CAREER POINT

Study Material for Pre foundation Class 6

Prepared by Career Point Kota Experts

CONTENTS OF THE PACKAGE AT A GLANCE

Class VI

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Physics	**Chemistry**	**Biology**
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♦ Temperature and its Measurement	♦ Methods of Separation in Everyday Life	♦ Mindful Eating: A Path to a Healthy Body
♦ Beyond Earth	♦ Nature's Treasures	♦ Living Creatures: Exploring their Characteristics

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Note to the Students

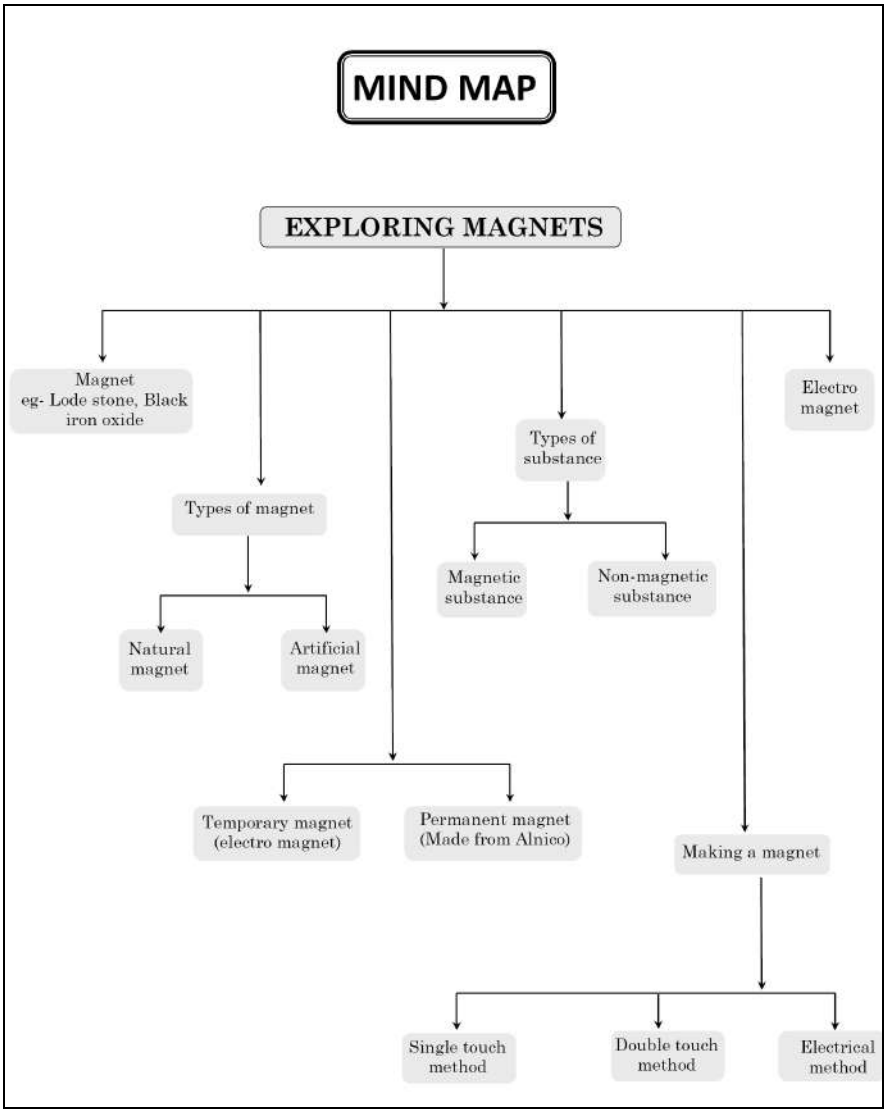
Career Point offers this Class 6 Study Package to support complete learning for school syllabus as well as various Olympiad exams. This sample represents our set of five books: **Physics**, **Chemistry**, **Biology**, **Mathematics** and **Mental Ability**. Each book provides clear concepts, solved examples and practice exercises to strengthen understanding and improve problem-solving skills. The material is designed to build a strong foundation from an early stage and help students develop confidence for higher classes and competitive preparation.

COMPONENTS OF EACH CHAPTER

These books are designed with an engaging and preparation-focused pedagogy and offer a perfect balance of conceptual learning and problem solving skills.

Mind Map

Each chapter contains many articles (Concepts, Theories etc.). Mind map interconnect all these articles logically. By this student can understand whole chapter articles interconnectivity clearly in a single picture frame.



Theory & Concepts

Each chapter consist of exhaustive theory which gives conceptual clarity and command over topics. Appropriate explanation of theory with the help of images, diagrams, flowcharts, mind maps, info graphics, and tables.

Magnet

A mineral was discovered in the town of **Magnesia** in Northern Greece about 4000 years ago, which was found to have a wondrous property. It could attract pieces of iron towards it. This mineral is called **magnetite**. Further it was found that thin strips of magnetite always align themselves in a particular direction when suspended freely in air. It was found that magnetite is mainly composed of oxides of iron **(Fe_3O_4)**. Magnetite is the world's first magnet. It is also called natural magnet or lodestone.

Types of Magnet

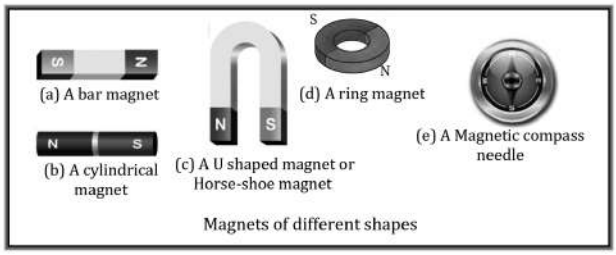
- **Natural magnet:** A magnet which occurs naturally and is not made by any artificial means is called a natural magnet.

  e.g.: **Magnetite**, which is an ore of iron **[Fe_3O_4]**.

- **Artificial magnet:** A substance to which properties of the natural magnet are imparted by artificial means is called artificial magnet.

  e.g.: The magnets made from **iron, steel, cobalt and nickel**.

  Nowadays, magnets are made in different shapes such as rectangular bar, cylindrical bar, U-shaped or horse-shoe shaped, ring-shaped and magnetic compass needle.



Competitive Level

Competitive level is specially designed for competition exam rquirements and to better understanding the concepts, well explained theory, clearly explained formulas with good number of quality examples are given in this.

COMPETITIVE LEVEL

Magnetic field and Magnetic field Lines

A region of influence surrounding a magnet, in which other magnets or materials like iron are affected by magnetic forces is called '**magnetic field**'.

Magnetic field line is an imaginary line such that tangent to it at any point gives the direction of magnetic field at that point in space. Magnetic field lines are drawn to represent magnetic field. Magnetic field lines can be drawn with the help of magnetic compass. Magnetic field lines are also called as magnetic lines of force.

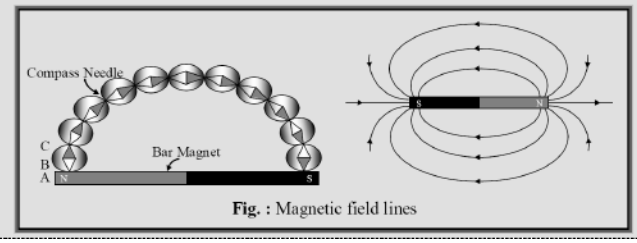


Fig. : Magnetic field lines

In Chapter Example

To understand the application of concepts, there is ***in chapter solved example*** are given. It contains large variety of all types of solved examples with explaination to ensure understanding the application of concepts.

Ex.2 Ekta is asked to collect data for size of shoes of students in her Class VI. Her finding are recorded in the manner shown below :

5	4	7	5	6	7	6	5	6	6	5
4	5	6	8	7	4	6	5	6	4	6
5	7	6	7	5	7	6	4	8	7	

Arrange the information in a table using tally marks.

Sol.

Shoe size	Tally marks	Number of students
4	𝍸	5
5	𝍸 III	8
6	𝍸 𝍸	10
7	𝍸 II	7
8	II	2

Practice Exercises

Includes three sets of exercises covering all the topics. Helps the students to assess their strengths and weaknesses and work on them accordingly. Separate exercises for subjective as well as objective questions and previous year competitive exams questions (NTSE, Olympiads)

NCERT Exercise

[Let Us Enhance Our Learning]

Q.1 Fill in the blanks :

(i) Unlike poles of two magnets each other, whereas like poles each other.

(ii) The materials that are attracted towards a magnet are called .

(iii) The needle of a magnetic compass rests along the direction.

(iv) A magnet always has poles.

Q.2 State whether the following statements are True (T) or False (F).

(i) A magnet can be broken into pieces to obtain a single pole. [ ]

(ii) Similar poles of a magnet repel each other. [ ]

(iii) Iron filings mostly stick in the middle of a bar magnet when it is brought near them. [ ]

(iv) A freely suspended bar magnet always aligns with the north-south direction. [ ]

Q.3 Column I shows different positions in which one pole of a magnet is placed near that of

According to you, which of the options given in Table is likely to be his observation?

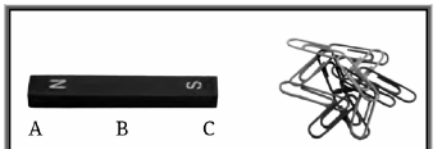


Fig. : Bar magnet and heap of steel U-clips

Table : Number of pins attracted by the magnet at its various positions

	Position A	Position B	Position C
(i)	10	2	10
(ii)	10	10	2
(iii)	2	10	10
(iv)	10	10	10

Exercise -1

Very Short Answer Type Questions

Q.1 Your mother was stitching your shirt. The needle slipped from her hand into a box containing buttons, threads etc. How would you search for the needle?

Q.2 What happens when a pole of a bar magnet say its north-pole is marked with a chalk and suspended freely? What do you observe on rotating the bar magnet?

Q.3 One feels a pull while opening or closing the door of a refrigerator. What can be the possible reason?

Q.4 What is a permanent magnet?

Q.5 How do the counters in a ludo game stick to its iron board?

Short Answer Type Questions

Q.6 Why is compass needle kept in a closed glass vessel?

Q.7 What happens when the north-pole of a magnet is brought near

duck moved towards the plate. But, when a plate containing some pebbles was brought close to the duck, it moved away from the plate. She asked her teacher for explanation about the same next day. Explain how this could have been possible. What values shown by Bhawana?

Fill in the Blanks

Q.16 (i) ..... are used in doorbells, telephones, and computers.

(ii) A ..... magnet is also known as U-shaped.

(iii) The materials, which are attracted towards a magnet are called.....

(iv) Paper is not a .....material.

(v) In olden days, sailors used to find direction by suspending a piece of .....

True or False

Q.17 (i) Magnets are used in special trains called Maglev.

Exercise -2

Q.1 Magnets attract
(A) wood (B) any metal
(C) plastics (D) iron

Q.2 In which of these shapes can we have a magnet?
(A) Ring (B) Bar
(C) Horseshoe (D) All of these

Q.3 A freely suspended magnet will align itself
(A) along the earth's equator
(B) perpendicular to the line joining the earth's North Pole and South Pole
(C) in any direction
(D) along the line joining the earth's North Pole and South Pole

Q.4 A device consisting of a small magnetic needle used to find directions on the earth's surface is called
(A) a magnetometer
(B) a magnet
(C) a magnetic compass
(D) a pathfinder

Q.5 When two magnets are brought close together

Q.9 Which of the following statements is true?
(A) An electromagnet does not attract a piece of iron.
(B) An electric current flowing in a circuit does not deflect a magnetic needle.
(C) An electromanget is a permanent magnet.
(D) An electromagnet can be used to separate plastic bags from a garbage heap

Q.10 If there are 3 bar magnets, the total number of poles will be:
(A) 2 (B) 6 (C) 3 (D) 4.

Q.11 Which scientist discovered that current carrying wire behave as magnet?
(A) Newton
(B) Hans Christian Oersted
(C) Einstein
(D) Faraday

Q.12 Coloured part of the needle of magnetic compass represents
(A) north (B) south
(C) east (D) west

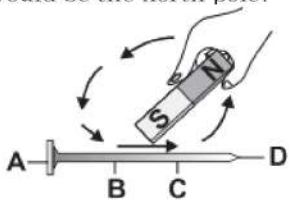
Exercise -3

(Previous Year Olympiad Questions)

Q.1 A compass is placed between two magnets as shown in the diagram. Magnet X is stronger than magnet Y. In which direction will the compass needle point?

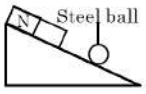
(A) 
(B) 
(C) 
(D) 

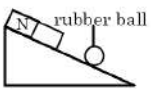
Q.2 An iron nail was magnetized using the method shown here. Which part of the iron nail would be the north pole?

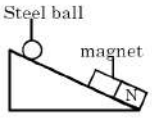


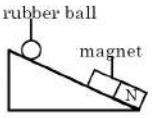
(A) A (B) B (C) C (D) D

Q.3 The diagrams given below show a steel ball, a rubber ball and a magnet placed at different position on a slope. In which one of the following diagrams would the ball roll down the slope the fastest?

(A) 

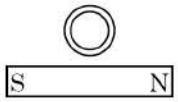
(B) 

(C) 

(D) 

Q.4 A student tries to magnetise a short steel rod. Which of the following tests will show that he has succeeded?
(A) Both ends of a magnet attract the rod
(B) One end of a magnet repels the rod
(C) The rod picks up a small piece of paper
(D) When freely suspended, the rod points in any direction

Q.5 A small compass is placed beside the middle of a bar magnet.

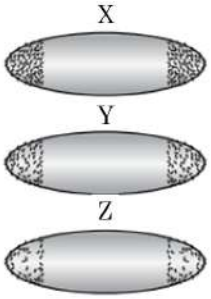


In which direction will the compass needle point?

(A) 
(B) 
(C) 
(D) 

Q.6 If a piece of metal was thought to be a magnet, which one of the following observations would offer conclusive evidence?
(A) It attracts a known magnet
(B) It repels a known magnet.
(C) It attracts a steel screw driver.
(D) None of these

Q.7 Three magnets X, Y and Z were dipped one by one in a heap of iron filings. Figure shows the amount of the iron filings stick to them. The strength of these magnets will be in the order

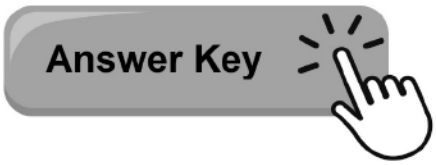


(A) X > Y > Z (B) X < Y < Z
(C) X = Y = Z (D) X < Y > Z

Q.8 To demagnetise a magnet using the heating method which of the following is the correct step?
(A) Heat the magnet to become red hot, and allow it to cool in the east-west direction
(B) Heat the magnet to become red hot and allow it to cool in the north-south direction
(C) Heat the magnet in boiling water and allow it to cool in the north-south direction
(D) Both A and B

Answer key

Answer key is provided at the end of the exercise sheets.



EXERCISE - 1

➢ **Fill in the Blanks:**

16. (i). magnet
(ii). horse shoe
(iii). magnetic material
(iv). magnetic
(v). magnet

➢ **True & False:**

17. (i). True
(ii). False
(iii). True
(iv). True
(v). False

➢ **Match the Column:**

18. [a → (iv); b → (i); c → (ii); d → (v); e → (iii)]

EXERCISE - 2

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	D	D	D	C	C	B	A	D	B	B	B	A	A	B	A
Ques.	16	17	18	19	20										
Ans.	B	D	C	B	D										

EXERCISE - 3

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	C	D	C	B	D	B	A	A	C	A	A	D	B	D	D
Ques.	16														
Ans.	B														

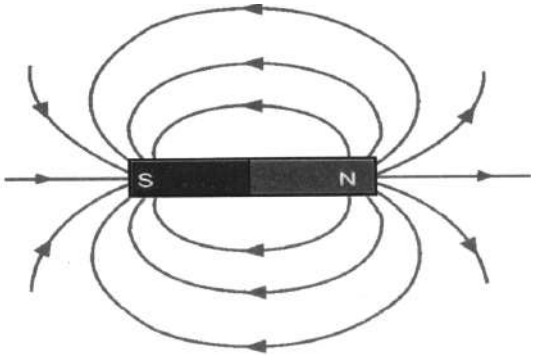
SCIENCE

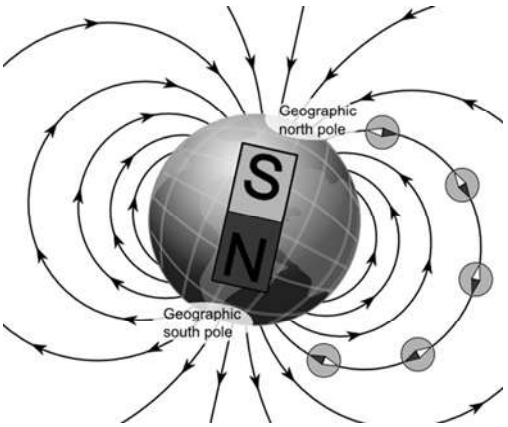
Chapter 3

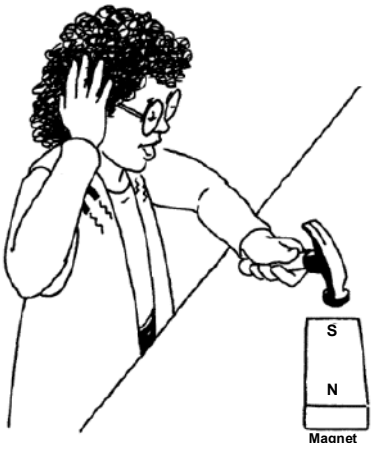
EXPLORING MAGNETS

Chapter Outline

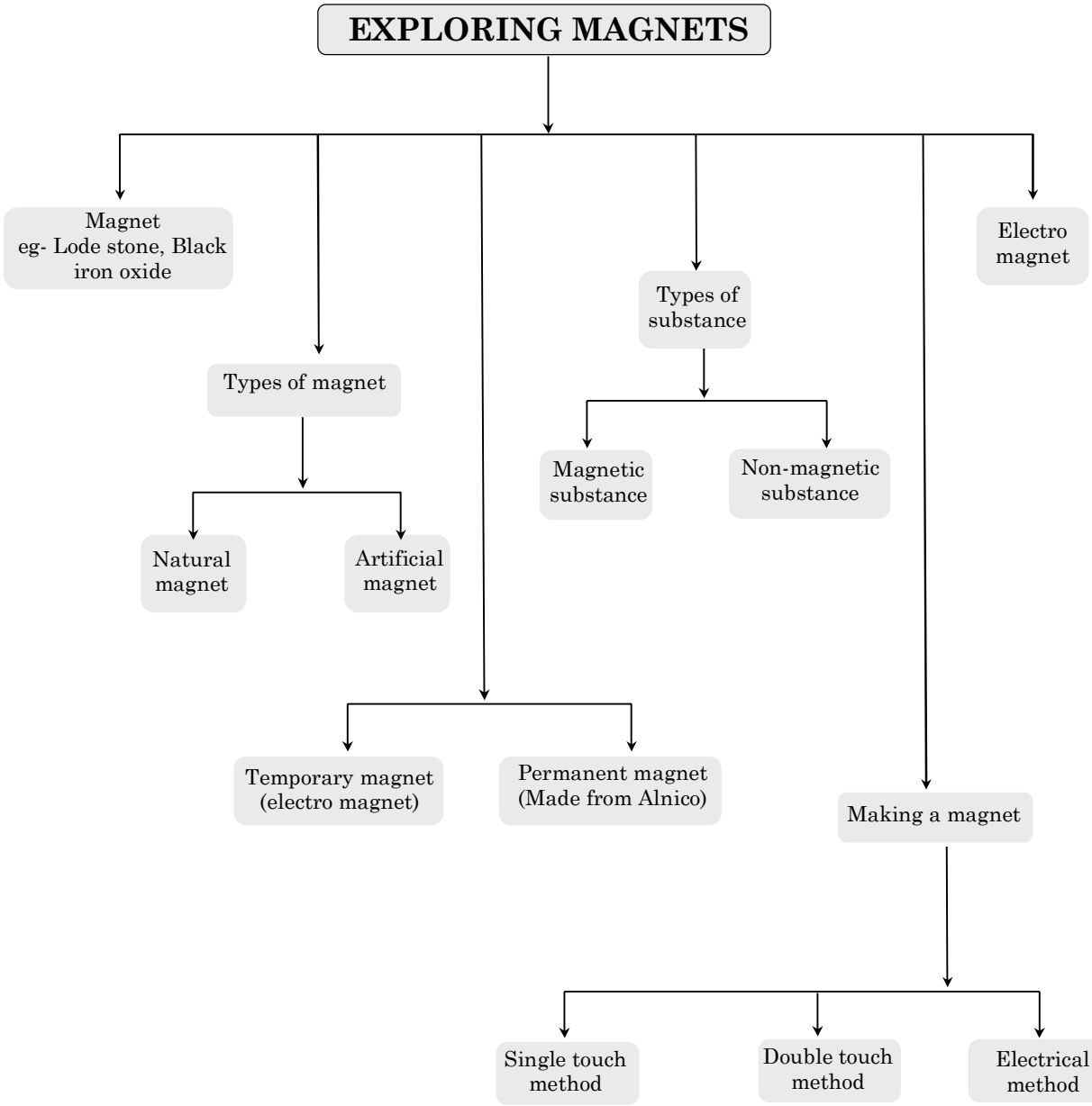
- Magnet
- Types of magnet
- Types of Materials
- Properties of magnet
- Permanent and Temporary Magnets
- Making a magnet
- Electromagnet
- Magnetic compass
- Fun with magnets
- Safety measures for magnets







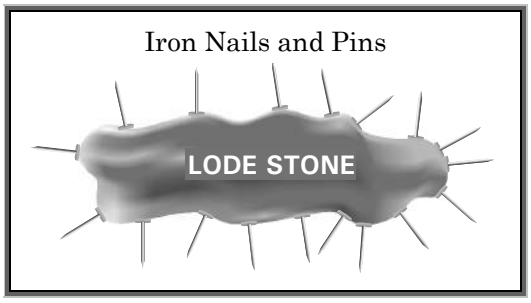
MIND MAP


EXPLORING MAGNETS
Magnet
eg- Lode stone, Black iron oxide
Types of magnet
Natural magnet
Artificial magnet
Types of substance
Magnetic substance
Non-magnetic substance
Electro magnet
Temporary magnet (electro magnet)
Permanent magnet (Made from Alnico)
Making a magnet
Single touch method
Double touch method
Electrical method

EXPLORING MAGNETS

Magnet

A mineral was discovered in the town of **Magnesia** in Northern Greece about 4000 years ago, which was found to have a wondrous property. It could attract pieces of iron towards it. This mineral is called **magnetite**. Further it was found that thin strips of magnetite always align themselves in a particular direction when suspended freely in air. It was found that magnetite is mainly composed of oxides of iron **(Fe_3O_4)**. Magnetite is the world's first magnet. It is also called natural magnet or lodestone.



