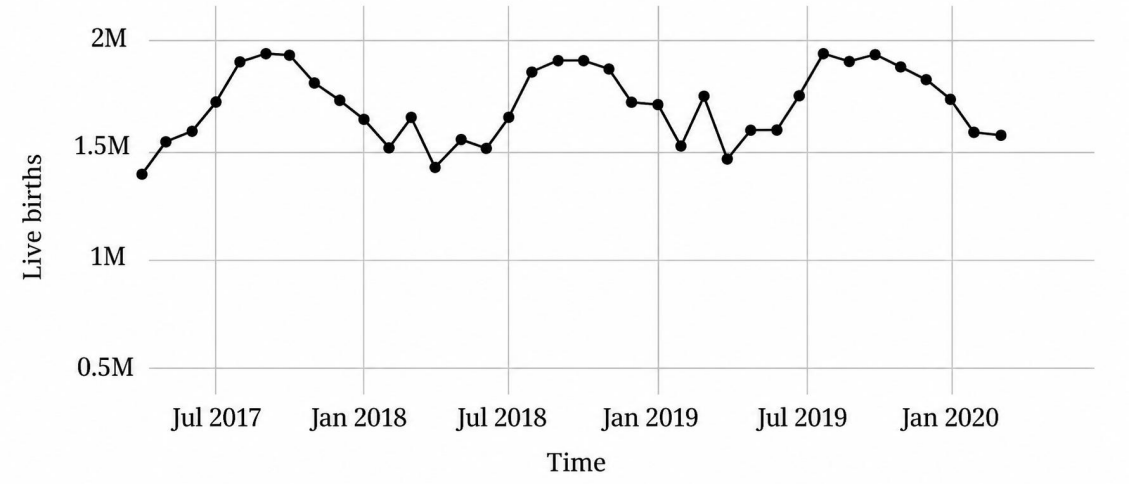
Students can read the monthly values from the New Delhi line and enter them in the corresponding columns of the table.

(iv) Mangaluru receives the greatest number of rainy days in a year, while Rameswaram receives the least among the cities shown.

(v) The main rainy season is:

- New Delhi: June to August
- Rameswaram: September to December

Question 3: The following line graph shows the number of births in every month in India over a time period:



Source: Nambiar et al (Forthcoming) – "Seasonal variations in births in India"

(i) What are your observations?
(ii) What was the approximate number of births in July 2017?
(iii) What time period does the graph capture?
(iv) Compare the number of births in January in the years 2018, 2019, and 2020.
(v) Estimate the number of births in the year 2019.

Solution:

(i) The number of births changes from month to month. The graph shows both increasing and decreasing trends during the given period.

(ii) The approximate number of births in July 2017 was **1.8 million**.

(iii) The graph covers the period from **July 2017 to January 2020**.

(iv) The approximate number of births in January was:

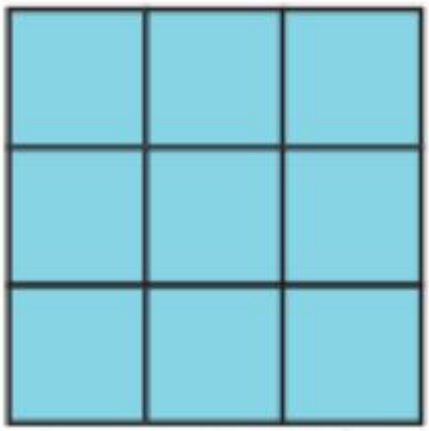
- January 2018: 1.6 million
- January 2019: 1.8 million
- January 2020: 1.9 million

Thus, the number of births in January increased during these three years.

(v) Students can estimate the total number of births in 2019 by reading and adding the values shown for all twelve months of that year.

5.3 Infographics

Question 1:
Mean Grids:



(i) Fill the grid with 9 distinct numbers such that the average along each row, column, and diagonal is 10.
(ii) Can we fill the grid by changing a few numbers and still get 10 as the average in all directions?

Solution:

(i)

8	1	6
3	5	7
4	9	2

Students can complete the grid using nine distinct numbers so that the sum of every row, column and diagonal is 30.

(ii) Yes. A few numbers may be changed, provided the other numbers are adjusted so that every row, column and diagonal continues to have a sum of 30.

