6. From the figures given below, classify the following pairs of angles into complementary and non complementary.

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7. From the figures given below, classify the following pairs of angles into supplementary and non supplementary.



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9. Find the complementary angle of

(i) 30º	(ii) 26º	(iii) 85°	(iv) 0º	(v) 90º
---------	----------	-----------	---------	---------

- 10. Find the supplementary angle of
 - (i) 70° (ii) 35° (iii) 165° (iv) 90° (v) 0°
 - (vi) 180° (vii) 95°

Challenging Problems

- 11. Think and write an object having
 - Parallel lines (1) _____ (2) _____ (3) _____
 - Perpendicular lines (1) _____ (2) ____ (3) ____
 - Intersecting lines (1) _____ (2) _____ (3) _____
- 12. Which angle is equal to twice its complement?
- 13. Which angle is equal to two-third of its supplement?
- 14. Given two angles are supplementary and one angle is 20° more than other. Find the two angles.
- 15. Two complementary angles are in ratio 7:2. Find the angles.
- 16. Two supplementary angles are in ratio 5:4. Find the angles.



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Summary

- A line extends along both directions without end.
- A line segment has two end points.
- Parallel lines never meet.
- When two lines meet they are called intersecting lines.
- When two rays have common starting point, they form an angle at that point.

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- We measure angles using protractor.
- An angle whose measure is less than 90° is called an acute angle.
- An angle whose measure is exactly 90° is called a right angle.
- An angle whose measure is greater than 90° is called an obtuse angle.
- When the two rays or lines coincide, they are said to make angle zero, that is 0°.
- Two angles are complementary when they add up to 90°.
- Two angles are supplementary when they add up to 180°.
- Given any two points there is a unique line passing through them.
- When three points lie on a line, they are said to be collinear.
- When two lines meet each other at 90°s at the point of intersection, they are called perpendicular lines.
- When three or more lines pass through the same point, they are said to be concurrent. That point is called the Point of Concurrency.



Learning Objectives

- To understand the necessity to collect the data.
- To organise collected data using tally marks.
- To understand the need for scaling in pictographs.
- To draw pictographs and interpret them.
- To draw bar graphs and interpret them.

Recap

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Count the objects in the following figure and complete the table that follows:



Fig. 5.1

Object	Number of Objects
Ball	8
Bat	
Funnel	
Square	



From the given Fig 5.1 and the table, answer the following questions.

- The total number of objects in the above picture is ______. (i)
- (ii) The difference between the number of squares and the number of bats is
- (iii) The ratio of the number of balls to the number of bats is ______.
- (iv) What are the objects equal in number?
- (v) How many more balls are there than the number of bats?

5.1 Introduction



Population census

matches

Necessity of collecting Data 5.2

Think about this situation

The Headmaster of a school (see Fig. 5.2) wanted to open Saving Bank accounts for his students. For this, he needed data from his students. Students did not understand the meaning of the word 'data'. Do you know what it means? Data means, "facts or figures which conclusions can be drawn". Data is from collected, measured and analyzed, whereupon it can be visualized using graphs or images. In this case, the details could consist of information like the ration card



number with address, the name of the student, Aadhaar card identity number, date of birth, phone number for communication etc., These are preserved for drawing inferences.

Name of the student	Aadhaar Number	Date of birth	Phone Number
D. Nallathambi			

5.2.1 Data

In our daily life, we come across many situations where we need to collect information in the form of Facts or Numbers.

For example,

- Number of students in your class using calculators.
- Number of brothers and sisters in your family.
- Number of different types of houses in a village.
- Number of girls wearing bangles.
- Number of buses crossing a certain road junction at a particular time.
- Number of persons in a street who watch T.V. for more than 2 hours a day.
- Number of shops in a shopping mall selling textiles.
- Speeds of bikes, cars and other vehicles passed along a specific highway.

Thus, the numerical information or facts collected are known as Data.

5.2.2 Collection of data

Santhi collected the following information about her friend's preference of sweets which is as shown below.

		IaDi	e: 5.1
Friend's name	Sweet preferred	Friend's name	Sweet preferred
Vetri	Gulabjamun	Sadaiyan	Laddu
Kurinji	Laddu	Rafiq	Gulabjamun
Mullai	Cake	Francis	Laddu
Madhavi	Gulabjamun	Vetriselvi	Laddu
Pegan	Cake	Mary	Gulabjamun
Rahim	Laddu	Fathima	Laddu
Nawaz	Cake	Raju	Cake
Siva	Gulabjamun	Robert	Gulabjamun
Joseph	Laddu	Kalai	Cake
Tamil	Gulabjamun	Anbu	Kesari
Malar	Laddu	Thamarai	Gulabjamun
Velan	Kesari	Mariya	Laddu
Malarkodi	Cake	Manimozhi	Kesari
Selvi	Gulabjamun	Mubina	Gulabjamun
Arivu	Laddu	Kottravai	Gulabjamun

The word 'data' was first used in 1640's.In 1946, the word 'data' also meant for "transmittable and storable computer information". In 1954, a termcalled 'data processing' was introduced. The plural form of 'datum' is 'data'. It also means "given" or "to give" in Latin.

Collect the data of the birth months of your classmates.



 Tabulate different kinds of crops cultivated by the farmers in a village

 List out different kinds of plants/ trees in your school campus

This way of collecting the data helps Santhi to decide, what sweets to get for her birthday and how much for each.

5.2.3 Types of Data

On the basis of collection, data are of two types. They are primary data and secondary data.

Primary data

Primary data means the raw data (not tailored data) which has just been collected from the original source and has not gone any kind of statistical treatment like sorting and tabulation.

Examples

- List of absentees in the class.
- A survey on writing habits of students conducted by a pen manufacturing company.
- The types of leaves collected by students for studying nature.

Secondary Data

Secondary data consists of second hand information which has already been collected. It could have been collected by someone other than the user, for some other purpose.

Examples

- The Headmaster collects the students' absentee list from school office.
- Cricket scores gathered from a website.
- Data from Television and Newspapers.
- List of contact numbers from telephone directory.

5.3 Organizing Data

The collected data are to be arranged methodically or logically so that the information can be looked up fast whenever needed, easily and efficiently. The method of organizing the data is discussed as follows.

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of literacy of people in your street.

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5.3.1 Tally Marks

Consider the data collected by Santhi (given in Table:5.1). Is it easy to get the required information from the data? For example, can any one quickly tell the number of people who do not like Laddu? No. So she decides to organize the data (See Fig. 5.3 (a)).

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Fig.5.3 (a)

Her friends come to help her. Malar arranges the data as given below in the table. She uses ' \checkmark ' marks to note down how many friends like each of the sweets. The count of each sweet is called as "Frequency".

Sweet	Marks	Frequency
Kesari	<i>√√√</i>	3
Gulabjamun	~~~~~~~~~~~	11
Laddu	\\\\\\\\	10
Cake	<i>√√√√√√</i>	6

Table: 5.2

But, Rahim arranges the data as shown below.

Table: 5.3

Sweet	Tally Marks	Frequency
Kesari		3
Gulabjamun		11
Laddu		10
Cake		6



Both have done well. But one would prefer tally marks as they are very simple.

Table: 5.4

One	Two	Three	Four	Five
I	П	Ш		Ш

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So, the teacher arranges the data as follows:

Table: 5.5

Sweet	Tally Marks	Frequency
Kesari	III	3
Gulabjamun	ШШI	11
Laddu	ШШ	10
Cake	LH1 I	6



Note

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The standard form of representing the data is got by using 'Tally marks'.