◈ Types of Magnet

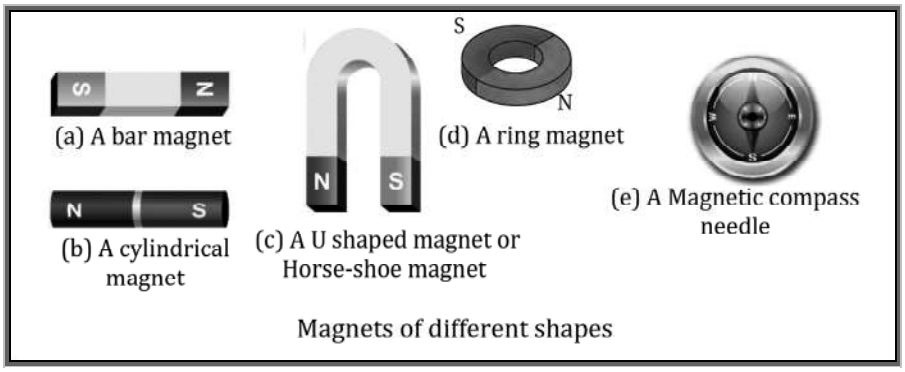
- **Natural magnet:** A magnet which occurs naturally and is not made by any artificial means is called a natural magnet.

  e.g.: **Magnetite**, which is an ore of iron **[Fe_3O_4]**.

- **Artificial magnet:** A substance to which properties of the natural magnet are imparted by artificial means is called artificial magnet.

  e.g.: The magnets made from **iron, steel, cobalt and nickel**.

  Nowadays, magnets are made in different shapes such as rectangular bar, cylindrical bar, U-shaped or horse-shoe shaped, ring-shaped and magnetic compass needle.

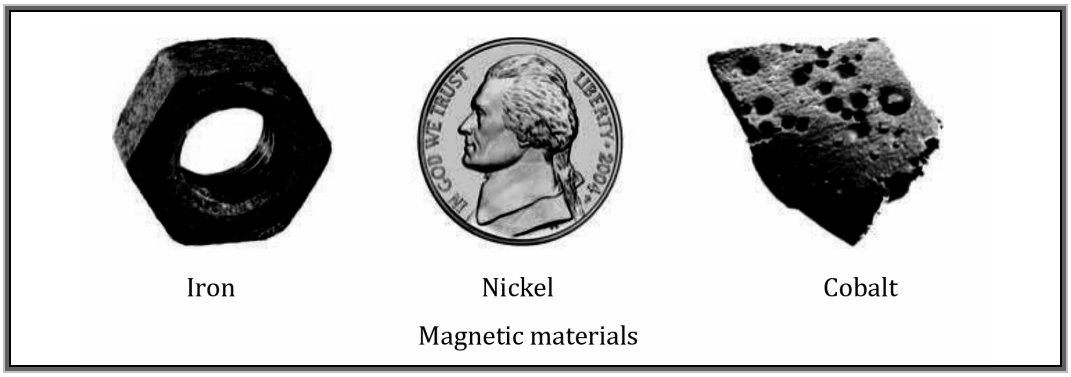


Types of Materials

◈ Magnetic Materials

Those substances that are attracted by magnets are called magnetic substances.

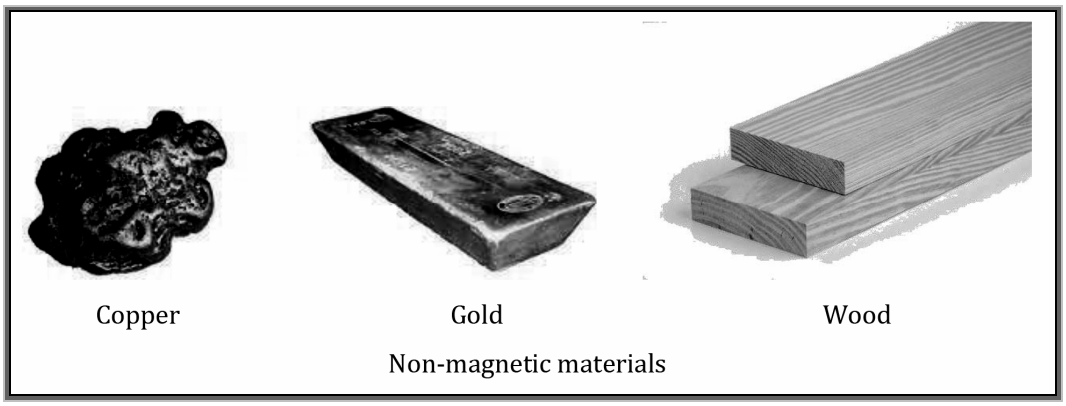
e.g.: Iron, nickel, cobalt, steel etc.



◈ Non-Magnetic Materials

Those substances that are not attracted by magnets are called non-magnetic substances.

e.g.: Plastic, rubber, glass, copper, silver, gold, wood etc.



Activity (NCERT)

Aim : To identify which materials are attracted to a magnet and classify them as magnetic or non-magnetic.

Materials Required :

- Different objects made of various materials (e.g. iron nail, aluminium foil, copper wire, key, plastic ruler, wooden pencil, glass tumbler.
- A bar magnet or U-shaped magnet.

Procedure :

- **Prediction :**
  - Examine each object and predict whether it will stick to the magnet.
  - Record your predictions in the observation table under the "Prediction" column (Yes/No).
- **Testing with Magnet :**
  - Hold the magnet and bring it close to each object one by one.
  - Observe whether the object is attracted to the magnet or not.
  - Record your observations in the "Observation" column (Yes/No).
  - Compare your predictions with the actual observations.
  - Identify which materials are magnetic (attracted to the magnet) and which are non-magnetic (not attracted).

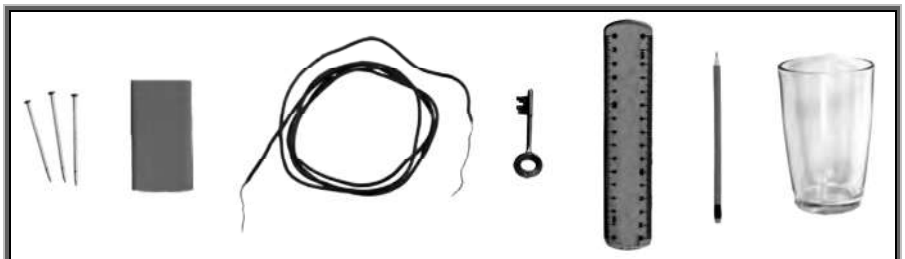


Fig. : Identifying the materials attracted by a magnet

Observation Table :

Name of Object	Material	Prediction (Yes/No)	Observation (Yes/No)
Iron nail	Iron		
Aluminium foil	Aluminium		
Copper wire	Copper		
Key	Steel (Iron alloy)		
Plastic ruler	Plastic		
Wooden pencil	Wood		
Glass tumbler	Glass		

Conclusion :

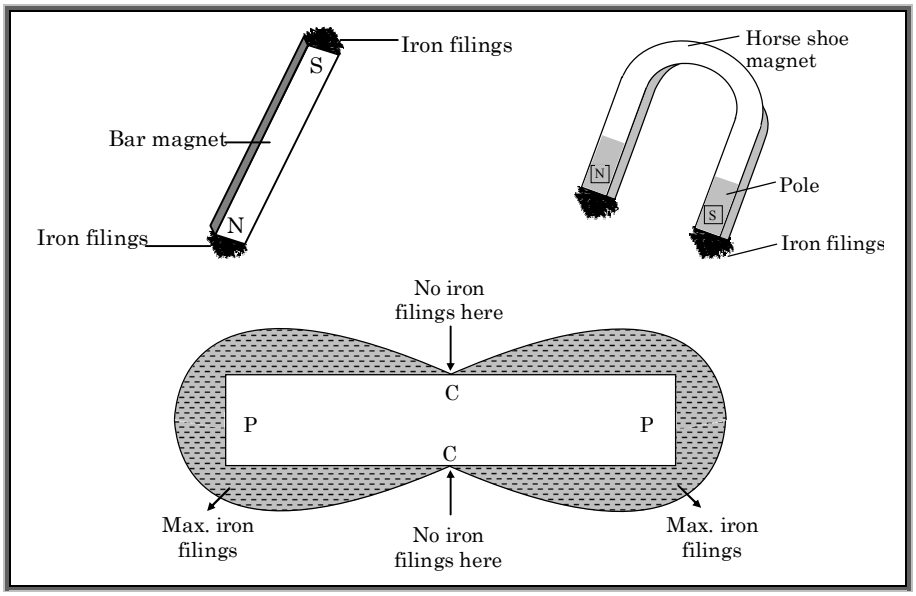
- **Magnetic Materials (Attraction to Magnet) :**
  Iron nail, key.
- **Non-Magnetic Materials (Not Attracted) :**
  Aluminium foil, copper wire, plastic ruler, wooden pencil, glass tumbler.

Properties of a Magnet

(i) Attractive property : It attracts small pieces of iron towards it i.e. it has attractive property.

Activity : Spread out some iron filings over a sheet of paper. Now, move a bar magnet over the filings taking care that all parts of the magnet move through iron filings and observe how the iron filings are distributed all over the magnet.

You will notice that most of the iron filings cling near the ends of the magnet while there are a few iron filings near the middle (see figure).



Repeat the experiment with a horse–shoe magnet. You will find that all magnets have maximum attractive power at its ends.

Poles of magnet: The points on the magnet which have maximum attraction property are called poles of the magnet. The poles of the magnet lie slightly inside from the end.

(ii) Directional property: When magnet suspends freely, it always points in north-south direction. Thus, magnet possesses directional property.

Activity (NCERT)

Aim : To see how a freely suspended magnet indicates directions.

Materials Required : Bar magnet, String/thread, Paper/marker for marking positions.

Procedure :

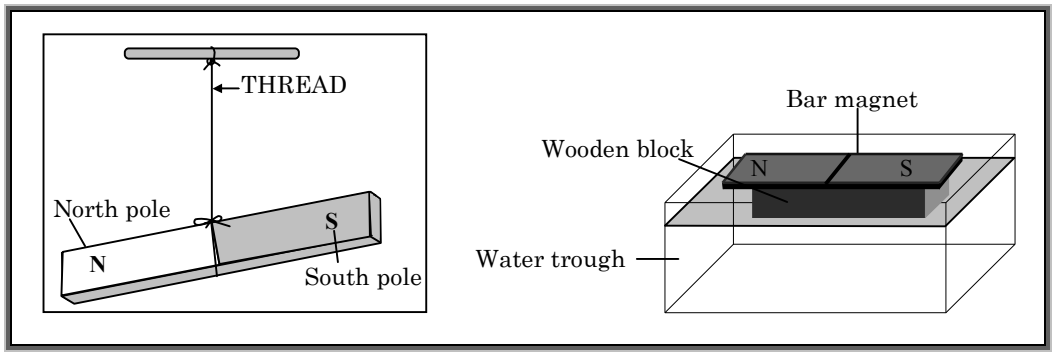
1. Tie the string to the centre of the bar magnet.
2. Suspend it freely so it hangs horizontally.
3. Rotate it gently and let it settle.
4. Mark the resting direction of the magnet.
5. Rotate it again; allow it to settle once more.
6. Check whether it rests along the same line.

Observation :

- Each time, the magnet comes to rest in the same direction.
- One end consistently points towards the north, the other towards the south.

Conclusion :

- A freely suspended magnet always rests in the north–south direction because Earth itself behaves like a magnet.
- This property allows magnets to be used for finding directions.

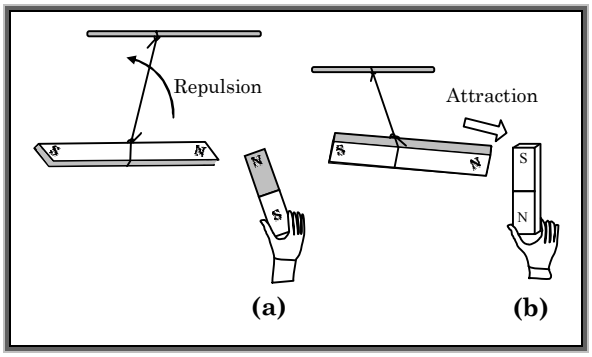


The end of the magnet pointing towards the North is called North Pole (N-Pole) and the other end of the magnet pointing towards the South is called South Pole (S-Pole).

(iii) Forces between the poles of two magnets : Like poles of magnet repel each other and unlike poles attract each other.

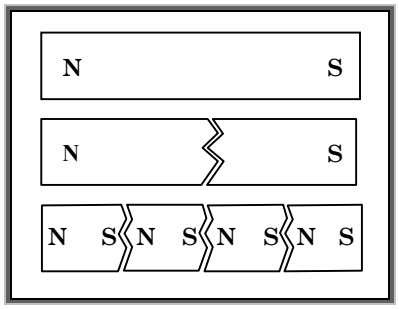
Activity : Take two bar magnets. Suspend one magnet with a piece of thread. It will come to rest in the north-south direction. Hold the other magnet in your hand and bring its north pole near the north pole of the suspended magnet, as shown in figure(a). What do you see? You will find that the north pole of the suspended magnet is repelled, i.e., north pole moves away.

Now bring the south pole of the magnet in hand near the north pole of the suspended magnet(figure-b) You will find that the north pole of the suspended magnet will be attracted towards the south pole of the other magnet, i.e., north pole of the suspended magnet will come close to the south pole of the magnet in hand.



We, therefore, conclude from this activity that like poles repel and unlike poles attract each other.

(iv) Magnetic poles always exist in pairs : If a bar magnet is broken into two pieces you will see that each piece behaves as a whole magnet. This shows that new poles are formed at the broken ends as shown in the figure. If these pieces are broken again, each smaller piece still remains a whole magnet with two opposite poles. Even a very small piece of a magnet is a whole magnet. Thus, we see that even the smallest piece of a magnet has north and south poles and we cannot separate the two poles.



We, therefore, conclude that the poles of a magnet cannot be separated. Magnetic poles always exist in pairs.

COMPETITIVE LEVEL

Magnetic field and Magnetic field Lines

A region of influence surrounding a magnet, in which other magnets or materials like iron are affected by magnetic forces is called '**magnetic field**'.

Magnetic field line is an imaginary line such that tangent to it at any point gives the direction of magnetic field at that point in space. Magnetic field lines are drawn to represent magnetic field. Magnetic field lines can be drawn with the help of magnetic compass. Magnetic field lines are also called as magnetic lines of force.

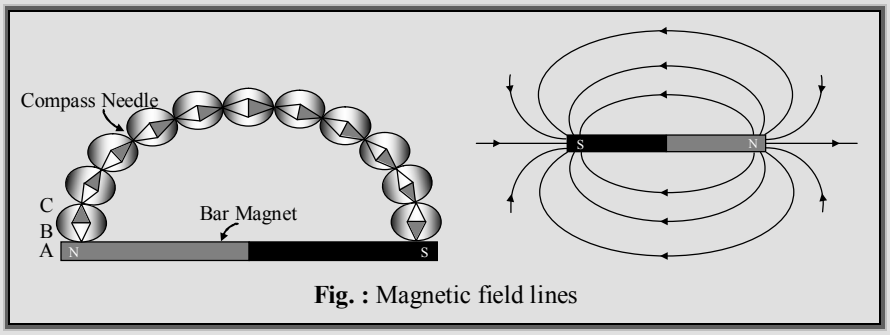


Fig. : Magnetic field lines

- **Properties of Magnetic field lines**

  (i) They form closed continuous curves.

  (ii) Externally, they move from north pole of a magnet to its south pole.

  (iii) Inside the magnet they move from south pole to north pole.

  (iv) Magnetic lines of force do not intersect each other because at the intersect point there are two directions possible for magnetic field, which is not true.

Permanent and Temporary Magnets

◈ Permanent Magnets

The magnets which retain their magnetism for a very long time are called permanent magnets. The permanent magnets are generally made from steel. More powerful permanent magnets are made from **ALNICO**, an alloy of **aluminium, nickel** and **cobalt** or from **ferrite**. The ferrite made permanent magnets are quite strong.

◈ Temporary Magnets

The magnets which cannot retain their magnetism for a long time are called temporary magnets. The temporary magnets are made from the **soft iron**.

e.g.: Electromagnet.

Making A Magnet

The methods by which an ordinary piece of any magnetic material, like iron or steel, can be made a magnet by single touch method, double touch method and electrical method. Let us study each method separately.

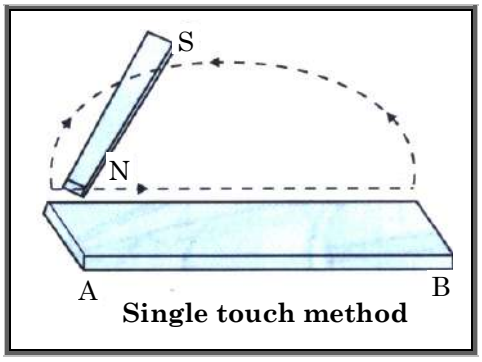
◈ Single touch method

A piece of any magnetic material, like iron or steel (a nail, knitting needle, bolt, etc.), is taken and placed on a bench or a tale. A bar magnet is brought close to the magnetic material (say an iron piece AB). One end of the bar magnet is stroked against it, moving from end A to end B of the iron piece.

When the bar magnet reaches end B, it is lifted and the stroke repeated from end A to end B, it is lifted and the stroke repeated from end A to B. This procedure is repeated several times, keeping two things in mind.

(i) The same pole of the bar magnet should be used every time.

(ii) Strokes should be in the same direction.

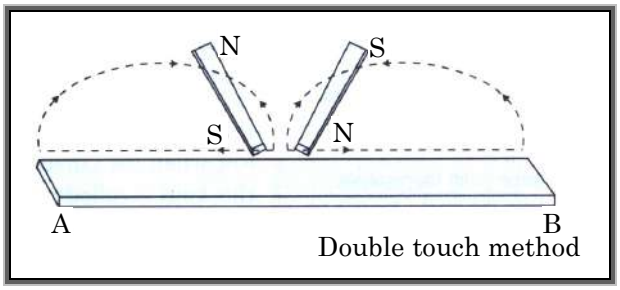


Single touch method

By Stroking the iron piece with the north pole of the bar magnet, end A becomes the north pole and end B the south pole.

◈ Double touch method

The iron piece to be magnetized, say AB, is placed on a bench and two bar magnets of equal strengths are taken. Here, the opposite poles of both the magnets are stroked, at the same time, from the centre to the opposite ends of the iron piece being magnetized. This step is repeated may times.



Double touch method

Then, the end A of the iron piece becomes the north pole and end B becomes the south pole.

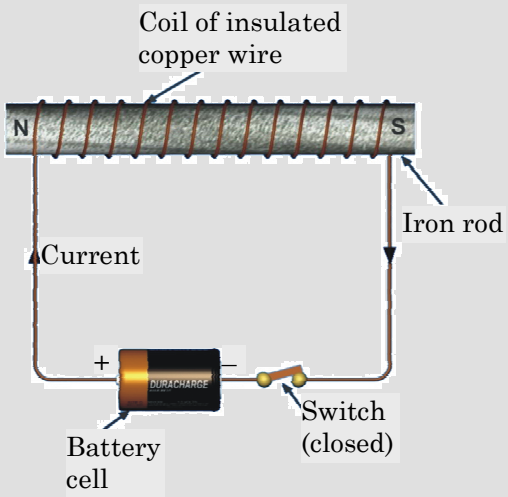
COMPETITIVE LEVEL

◈ Electrical method

- **Electromagnet :**

  Hans Christian Oersted, a Danish scientist, discovered in 1819 that a wire carrying electric current behaves like a magnet. This discovery provided the best method to make magnets by using an electric current.

  An **electromagnet** is a coil of wire wrapped around an iron core. When an electric current flows through the coil, it creates a magnetic field. This produces temporary magnetism in the iron core. Thus, magnetism of current carrying coil and iron core together produces a strong magnetic field. When the current stops, the iron core is no longer magnetised and there is no magnetic field due to the coil.



- **Applications of Electromagnet :**

  (i) In factories very strong electromagnets are used with cranes for lifting very heavy iron ingots and steel scraps, from one place to other.

