4 Data Handling

Why This Chapter Matters

Have you ever wondered how your favorite cricket team plans its strategy? Or how a supermarket knows exactly which ice cream flavors to stock more of in the summer? The secret is **data**! They collect information about player performance, weather conditions, and what people buy. This information, or data, is like a secret code. In this chapter, we will become data detectives, learning how to collect, organize, and read this code to uncover amazing stories hidden in numbers and facts all around us.

Meet EeeBee.AI

Hello, future data wizards! I'm EeeBee. My circuits are buzzing with information, and I love finding patterns and stories hidden in numbers. Data can seem like a jumble, but I'm here to help you sort it out. I'll pop up with helpful hints, fun facts, and tricky questions to make sure your data-detective skills are sharp.

Learning Outcomes

By the end of this chapter, you will be able to:

- **Collect** and **Organize** raw data into meaningful formats.
- **Construct** and use tally marks to create frequency distribution tables.
- **Interpret** data presented in pictographs and bar graphs.
- **Draw** your own pictographs and bar graphs to represent given information.
- **Analyze** data from tables and graphs to answer questions and draw simple conclusions.

From Last Year's Notebook

- You learned to be a great **Sorter and Counter,** organizing objects into groups to see how many there were.
- You became a **Picture Detective**, looking at simple charts and pictures to compare which group had more or less.
- Now in grade 6, we will learn more organized ways to handle larger amounts of information.
- You'll use **Tally Marks** (|||) – a super-fast method for counting as you collect data.
- You will create professional-looking **Bar Graphs** to compare data clearly and tell a powerful story with numbers.

Real Math, Real Life

- **Data Powers the World Around Us:** From doctors tracking our health to scientists studying climate change, professionals use data every single day. Even video game designers use player data to make games more fun and challenging!
- **A Key Skill for Almost Any Job:** Whether you dream of being an engineer, a journalist, a marketing expert, or a business owner, knowing how to understand and use data will be essential for success.
- **It Helps You Make Smarter Choices:** Learning about data isn't just for a future job. It helps you make better, evidence-based decisions in your own life, like choosing a product based on reviews or understanding school performance reports.

Quick Prep

1. Look around the classroom. How many fans are there? How many windows?
2. If five of your friends like cricket and three like football, how many friends did you ask in total?
3. Name three different colors of school bags you can see right now.
4. If you were to ask everyone in your class for their favorite fruit, what do you think the most popular answer would be?
5. How would you make a list to show the number of boys and girls on your school bus?

Introduction

Imagine your teacher asks, "What is our class's favorite sport?" and everyone shouts their answer at once. It would be chaos! To make sense of it, you need a system. This section is all about the first, most crucial steps of data handling: gathering information (collecting) and arranging it in a way that is neat and easy to understand (organizing). We'll learn how simple marks on a page can turn a jumble of answers into a clear picture of what the data is telling us.

Chapter Overview

Get ready to make sense of information all around you! This chapter will be your guide to understanding the world through data.

- **Collect & Organize Data:** You'll start by gathering raw information and learning how to organize it. We'll use super-fast tally marks and create frequency tables to turn messy numbers into clear facts.
- **Visualize Your Findings:** Next, you'll bring data to life! You will learn to create, read, and interpret pictographs and bar graphs, mastering their parts to tell a powerful visual story.
- **Analyze & Apply Your Skills:** Finally, you'll use your new knowledge to draw smart conclusions, solve real-world problems, and even get an introduction to calculating the average (mean) of a set of numbers.

From History's Pages

Over 350 years ago, in the 1660s, a man in London named **John Graunt** studied records of births and deaths. He organized this information into tables to understand population trends, like how many people died from certain diseases. He was one of the very first people to use statistics to understand the world around him, turning simple lists of numbers into powerful knowledge. His work laid the foundation for modern statistics and showed how organizing data can help us see patterns we would otherwise miss.

Collecting and Organizing Data

Data is simply a collection of facts or information, like numbers, words, or measurements. When we first collect it, it's often messy and unorganized, called **raw data**. Imagine a list of marks from a class test: 15, 23, 15, 18, 23, 25, 18, 15. It's hard to see any patterns. The magic of data handling begins when we organize this raw data. In this section, we'll learn to use **tally marks** to count our data and then arrange it neatly in a **frequency distribution table** to see how often each piece of information appears.

Sub-concepts to be covered

1. Steps of data handling
2. Collecting data
3. Organizing data
4. Tally Marks Legend
5. **Key terms:** Observation, Frequency, Frequency Distribution Table

Mathematical Explanation

The process of organizing data is a fundamental statistical method. Let's take a real-world example to understand the flow from raw data to a frequency distribution table.

Steps of data handling

1. **Collecting Data:** This is the first step where we gather information from different places, like surveys, websites, or sensors. The data can be numbers, text, or even pictures.
2. **Cleaning Data:** Sometimes data isn't perfect. There may be mistakes or missing pieces. Cleaning data means fixing those issues, like deleting duplicate information or filling in missing values.
3. **Organizing Data:** After cleaning, we organize the data in a way that makes sense and is easy to understand, like putting items in the right drawers.
4. **Transforming Data:** Sometimes, data needs to be changed to be more useful. For example, you might want to turn a list of dates into a more readable format, or combine different pieces of information.
5. **Storing Data:** Data needs to be stored safely so that it can be accessed later. This could be in a **computer file, a database, or the cloud.**
6. **Analyzing Data:** This is where we look at the data closely to find patterns or answers. You might use tools like Excel or special software to do this.
7. **Making Decisions:** Finally, after analyzing the data, we use it to make smart decisions or predictions. This could be a **business decision**, a **scientific discovery**, or even a **personal choice**.

   In short, data handling is about making sure the data you collect is clean, organized, and ready to help you solve problems or answer questions!

Collecting Data

Data collection is the first step in working with data. It's like gathering pieces of a puzzle that you will later put together. It's the process of gathering information from different places or sources. like: **Surveys, Interviews, Websites/Online, Existing Databases.**

1. **Data:** A collection of information in the form of numerical figures, words, or measurements. For example, the heights of students in a class (145 cm, 152 cm, 148 cm) is data.
2. **Raw Data:** Data that has been collected but not yet organized or processed. The initial list of student heights is raw data.

Organizing Data

Once you've collected the data, you need to organize it so it's easy to understand and use. This step is like sorting your puzzle pieces before you start putting them together. Like: **Categorizing, Creating Tables, Labeling, Sorting.**

Tally Marks

A simple way of keeping count in groups of five. We use **vertical lines** (|) for each of the first four counts. The fifth count is represented by a **diagonal line** across the previous four (𝍸). This makes counting the totals easier.

Key terms

1. **Observation:** Each individual numerical figure or piece of information in a set of data is called an **observation**. In the list {15, 23, 15, 18}, each number is an observation.
2. **Frequency:** The number of times a particular observation occurs in the data. In the list {15, 23, 15, 18, 15}, the frequency of the observation '15' is 3.
3. **Frequency Distribution Table:** A table that shows each observation and its corresponding frequency. It usually has three columns: one for the categories/observations, one for the tally marks, and one for the frequency (the final count).

Scenario: A survey was conducted in a class of 20 students to find their favorite ice cream flavor. The raw data collected is: Vanilla, Chocolate, Strawberry, Chocolate, Vanilla, Butterscotch, Chocolate, Vanilla, Strawberry, Chocolate, Vanilla, Chocolate, Butterscotch, Strawberry, Chocolate, Vanilla, Vanilla, Chocolate, Strawberry, Chocolate

- **Step 1:** Identify the Observations (Categories) First, we look through the raw data and list all the unique flavors. The observations are: Vanilla, Chocolate, Strawberry, Butterscotch.
- **Step 2:** Count the Frequency using Tally Marks Now, we go through the raw data one by one and make a tally mark next to the corresponding flavor.

Vanilla	𝍸 |	(6)
Chocolate	𝍸 |||	(8)
Strawberry	||||	(4)
Butterscotch	||	(2)

Why use the crossed-out fifth mark? It groups the counts into bundles of five, making it much faster to total them up. Instead of counting 1, 2, 3, ... 8, you can see one group of 5 and 3 more, which is 5 + 3 = 8.