Question 2: Give two examples of data that satisfy each of the following conditions:
(i) 3 numbers whose mean is 8.
(ii) 4 numbers whose median is 15.5.
(iii) 5 numbers whose mean is 13.6.
(iv) 6 numbers whose mean = median.
(v) 6 numbers whose mean > median.

Solution:

(i) 3 numbers whose mean is 8

- 6, 8, 10
- 7, 8, 9

(ii) 4 numbers whose median is 15.5

- 10, 15, 16, 20
- 12, 15, 16, 18

(iii) 5 numbers whose mean is 13.6

- 10, 12, 13, 15, 18
- 11, 12, 13, 14, 18

(iv) 6 numbers whose mean = median

- 2, 4, 6, 8, 10, 12
  Mean = Median = 7
- 1, 3, 5, 7, 9, 11
  Mean = Median = 6

(v) 6 numbers whose mean > median

- 1, 2, 3, 4, 5, 30
  Mean = 7.5 and Median = 3.5
- 2, 3, 4, 5, 6, 20
  Mean = 6.67 approximately and Median = 4.5

Question 3: Fill in the blanks such that the median of the collection is 13: 5, 21, 14, _____, _____, _____. How many possibilities exist if only counting numbers are allowed?

Solution:

For six numbers, the median is the average of the 3rd and 4th values after arranging the data in ascending order.

To obtain a median of 13, the two middle values must have a sum of 26.

One possible completed collection is:

5, 8, 12, 14, 21, 28

Median = (12 + 14)/2
= 13

Since the last number can be any counting number greater than or equal to 14 while suitable smaller values are chosen, infinitely many possible collections can be formed.

Question 4: Fill in the blanks such that the mean of the collection is 6.5: 3, 11, _____, _____, 15, 6. How many possibilities exist if only counting numbers are allowed?

Solution:

Let the missing numbers be x and y.

Mean = 6.5

Therefore:

(3 + 11 + x + y + 15 + 6)/6 = 6.5

35 + x + y = 39

x + y = 4

The possible ordered pairs of counting numbers are:

- (1, 3)
- (2, 2)
- (3, 1)

Therefore, there are **three ordered possibilities**. If the order of the two blanks is ignored, there are **two distinct pairs: 1 and 3, or 2 and 2**.

Question 5: Check whether each of the statements below is true. Justify your reasoning. Use algebra, if necessary, to justify.
(i) The average of two even numbers is even.
(ii) The average of any two multiples of 5 will be a multiple of 5.
(iii) The average of any 5 multiples of 5 will also be a multiple of 5.

Solution:

(i) The statement is not always true.

Let the even numbers be 2a and 2b.

Average = (2a + 2b)/2
= a + b

The value of a + b may be even or odd.

For example, the average of 2 and 4 is 3, which is not even.

(ii) The statement is not always true.

For example, 5 and 10 are both multiples of 5.

Average = (5 + 10)/2
= 7.5

Therefore, the average is not necessarily a multiple of 5.

(iii) The statement is not always true.

For example, consider the five multiples of 5:

5, 5, 5, 5 and 10

Average = 30/5
= 6

Since 6 is not a multiple of 5, the statement is false.

Question 6: There were 2 new admissions to Sudhakar's class just a couple of days after the class average height was found to be 150.2 cm.
(i) Which of the following statements are correct? Why?
(a) The average height of the class will increase as there are 2 new values.
(b) The average height of the class will remain the same.
(c) The heights of the new students have to be measured to find out the new average height.
(d) The heights of everyone in the class have to be measured again to calculate the new average height.

Solution:

Option (c) is correct.

The heights of the two new students must be known to calculate the new average. The average may increase, decrease or remain unchanged depending on their heights. The heights of the existing students do not need to be measured again.

(ii) The heights of the two new joinees are 149 cm and 152 cm. Which of the following statements about the class's average height is correct? Why?
(a) The average will remain the same.
(b) The average will increase.
(c) The average will decrease.
(d) The information is not sufficient to make a claim about the average.

Solution:

The average height of the two new students is:

(149 + 152)/2
= 150.5 cm

Since 150.5 cm is greater than the old average of 150.2 cm, the class average will increase slightly.

Therefore, **option (b) is correct**.