Fig. Crane Lifting Iron

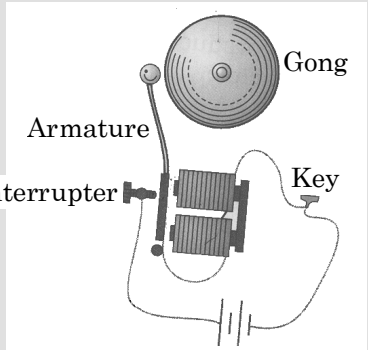


Fig. An electric bell

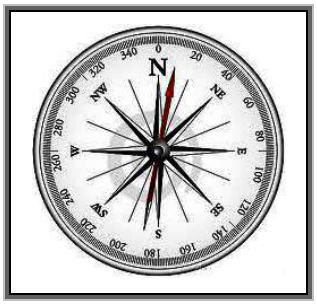
  (ii) In hospitals they are used for removing small steel splinters from the eyes of a patient.

  (iii) In office and houses they are used in electric bells.

  (iv) To separate iron ore from muddy impurities in metallurgical industries.

The Magnetic Compass

When people think of instruments that help with direction finding, the first one that strikes to mind is probably the magnetic compass. It is the oldest instrument for navigation and has been a vital tool for navigators at sea for centuries. The compass allows ships to steer a selected course. By taking bearings of visible objects with a compass, the navigator is also able to fix a ship's position on a chart.



◈ Where was the compass first used?

The Chinese were probably aware that an iron bar stroked with a lodestone acquired a directional north-south property as long as 2000 years ago. However, the precise date at which this knowledge was used to create the first magnetic compass is unknown. By the 10th century, the idea had been brought to Europe, probably from China, by Arab traders. Magnetic compasses of a very simple kind were certainly in use in the Mediterranean as early as the 12th century. However, early compasses were not very reliable. Although the magnetic compass was in general use in the Middle Ages, little was known about precisely how it worked.

A compass is an extremely simple device. A **magnetic compass** (as opposed to a gyroscopic compass) consists of a small, lightweight magnet balanced on a nearly frictionless pivot point. The magnet is generally called a **needle**. One end of the needle is often marked "N," for north, or coloured in some way to indicate that it points toward north. On the surface, that's all there is to a compass.

Note : *Modern compasses usually use a magnetized needle or dial inside a capsule completely filled with fluid (oil, kerosene or alcohol is common). The fluid dampens the movement of the needle and causes it to stabilize quickly rather than oscillate back and forth around magnetic north. North on the needle or dial, as well as other key points are often marked with self-luminous materials to enable the compass to be read at night or in poor light.*

Activity (NCERT)

Aim : To construct a simple magnetic compass using a magnetized needle and observe its directional behaviour.

Materials Required :

- Sewing needle (iron)
- Cork piece
- Iron filings/pins (for testing magnetisation)
- Strong bar magnet
- Bowl of water
- wooden table.

Procedure :

1. Place the needle on a table.
2. Stroke one end of the magnet from one end of the needle to the other, lifting it after each stroke.
3. Repeat 30–40 times using the same pole of the magnet and in the same direction of stroke.
4. Bring iron filings near the needle to check if it has become magnetic.
5. Push the needle through the cork horizontally.
6. Float the cork gently in a bowl of water.
7. Allow the needle to settle.

Fig. : (a) Making an iron needle a magnet

Fig. : (b) A compass needle in bowl of water

Observation :

- The needle attracts small iron filings, showing magnetisation.
- When floating, the needle aligns itself in one fixed direction every time.

Conclusion :

A magnetised needle acts as a simple compass needle and always rests in the north–south direction.

Do You Know ?

- A long time ago, Indians used a navigation device called **matsya-yantra**. It was a magnetised fish-shaped iron piece floating in oil, working like a compass to show direction.

Fig. : Matsya-Yantra

- In some magnets, the North and South poles are marked as N and S. In some other magnets, the North pole is indicated by a white dot. Sometimes, the North pole of magnet is painted red and South pole is painted blue.

Can the magnetic effect act through non-magnetic material ?

Activity (NCERT)

Aim : To find out whether magnetic influence can pass through non-magnetic materials.

Materials Required :

- Magnetic compass
- Bar magnet
- Sheets of wood
- Cardboard
- Plastic
- Glass

Procedure :

1. Place compass and magnet so the needle deflects.
2. Without moving either, insert a sheet of wood between them.
3. Note any change.
4. Repeat using cardboard, plastic, and glass.

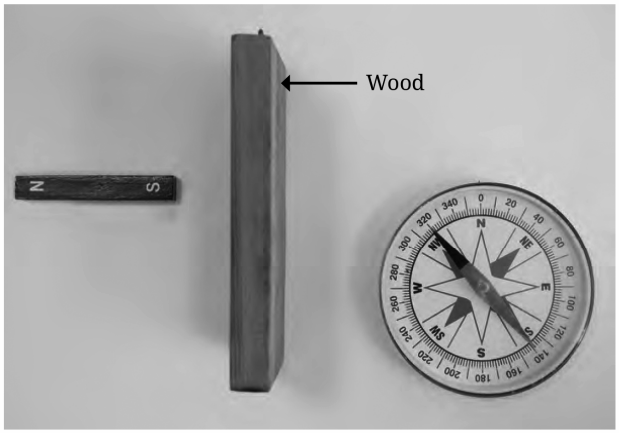


Fig.: Compass needle and a magnet with a piece of wood in between

Observation :

For all materials (wood, cardboard, plastic, glass), the compass needle shows almost the same deflection.

Conclusion :

Magnetic influence can pass through non-magnetic materials like wood, cardboard, plastic, and glass.

Fun With Magnets

Magnetic effect can act through non magnetic materials. This property of magnet can be used in picking out a steel paper clip fallen in water. We can make magnetic garland using a magnet. We can take steel balls out of the maze by moving a magnet below the cardboard tray.

Fig. : Steel paperclip in water

Fig. : Magnetic garland

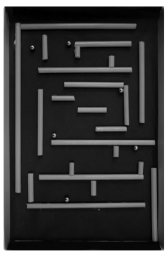
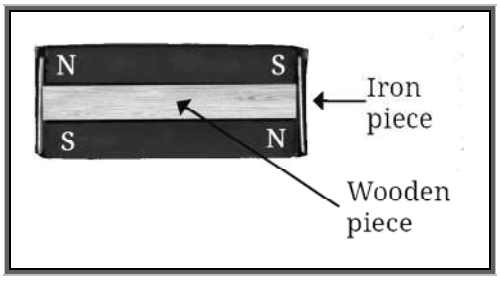


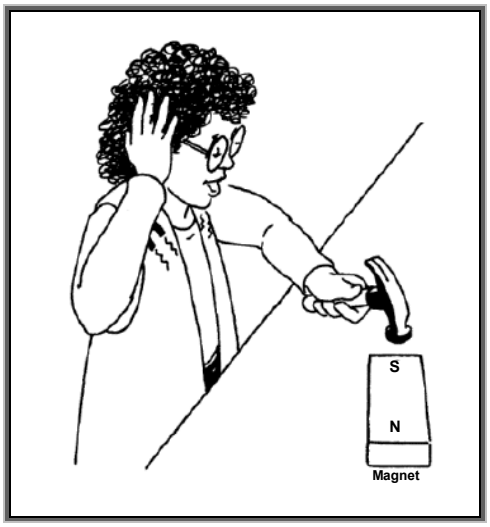
Fig. : Steel balls in a maze

Safety measures for magnets

(A) Magnets tend to become weak after some time. This weakening is called **self-demagnetisation**. A **magnetic keeper** is a piece of iron that is temporarily added between the north and south poles of a magnet to prevent it from demagnetising. Keepers also have a useful safety function, as they stop external metal being attracted to the magnet.



(B) Magnets should not be heated at high temperatures, repeatedly hammered or dropped from some height. This is because by doing so, they loose their magnetism.



(C) Keep magnets away from the cassettes, mobiles, television, music system, compact disks (CDs) and the computer.

Chapter at a glance

- Magnets attract only certain materials, mainly iron, nickel, and cobalt, while substances like wood, plastic, paper, glass, and aluminium show no magnetic attraction.
- Every magnet has two poles north and south, these ends are the strongest parts of a magnet.
- When two magnets are brought close, unlike poles attract each other while like poles repel, and this repulsion is the most reliable method to test whether an object is a magnet.
- If a magnet is broken into pieces, each piece still forms its own north and south poles.
- A freely suspended magnet always settles in the north–south direction because Earth itself acts like a giant magnet, and this behavior forms the basis of a magnetic compass.
- Along with permanent magnets, there are also electromagnets, which are magnets created by passing electric current through a coil of wire wound around an iron core.
- Electromagnets can be made stronger or weaker by adjusting the current, and they are widely used in cranes, electric bells, motors, and many household appliances.
- Magnets must be handled carefully because they can lose their strength if they are dropped, hammered, or heated.
- Storing magnets with opposite poles facing each other, along with soft iron keepers, helps maintain their magnetism.
- Many everyday items—like fridge doors, bag locks, toys, speakers, and simple scientific instruments—work using the basic principles of magnetism and the behavior of both permanent magnets and electromagnets.

NCERT Exercise

[Let Us Enhance Our Learning]

Q.1 Fill in the blanks :

(i) Unlike poles of two magnets each other, whereas like poles each other.

(ii) The materials that are attracted towards a magnet are called .

(iii) The needle of a magnetic compass rests along the direction.

(iv) A magnet always has poles.

Q.2 State whether the following statements are True (T) or False (F).

(i) A magnet can be broken into pieces to obtain a single pole. [ ]

(ii) Similar poles of a magnet repel each other. [ ]

(iii) Iron filings mostly stick in the middle of a bar magnet when it is brought near them. [ ]

(iv) A freely suspended bar magnet always aligns with the north-south direction. [ ]

Q.3 Column I shows different positions in which one pole of a magnet is placed near that of the other. Column II indicates the resulting interaction between them for different situations. Fill in the blanks.

Column-I	Column-II
N – N	----------
N – ----------	Attraction
S – N	----------
---------- – S	Repulsion

Q.4 Atharv performed an experiment in which he took a bar magnet and rolled it over a heap of steel U-clips (Fig.).

According to you, which of the options given in Table is likely to be his observation?

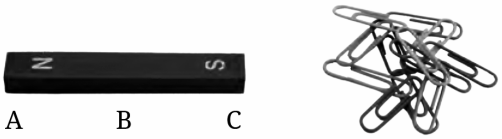


Fig. : Bar magnet and heap of steel U-clips

Table : Number of pins attracted by the magnet at its various positions

	Position A	Position B	Position C
(i)	10	2	10
(ii)	10	10	2
(iii)	2	10	10
(iv)	10	10	10

Q.5 Reshma bought three identical metal bars from the market. Out of these bars, two were magnets and one was just a piece of iron. How will she identify which two amongst the three could be magnets (without using any other material)?

Q.6 You are given a magnet which does not have the poles marked. How can you find its poles with the help of another magnet which has its poles marked?

Q.7 A bar magnet has no markings to indicate its poles. How would you find out near which end its North pole is located without using another magnet?

Q.8 If the earth is itself a magnet, can you guess the poles of earth's magnet by looking at the direction of the magnetic compass?

Q.9 While a mechanic was repairing a gadget using a screw driver, the steel screws kept falling down. Suggest a way to solve the problem of the mechanic on the basis of what you have learnt in this chapter.

Q.10 Two ring magnets X and Y are arranged as shown in Figure. It is observed that the magnet X does not move down further. What could be the possible reason?

Suggest a way to bring the magnet X in contact with magnet Y, without pushing either of the magnets.

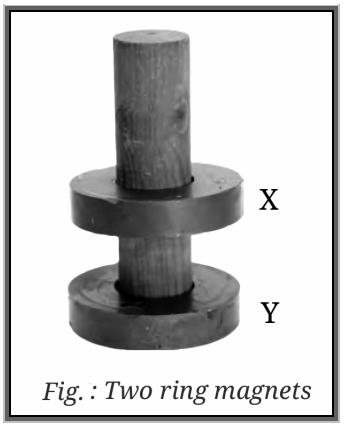


Fig. : Two ring magnets

Q.11 Three magnets are arranged on a table in the form of the shape shown in Figure. What is the polarity, N or S, at the ends 1, 2, 3, 4 and 6 of the magnets? Polarity of one end (5) is given for you.

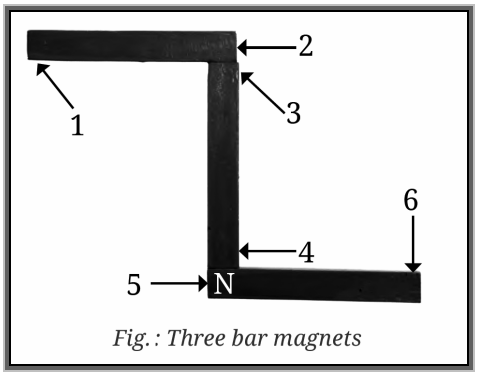


Fig. : Three bar magnets

Exercise -1

➢ Very Short Answer Type Questions

Q.1 Your mother was stitching your shirt. The needle slipped from her hand into a box containing buttons, threads etc. How would you search for the needle?

Q.2 What happens when a pole of a bar magnet say its north-pole is marked with a chalk and suspended freely? What do you observe on rotating the bar magnet?

Q.3 One feels a pull while opening or closing the door of a refrigerator. What can be the possible reason?

Q.4 What is a permanent magnet?

Q.5 How do the counters in a ludo game stick to its iron board?

➢ Short Answer Type Questions

Q.6 Why is compass needle kept in a closed glass vessel?

Q.7 What happens when the north-pole of a magnet is brought near
(i) north-pole,
(ii) the south-pole of a freely suspended magnet?

Q.8 Can we isolate north-pole or south-pole, explain in brief?

Q.9 How do the properties of a permanent magnet get destroyed?

Q.10 Why is there a circular magnet near the mouth of some pin holders?

➢ Long Answer Type Questions

Q.11 Discuss the any one method for making a magnet.

Q.12 Discuss the properties of bar magnet.

Q.13 Can a magnet be demagnetized? How?

Q.14 How can you show that unlike poles attract each other while like poles repel each other?

Q.15 Bhawana witnessed on interesting game at the fair. A duck was floating in a tub. When a plate containing some grains of rice was brought close to the duck, the duck moved towards the plate. But, when a plate containing some pebbles was brought close to the duck, it moved away from the plate. She asked her teacher for explanation about the same next day. Explain how this could have been possible. What values shown by Bhawana?

➢ Fill in the Blanks

Q.16 (i) …….. are used in doorbells, telephones, and computers.

(ii) A …… magnet is also known as U-shaped.

(iii) The materials, which are attracted towards a magnet are called…….

(iv) Paper is not a ……material.

(v) In olden days, sailors used to find direction by suspending a piece of ……

➢ True or False

Q.17 (i) Magnets are used in special trains called Maglev.

(ii) If we break a magnet into two, we will get one piece having only the north pole and another piece having only the south pole.

(iii) Bar magnets always point towards North-South direction.

(iv) A compass can be used to find North-South direction at any place.

(v) Rubber is a magnetic material.

➢ Match the Column

Q.18

Column-A		Column-B	
(a)	N-N	(i)	Ebonite
(b)	Non magnetic	(ii)	Attraction
(c)	S-N	(iii)	Cobalt
(d)	Electromagnet	(iv)	Repulsion
(e)	Magnetic Substance	(v)	Soft iron

Exercise -2

Q.1 Magnets attract
(A) wood (B) any metal
(C) plastics (D) iron

Q.2 In which of these shapes can we have a magnet?
(A) Ring (B) Bar
(C) Horseshoe (D) All of these

Q.3 A freely suspended magnet will align itself
(A) along the earth's equator
(B) perpendicular to the line joining the earth's North Pole and South Pole
(C) in any direction
(D) along the line joining the earth's North Pole and South Pole

Q.4 A device consisting of a small magnetic needle used to find directions on the earth's surface is called
(A) a magnetometer
(B) a magnet
(C) a magnetic compass
(D) a pathfinder

Q.5 When two magnets are brought close together,
(A) like poles attract and unlike poles repel each other
(B) attraction or repulsion depends on the orientation of the magnets
(C) like poles repel and unlike poles attract each other
(D) attraction or repulsion depends on the shape of the magnets

Q.6 The chemical formula of magnetite (natural magnet) is:
(A) Fe_2O_3 (B) Fe_3O_4 (C) FeO (D) FeO2

Q.7 The poles of the magnet always exist in
(A) pairs (B) single
(C) both (A) and (B) (D) cant say

Q.8 The magnet can be demagnetised by
(A) hammering
(B) heating
(C) dropping from height
(D) all of these

Q.9 Which of the following statements is true?
(A) An electromagnet does not attract a piece of iron.
(B) An electric current flowing in a circuit does not deflect a magnetic needle.
(C) An electromanget is a permanent magnet.
(D) An electromagnet can be used to separate plastic bags from a garbage heap

Q.10 If there are 3 bar magnets, the total number of poles will be:
(A) 2 (B) 6 (C) 3 (D) 4.

Q.11 Which scientist discovered that current carrying wire behave as magnet?
(A) Newton
(B) Hans Christian Oersted
(C) Einstein
(D) Faraday

Q.12 Coloured part of the needle of magnetic compass represents
(A) north (B) south
(C) east (D) west

Q.13 ALNICO is an example of ---------- magnet
(A) permanent (B) temporary
(C) both (A) and (B) (D) none of these

Q.14 Electromagnet is an example of ---------- magnet
(A) permanent (B) temporary
(C) both (A) and (B) (D) none of these

Q.15 A freely suspended magnet always align itself along the
(A) north-south direction.
(B) north -east direction
(C) south-east direction
(D) east -west direction

Q.16 Which one of these is temporary magnet?
(A) Bar magnet
(B) Electromagnet
(C) U shaped magnet
(D) Horse-shoe magnet

Q.17 Which of the following is/are non magnetic materials:

(A) plastic (B) glass
(C) rubber (D) all of these

Q.18 Where is the force of attraction of a magnet the maximum?

(A) At all sides
(B) All over the magnet
(C) At its poles
(D) At its centre

Q.19 In which direction does a magnet always point when suspended freely?

(A) South-West
(B)North-South
(C) East-West
(D) West-South

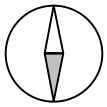
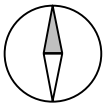
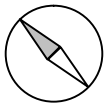
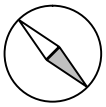
Q.20. Where does a compass work?

(A) Only in oceans or seas.
(B) Only on land, where the earth's magnetic field is strong.
(C) Only on high mountains.
(D) At all the places within the earth's magnetic field.

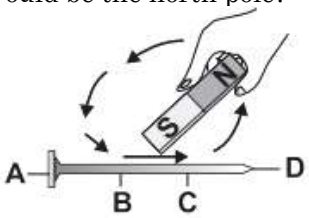
Exercise -3

(Previous Year Olympiad Questions)

Q.1 A compass is placed between two magnets as shown in the diagram. Magnet X is stronger than magnet Y. In which direction will the compass needle point?

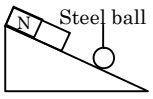
(A) 
(B) 
(C) 
(D) 

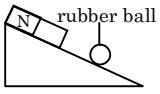
Q.2 An iron nail was magnetized using the method shown here. Which part of the iron nail would be the north pole?

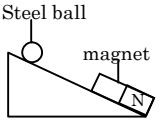


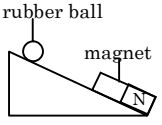
(A) A (B) B (C) C (D) D

Q.3 The diagrams given below show a steel ball, a rubber ball and a magnet placed at different position on a slope. In which one of the following diagrams would the ball roll down the slope the fastest?

(A) 

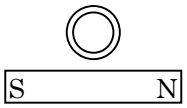
(B) 

(C) 

(D) 

Q.4 A student tries to magnetise a short steel rod. Which of the following tests will show that he has succeeded?
(A) Both ends of a magnet attract the rod
(B) One end of a magnet repels the rod
(C) The rod picks up a small piece of paper
(D) When freely suspended, the rod points in any direction

Q.5 A small compass is placed beside the middle of a bar magnet.

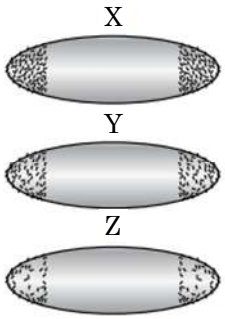


In which direction will the compass needle point?

(A) 
(B) 
(C) 
(D) 

Q.6 If a piece of metal was thought to be a magnet, which one of the following observations would offer conclusive evidence?
(A) It attracts a known magnet
(B) It repels a known magnet.
(C) It attracts a steel screw driver.
(D) None of these

Q.7 Three magnets X, Y and Z were dipped one by one in a heap of iron filings. Figure shows the amount of the iron filings stick to them. The strength of these magnets will be in the order



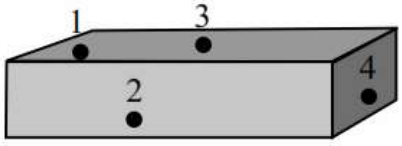
(A) X > Y > Z (B) X < Y < Z
(C) X = Y = Z (D) X < Y > Z

Q.8 To demagnetise a magnet using the heating method which of the following is the correct step?
(A) Heat the magnet to become red hot, and allow it to cool in the east-west direction
(B) Heat the magnet to become red hot and allow it to cool in the north-south direction
(C) Heat the magnet in boiling water and allow it to cool in the north-south direction
(D) Both A and B

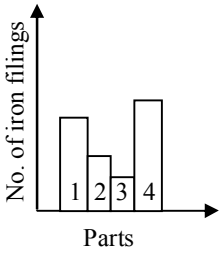
Q.9 The north pole of a bar magnet picks up an iron nail. Which of the following options is correct regarding the pole(s) induced in the nail?