- **Step 3: Create the Frequency Distribution Table** This is the final, organized representation. We **create** a table with three columns.
  - **Column 1:** Ice Cream Flavor (The Observation)
  - **Column 2:** Tally Marks (The Counting Process)
  - **Column 3:** Frequency (The Final Count)

Ice Cream Flavor	Tally Marks	Frequency (No. of Students)
Vanilla	𝍸 |	6
Chocolate	𝍸 |||	8
Strawberry	||||	4
Butterscotch	||	2
Total		**20**

By organizing the data this way, we can instantly see that Chocolate is the most popular flavor and Butterscotch is the least popular. The raw, jumbled list has been transformed into useful information.

Example of Collecting and Organizing Data

Let's say you're doing a survey to find out the favorite fruits of 10 people. Here's what the steps might look like:

- **Collecting:** You ask 10 people, "What's your favorite fruit?" and write down their answers.
- **Organizing:** Once you have the answers, you organize them in a table like this:

Person	1	2	3	4	5	6	7	8	2	10
Favorite Fruit	Apple	Banana	Apple	Orange	Banana	Orange	Apple	Mango	Mango	Orange

Now, you have all the information in a neat and easy-to-read table. You can easily see that "Apple" and "**Orange**" are the most popular fruits.

Example: The following table shows the number of books read by students in a class during the month of December. The data is represented using tally marks.

Student	A	B	C	D	E	F	G
Number of Books	𝍸 ||	𝍸 𝍸 |	𝍸 𝍸 𝍸	𝍸 𝍸	𝍸 𝍸 |||	𝍸 𝍸	𝍸 𝍸 𝍸

- A group of 5 tally marks represents 5 books.
- A single tally mark represents 1 book.

Questions:

1. Who read the most books?
2. How many books were read by all the students together?

Convert Tally Marks to Numbers

Let's first convert the tally marks into numbers for each student:

- Student A: 𝍸 || = 5 + 2 = 7 books
- Student B: 𝍸 𝍸 | = 5 + 5 + 1 = 11 books
- Student C: 𝍸 𝍸 𝍸 = 5 + 5 + 5 = 15 books
- Student D: 𝍸 𝍸 = 5 + 5 = 10 books
- Student E: 𝍸 𝍸 ||| = 5 + 5 + 3 = 13 books
- Student F: 𝍸 𝍸 = 5 + 5 = 10 books
- Student G: 𝍸 𝍸 𝍸 = 5 + 5 + 5 = 15 books

The table created in this manner is referred to as a frequency distribution table, and the count of tally marks in each row represents the frequency, which indicates the number of occurrences or students in that category. This organization of data makes it more structured, facilitating easier interpretation and analyses.

Example 1 : Here's a table showing the number of fruits sold by a fruit vendor over the course of a week.

Day	Apples	Bananas	Oranges	Mangoes
Monday	20	15	30	10
Tuesday	25	20	25	12
Wednesday	18	22	28	14
Thursday	30	18	35	15
Friday	28	19	40	20

Question: What is the total number of apples sold throughout the week?

Solution: To find the total number of apples sold, add the apples sold each day:

- Monday: 20
- Tuesday: 25
- Wednesday: 18
- Thursday: 30
- Friday: 28

Total apples sold = 20 + 25 + 18 + 30 + 28 = 121 apples

Question: On which day were the most bananas sold?

Solution: The number of bananas sold each day:

- Monday: 15
- Tuesday: 20
- Wednesday: 22
- Thursday: 18
- Friday: 19

The maximum number of bananas was sold on Wednesday (22 bananas).

Question: How many more oranges were sold on Friday than on Monday?

Solution:

- Oranges sold on Friday: 40
- Oranges sold on Monday: 30

The difference = 40 - 30 = 10 more oranges were sold on Friday than on Monday.

Question: What is the total number of fruits sold on Thursday?

Solution: To find the total fruits sold on Thursday, add the fruits sold:

- Apples: 30
- Bananas: 18
- Oranges: 35
- Mangoes: 15

Total fruits sold on Thursday = 30 + 18 + 35 + 15 = 98 fruits

Question: What is the average number of mangoes sold per day over the week?

Solution: To find the average number of mangoes sold, first find the total number of mangoes sold throughout the week:

- Monday: 10
- Tuesday: 12
- Wednesday: 14
- Thursday: 15
- Friday: 20

Total mangoes sold = 10 + 12 + 14 + 15 + 20 = 71 mangoes

Now, divide by the number of days (5):

Average mangoes sold per day = 71 ÷ 5 = 14.2 mangoes per day.

Example 2 : The ages of 25 teachers in a school are recorded as follows: 32, 45, 28, 35, 45, 32, 50, 35, 28, 45, 32, 35, 40, 50, 32, 45, 35, 28, 40, 32, 35, 45, 32, 28, 40. Create a frequency distribution table for this data.

Solution: **Step 1:** Identify the unique ages (observations): 28, 32, 35, 40, 45, 50.

Step 2: Create the table and fill it by making tally marks for each age.

Age of Teachers	Tally Marks	Frequency (No. of Teachers)
28	𝍸	4
32	𝍸 |	6
35	𝍸	5
40	𝍷	3
45	𝍸	5
50	||	2
Total		**25**

Example 3 : A student throws a die 30 times and records the outcome each time: 6, 1, 4, 3, 5, 2, 6, 4, 3, 1, 5, 5, 2, 6, 4, 3, 3, 1, 6, 5, 2, 4, 3, 5, 6, 1, 2, 4, 5, 6 Organize this data in a frequency distribution table. Which number appeared the most times? Which appeared the least?

Solution: The observations are the numbers on the die: 1, 2, 3, 4, 5, 6.

Die Outcome	Tally Marks	Frequency
1	𝍸	4
2	𝍸	4
3	𝍸	5
4	𝍸	5
5	𝍸 |	6
6	𝍸 |	6
Total		**30**

From the table, we can see that the numbers 5 and 6 appeared the most times (6 times each). The numbers 1 and 2 appeared the least times (4 times each).

Knowledge Checkpoint

- What is the difference between data and raw data?
- What is the frequency of the letter 'A' in the word 'MATHEMATICS'?
- A shopkeeper sold 7 chocolate bars, 5 candy bars, and 3 packets of chips. How would you start organizing this data?

Activity

The T-Shirt Color Survey

- **Objective:** To collect and organize data about the T-shirt colors worn by classmates.
- **Materials:** Pen, pencil, notebook.
- **Procedure:**
  1. Work in groups of 4-5.
  2. Look around the classroom and observe the color of the T-shirt (or shirt/kurta) each student is wearing.
  3. In your notebook, create a raw data list of all the colors you see (e.g., Red, Blue, White, Red, Green, Blue...).
  4. Identify the unique colors. These will be your categories.
  5. Create a frequency distribution table with three columns: "**Color**", "**Tally Marks**", and "**Frequency**".
  6. Go through your raw data list and put a tally mark for each color in the table.
  7. Count the tally marks to find the frequency for each color.
  8. Find the total number of students surveyed.
- **Discussion:**

  Which color is the most common (the mode)? Which is the least common? Why do you think certain colors are more popular?

Do It Yourself

Imagine you are organizing data for the heights of 1000 students in your school. The heights range from 120 cm to 165 cm. Would it be a good idea to make a frequency table with an entry for every single height (120, 121, 122...)? Why or why not? What could be a better way to organize this kind of data? (This hints at the idea of grouping data into intervals, a concept for higher grades).

Key Terms

- **Data:** A collection of information, usually in the form of numbers, words, or measurements.
- **Raw Data:** The initial, unorganized data as it was collected.
- **Observation:** Each individual item or entry in a dataset.
- **Frequency:** The number of times a specific observation appears in the data.
- **Tally Marks:** A system of using marks to count and keep track of data in groups of five.
- **Frequency Distribution Table:** A table that organizes data by listing each observation along with its frequency.

