22 Data Collection and Representation

By studying this lesson, you will be able to,

- collect data using tally marks and
- represent data in tables and picture graphs.

22.1 Collecting data using tally marks

With the intention of preparing a plan for a parking lot, Pradeepa and Dileepa were handed over to find the different types and corresponding numbers of vehicles that arrive on a normal day to a certain office.

Each time a vehicle arrived, to represent the type and the arrival, a segment of a line (/) is marked as shown in the tables, to the right of the type of vehicle. The symbol "/" is called a **tally mark.**

The leaflet prepared by Pradeepa is given below.

Type of Vehicle	Number of vehicles represented by tally marks
Car	////////////////
Van	////
Motorcycle	//////////////////////////////
	//////////
Bicycle	//////////////////////////

Complete the following table by counting the number of line segments there are to the right of each type of vehicle in the above leaflet.

Type of Vehicle	Number of Vehicles
Car	
Van	
Motorcycle	
Bicycle	

The leaflet prepared by Dileepa is given below.

Type of Vehicle	Number of vehicles represented by tally marks
Car Van Motorcycle Bicycle	

As shown in the above table, Dileepa has marked the 5th vehicle of each type that arrived by drawing the 5th tally mark across the four tally marks that had been marked before. Therefore  represents 5 vehicles.

Find the number of vehicles of each type that arrived by counting the groups of 5 and remaining line segments in the above leaflet, and complete the following table.

Type of Vehicle	Number of Vehicles
Car Van Motorcycle Bicycle	

Which of the two leaflets did you find it easier to use when you were completing the table?

It is easier and quicker to count the tally marks that have been separated into groups of five in Dileepa's leaflet than to count the tally marks one by one in Pradeepa's leaflet.

Accordingly, the leaflet prepared with the number of vehicles of each type that arrived at the office included in it, based on what Dileepa had noted down is given below.

Type of Vehicle	Tally Marks	Number of Vehicles
Car	𝍸 𝍸 𝍸	15
Van	////	4
Motorcycle	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 //	42
Bicycle	𝍸 𝍸 𝍸 𝍸 𝍸 ///	28

Information that can be represented by numbers as above is considered as **data**.

Information such as the daily attendance of students in a school and the number of births recorded in a hospital are presented as data.

Exercise 22.1

(1) The number of child births recorded during the first five months of the year in a certain hospital is given in the tally chart given below. Complete the table by writing down the number of child births that occurred during each month.

Month	Child births denoted by tally marks	Number of child births
January	𝍸 𝍸 //	
February	𝍸 𝍸 𝍸 ////	
March	𝍸 𝍸 𝍸 𝍸	
April	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 /	
May	𝍸 𝍸 𝍸 ////	

(2) The number of family members belonging to the families of the thirty six Grade 6 students in a certain class is given below.

3 4 5 5 6 3 4 5 5 6 2 3
5 4 3 5 5 6 5 4 3 6 3 2
4 5 6 4 5 6 6 5 5 6 2 2

Copy the following table and represent this data in it.

Number of family members	Families denoted by tally marks	Number of families
2 3 4 5 6		

(3) The marks received for a test by thirty five students in a class is given below (The maximum marks that a student could receive for this test is 10).

Marks Received	Number of students who received the relevant mark, denoted by tally marks
10	𝍸 𝍸 //
9	𝍸
8	𝍸 ///
7	////
Less than 7	𝍸 /

(i) How many students received 10 marks?

(ii) Are there more students who received more than 8 marks or less than or equal to 8 marks? Give reasons for your answer.

(4) The marks received by forty students for a science test is given below (The maximum marks that a student could receive for this test is 15).

3	2	4	1	2	9	4	13	8	5
10	11	12	13	13	8	15	14	9	9
15	13	3	5	6	9	7	11	8	13
11	13	15	15	9	15	14	14	8	9

Represent this data in the following table using tally marks.

Marks	The students who obtained the marks in the first column, denoted by tally marks	The number of students
1, 2, 3		
4, 5, 6		
7, 8, 9		
10, 11, 12		
13, 14, 15		

How many students received less than 10 marks ?

22.2 Representing data using picture graphs

The different ways in which 35 grade 6 students of a certain school travel to school are given in the following table.

Method of travelling to school	Number of students
Walking	11
Bicycle	8
Bus	12
Other	4

This data has been represented in another way below.

Walking	
Bicycle	
Bus	
Other	

Each student has been represented by the symbol  .

A representation of data such as the above is called as a **picture graph. Number of data represented by a symbol in the picture graph should be indicated.**

Example 1

The number of popsicles sold by an ice cream seller on 5 days of a certain week is given in the following table. Represent this data by a picture graph.

Day	Number of popsicles
Monday	72
Tuesday	120
Wednesday	144
Thursday	60
Friday	132

Let us consider how this data can be represented in a picture graph. Initially, a suitable symbol should be selected, and the number of popsicles each symbol represents has to be decided.

Let us select the symbol  . Next, let us decide how many popsicles this symbol represents.

If one popsicle is represented by the symbol  , we would have to draw 144 of these symbols to denote 144 popsicles. Since this is not possible, we represent several popsicles by one symbol.

Let us consider the numbers which divide each of the above numbers without remainder. The above numbers are divisible by 2, 3, 4, 6 and 12. If 2 popsicles are represented by one symbol, 72 symbols have to be drawn to denote 144 popsicles. This too is not possible. It is more appropriate to represent 12 popsicles by  , since a large value can then be represented by a small number of symbols.

To find the number of symbols required to denote the number of popsicles sold each day, the number of popsicles sold each day has to be divided by 12.