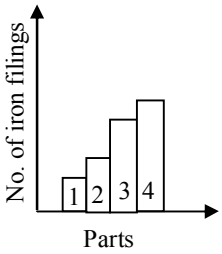
(A) South pole only
(B) North pole only
(C) A north pole and a south pole
(D) None of these

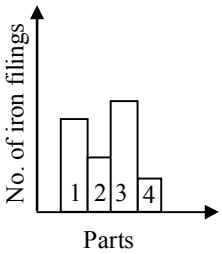
Q.10 Beena spread some iron filings uniformly on a sheet of paper. Now, she placed the given magnet on the sheet.

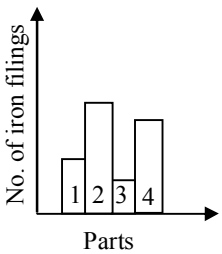


Which of the following bar graphs correctly represent the number of iron filings stick to various parts of the magnet?

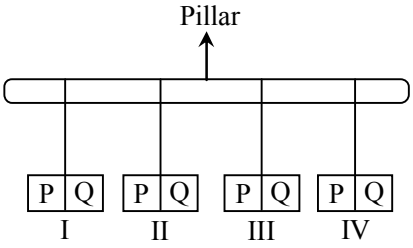
(A)


(B)


(C)


(D)


Q.11 Arpita suspends four bars of different materials from a pillar and bring the north pole of a bar magnet near part P and Q of each bar one by one as shown in the given figure. Then the records the observations, which are given below.

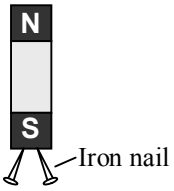


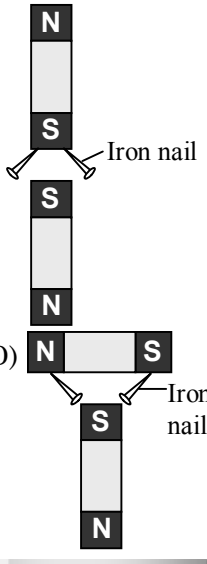
Bar	Magnet and part P	Magnet and part Q
I.	Repel	Attract
II.	Nothing happens	Nothing happens
III.	Attract	Repel
IV.	Attract	Attract

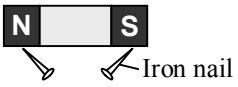
Which one of the following sets correctly represents bars I, II, III and IV?

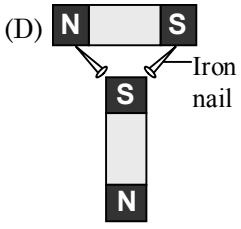
	Bar I	Bar II	Bar III	Bar IV
A.	Magnet	Wooden bar	Magnet	Iron bar
B.	Magnet	Iron bar	Magnet	Glass bar
C.	Stainless steel bar	Magnet	Iron bar	Magnet
D.	Magnet	Iron bar	Glass bar	Copper bar

Q.12 Which one of the following representations is incorrect?

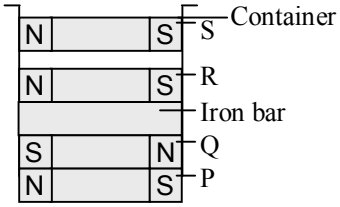
(A)


(B)


(C)


(D)


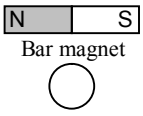
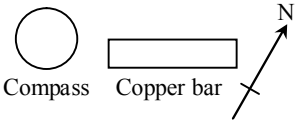
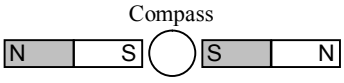
Q.13 Four magnets are kept in a container as shown in the given figure. Which of the following statements regarding this are correct?



(i) Magnets R and S must attract.
(ii) Magnetic field cannot pass through the iron bar.
(iii) Magnets Q and R must attract.
(iv) If the iron bar is removed then magnets R and Q will repel.

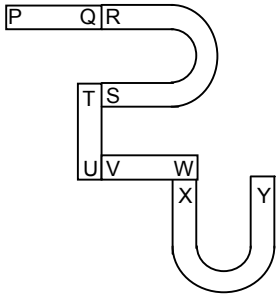
(A) I and II only (B) III only
(C) I and IV only (D) II and IV only

Q.14 In the given columns, column I shows the positions of a compass placed near a bar magnet(s) and a copper bar. While column II shows the direction in which the compass needle point. Match column I with column II and select the correct option from the given codes.

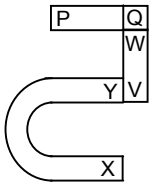
Column-I		Column-I	
(p)		(i)	
(q)		(ii)	
(r)		(iii)	
		(iv)	

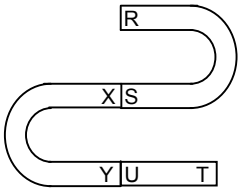
(A) (p)–(ii), (q)–(iv), (r)–(i)
(B) (p)–(ii), (q)–(iii), (r)–(iv)
(C) (p)–(iii), (q)–(i), (r)–(iv)
(D) (p)–(ii), (q)–(iv), (r)–(iii)

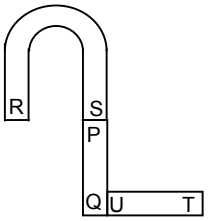
Q.15 The given figure represents the combination of five magnets which are attracted to one another.

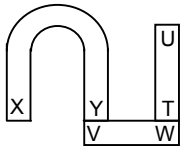


Which one of the following options represents the possible arrangement of the three magnets?

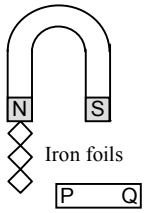
(A) 

(B) 

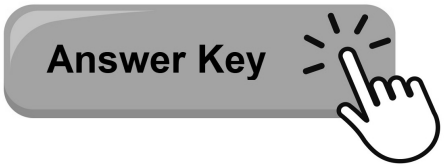
(C) 

(D) 

Q.16 A magnet attracts some iron foils as shown in the given figure. A rod PQ is placed near the lowest piece of iron foil. The foil repels the rod. What can be deduced from the given situation ?



(A) Q is a north pole
(B) P is a north pole
(C) P and Q are unmagnetised
(D) P and Q have same poles



EXERCISE - 1

➢ **Fill in the Blanks:**

16. (i). magnet
(ii). horse shoe
(iii). magnetic material
(iv). magnetic
(v). magnet

➢ **True & False:**

17. (i). True
(ii). False
(iii). True
(iv). True
(v). False

➢ **Match the Column:**

18. [a → (iv); b → (i); c → (ii); d → (v); e → (iii)]

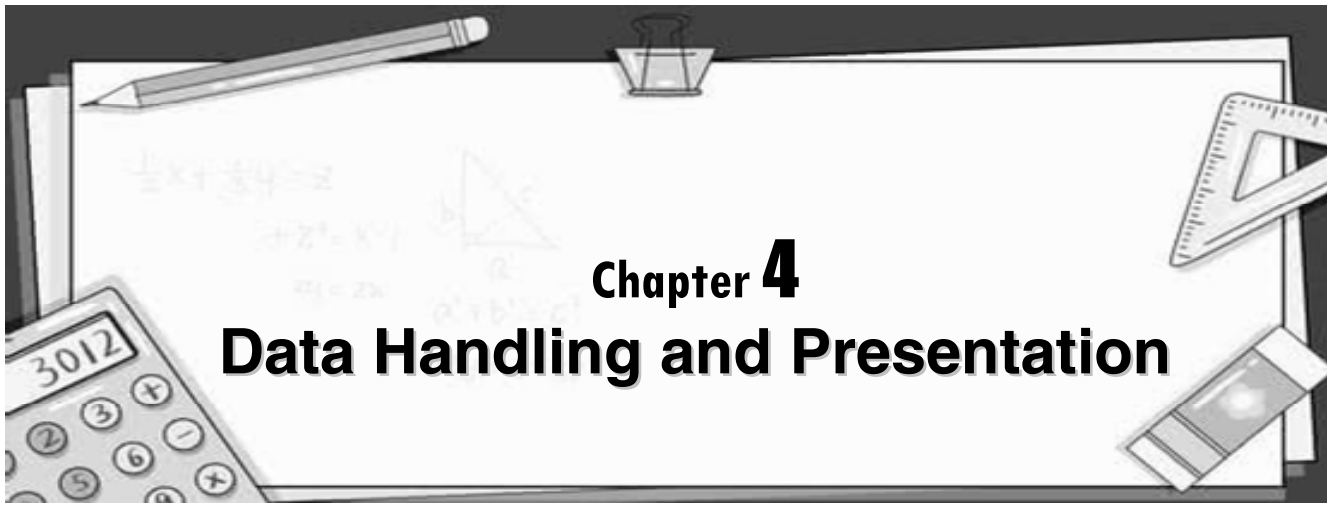
EXERCISE - 2

Ques.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Ans.	D	D	D	C	C	B	A	D	B	B	B	A	A	B	A
Ques.	**16**	**17**	**18**	**19**	**20**										
Ans.	B	D	C	B	D										

EXERCISE - 3

Ques.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Ans.	C	D	C	B	D	B	A	A	C	A	A	D	B	D	D
Ques.	**16**														
Ans.	B														

MATHEMATICS

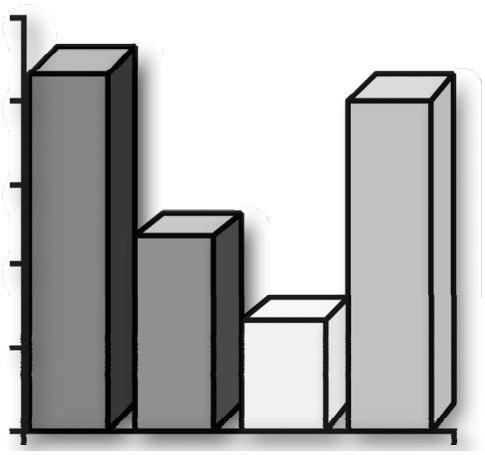


Chapter 4
Data Handling and Presentation

Chapter Outline

- ✧ **Introduction**
- ✧ **Organizing Data**
- ✧ **Representation of Data**
- ✧ **Artistic and Aesthetic Considerations**
- ✧ **Infographics**

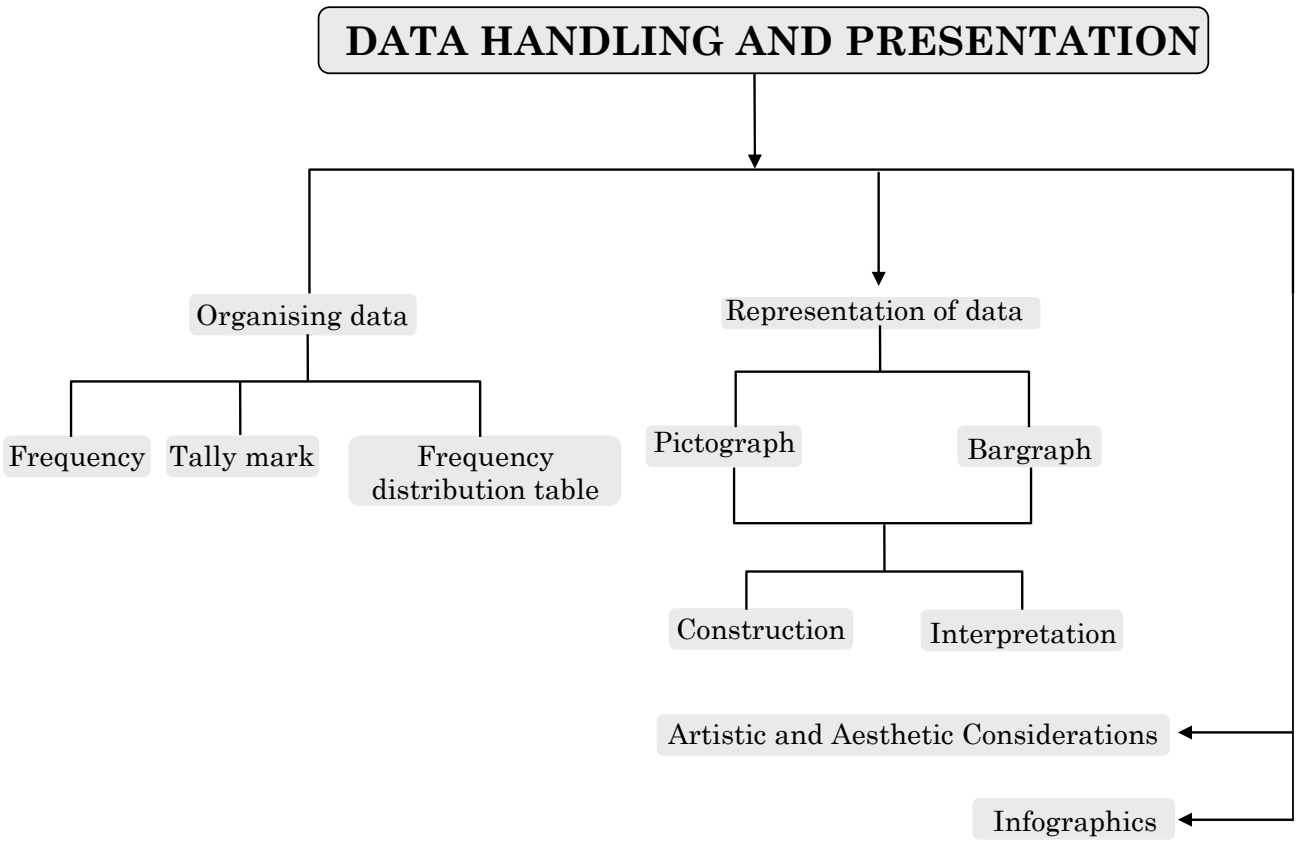
Sports	Tally	No of Students
Basketball	𝍸 |	6
Ice Hockey	𝍸	5
Baseball	𝍸	4
Soccer	||	2



One ● represents 5 toys

Name	Number of Toys
Tom	● ● ●
Dick	● ●
Harry	● ● ● ● ●
Bobby	● ● ● ●
Bunty	● ● ● ● ● ●

MIND MAP


DATA HANDLING AND PRESENTATION
Organising data
Frequency
Tally mark
Frequency distribution table
Representation of data
Pictograph
Bargraph
Construction
Interpretation
Artistic and Aesthetic Considerations
Infographics

DATA HANDLING AND PRESENTATION

Introduction

Facts or figures (numeric or alpha-numeric) collected with a definite purpose are called *data*. Data when collected is unorganized, in original form it is called **raw** data. Each of the items in the raw data is called an observation.

Information collected by the investigator herself or himself with a definite cause is called *primary data. When data is collected from secondary source (such as newspapers, magazines, television, internet, etc.) then it is called secondary data.*

Organising Data

Data available to us is in an unorganised form .To draw meaningful inferences, we need to organise the data systematically. After collection, data is condensed by organizing it in a tabular form using *tally marks*.

[| means 1 , || means 2 , ||| means 3 , |||| means 4 , 𝍸 means 5, 𝍸| means 6 and so on.]

For example, a group of students was asked for their favourite subject. The results were as listed below :

Art, Mathematics, Science, English, Mathematics. Art, English, Mathematics, English, Art, Science. Art, Science, Science, Mathematics, Art, English. Art, Science, Mathematics, Science, Art.

Which is the most liked subject and the one least liked ?

It is not easy to answer the question looking at the choices written haphazardly. We arrange the data in Table using tally marks.

Subject	Tally marks	Number of students
Art	𝍸 ||	7
Mathematics	𝍸	5
Science	𝍸 |	6
English	||||	4

The number of tallies before each subject gives the number of students who like that particular subject.

This is known as the **frequency** of that subject.

Frequency gives the number of times that a particular entry occurs.

From Table,

Frequency of students who like English is 4.

Frequency of students who like Mathematics is 5.

Ex.1 The blood groups of 25 students are recorded as under:

A, B, O, A, AB, O, A, O, B, A, O, B, A, AB, AB, A, A, B, B, O, B, AB, O, A, B.

Arrange the information in a table using tally marks.

Sol.

Blood group	Tally marks	Number of students
A	𝍸 |||	8
B	𝍸 ||	7
O	𝍸 |	6
AB	||||	4

Ex.2 Ekta is asked to collect data for size of shoes of students in her Class VI. Her finding are recorded in the manner shown below :

5	4	7	5	6	7	6	5	6	6	5
4	5	6	8	7	4	6	5	6	4	6
5	7	6	7	5	7	6	4	8	7	

Arrange the information in a table using tally marks.

Sol.

Shoe size	Tally marks	Number of students
4	𝍸	5
5	𝍸 |||	8
6	𝍸 𝍸	10
7	𝍸 ||	7
8	||	2

Representation of Data

Data can also be represented pictorially. This can be done using a pictograph or a bar chart.

◈ Pictograph

A pictograph represents data in the form of pictures, objects or parts of objects. **It helps answer the questions on the data at a glance.**

- **Interpretation of a Pictograph**

NCERT Example

Q. Nand Kishor collected responses from the children of his middle school in Berasia regarding how often they slept at least 9 hours during the night. He prepared a pictograph from the data:

Response	Number of Children (▲ = 10 Children)
Always	▲ ▲ ▲ ▲ ▲
Sometimes	▲ ▲ ◢
Never	▲ ▲ ▲ ▲

Answer the following questions using the pictograph:

(i) What is the number of children who always slept at least 9 hours at night?

(ii) How many children sometimes slept at least 9 hours at night?

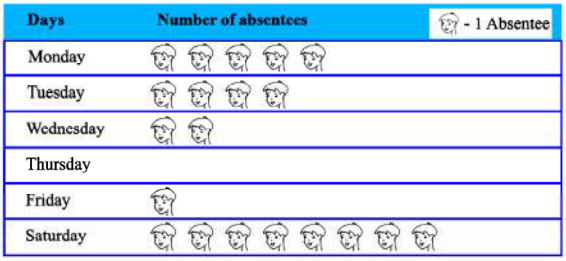
(iii) How many children always slept less than 9 hours each night?

Ans. (i) In the table, there are 5 pictures for 'Always'. Each picture represents 10 children. Therefore, 5 pictures indicate $5 \times 10 = 50$ children.

(ii) There are 2 complete pictures ($2 \times 10 = 20$) and a half picture (half of $10 = 5$). Therefore, the number of children who sleep at least 9 hours only sometimes is $20 + 5 = 25$.

(iii) There are 4 complete pictures for 'Never'. Hence, $4 \times 10 = 40$ children never sleep at least 9 hours in a night, i.e., they always sleep less than 9 hours.

Ex.3 The following pictograph shows the number of absentees in a class of 30 students during the previous week :



(a) On which day were the maximum number of students absent?

(b) Which day had full attendance?

(c) What was the total number of absentees in that week?

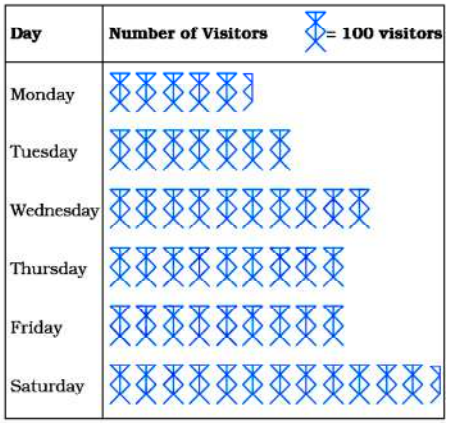
Sol. (a) Maximum absentees were on saturday. (There are 8 pictures in the row for saturday; on all other days, the number of pictures are less).

(b) Against thursday, there is no picture, i.e. no one is absent. Thus, on that day the class had full attendance.

(c) There are 20 pictures in all. So, the total number of absentees in that week was 20.

Ex.4 The number of vistors in a science exhibition on different days of a week is shown below :

Look at the below pictograph and answer the following questions :



(a) What is the total number of visitors from Monday to Saturday?

(b) On which day was the number of visitors maximum? What was their total number?

(c) On which day was the number of visitors minimum?

(d) On which day was the number of visitors same as the number of visitors on two days taken together?

Sol. Number of visitors on Monday, Tuesday, Wednesday, Thursday, Friday and Saturday were 550, 700, 1000, 900, 900, and 1250 respectively.

(a) The total number of visitors from Monday to Saturday

= 550 + 700 + 1000 + 900 + 900 + 1250 = 5300

(b) The number of visitors was maximum on Saturday and the number was 1250.

(c) The number of visitors was minimum on Monday and the number was 550.

(d) The number of visitors on Saturday was 1250 which was equal to the total number of visitors on Monday (550) and Tuesday (700).

Ex.5 The following pictograph represents the number of cycles produced in a factory during 2004 – 2008. Read the pictograph to answer the questions given below.

Number of Cycles

Scale: 1 🚲 = 2000 cycles

2004– 🚲🚲🚲🚲

2005– 🚲🚲🚲🚲🚲🚲🚲🚲

2006– 🚲🚲🚲🚲🚲🚲

2007– 🚲🚲🚲🚲🚲🚲🚲🚲🚲🚲

2008– 🚲🚲🚲🚲🚲🚲🚲🚲

(a) How many cycles were produced in 2007?

(b) How many cycles were produced in 2005?

(c) In which year was the production of cycles the largest ?

Sol. (a) 18000 (b) 14000 (c) 2007

Ex.6 The colours of fridges preferred by people living in a locality are shown by the following pictograph:

Colours	Number of people	🧍 - 10 People
Blue	🧍🧍🧍🧍🧍	
Green	🧍🧍🧍	
Red	🧍🧍🧍🧍🧍 5	
White	🧍🧍	

(a) Find the number of people preferring blue colour.

(b) How many people liked red colour?

Sol. (a) Blue colour is preferred by 50 people.

(b) Deciding the number of people liking red colour needs more care.

For 5 complete pictures, we get 5 × 10 = 50 people.

For the last incomplete picture, we take it as 5.

So, number of people preferring red colour is nearly 55.

