Connecting the Dots Class 7 Solutions Maths Ganita Prakash Part 2 Chapter 5

5.1 Of Questions and Statements, 5.2 Representative Values

Figure It Out (Page 101)

Question 1.
Shreyas is playing with a bat and a ball—but not cricket. He counts the number of times he can bounce the ball on the bat before it falls to the ground. The data for 8 attempts is 6, 2, 9, 5, 4, 6, 3, 5. Calculate the average number of bounces of the ball that Shreyas can make with his bat.

Solution:
Number of bounces of the ball in 8 attempts = 6, 2, 9, 5, 4, 6, 3, 5
Number of attempts = 8
Average number of bounces of the ball = 6+2+9+5+4+6+3+58
= 408 = 5 So, the average number of bounces of the ball is 5.

Question 2.
Try the activity above on your own. Collect data for 7 or more attempts and find the average.

Solution: Do yourself.

Question 3.
Identify a flowering plant in your neighbourhood. Track the number of flowers that bloom every day over a week during their flowering season. What is the average number of flowers that bloom per day?

Solution: Do yourself.

Question 4.
Two friends are training to run a 100 m race. Their running times over the past week are given in seconds — Nikhil: 17, 18, 17, 16, 19, 17, 18; Sunil: 20, 18, 18, 17, 16, 16, 17. Who, on average, ran quicker?

Solution:
Nikhil's running times over the past week in seconds: 17, 18, 17, 16, 19, 17, 18
Number of days in a week = 7 Average running time of Nikhil =
Total number of seconds Number of days
= 17+18+17+16+19+17+187
= 1227
= 17.43 seconds.
Sunil's running time over the past week in seconds: 20, 18, 18, 17, 16, 16, 17.
Average running time of Sunil = 20+18+18+17+16+16+177
= 1227 = 17.43 seconds Both Nikhil and Sunil have the same average running time.

Question 5.
The enrolment in a school during six consecutive years was as follows: 1555, 1670, 1750, 2013, 2040, 2126. Find the mean enrolment in the school during this period.

Solution:
The enrolment in a school during six consecutive years = 1555, 1670, 1750, 2013, 2040, 2126 Number of years = 6 Mean =
Sum of all the enrolments Number of years
= 1555+1670+1750+2013+2040+21266
= 111546 = 1859 So, the mean enrolment in the school was 1,859.

Figure It Out (Pages 112-113)

Question 1.
Find the median of onion prices in Yahapur and Wahapur.

Month	Yahapur
January	25
February	24
March	26
April	28
May	30
June	35
July	39
August	43
September	49
October	56
November	59
December	44

Month	Wahapur
January	19
February	17
March	23
April	30
May	38
June	35
July	42
August	39
September	53
October	60
November	52
December	42

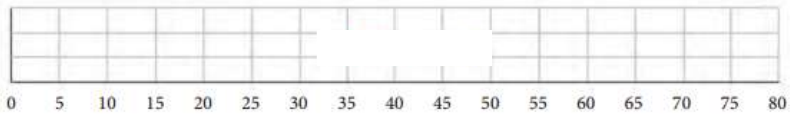
Solution:
Monthly onion prices in Yahapur in ascending order:
24, 25, 26, 28, 30, 35, 39, 43, 44, 49, 56, 59
Since there are 12 numbers (an even count), the median is the average of the 6th and 7th numbers.
6th number = 35
7th number = 39
Median = 35+392=742 = 37
Median of onion prices in Yahapur = ₹ 37/kg
Monthly onion prices in Wahapur in ascending order:
17, 19, 23, 30, 35, 38, 39, 42, 42, 52, 53, 60
Since there are 12 numbers (an even count), the median is the average of the 6th and 7th numbers.
6th number = 38
7th number = 39
Median = 38+392=772 = 38.5 Median of onion prices in Wahapur = ₹ 38.5/kg.

Question 2.
Sanskruti asked her class how many domestic animals and pets each had at home. Some of the students were absent. The data values are 0, 1, 0, 4, 8, 0, 0, 2, 1, 1, 5, 3, 4, 0, 0, —, 10, 25, 2, —, 2, 4. Find the mean and median. How would you describe this data?