Facts Flash

- The word "**data**" is actually the plural form of the Latin word "**datum**," which means "**something given**." So, when we talk about data, we are talking about many pieces of given information!
- Tally marks are one of the oldest ways of counting, used even before numbers were invented! Ancient people would carve notches into bones or wood to keep track of animals or days.

Mental Mathematics

- **Quick Tally Counting:** Look at these tally marks and say the number as fast as you can:
  - 𝍸 ||| (Answer: _____)
  - 𝍸 𝍸 || (Answer: _____)
  - 𝍸 𝍸 𝍸 𝍸 (Answer: ____)
- **Frequency from a List:** Listen to this list of colors and mentally count the frequency of 'Blue': Red, Blue, Green, Blue, Red, Yellow, Blue, Blue.
- **Total Check:** If a table shows frequencies of 5, 8, and 4, what is the total number of observations?

Gap Analyzer™ Homework | Watch Remedial

Exercise 4.1

1. **The ice cream flavors preferred by 30 students were recorded as follows:**

   Vanilla, Chocolate, Strawberry, Vanilla, Mango, Chocolate, Strawberry, Vanilla, Chocolate, Mango, Vanilla, Chocolate, Mango, Strawberry, Vanilla, Chocolate, Mango, Vanilla, Mango, Chocolate, Vanilla, Strawberry, Chocolate, Mango, Vanilla, Chocolate, Mango, Vanilla, Chocolate, Vanilla

   Questions:

   a) Arrange the data in a table using tally marks.

   b) How many students prefer Mango?

2. The canteen manager, Mrs. Sharma, wants to know which snacks are most popular on a Monday. She makes a list of every snack sold during the lunch break.

   Raw Data: Samosa, Juice, Sandwich, Samosa, Chips, Juice, Samosa, Sandwich, Juice, Chips, Samosa, Juice, Samosa, Sandwich, Chips, Juice, Samosa, Samosa, Chips, Juice.

   a) Help Mrs. Sharma by creating a frequency distribution table for her snack sales. Use tally marks to count the items.

   b) Which snack was the most popular, and which was the least popular on Monday?

   c) How many snacks did Mrs. Sharma sell in total during the lunch break?

   d) Based on your table, if Mrs. Sharma can only prepare two snack items in large quantities for Tuesday, which two should she choose and why?

3. **The types of books read by 18 students are recorded as:**

   Fiction, Non-fiction, Science, Fiction, Fiction, Non-fiction, Science, Fiction, Science, Non-fiction, Fiction, Science, Non-fiction, Fiction, Non-fiction, Fiction, Science, Non-fiction

   Questions:

   a) Create a tally table for the data.

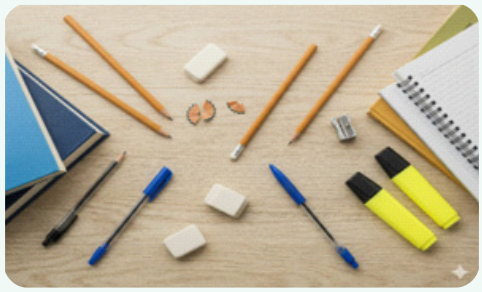
   b) How many students read Fiction books?

4. **The following data represents the number of goals scored by a group of 30 students in a football match:** 5, 3, 7, 2, 3, 6, 4, 7, 5, 6, 4, 7, 8, 6, 5, 4, 3, 5, 6, 2, 7, 8, 6, 3, 4, 5, 2, 6, 7, 4

   a) Prepare a frequency distribution table for the given data.

   b) What is the total number of goals scored by all students?

5. **A top-down view of a student's desk with various stationery items scattered on it.**



Answer the following questions based on the given image:

a) Observe the items on the desk and organize them into a frequency distribution table with tally marks.

b) How many writing tools (Pencils + Pens + Highlighters) are on the desk in total?

c) Which item appears the least number of times on the desk?

d) If you put the pencils and pens into a pencil case, what is the total number of items left on the desk?

6. **A colorful drawing of a fruit containing a mix of apples, bananas, oranges, and a bunch of lichis.**

Answer the following questions based on the given image:

a) Look at the images. Create a frequency distribution table for the types of fruit shown.

b) Which fruit is the most numerous in the figure?

c) What is the total number of individual fruits in the figure (count the lichis as one item)?

d) If you decide to share all the bananas equally among 3 friends, how many bananas will each friend get?

7. **The favorite sports of 22 students were recorded as:**

Football, Basketball, Cricket, Football, Tennis, Basketball, Cricket, Football, Tennis, Basketball, Cricket, Football, Tennis, Basketball, Cricket, Football, Basketball, Tennis, Football, Cricket, Tennis, Football

Questions:

a) Represent the data using tally marks in a table.

b) How many students prefer Football?

Representation of Data with Pictographs

A picture is worth a thousand words, and in mathematics, it can be worth a thousand numbers too! Once we have organized our data into a table, the next step is to show it to others. A long table of numbers can be boring, but a colorful picture can grab attention and make the information easy to understand instantly. In this section, we will learn how to use simple pictures or symbols to create pictographs, a fun and visual way to represent and compare data.

Interpreting and Drawing Pictographs

A pictograph (or picture graph) is a chart that uses pictures or symbols to represent data. It's a visual way to make comparisons between different categories. For a pictograph to make sense, it must have a **key** or **scale**, which tells us what each picture or symbol stands for. For example, a picture of a single book might represent 10 books read. Without the key, the graph is meaningless! We will learn both how to read information from a pictograph and how to create our own.

Sub-concepts to be covered

1. **Pictograph:** A graph that uses pictures or symbols to display data. The pictures are arranged in a single line or a stack to represent the frequency of that category.
2. **Symbol:** The picture used in the pictograph to represent a certain number of items. The choice of symbol should be related to the data (e.g., a tree symbol for data about trees).
3. **Key (or Scale):** The most important part of a pictograph. The key explains the value of one symbol.

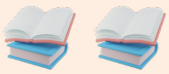
   For example, Key:  = 10 trees.
4. **Interpreting Pictographs:** Reading a pictograph involves using the key to find the value for each category, comparing values, and calculating totals.
5. **Drawing Pictographs:** Creating a pictograph involves choosing an appropriate symbol and scale, calculating how many symbols are needed for each category, and drawing them neatly with a title and key. This sometimes involves using parts of a symbol (e.g., half a symbol) to represent smaller numbers.

Mathematical Explanation

Pictograph

The following pictograph represents the number of books read by five students during a month. Each book is represented by the symbol  .

Books Read by Students

Student A:	
Student B:	
Student C:	
Student D:	
Student E:	

After observing the above picture, we can easily answer the following questions:

i. By which student, most number of books were read?

ii. By which student, least number of books were read?

iii. What is the total number of books read in that month?

Solution :

i. Number of books read by each student:

- Student A: 4 books
- Student B: 3 books
- Student C: 5 books
- Student D: 2 books
- Student E: 6 books

i. Student E read the most books (6 books).

iii. Total number of books read = 4 + 3 + 5 + 2 + 6 = 20 books.

Drawing the Pictograph

Let's understand the process of creating and interpreting a pictograph with an example.

Data: A survey was done to find the number of fruit saplings planted by different classes in a school.

- **Class 6A:** 40 saplings
- **Class 6B:** 50 saplings
- **Class 6C:** 35 saplings

Step 1: Choose a Title, Symbol, and Scale (Key).

- **Title:** Saplings Planted by Class 6
- **Symbol:** A simple tree is a good choice. Let's use  .
- **Scale/Key:** The numbers are 40, 50, and 35. They are all multiples of 5. A good scale would be 1  = 10 saplings. If we chose 1  = 1 sapling, we would have to draw 50 trees, which is too many! If we chose 1  = 20 saplings, it would be hard to show 35. So, 1  = 10 is a good balance.

Step 2: Calculate the number of symbols needed

- **Class 6A (40 saplings):** 40 ÷ 10 = 4 symbols. So,  .
- **Class 6B (50 saplings):** 50 ÷ 10 = 5 symbols. So,  .
- **Class 6C (35 saplings):** 35 ÷ 10 = 3.5. This means we need 3 full symbols and half a symbol. We need to show what half a symbol looks like in our key.