- **Drawing a Pictograph**

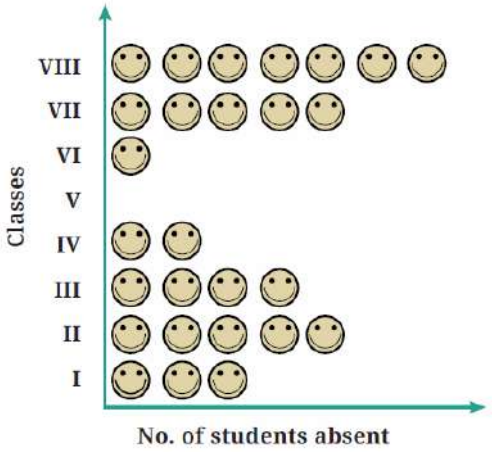
Drawing a pictograph is interesting.

NCERT Examples

Q. Lakhanpal collected data on how many students were absent in each class. Represent it by a pictograph

Class	I	II	III	IV	V	VI	VII	VIII
No. of students	3	5	4	2	0	1	5	7

Ans. We can solve such a situation by making an assumption that - ☺ represents 1 student

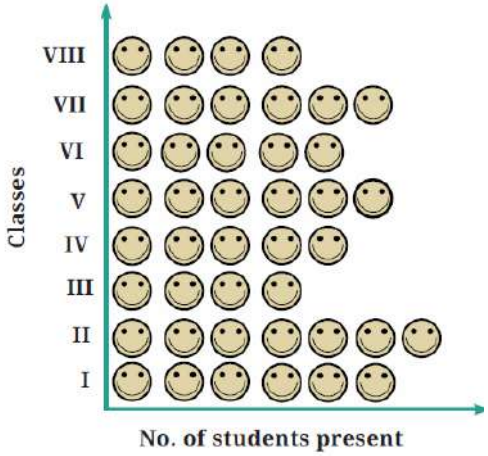


Q. Jarina and Sangita collected data on number of students were present in each class. Represent it by a pictograph

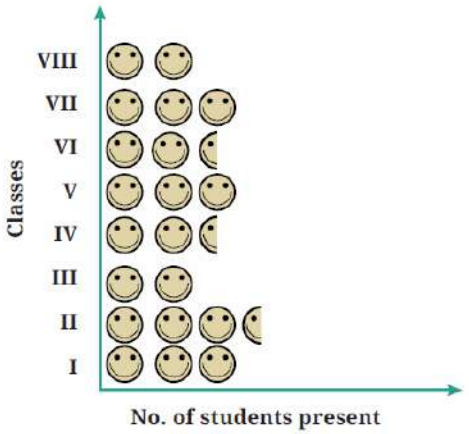
Class	I	II	III	IV	V	VI	VII	VIII
No. of students	30	35	20	25	30	25	30	20

Ans. We can solve such a situation by making an assumption that-

(i) Jarina decided to use ☺ to represent 5 students.



(ii) Sangita decided to use one ☺ to represent 10 students and ☾ to show 5 students.



Ex.7 The following are the details of number of students present in a class of 30 during a week. Represent it by a pictograph.

Days	Number of students present
Monday	25
Tuesday	26
Wednesday	28
Thursday	30
Friday	29
Saturday	22

If represents say 5 students, how will you represent, say, 4 or 3 students?

Sol. We can solve such a situation by making an assumption that — represents 5 students, represents 4 students,

represents 3 students,

represents 2 students,

represents 1 student, and then start the task of representation.

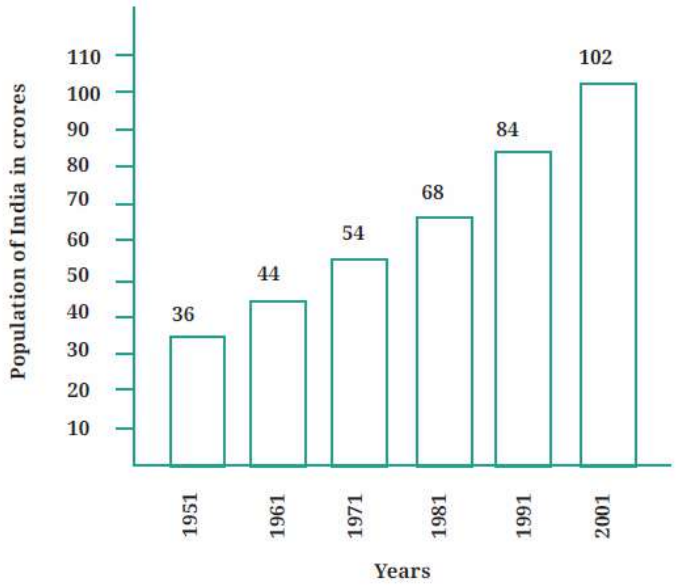
Days	Number of students present
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	

◈ Bar Graph

Some times representing data by pictograph is not only time consuming but at times difficult too. When the given data is large and also not in multiples of a number, it is difficult to draw pictographs. When numerical data is presented as columns on a graph, this graphical representation of data is called a **bar graph**. It is also known as column graph

NCERT Example

Q.



The above bar graph shows the population of India in each decade over a period of 50 years.

(i) How much did the population of India increase over 50 years?

(ii) How much did the population increase in each decade?

Ans. **(i)** Increase in population over 50 years = 102 – 36 = 66 crores .

(ii) Population increase in each decade

(a) From 1951 to 1961 = 44 – 36 = 8 crores

(b) From 1961 to 1971 = 54 – 44 = 10 crores

(c) From 1971 to 1981 = 68 – 54 = 14 crores

(d) From 1981 to 1991 = 84 – 68 = 16 crores

(e) From 1991 to 2001 = 102 – 84 = 18 crores

- **Construction of a bar graph :** Following are the steps to construct a bar graph

1. On the graph paper draw a horizontal line (x-axis) and a vertical line (y-axis)
2. Along the horizontal line, mark points at equal distances and write the names of the items for which the data is to be represented.
3. Choose a suitable scale which shall determine the height of the bars.
4. Locate the heights of different bars according to scale.
5. On x-axis draw bars of equal width according to the required height.
6. Keep the same distance between the bars.

- **Properties of bar graph**
  1. Bars can be either horizontal or vertical.
  2. The height or length of a bar represents the numerical value of the data.
  3. The width of each bar is kept same.
  4. The distance between any two consecutive bars should be equal.
  5. Bars can be shaded, hatched or coloured to make them look attractive.

NCERT Examples

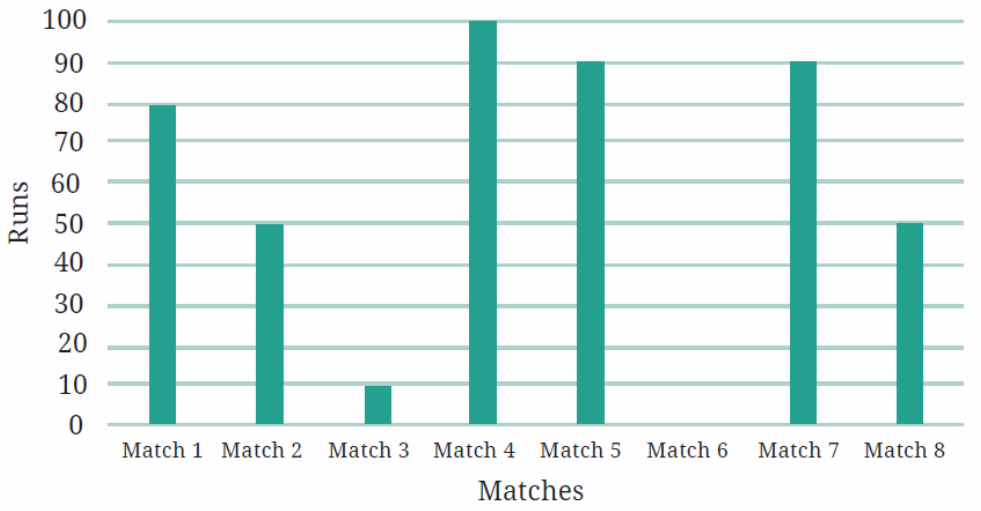
Q. The number of runs scored by Smriti in each of the 8 matches are given in the table below:

Match	Match 1	Match 2	Match 3	Match 4	Match 5	Match 6	Match 7	Match 8
Runs	80	50	10	100	90	0	90	50

Represent the above data using a bar graph.

Ans. Bar graph representing the above data.

Scale 1 unit = 10 Runs



Q. The following table shows the monthly expenditure of Imran's family on various items:

Items	Expenditure (in ₹)
House rent	3000
Food	3400
Education	800
Electricity	400
Transport	600
Miscellaneous	1200

Represent the above data using a bar graph.

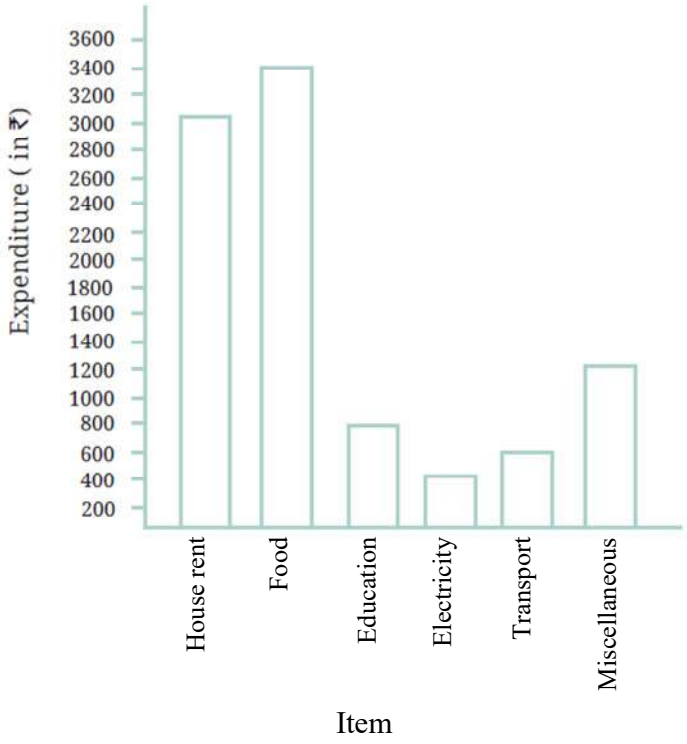
Ans. To represent this data in the form of a bar graph, here are the steps —

- Draw two perpendicular lines, one horizontal and one vertical.
- Along the horizontal line, mark the 'items' with equal spacing between them and mark the corresponding expenditures along the vertical line.
- Take bars of the same width, keeping a uniform gap between them.
- Choose a suitable scale along the vertical line. Let, 1 unit length = ₹ 200, and then mark and write the corresponding values (₹ 200, ₹ 400, etc.) representing each unit length.

After calculation the heights of the bars for various items as shown below —

Items		
House rent	3000 ÷ 200	15 units
Food	3400 ÷ 200	17 units
Education	800 ÷ 200	4 units
Electricity	400 ÷ 200	2 units
Transport	600 ÷ 200	3 units
Miscellaneous	1200 ÷ 200	6 units

Here is the bar graph that we obtain based on the above steps:



Ex.8 Following table shows the monthly expenditure of Imran's family on various items.

Items	Expenditure (in Rs)
House rent	3000
Food	3400
Education	800
Electricity	400
Transport	600
Miscellaneous	1200

Sol. To represent this data in the form of a bar diagram, here are the steps.

(a) Draw two perpendicular lines, one vertical and one horizontal.

(b) Along the horizontal line, mark the 'items' and along the vertical line, mark the corresponding expenditure.

(c) Take bars of same width keeping uniform gap between them.

(d) Choose suitable scale along the vertical line. Let 1 unit length = Rs 200 and then mark the corresponding values.

Calculate the heights of the bars for various items as shown below.

House rent : 3000 ÷ 200 = 15 units

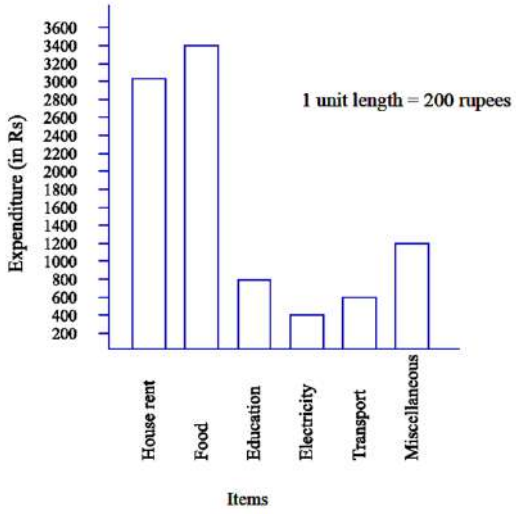
Food : 3400 ÷ 200 = 17 units

Education : 800 ÷ 200 = 4 units

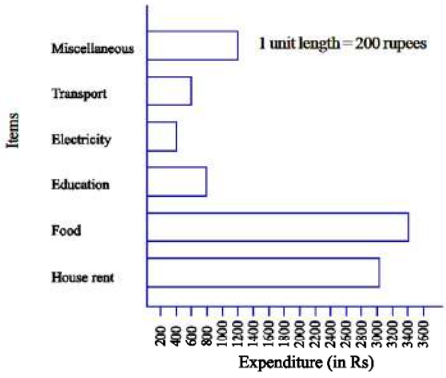
Electricity : 400 ÷ 200 = 2 units

Transport : 600 ÷ 200 = 3 units

Miscellaneous : 1200 ÷ 200 = 6 units



Same data can be represented by interchanging positions of items and expenditure as shown below :

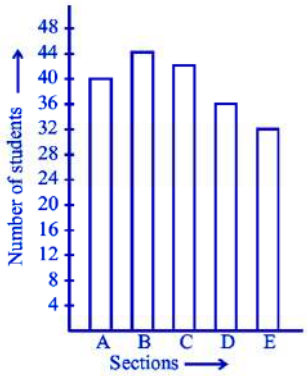


Ex.9 In a school, there are five sections of Class VI. The number of students in each section is given below:

Section	A	B	C	D	E
Number of students	40	44	42	36	32

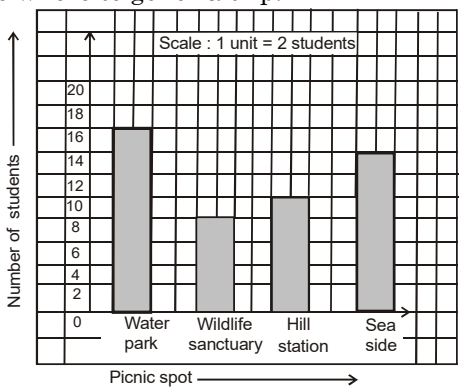
Represent the above data using a bar graph.

Sol. First of all, draw a horizontal line and a vertical line. Choose a suitable scale along the vertical line, say 1 unit length= 4 students. On the horizontal line, write the sections A, B, C, D and E. Draw vertical bars on the respective section showing the number of students in that section.



Interpretation of a bar graph

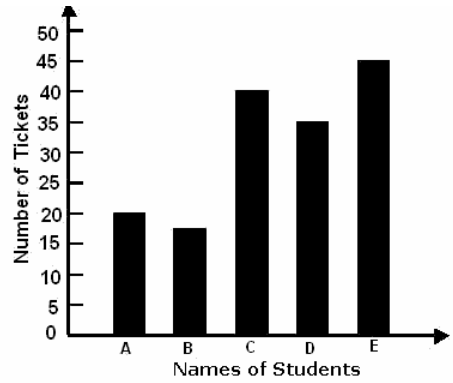
Ex.10 A class took a vote to decide where to go for a trip.



(a) How many students are there in the class?
(b) Where did the majority of students want to go?
(c) Which was the second choice?
(d) How many students voted for water park?

Sol. (a) There were 48 students are in the class.
(b) The majority of students want to go Water park
(c) Sea side is the second choice is.
(d) 16 .

Ex.11 The following bar graph shows the number of tickets sold by five students A, B, C, D and E during a fair. Find the average number of tickets sold by A, C, D and E



Sol. Required average $= \frac{20+40+35+45}{4} = 35$

Artistic and Aesthetic Considerations

An artistic and aesthetic considerations are the collection of stylistic choices an artist uses to make a object interesting and effective or to communicate meaning, value or emotion to the observe. When making a visual presentation of data such as a pictograph or bar graph, it is important to make it fit in the intended space, which can be controlled. e.g.
By choosing the scale appropriately.

Ex.12 Table given below shows the 5 highest peaks in India, along with the height of each peak in metres.

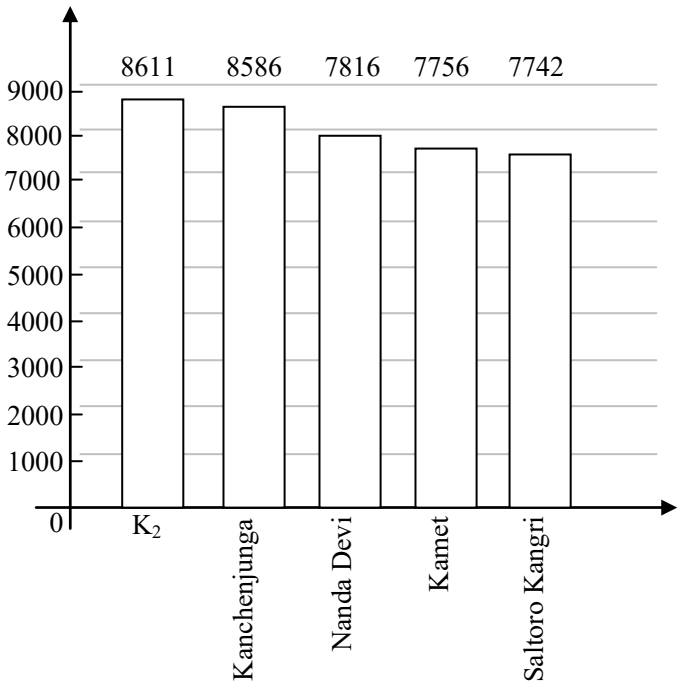
Highest peak	K_2	Kanchenjunga	Nanda Devi	Kamet	Saltoro Kangri
Height	8611 m	8586 m	7816 m	7756 m	7742 m

(i) Draw bar graph for above data.

(ii) How much taller is peak K_2 than peak Saltoro Kangri ?

(iii) Are peak Nanda Devi and peak Kamet very different in height ? How can describe it easily ?

Sol. (i)



(ii) From the above bar graph it is easily clear that 8611- 7742= 869 m taller is peak K_2 than peak Saltoro Kangri

(iii) Difference in height = height of Nanda Devi – height of Kamet

= 7816 – 7756 = 60 m

There is a very less difference in height of the peak of Nanda Devi and peak Kamet.

Infographics

Infographics enhance traditional data visulisations like bar graphs by incorporating artistic and visual elements. The goal of infographics is to make data presentations not only more attractive but also more effective in communicating information quickly and clearly.

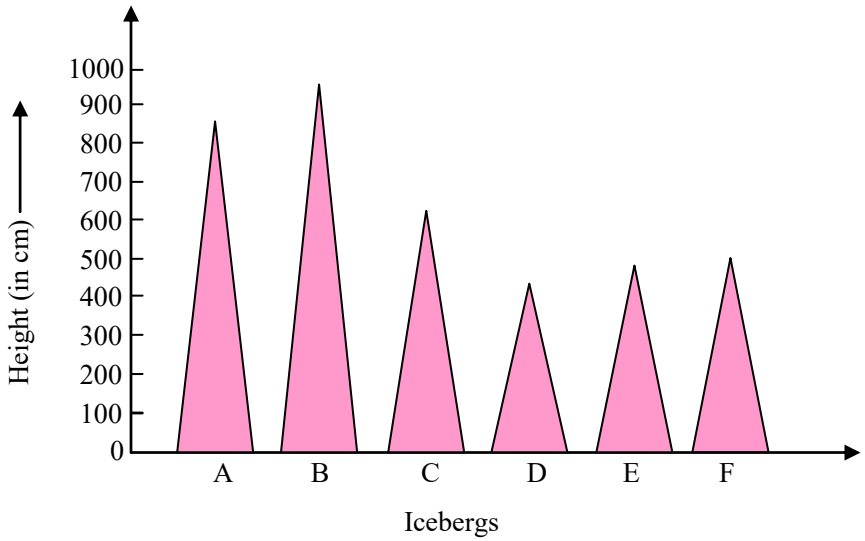
Traditional bar graphs can be converted into infographics by using the following steps :

- Instead of using plain rectangular bars, we can use shapes that better represent the data. For height, triangular bars facing upward or icons can be used. This makes the graph more intuitive and visually connected to the data that it represents.
- Including visual elements such as background image of height of icebergs which are a made up of frozen fresh water. When the temperature over the sea is about –5°C in very cold regions relevant images can provide context and make the infographic more engaging.

Ex.13 Table given below shows the highest icebergs, along with the height of each iceberg in cm.

Icebergs	A	B	C	D	E	F
Height (in cm)	870 cm	980 cm	620 cm	430 cm	540	560 cm

Sol. In the above example, we can use triangles to make the bar graph look more, realistic as shown



NCERT EXERCISE (FIGURE IT OUT)

Q.1 Naresh and Navya decided to go to each student in the class and ask what their favourite game is. Then they prepared a list.
Navya is showing the list:

Mehnoor – Kabaddi	Pushkal – Satoliya (Pittu)	Anaya – Kabaddi
Jubimon – Hockey	Densy – Badminton	Jivisha – Satoliya (Pittu)
Simran – Kabaddi	Jivika – Satoliya (Pittu)	Rajesh – Football
Nand – Satoliya (Pittu)	Leela – Hockey	Thara – Football
Ankita – Kabaddi	Afshan – Hockey	Soumya – Cricket
Imon – Hockey	Keerat – Cricket	Navjot – Hockey
Yuvraj – Cricket	Gurpreet – Hockey	Hemal – Satoliya (Pittu)
Rehana – Hockey	Arsh – Kabaddi	Debabrata – Football
Aarna – Badminton	Bhavya – Cricket	Ananya – Hockey
Kompal – Football	Sarah – Kabaddi	Hardik – Cricket
Tahira – Cricket		

She says (happily), "I have collected the data. I can figure out the most popular game now!".
A few other children are looking at the list and wondering, "We can't yet see the most popular game. How can we get it from this list?".