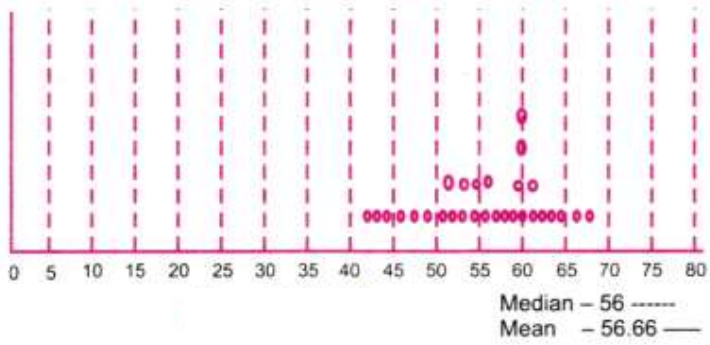
Solution:
Ignoring the missing values, the total data values are 20. Arranging daUj values in ascending order: 0, 0, 0, 0, 0, 0, 1, 1, 1, 2, 2, 2, 3, 4, 4, 4, 5, 8, 10, 25
Since there are 20 values (an even number), the median is the average of the

10th and 11th values. 10th value = 2 11th value = 2 Median = 2+22=42 = 2
Mean = Sum of the values Total number of values
= 7220 = 3.6 Mean = 3.6 The data shows the number of domestic animals/pets students have at home. Most students have 0 – 4 pets. There is a wide range, with an outlier of 25 at the higher end of the data.

Question 3.
Rintu takes care of a date-palm tree farm in Habra. The heights of the trees (in feet) in his farm are given as: 50, 45, 43, 52, 61, 63, 46, 55, 60, 55, 59, 56, 56, 49, 54, 65, 66, 51, 44, 58, 60, 54, 52, 57, 61, 62, 60, 60, 67. Fill the dot plot, and mark the mean and median. How would you describe the heights of these palm trees? Can you think of quicker ways to find the mean? How many trees are shorter than the average height?



Solution:
The dot plot of the height of trees.



For the median, arrange the heights in ascending order:
43, 44, 45, 46, 49, 50, 51, 52, 52, 54, 54, 55, 55, 56, 56, 57, 58, 59, 60, 60, 60, 60, 61, 61, 62, 63, 65, 66, 67
Total number of trees = 29
For odd number 29, the median is the middle value, which is the 15th term.
So, median = 56
Sum of heights = 43 + 44 + 45 + 46 + 49 + 50 + 51 + 52 + 52 + 54 + 54 + 55 + 55 + 56 + 56 + 57 + 58 + 59 + 60 + 60 + 60 + 60 + 61 + 61 + 62 + 63 + 65 + 66 + 67 = 1621
Mean = Sum of the heights Number of trees
= 162929 = 55.89 The height of the date palm trees ranges from 43 to 67 feet, with most trees clustered around 55-60 feet. The median height is 56 feet,

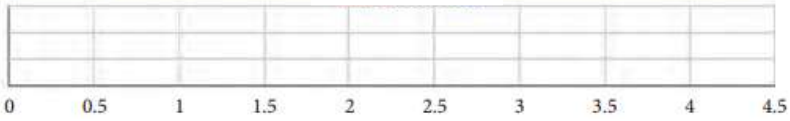
indicating that half of the trees are shorter than 56 feet and half are taller. The mean height is approximately 55.89 feet. 13 trees are shorter than the average height.

Question 4.
The daily water usage from a tap was measured. The usage in liters for the first few days is: 5.6, 8, 3.09, 12.9, 6.5, 12.1, 11.3, 20.5, 7.4. (a) Can the mean or median daily usage lie between 25 and 30? Justify your claim using the meaning of mean and median. (b) Can the mean or median be less than the minimum value or greater than the maximum value in a data set?

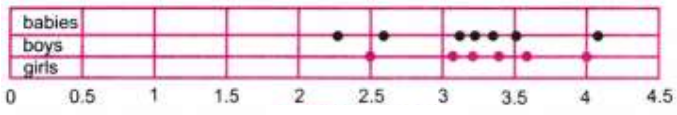
Solution:
(a) The mean or median cannot lie between 25 and 30. Because the mean is the average of all values, it is always between the minimum and maximum values, which are 3.09 litres and 20.5 litres, respectively. The median is the middle value, so it is also within the range of the data. (b) No, the mean and median cannot be less than the minimum value or greater than the maximum value in a data set.

Question 5.
The weights of a few newborn babies are given in kgs. Fill the dot plot provided below. Analyse and compare this data.