- The occurrence of each information is marked by a vertical line ''.
- Every fifth tally is recorded by striking through the previous four vertical lines as 'III'.
- This makes counting up the tallies easy.

Example 5.1

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Thamarai is fond of reading books. The number of pages read by her on each day during the last 40 days are given below. Make a Tally Marks table.

1	3	5	6	6	3	5	4	1	6	2	5	3	4	1	6	6	5	5	1
1	2	3	2	5	2	4	1	6	2	5	5	6	5	5	3	5	2	5	1

Solution

The Tally marks table is given below.

Number of pages	Tally Marks	Frequency
1	LHI II	7
2	ШI	6
3	Ш	5
4		3
5	un un	12
6	LALI I	7
Total	40	





If someone asks, "typically, how many pages does Thamarai read in one day?", what will be your answer?

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Geogebra's url :

https://www.geogebra.org/m/gzRAnHKw

Alternate source to try tally calculations:

https://play.google.com/store/apps/details?id=org.geogebra&hl=en

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Exercise 5.1

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- 1. Fill in the blanks.
 - (i) The collected information is called _____.
 - (ii) An example of a Primary Data is ______.
 - (iii) An example of a Secondary Data is _____.
 - (iv) The tally marks for number 7 in standard form is ______.
- 2. Viji threw a die 30 times and noted down the result each time as follows. Prepare a table on the numbers shown using Tally Marks.

1	4	3	5	5	6	6	4	3	5	4	5	6	5	2
4	2	6	5	5	6	6	4	5	6	6	5	4	1	1

3. The following list tells colours liked by 25 students. Prepare a table using Tally Marks.

Red	Blue	White	Grey	White
Green	Grey	Blue	Green	Grey
Blue	Grey	Red	Green	Red
Blue	Blue	Green	Blue	Green
Grey	Grey	Green	Grey	Red

4. The following are the marks obtained by 30 students in a class test out of 20 in Mathematics subject.

11	12	13	12	12	15	16	17	18	12
20	13	13	14	14	14	15	15	15	15
16	16	16	15	14	13	12	11	19	17

Prepare a table using Tally Marks.

5. The table shows the number of calls recorded by a Fire Service Station in one year.

Types of Calls	Tally Marks	Frequency
Building Fires	ШI	
Other Fires	ШШІ	
Hazardous Materials		7
Rescues		4
False Alarms	ШП	
Total		



Complete the table and answer the following questions.

- (i) Which type of call was recorded the most?
- (ii) Which type of call was recorded the least?
- (iii) How many calls were recorded in all?
- (iv) How many calls were recorded as False Alarms?

Objective Type Questions

- 6. The tally marks for the number 7 in standard form is _____.
 (a) 7 (b) ↓↓↓↓ (c) √√√√√√ (d) ↓↓↓↓
- 7. The tally marks ||| ||| represents the number count
 - (a) 5 (b) 8 (c) 9 (d) 10
- 8. The plural form of 'datum' is(a) datum(b) datums(c) data(d) datas

5.4 Representation of data using Pictograph

The teacher was discussing about the pollution caused by the vehicles. The students said that they saw many vehicles when they were standing in the bus stop while coming to school. Everyone described in their own way, but Azhagi drew the pictures of the vehicles that she had seen, as shown below.



All the students were able to easily understand that Azhagi had seen 5 cars, 3 lorries and 2 buses. This sort of representation of data using pictures is called Pictograph.

Nowadays pictographs are frequently used in promotion of tourism, weather forecast, geography etc.

Advantages of using Pictograph

- The data can be easily analyzed and interpreted.
- The pictures and symbols help us to understand better.

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A pictograph is the representation of data through pictures.

- The pictograph is a pictorial representation for a word or Phrase.
- A pictograph is also called Pictogram.
- Pictographs were used as the earliest known form of writing examples having been discovered in Egypt and Mesopotomia since 3000 BC.

5.4.1 Need for scaling in the Pictograph

Fig. 5.4 shows, a fruit stall where there are 40 mangoes, 55 apples, 35 oranges and 60 bananas. How can we represent this data by using pictures? If the data is very large, it is very difficult and time consuming to represent each of the fruits in a pictograph. In such cases, we can use one picture to represent many of the same kind. This is called scaling.

5.4.2 Drawing Pictographs

Consider the above data of fruits. 40 and 60 are multiples of 10, while 55 and 35 are multiples of 5. Let us assume,

that One full picture of fruit represents 10 fruits and One half picture represents 5 fruits.

The pictograph can be drawn for the above data as shown below.

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Fig. 5.4





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5.4.3 Interpreting pictograph

From the above pictograph the number of fruits can be calculated very easily.

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Number of Mangoes	=	4 full pictures \Rightarrow 4 × 10 = 40 mangoes
Number of Apples	=	5 full pictures and 1 half picture \Rightarrow (5 x 10) + 5 = 55 apples
Number of Bananas	=	6 full pictures \Rightarrow 6 × 10 = 60 bananas
Number of Oranges	=	3 full pictures and 1 half picture \Rightarrow (3 x 10) + 5 = 35 oranges

Example 5.2

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The following table shows the number of vehicles sold in a year.



Key: One picture represents 10 vehicles

Look at the pictograph and answer the following questions.

- (i) How many motor cycles were sold in a year?
- (ii) Number of buses sold in a year is 20. Say True or False.
- (iii) How many bicycles were sold ?
- (iv) How many cars and vans were sold?
- (v) How many vehicles were sold altogether?

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Solution

Given : 1 picture represents 10 vehicles

- (i) There were $9 \times 10 = 90$ motor cycles sold.
- (ii) True.
- (iii) There were $4 \times 10 = 40$ bicycles sold.
- (iv) There were 7 cars and 3 vans pictures. Therefore 70 + 30 = 100 cars and vans sold.
- (v) There were 7 cars, 3 vans, 9 motor cycles, 2 buses and 4 bicycles sold. Therefore, 70 + 30 + 90 + 20 + 40 = 250 vehicles sold.

Example 5.3

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The pictograph shows the number of branded mobile phones sold in five months.



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Observe the given table and answer the following questions.

- (i) In which month was the maximum number of brand B mobiles sold?
- (ii) In which month was equal number of brand A and brand B mobiles sold?
- (iii) In which month was the minimum number of brand A mobiles sold?
- (iv) Find the total number of Brand A Mobiles that were sold in 5 months.
- (v) What is the difference between the sale of brand A and brand B Mobiles in the month of May?

Solution

- (i) February
- (ii) April
- (iii) March
- (iv) 1250
- (v) Brand A has sold 200 mobiles more than brand B



Collect from class VI students data regarding games they like and then draw a pictograph for the data collected.

Exercise 5.2

- 1. Fill in the blanks.
 - (i) If (i) represents 100 balls then (i) (i) represents _____ balls.
 - (ii) If 200 is represented by then 600 is represented by _____.
 - (iii) Representation of data by using pictures is known as ______.
- 2. Draw a pictograph for the given data.

Month	June	July	August	September
Number of Computers sold	300	450	600	550

(Choose your own suitable scale)

3. The following table shows the number of tourists who visited the places in the month of May. Draw a pictograph.

Place	Mahabalipuram	Vedanthangal	Hogenakkal	Ooty
Number of Tourists	20,000	15,000	40,000	35,000

(Choose your own suitable scale)

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4. The following Pictograph shows the number of students playing different games in a school.

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Game	Number of Students						
Kho-Kho							
Kabaddi							
Basketball							
Volleyball							
Hockey							
Represents 10 students							



Answer the following questions.