(i) What would you do to find the most popular game among Naresh's and Navya's classmates?

(ii) What is the most popular game in their class?

(iii) Try to find out the most popular game among your classmates.

(iv) Pari wants to respond to the questions given below. Put a tick (✓) for the questions where she needs to carry out data collection and put a cross (×) for the questions where she doesn't need to collect data. Discuss your answers in the classroom.

a. What is the most popular TV show among her classmates? ☐

b. When did India get independence? ☐

c. How much water is getting wasted in her locality? ☐

d. What is the capital of India? ☐

Q.2 Shri Nilesh is a teacher. He decided to bring sweets to the class to celebrate the new year. The sweets shop nearby has jalebi, gulab jamun, gujiya, barfi, and rasgulla. He wanted to know the choices of the children. He wrote the names of the sweets on the board and asked each child to tell him their preference. He put a tally mark '|' for each student and when the count reached 5, he put a line through the previous four and marked it as 𝍸.

Sweets	Tally Marks	No. of Students
Jalebi	𝍸 |	6
Gulab jamun	𝍸 ||||	9
Gujiya	𝍸 𝍸 |||	13
Barfi	|||	3
Rasgulla	𝍸 ||	5

(i) Complete the table to help Shri Nilesh to purchase the correct numbers of sweets:

a. How many students chose jalebi? ☐

b. Barfi was chosen by ☐ students?

c. How many students chose gujiya? ☐

d. Rasgulla was chosen by ☐ students?

e. How many students chose gulab jamun? ☐

Shri Nilesh requested one of the staff members to bring the sweets as given in the table. The above table helped him to purchase the correct numbers of sweets.

(ii) Is the above table sufficient to distribute each type of sweet to the correct student? Explain. If it is not sufficient, what is the alternative?

Q.3 Sushri Sandhya asked her students about the sizes of the shoes they wear. She noted the data on the board.

4	5	3	4	3	4	5	5	4
5	5	4	5	6	4	3	5	6
4	6	4	5	7	5	6	4	5

She then arranged the shoe sizes of the students in ascending order —

3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 4, 4, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 6, 6, 6, 6, 7

(i) Help her to figure out the following:

a. The largest shoe size in the class is _____.

b. The smallest shoe size in the class is _____.

c. There are _____ students who wear shoe size 5.

d. There are _____ students who wear shoe sizes larger than 4.

(ii) How did arranging the data in ascending order help to answer these questions?

(iii) Are there other ways to arrange the data?

Q.4 Write the names of a few trees you see around you. When you observe a tree on the way from your home to school (or while walking from one place to another place), record the data and fill in the following table:

Tree	No. of Trees
Peepal	
Neem	
…	
….	

a. Which tree was found in the greatest number?

b. Which tree was found in the smallest number?

c. Were there any two trees found in the same numbers?

Q.5 Take a blank piece of paper and paste any small news item from a newspaper. Each student may use a different article. Now, prepare a table on the piece of paper as given below. Count the number of each of the letters 'c', 'e', 'i', 'r', and 'x' in the words of the news article, and fill in the table.

Letter	c	e	i	r	x	Any other letter of your choice
Number of times found in the news item						

a. The letter found the most number of times is _____.

b. The letter found the least number of times is _____.

c. List the five letters 'c', 'e', 'i', 'r', 'x' in ascending order of frequency. Now, compare the order of your list with that of your classmates. Is your order the same or nearly the same as theirs? (Almost everyone is likely to get the order 'x, c, r, i, e'.) Why do you think this is the case?

d. Write the process you followed to complete this task.

e. Discuss with your friends the processes they followed.

f. If you do this task with another news item, what process would you follow?

Q.6 The following pictograph shows the number of books borrowed by students, in a week, from the library of Middle School, Ginnori:

Day	Number of Books Borrowed (🕮 = 1 Book)
Monday	🕮 🕮 🕮 🕮 🕮
Tuesday	🕮 🕮 🕮 🕮
Wednesday	🕮 🕮
Thursday	
Friday	🕮 🕮 🕮 🕮 🕮
Saturday	🕮 🕮 🕮 🕮 🕮 🕮 🕮 🕮

a. On which day were the minimum number of books borrowed?
b. What was the total number of books borrowed during the week?
c. On which day were the maximum number of books borrowed? What may be the possible reason?

Q.7 Magan Bhai sells kites at Jamnagar. Six shopkeepers from nearby villages come to purchase kites from him. The number of kites he sold to these six shopkeepers are given below —

Shopkeeper	Number of Kites Sold
Chaman	250
Rani	300
Rukhsana	100
Jasmeet	450
Jetha Lal	200
Poonam Ben	700

Prepare a pictograph using the symbol  to represent 100 kites.

Answer the following questions:
a. How many symbols represent the kites that Rani purchased?
b. Who purchased the maximum number of kites?
c. Who purchased more kites, Jasmeet or Chaman?
d. Rukhsana says Poonam Ben purchased more than double the number of kites that Rani purchased. Is she correct? Why?

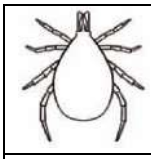
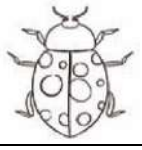
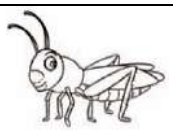
Q.8 How many total cars passed through the crossing between 6 a.m. and noon?

Q.9 Why do you think so little traffic occurred during the hour of 6–7 a.m., as compared to the other hours from 7 a.m.–noon?

Q.10 Why do you think the traffic was the heaviest between 7–8 a.m.?

Q.11 Why do you think the traffic was lesser and lesser each hour after 8 a.m. all the way until noon?

Q.12 Samantha visited a tea garden, and collected data of the insects and critters she saw there. Here is the data she collected:

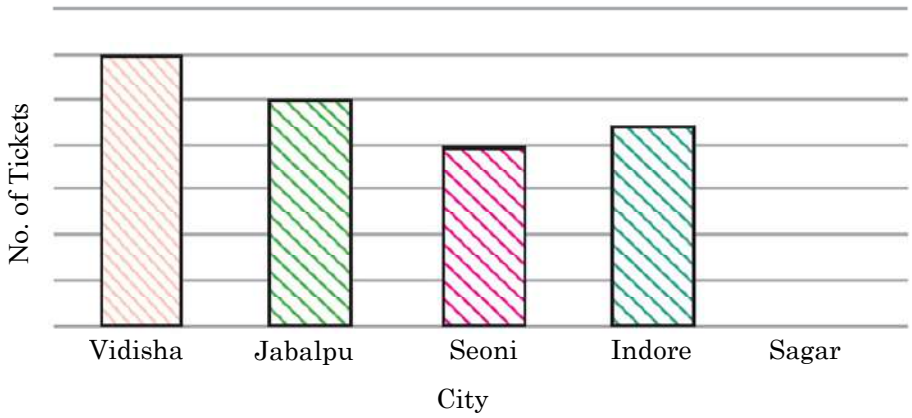
				
Mites	Caterpillars	Beetles	Butterflies	Grasshoppers
6	10	5	3	2

Help her prepare a bar graph representing this data.

Q.13 Pooja collected data on the number of tickets sold at the Bhopal railway station for a few different cities of Madhya Pradesh over a two-hour period.

City	Vidisha	Jabalpur	Seoni	Indore	Sagar
Number of tickets	24	20	16	28	16

She used this data and prepared a bar graph on the board to discuss the data with her students, but someone erased a portion of the graph.



a. Write the number of tickets sold for Vidisha above the bar.
b. Write the number of tickets sold for Jabalpur above the bar.
c. The bar for Vidisha is 6 unit lengths and the bar for Jabalpur is 5 unit lengths. What is the scale for this graph?
d. Draw the correct bar for Sagar.
e. Add the scale of the bar graph by placing the correct numbers on the vertical axis.
f. Are the bars for Seoni and Indore correct in this graph? If not, draw the correct bar(s).

Q.14 Chinu listed the various means of transport that passed across the road in front of his house from 9 a.m. to 10 a.m. :

bike	car	bike	bus	bike	bike
bike	auto rickshaw	bicycle	bullock cart	bicycle	auto rickshaw
car	scooter	car	auto rickshaw	bicycle	bike
car	auto rickshaw	bike	scooter	bike	car
bicycle	scooter	bicycle	scooter	bike	bus
auto rickshaw	auto rickshaw	bike	bicycle	bus	bike
bicycle	scooter	bus	scooter	auto rickshaw	bike
scooter	bicycle	bike	bullock cart	auto rickshaw	scooter
car	scooter				

a. Prepare a frequency distribution table for the data.
b. Which means of transport was used the most?
c. If you were there to collect this data, how could you do it?
Write the steps or process.

Q.15 Roll a die 30 times and record the number you obtain each time.
Prepare a frequency distribution table using tally marks. Find the number that appeared:
a. The minimum number of times.
b. The maximum number of times.
c. Find numbers that appeared an equal number of times.

Q.16 Faiz prepared a frequency distribution table of data on the number of wickets taken by Jaspreet Bumrah in his last 30 matches :

Wickets Taken	Number of Matches
0	2
1	4
2	6
3	8
4	3
5	5
6	1
7	1

a. What information is this table giving ?
b. What may be the title of this table ?
c. What caught your attention in this table ?
d. In how many matches has Bumrah taken 4 wickets ?
e. Mayank says, "If we want to know the total number of wickets he has taken in his last 30 matches, we have to add the numbers 0, 1, 2, 3 …, up to 7." Can Mayank get the total number of wickets taken in this way? Why?
f. How would you correctly figure out the total number of wickets taken by Bumrah in his last 30 matches, using this table?

Q.17 The following pictograph shows the number of tractors in five different villages.

Villages	Number of Tractors (= 1 Tractor)
Village A	
Village B	
Village C	
Village D	
Village E	

Observe the pictograph and answer the following questions—
a. Which village has the smallest number of tractors?
b. Which village has the most tractors?
c. How many more tractors does Village C have than Village B?
d. Komal says, "Village D has half the number of tractors as Village E." Is she right?

Q.18 The number of girl students in each class of a school is depicted by the pictograph :

Classes	Number of Girls students (= 4 Girls)
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

Q.19 Observe this pictograph and answer the following questions:

a. Which class has the least number of girl students?
b. What is the difference between the number of girls in Classes 5 and 6?
c. If two more girls were admitted in Class 2, how would the graph change?
d. How many girls are there in Class 7?

Q.20 Mudhol Hounds (a type of breed of Indian dogs) are largely found in North Karnataka's Bagalkote and Vijaypura districts. The government took an initiative to protect this breed by providing support to those who adopted these dogs. Due to this initiative, the number of these dogs increased. The number of Mudhol dogs in six villages of Karnataka are as follows —
Village A : 18, Village B : 36, Village C : 12, Village D : 48, Village E : 18, Village F : 24
Prepare a pictograph and answer the following questions:

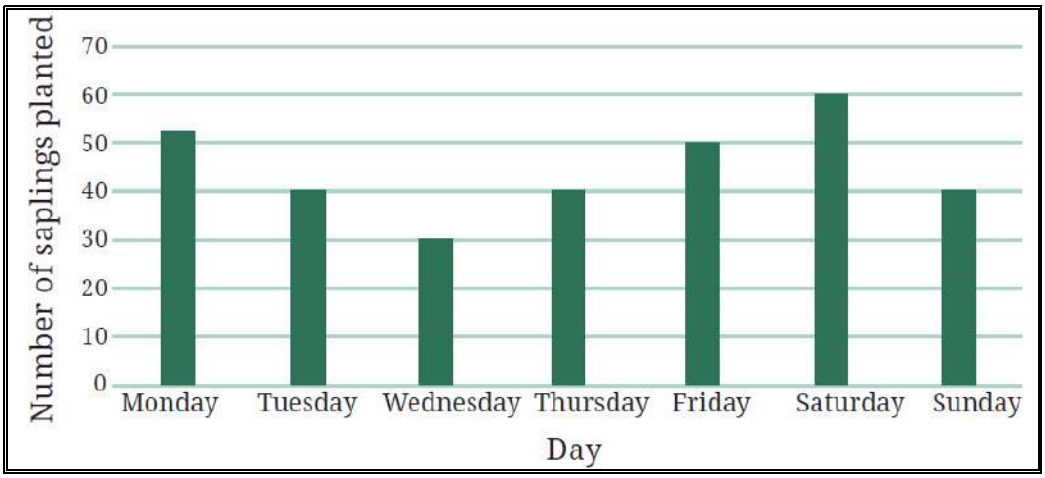
a. What will be a useful scale or key to draw this pictograph?
b. How many symbols will you use to represent the dogs in Village B?
c. Kamini said that the number of these dogs in Village B and Village D together will be more than the number of these dogs in the other 4 villages. Is she right? Give reasons for your response.

Q.21 A survey of 120 school students was conducted to find out which activity they preferred to do in their free time:

Preferred Activity	Number of Students
Playing	45
Reading story books	30
Watching TV	20
Listening to music	10
Painting	15

Draw a bar graph to illustrate the above data taking the scale of 1 unit length = 5 students. Which activity is preferred by most students other than playing?

Q.22 Students and teachers of a primary school decided to plant tree saplings in the school campus and in the surrounding village during the first week of July. Details of the saplings they planted are as follows —

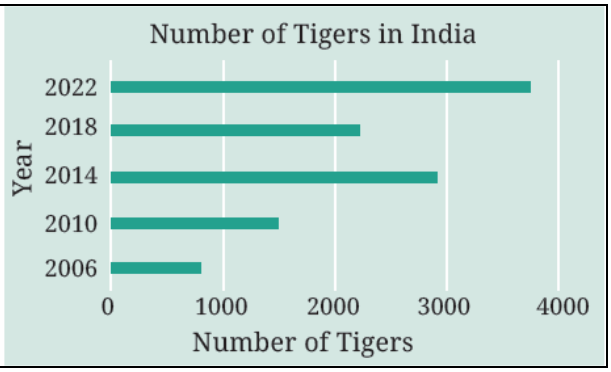


a. The total number of saplings planted on Wednesday and Thursday is _____.
b. The total number of saplings planted during the whole week is _____.

c. The greatest number of saplings were planted on _____ and the least number of saplings were planted on _____.
Why do you think that is the case? Why were more saplings planted on certain days of the week and less on others? Can you think of possible explanations or reasons? How could you try and figure out whether your explanations are correct?

Q.23 The number of tigers in India went down drastically between 1900 and 1970. Project Tiger was launched in 1973 to track and protect the tigers in India. Starting in 2006, the exact number of tigers in India was tracked. Shagufta and Divya looked up information about the number of tigers in India between 2006 and 2022 in fouryear intervals. They prepared a frequency table for this data and a bar graph to present this data, but there are a few mistakes in the graph. Can you find those mistakes and fix them?

Year	Number of Tigers (approx.)
2006	1400
2010	1700
2014	2200
2018	3000
2022	3700



Q.24 If you wanted to visually represent the data of the heights of the tallest persons in each class in your school, would you use a graph with vertical bars or horizontal bars? Why?

Q.25 If you were making a table of the longest rivers on each continent and their lengths, would you prefer to use a bar graph with vertical bars or with horizontal bars? Why? Try finding out this information, and then make the corresponding table and bar graph! Which continents have the longest rivers?

Exercise -1

➢ Very Short Answer Type Questions

Q.1 What is data?

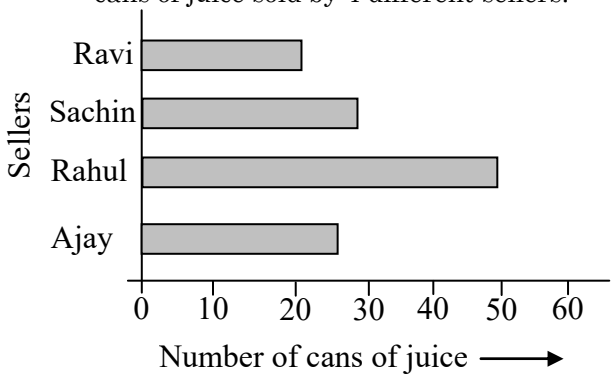
Q.2 Why do we use tally marks?

Q.3 What is pictograph?

Q.4 What is bar graph?

Q.5 What do you mean by primary data?

Q.6 The given bar graph shows the number of cans of juice sold by 4 different sellers.



How many cans of juice Ajay sold ?

Q.7 Students of a class were tested to find their pulse rate. The following figures were obtained for the number of beats per minute.
70, 60, 70, 68, 67, 62, 71, 71, 59, 73, 73, 60, 60, 62, 62, 68, 70, 70, 70, 74, 69
How many students are there whose pulse rate is more than 60 per minute ?

Q.8 If  represents 150 pillars, what does  represents?

Q.9 If  represents 50 icecreams, then how will you represent 35 ice-creams?

➢ Short Answer Type Questions – Type I

Q.10 Define the following terms:
(i) Observations
(ii) Data
(iii) Frequency of an observation
(iv) Frequency distribution

Q.11 The number of two wheelers owned individually by each of 50 families are listed below. Make a table using tally marks.
1,1,2,1,1,1,2,1,2,1,0,1,1,2,3,1,2,1,1,2,1,2,3, 1,0,2,1,0,2,1,2,1,2,1,1,4.1,3,1,1,2,1,1,1,1,2, 3,2,1,1
Find the number of families having two or more, two wheelers.

Q.12 The lengths in centimetres (to the nearest centimetre) of 30 carrots are given as follows:
15,22,21,20,22,15,15,20,20,15,20,18,20,22, 21,20,21,18,21,18,20,18,21,18,22,20,15,21, 8,20
Arrange the data given above in a table using tally marks and answer the following questions.
(i) What is the number of carrots which have length more than 20 cm?
(ii) Which length of the carrots occur maximum number of times? Minimum number of times?

Q.13 Thirty students were interviewed to find Out what they want to be in future. Their responses are listed as below:
doctor, engineer, doctor, pilot, officer, doctor, engineer, doctor, pilot, officer, pilot, engineer, officer, pilot, doctor, engineer, pilot, officer, doctor, officer, doctor, pilot, engineer, doctor, pilot, officer, doctor, pilot, doctor, engineer
Arrange the data in a table using tally marks.

Q.14 Total number of animals in five villages are as follows:

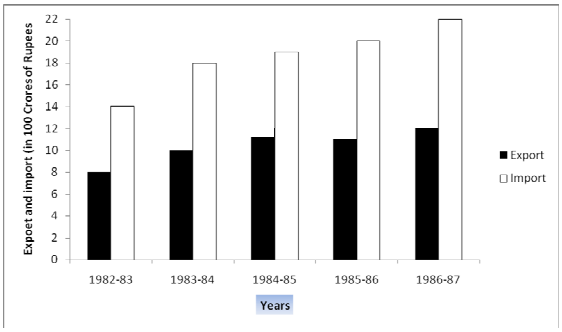
Village	Number of animals
A	80
B	120
C	90
D	40
E	60

Prepare a pictograph of these animals using one symbol to represent 10 animals.

Q.15 The heights (in cm) of 20 boys of Class VI are : 140, 138, 139, 140, 140, 147, 139, 139, 139, 139, 140, 147, 138, 140, 139, 140, 147, 147, 138, 139. Which height has the maximum frequency and the minimum frequency in the given data ?

➢ Short Answer Type Questions – Type II

Q.16 Read the following bar graph and answer the following questions:



(i) What information is given by the bar graph?

(ii) In which year the export is minimum?

(iii) In which year the import is maximum?

(iv) In which year the difference of the values of export and import is maximum?

Q.17 Students of Class VI in a school were given a task to count the number of articles made of different materials in the school. The information collected by them is represented as follows:

Material used	Articles ⊞ = 20 articles
Wood	⊞ ▭
Glass	⊞
Metal	⊞ ⊞ ▭
Rubber	⊞ ▫
Pastic	⊞ ▭

Observe the pictograph and answer the following questions :

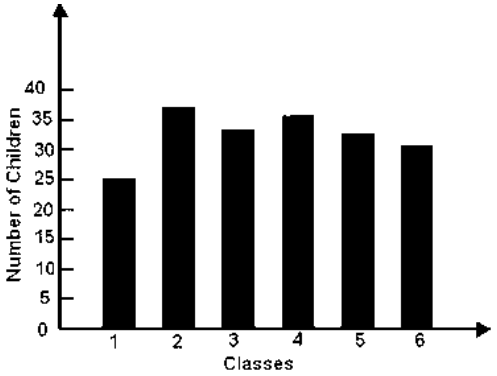
(i) Which material is used in maximum number of articles?

(ii) Which material is used in minimum number of articles?

(iii) Which material is used in exactly half the number of articles as those made up of metal?

(iv) What is the total number of articles counted by the students?

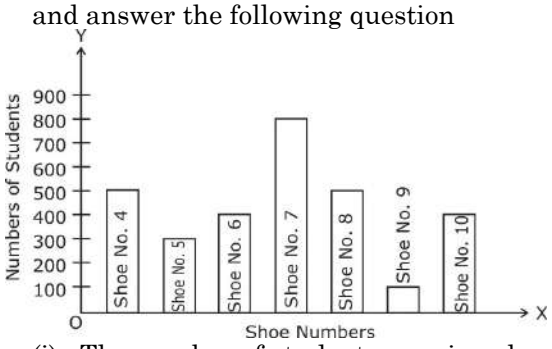
Q.18 The following bar graph shows the number of children of various classes.



