Tales by Dots and Lines Class 8 Solutions Maths Ganita Prakash Part 2 Chapter 5

5.1 The Balancing Act

Figure It Out (Pages 113-116)

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 mean of the first 50 natural numbers.
The first 50 natural numbers.
1, 2, 3,……, 50
The sum of n natural numbers is $\frac{n(n+1)}{2}$
So for n = 50
the sum = $\frac{50(50+1)}{2}$
= = $\frac{50\times51}{2}$
= 1275

$$\text{Mean} = \frac{\text{Sum of the first 50 natural numbers}}{\text{Total number of natural numbers}}$$

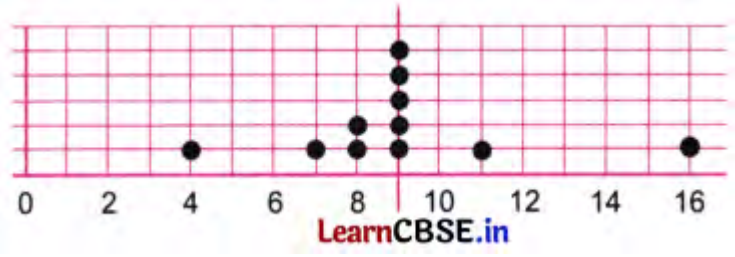
$= \frac{1275}{50}$
= 25.5
Observations:
The mean of the first n natural numbers is always $\left(\frac{n+1}{2}\right)$
For n = 50, $\frac{51}{2}$ = 25.5

(ii) Mean of the first 50 odd numbers.
The first 50-odd numbers
1, 3, 5, 7, 9,……, 99
Sum of the first n odd numbers = n^2
So for n (= 50) the sum = $(50)^2$ = 2500
Mean = $\frac{2500}{50}$ = 50
Observations:
The mean of the first n odd numbers is always n.
For 50-odd numbers, the mean is 50.

(iii) Mean of the first 50 multiples of 4.
The first 50 multiples of 4 = 4, 8, 12, 16,……, 200
Sum of multiples of 4 = 4 + 8 + 12 + ……. + 200
= 4(1 + 2 + 3 + ….. + 50)
= 4 × (1275)
= 5100
Mean = $\frac{5100}{50}$ = 102
Observations:
The mean of the first n multiples of 4 is 4 times the mean of the first n 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).

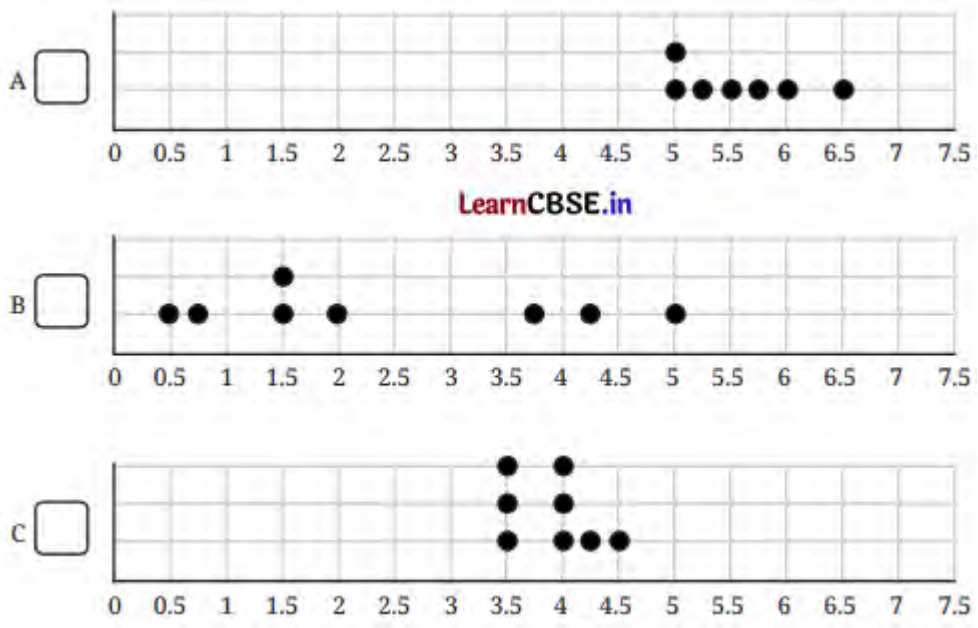
Solution:
From the dot plot, the data values
4, 7, 8, 8, 9, 9, 9, 9, 9, 11, x
Number of observations = 11
Mean = 9
Sum of data values = 4 + 7 + 8 + 8 + 9 + 9 + 9 + 9 + 9 + 11 = 83
Total sum = 9 × 11 = 99
Missing number = 99 – 83 = 16