Boys	3.5	4.1	2.6	3.2	3.4	3.8
Girls	4.0	3.1	3.4	3.7	2.5	3.4

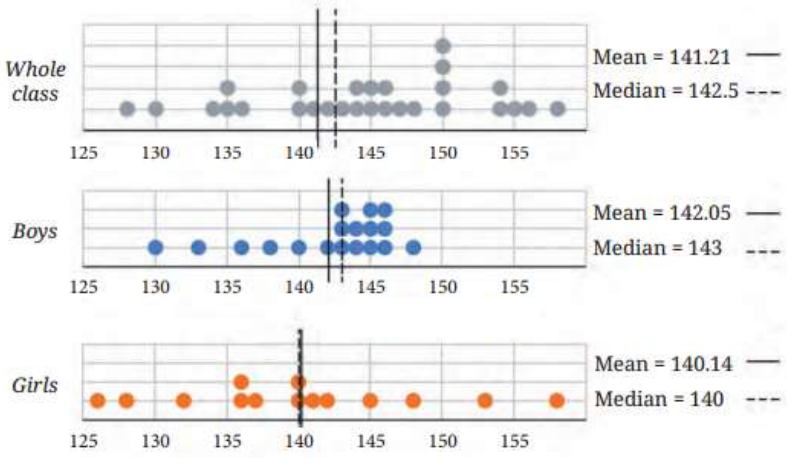


Solution:



The weight of boys is between 2.6 kg and 4.1 kg. The weight of girls lies between 2.5 kg and 4 kg. The heaviest baby is a boy, and the lightest is a girl.

Question 6.
The dot plots of the heights of another section of Grade 5 students of the same school are shown below. Can you share your observations? What can we infer from the dot plots and the central tendency measures?



Solution:

We infer from the dot plots and the central tendency measures. The girls' heights are more spread and are between 126 and 158. The boys' height lies between 130 and 148. Both the tallest and shortest in the class are girls. Yet, the girls' average height is less than the whole class average and also less than the boys' average height. We can say that boys are taller than girls in this class. For boys' heights mean < median (142.05 < 143) indicates a small influence of values on the lower side. For girls' heights mean > median (140.14 > 140), indicating a small influence of values on the higher side. On comparing the data of heights given here and in the previous example of the section of grade 5 section, we find that the boys and girls of this section are shorter in height.

Question 7.

The weights of some sumo wrestlers and ballet dancers are: Sumo wrestlers: 295.2 kg, 250.7 kg, 234.1 kg, 221.0 kg, 200.9 kg. Ballet dancers: 40.3 kg, 37.6 kg, 38.8 kg, 45.5 kg, 44.1 kg, 48.2 kg. Approximately how many times heavier is a sumo wrestler compared to a ballet dancer?

Solution:

Average weight of Sumo wrestlers

$$= \frac{\text{Sum of weights}}{\text{Number of Sumo Wrestlers}}$$

$$= \frac{(295.2 + 250.7 + 234.1 + 221 + 200.9)}{5} \text{ kg}$$

$$= \frac{1201.9}{5} \text{ kg} = 240.38 \text{ kg}$$

Average weight of Ballet Dancers

$$= \frac{\text{Sum of weights}}{\text{Number of Ballet Dancers}}$$

$$= \frac{(40.3 + 37.6 + 38.8 + 45.5 + 44.1 + 48.2)}{6} \text{ kg}$$

$$= \frac{254.5}{6} = 42.417 \text{ kg}$$

$$\text{Times heavier} = \frac{\text{Average weight of Sumo Wrestler}}{\text{Average weight of Ballet Dancer}}$$