Step 3: Draw the Pictograph with the Key

Title: Saplings Planted by Class 6

Class	Number of Saplings Planted
6A	
6B	
6C	
Key:  = 10 saplings,  = 5 saplings	

Interpreting the Pictograph

Now, someone else can look at our pictograph and answer questions:

Question: How many saplings did Class 6C plant?

Answer: We see 3 full trees and one half tree. Using the key, that's (3 × 10) + 5 = 35 saplings.

Question: Which class planted the most saplings?

Answer: Class 6B, because it has the longest row of symbols (5 trees).

Question: What is the total number of saplings planted?

Answer: 40 (for 6A) + 50 (for 6B) + 35 (for 6C) = 125 saplings.

Example 4 : The pictograph below shows the number of students in a class who like different fruits.

Fruit	Number of Students
Apple	
Banana	
Grapes	
Orange	

Key: Each fruit symbol represents 4 students.

Questions

1. How many students like apples?
2. Which fruit is liked by the least number of students?
3. How many more students like grapes than bananas?
4. What is the total number of students surveyed?

Solutions:

1. **Apples:** 5 symbols × 4 students = 20 students
2. **Least liked:** Orange (2 symbols × 4 = 8 students)
3. **Grapes – Bananas:** (4 × 4) – (3 × 4) = 16 – 12 = 4 students
4. **Total:** (5 × 4) + (3 × 4) + (4 × 4) + (2 × 4) = 20 + 12 + 16 + 8 = 56 students

Example 5 : The following pictograph represents the number of students who participated in different sports in a school. Each symbol  represents 5 students.

Sports Participation:

Basketball	
Football	
Cricket	
Volleyball	
Tennis	

i. How many students participated in each sport?
ii. Which sport had the highest participation?
iii. What is the total number of students who participated in the sports?
iv. How many more students participated in Volleyball than Football?

Solution :

i. Number of students who participated in each sport:

Basketball: 30 students (6 )

Football: 15 students (3 🏅)

Cricket: 35 students (7 🏅)

Volleyball: 40 students (8 🏅)

Tennis: 10 students (2 🏅)

ii. The sport with the highest participation is Volleyball (40 students).

iii. **Total number of students who participated in the sports:**

30 (Basketball) + 15 (Football) + 35 (Cricket) + 40 (Volleyball) +10 (Tennis) = 130

Total students = 130.

iv. The number of students who participated in Volleyball is 40, and in Football is 15. The difference is:

40 – 15 = 25

25 more students participated in Volleyball than Football.

Knowledge Checkpoint

- What is the purpose of a key in a pictograph?
- If one cupcake symbol 🧁 represents 4 cupcakes, how many cupcakes do (🧁) represent?
- Can you use different symbols for different categories in the same pictograph? Why or why not?

Activity

Our Dream Vacation Pictograph

Objective: To create a pictograph based on a class survey.

Materials: Chart paper, colored pens or markers, ruler.

Procedure:

1. As a class, brainstorm 4-5 types of vacation spots (e.g., Mountains, Beach, City, Jungle Safari).
2. The teacher conducts a survey by asking each student to vote for their favorite vacation spot.
3. The results are tallied on the board in a frequency table.
4. In groups, students will now create a pictograph on chart paper.
5. Each group must decide on a title, a suitable symbol (e.g., a sun for beach, a mountain for mountains), and a key. The key should be appropriate for the class size (e.g., 1 symbol = 2 students).
6. Draw the pictograph neatly.
7. Present your pictograph to the class and explain why you chose your symbol and key.

Facts Flash

- The Isotype (International System of Typographic Picture Education) was a visual language of pictograms developed in the 1920s by Otto Neurath to make complex social and economic data understandable to ordinary people. This was a major step in the history of modern infographics!
- Your phone's battery indicator is a type of pictograph! The bars or the filled-in portion of the battery symbol visually represent the amount of charge left.

Do It Yourself

When would a pictograph be a bad choice for representing data? Think about a situation where you have very large and very precise numbers, like the exact population of major cities (e.g., Mumbai: 12,442,373; Delhi: 11,034,555). Why would a bar graph be better in this case?

Key Terms

- **Pictograph:** A chart that uses pictures or symbols to represent data quantities.
- **Symbol:** The specific image used in a pictograph to represent a set number of items.
- **Key/Scale:** An explanation, usually in a box, that defines the numerical value of one symbol.

Mental Mathematics

- **Quick Calculations:** A pictograph key says 1 star = 10 points.
  - How many points for 7 stars?
  - How many points for 3.5 stars?
  - How many stars for 90 points?
- **Fast Comparison:** In a pictograph of animal counts, Monkeys have 8 symbols and Lions have 4 symbols. How many times more Monkeys are there than Lions?
- **Totaling:** A pictograph shows: Apples (3 symbols), Bananas (5 symbols), Oranges (2 symbols). If 1 symbol = 5 fruits, what is the total number of fruits?

Exercise 4.2

Gap Analyzer™ Homework | Watch Remedial

1. Pictograph: Favorite Subjects of Students in a School

Subject	Pictograph
Mathematics	7
Science	9
English	8
History	6
Geography	10

Key: = 5 Students

i. How many students prefer Mathematics?

ii. How many more students prefer Science than English?

iii. What is the total number of students who prefer History and Geography combined?

2. **The pictograph below shows the number of sports equipment sold in a month. Each picture represents 10 items sold.**

Sport	Equipment Sold
Football	
Basketball	
Tennis	
Cricket	
Badminton	

i. How many footballs were sold?

ii. How many more basketballs were sold than tennis rackets?

iii. Which sport had the highest sales, and how many items were sold?

iv. What is the total number of cricket and badminton equipment sold combined?

3. **A group of students visited a local petting zoo and counted the number of animals in some of the enclosures. They created a pictograph to show their findings.**

Animal	Count
Goats	
Sheeps	
Rabbits	
Chickens	
Cows	
Key: 1 image = 4 animals	

Answer the following questions based on the data:

i. How many rabbits were there in the enclosure?

ii. Which animal had the lowest count?

iii. Were there more goats or chickens? By how many?

iv. What is the total number of animals the students counted?

v. Which animal group has the least number, and how many fewer are they compared to Cows?

Representation of Data with Bar Graphs

While pictographs are fun, they can be tricky to draw, especially when you need to show parts of a symbol. What if we need a more accurate and easier-to-draw way to compare information? Enter the bar graph! A bar graph uses solid bars of different heights or lengths to show the value of data. It's like a skyline of information, where you can see the tall skyscrapers and the shorter buildings, allowing for quick and clear comparisons. This is one of the most powerful tools in your data detective kit!

Interpreting and Constructing Bar Graphs

A **bar graph** (or bar chart) is a diagram that represents data using rectangular bars of equal width. The length or height of the bars is proportional to the values they represent. Bar graphs are excellent for comparing data across different categories. They have two main lines, called **axes**. The **horizontal axis** (**X-axis**) shows the categories, and the **vertical axis** (**Y-axis**) shows the numerical values. A clear **scale** on the Y-axis helps us read the value of each bar accurately. We will learn to read, interpret, and construct our own bar graphs.

Sub-concepts to be covered

1. Bar Graph
2. Properties of Bar Graphs
3. Construction of a Bar Graph
4. Aesthetic and Artistic Considerations
5. Interpretation of a Bar Graph: The skill of reading a bar graph to answer questions, such as finding the value of a specific category, identifying the highest and lowest values, and comparing different categories.

Mathematical Explanation

Bar Graphs

A bar graph is a visual representation of data using rectangular bars. Each bar represents a category or a specific value, and the length or height of the bar corresponds to the value it represents. The bars can be arranged vertically or horizontally, and the data is usually represented on two axes:

1. **The X-axis** (horizontal axis) shows the different categories or items.
2. **The Y-axis** (vertical axis) shows the values or quantities related to each category.

Example: Imagine you're studying the number of books read by students in a class. Here's how a bar graph would work:

X-axis: Names of students (e.g., Alice, Bob, Charlie, etc.)