- (i) Which is the most popular game among the students?
- (ii) Find the number of students playing Kabaddi.
- (iii) Which two games are played by equal number of students?
- (iv) What is the difference between the number of students playing Kho-Kho and Hockey?
- (v) Which is the least popular game among the students?

Objective Type Questions

5.	. The pictorial representation for a phrase is a							
	(a) Picto	(b) Tally mark	(c) Frequency	(d) Data				
6. The representation of 'one picture to many objects' in a Pictograph is ca								
	·							
	(a) Tally mark	(b) Pictoword	(c) Scaling	(d) Frequency				
7.	A Pictograph is also known as							
	(a) Pictoword	(b) Pictogram	(c) Pictophrase	(d) Pictograft				

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5.5 Representation of data using Bar Graph

Ragavi's father is a mobile shop owner. She finds the following data of sale of mobiles in a week.

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Table: 5.6

Day	Number of Mobiles Sold	What if the number of mo	biles Yes!
Sunday	50	De 4, 37 OF 303? HOW III	dily Try clis:
Monday	45	pictures will be used:	
Tuesday	40		
Wednesday	20	For this data instead	
Thursday	35	of pictographs,	
Friday	30	something different	
Saturday	55	can be used.	



A Bar graph consists of equally - spaced parallel bars (Horizontal or Vertical) whose lengths / heights are proportional to the number of items given.

5.5.1 Drawing Bar-Graph

Step 1. Draw two lines which are perpendicular to each other. One of them is horizontal and the other one is vertical.



Step 2. A suitable title (Sale of mobiles in a week) is given. The lines are labelled (Horizontal line \rightarrow Days of the week; vertical line \rightarrow Number of mobiles sold).

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Step 3. A suitable scale is chosen. The scale used is stated on the graph.



Days of the Week

Fig. 5.7

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Step 4. Let the vertical line start from 0 and the values of information are marked at equal distances in same increments.



Step 5. For each information vertical bars are drawn on the horizontal line. They are labelled by respective information (as Monday, Tuesday... Sunday).



This graph is called as Vertical Bar Graph.

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The corresponding horizontal Bar Graph will look like this:

5.5.2 Interpreting the Bar Graph

The data from the above Bar Graph (Fig. 5.10) can be easily interpreted and analyzed as follows.

- The maximum number of mobiles were sold on Sunday (55).
- The minimum number of mobiles were sold on Thursday (20).
- The total number of mobiles sold in the week (50+45+40+20+35+30+55 = 275).
- The number of mobiles sold on a particular day (for example: on Friday is 35, etc.,).



interpret them using

Bar graphs.

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Example 5.4



Study the above Bar graph and answer the following questions.

- (i) Which activity is followed by maximum number of students?
- (ii) How many students in all, spend their time on solving puzzles?
- (iii) The total number of students who follow either reading stories or reading their subjects is _____.
- (iv) The activity followed by minimum number of students is ______.
- (v) The number of students who took part in reading comics is ______.

Solution

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- (i) 'Reading stories' is followed by maximum number of students.
- (ii) 7 students spend their time to work out solving puzzles.
- (iii) 8 + 4 = 12 students spend their time on reading.
- (iv) 'Studying subject' is followed by minimum number of students.



(v) 5 students spend their time on reading comics.

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Exercise 5.3

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1. Read the given Bar Graph which shows the percentage of marks obtained by Brinda in different subjects in an assessment test.



Observe the Bar Graph and answer the following questions.

- (i) 1 Unit = _____ % of marks on vertical line.
- (ii) Brinda has scored maximum marks in ______ subject.
- (iii) Brinda has scored minimum marks in ______ subject.
- (iv) The percentage of marks scored by Brinda in Science is ______.

(v) Brinda scored 60% marks in the subject _____.

- (vi) Brinda scored 20% more in ______ subject than ______ subject.
- 2. Chitra has to buy Laddus in order to distribute to her friends as follows:

Classes	VI	VII	VIII	IX	X
Number of Laddus	70	60	45	80	55

Draw a Bar Graph for this data.

3. The fruits liked by the students of a class are as follows:

Fruits	Bananas	Grapes	Apples	Mangoes	Guavas	Papayas	Other fruits
Number of students	8	10	8	7	12	3	2

Draw a Bar Graph for this data.

4. The pictograph below gives the number of absentees on different days of the week in class six. Draw the Bar graph for the same.

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Objective Type Questions

- 5. A bar graph cannot be drawn using ______.
 - (a) Horizontal bars only
 - (b) Vertical bars only
 - (c) Both horizontal bars and vertical bars
 - (d) Either horizontal bars or vertical bars.
- 6. The spaces between any two bars in a bar graph ______.
 - (a) can be different (b) are the same
 - (c) are not the same (d) all of these

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		Misc	ellane	ous pr	actice	probl	ems			
The heights (in centimeters) of 40 children are.										
110	112	112	116	119	111	113	115	118	120	
110	113	114	111	114	113	110	120	118	115	
112	110	116	111	115	120	113	111	113	120	
115	111	116	112	110	111	120	111	120	111	

Exercise 5.4

Prepare a tally mark table.

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2. There are 1000 students in a school. Data regarding the mode of transport of the students is given below. Draw a pictograph to represent the data.

Mode of Travel	On Foot	Bicycle	Scooter	Bus	Car
Number of Students	350	300	150	100	100

3. The following pictograph shows the total savings of a group of friends in a year. Each picture represents a saving of Rs.100. Answer the following questions.





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- (i) What is the ratio of Ruby's saving to that of Thasnim's?
- (ii) What is the ratio of Kuzhali's savings to that of others?
- (iii) How much is Iniya's savings?
- (iv) Find the total amount of savings of all the friends?
- (v) Ruby and Kuzhali save the same amount. Say True or False.

Challenging Problems

4. The table shows the number of moons that orbit each of the planets in our solar system.

Planet	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune
Number of Moons	0	0	1	2	28	30	21	8

Make a Bar graph for the above data.

5. The prediction of Weather in the month of September is given below.

			September			
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 🌺	2
3 🍓	4 🌺	5 🚵	6	7 会	8 🌺	9 🌞
10 🚵	11 🕳	12 🚵	13 🌺	14	15 会	16
17 会	18 🌺	19 🌺	20 🌺	21 🚵	22 🚴	23
24 🌺	25	26	27 🚵	28	29 🌺	30 会
	Sunny	Part	ly Cloudy	Cloudy	Rainy	

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- (i) Make a frequency table of the types of weather by reading the calendar.
- (ii) How many days are either cloudy or partly cloudy?
- (iii) How many days do not have rain? Give two ways to find the answer?
- (iv) Find the ratio of the number of Sunny days to Rainy days.
- 6. 30 students were interviewed to find out what they want to become in future. Their responses are given in the following table.

Profession	Tally marks
Teacher	LIL III
Pilot	
Bank Manager	Ш
Doctor	
Engineer	Ш
Other Professions	

Represent this data using Pictograph.

7. Yasmin of class VI was given a task to count the number of books which are biographies, in her school library. The information collected by her is represented as follows.

Biographies	Number of books
Mathematicians	
Scientists	
Novelists	
Sportspersons	
Politicians	
K	ey: 💼 represents 20 books

Observe the pictograph and answer the following questions.

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- (i) Which title has the maximum number of biographies?
- (ii) Which title has the minimum number of biographies?
- (iii) Which title has exactly half the number of biographies as Novelists?
- (iv) How many biographies are there on the title of Sportspersons?
- (v) What is the total number of biographies in the library?
- 8. The bar graph illustrates the results of a survey conducted on vehicles crossing over a Toll Plaza in one hour.