$$= \frac{240.38 \text{ kg}}{42.417 \text{ kg}} = 5.6 \text{ times} \approx 6$$

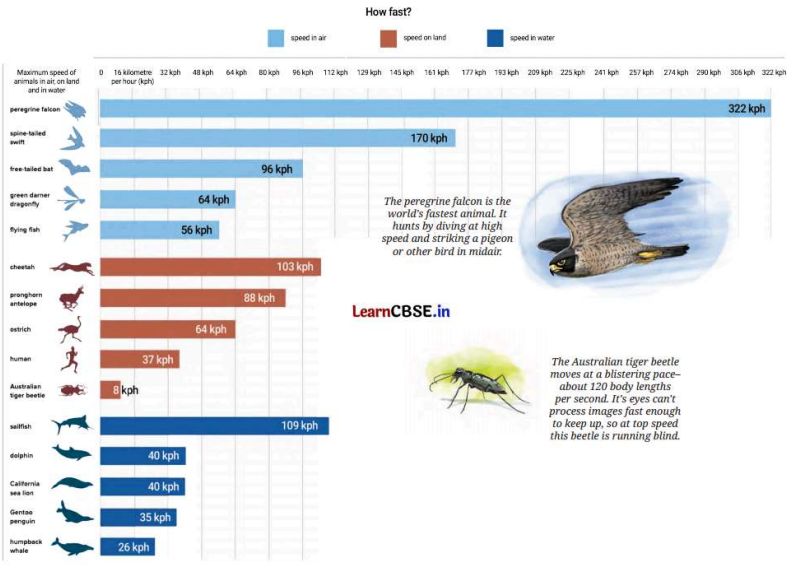
A sumo wrestler is approximately 6 times heavier compared to a Ballet Dancer.

5.3 Visualising Data

Figure It Out (Pages 122-125)

Question 1.

The following infographic shows the speeds of a few animals in the air, on land, and in the water. Can we call this graph a bar graph?



(a) What is the scale used in this graph? (b) What did you find interesting in this infographic? What do you want to explore further? (c) Identify a pair of creatures where one's speed is about twice that of the other. (d) Can we say that a sailfish is about 4 times faster than a humpback whale? Can we say that a sailfish is the fastest aquatic animal in the world?

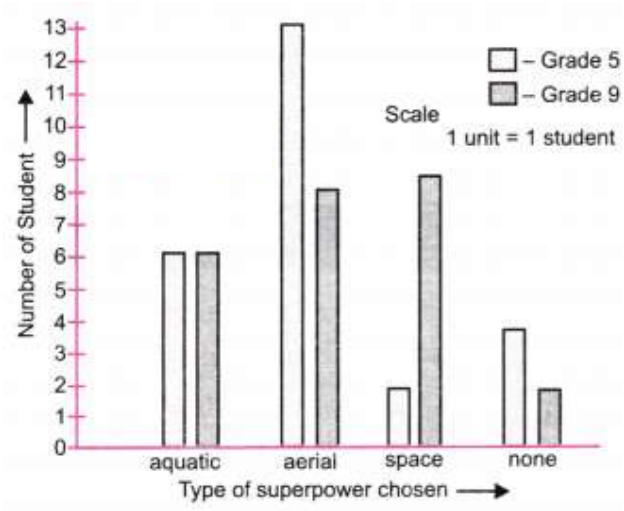
Solution:
(a) Scale: 1 unit length = 16 kilometres per hour. (b) Do yourself. (c) The speed of the green darner dragonfly (64 kph) is approximately twice that of the gentoo penguin (35 kph). (d) Yes, we can say that a sailfish is about 4 times faster than a humpback whale, as the speed of a sailfish is 109 kph, which is about 4 times the speed of a humpback whale (26 kph). ∴ 26 × 4 = 104 kph Yes, according to the given data, we can say that a sailfish is the fastest aquatic animal in the world.

Question 2.
Preyashi asked her students 'If you were to get a super power to become aquatic (water-borne), aerial (air-borne), or spaceborne, which one would you choose?'. The responses are shown below. Some chose none. Draw a double-bar graph comparing how both grades chose each option. Choose an appropriate scale.

Grade 5	w, a, a, a, w, n, s, a, n, w, a, a, a, a, a, w, w, s, a, a, n, w, a, a, n
Grade 9	n, w, s, a, s, w, s, s, a, a, w, s, s, a, s, a, n, w, s, s, a, w, a, w, a

Solution:

	w	*a*	*s*	*n*
Grade 5	6	13	2	4
Grade 9	6	8	9	2

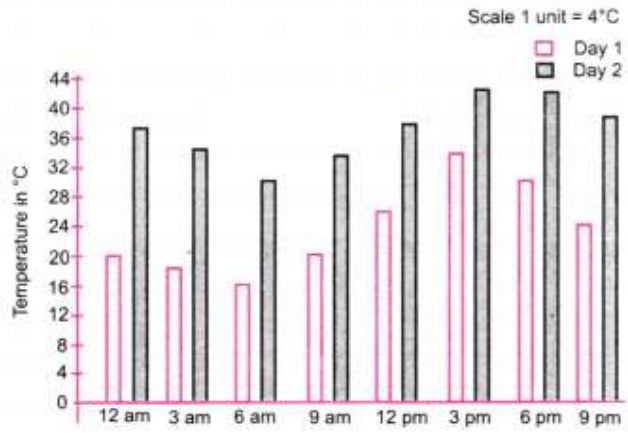


Question 3.

