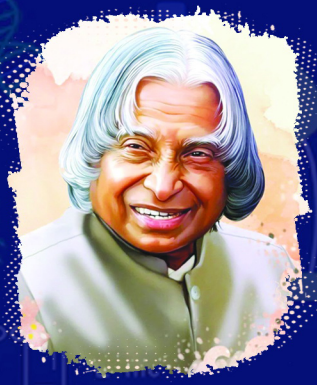
PHYSICAL SCIENCE HANDBOOK



8th Class

(Semester-2)

NEW VERSION



FEATURES

- Mind Map
- Main Points
- Intext Questions
- Keep the curiosity alive
- Discover, design, and debate
- Investigates (Activities)
- Prepare some questions based on your learnings so far
- Multiple choice questions
- CBA Questions

"Shaping Young Minds for a Better Future"

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SEMESTER -2	
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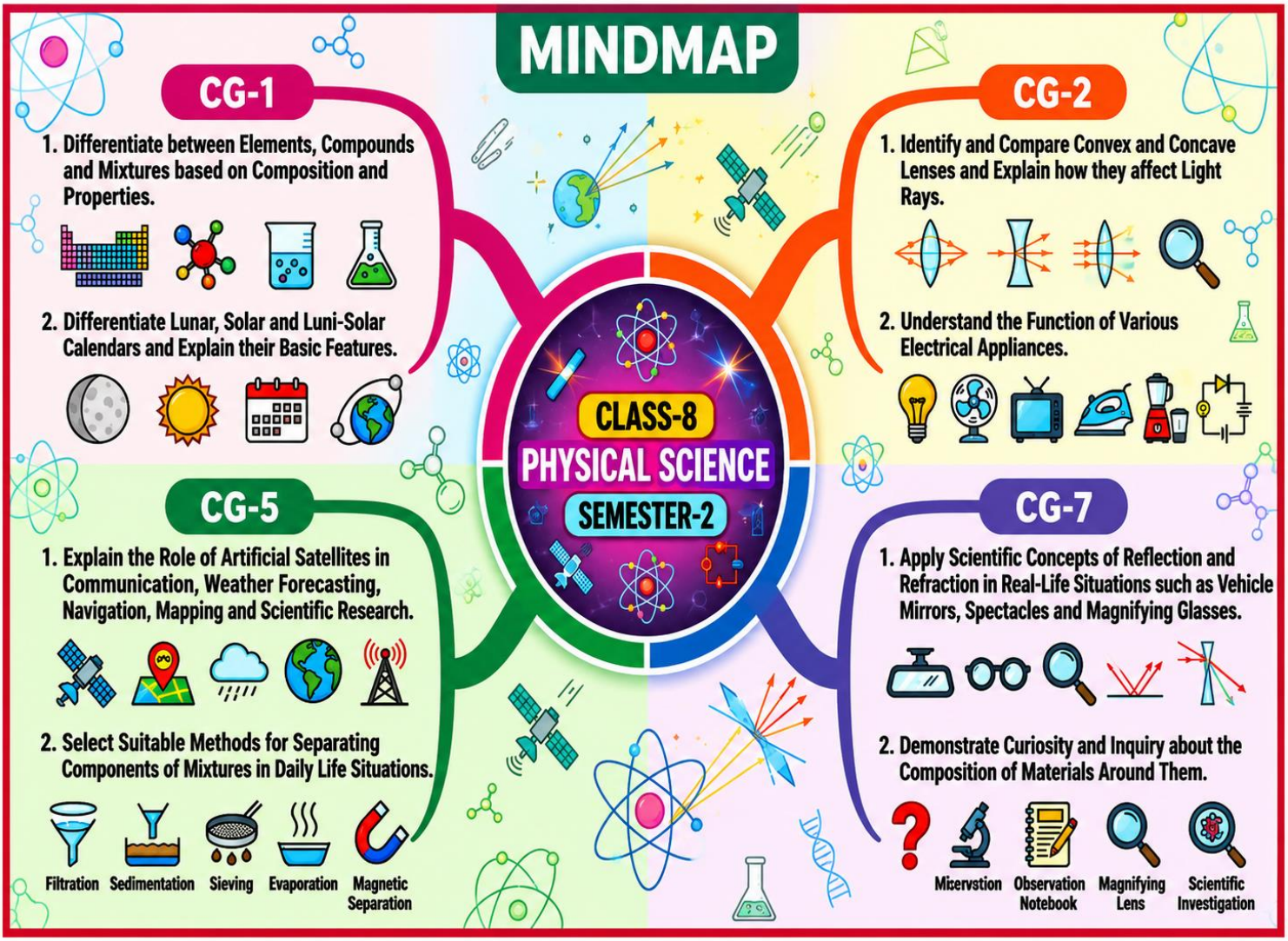
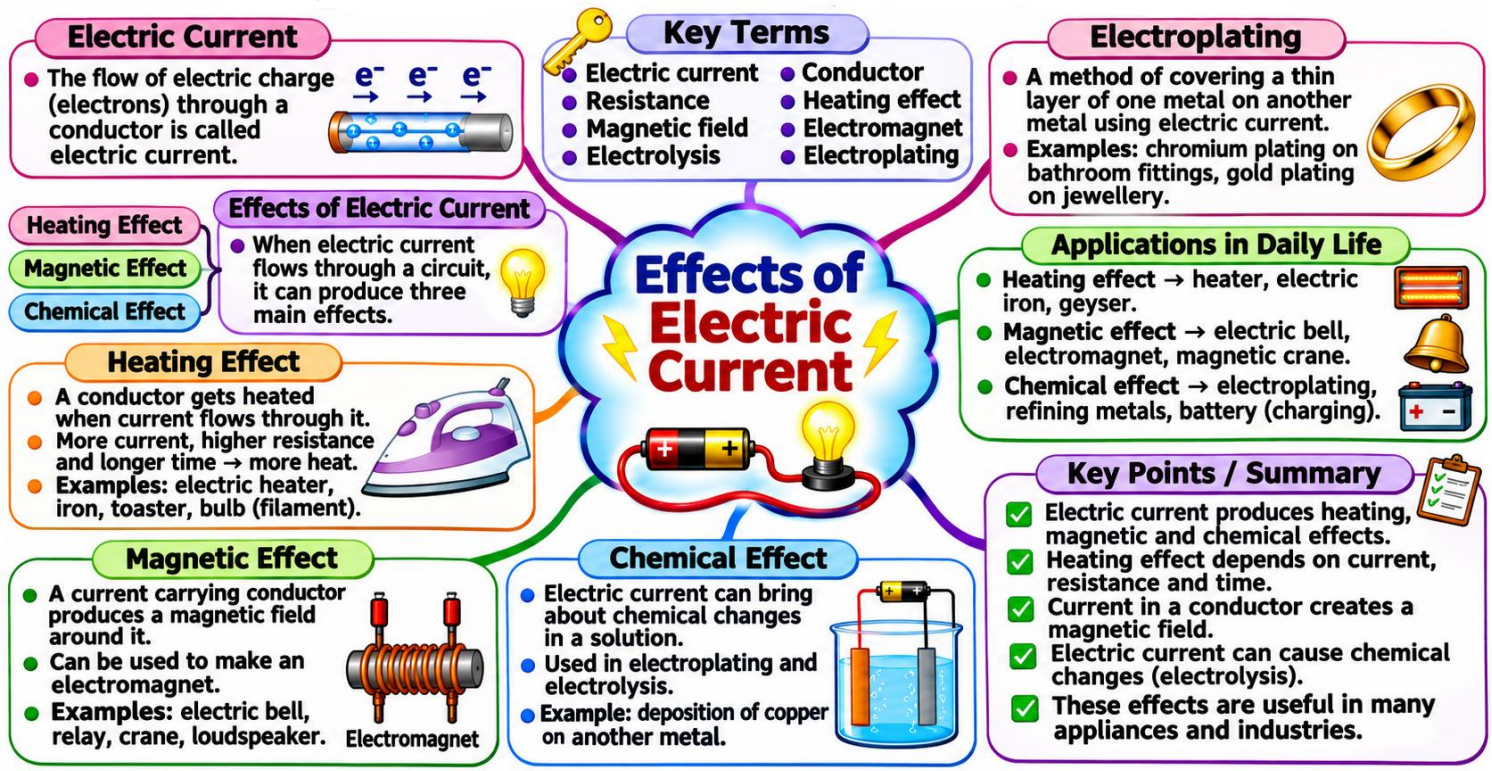


CHAPTER - 6: Effects of Electric Currents

Mind Map



Main Points

1. Electric current produces a **magnetic effect** around a conductor.
2. A compass needle deflects near a current-carrying wire.
3. The region around a magnet or current-carrying wire where magnetic effect is felt is called a **magnetic field**.
4. The magnetic field disappears when electric current stops flowing.
5. The phenomenon in which current produces magnetism is called the **magnetic effect of electric current**.
6. Hans Christian Oersted discovered the link between electricity and magnetism in 1820.
7. A current-carrying coil behaves like a magnet.
8. Such a temporary magnet is called an **electromagnet**.
9. Electromagnets become stronger when an **iron core** is inserted.
10. An electromagnet loses magnetism when current stops flowing.
11. Electromagnets have **North and South poles** like ordinary magnets.
12. The strength of an electromagnet increases with more electric current.
13. Increasing the number of turns in the coil increases electromagnet strength.
14. Reversing the direction of current reverses the poles of an electromagnet.
15. Earth behaves like a giant magnet due to electric currents inside its core.
16. Lifting electromagnets are used in cranes to lift heavy iron and steel objects.
17. Switching OFF the current removes the magnetic effect in lifting electromagnets.
18. A current-carrying wire becomes hot due to the **heating effect of electric current**.
19. Resistance in a conductor converts electrical energy into heat energy.
20. Nichrome wire produces more heat than copper wire of the same size.
21. The heat generated depends on current, material, thickness, length of wire, and time of current flow.
22. Electric heaters, irons, kettles, and stoves work on the heating effect of electric current.
23. A heating element is a rod or coil that becomes hot when current passes through it.
24. Overheating in wires and appliances can damage plugs, sockets, and cause fires.
25. A Voltaic cell generates electricity through chemical reactions.
26. A Voltaic cell contains two different metal electrodes and an electrolyte.

27. When chemicals in a cell are used up, the cell becomes **dead**.
28. Lemon juice can act as an electrolyte in a simple electric cell.
29. Dry cells contain a paste-like electrolyte instead of liquid electrolyte.
30. Rechargeable batteries can be charged and reused many times.

-------: Definitions :-------

Magnetic Effect of Electric Current: When electric current flows through a conductor (like a wire), it produces a magnetic field around it. This phenomenon is known as the magnetic effect of electric current.
Electromagnet: A current-carrying coil that behaves like a magnet is called an electromagnet.
Heating Effect of Electric Current: When an electric current passes through a conductor, it gets heated. This warming is known as the heating effect of electric current.
Conductors: Liquids that allow electric current to pass through them are called conductors.
Non-conductors (Insulators): Liquids that do not allow electric current to pass through them are called non-conductors or insulators.
Electrolytes: Liquids that contain free ions conduct electricity well. These are called electrolytes.
Chemical Effects of Electric Current: When electric current passes through a conducting liquid (electrolyte) or some other electrolytic substances, it can produce chemical reactions. These are called the chemical effects of electric current.
Electrolysis: Liquids that contain free ions conduct electricity well. These are called electrolytes.
Electroplating: The process of coating one metal on another using electricity is called electroplating.
Voltaic Cell: A Voltaic cell, also known as a Galvanic cell, is a device that generates electricity through chemical reactions.
Dry Cell: A dry cell is a single-use cell in which the electrolyte is a thick paste rather than a liquid.