Accordingly,

the number of symbols required to denote the sales on Monday } $= 72 \div 12 = 6$

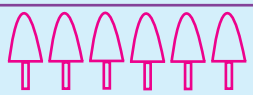
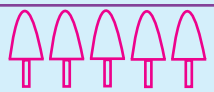
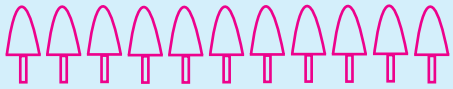
the number of symbols required to denote the sales on Tuesday } $= 120 \div 12 = 10$

the number of symbols required to denote the sales on Wednesday } $= 144 \div 12 = 12$

the number of symbols required to denote the sales on Thursday } $= 60 \div 12 = 5$

the number of symbols required to denote the sales on Friday } $= 132 \div 12 = 11$

Now let us represent the above data in a picture graph.

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

12 popsicles are denoted by the symbol  .

Example 2

The number of children training for several events to be held at a certain school inter-house sports competition is given below.

Event	Number of Children
Track	144
Field	90
Netball	60
Volleyball	42
Cricket	48

Represent this data in a picture graph.

We need to first decide on a suitable symbol to represent this data, as well as to decide on the number of children each symbol represents.

First, let us decide on the number of children that are to be represented by one symbol, and then decide on a picture accordingly.

From these numbers, the numbers 144, 60 and 48 are divisible by 4, 6 and 12. Let us consider whether it is suitable to select the largest of these numbers which is 12.

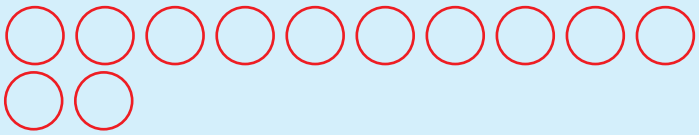
- The number of symbols required to denote track games = 144 ÷ 12 = 12
- The number of symbols required to denote field games = 90 ÷ 12 = 7 with a remainder of 6. Here 6 is exactly half of 12.
- The number of symbols required to denote netball = 60 ÷ 12 = 5
- The number of symbols required to denote volleyball = 42 ÷ 12 = 3 with a remainder of 6. Here 6 is exactly half of 12.
- The number of symbols required to denote cricket = 48 ÷ 12 = 4

Accordingly, a suitable symbol should be used so that $\frac{1}{2}$ the symbol too can easily be represented.

Let us represent 12 children by the symbol  .

Let us represent 6 children by half the above symbol, that is  .

Now let us represent the above information in a picture graph.

Track Events	
Field Events	
Netball	
Volleyball	
Cricket	

12 students are represented by  .

Example 3

The number of students enrolled in a certain Montessori during the past five years is given in the following table. Represent this data in a picture graph.

Year	Number of Students
2009	20
2010	18
2011	21
2012	26
2013	27

To represent this data in the table by a picture graph, let us first find out how many students should be represented by one symbol.

For this, let us select a simple symbol. It is given below.

Let us represent 4 students by a full circle  .

Accordingly, half a circle $\left(\frac{1}{2}\right)$ can be used to represent 2 students and a quarter of a circle $\left(\frac{1}{4}\right)$ can be used to represent 1 student.

Thus, 2 students are represented by  .

One student is represented by  .

Three students are represented by  .

Accordingly, let us find the number of figures that are required to represent the number of students enrolled each year, in the following manner.

Year	Number of Symbols
2009	Since 20 ÷ 4 = 5, 5 complete circles.
2010	Since 18 ÷ 4 = 4 with a remainder of 2, 4 complete circles and half a circle.
2011	Since 21 ÷ 4 = 5 with a remainder of 1, 5 complete circles and a quarter of a circle.
2012	Since 26 ÷ 4 = 6 with a remainder of 2, 6 complete circles and half a circle.
2013	Since 27 ÷ 4 = 6 with a remainder of 3, 6 complete circles and three quarter of a circle.

Now let us represent this data in the given table in a picture graph using the above symbols.

Year	Number of students
2009	
2010	
2011	
2012	
2013	

4 students are represented by  .

Exercise 22.2

(1) The number of registered letters that a post office had to send out during the 5 week days of a certain week is given in the following table.

Day	Number of letters
Monday	20
Tuesday	26
Wednesday	32
Thursday	30
Friday	42

Denote 8 letters by a suitable symbol and represent this data in a picture graph.

(2) The number of customers that arrived at a certain bank during the working hours of a week day to carry out transactions is given in the following table.

Time	Number of customers	
	To withdraw money	To deposit money
9.00 a.m. – 10.00 a.m.	18	12
10.00 a.m. – 11.00 a.m.	30	6
11.00 a.m. – Noon	24	15
Noon – 1.00 p.m.	48	42
1.00 p.m. – 2.00 p.m.	36	54

(i) If six customers are represented by  draw a picture graph of the number of customers who arrived at the bank to withdraw money.

(ii) Is the symbol  alone sufficient to denote the number of customers who arrived at the bank to deposit money? Give reasons for your answer.

(iii) Draw a picture graph to represent the number of customers who arrived at the bank to deposit money by using the above figure and if necessary, a half of it.

(3) A record of the arrival times of the employees of a certain office is given in the following table.

Arrival Time	Number of Employees
7.50 a.m. – 8.00 a.m.	24
8.00 a.m. – 8.10 a.m.	20
8.10 a.m. – 8.20 a.m.	58
8.20 a.m. – 8.30 a.m.	46

(a) Select a suitable symbol to represent this data in a picture graph.

(b) Write down the number of employees represented by

(i) the whole figure you selected.
(ii) half the figure you selected.
(iii) three quarters of the figure you selected.
(iv) a quarter of the figure you selected.

(3) Using this symbol, represent the above information in a picture graph.

Summary

- One method of collecting data is using tally marks.
- Collected data can be represented by using tables or picture graphs.