Observe the bar graph carefully and fill up the following table.

Vehicles	Vans		Buses		Cars	Others	Total vehicles
Number of Vehicles		30		45			

9. The lengths (in the nearest centimetre) of 30 drumsticks are given as follows.

Lengths	Number of drumsticks
24	Ш
25	
26	
27	ШI
28	
29	WI III
30	ШI
31	Ш

Draw the bar graph showing the same information.

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Prasanta Chandra Mahalanobis

(29.06.1893 - 28.06.1972)

He was born in Bikrampur in Bengal. He was the founder of Indian Statistical Institute and greatly helped in data analysis for Indian Government.

Summary

- Information collected is known as data.
- First-hand information is called primary data.
- The data collected by someone else is called secondary data.
- The data collected is organized usually in a tally marks table.
- The organized data can be represented using a pictograph or a bar graph.
- A pictograph is the representation of data through pictures of objects.
- A bar graph consists of parallel bars (horizontal or vertical) whose length corresponds to the number of items.
- The pictographs and the bar graphs are interpreted to answer the questions on data.

Chapter

INFORMATION PROCESSING



Learning Objectives

- To learn how to count and list systematically.
- To explore different methods of arranging information.
- To solve puzzles like Sudoku.

6.1 Introduction

Ponmozhi is at her cousin's wedding which has a large gathering of people. There are a few hundred people, for sure. Suddenly her uncle comes and says, "We are getting ready to serve the meal; one of you quickly count the number of people and tell me". "Ponmozhi, you are good at counting; Do this quickly and tell to me, I will be inside, getting the plantain leaves ready."

It will be very tedious to count each and everyone assembled there. Ponmozhi is standing on a chair and is trying to count everyone. Suddenly, Ponmozhi is unsure of the count that she made and she did not want to count the same head more than once?"

Ponmozhi was told that the task of counting was not easy. While counting, some people may leave, some may enter, some may move here and there. So it is difficult to make sure that her count would be correct.



Fig. 6.1





But in a wedding feast it does not matter if there is a small error in the count: Whether there are 384 persons or 417 persons in the hall it does not really make much of a difference. Food made ready for 400 persons can be sufficient for 20 more persons. Mathematics will help not only in exact counting but also in estimation and approximate counting, depending on what is actually needed.

Instead of the above wedding hall situation, counting the number of children in the classroom is very easy. But counting the number of people in the wedding hall is difficult. There are many reasons for this.

The number of children in the classroom is small, in 10s rather than 100s. Children sit in the benches, the same number on each bench and the benches are organized in rows and

columns. Children sit in one place when you are counting. The number is too small to ask the children to count starting from the left of the first row to the right of the last row, as the children themselves have collectively counted the number present in the class. But again we need not do this. If 3 children sit on each bench and there are 3 benches in a row and there are 4 rows, and every bench in the class is fully



occupied, then we have $3 \times 3 \times 4 = 36$ children in class. But what should we do if all benches are not occupied full? If there are 3 benches with only 2 children and one bench with only one child, we only need to subtract (3+2) from 36 to get 31 children in the class. Importantly, not only we can get the answer, but also we can be confident that everyone was counted, and that nobody was left uncounted or counted twice.

The absence of these factors makes counting in wedding halls more difficult. In general, we can say:

The place in which the things are counted is fixed and arranged in some order, then counting is easy, otherwise it is difficult.

This suggests that the things should be in order if it is needed to be counted easily.



6. 2 Systematic listing

There are two shorts and three shirts. In how many different combinations can you wear them?

At a time you are going to pick one of the shorts and different shirts. We denote the shorts as A and B, and the shirts as p, q and r. Then you can wear one of these: A p, A q, A r, B p, B q and B r.

Thus you have six different combinations and you know that you have counted all the possibilities. This is systematic listing.

Situation 1

Your friend has built a house with three floors. He wants to paint each floor with three different colours red, blue and green. Can you help him to find different ways of possible colour combinations to paint the home?

In how many ways can his house be painted with these three colours?

Let us consider the floors as the Third floor, the Second floor and the First floor. We can say that the painting can be done as RBG, BRG, GRB...etc. But here it is possible that we may miss out some patterns of colours. So, we can use systematic listing as given below.



Step 1: Fix one colour; try the possible arrangements with other colours. For example, if the Third floor is fixed as Red, then we get 2 ways which is shown in the table below.

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Fix Third floor Colour	Second floor Colour	First floor Colour
Red	Blue	Green
Red	Green	Blue

Step 2: If the Third floor is fixed as Blue, then we get another 2 ways which is shown in the table below.

Fix Third floor Colour	Second floor Colour	First floor Colour
Blue	Green	Red
Blue	Red	Green

Step 3: If the Third floor is fixed as Green, then we get 2 more ways which is shown in the table below.

Fix Third floor Colour	Second floor Colour	First floor Colour
Green	Blue	Red
Green	Red	Blue

Hence, we get 6 different ways of painting the three floors, which are R-B-G, R-G-B, B-G-R, B-R-G, G-B-R and G-R-B.

Situation 2

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Suppose you want to write four digit numbers by using the digits 3, 6, 9 and 5. What are the possible numbers you can write using each digit exactly once?

If you list randomly, for example 9365, 3695, 5639 and so on, you may not write all the possibilities. So, write in ascending order.

• All numbers beginning with 3:

Fix next digit and change the other 2 digits. We get, 3569, 3596, 3659, 3695, 3956, 3965.

Similarly,

- All numbers beginning with 5 5369, 5396, 5639, 5693, 5936, 5963
- All numbers beginning with 6 6359, 6395, 6539, 6593, 6935, 6953
- All numbers beginning with 9 9356, 9365, 9536, 9563, 9635, 9653

Totally, we can have 6+6+6+6 = 24 numbers



Now drop the condition that each digit must be used exactly once. List the numbers that are possible now and find the numbers that were not listed above.

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Try these

Mother had a lot of wooden pieces in different shapes with her. She gave 6 triangles to Kannagi and 6 circles to Madhan and asked them to create different figures using them. They tried and got some interesting figures. Can you create figures like them that are nice and interesting?



Fig.6.7

Exercise 6.1

1. Suppose, you have two shorts, one is black and the other one is blue; three shirts which are in white, blue and red. You again wish to make different combinations, but you always want to make sure that the shorts and shirt that you wear are of different colours. List and check how many combinations are possible now.



2. You have two red and two blue blocks. How many different towers can you build that are four blocks high using these blocks? List all the possibilities.

6.3 Systematic completion of lists

Suppose that you are already given a list that is partially filled. How would you complete it? In the activity with 4-digit numbers we had experienced this already. The idea is to find how the filled in part is arranged and use the same idea to complete the rest.

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Form a group with two of your friends and try this. All three of you together have to draw a scene. First, one of your friends should draw one part, next the other friend has to continue it, and finally you have to complete it. No discussion or any other communication is allowed. Finally each person tells what (s)he actually intended to draw the full picture.

Completion with some constraints is best enjoyed in Sudoku. This is a puzzle where there is a partially filled in grid. Horizontal lines of cells in the grid are called as rows and vertical lines of cells in the grid are called as columns. You have to fill in the remaining blank cells with numbers from 1 to 9 so that no number repeats in a row, or in a column. In 3x3 Sudoku, you can use only the numbers from 1 to 3. In 4x4 Sudoku, you can use only the numbers from 1 to 4 and so on.