Probe and Ponder

Is there any other way to find out if current is flowing without an electric lamp?
Yes. Place a magnetic compass near the wire. Deflection of the compass needle indicates that current is flowing.
Is it possible to make temporary magnets? How?
Yes. Wind insulated copper wire around a soft iron nail and connect it to a cell. When current flows, the nail acts as a temporary magnet.
How is heat generated in electrical appliances?
Heat is generated when electric current passes through a resistance wire. This is called the heating effect of electric current.
How do jewellery or other objects shine like gold or stainless steel?
By **electroplating**, a thin layer of metal is deposited on an object using electric current.
How do we know if a cell or battery is dead? Can all batteries be recharged?
A discharged cell cannot operate a device properly. No, only rechargeable cells and batteries can be recharged.
Share Your Questions

1. What are the different effects of electric current?
2. How does the number of turns in a coil affect the strength of an electromagnet?
3. What is electroplating, and what are its uses?
4. Why does a nichrome wire become hot when electric current passes through it?
5. How can we make a simple electric cell using easily available materials?

Intext Questions

1. Can we use electric current to make a magnet?
Ans: Yes. When electric current flows through a wire, it creates a magnetic field. This temporary magnet is called an electromagnet.
2. Does electromagnet also have two poles like a bar magnet?
Ans: Yes. An electromagnet has two poles — North and South, just like a bar magnet. You can find them using a compass or another magnet.
3. Are electromagnets also used in real life, for lifting objects?
Ans: Yes. Electromagnets are used in places like scrapyards to lift heavy iron objects such as cars and metal pieces.
4. While doing the activity for electromagnet, did you also notice that the wire ends got warm? Why would

that happen?

Ans: Yes.This happens because of heating effect of electric current. When current flows through a wire, it faces resistance, and some electrical energy is converted into heat.

5. What is inside these cells and batteries that produces electricity?

Ans: Cells and batteries contain two different metal electrodes and Electrolyte (chemicals). These chemicals undergo chemical reactions that produce electric current.

6. Can we also make our own Voltaic cell using easily available materials?

Ans: Yes. You can make a simple cell using: Lemon / potato, Copper strips, Zinc nail
This setup produces a small amount of electricity and is called a simple voltaic cell.



1. Fill in the blanks:

(i) The solution used in a Voltaic cell is called _____.

(ii) A current carrying coil behaves like a _____ .

Ans: (i) electrolyte (ii) magnet

2. Choose the correct option:

(i) Dry cells are less portable compared to Voltaic cells. (True/False)

(ii) A coil becomes an electromagnet only when electric current flows through it. (True/False)

(iii) An electromagnet, using a single cell, attracts more iron paper clips than the same electromagnet with a battery of 2 cells. (True/False)

Ans: (i) False (ii) True (iii) False

3. Answer in brief:

i) What is the chemical effect of electric current?

ii) Describe an activity to show the deposition of metal on another metal due to electric current.

iii) What are the uses of electroplating?

Ans: i) When electric current passes through certain liquids, it produces chemical changes. This is called the chemical effect of electric current.

ii) **Aim:** To show the deposition of copper on another metal using electric current.

Required Materials: Beaker, copper sulphate solution, two clean copper plates, battery, switch and connecting wires.

Procedure:

a) Take copper sulphate solution in a beaker.
b) Take two clean copper plates.
c) Connect one plate to the positive terminal of the battery.
d) Connect the other plate to the negative terminal.
e) Dip both plates into the solution.
f) Switch ON the circuit for 15–20 minutes.
g) Remove the plates and observe them.

Observation: A reddish-brown layer of copper is deposited on the plate connected to the negative terminal.

Conclusion: Electric current can deposit one metal on another metal. This process is called electroplating.

iii) 1. To give objects a shiny appearance.
2. To protect metals from corrosion.
3. To coat objects with a thin layer of another metal.
4. To improve the appearance and durability of objects.

4. An electric current flows through a nichrome wire for a short time.

(i) The wire becomes warm.

(ii) A magnetic compass placed below the wire is deflected.

Choose the correct option:

(a) Only (i) is correct **(b) Only (ii) is correct**

(c) Both (i) and (ii) are correct **(d) Both (i) and (ii) are not correct**

Ans: (c) Both (i) and (ii) are correct

5. Match the items in Column A with those in Column B.

Column A	Column B
(i) Voltaic cell	(a) Best suited for electric heater
(ii) Electric iron	(b) Works on magnetic effect of electric current
(iii) Nichrome wire	(c) Works on heating effect of electric current
(iv) Electromagnet	(d) Generates electricity by chemical reactions

Ans: (i) – (d), (ii) – (c), (iii) – (a), (iv) – (b)

6. Nichrome wire is commonly used in electrical heating devices because it

(i) is a good conductor of electricity. **(ii) generates more heat for a given current.**

(iii) is cheaper than copper. **(iv) is an insulator of electricity.**

Ans: (ii) generates more heat for a given current.

7. Electric heating devices (like an electric heater or a stove) are often considered more convenient than traditional heating methods (like burning firewood or charcoal). Give reason(s) to support this statement considering societal impact.

Ans: (i) They do not produce smoke or harmful gases, reducing air pollution and health problems.
(ii) They help protect forests by reducing the need for firewood, supporting environmental conservation.
(iii) They are clean, safe, and easy to use, improving hygiene in homes.
(iv) They save time and effort, especially for cooking and heating, improving quality of life.
(v) They are more suitable for modern urban living, promoting better living standards in society.

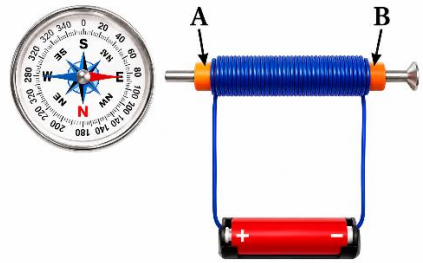
8. Look at the Fig. 6.4a. If the compass placed near the coil deflects:

(i) Draw an arrow on the diagram to show the path of the electric current.

(ii) Explain why the compass needle moves when current flows.

(iii) Predict what would happen to the deflection if you reverse the battery terminals.

Ans:



(i) Electric current flows from the + terminal → up through the wire → around the coil (from A to B) → down to the − terminal of the battery.

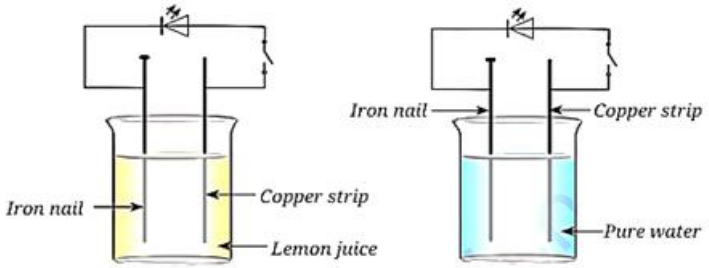
(ii) When electric current flows through the coil, it produces a magnetic field around the coil. The compass needle is a tiny magnet, and it gets affected by this magnetic field, causing it to deflected.

(iii) The direction of the magnetic field also reverses, and the compass needle will deflect in the opposite direction.

9. Suppose Sumana forgets to move the switch of her lifting electromagnet model to OFF position (in introduction story). After some time, the iron nail no longer picks up the iron paper clips, but the wire wrapped around the iron nail is still warm. Why did the lifting electromagnet stop lifting the clips? Give possible reasons.

Ans: (i) When the switch was kept ON for a long time, the wire became hot because electric current produces heat.
(ii) The battery slowly lost its power, so less electric current flowed through the coil.
(iii) When the current became less, the electromagnet became weak and could not produce a strong magnetic field.
(iv) Therefore, even though the wire was still warm, the electromagnet could not lift the iron paper clips.

10. In Fig. 6.17, in which case the LED will glow when the switch is closed?



Ans: The LED will glow in fig (a).
Lemon juice contains acids and dissolved salts, so it conducts electricity and completes the circuit.

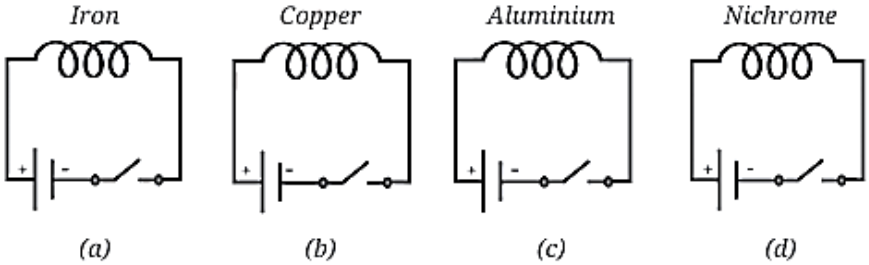
Pure water (fig b) is a poor conductor of electricity, so the LED will not glow.

11. Neha keeps the coil exactly the same as in Activity 4.4 but slides the iron nail out, leaving only the coiled wire. Will the coil still deflect the compass? If yes, will the deflection be more or less than before?

Ans: Yes, the coil will still deflect the compass because electric current in the coil produces a magnetic field even without the iron nail. But the deflection will be less than before.

The iron nail makes the magnetic field stronger. When the nail is removed, the magnetic field becomes weak, so the compass needle shows less deflection.

12. We have four coils, of similar shape and size, made up from iron, copper, aluminium, and nichrome as shown in Fig. 6.18.



When current is passed through the coils, compass needles placed near the coils will show deflection.

(i) Only in circuit (a)
(ii) Only in circuits (a) and (b)
(iii) Only in circuits (a), (b), and (c)
(iv) In all four circuits

Ans: (iv) In all four circuits

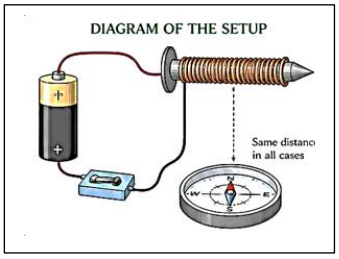
Discover, Design and Debate

1. Make coils of turns 25, 50, 75, and 100. Connect them to the same cell one by one. Note the deflection in a magnetic compass placed in the same position in all the cases. Report your observations. Draw conclusion of the effect of number of turns of the coil on the strength of the electromagnet.

Aim: To study the effect of the number of turns of a coil on the strength of an electromagnet.

Procedure:

a) Prepare coils with 25, 50, 75 and 100 turns.
b) Connect each coil to the same electric cell, one by one.
c) Place a magnetic compass in the same position for all the coils.
d) Observe and note the deflection of the compass needle.



Observations:

Number of turns	Deflection of compass needle
25 turns	Less deflection
50 turns	More deflection
75 turns	Still more deflection
100 turns	Maximum deflection

Conclusion: As the number of turns in the coil increases, the strength of the electromagnet increases.

Result: The strength of an electromagnet can be increased by increasing the number of turns of the coil.

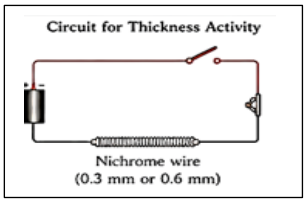
2. Take two thin nichrome wires of equal length and different thickness (approximately one of these wire thickness to be double of the other, say 0.3 mm and 0.6 mm). Connect them one by one in a circuit which has a switch and a cell, and allow the current to flow for 30 s in each case. Momentarily touch these wires. Which wire heats up more? Now repeat the same activity with two nichrome wires of same diameter but of different lengths. Prepare a brief report of your activity.

Aim: To study the effect of thickness and length of nichrome wire on the heating effect of electric current.