The temperature variation over two days in different months in Jodhpur, Rajasthan, is given below. Draw a double-bar graph. Use the scale 1 unit = 4°C. Can you guess which two months these days might belong to?

	12 am	3 am	6 am	9 am	12 pm	3 pm	6 pm	9 pm
Day 1	20°C	18°C	16°C	20°C	26°C	34°C	30°C	24°C
Day 2	37°C	34°C	30°C	33°C	37°C	43°C	42°C	39°C

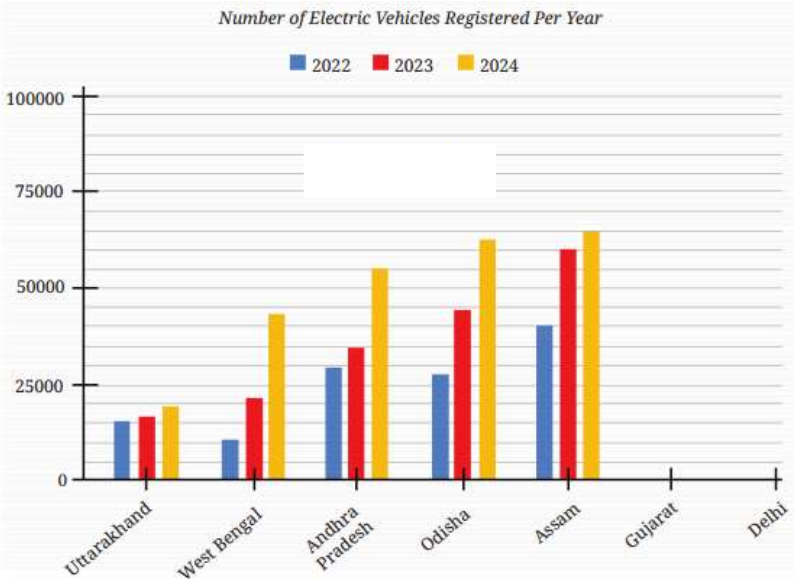
Solution:



These days might belong to December and May.

Question 4.

The following clustered-bar graph shows the number of electric vehicles registered in some states every year from 2022 to 2024.



(a) The data (rounded off to thousands) for the states of Gujarat and Delhi are given in the table below. Mark the corresponding bars on the bar graph. (It is enough if you place the top of the bars between the two appropriate vertical guidelines.)

	2022	2023	2024
Gujarat	69000	89000	78000
Delhi	62000	74000	81000

(b) Notice how the graph is organised, what scale is used, and what patterns the data shows.

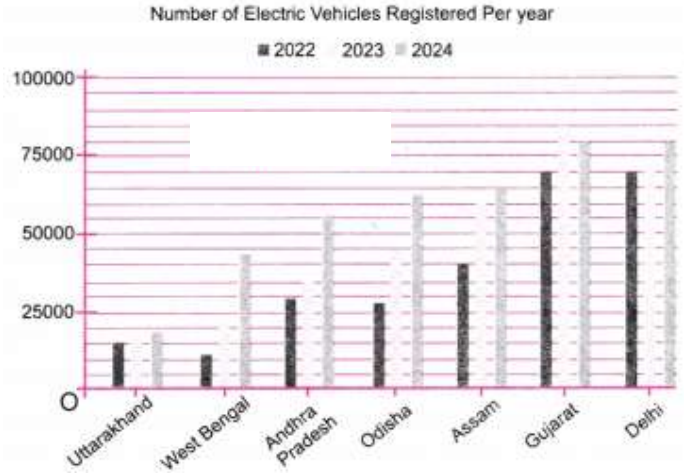
(c) How would you describe the change for various states between 2022 and 2024?

(d) Approximately how many more registrations did Assam get in 2023 compared to 2022?

(e) How many times more did the registrations in West Bengal increase from 2022 to 2024?

(f) Is this statement correct—'There were very few new registrations in Uttarakhand in 2023 and 2024, as the increase in the bar lengths is minimal'?