Sudoku

The word Sudoku comes from the Japanese language. Su means 'number' and Doku means 'single'. It refers to the condition that each number is listed only once in each row, column, box etc. The modern version of this puzzle is said to have come from Howard Garns, a 74-year-old retired architect and freelance puzzle constructor from Indiana, USA and it was first published in 1979.

(i) 3X3 Sudoku

1	2	3			
2	3	1			
(a)					



Fig. 6.8

In Fig, 6.8 (a) two rows are fixed. We get only one possible way to complete the third row (Fig. 6.8 (b)).



(ii) 3X3 sudoku



In the above 3 x 3 sudoku, the first row only is fixed. The second row can be filled in 2 ways either by $2 \ 3 \ 1 \ \text{or} \ 3 \ 1 \ 2$

1	2	3	1	2	3
2	3	1	3	1	2
3	1	2	2	3	1
	(a)			(b)	



To fill the third row, bear in mind that numbers cannot be repeated in the row or in the column. The third row can be filled by only one way in each case.

(iii) 3 × 3 sudoku

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In how many different ways can the first row be arranged?

The first row can be arranged in six ways as (1,2,3), (1,3,2), (2,1,3), (2,3,1), (3,1,2) and (3,2,1).

(iv) Let us find all possible solutions to solve 3×3 sudoku puzzle.

1	2	3	1	2	3	2	3	1	2	3	1
2	3	1	3	1	2	3	1	2	1	2	3
3	1	2	2	3	1	1	2	3	3	1	2
(a)			(b)			(C)			(d)		



1	3	2		1	3	2		3	2	1	3	2	1
3	2	1		2	1	3		2	1	3	1	3	2
2	1	3		3	2	1		1	3	2	2	1	3
(e)					(f)				(g)			(h)	
2	1	3		2	1	3		3	1	2	3	1	2
1	3	2		3	2	1		1	2	3	2	3	1
3	2	1		1	3	2		2	3	1	1	2	3
(i)			(j)		(k)		(I)						
Fig. 6.11													

We get 12 possible ways.

(iv) Here is a partially filled 4x4 sudoku.

1	4	3	
3			4
	1	2	
2		4	1



One way of completing it is given below. Is there any other way to complete the sudoku?

1	4	3	2
3	2	1	4
4	1	2	3
2	3	4	1



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In the 4 \times 4 Sudoku, there is an extra condition. We have four 2 \times 2 grid boxes in the 4 \times 4 sudoku. You have to be careful that no number from 1 to 4 repeats within that 2 \times 2 grid also.

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6.4 Magic triangle

Magic triangles are also very interesting in a similar way.

In a magic triangle, numbers are to be filled without repetition on the sides of a triangle. So that the sum of each side remains the same.

Fill up the circle with the numbers from 1 to 6 without repetition so that each side of the magic triangle adds upto 12.



Fig. 6.14

Step 1: Place the larger numbers at the corners of the triangle i.e., 4, 5, and 6.

Step 2: Place the smaller numbers i.e., 1,2 and 3 in the middle of each side.

Step 3: Now, try placing 1 between 4 and 5; 2 between 5 and 6 and 3 between 6 and 4.



Fig. 6.15

Wrong Placement of numbers (first row 4, second row 1,3 and third row 5,2,6)

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Sum of the numbers on three sides of the triangle are 10, 13 and 13. All the total are not the same. This placement of numbers is not correct.

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Try the other way, by changing the numbers as shown in the figure, given below.



Wrong Placement of numbers (first row 4, second row 2,1 and third row 5,3,6)

Sums of the numbers on three sides of the triangle are 11, 14 and 11. Again, the totals are not the same.

Try again. Change the numbers to get a total of 12 on each side.



Fig. 6.17

Correct placement of numbers. (first row 4, second row 3,2 and third row 5,1,6)

This is the desired magic triangle.

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Exercise 6.2

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1) In the following magic triangle, arrange the numbers from 1 to 6, so that you get the same sum on all its sides.



3) Arrange the odd numbers from 1 to 17 without repetition to get a sum of 30 on each side of the magic triangle.



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4) Put the numbers 1, 2, 3, 4, 5, 6, & 7 in the circles so that each straight line of three numbers add up to the same total.

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5) Place the number 1 to 12 in the 12 circles so that the sum of the numbers in each of the six lines of the star is 26. Use each number from 1 to 12 exactly once. Find more possible ways?



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6.5 More figures in a figure

Example 1

How many triangles are there in the given figures?





(i) Solution

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A, B, C, D are four triangles.

Combining A & D, B & D and D & C do not form any triangles.

Combining A, B & D; A, C & D and B, D & C also do not form any triangles.

Combining A, B, C & D = 1 triangle

 \therefore Total number of triangles = 4 + 1 = 5

(ii) Solution

A, B, C, D, & E are five triangles.

No combination of these triangles taken 2 at a time, form any triangle.

Only the combinations of A, F & C; A, F & D; B, F & E; B, F & D and C, F & E form triangles when taken 3 triangles at a time. Hence, the total number of triangles = 5 + 5 = 10.







INFORMATION PROCESSING

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Expected Result is shown in this picture



Step – 1

Open the Browser and copy and paste the Link given below (or) by typing the URL given (or) Scan the QR Code. Step - 2

"Genius Puzzles" web page will appear. There are many PUZZLES related to the triangle are present. This page is to find "HOW MANY TRIANGLES ARE THERE" in the given figure.

Step-3

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Calculate your answer and click "View Answer" to check whether your answer is correct for each puzzle.





Browse in the link

Triangles: <u>https://gpuzzles.com/quiz/how-many-triangles-are-there-puzzles-with-answers/</u>

2) Find the number of dots in the tenth figure of the following patterns.





- (i) Draw the next pattern.
- (ii) Prepare a table for the number of dots used for each pattern.
- (iii) Explain the pattern.
- (iv) Find the number of dots in the 25^{th} pattern.
- 4) Count the number of squares in each of the following figures?



5) How many Circles are there in the following figure?



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6) Find the minimum number of straight lines used in forming the following figures.



Answers CHAPTER 1 - NUMBERS

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Exercise 1.1

- 1) (i) 10,00,000 (ii) 9,99,99,999 (iii) Five Thousand (iv) 7000000+600000+70000+900+5
- 2) (i) True (ii) False (iii) False (iv) False
- 3) Lakh, Ten thousand, Thousand, Hundred, Ten, One
- 4) 10
- 5) Largest 75320 Smallest 20357
- 6) (i) 70,00,000 (ii) 7,000,000
- 7) (i) 347,056 (ii) 7,345,671 (iii) 634,567,105 (iv) 1,234,567,890
- 8) Indian System : 9,99,999 (Nine Lakh Ninety Nine Thousand Nine Hundred Ninety Nine) International System : 999,999 (Nine Hundred Ninety Nine Thousand, Nine Hundred Nintey Nine)
- 9) (i) Seventy five lakh thirty two thousand one hundred five
 - (ii) Nine crore seventy five lakh sixty three thousand four hundred fifty three
- 10) (i) Three hundred forty five thousand six hundred seventy eight
 - (ii) Eight million three hundred forty three thousand seven hundred ten
 - (iii) One hundred three million four hundred fifty six thousand seven hundred eighty nine
- 11) (i) 2,30,51,980 (ii) 66,345,027 (iii) 789,213,456
- 12) 26,345
- 13) 1,000,000 (One million)

Objective Type Questions

- 14) (a) 100 Crore
- 15) (b) 10000001
- 16) (c) 2
- 17) d) 6× 100000 + 7 × 10000 +0× 1000 +9× 100 +0× 10 +5× 1