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 remeasure all the heights. Since the shoes add 1 cm to every student's height, the average height with shoes is 1 cm more than the actual average height. So the correct average height is 1 cm less than the measured average height.
(ii) Correct average height = 150.2 cm – 1 cm = 149.2 cm
∴ 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:
We can determine it by examining the dot plots. In dot plot A, most song lengths are between 5 and 6.5 minutes, so the mean is likely around 5.57 minutes. In dot plots B and C, all song lengths are below 5.57 minutes, so their means cannot exceed 5.57. Therefore, dot plot A is the one with a mean of 5.57 minutes.
Check:
For Album A
Data values = 5, 5, 5.25, 5.5, 5.75, 6, 6.5
Mean = $\frac{5+5+5.25+5.5+5.75+6+6.5}{7}$

$= \frac{39}{7}$

= 5.57 minutes

For Album B

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

Mean = $\frac{0.5+0.75+1.5+1.5+2+3.75+4.25+5}{8}$

$= \frac{19.25}{8}$

= 2.41 minutes

For Album C

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

Mean = $\frac{3.5+3.5+3.5+4+4+4+4.25+4.5}{8} = \frac{30.75}{8}$

= 3.9 minutes

Album (A) has a mean of 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 to 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 given data set is 8, 10, 19, 23, 26, 34, 40, 41, 41, 48, 51, 55, 70, 84, 91, 92

The number of observations (n) = 16 (even)

Median = average of $\left(\frac{n}{2}\right)^{th}$ and $\left(\frac{n}{2}+1\right)^{th}$ terms

= average of 8th and 9th terms

$= \frac{41+41}{2}$

$= \frac{82}{2}$

= 41

(i) To keep the median 41 with an odd number of values (n = 17), the new value must be placed at the median itself in the order list for making the middle value the 9th value. So the value could be 41.

(ii) With n = 18 (even) the median is the average of the 9th and 10th values.

To keep the median 41, we need to add two numbers whose sum is 82.

For this, one value should be less than 41 and the other greater than 41.

For example, the two values could be 40 and 42.

(iii) With n = 15 (odd) the median is the 8th value that is 41.

So we can remove another 41 from the ordered list.

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) Sometimes true: Removing a value less than the median can decrease the median. But if the data set has an even number of elements and the removed value is below the lower of the two middle values, the median may stay the same.
(ii) Always true: The mean is the sum of all values divided by the number of values. Adding a value less than the mean decreases the total sum less than proportionally to the increase in the number of values, thus decreasing the mean.
(iii) Sometimes true: Including any 4 values could shift the median depending on whether those values are above or below the median and on the original number of observations.
(iv) Never true: Including values less than the median will either keep the median the same or decrease it, but it will never increase it.

Question 7.
The mean of the numbers 8, 13, 10, 4, 5, 20, y, 10 is 10.375. Find the value of y.
Solution:
Numbers = 8, 13, 10, 4, 5, 20, y, 10
Total numbers = 8
Mean = 10.375
Total Sum = 10.375 × 8 = 83
Sum of numbers = 8 + 13 + 10 + 4 + 5 + 20 + y + 10 = 70 + y
So 83 = 70 + y
y = 83 – 70 = 13

Question 8.
The mean of a set of data with 15 values is 134. Find the sum of the data.
Solution:
Mean = 134
Total values = 15
Sum of data = 134 × 15 = 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 data (excluding p)

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

Total observations = 11 (odd)

Median = $\left(\frac{n+1}{2}\right)^{th}$ term

= 6th term

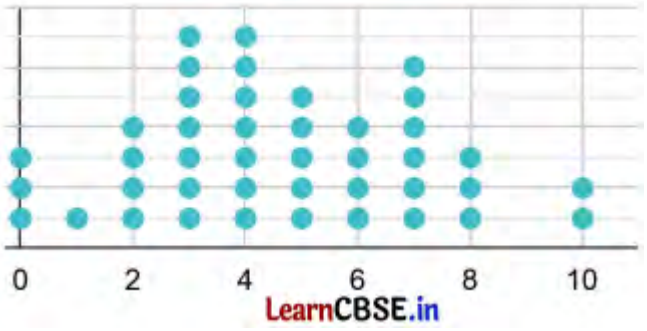
= 29

So, p must be ≥ 29 to keep the value 29 in the middle.