A. Effect of Thickness

Procedure:

a) Take two nichrome wires of equal length but different thicknesses (0.3 mm and 0.6 mm).
b) Connect them separately to the same electric cell and switch.
c) Allow current to flow for 30 seconds in each case.
d) Compare the heating of both wires.



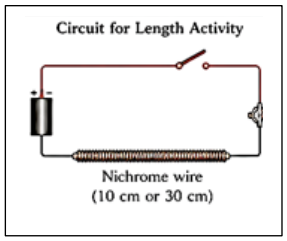
Observations:

Wire thickness	Observation
0.3 mm (Thin wire)	Higher resistance
0.6 mm (Thick wire)	Lower resistance

Conclusion: The thickness of a wire affects its resistance and the heating produced by electric current.

B. Effect of Length

Procedure:



a) Take two nichrome wires of the same diameter but different lengths.
b) Connect them separately to the same electric cell and switch.
c) Allow current to flow for 30 seconds in each case.
d) Compare the heating of both wires.

Observations:

a) The longer wire has greater resistance.
b) The shorter wire has less resistance.

Conclusion: The resistance of a wire depends on its length and thickness. Nichrome wires offer higher resistance compared to copper wires of the same size.

Result: The heating effect of electric current depends on the resistance of the wire and the current flowing through it.

3. Try to make an electric cell using various fruits and vegetables. Also try with electrodes of different metals. Prepare a brief report.

Aim: To prepare an electric cell using different fruits and vegetables.

Materials Required: Lemons, Potato, Copper wires, Iron nails, Connecting wires, LED, Salt solution (if required)

Procedure:

a) Take five or six juicy lemons.
b) Insert one copper wire and one iron nail into each lemon, keeping them apart.
c) Connect the copper wire of one lemon to the iron nail of the next lemon.
d) Connect the remaining two terminals to an LED.
e) Observe whether the LED glows.
f) Repeat the activity using different fruits and vegetables.

Observations:

Fruit/Vegetable	Observation
Lemon	Can produce electricity
Potato	Can produce electricity
Other juicy fruits	Can be tested for electricity production

a) The LED glows when sufficient electric current flows through it.
b) The lemon juice acts as an electrolyte.
c) Copper and iron act as electrodes.

Conclusion: An electric cell can be prepared using fruits and vegetables with two different metal electrodes. The chemical reactions between the electrodes and electrolyte help produce electricity.

Result: Fruits and vegetables containing suitable electrolytes can be used to make simple electric cells.

4. Prepare a project on the benefits and harms of electroplating to the environment. Discuss it in the classroom.

Title: Benefits and Harms of Electroplating to the Environment

Introduction: Electroplating is the process of coating one metal with another metal using electricity.

Benefits of Electroplating

a) It protects iron objects from rusting.
b) Chromium plating improves the appearance of objects.
c) Gold and silver plating make artificial jewellery attractive.
d) It makes surfaces shiny and durable.
e) It increases the life of metal objects.

Harms of Electroplating

a) Electroplating industries may release harmful chemicals.
b) Untreated chemical waste can pollute water bodies.
c) Some metal salts can harm aquatic plants and animals.
d) Chemical waste may contaminate soil.
e) Improper disposal of industrial waste can affect human health.

Environmental Protection Measures

a) Treat industrial wastewater before releasing it.

b) Dispose of chemical waste safely.
c) Reuse and recycle chemicals wherever possible.
d) Follow proper environmental safety rules.
e) Use environmentally friendly plating methods.

Conclusion: Electroplating is useful for protecting metals from rusting and improving their appearance. However, improper disposal of chemicals can harm the environment. Therefore, electroplating industries should follow proper waste management methods.

Activites

Activity 6.1

Aim: To observe that electric current produces a magnetic effect. (or)
To observe the magnetic effect of the electric current using the compass needle.

Required materials: Magnetic compass, electric cell, cell holder, two drawing pins, safety pin, two nails, two connecting wires, cardboard, and a switch.

Procedure:



a) Fix two nails on a cardboard piece.
b) Place the electric cell and switch on the cardboard.
c) Stretch one wire between the two nails and connect it to the cell and switch.
d) Place the magnetic compass below the wire.
e) Switch on the circuit and observe the compass needle.
f) Switch off the circuit and observe again.

Observation: When the current flows through the wire, the compass needle gets deflected.
When the current is stopped, the needle comes back to its original position.

Conclusion: Electric current produces a magnetic field around the wire. This magnetic field causes the compass needle to move.

Activity 6.2

Aim: To see that an iron nail becomes a magnet when electric current passes through a coil. (or)
To make an electromagnetic using an iron nail and observe its magnetic property.

Required materials: A piece of insulated wire, an iron nail, one electric cell, some paper clips, and tape

Procedure:



a) Wrap the wire around the iron nail.
b) Connect both ends of the wire to the cell for a few seconds.
c) Bring the nail near the paper clips.
d) Then remove the wire from the cell and see what happens.

Observation: The paper clips stick to the nail when the wire is connected to the cell.The paper clips fall when the wire is disconnected.

Conclusion: Electric current makes the nail act like a magnet. So, current produces a magnetic effect.

Activity 6.3

Aim: To show that a current-carrying coil behaves like a magnet and becomes stronger with an iron core. (or)
To observe how a coil with and without an iron core affects magnetic compasses and attracts objects.

Required materials: Insulated wire, chart paper, iron nail, electric cell, two magnetic compasses, iron/steel paper clips, adhesive tape.

Procedure:



a) Make a paper cylinder using chart paper.
b) Wind the insulated wire around it to form a coil and secure it with tape.
c) Place two magnetic compasses near the two ends of the coil.
d) Connect the ends of the coil to the electric cell and observe the compass needles.
e) Disconnect the cell and see the change in the needles.
f) Now insert an iron nail inside the paper cylinder and repeat the activity.
g) Bring paper clips near the ends of the coil and observe.

Observation: When current flows through the coil, the compass needles deflect. When the current is stopped, the needles return to their original positions.

When an iron nail is placed inside the coil, the deflection is more.The coil also attracts paper clips.
Conclusion: A current-carrying coil acts like a magnet. With an iron core, it becomes a stronger magnet. This is called an **electromagnet**.

Activity 6.4

Aim: To identify the poles of an electromagnet.
Required materials: Electromagnet made in Activity 4.3, magnetic compass, electric cell, connecting wires.
Procedure:

a) Label the two ends of the electromagnet as A and B.
b) Place a magnetic compass near end A.
c) Connect the electromagnet to the cell and observe which pole of the compass is attracted to end A.
d) Now place the compass near end B and observe again.



Observation: The compass needle is attracted differently near the two ends of the electromagnet. If one end attracts the north pole of the compass, that end is the south pole. The other end behaves as the opposite pole.
Conclusion: An electromagnet has two poles like a bar magnet. Its two ends act as north pole and south pole.

Activity 6.5

Aim: To construct a simple electric motor and observe its working.
Required Materials: Disc magnet, coil of wire, electric cell, connecting wires and supporting stand.
Procedure:

a) Take a coil of wire and a disc magnet.
b) Arrange the coil on a supporting stand.
c) Place the disc magnet below the coil.
d) Connect the coil to an electric cell.
e) Allow electric current to flow through the coil.
f) Observe the movement of the coil.

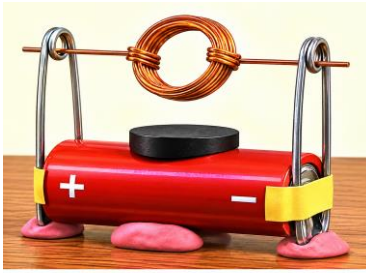


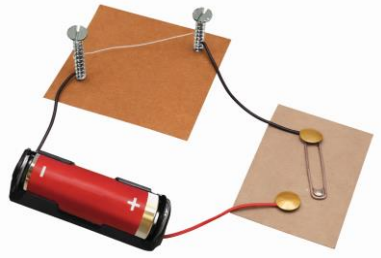
Fig. 6.5 Simple electric motor

Observation: The coil starts rotating when electric current flows through it.
Conclusion: An electric motor converts electrical energy into mechanical energy.

Activity 6.6

Aim: To observe the heating effect of electric current. (or)
To observe and compare the heating of a nichrome wire when electric current flows through it.
Required materials: Cardboard piece, two nails, nichrome wire, electric cell, cell holder, switch, and connecting wires.
Procedure:

a) Fix two nails on the cardboard.
b) Tie the nichrome wire between the two nails.
c) Connect the wire to the electric cell and switch.
d) First touch the wire when the switch is OFF.
e) Now switch ON the current for about 30 seconds and then switch it OFF.
f) Touch the wire carefully for a moment.

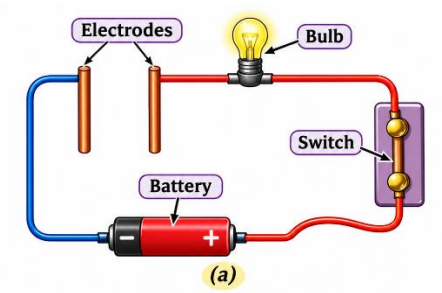


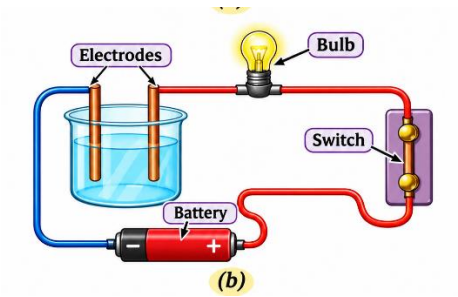
Observation: The nichrome wire feels warm after current passes through it.
Conclusion: When electric current flows through a wire, heat is produced. This is called the heating effect of electric current**.**

Activity 6.7

Aim: To show that some liquids allow electric current to pass through them.
Required Materials: Battery, connecting wires, switch, small bulb and lemon juice.
Procedure:

a) Make a simple circuit using a battery, bulb and wires.
b) Take lemon juice in a small jar.
c) Dip the two free wire ends into the lemon juice.
d) Switch ON the circuit.
e) Observe the bulb.





Observation: The bulb glows when the wire ends are dipped into lemon juice.
Conclusion: Lemon juice conducts electricity.

Activity 6.8

Aim: To identify conducting and non-conducting liquids.
Required Materials: Battery, bulb, connecting wires, switch, beakers and different liquids.
Liquids Required: Copper sulphate solution, Distilled water, Vegetable oil, Vinegar, Sugar solution
Procedure:

a) Make a simple electric circuit using a battery and bulb.
b) Take copper sulphate solution in a beaker.
c) Dip the two wire ends into the solution.
d) Switch ON the circuit and observe the bulb.
e) Repeat the activity with the other liquids.
f) Record your observations.

Observation:

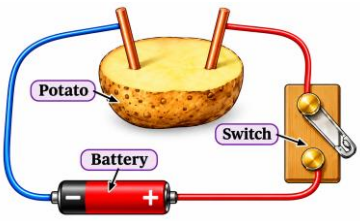
Liquid	Bulb Observation
Copper sulphate solution	Glows
Distilled water	Does not glow
Vegetable oil	Does not glow
Vinegar	Glows
Sugar solution	Does not glow

Conclusion: Copper sulphate solution and vinegar conduct electricity. The other tested liquids do not allow sufficient current to pass through in this activity.

Activity 6.9

Aim: To show the chemical effect of electric current in a potato.
Required Materials: Fresh potato, two copper wires, battery, switch and connecting wires.
Procedure:

a) Take a fresh potato.
b) Insert two copper wires into the potato.
c) Connect the wires to a battery and switch.
d) Switch ON the circuit.
e) Wait for some time.
f) Observe the potato around the wires.