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			Exercise 1.2	2					
1)	(i) 48792< 48972	(ii) 1	248654> 1246854	(iii) 658794	= 658794				
2)	(i) False	(ii) F	alse	(iii) True					
3)	The greatest num	ber is 13	386787215						
	The smallest num	ber is 8	6720560						
4)	128435 > 25840	> 21354	> 10835 > 6348						
5)	76095321, 86593	214 (Sim	nilarly, we can write r	nany numbers	s)				
6)	479, 497, 749, 79	4, 947, 9	974						
7)	4698								
8)	The smallest Postal Index Number is 631036								
	The largest Postal Index Number is 631603								
9)	(i) Anaimudi	(ii) 2	2695 > 2637 > 1778	> 1647	(iii) 1048 m				
10)	(c) 134205, 13420)8, 1542	.03						
11)	(a) 1489000 and	1492540)						
12)	(d) 26								
			Exercise 1.3	3					
1)	(i) 360 (ii)	150	(iii) 1						
2)	(i) False (ii)	True	(iii) False						
3)	11910								
4)	2,15,750								
5)	39,000 bicycles								
6)	₹ 2500								
7)	(i) 9 (ii) 11	(ii) 1	.07						
8)	(d) 1								
9)	(b) 12								

10) (c) ×

Exercise 1.4										
1)	(i) 800	(ii) 1000	(iii) 90	,000						
2)	(i) False	(ii) True	(iii) Fa	lse						
3)	(i) 4100	(ii) 45,000	(iii) 90	,000	(iv) 5	1,00,000	(v) 30,00,00,000			
4)	1,90,000									
5)	(i) 12,300	(ii) 18,99,60	00							
6)	3,37,000									
7)	(b) 10855									
8)	(c) 76800									
9)	(a) 9800000									
10)	(b) 165000									
			Ex	ercis	e 1.5	5				
1)	(i) 1	(ii) 34	(iii) 0		(iv) Z	ero	(v) one			
2)	(i) False	(ii) False	(iii) Tru	ue	(iv) T	rue	(v) True			
3)	(i) Commutat	ivity for Addi	tion	(ii) As	sociati	vity for Mul	tiplication			
	(iii) Zero is Ad	dditive Identi	ty	(iv) 0	ne is N	Iultiplicative	e Identity			
	(v) Distributiv	ity of Multipl	ication o	over Ac	dition					
ł)	(i) 5100	(ii) 3,00,000	0	(iii) 13	3,200	(iv) 334				
5)	(b) 0									
5)	(d) 59									
7)	(a) an even n	number								
8)	(b) 0									
9)	(c) 2/0									
10)	(c) 4237+ 54	98 × 3439 =	(4237 +	- 5498) × 34	39				

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Exercise 1.6

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- Ascending Order : 6,85,48,437 < 7,21,47,030 < 7,26,26,809 < 9,12,76,115
 Descending Order: 9,12,76,115 >7,26,26,809 >7,21,47,030 > 6,85,48,437
- 3) (i) 1706 tigers in 2011 (ii) 2100 (iii) 520 tigers increased from 2011 to 2014
- 4) among 6 friends, each of them get 37 apples. 3 apples left over
- 5) 515 + 1 = 516 trays required
- (i) Indian System: Two crore fifty nine lakh forty one thousand nine hundred
 International System : Twenty five million nine hundred forty one thousand nine hundred
 - (ii) 5,50,500 (iii) Eighty six crore forty lakh seven hundred thirty
 - (iv) Ninteen million eight hundred eighty eight thousand eight hundred

(v) Indian System : 60,53,100 - Sixty lakh fifty three thousand one hundred

International System : 6,053,100 - Six million fifty three thousand one hundred

7) One of the answers is 43781. Many answers are possible

- 8) (i) 85 rows are required to fill 7650 chairs (ii) The remaining chairs are 39
- 9) Yes, both are same (30,00,000)
- 10) Relevant answers are yours

CHAPTER 2 - ALGEBRA

Exercise 2.1

- 1) (i) Variables (ii) Different (iii) n
- 2) (i) False (ii) True (iii) False
- 3)

Shapes	1st Pattern	2nd Pattern	3rd Pattern	4th Pattern	5th Pattern
Squares	1	2	3	4	5
Circles	1	2	3	4	5
Triangles	2	4	6	8	10

- 4) a) 3n b) 4n
- 5) 5p
- 6) Arivazhagan's age is 'n-30'
- 7) (i) u + 2 (ii) u 2

Objective Type Questions

- 8) c) can take different values
- 9) c) 6 × *y*
- 10) a) x 4
- 11) d) 7*w*
- 12) d) 22

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Exercise 2.2

1)	(i) f - 5	(ii) <u>s</u>	(iii) 10 l	(iii) 10 less to 2 times m						
	(iv) n - 7	(v) 17								
2)	(i) False	(ii) True	(iii) Fals	e (iv) Tru	ue (v) Fa	alse				
3)	(i) t + 100	(ii) 4q	(iii) 8 - j	v (iv) 56	+ 2x	(v) 9 <i>y</i> - 4				
4)) (i) <i>x</i> divided by 3 (ii) 12 less to 5 times n (iii) 11 added to 10 times <i>x</i>					10 times x				
	(iv) product of 70 and s									
5)	Vetri's answer is correct									
6)	(i) 13	(ii) 299; 3	01 (i	ii)18						
7)										
	k	3	6	9	12	15	18			
	<u>k</u> 3	1	2	3	4	5	6			
	The value of	`k' is 15.								
8)	b) <i>y</i> = 6									
9)	a) n - 6 = 8									

10) c) c = 24

Exercise 2.3

- 1) 8; 77; 666; 5555; 44444; 333333
- 2) (i) 4s (ii) 3s
- 3)

8	7	7	8	=30
8	8	10	10	=36
8	10	7	7	=32
8	7	10	7	=32
=32	=32	=34	=32	=130

4) k = 3; m = 1; n = 10; a = 9; b = 6; c = 4; x = 4; y = 9.

- 5) 19
- 6) (i) P=2; Q=8; R=6; S=10

(ii)					
Rectangle	Р	Q	R	S	Т
Number of squares along the breadth	2	2	2	2	2
Number of squares along the length	1	4	3	5	x
Total number of squares in rectangle	2	8	6	10	2 <i>x</i>

7)

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х 6	0 0		t 3	8	
0		z 2	5		^p 9
v 3	6	5		k 4	9
0			^u 2	4	
		a 6	0		m 1
	s 2	4	7		0

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CHAPTER 3 - RATIO AND PROPORTION

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Exercise 3.1

1)	(i) 3 : 5	(ii) 3:2	(iii)9:10	(iv)3:8	
2)	(i) True	(ii) False			
3)	(i) 3 : 4	(ii) 4:3	(iii) 7:15	(iv) 4:9	(v) 3 : 4
4)	5:3				
5)	1:3				
6)	(i) 3 : 2	(ii)2:5	(iii)3:5		
7)	(d) 5 : 1				
8)	(c) 2 : 1				
9)	(d) 10 : 7				
10.	(b) 3 : 4				
11.	(c) 5 : 1				
			Exercise 3.2	2	
1)	(i) 15	(ii) 8	(iii) 12		
2)	(i) 36 inches,	6 Feet	(ii) 14 days, 9 wee	eks	
3)	(i) False	(ii) True			
4)	(i) 6 : 4, 9 :	6 (ii) 2 : 12,	3:18 (iii)10:8,	15 : 12	
5)	(i) 4 : 5 is lar	ger than 8 : 1	L5 (ii) 7 : 8 is large	r 3 : 4 (iii) 2 :	1 is larger than 1 : 2
6)	(i) 12, 8	(ii) 12	2, 15 (iii) 1	12, 28	
7)	(i) Rs.2400	(ii) R	s.1600		
8)	27 cm, 36 cm	n			
9)	(a) 6				
10)	(d) 12 : 21				
11)	(d) 20/28				
12)	(c) Rs.1000				