So possible values of p are (iii) 40, (iv) 100, (v) 29, (vi) 47, and (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:

From the dot plot Data

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 = (0 × 3) + (1 × 1) + (2 × 4) + (3 × 7) + (4 × 7) + (5 × 5) + (6 × 4) + (7 × 6) + (8 × 3) + (10 × 2)
= 0 + 1 + 8 + 21 + 28 + 25 + 24 + 42 + 24 + 20
= 193
Total number of students = 42

Average = $\frac{193}{42}$ = 4.59 times

(ii) Total number of students = 42 (even)
So Median = average of 21st and 22nd terms

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

The 21st and 22nd terms lie in the cumulative frequency corresponding to 4.

So median = $\frac{4+4}{2}$ = 4

Median number of times students rode their cycles = 4

(iii) (a) Invalid

(b) Valid

(c) Valid

(d) Invalid

(e) Next week's mean and median will be Mean = previous mean + 1

= 4.59 + 1

= 5.59

Median: Now the 21st and 22nd terms lie in the cumulative frequency corresponding to 5.

So Median = $\frac{5+5}{2}$ = 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:

The minimum number of trials is 1.

The maximum number of trials is 10.

$$\text{Mean} = \frac{\begin{array}{c}(1\times 1)+(2\times 0)+(3\times 0)+(4\times 1)\\ +(5\times 4)+(6\times 9)+(7\times 12)+\\ (8\times 15)+(9\times 10)+(10\times 10)\end{array}}{62}$$

$$= \frac{\begin{array}{c}1+0+0+4+20+54+84\\ +120+90+100\end{array}}{62}$$

$$= \frac{473}{62}$$

= 7.6 trials

Median:

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 = average of $\left(\frac{62}{2}\right)^{th}$ term and $\left(\frac{62}{2}+1\right)^{th}$ term

= average of 31th and 32th terms

The 31st and 32nd terms lie in the cumulative frequency corresponding to 8.

5.2 Visualising and Interpreting Data

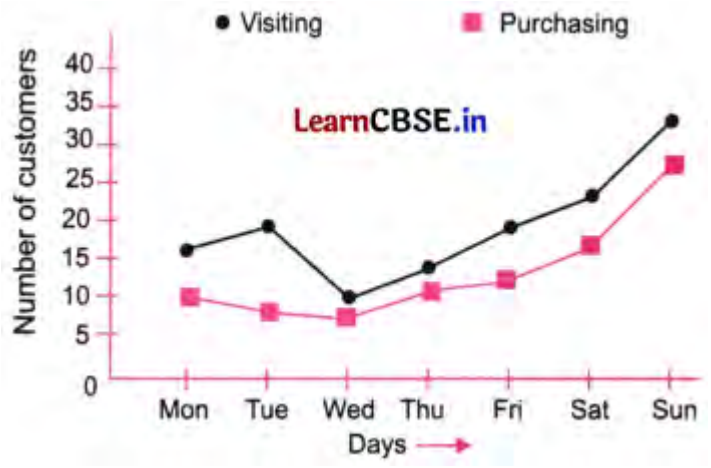
Figure It Out (Pages 122-123)

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.