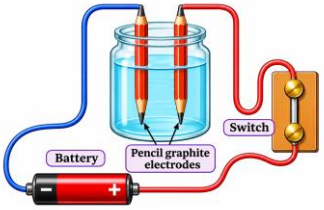


Observation: A greenish-blue spot appears around the wire connected to the positive terminal.
Conclusion: Electric current produces chemical changes in the potato.

Activity 6.10

Aim: To show that electric current produces chemical changes in salt water.
Required Materials: Plastic tray, salt water, two pencils (graphite electrodes), battery, switch and connecting wires.
Procedure:

a) Take a plastic tray and fill it with salt water.
b) Take two pencils and expose their graphite tips.
c) Dip the graphite tips into the salt water without touching each other.
d) Connect the pencils to a battery using wires.
e) Switch ON the circuit.
f) Observe the bubbles near both pencils.

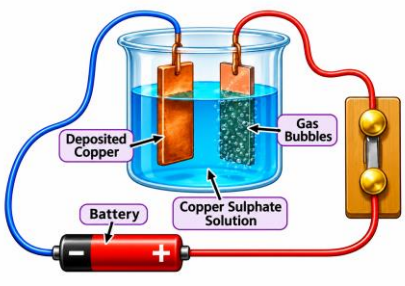


Observation: Gas bubbles are formed at both electrodes. More bubbles are seen at the negative electrode.
Conclusion: Electric current causes chemical changes in salt water. This process is called electrolysis.

Activity 6.11

Aim: To show the deposition of copper on another metal using electric current.
Required Materials: Beaker, copper sulphate solution, two clean copper plates, battery, switch and connecting wires.
Procedure:

h) Take copper sulphate solution in a beaker.
i) Take two clean copper plates.
j) Connect one plate to the positive terminal of the battery.
k) Connect the other plate to the negative terminal.
l) Dip both plates into the solution.
m) Switch ON the circuit for 15–20 minutes.
n) Remove the plates and observe them.

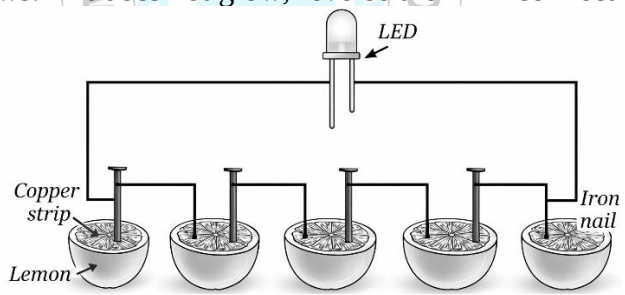


Observation: A reddish-brown layer of copper is deposited on the plate connected to the negative terminal.
Conclusion: Electric current can deposit one metal on another metal. This process is called electroplating.

Activity 6.12

Aim: To make a simple voltaic cell using lemons and observe whether it can light an LED. (or)
To build a simple battery using lemons and light up an LED.
Required materials: Five or six lemons, copper wires/strips, iron nails, one LED, and connecting wires.
Procedure:

a) Insert one copper strip and one iron nail into each lemon, keeping a small distance between them.
b) Repeat this for all the lemons.
c) Join the copper strip of one lemon to the iron nail of the next lemon.
d) Connect the LED between the first free copper strip and the last free iron nail.
e) Observe whether the LED glows. If it does not glow, reverse the LED connections and observe again.



Observation: The LED glows when the connections are made properly. If the LED does not glow at first, it may glow after reversing the LED terminals.
Conclusion: A lemon cell can produce electricity. Several lemon cells connected together can provide enough electrical energy to light an LED.

Prepare Some Questions Based on Your Learnings So Far

1. **Why does an electric bulb glow when current passes through it?**
2. **How is heat produced in an electric iron or heater?**
3. **Why does a fuse melt when excessive current flows in a circuit?**
4. **How can electric current produce a magnetic effect?**
5. **Where are electromagnets used in daily life?**
6. **Why are copper wires commonly used in electrical circuits?**
7. **When does a short circuit occur?**
8. **How long can a battery supply electricity to a device?**
9. **Why should we avoid touching electrical appliances with wet hands?**
10. **Why do electric bells use electromagnets?**

Tables

1. Table 6.1 – Applications of Electromagnets

Textbook pages 13–14

Sl. No.	Electromagnetic Device	Application
1	A Maglev train	Uses magnetic forces to lift and move trains with very little friction.
2	Electric bell	Uses an electromagnet to attract the hammer and produce sound.
3	Electromagnetic crane	Used to lift, move and sort heavy iron and steel objects.
4	Loudspeaker	Converts electrical signals into sound.
5	Electric motor	Converts electrical energy into mechanical energy to produce rotation.
6	Magnetic separation	Used to separate magnetic materials from non-magnetic materials.

2. Table 6.2 – Conductivity of Liquids

Textbook page 24 – Activity 6.8

Sl. No.	Liquid	Bulb glow or not	Conductive or Non-conductive
1	Copper sulphate	Glows	Conductive
2	Distilled water	Does not glow	Non-conductive
3	Vegetable oil	Does not glow	Non-conductive
4	Vinegar	Glows	Conductive
5	Sugar solution	Does not glow	Non-conductive

Multiple Choice Questions

1. When a current flows through a straight conductor, the magnetic field around it is in the shape of
A. straight lines B. concentric circles
C. parallel planes D. radial lines

2. Which rule helps determine the direction of the magnetic field around a current-carrying straight wire?
A. Fleming's Left-hand Rule B. Maxwell's Rule
C. Right-hand Thumb Rule D. Lenz's Rule

3. The magnetic field inside a long solenoid (closely wound coil) is
A. zero B. non-uniform outside only
C. uniform and strong inside D. only at the ends

4. A soft iron core placed inside a solenoid will make the solenoid behave as
A. an insulator B. an electromagnet
C. a capacitor
D. a permanent magnet without current

5. Electromagnets are preferred over permanent magnets in many devices because they are
A. always weaker B. cheaper to make
C. switchable (can be turned on/off)
D. not affected by current

6. Which of the following increases the strength of an electromagnet?
A. Decreasing number of turns in the coil
B. Removing the core
C. Increasing current through the coil
D. Reversing the current direction

7. The direction of force on a current- carrying wire in a magnetic field is given by
A. Ohm's Law B. Fleming's Left-hand Rule
C. Right-hand Thumb Rule
D. Ampere's Principle

8. Fleming's Left-hand Rule is used for
A. determining direction of induced current
B. determining direction of motion of a current-carrying conductor in a magnetic field
C. measuring magnetic field strength
D. finding potential difference

9. If the direction of current in a solenoid is reversed, the polarity of its ends
A. remains same B. gets reversed
C. disappears D. becomes neutral

10. Which device works on the magnetic effect of current?
A. Ammeter B. Motor
C. Capacitor D. Resistor

11. Heating effect of electric current is used in which household device?
A. Refrigerator B. Electric iron
C. Electric bell D. Loudspeaker

12. Which law gives the relationship between heat produced in a resistor, current and time?
A. Faraday's Law B. Lenz's Law
C. Chemical effect D. None

13. According to Joule's law, heat produced (H) in a resistor is proportional to
A. $I \times R$ B. $I^2 \times R \times t$
C. V / I D. R / I

14. For a given resistance and current, if the time is doubled, heat produced will be
A. halved B. unchanged
C. doubled D. become zero

15. Which of these increases the heating effect in a wire?
A. Decreasing current B. Decreasing resistance
C. Increasing current D. Shortening the time

16. A fuse in an electrical circuit protects appliances by
A. decreasing current when overloaded
B. burning out when current exceeds safe limit
C. increasing voltage D. acting as a switch

17. The element commonly used in fuses because it melts easily is
A. iron B. copper
C. tin-lead alloy D. tungsten

18. In which of the following is maximum heat produced for same current and time?
A. 2 Ω resistor B. 4 Ω resistor
C. 6 Ω resistor D. 8 Ω resistor

19. Which of these materials is a poor conductor of heat (and used as a filament)?
A. Copper B. Aluminium
C. Tungsten D. Silver

20. An electric heater converts electrical energy primarily into
A. light energy B. heat energy
C. sound energy D. chemical energy

21. The coil of an electric heater is made of an alloy rather than pure metal because the alloy has
A. lower melting point only
B. higher resistance and higher melting point
C. zero resistance D. magnetic properties

22. Which phenomenon explains the working of an electric motor?
A. Heating effect of current
B. Magnetic effect of current
C. Photoelectric effect D. Electroplating

23. When a compass needle is brought near a current-carrying wire, it experiences
A. gravitational force
B. magnetic force and aligns accordingly
C. chemical reaction D. no effect

24. Magnetic field lines due to a current-carrying circular loop are strongest at
A. the center of the loop B. very far from the loop
C. at the edge only D. uniformly everywhere

25. An electric bell uses which effect of electric current?
A. Heating effect B. Magnetic effect
C. Joule's Law of Heating D. Ohm's Law

26. In an electric circuit, if two resistors of equal resistance are connected in series, the heat produced in each (for same current) will be
A. same in both B. more in first only
C. more in second only D. none

27. The direction of induced current (in electromagnetic induction) is given by
A. Fleming's Left-hand Rule B. Ohm's Law
C. Lenz's Law D. Joule's Law

28. A wire placed parallel to magnetic field lines and carrying current will experience
A. maximum force B. zero force
C. unpredictable force D. magnetic heating

29. When electric current passes through a filament bulb, it glows due to
A. chemical reaction
B. heating of filament to high temperature
C. magnetic field generation only
D. nuclear reaction

30. Which instrument uses a coil and magnet to measure current?
A. Voltmeter B. Ammeter
C. Thermometer D. Galvanometer

31. If the resistance of a heater is increased while voltage remains the same, the heat produced per unit time will
A. increase B. decrease
C. remain same D. become zero

32. Which of the following statements is true about magnetic field lines?
A. They start from south pole and end at north pole.
B. They never form closed loops.
C. They never intersect each other.
D. They are straight for all magnets.

33. The direction of magnetic field inside a solenoid is from
A. south to north pole (inside)
B. north to south pole (inside)
C. outwards only D. zero

34. Which of these is a use of electromagnets?
A. Holding papers in a file permanently
B. Lifting heavy pieces of scrap iron in junkyards
C. Replacing batteries
D. Cooling electronic circuits

35. Which arrangement will produce greater heating for the same applied voltage?
A. One resistor of 10 Ω
B. Two resistors of 5 Ω each in series
C. Two resistors of 5 Ω each in parallel
D. None of these

36. A strong electromagnet is required for an experiment. Which change will NOT help to strengthen it?
A. Increasing current through coil
B. Increasing number of turns in coil
C. Using a soft iron core
D. Using a thicker (lower resistance) wire but same turns and current

37. When current is switched on in a coil, a nearby compass needle
A. will not be affected
B. may deflect showing the magnetic effect
C. will melt due to heating effect
D. will catch fire

38. Which color-coded wire in typical domestic wiring is usually neutral (may vary by country)?
A. Live (brown) B. Neutral (blue)
C. Earth (green/yellow) D. All same

39. The function of an earth wire is to
A. provide a path for current in normal operation
B. provide a low-resistance path for fault current to flow to ground
C. increase voltage D. store charge

40. Which of the following is least likely to be heated significantly by passing same current?

A. Thin wire of high resistance
B. Thick copper wire of low resistance
C. Filament wire specially made to heat
D. Nichrome heating element

41. In a circuit, if current is doubled and resistance remains constant, power dissipated (as heat) becomes
A. half B. same C. double D. four times

42. The SI unit of magnetic field strength (magnetic flux density) is
A. Tesla (T) B. Newton (N)
C. Joule (J) D. Ohm (Ω)

43. What happens to the temperature of a resistor when more current is passed for the same duration?
A. Decreases B. Increases
C. Remains same
D. First decreases then increases