(i) The total number of children in class 1 is

(ii) In which class number of students are highest

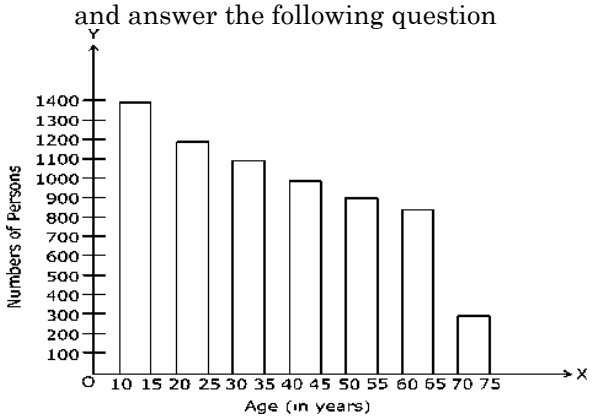
Q.19 Read the bar graph shown in the figure and answer the following question



(i) The number of students wearing shoe no. 6 is

(ii) The shoe number is worn by the maximum numbers of students is

Q.20 Study the bar graph representing the number of persons in various age groups and answer the following question



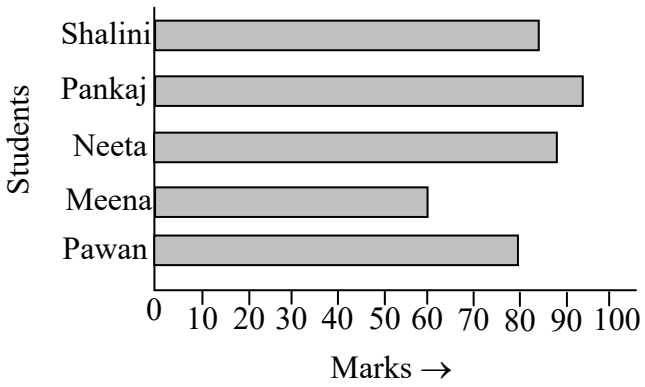
(i) The total population of the town is

(ii) The age group of exactly 1200 persons living in the town is

(iii) Whether the population in general increases, decreases or remains constant with the increase in the age group?

(iv) The number of persons in the age-group 60–65 is

Q.21 The given bar graph shows the marks obtained by students in a Science test.

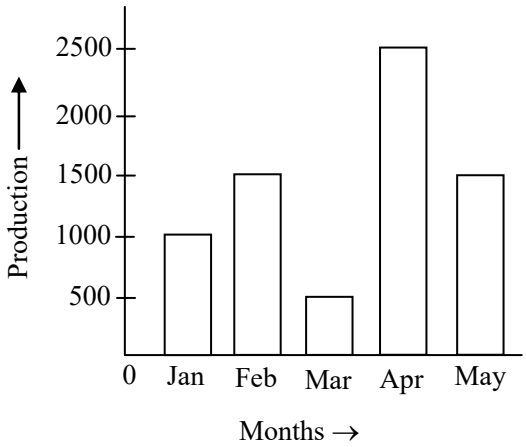


Who scored the highest marks in the test? What is the score ?

Q.22 Draw a pictograph to represent the data given below :

Years	2021	2022	2023	2024
Number of trees planted	40	20	60	30

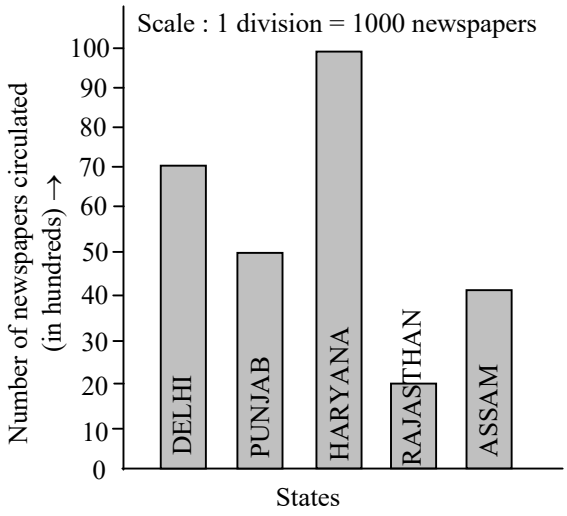
Q.23 Given below is a bar graph showing the number of cars produced in a factory during the first five months of a year.



In which month 1000 cars was produce in the factory?

➢ Long Answer Type Questions

Q.24 Read the bar graph and answer the followings questions.



(i) What information is given by graph ?

(ii) Name the State in which 2000 newspapers are circulated.

(iii) What is the difference between the newspapers circulated in Haryana and Delhi ?

Q.25 Following pictograph shows favourite colour of boys in a colony. Study it and answer the following questions.

Colour	**No. of boys**
Green	5
Pink	4
Red	1
Blue	4
Each represents 5 boys	

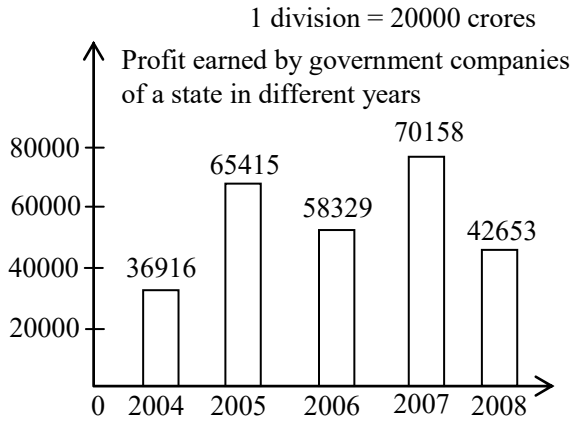
(i) What is the total number of boys in the colony ?

(ii) Which two colours are liked by same number of boys ?

(iii) How many more boys liked pink colour than red colour ?

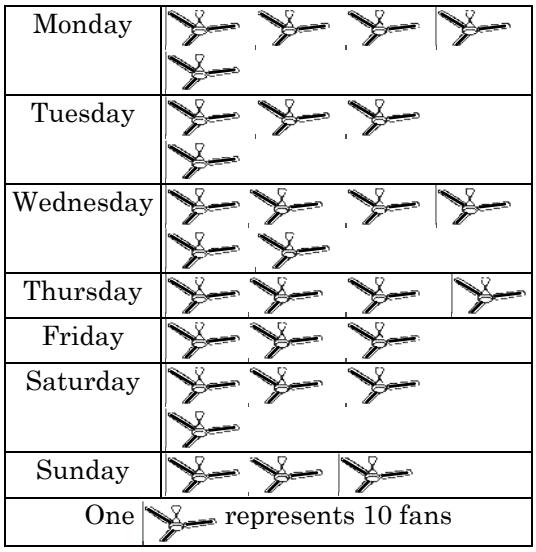
(iv) Which colour is most liked by boys ?

Q.26 Read the following bar graph. It shows us the profit earned by the Government companies of a State in different years.



(i) What was the profit earned in 2004 ?
(ii) What was the profit earned in 2007 ?
(iii) Arrange the profit earned in different years in ascending order.

Q.27 Read the pictograph given below and answer the following questions (sales of fan on different days of a week):

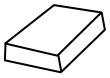
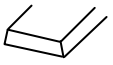


(i) How many fans were sold on Monday?
(ii) On which day the minimum number of fans were sold?
(iii) On which day the maximum number of fans were sold?
(iv) Find the total number of fans sold during the week.

➢ Fill in the Blanks

Q.28 (i) The frequency of 12 is written symbolically as ..... using tally marks.
(ii) In a pictograph if one wrist watch represents 100 watches, 700 wrist watches can be represented by ..... watches.
(iii) In a bar graph the..... of each bar represents the given number.
(iv) The collection of information generally in the form of numbers is called.....
(v) A..... is drawn by using bars of uniform width drawn at equal distances.

➢ True or False

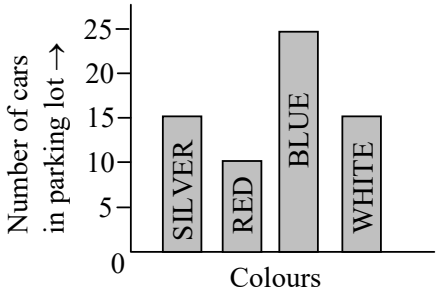
Q.29 (i) Diagrams and graphs help in analysis of data.
(ii) Bar graphs can be drawn only vertically.
(iii) In a bar graph showing various modes of transportation used by students to travel to school, the bar having minimum length represents the most likely mode of transportation.
(iv) An observation occurring five times in a data is recorded as |||||. using tally marks.
(v) In a pictograph, if a symbol  represents 50 books in a library shelf, then the symbol  represents 25 books.

➢ Match the Column

Q.30 Match column I to column II in the following:

Column-I	Column-II
(i) Raw data	(a) table form
(ii) Organized data	(b) bar used
(iii) Bar graph	(c) pictures used
(iv) Pictograph	(d) When data is first collected

Q.31 Study the bar graph and match the lists.



List-I		List-II	
(P)	Total number of cars in the parking lot is	1.	Blue
(Q)	Number of cars which are blue in colour is	2.	25
(R)	The least common colour among the cars is	3.	65
(S)	The most common colour among the cars is	4.	Red

(A) P-2, Q-3, R-1, S-4
(B) P-1, Q-2, R-3, S-4
(C) P-4, Q-3, R-2, S-1
(D) P-3, Q-2, R-4, S-1

Exercise -2

Direction (Q.1 to Q.3) : The following table shows the amount of electricity produced (in millions kilowatt) during some particular years.

Years	Amount of electricity (in million kilowatt)
2004	38.52
2005	45.51
2006	50.28
2007	75.53

Q.1 The total electricity produced during the last two years is :
(A) 124.81 million kilowatt
(B) 125.81 million kilowatt
(C) 126.81 million kilowatt
(D) 127.81 million kilowatt

Q.2 The rise in the amount of electricity produced from 2004 to 2006 is :
(A) 8.54 million kilowatt
(B) 10.23 million kilowatt.
(C) 11.76 million kilowatt
(D) 12.46 million kilowatt.

Q.3 The maximum electricity was generated in the year :
(A) 2004 (B) 2005
(C) 2006 (D) 2007

Q.4 Using tally marks, which one of the following represents the number eight:
(A) 𝍸 III (B) 𝍸 𝍸
(C) 𝍸 II (D) 𝍸 III

Direction (Q.5 to Q.8) : Final marks of 20 students are as follows:
53, 61, 48, 60, 78, 68, 55, 100, 67, 90, 75, 88, 77, 37, 84, 58, 60, 48, 62, 56

Q.5 How many have scored less than 50 ?
(A) 2 (B) 3 (C) 5 (D) 1

Q.6 How many have scored 75 or more ?
(A) 3 (B) 15 (C) 7 (D) 10

Q.7 If 40 is the pass mark how many have failed ?
(A) 1 (B) 2 (C) 3 (D) 4

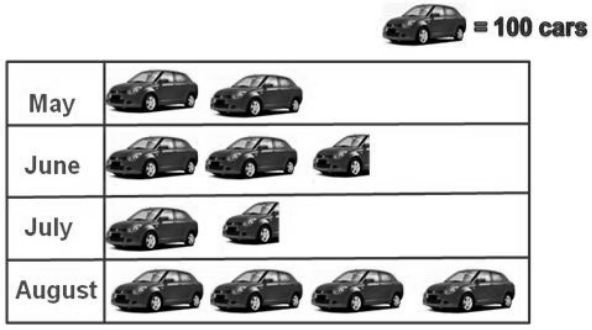
Q.8 What is the highest score ?
(A) 37 (B) 88 (C) 100 (D) 90

Q.9 The marks (out of 10) obtained by 28 students in a Mathematics test are listed as below:
8, 1, 2, 6, 5, 5, 5, 0, 1, 9, 7, 8, 0, 5, 8, 3, 0, 8, 10, 10, 3, 4, 8, 7, 8, 9, 2, 0
The number of students who obtained marks more than or equal to 5 is :
(A)13 (B)15 (C)16 (D) 17

Q.10 The weight of 25 student of class X in kg given as below:
35 , 38 , 40 , 45 , 43 39 , 45.5 , 37, 46, 45, 36, 37, 46, 39, 38, 40, 41, 42, 42, 43, 38, 37, 36, 49, 50.
How many students have 50 or more than 50 weight?
(A) 4 (B) 3 (C) 2 (D) 1

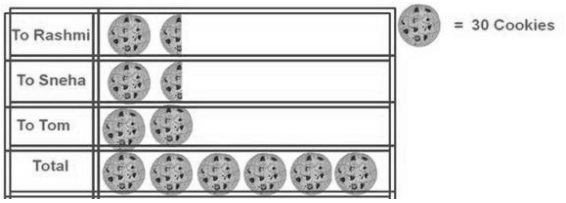
Q.11 Pictograph represents the data in the form of :
(A) numerical figures.
(B) alphabets.
(C) symbols or pictures.
(D) graphs.

Q.12 The following pictograph shows the sale of Maruti car by a showroom in the months of year 2009. The maximum numbers of cars sold in the month of :



(A) May. (B) June.
(C) July. (D) August.

Q.13. Merlin has prepared some cookies for a party. The distribution of those is shown in the form of pictograph. The number of cookies Merlin gave to Rashmi and Sneha, is :



(A) 30. (B) 45. (C) 60. (D) 90.

Q.14 The following pictograph shows the number of students in different classes. If class 4th has ten students, then the number of umbrellas to be shown in the pictograph for 4th class will be :

Classes	Umbrellas = 5 students
1st	
2nd	
3rd	
4th	

(A) 10. (B) 5. (C) 2. (D) 1.

Q.15 If a ball represent 10 students present in the class on particular day. If there are 73 students in the class and 23 students are absent on Friday. How many balls represent numbers of students present on Friday.

(A) 5 (B) 3 (C) 2 (D) 1

Q.16 The height of Bar in Bar graph represent :

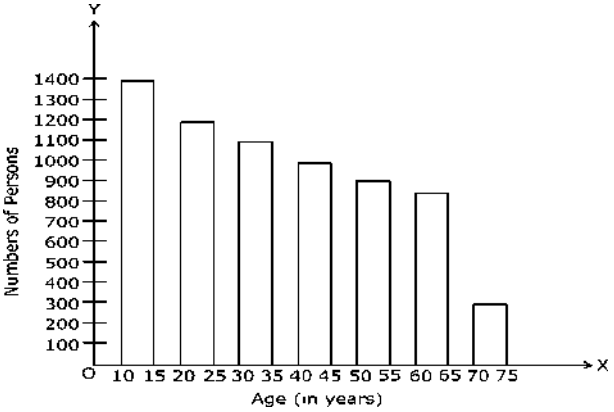
(A) Item

(B) numerical value

(C) properties of Item

(D) none of these

Direction (Q.17 to Q.18) : Study the bar graph representing the number of persons in various age groups and answer the following question



Q.17 The total population of the town is:

(A) 6750. (B) 7000.

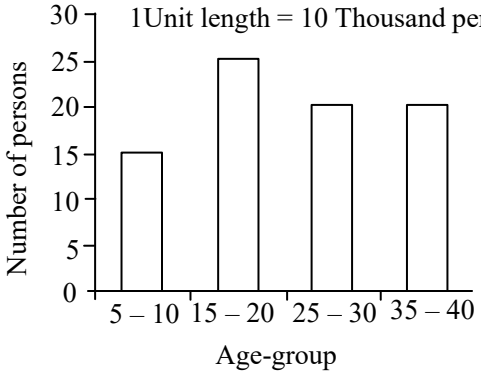
(C) 5550. (D) 4650.

Q.18 The age group of exactly 1200 persons living in the town is :

(A) 20 – 25. (B) 10 – 15.

(C) 30 – 35. (D) 50 – 55

Direction (Q.19 to Q.20): The following bar graph represents the number of persons in various age groups.



Q.19 The number of persons lie in the age group 15-20 is :

(A) 50,000. (B) 1,00,000.

(C) 2,00,000. (D) 2,50,000.

Q.20 The number of persons are equal in age groups of :

(A) 5-10 and 15-20. (B) 5-10 and 35-40.

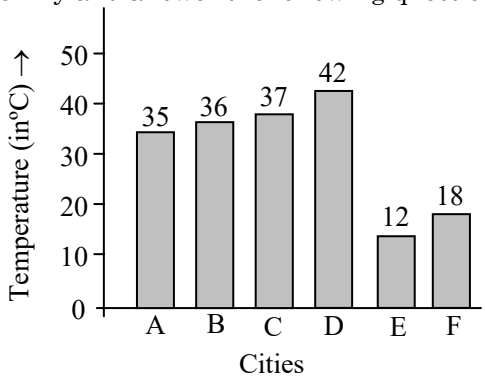
(C) 15-20 and 25-30. (D) 25-30 and 35-40.

Q.21 The presentation of data in the form of pictures is called

(A) bar graph (B) pictograph

(C) tally marks (D) None of these

Directions (22-24) : The bar graph shows the temperatures in 6 big cities in a country. Study it carefully and answer the following questions.

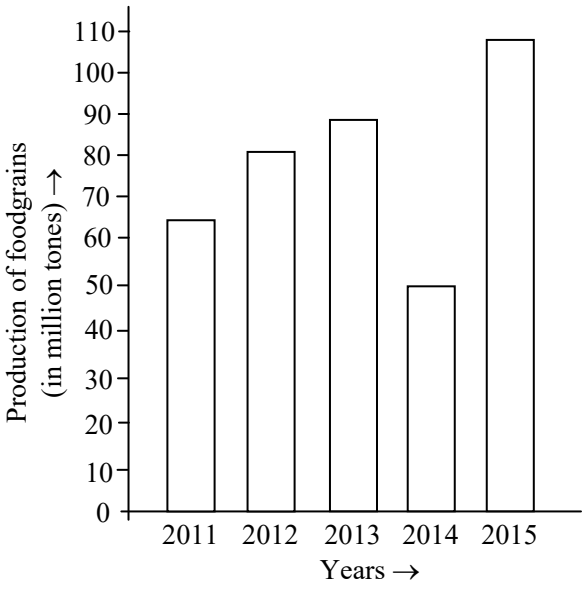


Q.22 The difference between the maximum and the minimum temperature is
(A) 28°C (B) 35°C
(C) 37°C (D) 30°C

Q.23 The number of cities whose temperatures are between 30°C to 40°C is
(A) 2 (B) 3
(C) 4 (D) 6

Q.24 If a place with temperature equal to or above 35°C is considered to be hot, then the number of cold places is
(A) 1 (B) 2
(C) 4 (D) 3

Directions (25-26) : Read the bar graph given below and answer the following questions.



Q.25 What is the fraction of the production of foodgrains in 2011 to that in 2014 ?
(A) 11 / 13 (B) 5 / 11
(C) 13 / 11 (D) 11 / 5

Q.26 Find the difference between the production of foodgrains (in million tonnes) in the year 2012 and 2015.
(A) 80 (B) 40
(C) 20 (D) 30

Q.27 The marks (out of 10) obtained by 30 students in a Mathematics test are listed as below:
8, 1, 2, 6, 5, 5, 5, 0, 1, 9, 7, 8, 0, 5, 8, 3, 0, 8, 10, 10, 3, 4, 8, 7, 8, 9, 2, 0, 3, 6
The number of students who obtained marks more than or equal to 5 is
(A) 23 (B) 20
(C) 18 (D) 17

Q.28 The given pictograph shows the number of girls in class X-XII.

Classes	Number of Girls
X	
XI	
XII	

Each represents 10 girls.
There are _____ girls in class X-XII.
(A) 120 (B) 125
(C) 50 (D) 85

Q.29 Production of cars in a factory in different years is shown here.

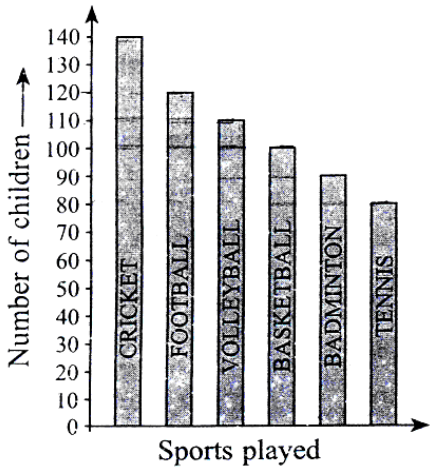
Year	1990	1991	1992	1993	1994
No. of Cars	1000	1500	2000	2400	3000

The ratio of production in the year 1990 to 1994 is
(A) 1 : 3 (B) 1 : 2
(C) 2 : 3 (D) 2 : 1

Exercise -3

Direction (1-2) :

Study the given graph carefully and answer the following questions.



Q.1 What fraction of the total number of children plays football?

(A) 3/16 (B) 13/64

(C) 11/64 (D) 5/32

Q.2 The difference between the number of children who play tennis and cricket altogether & basketball and volleyball altogether is_____.

(A) 20 (B) 40

(C) 10 (D) 50

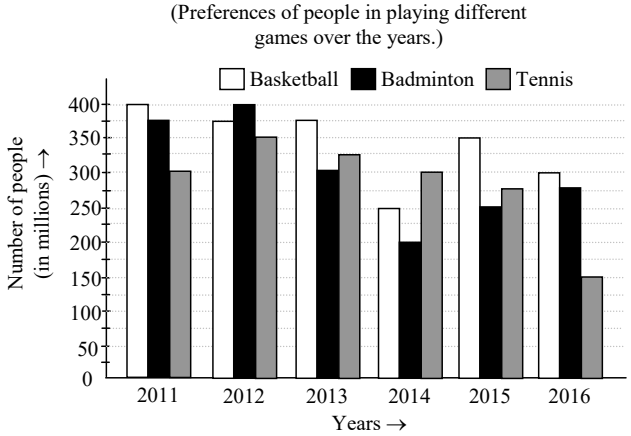
Q.3 The given table shows the postal rate for delivery in Kerala. Find the postal rate for a parcel which weighs 400 g.