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			Exercise 3.3	}
1)	(i) 12	(ii) 9	(iii) 4; 12	(iv) 24; 2
2)	(i) False	(ii) False	(iii) False	
3)	(i) 3 : 9 : : 4	4:12	(ii) 9:3::12:4	
4)	Yes			
5)	(i) Yes	(ii) No		
6)	Yes			
7)	(c) 2 : 5 , 10	: 25		
8)	(d) 8			
9)	(c) 35			
			Exercise 3.4	
1)	(i) Rs.30	(ii) 25 days		
2)	(i) True	(ii) False		
3)	80 Pages			
4)	24 Chairs			
5)	75km			
6)	2 km			
7)	44 points			
8)	Asif's run rate	e is better		
9)	My friend's ra	te of purchas	e is better than me.	
10)	(b) 270			
11)	(c) 35			
12)	(c) 6 km			

Exercise 3.5

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1) (i) 1 : 4 (ii) 4 : 5 (iii) 1 : 5 (iv) Ratio of elephant to cheetah is least

- 2) 60 teachers and 6 administrators
- 3) (i) 2 : 1 (ii) 1 : 3 (iii) 12 ratios
- 4) A: B = 2: 1, B: C = 2: 1; They are in proportion.
- 5) (a) $\frac{1}{4}$ cup (b) 8 cups

(c) Ragi flour, Raw rice and water are in one unit, Sesame oil and salt are in different units. these different units cannot be compared and cannot be expressed as a ratio.

- 6) 2:1
- 7) There are four different ways.
- 8) Team B has better record
- 9) The standard 8 is the least ratio
- 10) The four different answers are : 1 and 90; 2 and 45; 30 and 3; 5 and 18; 6 and 15
- 11) 29:44
- 12) (a) Black balls (b) 96 balls (c) 32 balls, 24 balls

CHAPTER 4 - GEOMETRY

Exercise 4.1

- 1) i) \overrightarrow{AB} ii) \overrightarrow{BA} iii) One
- 2) 10, PQ, PA, PB, PC, AB, BC, CQ, AQ, BQ, AC,
- 3) \overline{XY} =2.4 cm, \overline{AB} =3.4cm, \overline{EF} =4 cm, \overline{PQ} =3cm.
- 5) (i) ÉF and GH, CD and AB (ii) CD and EF, AB and EF, CD and GH, AB and GH (iii) P, Q, R and S
- 6) (i) \overrightarrow{CD} and \overrightarrow{EF} , \overrightarrow{CD} and \overrightarrow{IJ} , \overrightarrow{EF} and \overrightarrow{IJ}
 - (ii) \overrightarrow{AB} and \overrightarrow{CD} , \overrightarrow{AB} and \overrightarrow{EF} , \overrightarrow{AB} and \overrightarrow{IJ} , \overrightarrow{GH} and \overrightarrow{IJ} , \overrightarrow{AB} and \overrightarrow{GH}
 - (iii) P, Q and R

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- (i) \boldsymbol{l}_3 and \boldsymbol{l}_4 , \boldsymbol{l}_4 and \boldsymbol{l}_5 , \boldsymbol{l}_3 and \boldsymbol{l}_5 7) (ii) l_1 and l_2 , l_1 and l_3 , l_1 and l_4 , l_1 and l_5 , l_2 and l_3 , l_2 and l_4 , l_2 and l_5 (iii) \boldsymbol{l}_1 and \boldsymbol{l}_2 (iv) Q (v) U
- 8) c) 3
- 9) c) AB

Exercise 4.2

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- iii) $P, \overrightarrow{PQ}, \overrightarrow{PR}$ (iv) $S, \overrightarrow{SV}, \overrightarrow{ST}$ 2) i) D, \overrightarrow{DE} and \overrightarrow{DF} ii) D, DE, DC
- 3) i), iii), v) are right angles
- 4) i), iii) and iv) are acute angles
- 5) i), ii) are obtuse angles
- 6) i) ∠LMN, ∠NML, ∠M
 - ii) \angle PQR, \angle RQP, \angle Q
 - iii) \angle MNO, \angle ONM, \angle N
 - iv) $\angle TAS$, $\angle SAT$, $\angle A$
 - v) \angle XYZ, \angle ZYX, \angle Y
 - vi) ∠ADB, ∠BDA, ∠D
- 7) i) True ii) False iii) False iv) True
- 9) i) Obtuse angle ii) Zero angle iii) Straight angle iv) Acute angle v) Right angle
- 10) i) 155° ii) 60° iii) 44° iv) 113°
- c) 45° 11) b) ∠ZXY

Exercise 4.3

1) ii) Non-Collinear iii) Non-Collinear i) Collinear iv) ° ► l

2) Ρ Q R

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Objective Type Questions

0) D AFC 7 U A, D, C 8	D) F
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Exercise 4.4

- 1) i) Parallel lines ii) Parallel lines iii) Parallel and Perpendicular lines
 - iv) Intersecting lines
- 2) Parallel lines

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 $\overline{\text{YX}} \text{ and } \overline{\text{DC}}$

 $\overline{\text{YD}}$ and $\overline{\text{ZE}}$

 $\overline{\text{XC}} \text{ and } \overline{\text{YD}}$

 \overline{YZ} and \overline{DE}

 $\overline{\text{XW}}$ and $\overline{\text{WB}}$

 $\overline{\text{XC}} \text{ and } \overline{\text{WB}}$

 $\overline{\text{WB}}$ and $\overline{\text{BA}}$

 $\overline{\text{ZV}} \text{ and } \overline{\text{EA}}$

 $\overline{\text{VA}} \text{ and } \overline{\text{WB}}$

 $\overline{\text{ZE}} \text{ and } \overline{\text{VA}}$

Concurrent Lines

 $\overline{AB}, \overline{AE}, \overline{AV}$

BA, BC, BW

 $\overline{CB}, \overline{CX}, \overline{CD}$

 $\overline{\text{DC}}, \overline{\text{DE}}, \overline{\text{DY}}$

EA, EZ, ED

 $\overline{XC}, \overline{XY}, \overline{XW}$

 $\overline{YX}, \overline{YZ}, \overline{YD}$

 $\overline{ZY}, \overline{ZE}, \overline{ZV}$

 $(\mathbf{\Phi})$

 $\overline{VA}, \overline{VW}, \overline{VZ}$

 $\overline{WB}, \overline{WV}, \overline{WX}$

- 3) i) $\angle 1 = \angle CBD$ or $\angle DBC$
 - ii) $\angle 2 = \angle DBE$ or $\angle EBD$
 - iii) $\angle 3 = \angle ABE$ or $\angle EBA$
 - iv) $\angle 1 + \angle 2 = \angle CBE$ or $\angle EBC$
 - v) $\angle 2 + \angle 3 = \angle ABD$ or $\angle DBA$
 - vi) $\angle 1 + \angle 2 + \angle 3 = \angle ABC$ or $\angle CBA$
- 4) i) right angle ii) acute angle iii) straight angle iv) obtuse angle

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- 6) (i) and (v) are complementary angles
 - (ii), iii) and iv) are non-complementary angles

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6th_Answers_151-170 Folder.indd 162

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7) ii) and iv) are supplementary i) and iii) are not supplementary i) ∠FAE;∠EAD 8) ii) ∠FAD; ∠DAC $\angle BAC; \angle CAE$ $\angle FAB; \angle BAC$ $\angle FAB; \angle FAE$ i) 60° iii) 5° iv) 90° v) 0° 9) ii) 64° 10) i) 110° ii) 145° iii) 15° iv) 90° v) 180° vi) 0° vii) 85°

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- 11) i) Legs of the table, railway track, edges of the scale
 - ii) Adjacent sides of a Board, Cross bars of windows, Adjacent sides of the textbook
 - iii) Cross bars of windows, Ladder, blades of a scissor.
- 12) 60° is twice its complement.
- 13) 72°
- 14) The two angles are 80° and 100°
- 15) Two angles are 70° and 20°.
- 16) The angles are 100° and 80° .