44. The heating effect of current is considered useful in which of the following?
A. Electric iron, toaster, and geyser
B. Motors and generators
C. Loudspeakers and headphones
D. Televisions

45. Which of the following is true about a solenoid?
A. It produces no magnetic field
B. It acts like a magnet only when current flows through it
C. It is always a permanent magnet
D. It weakens a magnetic field

46. Where is the magnetic field outside a straight current-carrying wire strongest?
A. At infinite distance B. Very far from the wire
C. Very near the wire
D. There is no magnetic field outside

47. An example of unwanted heating in electrical circuits that can cause fire is caused by
A. correct wiring
B. short circuit or overloaded circuit
C. using proper fuses D. using earthing

48. Which of the following increases both magnetic field and heating effect in a coil?
A. Decreasing current B. Increasing current
C. Using a non- conducting core
D. Reducing turns of coil

49. The working principle of an electric bell is based on
A. heating effect producing sound
B. magnetic effect attracting and releasing an armature repeatedly
C. chemical reaction
D. electromagnetic radiation

50. Lenz's law gives the direction of induced current such that it
A. helps the change in magnetic flux
B. opposes the change in magnetic flux
C. maximizes heat produced
D. minimizes magnetic field

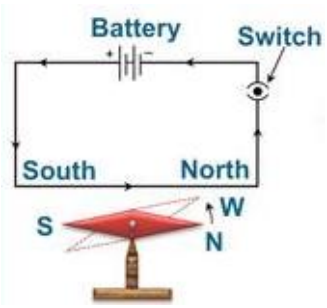
Answers

1. B	2. C	3. C	4. B	5. C	6. C	7. B	8. B	9. B	10. B
11. B	12. C	13. B	14. C	15. C	16.B	17. C	18.D	19. C	20. B
21. B	22. B	23. B	24. A	25. B	26. A	27. C	28. B	29. B	30. D
31. B	32. C	33. B	34. B	35. C	36. D	37. B	38. B	39. B	40. B
41. D	42. A	43. B	44. A	45. B	46. C	47. B	48. B	49. B	50. B

COMPETENCY BASED QUESTIONS

1 Mark Questions

1. Observe the picture. What does the deflection of a compass needle near a current- carrying wire indicate?
A) Magnetic effect B) Heating effect
C) Chemical effect D) Cooling effect



2. When the switch is turned OFF, what happens to the compass needle?
A) It continues to deflect B) It returns to its original direction
C) It breaks D) It becomes a permanent magnet

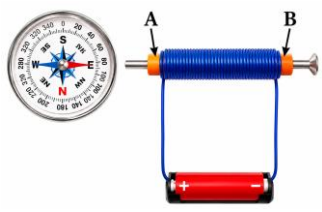
3. Which of the following works on the magnetic effect of electric current?

(a)  (b)  (c)  (d) 

4. What is the main purpose of inserting an iron nail into the coil?

A) To reduce the magnetic effect B) To produce light

C) To stop current D) To increase the strength of the electromagnet



5. What happens if the number of turns in the coil is increased?

A) Magnetic strength decreases B) Current stops

C) Magnetic strength increases D) The coil becomes an insulatc

6. Which of the following is used to lift heavy iron objects in factories?

A) Permanent bar magnet B) Lifting electromagnet C) Compass D) Electric bulb

7. An electric motor convert

A) Mechanical energy into heat energy B) Electrical energy into mechanical energy

C) Heat energy into light energy D) Sound energy into electrical energy

8. The rotation of the coil in a simple electric motor is caused by

A) Heating effect B) Interaction between magnetic fields C) Chemical reaction D) Sound waves

9. The heating element of an electric appliance is generally made of

A) Nichrome B) Wood C) Plastic D) Rubber

10. Which of the following is an industrial application of the heating effect of electric current?

A) Melting scrap steel B) Measuring rainfall

C) Detecting earthquakes D) Measuring atmospheric pressure

11. What happens to the amount of heat produced if the current in a wire is increased?

A) It decreases B) It stays the same C) It increases D) It vanishes

12. Why should we avoid throwing used batteries in the regular trash?

A) They contain paper and plastic B) They are still useful

C) They contain harmful metals and chemicals D) They are very heavy

13. What happens when the chemicals inside the cell are used up?

A) The cell produces more electricity B) The cell stops supplying electricity

C) The cell becomes a magnet D) The cell starts producing light

14. Which of the following statements is NOT correct?

A) Electric current can produce a magnetic effect. B) A compass needle deflects near a current carrying wire.

C) Magnetic field remains even after current stops flowing. D) Electromagnets work using electric current.

15. During the electrolysis of water, which gas is produced at the positive electrode?

A) Hydrogen B) Oxygen C) Nitrogen D) Helium

1-A	2-B	3-B	4-D	5-C	6-B	7-B	8-B	9-A	10-A	11- C	12-C	13-B	14-C	15-B

16. Assertion (A): Nichrome wire becomes hot when electric current passes through it.

Reason (R): Nichrome offers higher resistance to the flow of electric current compared to copper wire of the same size and length.

A) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.

B) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

C) Assertion is true, but Reason is false.

D) Assertion is false, but Reason is true.

Ans: A) Both A and R are true, and R is the correct explanation of A.

17.Assertion (A): Distilled water is a good conductor of electricity.

Reason (R): Only liquids that contain free ions (electrolytes) conduct electricity well.

A) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.

B) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

C) Assertion is true, but Reason is false.

D) Assertion is false, but Reason is true.

Ans: D) Assertion is false, but Reason is true.

18. Choose the CORRECT statement.

A) All liquids conduct electricity equally well. B) Distilled water is a good conductor of electricity.
C) Liquids like lemon juice, salt water and vinegar allow electric current to pass through them.
D) Vegetable oil is a good conductor of electricity.

Ans: C)

19. Choose the INCORRECT statement.

A) A current-carrying coil behaves like a magnet.
B) Electromagnets are widely used in factories and scrap yards.
C) Electroplating is used to protect iron objects from rusting.
D) Rechargeable batteries cannot be recharged and reused.

Ans: D)

20. Match the following.

Column A	Column B
1. Electric bell	a) Purification of metals
2. Electrolysis	b) Produces sound using an electromagnet
3. Dry cell	c) Portable source of electricity
4. Rechargeable battery	d) Can be recharged and reused multiple times

A) 1-c, 2-a, 3-d, 4-b B) 1-b, 2-c, 3-a, 4-d C) 1-a, 2-b, 3-c, 4-d D) 1–b, 2–a, 3–c, 4–d.

Ans: D) 1–b, 2–a, 3–c, 4–d.

2 Marks Questions

1. Write any two factors that affect the strength of an electromagnet.

Ans: i) Number of turns in the coil ii) Amount of electric current flowing through the coil.

2. What happens when an iron nail is inserted into a current-carrying coil?

Ans: The iron nail becomes magnetised and increases the strength of the electromagnet.

3. How can the poles of an electromagnet be reversed?

Ans: By changing the direction of electric current flowing through the coil.

4. Mention any two applications of electromagnets.

Ans: Electric bells, Electromagnetic cranes.

5. Why is nichrome wire used in heating elements?

Ans: Nichrome has high electrical resistance. Therefore, it produces heat when electric current passes through it.

6. Name any four household appliances that work on the heating effect of electric current.

Ans: Electric iron, Electric stove, Electric kettle, Room heater.

7. What are conducting liquids? Give two examples.

Ans: Liquids that allow electric current to pass through them are called conducting liquids. Examples: Lemon juice and salt solution.

8. Why does distilled water not conduct electricity well?

Ans: Distilled water contains very few free ions, so it does not conduct electricity well.

9. Differentiate between dry cells and rechargeable batteries.

Ans:

Dry cell	Rechargeable battery
Generally used until its chemicals are exhausted.	Can be recharged and reused multiple times.
Commonly used in portable devices.	Used in mobile phones, laptops and vehicles.

10. Why is tungsten used in electric bulbs?

Ans: Tungsten is used because it has a very high melting point and glows brightly when heated.

11. What is a fuse?

Ans: A fuse is a safety device that melts and breaks the circuit when excess current flows through it.

4 Marks Questions

1. Explain rechargeable batteries and their applications.

Ans: 1. Rechargeable batteries can be recharged and reused multiple times.
2. There are many different kinds of rechargeable batteries used for different applications.
3. They are used in watches and portable devices.
4. They are used in laptops, mobile phones, cameras and vehicles.
5. However, they do not last forever.

6. After being charged many times, they slowly wear out.

2. Why should batteries be recycled and not thrown in dustbins?

Ans: Batteries contain chemicals and metals like lead, lithium and cadmium that can harm the environment if thrown in normal trash. These materials can leak into the soil or cause fires. Recycling helps recover useful metals and prevents pollution. It's safer for both people and the planet.

3. Explain the construction and working of an electromagnet.

Ans: Construction:

1. A copper wire is wound around a soft iron nail or rod.
2. The wire ends are connected to a battery.

Working:

1. When electric current passes through the coil, the iron core becomes magnetic.
2. It attracts iron objects.
3. When current is switched off, magnetism disappears.

4. Explain the heating effect of electric current.

Ans: When electric current passes through a conductor, heat is produced. This is called the heating effect of electric current.

Applications: Electric iron, Heater, Toaster, Electric kettle

5. Explain the working of an electric bell.

Ans: 1. When the switch is pressed, current flows through the coil.

2. The coil becomes an electromagnet.
3. It attracts the iron armature and the hammer strikes the gong.
4. The circuit breaks and the armature returns back.
5. This process repeats rapidly producing sound.

6. Why are fuses important in electrical circuits?

Ans:1. Fuses protect electrical appliances from damage.

6. They prevent short circuits and fire accidents.
7. They melt automatically when excess current flows.
8. Thus, fuses ensure electrical safety.

8 Marks Questions

1. Explain the applications of electromagnets in daily life.

Ans: Electromagnets are used in many electrical appliances and devices.

1. Maglev train: Electromagnets are used in Maglev trains.
7. Electric bell: Electromagnets are used in electric bells.
8. Electromagnetic crane: Used for lifting heavy metal items.
9. Loudspeakers: Electromagnets are used in loudspeakers.
10. Electric motor: Electric current and a magnetic field work together to make an electric motor work.
11. Magnetic separation: Electromagnets are used in magnetic separation.