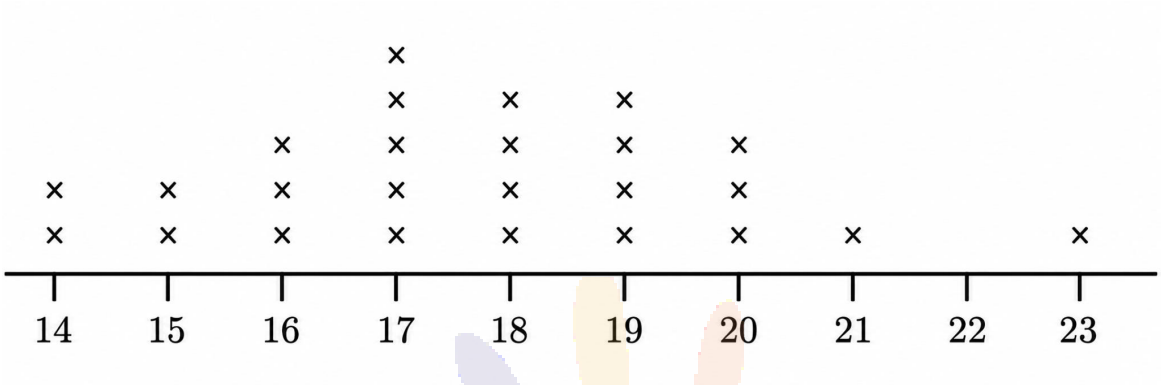
(iii) Which of the following statements about the new class average height are correct? Why?
(a) The median will remain the same.
(b) The median will increase.
(c) The median will decrease.
(d) The information is not sufficient to make a claim about the median.

Solution:

The median depends on the positions of all the heights when arranged in ascending order. The complete ordered data is not available.

Therefore, **option (d) is correct**.

Question 7: Is 17 the average of the data shown in the dot plot below? Share the method you used to answer this question.



Solution:

Using the count-and-calculate method:

Value (x)	Frequency (f)
14	2
15	2
16	3
17	5
18	4
19	4
20	3
21	1
23	1

Sum = (14 × 2) + (15 × 2) + (16 × 3) + (17 × 5) + (18 × 4) + (19 × 4) + (20 × 3) + 21 + 23

= 443

Total number of observations:

= 2 + 2 + 3 + 5 + 4 + 4 + 3 + 1 + 1
= 25

Mean = 443/25
= 17.72

Therefore, **17 is not the exact average**. The average is **17.72**.

Question 8: The weights of people in a group were measured every month. The average weight for the previous month was 65.3 kg, and the median weight was 67 kg. The data for this month showed that one person has lost 2 kg and two have gained 1 kg. What can we say about the change in mean weight and median weight this month?

Solution:

One person lost 2 kg, while two people gained 1 kg each.

Net change in total weight:

−2 + 1 + 1 = 0 kg

Since the total weight and the number of people remain unchanged, the new mean is still **65.3 kg**.

However, the change in median cannot be determined because it depends on the original positions of these three people in the ordered list of weights.

Therefore:

- Mean remains unchanged.
- Change in median cannot be determined from the given information.

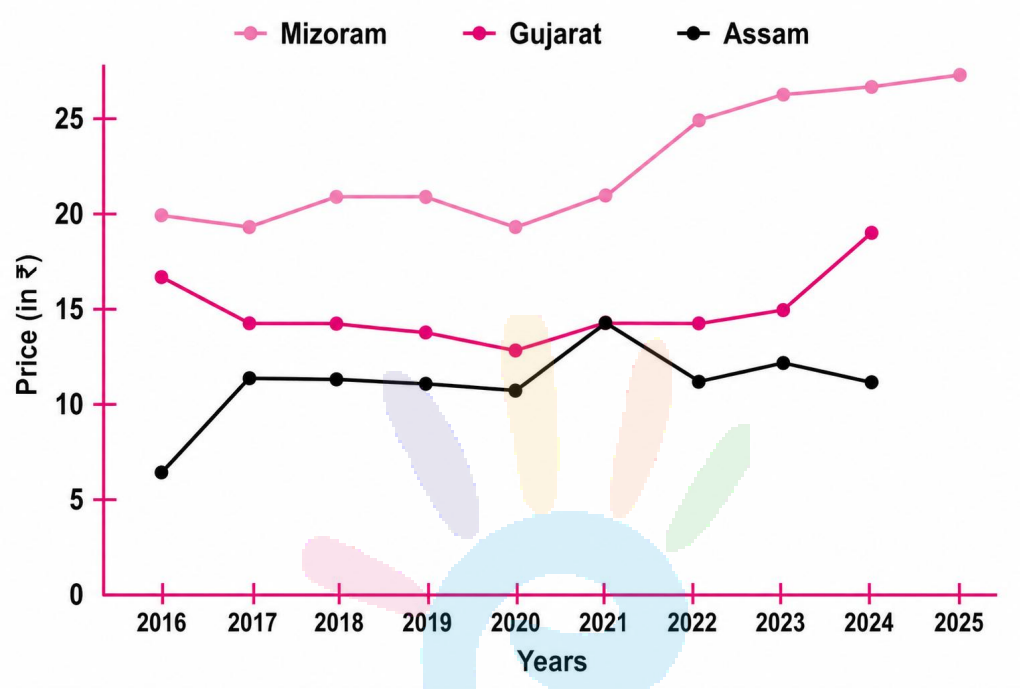
Question 9: The following table shows the retail price (in ₹) of iodised salt in the month of January in a few states over 10 years. For your calculations and plotting, you may round off values to the nearest counting number.