Y-axis: Number of books read (e.g., 1 to 10 books)

Each student's name would have a bar above it, and the height of the bar would represent the number of books they read. This makes it easy to compare the number of books read by each student at a glance.

Bar graphs help in comparing data across different categories and are commonly used in both educational and professional settings.

Properties of Bar Graphs

Bar graphs have several important properties that make them useful for representing data. These properties help in interpreting the data clearly and effectively. Here are the key properties of bar graphs:

1. Bars

- Bars in a bar graph are rectangular in shape and represent data.
- The length or height of each bar represents the quantity or value of the category it is associated with.

2. **Axes**

- A bar graph has two axes: the X-axis (horizontal) and the Y-axis (vertical).
- The X-axis usually represents categories or items (e.g., months, students, products).
- The Y-axis represents the numerical values or quantities corresponding to each category.

3. **Scale:** The Y-axis has a scale, which helps to measure the data accurately. The scale should be consistent and well-labeled so that the height or length of the bars can be easily interpreted.

4. **Spacing Between Bars**

- Bars are usually spaced evenly apart to make the graph neat and easy to read.
- In some cases, bars may touch each other, depending on the type of bar graph (e.g., histograms).

5. **Labels**

- Both axes should have clear labels to show what they represent (e.g., names, time periods, quantities).
- Each bar should also have a label or value at the top to indicate its exact value.

6. **Orientation:** Bar graphs can be either vertical or horizontal. In vertical bar graphs, the bars extend upwards from the X-axis, while in horizontal bar graphs, the bars extend from the Y-axis to the right.

7. **Title:** Every bar graph should have a title to describe the data being represented. It should be clear and specific so that the viewer understands the context.

8. **Comparing Data:** One of the key properties of a bar graph is that it allows for easy comparison of data between different categories or groups. By observing the height or length of the bars, it is easy to see which category has more or less of the represented quantity.

Construction of Bar Graphs

Constructing a bar graph involves several steps to visually represent data. Below is a step-by-step guide on how to construct a bar graph:

Steps for Constructing a Bar Graph:

1. **Collect the Data:** Before constructing the bar graph, you need to have data that you want to represent. The data is typically in the form of categories and corresponding numerical values.

Example: Let's say we have the following data showing the number of books read by five students in a month.

Student	Aarav	Priya	Sameer	Ananya	Rohan
Books Read	10	7	12	5	8

2. **Draw Two Axes**

- **X-axis (Horizontal axis):** This axis will represent the categories. In this case, it will be the names of the students.
- **Y-axis (Vertical axis):** This axis will represent the values. In this case, it will represent the number of books read.
- Make sure the axes are drawn at right angles to each other.

3. **Label the Axes**

- **X-axis:** Label it with the categories you want to display (e.g., Aarav, Priya, Sameer, Ananya, Rohan).
- **Y-axis:** Label it with the range of values (e.g., 0, 5, 10, 15, 20 for the number of books). Be sure the values on the Y-axis are equally spaced.

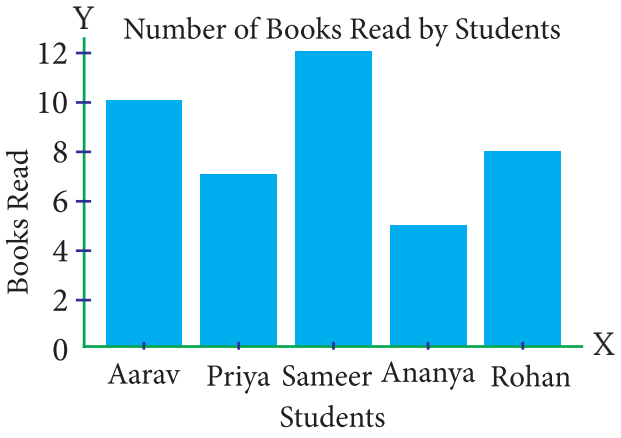
4. **Scale the Y-axis:** The Y-axis should have an appropriate scale that allows for easy comparison of values. Make sure the scale is consistent (e.g., intervals of 1, 5, or 10). In our example, we can use intervals of 5.

5. **Draw the Bars:** For each category on the X-axis (e.g., each student), draw a vertical or horizontal bar. The height or length of the bar should correspond to the value on the Y-axis.

For example:

- For Aarav, the bar will reach up to 10 on the Y-axis.
- For Priya, the bar will reach up to 7 on the Y-axis.
- Continue this for all students.

The bars should be equally spaced apart and of the same width for consistency.



6. **Label the Bars (Optional):** You can add the value of each bar on top of the bar to make it easier to understand the exact number represented by each bar.

7. **Title the Graph:** Give the bar graph a meaningful title that describes what the graph is about. For example, "Number of Books Read by Students."

Example: The marks obtained by Ravi in his annual examination are shown below:

Subjects	Hindi	English	Mathematics	Science	Social Studies
Marks obtained	60	80	90	70	55

Draw a bar graph to represent the above data.

Solution: We can draw the bar graph by following steps:

(i) On a graph paper, draw a horizontal line OX and vertical line OY.

(ii) Along horizontal line, write the names of the subjects at points taken at uniform gaps.

(iii) Choose the scale 1 unit length = 10 marks.

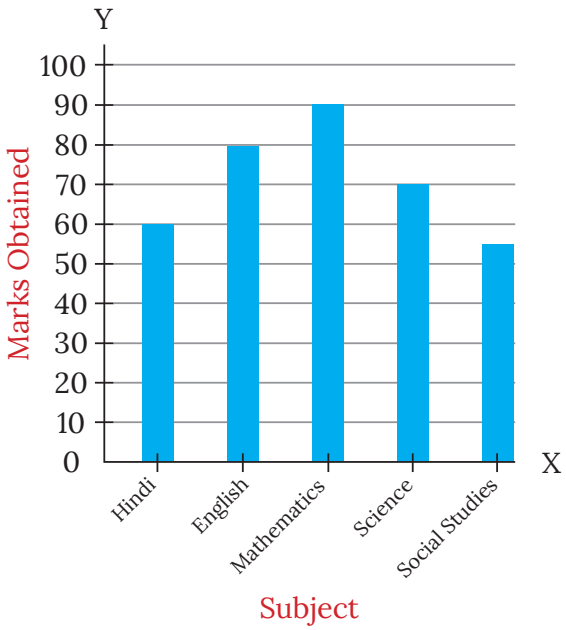
(iv) On the horizontal line, draw bars of equal width and of heights obtained in step (iv) at the points marked in step (ii).

(v) Then, the heights of the various bars are:

Hindi = 60; Mathematics = 90;

English = 80, Science = 70;

Social Studies = 55.



Aesthetic and Artistic Considerations

Mathematics is not only about solving problems; it is also about beauty, balance, and creativity. When we present ideas through neat graphs, colourful charts, or symmetrical designs, concepts become more interesting and easier to understand.

This artistic side of maths appears in patterns, shapes, and harmony found in nature, art, and daily life. Adding colour, design, and clarity makes learning joyful and helps us appreciate the hidden elegance of mathematics beyond numbers and formulas.

Infographics

Infographics in mathematics are a fun and engaging way to represent math concepts **visually**. They use pictures, charts, graphs, and other visual elements to help students understand and remember mathematical ideas more easily. Infographics can help students better grasp important concepts like numbers, shapes, measurements, data, and more.

Why Use Infographics in Mathematics?

1. **Visual Learning:** Many students find it easier to understand math when it's shown **visually**. Infographics turn abstract ideas into concrete, easy-to-see examples.
2. **Engagement:** Infographics are colorful, fun, and visually appealing, which makes learning math more exciting.
3. **Memory:** Visual representations help students remember concepts better because they are easier to recall than just numbers or text.
4. **Simplification:** Infographics break down complex math ideas into simpler, digestible parts, making math less intimidating for students.