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

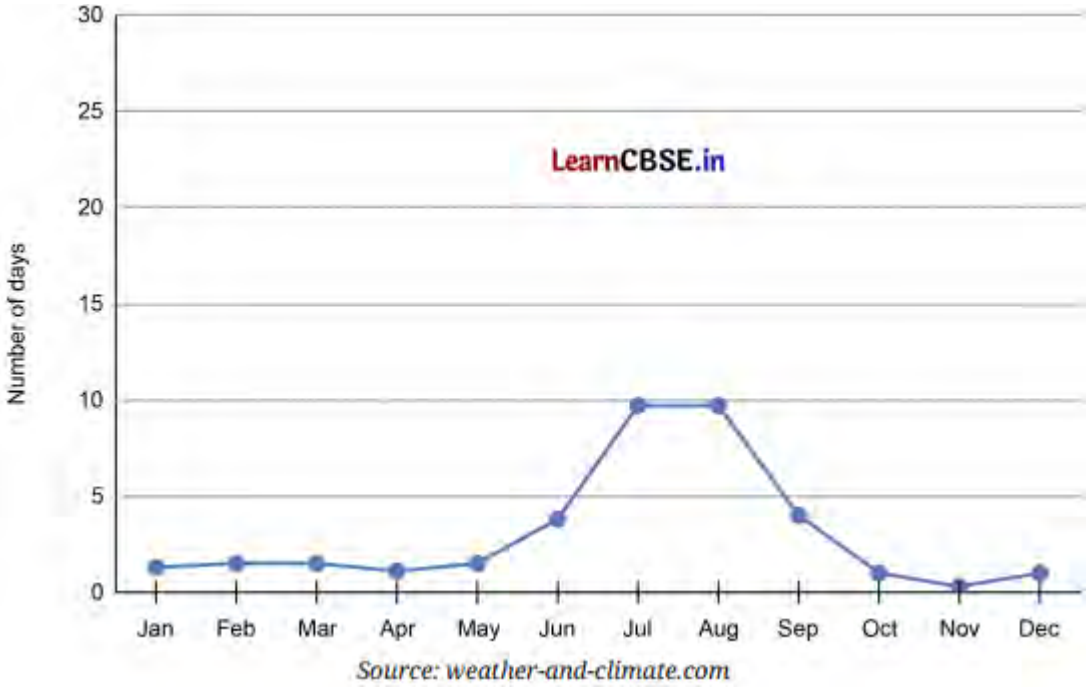
Solution:
Line Graph



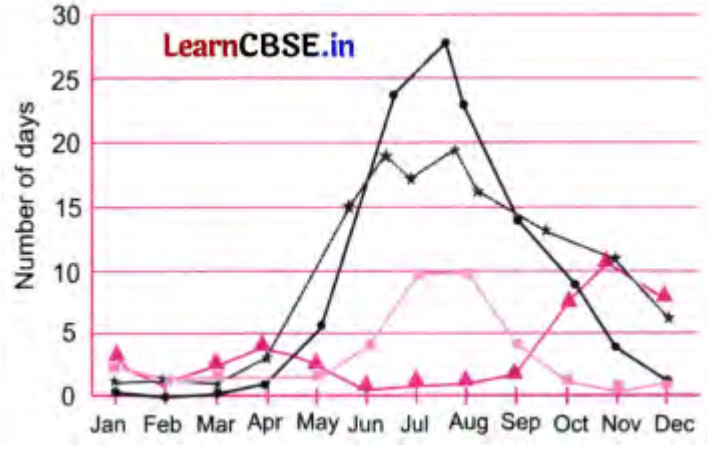
Question 2.
The average number of days of rainfall in each month for a few cities is shown in the table below:

LearnCBSE.in	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) Line graph.
(ii)

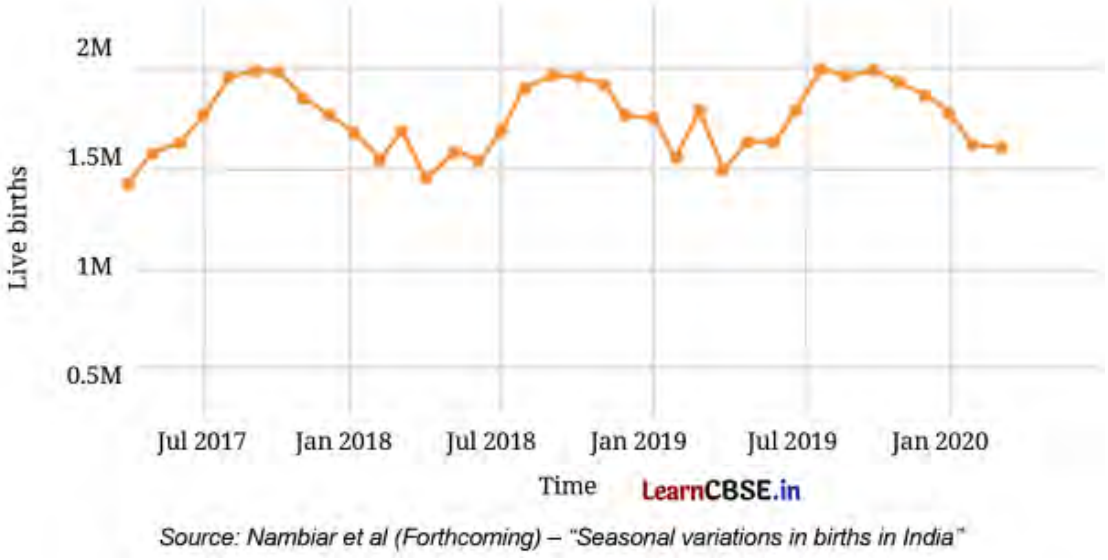


(iii)