Weight up to	Postal rate
20 g	₹ 20
50 g	₹ 50
100 g	₹ 100
250 g	₹ 150
500 g	₹ 200

(A) ₹ 175 (B) ₹ 200

(C) ₹ 300 (D) ₹ 350

Directions (4-5) : Study the bar graph given below and answer the following questions.



Q.4 From 2011 to 2016, find the difference between the total number of people who preferred to play Basketball and Badminton (in millions) ?

(A) 525 (B) 275

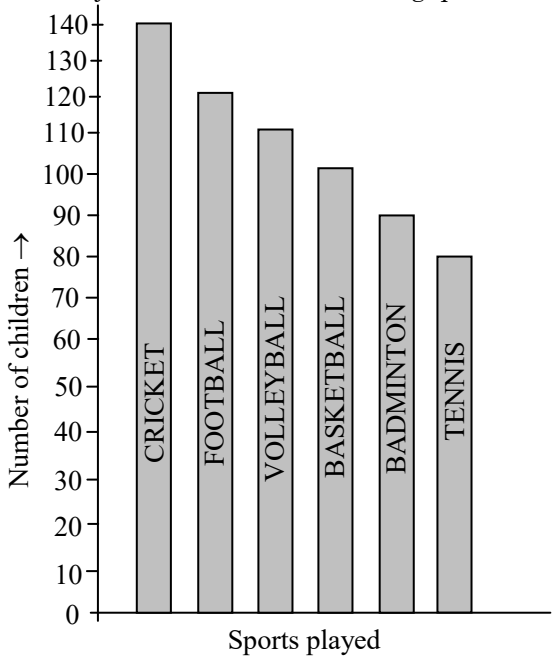
(C) 730 (D) 250

Q.5 How many people (in millions) have preferred to play Tennis in all the years altogether?

(A) 3200 (B) 2100

(C) 1200 (D) 1700

Directions (6-7) : Study the given graph carefully and answer the following questions.



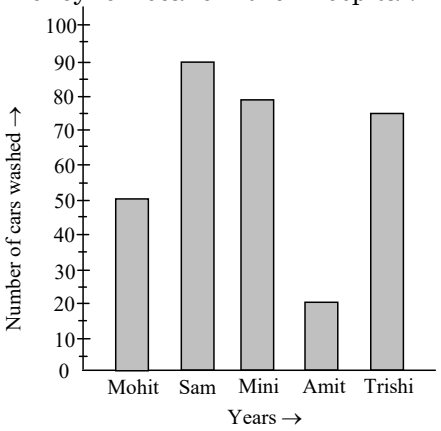
Q.6 What fraction of the total number of children play football ?

(A) 3/16 (B) 13/64
(C) 11/64 (D) 5/32

Q.7 The difference between the number of children who play tennis and cricket together & basketball and volleyball together is

(A) 20 (B) 40
(C) 10 (D) 50

Q.8 The given bar graph shows number of cars washed by five friends to raise money for local children hospital.



What is the difference between the number of cars washed by (Trishi and Sam) & (Mohit and Mini)

(A) 20 (B) 30
(C) 35 (D) 25

Q.9 One 🎈 represents 5 balloons then number of symbols to be drawn to represent 60 balloons is

(A) 5 (B) 60
(C) 10 (D) 12

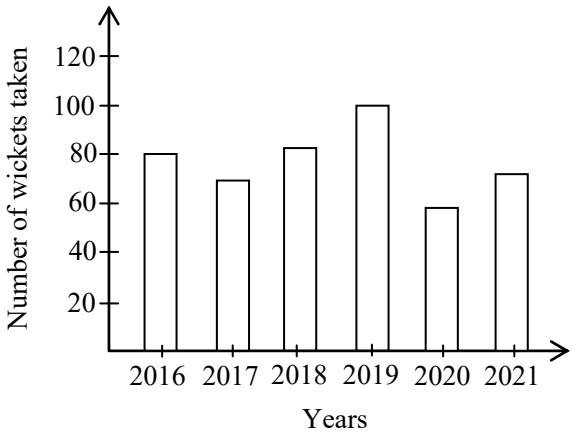
Q.10 In a survey of 12 families, each family is found to have the following number of children.

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

Number of families with 2 children is equal to number of families with _____.

(A) 1 child
(B) 3 children
(C) 4 children
(D) None of these

Q.11 The given bar graph shows the number of wickets taken by a player X from the year 2016 to 2021. Study the graph carefully and answer the given question.



Find the ratio of number of wickets taken by the player in years 2017 and 2021 together to 2016 and 2019 together.

(A) 3 : 5 (B) 4 : 7
(C) 7 : 9 (D) 5 : 9

Answer Key

EXERCISE - 1

1. A data is a collection of numbers representing some information.
2. Tally marks helps us to find frequency of the variable.
3. A pictograph represents data through pictures of objects.
4. A bar graph helps represent data visually with the help of bars of uniform width. The height of these bars represents the given frequency.
5. Data collected directly from the source by the person himself is called primary data.

6. 25 **7.** 17 **8.** 525 pillars **9.** 

11.

Number of two wheelers	Tally marks
0	|||
1	𝍸 𝍸 𝍸 𝍸 𝍸 |||
2	𝍸 𝍸 ||||
3	||||
4	|

19 families

12.

Lengths in cm	Tally marks	Number of carrots
15	𝍸	5
18	𝍸 |	6
20	𝍸 ||||	9
21	𝍸 |	6
22	||||	4

(i) 10 (ii) 20, 22

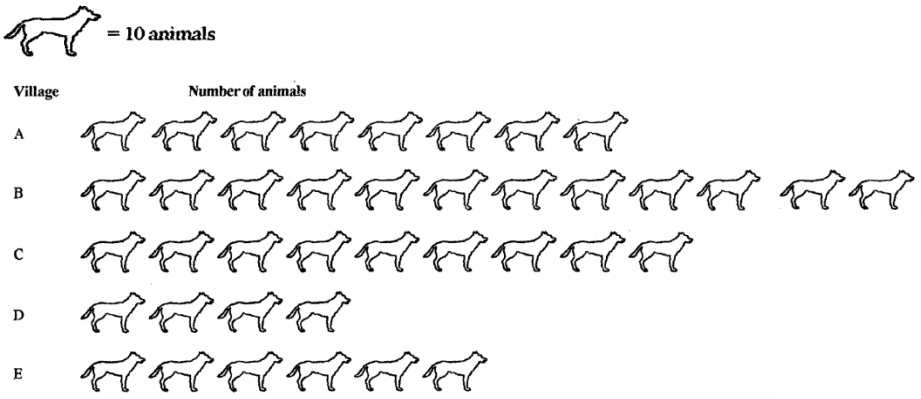
13.

Responses	Tally Marks	Number of Responses
Doctor	𝍸 𝍸	10
Engineer	𝍸 |	6
Pilot	𝍸 |||	8
Officer	𝍸 |	6

14. Let an icon showing an animal represent 10 animal. Then, the number of icons for different villages are as given below:

Villages	Number of icons
A	8
B	12
C	9
D	4
E	6

The pictograph representing the above data is as shown below:



15. maximum frequency = 139
minimum frequency = 138

16. (i) It gives the information regarding import and export from 1982-83 to 1986-87.
(ii) 1982-83 (iii) 1986-87 (iv) 1986-87

17. (i) Metal (ii) Glass (iii) Rubber (iv)160 **18.** (i) 25 (ii) Class 2

19. (i) 400 (ii) Shop no. 7 **20.** (i) 6750 (ii) 20-25 (iii) decrease (iv) 850

21. Pankaj scored the highest marks in the test and his score is 95.

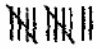
23. In January month 1000 cars was produce in the factory.

24. (i) The bar graph shows the number of newspapers circulated in different states.
(ii) Rajasthan (iii) 3000

25. (i) 70 (ii) Pink and Blue (iii) 15 (iv) Green colour

26. (i) ₹ 36916 crores (ii) ₹ 70158 crores
(iii) 36916 crores < 42653 crores < 58329 crores < 65415 crores < 70158 crores

27. (i) 50 fans (ii) Friday and Sunday (iii) Wednesday (iv) 290 fans

28. (i)  (ii) 7 (iii) length (iv) data (v) bar graph

29. (i) True (ii) False (iii) False (iv) False (v) True

30. (i) → (d); (ii) → (a); (iii) → (b); (iv) → (c)

31. (D) P-3, Q-2, R-4, S-1

EXERCISE - 2

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	C	D	D	B	C	A	C	D	D	C	D	D	C	A
Ques.	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	
Ans.	B	A	A	D	D	B	D	B	B	C	D	C	D	A	

EXERCISE - 3

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	A	C	C	D	D	A	C	C	D	B	C

MENTAL ABILITY

Chapter 1

NUMBER SERIES

Number Series problems deal with numbers. While attempting to solve the question, you have to check the pattern of the series. Series moves with certain mathematical operations like :

- Consecutive odd/even numbers.
- Consecutive prime / composite numbers.
- Squares/cubes of some numbers with/without variation of addition or subtraction of some number.
- Sum/product/difference of preceding number(s) .
- Addition/subtraction/multiplication/division by some number.
- Many more combinations of the relationship given above.

Some Steps to solve the series

Step I : If it is a simple series you will be able to solve it easily.

Step II: If you fail to determine the trend of the series. Determine whether it is increasing, decreasing or alternating.

Step III : If a series is increasing or decreasing. Use the following rules :

(a) If the rise of a series is **slow or gradual**, the series is likely to have an **addition-based increase**; successive numbers are obtained by adding some numbers.

(b) If the rise of a series is **very sharp** initially **but slows down later** on, the series is likely to be formed by adding **squared or cubed** numbers.

(c) If the rise of a series is throughout **equally sharp**, the series is likely to be **multiplication-based**; successive terms are obtained by multiplying by some terms (and, maybe, some addition or subtraction could be there, too).

(d) If the rise of a series is **irregular**, there may be two possibilities. Either there may be a **mix of two series** or two **different kinds of operations** may be going on alternately. (The first is more likely when the increase is very irregular : the second is more likely when there is a pattern, even in the irregularity of the series).

Type of questions asked in the examination:

(i) Find the missing term(s).

(ii) Find the wrong term(s).

◈ Find the Missing Term

Ex.1 325, 259, 204, 160, 127, 105 , ?

(A) 84 (B) 100

(C) 90 (D) 94

Sol. **(D)** Gradual slow decrease. Check the differences of successive terms. They are 66, 55, 44, 33, 22. Hence, next decrease will be : 11.
Next term = 105 – 11 = 94.

Ex.2 54, 43, 34, 27, 22, 19 ,?

(A) 18 (B) 17

(C) 16 (D) 15

Sol. **(A)** Gradual slow decrease. Likely to be arithmetical decrease. Check the differences. They are 11, 9, 7, 5, 3. Hence, next decrease will be 1.
Next term = 19 – 1 = 18.

Ex.3 16, 17, 21, 30, 46, 71 , ?

(A) 81 (B)90

(C) 97 (D) 107

Sol. **(D)** Each term is obtained by adding 1^2, 2^2, 3^2, 4^2, 5^2..... respectively.
Next term = $71 + 6^2 = 107$

Ex.4 3, 4, 8, 17, 33, 58 , ?

(A) 69 (B)94

(C) 74 (D) 89

Sol. **(B)** Sharp increase that slows down later on, likely to be addition of squared or cubed numbers. On checking the series is:
$+ 1^2 + 2^2, + 3^2, + 4^2, + 5^2,$?
Next term = $58 + 6^2 = 94$.

Ex.5 0, 6, 24, 60, 120, 210, ?

(A) 240 (B) 290

(C) 336 (D) 504

Sol. **(C)** Clearly, the given series is
$1^3 - 1, 2^3 - 2, 3^3 - 3, 4^3 - 4, 5^3 - 5, 6^3 - 6.$
$\therefore$ Next number = $7^3 - 7 = 343 - 7 = 336$

Ex.6 –2, 4, 22, 58, 118, 208 , ?

(A) 250 (B) 334

(C) 310 (D) 294

Sol. **(B)** Series increases sharply but then its speed of rise slows down, likely to be addition of squared or cubed numbers. On checking, the series is: $1^3 - 3$, $2^3 - 4$, $3^3 - 5$, $4^3 - 6$....

Next term = $7^3 - 9 = 334$.

Ex.7 3, 3, 6, 18, 72, 360 , ?

(A) 720 (B) 1890

(C) 2160 (D) None of these

Sol. **(C)** Sharp increase.

The series is : × 1, × 2, ×3, ×4, ×5, ...

Next term = 360 × 6 = 2160

Ex.8 8, 14, 26, 50, 98, 194 , ?

(A) 388 (B) 384

(C) 386 (D) 382

Sol. **(C)** Sharp increase and terms roughly doubling every time. On checking with 2 as multiple the series is:

next term = previous term ×2 –2. Next term = 194 ×2 – 2.= 386

Ex.9 6, 16, 36, 76, 156, 316 , ?

(A) 632 (B) 636

(C) 642 (D) 650

Sol. **(B)** Sharp increase with terms roughly doubling each time. Likely to have geometrical nature with 2 as multiple. On checking the series is: × 2 + 4.

Next term = 316 × 2 + 4 = 636

Ex.10 824, 408, 200, 96, 44, 18 , ?

(A) 10 (B) 8

(C) 7 (D) 5

Sol. **(D)**Sharp decrease and terms roughly being halved every time. Checking with 2 as divisor the series is :

Next term (previous term – 8) ÷ 2.

Next term = 5.

Ex.11 8, 8, 9, 9, 11, 10, 14, 11 , ?

(A) 14 (B) 18

(C) 19 (D) 20

Sol. **(B)**Irregular. Very irregular. Likely to be, therefore, mixed. On checking it is a mix of two series:

8, 9, 11, 14, (+1, +2, +3 etc.) and 8, 9, 10, 11.

Next term = 14 + 4 + 18.

Ex.12 4, 6, 12, 14, 28, 30, ?

(A) 32 (B) 60

(C) 62 (D) 64

Sol. **(B).** The given sequence is a combination of two series :

I. 4, 12, 28, ? and II. 6, 14, 30.

Now, the pattern followed in each of the above two series is : +8, +16, +32 ....

So, missing number = (28 + 32) = 60

Ex.13 1, 3, 3, 6, 7, 9, ?, 12, 21.

(A) 10 (B) 11

(C) 12 (D) 13

Sol. **(D)** Clearly, the given sequence is a combination of two series :

I. 1, 3, 7, ?, 21 and II. 3, 6, 9, 12

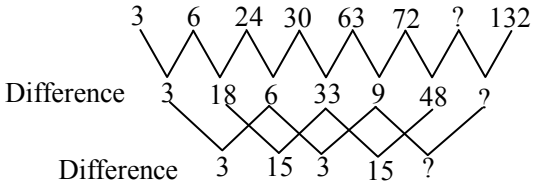
The pattern followed in I is + 2, + 4, +6, +8 ...; and the pattern followed in II is +3. Thus, missing number = 7 + 6 = 13.

Ex.14 3, 6, 24, 30, 63, 72, ?, 132

(A) 128 (B) 122

(C) 120 (D) 124

Sol. **(C)** The difference between the terms is given below as:



Therefore alternate difference between the difference is 3 and 15 respectively.

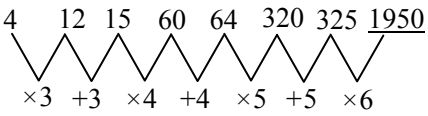
Hence, the next term would be 72 + 48 = 120.

Ex.15 4, 12, 15, 60, 64, 320, 325, ?

(A) 1950 (B) 1850

(C) 1935 (D) 1955

Sol. **(A)**

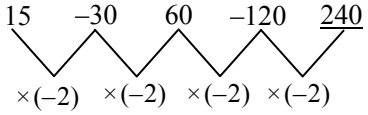


Ex.16 15, –30, 60, –120, ?

(A) 150 (B) 240

(C) 270 (D) 180

Sol. **(B)**



◈ Find the Wrong Term

Ex.17 2, 5, 9, 11, 14

(A) 2 (B) 5

(C) 9 (D) 11

Sol. **(C)** Series : + 3, + 3, + 3, ...

The next term is got by adding 3 in preceding term.

$\therefore$ 2 + 3 = 5, 5 + 3 = 8

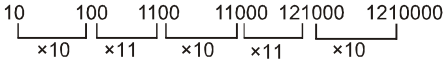
Hence, 9 is wrong term.

Ex.18 10, 100, 1100, 11000, 111000, 1210000.

(A) 1100 (B) 11000

(C) 100 (D) 111000

Sol. **(D)** Given series is :



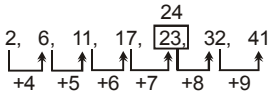
Hence, the wrong term is 111000 .

Ex.19 2, 6, 11, 17, 23, 32, 41

(A) 6 (B) 17

(C) 23 (D) 32

Sol. **(C)** Given series is :



Hence, the wrong term is 23.

Ex.20 61, 52, 63, 95, 46, 18

(A) 95 (B) 63

(C) 46 (D) 52

Sol. **(A)**On interchanging the digits of each term, we get a number which is a perfect square of a natural number.

$4^2 = 16 \Rightarrow 61$, $5^2 = 25 \Rightarrow 52$, $6^2 = 36 \Rightarrow 63$,

$7^2 = 49 \Rightarrow 94$,

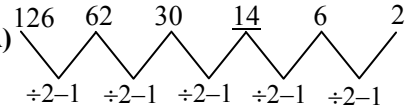
Hence, the wrong term is 95.

Ex.21 126, 62, 30, 15, 6, 2

(A) 15 (B) 30

(C) 6 (D) 62

Sol. **(A)**



Hence, the wrong term is 15.

EXERCISE

Directions (1 to 24) : Find the missing term

Q.1 7, 12, 19, ?, 39.
(A) 29 (B) 28
(C) 26 (D) 24

Q.2 6, 11, 21, 36, 56, ?
(A) 42 (B) 51
(C) 81 (D) 91

Q.3 1, 6, 13, 22, 33, ?
(A) 44 (B) 45
(C) 46 (D) 47

Q.4 1, 9, 17, 33, 49, 73, ?
(A) 97 (B) 98
(C) 99 (D) 100

Q.5 3, 7, 15, 31, 63, ?
(A) 92 (B) 115
(C) 127 (D) 131

Q.6 1, 6, 15, ?, 45, 66, 91
(A) 25 (B) 26
(C) 27 (D) 28

Q.7 1, 2, 3, 5, 8, ?
(A) 9 (B) 11
(C) 13 (D) 15

Q.8 77, 49, 36, 18, ?
(A) 8 (B) 9
(C) 4 (D) 12

Q.9 18, 35, 69, 137, ?
(A) 270 (B) 273
(C) 271 (D) 272

Q.10 6, 12, 7, 11, 8, 10, 9, ?
(A) 8 (B) 15
(C) 9 (D) 14

Q.11 9, 11, 15, 23, ?
(A) 25 (B) 21
(C) 39 (D) 31

Q.12 2, 3, 5, 7, 11, 13, ?
(A) 12 (B) 14
(C) 16 (D) 17

Q.13 7, 11, 13, 17, 19, 23, 25, ?
(A) 25 (B) 27
(C) 24 (D) 29

Q.14 2, 5, 11, 23, 47, ?
(A) 82 (B) 95
(C) 110 (D) 118

Q.15 1, 1, 2, 4, 3, 9, 4, ?
(A) 10 (B) 12
(C) 16 (D) 20

Q.16 5, 8, 14, 26, 50, ?
(A) 60 (B) 98
(C) 68 (D) 78

Q.17 100, 91, 83, 76, 70, ?
(A) 65 (B) 60
(C) 62 (D) 63

Q.18 101, 100, ?, 87, 71, 46.
(A) 92 (B) 88
(C) 89 (D) 96

Q.19 2, 3, 5, 8, 13, 21, ?
(A) 34 (B) 28
(C) 26 (D) 25

Q.20 1, 1, 2, 6, 24, 120, ?
(A) 729 (B) 720
(C) 600 (D) 480

Q.21 28, 15, 6, ?, 0
(A) 3 (B) 2
(C) 1 (D) 0

Q.22 96, 90, 78, ?, 36, 6
(A) 60 (B) 54
(C) 72 (D) 48

Q.23 3, 6, 18, 72, 360, ?
(A) 720 (B) 1080
(C) 1600 (D) 2160

Q.24 480, 480, 240, 80, 20, ?
(A) 4 (B) 1
(C) 5 (D) 10

Directions (25 to 29) : Find the wrong terms

Q.25 5, 10, 12, 24, 26, 48, 54
(A) 10 (B) 24
(C) 26 (D) 48

Q.26 5, 8, 11, 14, 16, 20
(A) 11 (B) 14
(C) 20 (D) 16

Q.27 2, 6, 11, 17, 23, 32, 41
(A) 6 (B) 17
(C) 23 (D) 32

Q.28 121, 143, 165, 186, 209
(A) 143 (B) 165
(C) 186 (D) 209

Q.29 3, 1, 4, 5, 10, 14, 23
(A) 5 (B) 10
(C) 14 (D) 23

Q.30 1, 2, 4, 8, 16, 32, 64, 96
(A) 4 (B) 32
(C) 64 (D) 96

ANSWER KEY

NUMBER SERIES

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	C	C	A	C	D	C	A	B	C	C	D	D	B	C	B	A	D	A	B
Que.	21	22	23	24	25	26	27	28	29	30										
Ans.	C	A	D	A	D	D	C	C	B	D										