Solution:
(a)

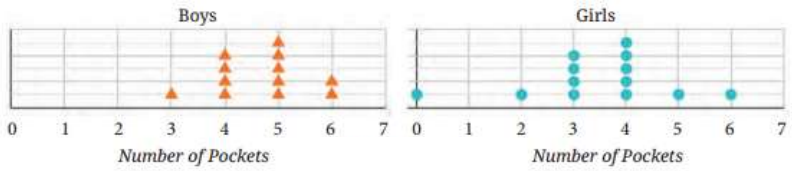


(b) Scale: 1 unit length = 25000 electric vehicles (c) (i) Most states show an increasing trend in electric vehicle registrations from 2022 and 2024. (ii) Delhi and Gujarat have the highest number of registrations among the states shown. Uttarakhand has the lowest number of registrations. (iii) On average, vehicle registrations seem to increase year by year across most states. (iv) Assam and Andhra Pradesh show significant growth in registrations. (d) Registrations in Assam In 2022 – 40,000 (approx) In 2023 – 60,000 (approx) More registration = 60000 – 40000 = 20000 Assam has approximately 20,000 more registrations in 2023 compared to 2022. (e) Registrations in West Bengal In 2022 – 11,000 (Approx) In 2024 – 44,000 (Approx) More times registration = 44000 + 11000 Increases = 4 times The registrations in West Bengal increased approximately four times from 2022 to 2024. (f) The statement is correct.

5.4 Data Detective

Figure It Out (Pages 129-134)

Question 1.
The dot plots below show the distribution of the number of pockets on clothing for a group of boys and for a group of girls.



Based on the dot plots, which of the following statements are true? (a) The data varies more for the boys than for the girls. (b) The median number of pockets for the boys is more than that for the girls. (c) The

mean number of pockets for the girls is more than that for the boys. (d) The maximum number of pockets for boys is greater than that for the girls.

Solution: (a) False (b) True (c) False (d) True

Question 2.
The following table shows the points scored by each player in four games:

Player	Game 1	Game 2	Game 3	Game 4
A	14	16	10	10
B	0	8	6	4
C	8	11	Did not play	13

Now answer the following questions:
(a) Find the average number of points scored per game by A.
(b) To find the mean number of points scored per game by C, would you divide the total points by 3 or by 4? Why? What about B?
(c) Who is the best performer?

Solution:
(a) Average number scored per game by A =
Sum of points Number of games played
= 14+16+10+104
= 504 = 12.5 (b) To find the mean number of points scored per game by C, we divide the total points by 3 because player 'C' did not play game 3 and played only 3 games. For player (B), we divide the total points by 4 because the player played all four games. (c) Player 'A' is the best performer.

Question 3.
The marks (out of 100) obtained by a group of students in a General Knowledge quiz are 85, 76, 90, 85, 39, 48, 56, 95, 81, and 75. Another group's scores in the same quiz are 68, 59, 73, 86, 47, 79, 90, 93, and 86. Compare and describe both groups' performance using mean and median.

Solution:
Group 1: Number of students in first group = 10 Sum of marks of first group = 85 + 76 + 90 + 85 + 39 + 48 + 56 + 95 + 81 + 75 = 730 Mean =
Sum of marks Number of students
= 73010

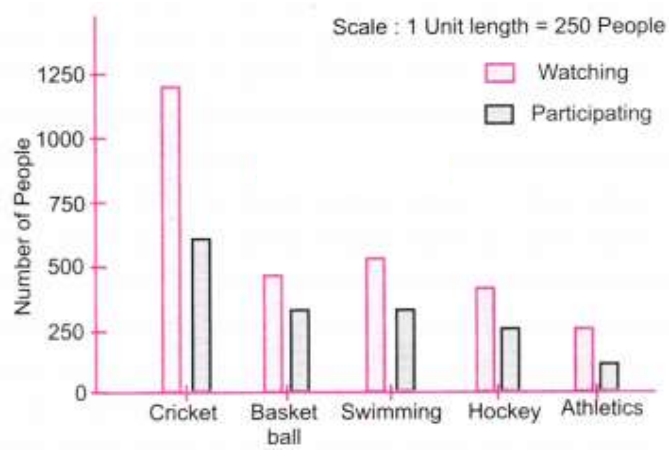
= 73
Arranging marks in ascending order:
39, 48, 56, 75, 76, 81, 85, 85, 90, 95
Since there are 10 scores (an even number), the median is the average of the 5th and 6th scores.
Median = 76+812=1572 = 78.5
Group 2: Number of students in the second group = 9
Sum of marks of second group = 68 + 59 + 73 + 86 + 47 + 79 + 90 + 93 + 86 = 681
Mean = 6819 = 75.67 Arranging the scores in ascending order: 47, 59, 68, 73, 79, 86, 86, 90, 93. Since there are 9 scores (an odd number). The median is the 5th score. Median = 79

Question 4.
Consider this data collected from a survey of a colony.