	Andaman and Nicobar Islands	Assam	Gujarat	Mizoram	Uttar Pradesh	West Bengal
2016	16	6	16.5	20	16.15	9.47
2017	12	12	14.75	20	16.97	11.65
2018	12	12	14.75	22	16.18	11.63
2019	12	12	14.75	22	18.24	11.43
2020	13.88	12	13	20	18.96	11.11
2021	18.22	15	14.45	22	20.63	12.79
2022	18.73	14	14.28	25	21.3	16.14
2023	20.63	12.02	14.54	27.65	25.39	18.43
2024	19.73	13.72	14.8	29.03	26.9	21.66
2025	20.99	12.35	19.2	29.8	24.81	23.99

(i) Choose data from any 3 states you find interesting and present it through a line graph using an appropriate scale.
(ii) What do you find interesting in this data? Share your observations.
(iii) Compare the price variation in Gujarat and Uttar Pradesh.
(iv) In which state has the price increased the most from 2016 to 2025?
(v) What are you curious to explore further?

Solution:

(i)



Students can select any three states and draw a line graph by taking the years on the horizontal axis and the rounded prices on the vertical axis.

(ii) The prices generally increased over the years in most states. Mizoram had comparatively high prices, while Gujarat showed relatively smaller variation.

(iii) The price increased much more in Uttar Pradesh than in Gujarat during the given period.

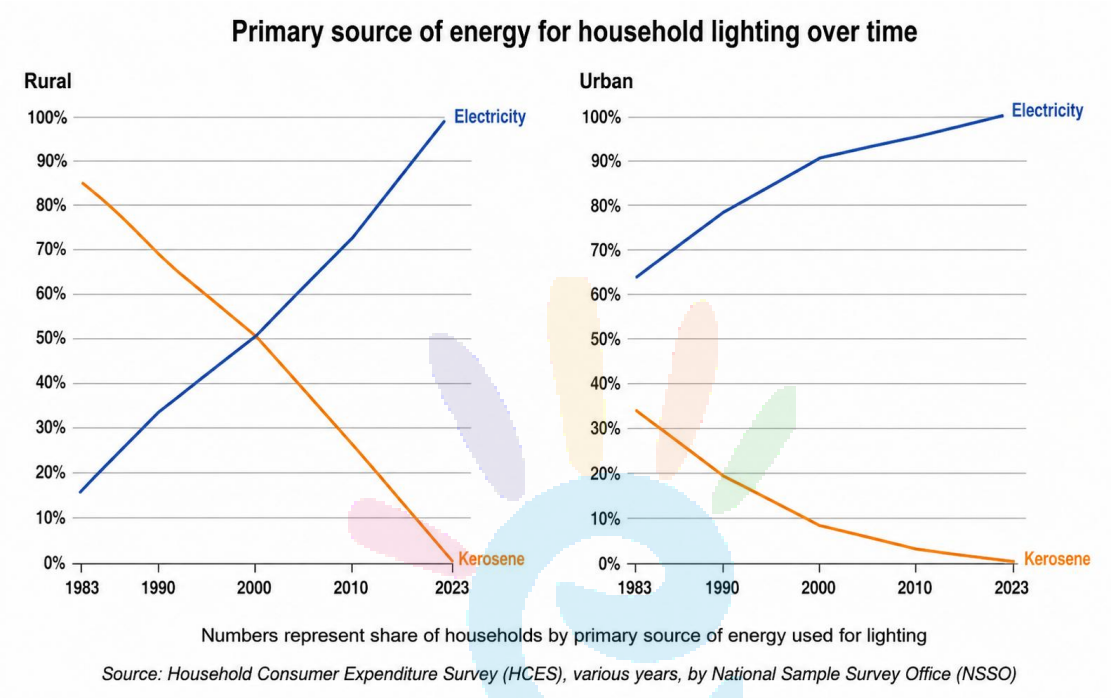
(iv) Price increase from 2016 to 2025:

- Andaman and Nicobar Islands = ₹20.99 − ₹16 = ₹4.99
- Assam = ₹12.35 − ₹6 = ₹6.35
- Gujarat = ₹19.20 − ₹16.50 = ₹2.70
- Mizoram = ₹29.80 − ₹20 = ₹9.80
- Uttar Pradesh = ₹24.81 − ₹16.15 = ₹8.66
- West Bengal = ₹23.99 − ₹9.47 = ₹14.52

Therefore, **West Bengal recorded the greatest price increase of ₹14.52**.

(v) Students may explore the reasons behind the large increase in the price of iodized salt in West Bengal.

Question 10: Referring to the graph below, which of the following statements are valid? Why?



(i) In 1983, the majority in rural areas used kerosene as a primary lighting source, while the majority in urban areas used electricity.
(ii) The use of kerosene as a primary lighting source has decreased over time in both rural and urban areas.
(iii) In the year 2000, 10% of the urban households used electricity as a primary lighting source.
(iv) In 2023, there were no power cuts.

Solution:

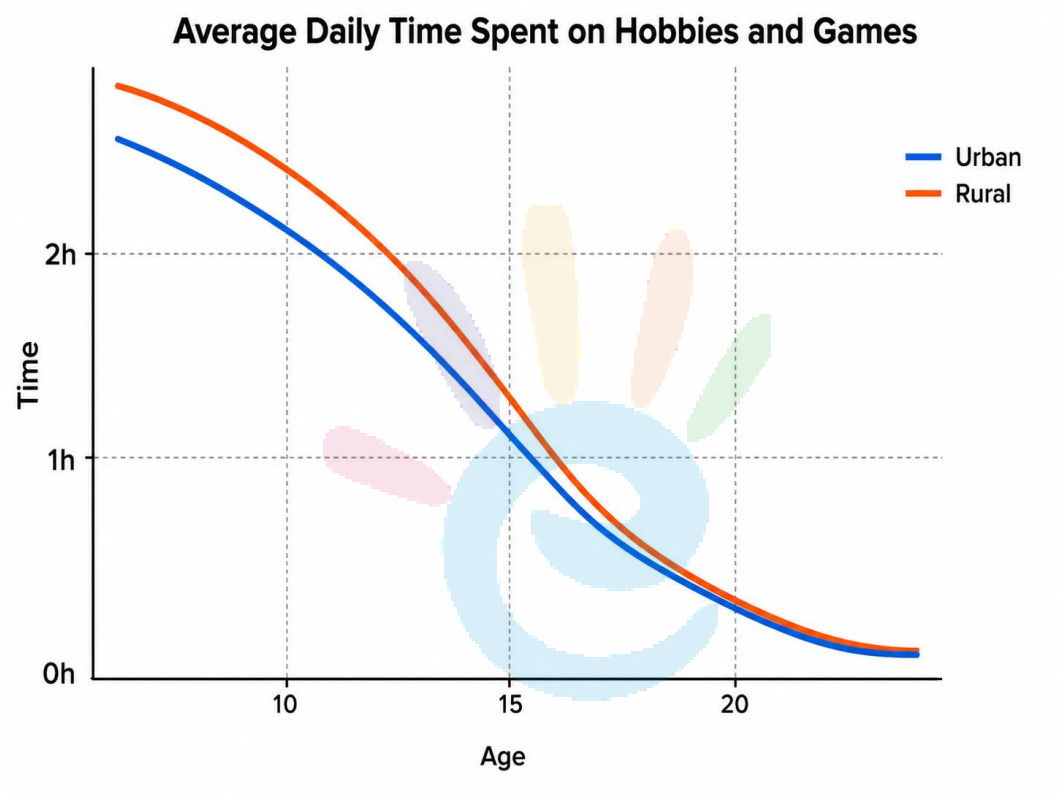
(i) Valid: The graph shows that in 1983, most rural households used kerosene, while most urban households used electricity.