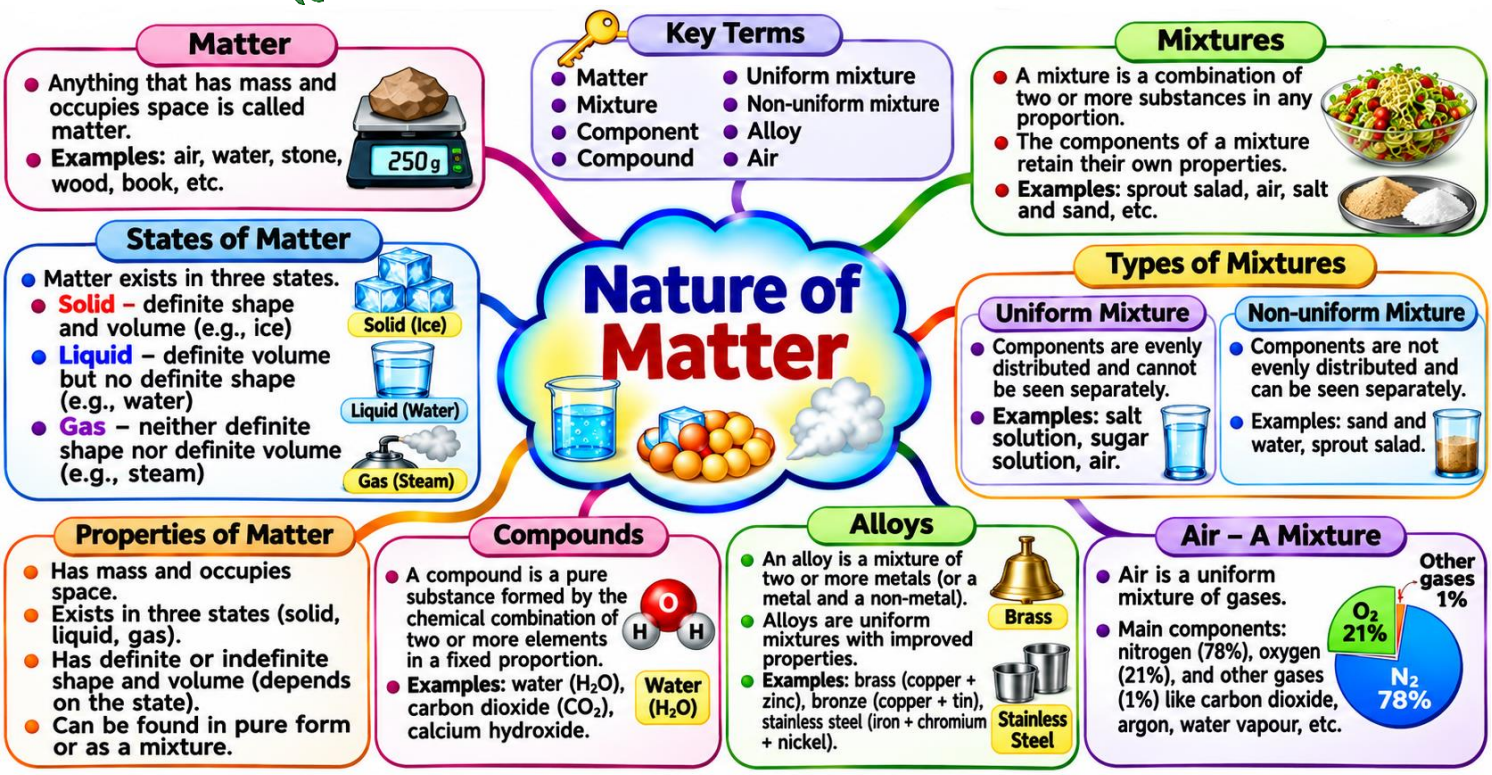
2. Write the harmful effects of the heating effect of electric current. How can they be prevented?

Ans: 1. Overheating in appliances may cause problems.

9. It can lead to damage to plugs and sockets.
10. Wires may become overheated.
11. Overheating in appliances can lead to fires.
12. To prevent unnecessary heating in household switchboards, it is important to use appropriate wires, plugs and sockets that are rated for the specified electric current.
13. Safety devices are placed in the circuit to minimise such incidents.

CHAPTER - 7: Nature of Matter

Mind Map



Main Points

1. Matter is made up of tiny particles.
2. Most materials around us are made of two or more substances mixed together.
3. A **mixture** is formed when two or more substances are mixed without chemical reaction.
4. In a mixture, each component retains its own properties.
5. The substances that make up a mixture are called its **components**.
6. Mixtures can be **uniform** or **non-uniform**.
7. In a non-uniform mixture, different components are visible separately.
8. In a uniform mixture, components are evenly distributed and cannot be distinguished.
9. Air is a **uniform mixture** of gases.
10. Nitrogen forms about 78% of air.
11. Lime water turns milky in the presence of carbon dioxide.
12. Dust particles suspended in air are pollutants.
13. Air quality is measured using the **Air Quality Index (AQI)**.
14. In science, all components of a mixture must be **pure substances**.
15. A **pure substance** contains only one kind of particles.
16. Pure substances cannot be separated into other substances by physical methods.
17. Pure substances are of two types — **elements and compounds**.
18. Water can be broken into hydrogen and oxygen by passing electricity through it.
19. **Elements** are the simplest substances that cannot be broken into simpler substances.
20. Elements are made up of identical particles called **atoms**.
21. Two or more atoms combine to form a **molecule**.
22. Elements are classified into **metals and non-metals**.
23. A **compound** is formed when elements combine chemically in fixed ratios.
24. Properties of compounds differ from those of their constituent elements.
25. Water is a compound made of hydrogen and oxygen in the ratio 2:1.
26. Sugar is a compound containing carbon, hydrogen, and oxygen.

27. A mixture of iron and sulfur retains the properties of both substances.
28. Heating iron and sulfur forms a new compound called **iron sulfide**.
29. Compounds cannot usually be separated by physical methods.
30. Minerals are natural solid substances found in the Earth and are mostly compounds.

-------: Definitions :-------

Matter: Anything that has mass and occupies space is called matter.
Mixture: When two or more substances are mixed, where each substance retains its properties, it is called a mixture.
Components of a Mixture: The individual substances that make up a mixture are called its components.
Uniform Mixture: A mixture in which the components are evenly distributed and cannot be distinguished is called a uniform mixture.
Non-uniform Mixture: A mixture in which the components are not evenly distributed and can be distinguished is called a non-uniform mixture.
Pure Substance: A pure substance is one that has no other substance present in it.
Element: Elements are substances that cannot be further broken down into simpler substances.
Compound: Compounds are formed when different elements combine in fixed ratios to form something entirely new.
Metals: Elements that possess metallic properties are called metals.
Non-metals: Elements that do not possess metallic properties are called non-metals.
Metalloids: Elements that have intermediate properties between metals and non-metals are called metalloids.
Minerals: Minerals are naturally occurring substances found in rocks.
Alloys: Alloys are mixtures of two or more metals or a metal with other elements.

Intext Questions

1. Which of the entities in the picture above consist of matter, and which of them do not?
Ans: Entities that have mass and occupy space consist of matter. Light, sound, and heat do not consist of matter.
2. How can elements be combined to form a compound?
Ans: Elements combine by chemical reactions in a fixed proportion to form a compound.
3. How could the discovery of a compound that absorbs carbon dioxide from the air contribute to solving environmental challenges?
Ans: A compound that absorbs carbon dioxide can help reduce air pollution and global warming.
4. Can you identify a few more examples of non-uniform mixtures around you?
Ans: Examples of non-uniform mixtures are soil, sand in water, oil and water, fruit salad.
5. Can you list a few uniform mixtures?
Ans: Examples of uniform mixtures are salt water, sugar solution, air, vinegar.
6. Is air a mixture? What kind of mixture is it?
Ans: Yes, air is a mixture**.** It is **a** uniform (homogeneous) mixture of gases.
7. Apart from gases, have you ever observed anything else present in the air?
Ans: Yes, apart from gases, dust, smoke, and water vapour are also present in air.
8. Have you ever noticed tiny shining particles moving in a beam of sunlight entering a dark room through a small opening?
Ans: Yes, we can see tiny shining particles moving in a beam of sunlight.
9. What are these particles?
Ans: These particles are mostly dust particles present in the air.
10. Isn't it interesting to know that some elements like silicon and boron have intermediate properties between those of metals and non-metals?
Ans: Yes, elements like silicon and boron are called metalloids because they show properties of both metals and non-metals.
11. Why cannot we separate hydrogen and oxygen present in water by physical means?
Ans: We cannot separate hydrogen and oxygen in water by physical means because water is **a** compound.
12. Is it possible to separate sodium chloride into its elements by physical processes?
Ans: No, sodium chloride cannot be separated into its elements by physical processes because it is a compound.
13. Was it in the dry sugar, or did it come by the condensation of water vapour in the air?
Ans: It came by the condensation of water vapour in the air, not from the dry sugar.



1. Consider the following reaction where two substances, A and B, combine to form a product C:

A + B → C

Assume that A and B cannot be broken down into simpler substances by chemical reactions. Based on this information, which of the following statements is correct?

(i) A, B, and C are all compounds and only C has a fixed composition.
(ii) C is a compound, and A and B have a fixed composition.
(iii) A and B are compounds, and C has a fixed composition.
(iv) A and B are elements, C is a compound, and has a fixed composition.

Ans: (iv) A and B are elements, C is a compound, and has a fixed composition.

2. Assertion: Air is a mixture.
Reason: A mixture is formed when two or more substances are mixed, without undergoing any chemical change.

(i) Both Assertion and Reason are true and Reason is the correct explanation for Assertion.
(ii) Both Assertion and Reason are true, but Reason is not the correct explanation for Assertion.
(iii) Assertion is true, but Reason is false.
(iv) Assertion is false, but Reason is true.

Ans: (i) Both Assertion and Reason are true and Reason is the correct explanation for Assertion.

3. Water, a compound, has different properties compared to those of the elements oxygen and hydrogen from which it is formed. Justify this statement.

Ans: Water is formed by the chemical combination of Hydrogen and Oxygen. Water is used for drinking and putting out fire, but hydrogen burns and oxygen helps burning. So, water has completely different properties from hydrogen and oxygen.

4. In which of the following cases are all the examples correctly matched? Give reasons in support of your answers.

(i) Elements — water, nitrogen, iron, air.
(ii) Uniform mixtures— minerals, seawater, bronze, air.
(iii) Pure substances— carbon dioxide, iron, oxygen, sugar.
(iv) Non-uniform mixtures — air, sand, brass, muddy water.

Ans: (i) Water and air are not elements. Water is a compound and air are a mixture.
(ii) Minerals are not uniform mixtures.
(iii) Carbon dioxide, iron, oxygen, and sugar are pure substances.
(iv) Air and brass are uniform mixtures, not non-uniform mixtures.

5. Iron reacts with moist air to form iron oxide, and magnesium burns in oxygen to form magnesium oxide. Classify all the substances involved in the above reactions as elements, compounds or mixtures, with justification.

Ans: **Iron** – Element, **Moist air** – Mixture, **Iron oxide (rust)** – Compound
Magnesium – Element, **Oxygen** – Element, **Magnesium oxide** – Compound

6. Classify the following as elements, compounds, or mixtures in Table 7.3. Carbon dioxide, sand, seawater, magnesium oxide, muddy water, aluminium, gold, oxygen, rust, iron sulfide, glucose, air, water, fruit juice, nitrogen, sodium chloride, sulfur, hydrogen, baking soda.

Table 7.3

Elements	Compounds	Mixtures

Identify pure substances amongst these and list them below.

Pure substances

Ans:

Elements	Compounds	Mixtures
Aluminium, Gold, Oxygen, Nitrogen, Sulfur, Hydrogen	Carbon dioxide, Magnesium oxide, Rust, Iron sulfide, Glucose, Water, Sodium chloride, Baking soda	Sand, Seawater, Muddy water, Air, Fruit juice.

Identify pure substances amongst these and list them below:
Elements and compounds are pure substances.
Aluminium, Gold, Oxygen, Nitrogen, Sulfur, Hydrogen, Carbon dioxide, Magnesium oxide, Rust, Iron sulfide, Glucose, Water, Sodium chloride, Baking soda

7. What new substance is formed when a mixture of iron filings and sulfur powder is heated, and how is it different from the original mixture? Also, write the word equation for the reaction.

Ans: A new substance called iron sulfide is formed. It is different because it has new properties and cannot be separated easily.

Word equation: Iron + Sulfur → Iron sulfide

8. Is it possible for a substance to be classified as both an element and a compound? Explain why or why not.

Ans: No. An element has only one kind of atom, while a compound has two or more different elements chemically combined.

9. How would our daily lives be changed if water were not a compound but a mixture of hydrogen and oxygen?

Ans: If water were a mixture of hydrogen and oxygen, it would not be safe to drink and could catch fire easily because hydrogen burns. Cooking, washing, and life on Earth would become very difficult.