Favourite Sport	Cricket	Basket Ball	Swimming	Hockey	Athletics
Watching	1240	470	510	430	250
Participating	620	320	320	250	105

Choose an appropriate scale and draw a double bar graph. Write down your observations.

Solution:



Observations: Cricket is the most popular sport for both watching and participating. More people watch sports than participate in them across all categories. Athletics has the lowest numbers for both watching and participating. Basketball and swimming have similar participation numbers, but more people watch swimming than Basketball.

Question 5.
Consider a group of 17 students with the following heights (in cm): 106, 110, 123, 125, 117, 120, 112, 115, 110, 120, 115, 102, 115, 115, 109, 115, 101. The sports teacher wants to divide the class into two groups so that each group has an equal number of students: one group has students with heights less than a particular height, and the other group has students with heights greater than the particular height. Suggest a way to do this. Can you guess the age of these students based on the tabular data in the 'Telling Tall Tales' section?

Solution:
17 is an odd number that cannot be divided into two perfectly equal groups. Arranging the heights of students in increasing order. 101, 102, 106, 109, 110, 110, 112, 115, 115, 115, 115, 115, 117, 120, 120, 123, 125 Mean = (17+12)th term = 9th term = 115 cm According to the conditions given in question, the height used to divide the students into two groups is 112 < height < 115 If we take 114 cm as the required height, then Group 1 (Less than 114 cm) – 101, 102, 106, 109, 110, 112 Total = 7 Students Group 2 (More than 114 cm) – 115, 115, 115, 115, 115, 115, 117, 120, 120, 123, 125 Total = 10 students.

Question 6.
Describe the mean and median of the heights of your class. You can visualise the heights on a dot plot.

Solution: Do yourself.

Question 7.
There are two 7th-grade sections at a school. Each section has 15 boys and 15 girls. In one section, the mean height of students is 154.2 cm. From this information, what must be true about the mean height of students in the other section? (a) The mean height of students in the other section is 154.2 cm. (b) The mean height of students in the other section is less than 154.2 cm. (c) The mean height of students in the other section is more than 154.2 cm (d) The mean height of the students' section cannot be determined.

Solution:
(d) The mean height of the students' section cannot be determined.

Question 8.
Standing tall in the storm.

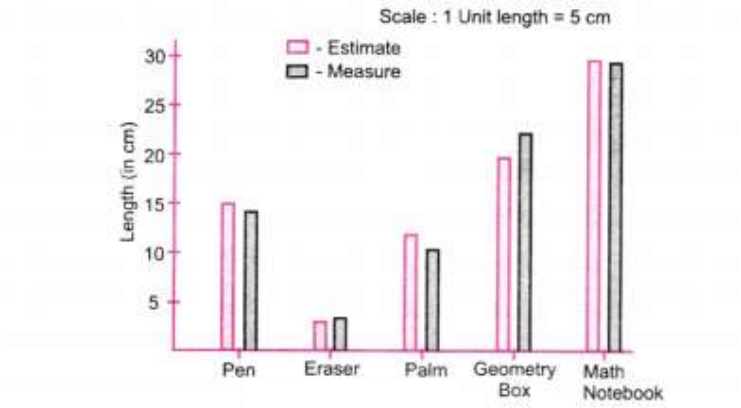
(a) Write estimated values for the number of skyscrapers in New York, Tokyo, and London. (b) Are the following statements valid? (i) Only 12 cities have more skyscrapers than Mumbai. (ii) Only 7 cities have fewer skyscrapers than Mumbai. (iii) The tallest building in the world is in Hong Kong.

Solution:
(a) Estimated values for the number of skyscrapers in New York – 38 Tokyo – 160 London – 305 (b) (i) Valid (ii) Valid (iii) Invalid

Question 9.
Estimate and then measure the objects listed in the following table. Draw a double bar graph based on the data. How accurate were your estimates? Find the average difference between the estimated and measured values.