(ii) Valid: The percentage of households using kerosene decreased over time in both rural and urban areas.

(iii) Invalid: The graph shows that more than 80% of urban households used electricity in 2000, not 10%.

(iv) Invalid: The graph provides information about sources of lighting, not about the occurrence of power cuts.

Question 11: Answer the following questions based on the line graph.



(i) How long do children aged 10 in urban areas spend each day on hobbies and games?
(ii) At what age is the average time spent daily on hobbies and games by rural kids 1.5 hours?
(a) 8 years
(b) 10 years
(c) 12 years
(d) 14 years
(e) 18 years
(iii) Are the following statements correct?
(a) The average time spent daily on hobbies and games by kids aged 15 is twice that of kids aged 10.
(b) All rural kids aged 15 spend at least 1 hour on hobbies and games every day.

Solution:

(i) Children aged 10 in urban areas spend approximately **2 hours per day** on hobbies and games.

(ii) The correct answer is **(d) 14 years**.

(iii)

(a) This statement is correct if the average values shown in the graph for ages 10 and 15 are in the ratio 1:2.

(b) This statement cannot be concluded from the graph. The graph shows an average value and does not prove that every rural child aged 15 spends at least one hour on hobbies and games.

Question 12: Individual Project: Create your own activity strip for each day of the week.



(i) Do you eat and sleep at regular times every day? Typically, how long do you spend outdoors?
(ii) Calculate the average time spent per activity. Represent this average day using a strip.
(iii) Similarly, track the activities of any adult at home. Compare your data with theirs.

Solution:

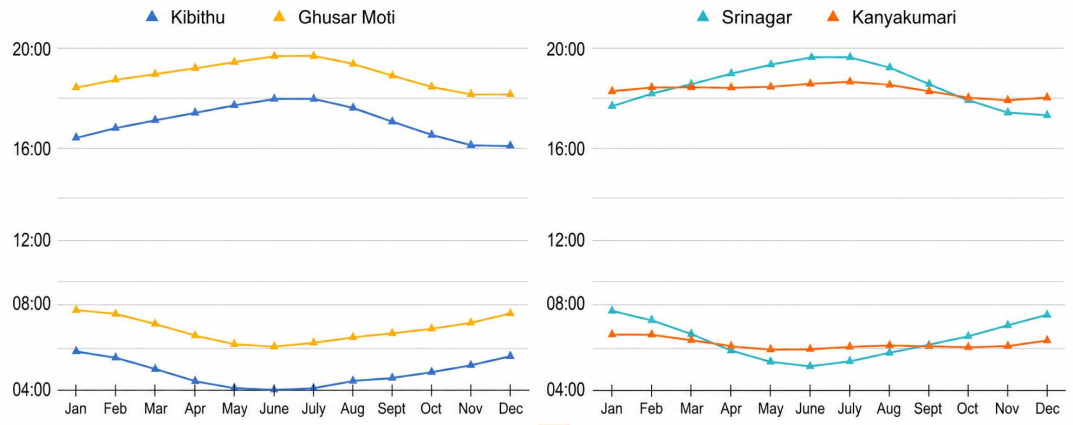
Students can complete this project themselves by recording their daily activities, calculating the average time spent on each activity and comparing the results with an adult's activity pattern.

Question 13: Small group project: Make a group of 3-4 members. Do at least one of the following:
(i) Track daily sleep time of all your family members for a week. Daily sleep time includes nighttime sleep, naps, and any sleep during the day.
(a) Represent this on strips.
(b) Put together the data of all your group members. Calculate the average and median sleep time of children, adults, elderly.
(c) Share your findings and observations.
(ii) When do schools start and end? On a weekday, Manoj's school starts at 9:30 am and ends at 4:30 pm, i.e., 7 hours, which includes class time and breaks. Collect information on the daily timings of different schools for Grade 8, including. class time and break time (the schools can be anywhere in the country. You can ask your neighbours, relatives, parents and friends to find out). Analyse and present the data collected.

Solution:

Students can complete this group project themselves by collecting the required data, organizing it in tables or strips and calculating the relevant mean and median values.