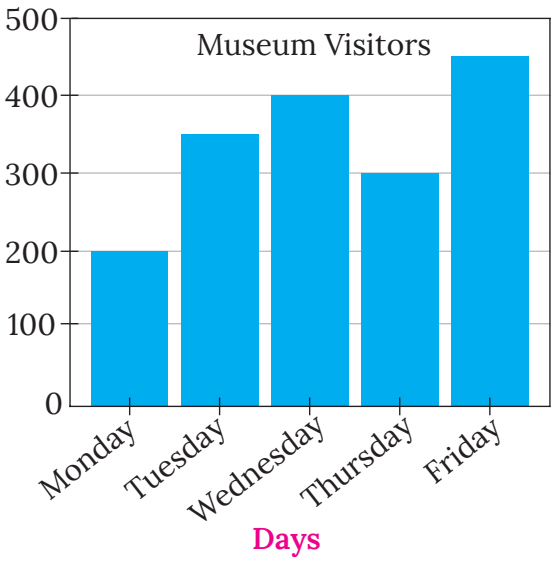
Example: The bar graph shows the number of visitors to a museum over 5 days. Study the graph and answer the questions.

i. On which day did the maximum number of visitors come?

ii. How many visitors came on Tuesday?

iii. How many fewer visitors came on Monday compared to Friday?

iv. What is the total number of visitors over the 5 days?



Solution:

i. The tallest bar is for Friday. So, the maximum number of visitors came on Friday.

ii. The bar for Tuesday reaches halfway between 300 and 400. So, 350 visitors came on Tuesday.

iii. Visitors on Friday = 450. Visitors on Monday = 200. The difference is 450 - 200 = 250 fewer visitors.

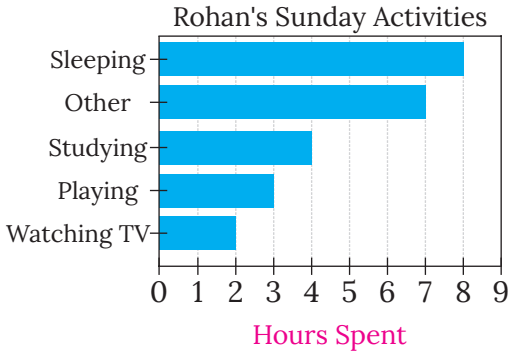
iv. Total visitors = 200 (Mon) + 350 (Tue) + 400 (Wed) + 300 (Thu) + 450 (Fri) = 1700 visitors.

Example 6 : The number of hours a student, Rohan, spent on different activities on a Sunday is given below. Construct a horizontal bar graph for this data.

- Studying: 4 hours
- Playing: 3 hours
- Watching TV: 2 hours
- Sleeping: 8 hours
- Other: 7 hours

Solution: For a horizontal bar graph, the categories are on the Y-axis and the values are on the X-axis.

1. **Axes:** Y-axis is "Activity", X-axis is "Hours Spent".
2. **Scale:** The highest value is 8. We can use a scale of 1 unit = 1 hour on the X-axis. Mark it 0, 1, 2, ... 9.
3. **Categories:** Mark Studying, Playing, TV, Sleeping, Other on the Y-axis.
4. **Draw Bars:** Draw horizontal bars from the Y-axis to the correct length on the X-axis.
5. **Title:** "Rohan's Sunday Activities".



Example 7 : The bar graph below shows the number of books read by five students in a class.

Student	Aarav	Priya	Sameer	Ananya	Rohan
Books Read	10	7	12	5	8

Question: How many books did Sameer read?

Solution: Sameer read 12 books.

Question: Which student read the fewest books, and how many did they read?

Solution: Ananya read the fewest books, 5 books.

Question: What is the total number of books read by all five students?

Solution: Total books = 10 + 7 + 12 + 5 + 8 = 42 books.

Example: In a survey of 50 people, the amount of time spent on various activities per day (in hours) was recorded. The data is represented by the following bar graph:

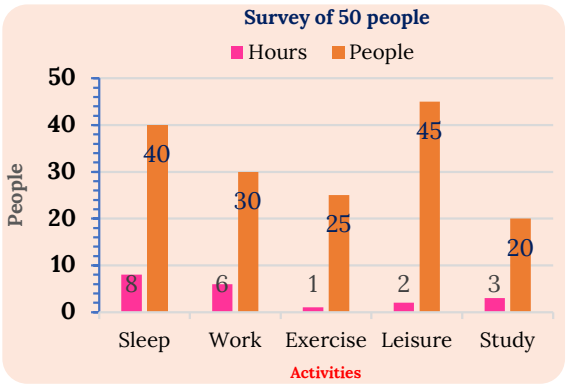
Sleep: 8 hours (40 people)

Work: 6 hours (30 people)

Exercise: 1 hour (25 people)

Leisure: 2 hours (45 people)

Study: 3 hours (20 people)



Questions:

1. What information does the bar graph provide?
2. How many people spend 3 hours on studying?
3. Which activity is done the most, and how many people do it?
4. Which activity requires the least amount of time, and how much time is spent on it?

Answer:

1. The bar graph shows the number of people in a survey of 50 individuals and the average number of hours they spend on various daily activities.
2. According to the bar graph, 20 people spend 3 hours on studying.
3. The most common activity is Leisure, done by 45 people.
4. The activity that requires the least amount of time is Exercise, with 1 hour spent by 25 people.

Knowledge Checkpoint

- What are the three most important things to include when drawing a bar graph?
- In a bar graph, if the bar for Team A is taller than the bar for Team B, what does that mean?
- The scale on a graph is 1 unit = 5 students. A bar is 4 units high. How many students does it represent?

Do It Yourself

- The marks obtained by four friends in Mathematics are:
- Aarav – 25, Neha – 30, Kabir – 20, and Zoya – 35.
- Draw a bar graph to represent this data.
- Which friend scored the highest marks?

Activity

The Birthday Bar Graph

- **Objective:** To collect class data and construct a large, collaborative bar graph.
- **Materials:** Large chart paper or whiteboard, markers, ruler.
- **Procedure:**
  1. The teacher will draw the X and Y axes for a large bar graph on the chart paper/board.
  2. The X-axis will be labeled "Month of Birth" and the 12 months will be marked on it.
  3. The Y-axis will be labeled "Number of Students". A suitable scale will be chosen (e.g., 1 unit = 1 student).
  4. The teacher will call out each month, starting from January.
  5. Students whose birthday falls in that month will raise their hands.
  6. A student volunteer will count the hands and draw the bar for that month up to the correct height on the graph.
  7. Repeat for all 12 months.
- **Discussion:** Which month has the most birthdays? Are there any months with no birthdays? How does the graph make it easy to see this information?

Facts Flash

- A bar graph can also be a double bar graph, which uses two bars side-by-side for each category to compare two sets of data at once. For example, you could compare the marks of Test 1 and Test 2 for each subject.
- While William Playfair invented the bar graph, he didn't call it that! He called it a "chart of imports and exports." The name "bar graph" became common much later.

Key Terms

- **Bar Graph:** A graph that uses rectangular bars to compare data across categories.
- **Axes:** The horizontal (X-axis) and vertical (Y-axis) lines that form the framework of the graph.
- **Scale:** The intervals used on an axis to measure the values. It must be consistent.
- **Title:** The heading that explains the subject of the bar graph.
- **Labels:** The names for the axes and the categories being measured.

Mental Mathematics

- **Reading the Graph:** A bar graph shows scores: Ram (bar at 50), Sita (bar at 80), Gita (bar at 60).
  - Who scored the highest?
  - What is the difference between Sita's and Gita's scores?
- **Scale Calculation:** The scale is 1 unit = 25 items.
  - How many items for a bar of 4 units?
  - How many units for a bar representing 75 items?
- **Quick Comparison:** A graph shows daily temperatures: Mon (25°C), Tue (30°C), Wed (28°C). Which day was the hottest?

Exercise 4.3

Gap Analyzer™ Homework | Watch Remedial

1. Anya tracked the number of pages she read each day for 5 days. Her data is in the table below.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Pages Read	20	15	25	10	30

Draw a bar graph to represent the above data.

a) You need to draw a vertical bar graph. What will you label the X-axis and Y-axis? What is a suitable scale for the Y-axis (e.g., 1 unit = 5 pages)?

b) On a sheet of graph paper, draw the complete bar graph. Make sure it has a title, labeled axes, and accurately drawn bars of equal width.

c) Looking at the bar graph you just created, on which day did Anya read the most pages? On which two days combined did she read the same number of pages as she did on Friday?

d) Anya's goal was to read a total of 100 pages in these 5 days. Did she meet her goal? By how many pages did she exceed or fall short of her goal?