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CHAPTER 5 - STATISTICS

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Exercise 5.1

1) (i) Data (ii) List of absentees in a class (iii) Cricket scores gathered from a website (iv)

2)

Face of die	Tally Marks	Frequency
1	III	3
2		2
3		2
4	LH1 I	6
5		9
6	W1111	8
		30

3)

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Colours	Tally Marks	Frequency
Red		4
Blue	ШI	6
White		2
Grey	W1 II	7
Green	UH1 I	6
		25

4)

Numbers	Tally Marks	Frequency
11	I	2
12	LH1	5
13		4
14		4
15	LH1 I	6

Numbers	Tally Marks	Frequency
16		4
17		2
18		1
19		1
20		1
		30

5)

Types of Calls	Tally Marks	Frequency
Building fires	ШI	6
Other fires	ШШІ	11
Hazardous materials	WI II	7
Rescues		4
False Alarms	W1 II	7
		35

(i) Other fires (ii) Rescues (iii) 35 (iv) 7

- 6) (b) [// ||
- 7) (c) 9

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8) (c) data

Exercise 5.2

i) 150 ii) iii) Pictograph
 i) kabaddi ii) 110 iii) Kho-Kho and Hockey iv) 0 v) Basketball
 (a) Picto
 (c) Scaling
 (b) Pictogram

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Exercise 5.3

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- 1) i) 10 ii) Mathematics iii) Language iv) 65% v) English vi) Mathematics; Science
- 5) (d) Either horizontal bars or vertical bars.
- 6) (b) are the same

Heights (in Cms)	Tally Marks	Frequency
110	Ш	5
111		8
112		4
113	Ш	5
114		2
115		4
116		3
117		
118		2
119		1
120	ШІ	6
		40

Exercise 5.4

3)	i) 5:4	ii) 5:19	iii) ₹ 300	iv) ₹ 2400	v) true
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- 5) ii) 14 days iii) 24 days iv) 10 : 6
- 7) i) Novelists ii) Scientists iii) Sportspersons iv) 25 v) 160

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CHAPTER 6 - INFORMATION PROCESSING

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Exercise 6.1

(1)	6 combinations are p	oossible,	Black - White	Black - Blue	Black - Red
			Blue - white	Blue - Blue	Blue - Red
(2)	6 possibilities,	R - B - R - B	R - R - B - B	B - R - R - B	
		B - R - B - R	B - B - R - R	R - B - B - R	

Exercise 6.2

(1) One of the answers is,



- (2) (i) Yes (ii) 5 (iii) 17, 19, 20, 21, 23
- (3)

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(4)



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(5) There are many other possible ways.



Exercise 6.3

(iii) 32 triangles

(iv) 35 triangles

(ii) 16 triangles

(ii) 100

- (1) (i) 12 triangles
- (2) (i) 55
- (3) (i)

(ii)

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Pattern	1	2	3	4
Number of dots	2	5	9	14

Pattern	1	2	3	4
Number of dots	2	2 + 3	2 + 3 + 4	2 + 3 + 4 + 5

(iv) 350

- (4) (i) 20 squares (ii) 10 squares
- (5) 7 circles
- (6) (i) 10 (ii) 12

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MATHEMATICAL TERMS

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Acute angle Additive Identity Algebra Algebraic Expressions Algebraic Statement Angle Associative Bar graph Classification Closure Coincide Collecting data Collinear points Commutative Complementary angles Construction Data/Information Denominator Discrete Distributive Equation Equivalent Ratio Estimation Expanded form Facts First hand information Fractions Frequency Geometry Horizontal bars Information Processing Integers Interchanging Digits Intersecting lines Interpret Line segment Lines Magic triangle Measure Multiplicative identity Natural Numbers Notation Number patterns Numerator Obtuse angle

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குறுங்கோணம் கூட்டல் சமனி இயற்கணிதம் இயற்கணித கோவைகள் இயற்கணித கூற்று கோணம் சேர்ப்பு பட்டை வரைபடம் வகைப்படுத்துதல் அடைவ ஒன்றுதல் தரவு திரட்டுதல் ஒரு கோடமை புள்ளிகள் பரிமாற்று நிரப்புக் கோணங்கள் வரைமுறை தரவு / தகவல் பகுதி தொடர்ச்சியற்ற பங்கீட்டு சமன்பாடு சமான விகிதம் மதிப்பீடு விரிவாக்கம் உண்மைகள் முதல்நிலை தரவு பின்னங்கள் நிகழ்வெண் வடிவியல் கிடைமட்ட பட்டைகள் தகவல் செயலாக்கம் முழுக்கள் இலக்கங்களின் இடமாற்றம் வெட்டும் கோடுகள் விவரித்தல் கோட்டுத்துண்டு கோடுகள் மாய முக்கோணம் அளவீடு பெருக்கல் சமனி இயல் எண்கள் குறியீடு எண் அமைப்புகள் தொகுதி விரிகோணம்

Operation on Variables Organizing data Parallel lines Pictograph Place Value Chart Plane Point of Intersection Points Points of concurrency Predecessor Primary data Product Properties Proportion Proportionality law Protractor Quotient Ratio Rays Right angle Rounding off Scaling Secondary data Sequence Set Square Shaded portion Solve Standard form Statistics Straight angle Successor Sudoku Supplementary angles Systematic listing Tabulation Tally mark Unitary method Unshaded portion Variables Variation Verbal statements Vertex Vertical bars Vice-versa Whole Numbers

மாறிகள் மீதான செயல்பாடு தரவு ஒருங்கமைப்பு இணை கோடுகள் உருவ விளக்கப்படம் இடமதிப்பு அட்டவணை தளம் வெட்டும் புள்ளி புள்ளிகள் ஒருங்கமை புள்ளிகள் முன்னி முதன்மை தரவு பெருக்கற்பலன் பண்புகள் விகித சமம் விகித சம விதி பாகைமாணி ஈவு விகிதம் கதிர்கள் செங்கோணம் முழுமையாக்கல் அளவுத்திட்டம் இரண்டாம் நிலைத் தரவு தொடர்கள் முக்கோணமானிகள் நிழலிடப்பட்டபகுதி தீர்வு காணல் திட்ட வடிவம் புள்ளியியல் நேர்கோணம் தொடரி சுடோகு மிகை நிரப்புக் கோணங்கள் முறையான பட்டியல் பட்டியலிடுதல் நேர்கோட்டு குறிகள் அலகு முறை நிழலிடப்படாத பகுதி மாறிகள் மாறல் சொற்றொடர் கூற்று முனை செங்குத்து பட்டைகள் மறுதலை முழு எண்கள்

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