Question 14: The following graphs show the sunrise and sunset times across the year at 4 locations in India. Observe how the graphs are organised. Are you able to identify which lines indicate the sunrise and which indicate the sunset?



Answer the following questions based on the graphs:
(i) At which place does the sun rise the earliest in January? What is the approximate day length at this place in January?
(ii) Which place has the longest day length over the year?
(iii) Share your observations — what do you find interesting? What are you curious to find out?

Solution:

Yes, the sunrise and sunset lines can be identified by comparing their times. The lower timeline represents sunrise, while the later timeline represents sunset.

(i) In January, the sun rises earliest in **Kibithu**, at approximately 6:00 a.m.

Approximate sunset time = 4:00 p.m.

Day length = 4:00 p.m. − 6:00 a.m.
= Approximately 10 hours

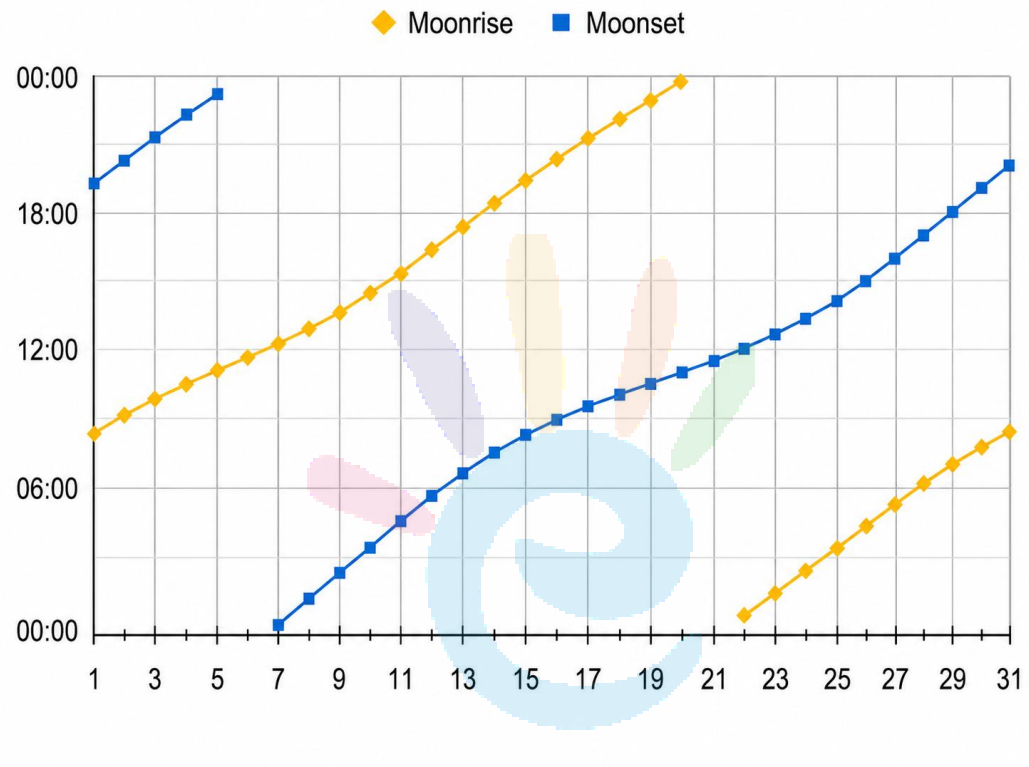
(ii) Ghuar Moti has the longest day length during the year.

(iii) Observations:

- Ghuar Moti has the longest day length.
- Kanyakumari shows the smallest seasonal difference in day length.
- Kibithu has the earliest sunrise in January.
- Ghuar Moti has the latest sunset in January.

Students may further explore how sunrise, sunset and day length change with latitude and seasons.

Question 15: We all know the typical sunrise and sunset timings. Do you know when the moon rises and sets? Does it follow a regular pattern like the sun? Let's find out. The following graph shows the moonrise and moonset times over a month:



(i) Find out on what dates amavasya (new moon) and purnima (full moon) were in this month.
(ii) What do you notice? What do you wonder?

Solution:

(i)

- Amavasya or new moon: Around Day 21
- Purnima or full moon: Around Day 7 or Day 8

(ii) The moonrise and moonset timings change from one day to another throughout the month. The time gap between moonrise and moonset also varies.

Students may wonder why the moon rises later each day and how its phases are connected with its rising and setting times.