2. **The following bar graph shows the amount of money four friends saved from their pocket money in the month of July.**

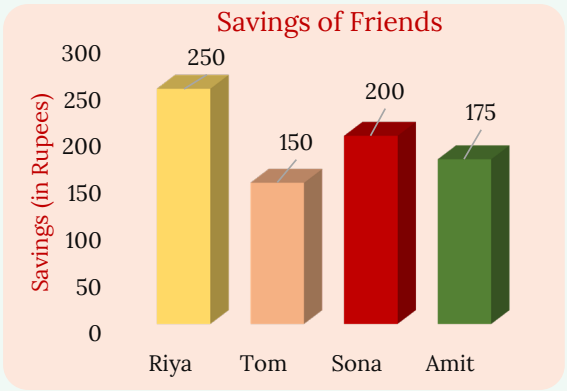
Answer the following questions based on the bar graph:

a) How much money did Sona save? How much money did Amit save?

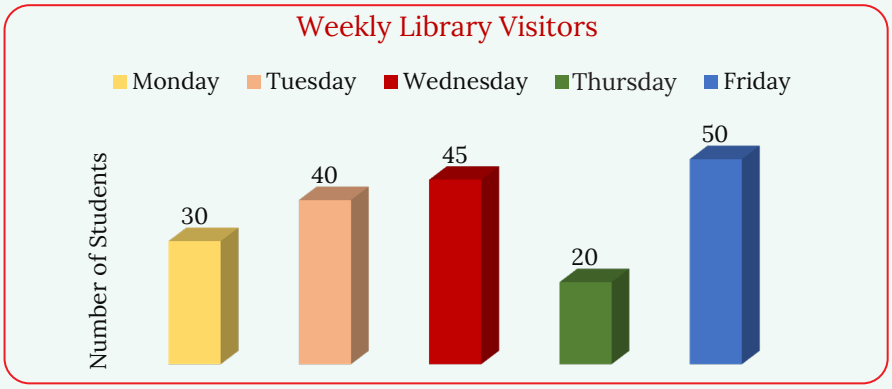
b) Who saved the most money? How much more did this person save than Tom?

c) What is the total amount of money saved by all four friends combined?

d) Riya wants to buy a new graphics tablet that costs ₹800. Based on her savings this month, how many more months will it take her to save enough money if she saves the same amount each month?



3. The following bar graph shows the School Library's Weekly Visitors.



Answer the following questions based on the bar graph:

a) How many students visited the library on Monday? How many students visited on Wednesday?

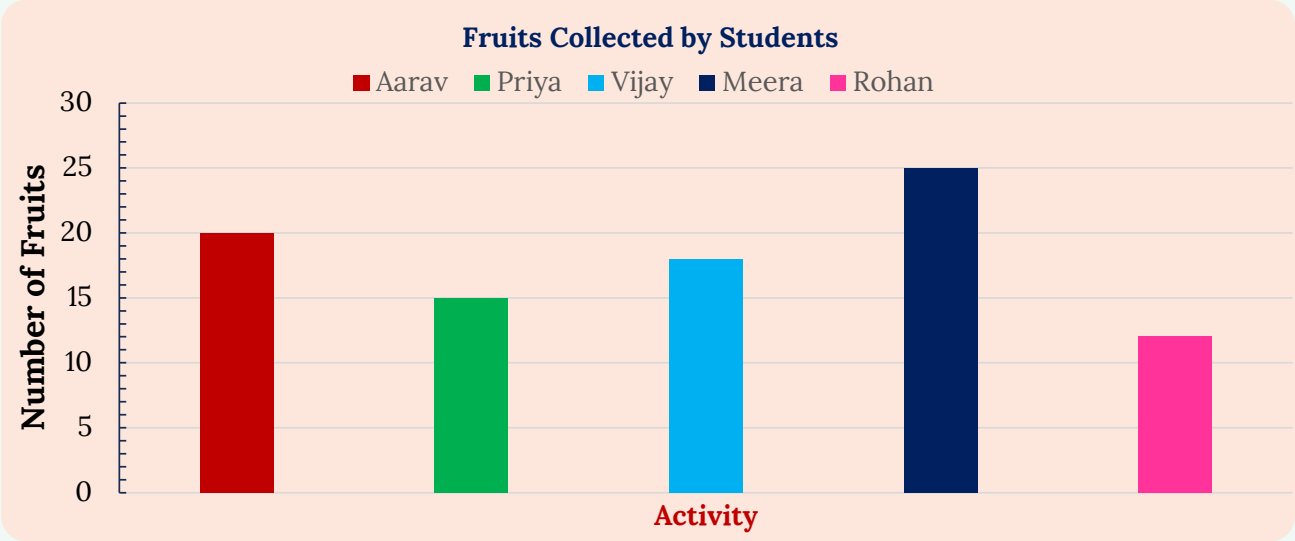
b) On which day did the most students visit the library?

c) What was the total number of student visits to the library from Monday to Wednesday?

d) The librarian believes that more students visit in the second half of the week (Wed, Thu, Fri) than the first half (Mon, Tue). Is she correct? Support your answer with calculations.

4. **The bar graph below shows the number of fruits collected by five students during a school activity:**

Number of Fruits Collected by Students



Answer the following questions based on the bar graph:

a) Who collected the second-highest number of fruits?

b) What is the total number of fruits collected by Aarav and Rohan?

c) How many fewer fruits did Priya collect than Meera?

d) Which student collected the average number of fruits, closest to the mean of all fruits collected?

e) If Meera gave away 5 fruits to Rohan, how many fruits would each of them have then?

Common Misconceptions

Misconception: "The tally mark for 5 is five vertical lines (𝍸)."

Correction: The first four marks are vertical, but the fifth is a diagonal line crossing the first four (𝍸). This grouping makes it much faster to count large numbers. Always bundle in fives!

Misconception: "In a pictograph, you don't need a key if the picture is obvious."

Correction: The key is the most important part of a pictograph! Without it, you have no idea if one symbol means 1 item, 10 items, or 100 items. A pictograph without a key is just a collection of pictures with no mathematical meaning.

Misconception: "In a bar graph, the width of the bars can be different. A wider bar means more."

Correction: This is incorrect and very misleading! In a bar graph, only the height (or length) of the bar represents the value. All bars must be of equal width so that we are only comparing their lengths. The spacing between the bars should also be equal to keep the graph neat and easy to read.

Real-life Data Handling: Mathematical Applications

Here are some relatable scenarios for Grade 6 students to see Data Handling in action:

- **Classroom Analyst:** Conducting a survey on classmates' favourite sports or cartoon characters. They would collect the data, use tally marks to organize it, and then create a bar graph to visually declare the "class favourite."
- **Pocket Money Manager:** Tracking their weekly or monthly expenses. By listing where their money goes (e.g., snacks, stationery, savings), they can create a pictograph or bar chart to understand their own spending habits.
- **Sports Statistician:** Following a cricket or football match and recording scores. They can chart runs per over or goals per match to analyse a team's performance and compare players.
- **Weather Watcher:** Recording the maximum daily temperature for a week. Plotting this on a bar graph helps them easily identify the hottest and coolest days, making weather patterns tangible.

Gap Analyzer™
Complete Chapter Test

EXERCISE

A. Choose the correct answer.

1. Which of the following represents the number 12 in tally marks?
   (a) 𝍸 𝍸 | ☐ (b) 𝍸 𝍸 || ☐ (c) 𝍸 𝍸 || ☐ (d) |||||||||||| ☐
2. In a bar graph, the height of a bar represents:
   (a) The width of the data ☐ (b) The category ☐
   (c) The frequency ☐ (d) The scale ☐
3. The primary purpose of a bar graph is to:
   (a) Show parts of a whole ☐ (b) Compare values across categories ☐
   (c) Show data over time ☐ (d) List raw data ☐
4. What is the first step in organizing a raw list of data?
   (a) Drawing a graph ☐ (b) Finding the average ☐
   (c) Creating a frequency table ☐ (d) Writing a conclusion ☐

Assertion & Reason

In each of the following questions, an Assertion (A) and a corresponding Reason (R) supporting it is given.
Study both the statements and state which of the following is correct:
a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false. d) A is false but R is true.