LearnCBSE.in	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

(iv) Mangaluru receives the most number of days of rainfall per year, and Rameswaram receives the least.
(v) In New Delhi rainy season is from June to August, and in Rameswaram, it is from 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) There is both increasing and decreasing trends in the number of births in every month.
(ii) Approx 1.8 M.
(iii) The graph captures the time period from July 2017 to Jan 2020.
(iv) The number of births in Jan 2018 is approx 1.6 M, in Jan 2019 approx 1.8 M, and in Jan 2020 approx 1.9 M. That means it is increasing continuously.
(v) The number of births in the year 2019 is approx 1.9 M.

5.3 Infographics

Figure It Out (Pages 127-132)

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

(ii) Yes, we can fill by changing any number that requires adjusting other numbers to keep row, column, and diagonal sums equal to 3 × average = 3 × 10 = 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 are
(a) 6, 8, and 10
(b) 7, 8, and 9.

(ii) 4 numbers whose median is 15.5 are
(a) 10, 15, 16, and 20
(b) 12, 15, 16, and 18.

(iii) 5 numbers whose mean is 13.6 are
(a) 10, 12, 13, 15, and 18.
(b) 11, 12, 13, 14, and 18.

(iv) 6 numbers whose Mean = Median
(a) 2, 4, 6, 8, 10, 12 (Mean = Median = 7)
(b) 1, 3, 5, 7, 9, 11 (Mean = Median = 6)

(v) 6 numbers whose Mean > Median
(a) 1, 2, 3, 4, 5, 30 (Mean = 7.5, Median = 3.5)
(b) 2, 3, 4, 5, 6, 20 (Mean = 6.67, 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:
The collection is (5, 21, 14, _____, _____, _____) with median 13.
For a set of 6 numbers,
the median (even) = average of $\left(\frac{6}{2}\right)^{th}$ and $\left(\frac{6}{2}+1\right)^{th}$ term
= average of 3rd and 4th terms
Let other terms be a, b, and c.
Arranging in order with a median of 13.
So, 14 must be the fourth term.
5, a, b, 14, 21, c
OR
5, a, b, 14 c, 21
6 + 14
Median = $\frac{b+14}{2}$ = 13
b = 26 – 14 = 12
∴ a < b and c > 14
One possible answer is 5, 8, 12, 14, 21, 28
If all three blanks are counting numbers and the median is 13, then infinite possibilities can exist as c > 14.

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:
The collection is (3, 11, x, y, 15, 6)
Mean = 6.5, let the other numbers be x and y.
For 6 numbers = $\frac{3+11+x+y+15+6}{6}$ = 6.5
⇒ 35 + x + y = 6.5 × 6
⇒ 35 + x + y = 39

⇒ x + y = 39 – 35 = 4
With counting numbers, the pairs (x, y) satisfying x + y = 4 are (1, 3), (3, 1), and (2, 2).
So, the number of possibilities is 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) True
Let the two even numbers be 2a and 2b.
Average = $\frac{(2a+2b)}{2}$ = a + b
Since (a + b) is an integer and the sum of two integers is an integer, the average is even.

(ii) True
Let the two multiples of 5 be 5m and 5n.
Average = $\frac{5m+5n}{2} = 5\left(\frac{m+n}{2}\right)$
This is a multiple of 5 if $\left(\frac{m+n}{2}\right)$ is an integer. That is m + n is even.

(iii) True
Let the five multiples of 5 be 5a, 5b, 5c, 5d, 5e.
Average = $\frac{5a+5b+5c+5d+5e}{5}$
= $= 5\left(\frac{a+b+c+d+e}{5}\right)$
= a + b + c + d + e
Since a + b + c + d + e is a whole number, the average of any 5 multiples of 5 will also be a multiple of 5.