Object	Estimate (in cm)	Measure (in cm)	Positive Difference
Length of a pen			
Length of an eraser			
Length of your plam			
Length of your geometry box			
Length of your math notebook			

Solution:

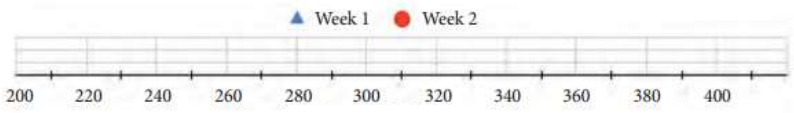


Object	Estimate in (cm)	Measure (in cm)	Positive Difference
Length of a pen	15	14.5	0.5
Length of an eraser	3	3.6	(–0.6)
Length of your palm	12	10.5	1.5
Length of your geometry box	20	22.4	(–2.4)
Length of your math notebook	30	29.5	0.5

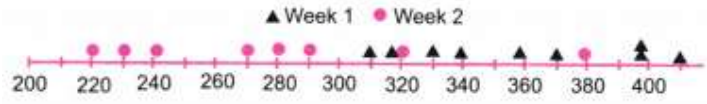
Sum of differences = 0.5 + (-0.6) + 1.5 + (-2.4) + 0.5 = -0.5
Average difference = −5.05 = -0.1 cm Estimated values are 0.1 cm less than actual values on average.

Question 10.
Aditi likes solving puzzles. She recently started attempting the 'Easy' level Sudoku puzzles. The time she took (in seconds) to solve these puzzles is — 410, 400, 370, 340, 360, 400, 320, 330, 310, 320, 290, 380, 280, 270, 230, 220, 240. The first nine values correspond to Week 1 and the rest to Week 2.

(a) Construct a dot plot below showing the data for both weeks.
(b) Describe the mean, median, and any observations you may have about the data.



Solution:



Mean = Sum of values/Total number of values

$$= \frac{\begin{array}{c}410 + 400 + 370 + 340 + 360 + 400 + \\ 320 + 330 + 310 + 320 + 290 + 380 + \\ 280 + 270 + 230 + 220 + 240\end{array}}{17}$$

$$= \frac{5470}{17} = 321.76 \approx 321 \text{ Sec.}$$

Arranging in ascending order: 220, 230, 240, 270, 280, 290, 310, 320, 320, 330, 340, 360, 370, 380, 400, 400, 410 With 17 values, the median is the 9th value. So median = 320 sec.

Question 11.
Individual Project: Pick at least one of the following: (a) How long is a sentence? Pick any two textbooks from different subjects. Choose any page with a lot of text from each book. (i) Use a dot plot to describe how many words the sentences have on each page. (ii) Compare the data of both pages using mean and median. (b) What is in a Name? Write down the names of all of your classmates. The following are some interesting things you can do with this data! (i) Find the mean and median name length (number of letters in a name). (ii) Visualise the data and describe its variability and central tendency. (iii) Which starting letters are more popular? Which are less popular? (iv) What is the median starting letter? What does this say about the number of names starting with the letters A-M and N-Z? (v) Plot a double-bar graph showing the number of boys' names and girls' names that:

- **Start and end with vowels,**
- **Start with vowels and end with consonants,**

- **Start with consonants and end with vowels,**
- **Start and end with consonants.**

Solution: Do yourself.

Question 12.
Individual Project (long term): This requires collecting data over 2 weeks or more. In and Out: Track how many times you step out of your house in a day. Do this for a month. (i) Describe the variability and central tendency of this data. Make a dot plot. (ii) Do you find anything interesting about this data? Share your observations. (iii) You can ask any of your family members or friends to do this as well.

Solution: Do yourself.

Question 13.
Small-group project: Pick at least one of the following. Make groups of 8 to 10. Collect data individually as needed. Put together everyone's data and do the appropriate analysis and visualisation. (a) Our heights vs. our family's heights: Collect the heights of your family members. (i) Make a dot plot showing the heights of just your family members. Describe its variability and central tendency. (ii) Make a double-bar graph showing each student's height next to their family's mean height. (iii) Look at everyone's data and share your observations. (b) Estimating time: Check the time and close your eyes. Open them when you think 1 minute has passed (no counting). Note down how many seconds you opened your eyes. Collect this data for yourself and for your family members. Repeat this activity to estimate 3 minutes. (i) Make two dot plots (for 1 minute and 3 minutes) showing estimates of just your family members. (ii) Mark these on the respective dot plots. Describe its variability and central tendency. (iii) Make a double bar graph showing each family's mean 1-minute estimate and mean 3-minute estimate. (iv) Look at everyone's data and share your observations.

Solution: Do yourself.