1. **Assertion (A):** A bar graph's scale must start from 0 for accurate representation.
   Reason (R): A non-zero starting point can make differences between bars look larger than they actually are.
2. **Assertion (A):** A pictograph is always the best way to show exact numbers.
   Reason (R): A pictograph uses symbols, and it can be difficult to show fractional or very precise data.
3. **Assertion (A):** The frequency of an observation is represented by tally marks.
   Reason (R): Tally marks are a method of counting to determine the frequency.

Case Study

An environmental group conducted a survey in a neighborhood to see how many households participate in recycling. They surveyed 50 houses and found the following:

- 25 houses recycle paper.
- 15 houses recycle plastic.
- 5 houses recycle glass.
- 5 houses do not recycle at all.

a. Organize this data into a frequency distribution table.
b. Which is the most common type of recycling in the neighborhood?
c. Create a bar graph to visually represent these findings.
d. The group wants to create a flyer to encourage more people to recycle. Which information from your graph would be most powerful to include?
e. If they want to double the number of houses recycling glass, how many new houses do they need to convince?

Project

Be a Data Journalist for a Day!

- **Your Mission:** To investigate a topic you are curious about, collect data, and report your findings like a real journalist.

Step 1: Choose Your Topic (Choose one or create your own)

- Favorite type of movie (Action, Comedy, Sci-Fi, Animation)
- Most popular superhero among friends
- Hours spent reading per week
- Favorite season of the year

Step 2: Collect Your Data

- Create a simple survey question.
- Interview at least 20 friends, family members, or classmates.
- Record your raw data carefully in your notebook.

Step 3: Organize and Represent

Organize your data into a neat frequency distribution table with tally marks.

Represent your data visually. You must create both:

1. A pictograph (choose a fun symbol and a smart key).
2. A vertical bar graph on graph paper (choose a proper scale).

Step 4: Write Your Report

Create a final report on a chart paper. Your report must include:

- ♦ A catchy headline for your story.
- ♦ Your frequency table.
- ♦ Your pictograph and your bar graph, both neatly drawn and labeled.

- A short paragraph (3-4 sentences) summarizing your findings. What did you discover? What was the most popular choice? What was the least popular? What surprised you?
- **Presentation:** Present your "**Data Journalist Report**" to the class, explaining your findings and how your graphs helped you tell the story.

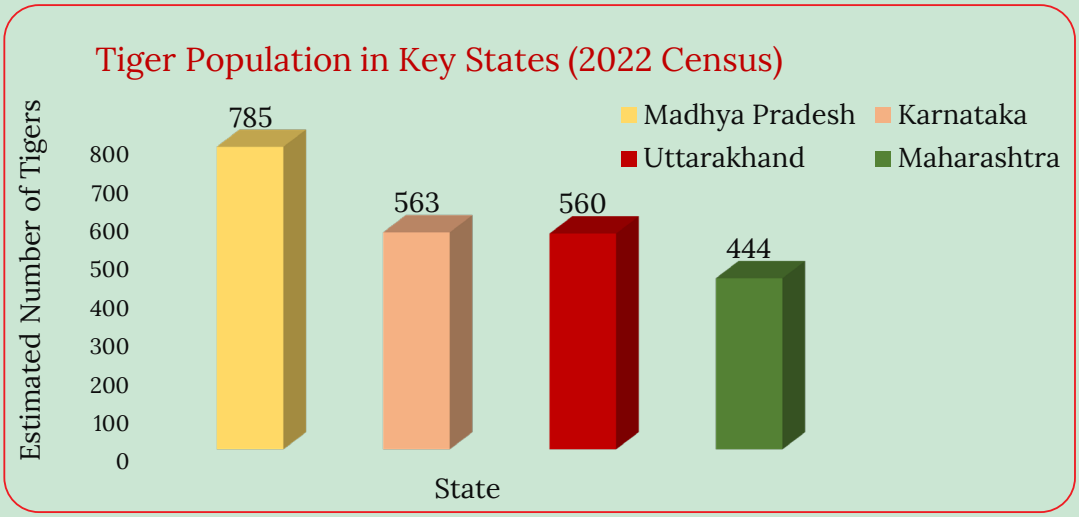
Source-Based Question

India's Tiger Conservation Success Story

Directions: Read the following text and analyze the data table about India's tiger population. Then, answer the questions that follow.

Source Text

India is home to more than 75% of the world's wild tigers. "Project Tiger," launched in 1973, is one of the most successful conservation programs in the world. The Government of India, through the National Tiger Conservation Authority (NTCA), conducts a nationwide tiger census every four years to monitor the population. The 2022 census revealed a remarkable achievement: India's tiger population has grown, showing that our conservation efforts are working. The data collected helps the government make better decisions to protect these magnificent animals and their habitats.



(Source: Adapted from 'Status of Tigers 2022' report by the National Tiger Conservation Authority (NTCA), Government of India)

Questions

1. According to the table, which state is home to the most tigers, and what is its estimated tiger population?
2. How many more tigers does Karnataka have compared to Maharashtra? Show your calculation.
3. Uttarakhand and Maharashtra are two important states for tiger conservation. What is the combined tiger population of these two states?
4. If a forest ranger was counting tigers in a specific zone and saw 8 tigers, how would they represent this number using tally marks?
5. Imagine you are creating a bar graph to show this data. If you choose a scale where 1 cm on the vertical axis represents 100 tigers, what would be the height of the bar for Madhya Pradesh?

Mind Map

Data Handling

Collecting & Organizing Data (Foundation)

- **Data:** Collection of facts (numbers, words, etc.).
- **Raw Data:** Unorganized information.
- **Tools:**

Tally Marks: Groups of 5 (𝍸).

Frequency Table:

- ✓ Observation/Category
- ✓ Tally Marks
- ✓ Frequency (final count)

Ice Cream Flavor	Tally Marks	Frequency (No. of Students)
Vanilla	𝍸 |	6
Chocolate	𝍸 ‖	8
Strawberry	𝍸	4
Butterscotch	‖	2
Total		**20**

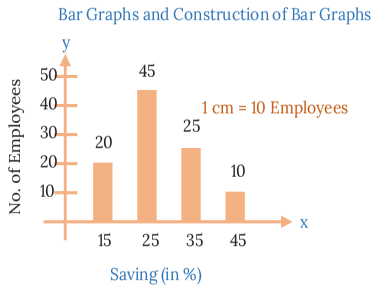
Pictographs (Story with Pictures)

- **Definition:** Data shown with pictures/symbols.
- **Must-Haves:**
  - ✓ Title
  - ✓ Symbols
  - ✓ Key (scale, e.g., 🍎 = 10 apples)
- **Skills:**
  - ✓ **Read:** Use key, compare rows.
  - ✓ **Draw:** Choose symbol/key, calculate symbols, draw neatly.

Mode of Transport	Number of Students
Bus	🙂🙂🙂🙂🙂🙂🙂
Car	🙂🙂🙂🙂
Walking	🙂🙂🙂🙂🙂🙂
Bicycle	🙂🙂🙂
Key: 🙂 Represents 4 Children	

Bar Graphs (Clear Comparisons)

- **Definition:** Rectangular bars represent data; height = value.
- **Must-Haves:**
  - ✓ Title
  - ✓ Axes (X = categories, Y = values)
  - ✓ Scale (start at 0)
  - ✓ Equal-width bars
- **Skills:**
  - ✓ **Read:** Check bar height, max/min, compare.
  - ✓ **Draw:** Label axes, choose scale, draw equal bars.



Aesthetic and Artistic Considerations

- Info graphics.
- Use of colors and patterns.
- Making graphs attractive and easy to understand.