10. Analyse Fig. 7.24. Identify Gas A. Also, write the word equation of the chemical reaction.

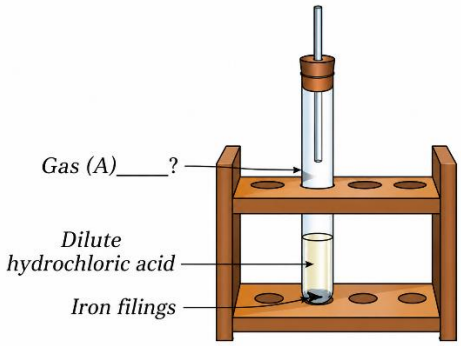


Fig. 8.24

Ans: Hydrogen gas

Iron + Hydrochloric acid → Iron chloride + Hydrogen gas

11. Write the names of any two compounds made only from non-metals, and also mention two uses of each of them.

Ans: Two compounds made only from non-metals and their uses:

(i) **Water:** Essential for life, Drinking, Washing

(ii) **Carbon dioxide:** Used in fire extinguishers, Used in soft drinks

12. How can gold be classified as both a mineral and a metal?

Ans: Gold is found naturally in the earth as a mineral and it also shows properties of a metal like lustre, ductility and conductivity. So,gold is a metal and a mineral.

Discover, Design and Debate

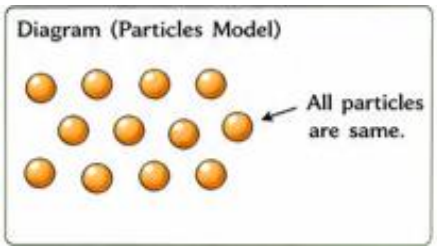
1. Design and create comic strips from real-life examples to differentiate between elements, compounds, and mixtures with diagrams and illustrate their properties and uses.

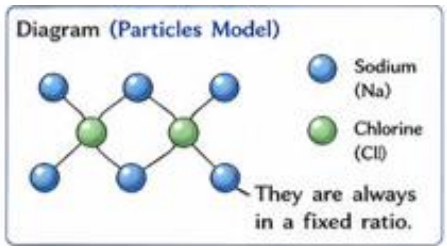
Ans: Simple diagrams:

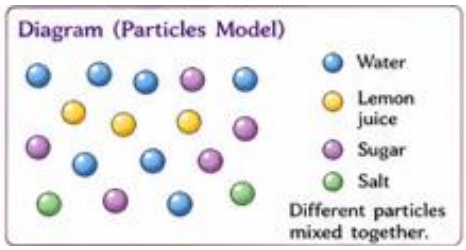
Element – All particles are of the same type.

Compound – Different types of atoms are chemically combined.

Mixture – Different types of particles are mixed together.







We can differentiate elements, compounds and mixtures as follows:

Element	Compound	Mixture
An element is a pure substance made up of one type of atom.	A compound is formed when two or more different elements combine in fixed ratios.	A mixture consists of two or more substances mixed together.
It cannot be broken down into simpler substances.	Its elements cannot be separated by physical methods.	Its components can be separated by physical methods.
Examples: Iron, gold, oxygen and copper.	Examples: Water, carbon dioxide and sugar.	Examples: Air, soil and salt water.
Used in making wires, jewellery and tools.	Used in drinking, cooking and medicines.	Used in food, construction and daily life.

2. Search for discoveries of some elements (such as phosphorus, sodium), compounds (such as penicillin) and mixtures (such as brass, bronze, stainless steel). Present your findings in the class.

Ans:

A. Elements

Element	Discovery	Discoverer
Phosphorus	Discovered in 1669	Hennig Brand
Sodium	Isolated in 1807	Humphry Davy





B. Compounds

Compound	Discovery	Discoverer
Penicillin	Discovered in 1928	Alexander Fleming



C. Mixtures (Alloys)

Mixture	Components	Uses
Brass	Copper and Zinc	Musical instruments, utensils
Bronze	Copper and Tin	Statues, medals
Stainless steel	Iron, Chromium and other elements	Utensils, buildings and tools







Conclusion: Elements, compounds and mixtures are important in our daily life. They are used in industries, medicines, buildings and many other applications.

3. Let us search: Read labels on items like detergents or snacks, and try to list the mixtures and compounds they contain.

Ans:

WHAT WE FOUND – READING LABELS

1. DETERGENT PRODUCTS

A. Surf Excel Easy Wash

S.No.	Category	Matter
1	**Mixtures (physically mixed)**	1. Enzymes 2. Fragrance 3. Optical brightener 4. Water 5. Sodium sulphate (mixture with other salts)

2	**Compounds (chemically formed)**	1. Sodium carbonate (Na_2CO_3) 2. Sodium silicate (Na_2SiO_3) 3. Linear alkyl benzene sulphonic acid 4. Sodium sulphate (Na_2SO_4)

B. Tide

S.No.	Category	Matter
1	**Mixtures (physically mixed)**	1. Zeolites 2. Enzymes 3. Perfume 4. Water 5. Polymer
2	**Compounds (chemically formed)**	1. Sodium carbonate (Na_2CO_3) 2. Sodium linear alkyl benzene sulfonate 3. Zeolites (sodium alumino silicate)

2. SNACK PRODUCTS

A. Lay's Classic

S.No.	Category	Matter
1	**Mixtures (physically mixed)**	1. Potato 2. Edible oil 3. Sugar 4. Spices 5. Condiments
2	**Compounds (chemically formed)**	1. Sodium chloride (NaCl) 2. Citric acid ($C_6H_8O_7$) 3. Monosodium glutamate (MSG) – $C_5H_8NO_4Na$

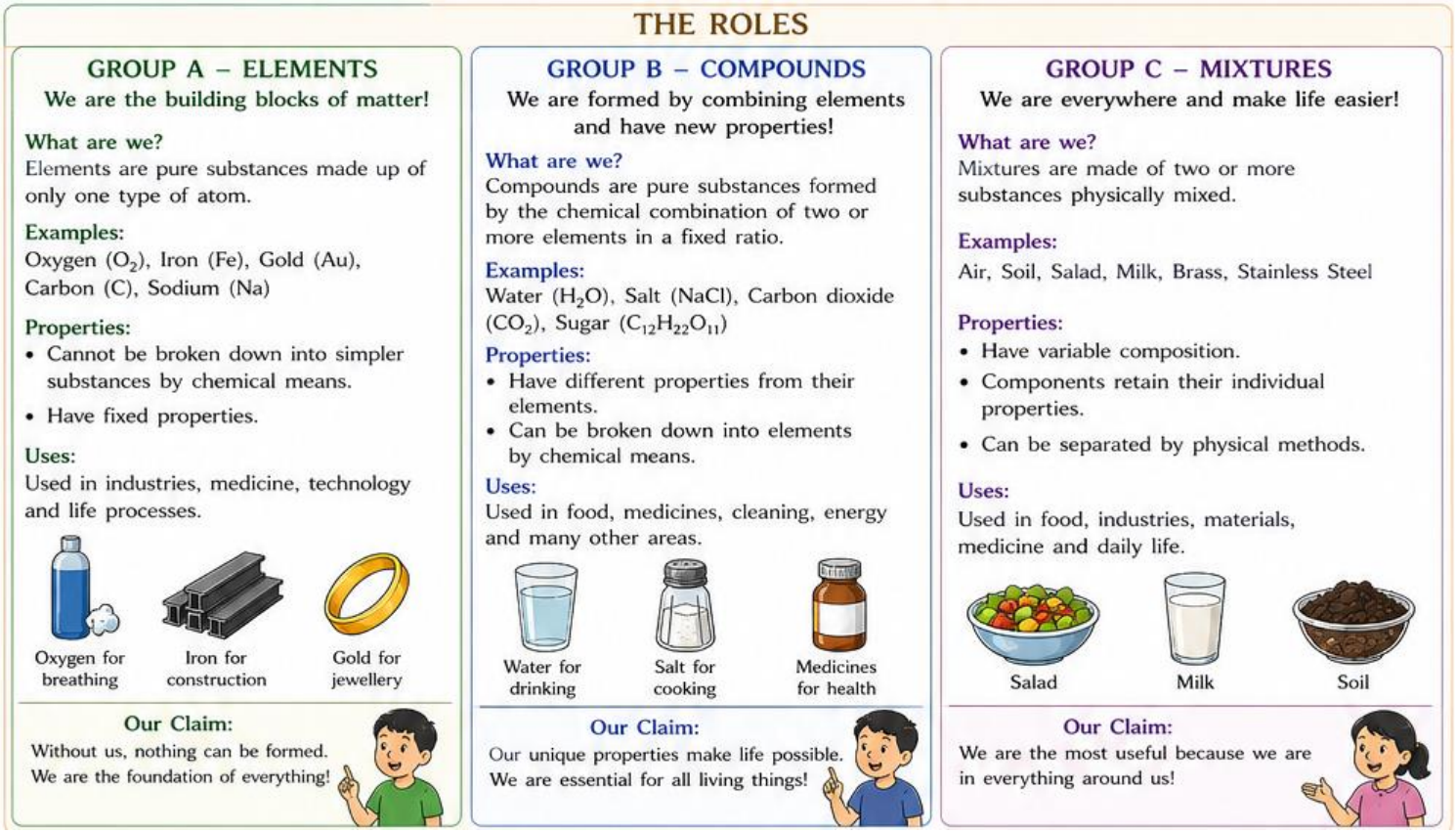
B. Kurkure

S.No.	Category	Matter
1	**Mixtures (physically mixed)**	1. Corn grits 2. Rice grits 3. Gram flour 4. Edible oil 5. Spices 6. Condiments
2	**Compounds (chemically formed)**	1. Sodium chloride (NaCl) 2. Citric acid ($C_6H_8O_7$) 3. Disodium inosinate ($C_{10}H_{11}N_4Na_2O_8P$) 4. Disodium guanylate ($C_{10}H_{12}N_5Na_2O_8P$)

Conclusion: Detergents and snacks contain different compounds and mixtures. The compounds are formed by chemical combination, whereas mixtures contain two or more substances mixed together.

4. Work in groups: Each group will pretend to be in the role of either an element, a compound, or a mixture. Debate which category among them is the most important.

Ans:



Activites

Activity 7.1

Aim: To observe the reaction between calcium oxide and water and detect carbon dioxide.
Required materials: Glass tumbler, water, calcium oxide (quick lime), spoon, filter (optional), petri dish.
Procedure:

a) Take water in a glass tumbler.
b) Add a small amount of calcium oxide slowly.
c) Stir carefully and observe the reaction.
d) Filter the solution to get clear lime water.
e) Keep the lime water in a dish for some time.
f) Observe any change.

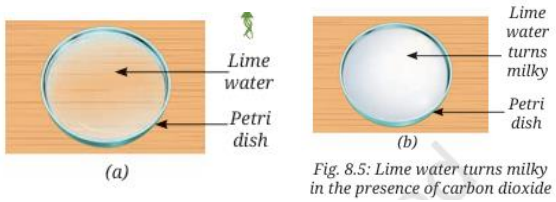


Fig. 8.5: Lime water turns milky in the presence of carbon dioxide

Observation: Heat is produced when calcium oxide reacts with water. After some time, the lime water turns milky.
Conclusion: Calcium oxide reacts with water to form calcium hydroxide and releases heat.
Lime water turns milky due to the presence of carbon dioxide.

Activity 7.2

Aim: To show that dust particles are present in air.
Required materials: Black sheet of paper, magnifying glass (optional).
Procedure:

a) Take a clean black sheet of paper.
b) Place it near an open window or in a room for a few hours.
c) Do not disturb it.
d) Observe the surface of the paper.
e) Use a magnifying glass if needed.