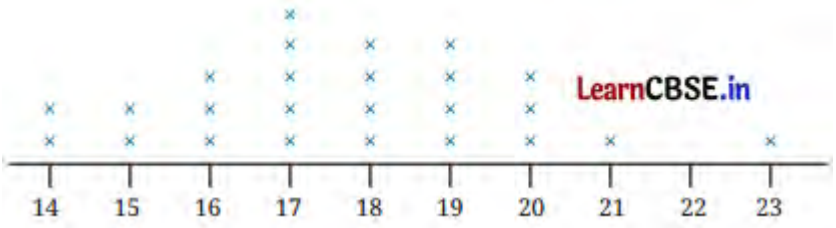
Question 6.
There were 2 new admissions to Sudhakar's class just a couple of days after the class average height was found to be 150.2 cm.
(i) Which of the following statements are correct? Why?
(a) The average height of the class will increase as there are 2 new values.
(b) The average height of the 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:

(c) The heights of the new students have to be measured to find out the new average height. The average may increase, decrease, or stay the same depending on the heights of the other 2 new students.

(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:
(b) The average will increase.
Old mean = 150.2 cm
Let the number of students be x
New mean = $\frac{Sum of heights of x + 149 + 152 students}{x+2}$
Average of new two heights = $\frac{149+152}{2} = \frac{301}{2}$ = 150.5
150.5 cm > 150.2 cm
As the average of 2 new added heights is greater than old average, the class average increases.
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:
(d) The information is not sufficient to make a claim about the median.
The median depends on the arrangement of all heights in the ordered list.
Adding two values changes the position of the middle value.
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:
Method: Count and Calculate

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
= 28 + 30 + 48 + 85 + 72 + 76 + 60 + 21 + 23
= 443
Total numbers = 2 + 2 + 3 + 5 + 4 + 4 + 3 + 1 + 1 = 25
Mean = $\frac{443}{25}$ = 17.72
The average of the data is 17.72, or on a dot plot, 17.

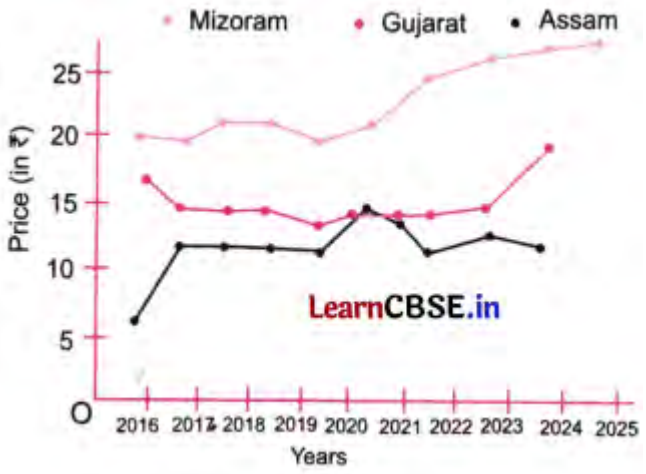
Question 8.
The weights of people in a group were measured every month. The average weight for the previous month was 65.3 kg, and the median weight was 67 kg. The data for this month showed that one person has lost 2 kg and two have gained 1 kg. What can we say about the change in mean weight and median weight this month?
Solution:
Original average weight = 65.3 kg
Let there be n people in the group.
Total weight = n × 65.3 kg
After one person loses 2 kg and two people each gain 1 kg, the net change in total weight is
Total weight = 65.3n + 1 + 1 – 2 = 65.3n
New mean = $\frac{65.3n}{n}$ = 65.3 kg

The new mean weight will remain unchanged.
The effect on the median depends on the original position of these three people, whose weight gains or lose.
So new median weight cannot be determined exactly without knowing more data.

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.

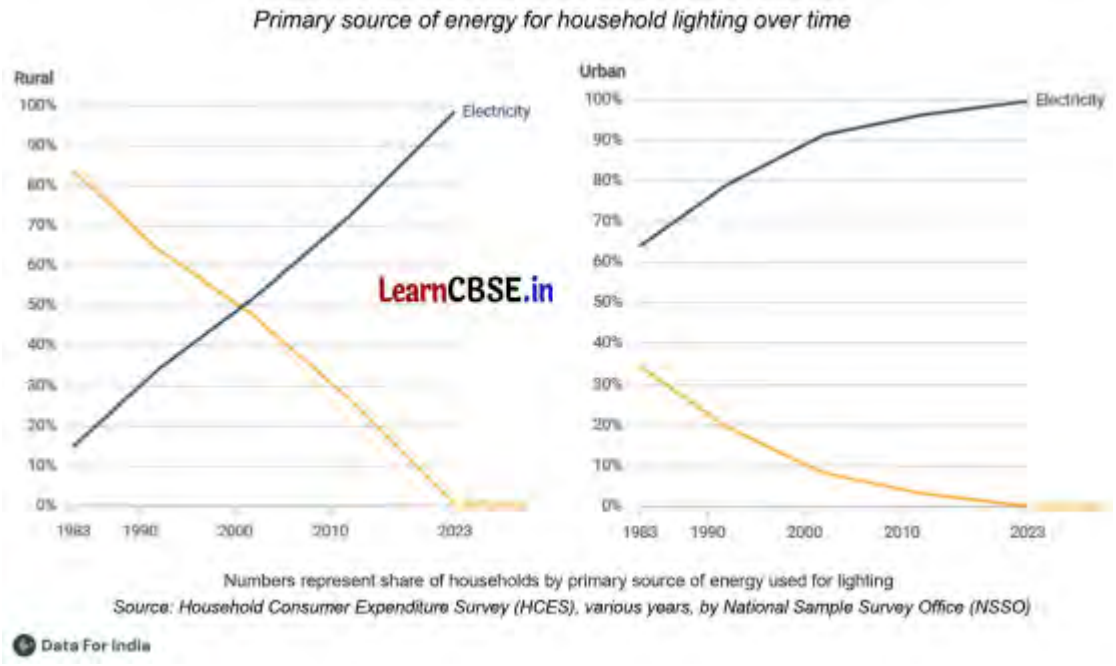
	Andaman and Nicobar Islands	Assam	Gujarat	Mizoram	Uttar Pradesh	West Bengal
2016	16	6	16.5	20	16.15	9.47
2017	12	12	14.75	20	16.97	11.65
2018	12	12	14.75	22	16.18	11.63
2019	12	12	14.75	22	18.24	11.43
2020	13.88	12	13	20	18.96	11.11
2021	18.22	15	14.45	22	20.63	12.79
2022	18.73	14	14.28	25	21.3	16.14
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)



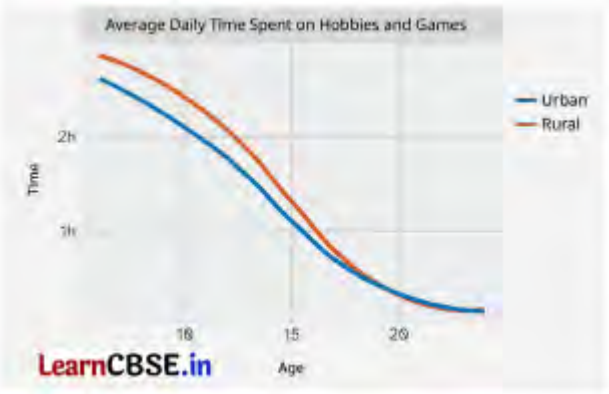
(ii) Price generally increases over the years for most states.
Mizoram shows the highest price jump and the highest overall prices in later years.
Gujarat has relatively stable prices compared to other states.
(iii) Uttar Pradesh has a large price increase compared to Gujarat.
(iv) Calculating the price increase for each state.
Andaman and Nicobar Islands = 20.99 – 16 = 4.99
Assam = 12.35 – 6 = 6.35
Gujarat = 19.2 – 16.5 = 2.7
Mizoram = 29.8 – 20 = 9.8
Uttar Pradesh = 24.81 – 16.15 = 8.66
West Bengal = 23.99 – 9.47 = 14.52
The price in West Bengal increases the most (₹ 14.42).
(v) We want to explore the reason behind the sharp price rise 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) In 1983, approx 85% majority in rural areas used kerosene, whereas 65% majority in urban areas used electricity. So the statement is valid.
(ii) Valid statement as the graph shows a decreasing trend of kerosene in both areas.
(iii) Invalid statement.
The graph shows that more than 80% urban majority use electricity as a primary lighting source.
(iv) The graphs do not give any information about the power cut. So the statement is invalid.

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 years in urban areas spend approximately 2 hours each day on hobbies

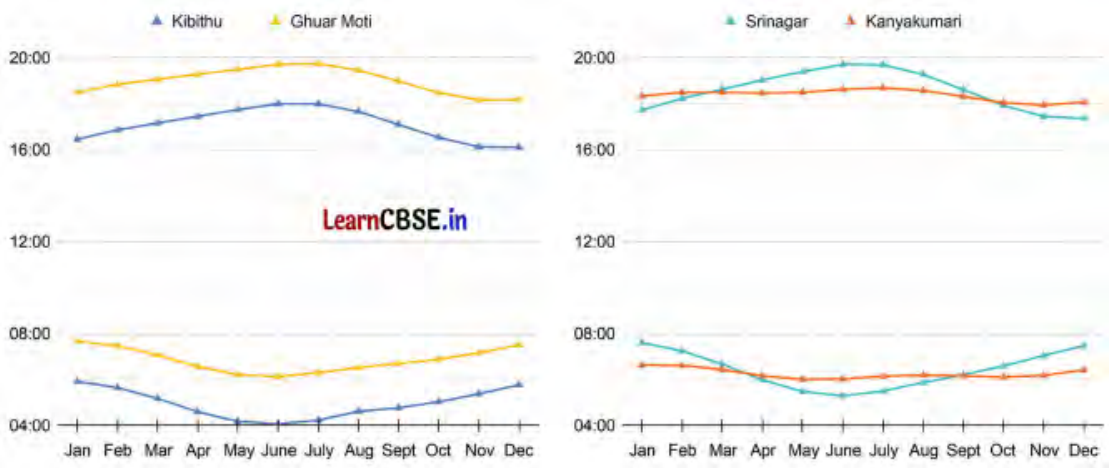
and games.
(ii) (d) 14 years
(iii) (a) and (b) both statements are correct.

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:
Collect and analyse your own data to answer the question.

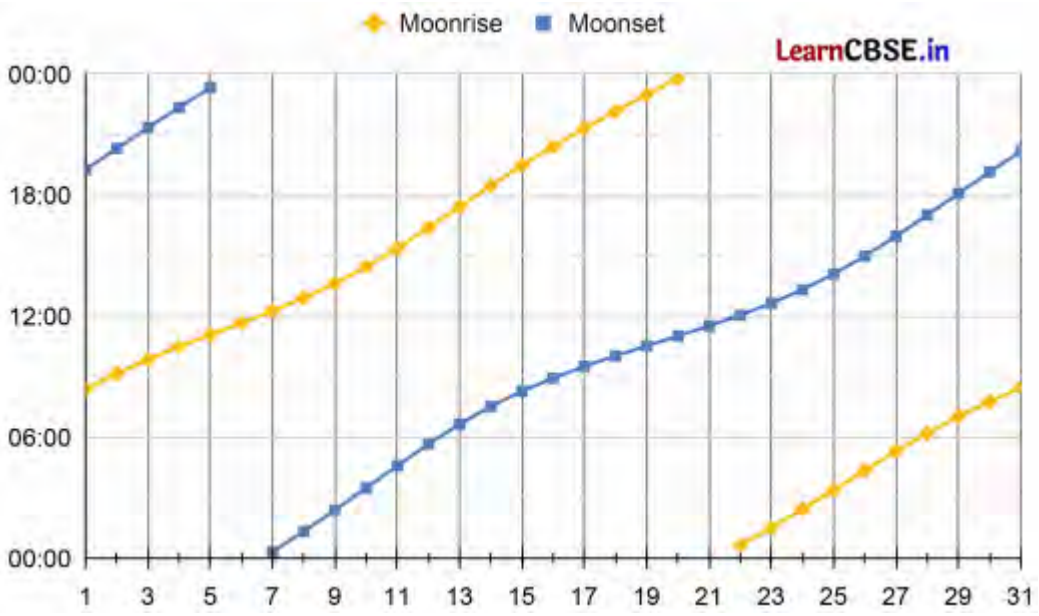
Question 13.
Small group project: Make a group of 3-4 members. Do at least one of the following:
(i) Track daily sleep time of all your family members for a week. Daily sleep time includes nighttime sleep, naps, and any sleep during the day.
(a) Represent this on strips.
(b) Put together the data of 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:
Collect and analyse your own data to answer the question.

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, we can identify the lines.
(i) In January, the sunrise was earliest in Kibithu. (approx 6:00)
The day length is (16:00-6:00) = 10 hours
(ii) The place with the longest day length over the year is Ghuar Moti.
(iii) Observations are
Longest day length – Ghuar Moti
Shortest day length – Kanyakumari
Earliest sunrise in Jan – Kibithu
Latest sunset in Jan – Ghuar Moti
I am curious to find out the seasonal variation of sunrise and sunset, or day length, for any particular location.

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 – Day 21
Purnima – Day 7-8
(ii) Observation: The difference between moonrise and moonset changes throughout the month.
Around the middle of the month, the gap between moonrise and moonset is the maximum.
I wonder
Why do the moonrise and moonset times change every day?
Why is the time gap between moonrise and moonset maximum on some days and minimum on others?