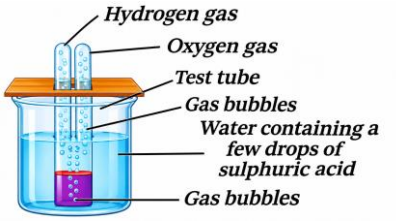


Observation: Tiny dust particles settle on the black paper. They are clearly visible on the surface.
Conclusion: Air contains dust particles. These particles remain suspended in air.

Activity 7.3

Aim: To show that water can be split into gases (hydrogen and oxygen) using electricity.
Required materials: Two test tubes, beaker/glass, water, few drops of dilute sulphuric acid, 9 V battery.
Procedure:

a) Fill a beaker with water and add a few drops of dilute sulphuric acid.
b) Fill two test tubes completely with this water.
c) Place a 9 V battery in the beaker.
d) Invert the test tubes over the battery terminals carefully.
e) Wait for a few minutes and observe gas bubbles forming.
f) After some time, observe the amount of gas collected in each test tube.

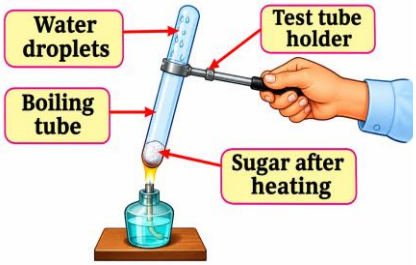


Observation: Gas bubbles form in both test tubes. One test tube collects more gas than the other.
The gases can be tested (hydrogen burns with a pop sound, oxygen supports burning).
Conclusion: Water splits into hydrogen and oxygen gases when electricity passes through it.
Hydrogen is produced in larger amount than oxygen.

Activity 7.4

Aim: To observe the effect of heating on sugar.
Required materials: Sugar, boiling tube, test tube holder, heat source
Procedure:

a) Take a small amount of sugar in a boiling tube.
b) Hold the tube with a holder.
c) Heat the sugar gently.
d) Observe the changes carefully.

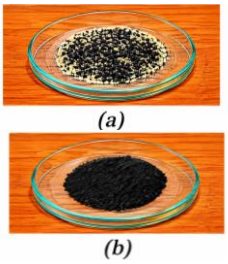


Observation: Sugar first melts and turns brown. Then it becomes black (charcoal). Water droplets are seen inside the tube.
Conclusion: Sugar undergoes a chemical change on heating. It decomposes into carbon (charcoal) and water.

Activity 7.5

Aim: To study the difference between a mixture and a compound.

Required materials: Iron filings, sulphur powder, watch glass, china dish, burner, magnet, dilute hydrochloric acid.



Procedure:

a) Mix iron filings and sulphur powder and label it as Sample A.
b) Observe its appearance.
c) Heat the mixture in a china dish to form a new substance and label it as Sample B.
d) Compare both samples.
e) Test both samples using a magnet.
f) Add a few drops of dilute hydrochloric acid to both samples and observe.

Observation: Sample A shows separate particles of iron and sulphur. Sample B is a black solid (new substance). Magnet attracts iron from Sample A but not from Sample B. Sample A and Sample B behave differently with acid.

Conclusion: Sample A is a mixture, while Sample B is a compound.

A compound has different properties from its components.

Prepare Some Questions Based on Your Learnings So Far

1. **Why are elements called pure substances?**
2. **How can we identify a mixture in daily life?**
3. **Why do compounds have properties different from their elements?**
4. **What happens when iron and sulfur are heated together?**
5. **Where do we use mixtures in our daily life?**
6. **Why is air considered a mixture?**
7. **When does a chemical change take place while forming a compound?**
8. **How long does it take for salt to dissolve completely in water?**
9. **Why can mixtures be separated by physical methods?**
10. **Why are compounds represented by chemical formulas?**

Tables

1. Table 7.1 – Different Types of Mixtures
Textbook page 52

Sl. No.	Mixture – Type	Example	Uniform or Non-Uniform
1	Gas and gas	Air	Uniform
2	Gas and liquid	Aerated water (soda water)	Uniform
		Oxygen dissolved in water	Uniform
3	Solid and gas	Carbon particles in air	Non-uniform
4	Liquid and liquid	Acetic acid in water (vinegar)	Uniform
		Oil and water	Non-uniform
5	Solid and liquid	Sand and water	Non-uniform
		Seawater	Uniform
6	Solid and solid	Baking powder (baking soda and tartaric acid)	Non-uniform
		Alloys	Uniform

2. Table 7.2 – Sample A and B Comparison
Textbook pages 68–70

Sl. No.	Experiment	Sample A	Sample B
1	Appearance (i) Colour (ii) Texture	 Black and yellow coloured particles Non-uniform	 Black Uniform throughout
2	Magnet test	Iron filings are attracted by the magnet	Not attracted by the magnet
3	Gas test (i) Odour (ii) Burning	 No smell Burns with a 'pop' sound	 Rotten egg-like odour Not specified in the textbook explanation

Multiple Choice Questions

1. Matter is anything that
A. has no mass B. occupies space and has mass
C. only has shape D. cannot be measured

2. A pure substance is made up of
A. two or more kinds of particles only
B. only one kind of particles
C. different materials mixed together
D. solids only

3. An element is a substance made of
A. two or more elements B. only one kind of atom
C. molecules of different types D. mixed particles

4. Which of the following is an element?
A. Water B. Air C. Iron D. Salt

5. A compound is formed when
A. substances mix physically
B. two or more elements combine chemically in a fixed ratio
C. only metals combine D. gases mix randomly

6. Which of the following is a compound?
A. Oxygen B. Nitrogen
C. Carbon D. Carbon dioxide

7. A mixture is formed when
A. substances combine chemically
B. substances are mixed physically
C. atoms are destroyed
D. compounds break down completely

8. Which of the following is a mixture?
A. Distilled water B. Sodium chloride
C. Air D. Oxygen gas

9. In a mixture, the components
A. lose their properties B. retain their properties
C. always react chemically
D. are present in fixed ratio

10. In a compound, the elements are present in
A. any ratio B. equal amount only
C. fixed ratio D. changing ratio

11. Which of the following is not a characteristic of a compound?
A. Fixed composition B. New properties
C. Components can be separated by physical methods
D. Formed by chemical combination

12. Which of the following is not a mixture?
A. Soil B. Lemonade C. Brass D. Oxygen

13. Brass is a mixture of
A. copper and zinc B. iron and carbon
C. sodium and chlorine D. carbon and oxygen

14. Air is a
A. compound B. mixture
C. element D. pure substance

15. Which of the following is a homogeneous mixture?
A. Sand and iron filings B. Oil and water
C. Salt dissolved in water D. Soil

16. Which of the following is a heterogeneous mixture?
A. Air B. Salt solution
C. Sugar solution D. Sand in water

17. Components of a mixture can usually be separated by
A. nuclear methods B. physical methods
C. chemical reaction only
D. electrical methods only

18. Which method is used to separate iron filings from sand?
A. Filtration B. Evaporation
C. Magnetic separation D. Sedimentation

19. Which method is used to separate an insoluble solid from a liquid?
A. Distillation B. Filtration
C. Sublimation D. Winnowing

20. Which method is used to obtain salt from salt solution?
A. Sedimentation B. Evaporation
C. Filtration D. Churning

21. Distillation is used to
A. separate insoluble solids only
B. separate components based on difference in boiling points
C. separate magnetic materials
D. separate solids by size

22. Water is a compound of
A. hydrogen and oxygen B. hydrogen and nitrogen
C. oxygen and carbon D. sodium and chlorine

23. Common salt is a compound of
A. sodium and oxygen B. sodium and chlorine
C. hydrogen and chlorine D. calcium and chlorine

24. Which of the following statements is true for elements?
A. They can be broken into simpler substances by chemical methods
B. They contain only one kind of atom
C. They are always mixtures
D. They are formed by physical mixing

25. A symbol represents
A. a mixture B. an atom of an element
C. a compound only D. a solution only

26. The smallest particle of an element that takes part in chemical reactions is
A. molecule B. atom C. ion D. cell

27. The smallest particle of a compound that can exist independently is
A. atom B. molecule C. proton D. electron

28. Which of the following is a property of mixtures?
A. Fixed melting point always
B. Components are chemically combined
C. Composition may vary
D. New substance is always formed

29. Which of the following has a fixed composition?
A. Mixture B. Compound C. Solution D. Alloy

30. Which of the following is an example of an alloy?
A. Water B. Steel C. Oxygen D. Sugar

31. Steel is mainly a mixture of
A. iron and carbon B. copper and zinc
C. sodium and chlorine D. hydrogen and oxygen

32. Which of the following is a non-metal element?
A. Copper B. Iron C. Sulphur D. Aluminium

33. Which of the following is a metal element?
A. Oxygen B. Nitrogen C. Gold D. Chlorine

34. Which of the following can be separated by filtration?
A. Salt and water B. Sugar and water
C. Sand and water D. Alcohol and water

35. Which of the following can be separated by evaporation?
A. Oil and water B. Salt and water
C. Sand and iron filings D. Rice and pulses

36. Which of the following is a solution?
A. Muddy water B. Salt water
C. Smoke D. Soil

37. A solution is a
A. heterogeneous mixture only
B. homogeneous mixture
C. pure substance D. compound only

38. In a solution, the substance that dissolves is called
A. solvent B. solute C. residue D. filtrate

39. In a salt solution, water is the
A. solute B. solvent C. residue D. solid

40. Which of the following is a pure substance?
A. Air B. Milk C. Copper D. Soil

41. Which of the following is not a pure substance?
A. Oxygen B. Distilled water
C. Brass D. Carbon dioxide

42. Compounds generally have properties
A. same as their constituent elements
B. different from their constituent elements
C. always metallic D. always gaseous

43. Which of the following is formed by chemical combination?
A. Mixture B. Compound C. Solution D. Alloy

44. Which of the following is formed by physical mixing?
A. Water B. Carbon dioxide
C. Air D. Sodium chloride

45. Which of the following has no chemical formula of its own?
A. Element B. Compound
C. Mixture D. Molecule

46. Which of the following is an example of a heterogeneous mixture?
A. Salt solution B. Air
C. Oil and water D. Vinegar

47. Which property helps to separate cream from milk?
A. Colour B. Density difference
C. Magnetism D. Solubility in water only

48. Churning is used to separate
A. sand from water B. cream from curd
C. salt from water D. iron from sulphur

49. Which of the following pairs represents a compound?
A. Iron and sulphur mixed together
B. Hydrogen and oxygen chemically combined
C. Sand and salt mixed together D. Oil and water

50. The study of elements, compounds and mixtures helps us understand
A. how substances are classified and separated
B. only the colour of substances
C. only living things D. only motion of objects

Answers

1. B	2. B	3. B	4. C	5. B	6. D	7. B	8. C	9. B	10. C
11. C	12. D	13. A	14. B	15. C	16. D	17. B	18. C	19. B	20. B
21. B	22. A	23. B	24. B	25. B	26. B	27. B	28. C	29. B	30. B
31. A	32. C	33. C	34. C	35. B	36. B	37. B	38. B	39. B	40. C
41. C	42. B	43. B	44. C	45. C	46. C	47. B	48. B	49. B	50. A

COMPETENCY BASED QUESTIONS

1 Mark Questions

1. Two substances are mixed together. Their individual properties remain unchanged, and they can be separated by physical methods. How are they classified?
A) Elements B) Compounds C) Mixtures D) Pure substances

2. A manufacturer mixes copper and tin to prepare bronze. How is bronze classified?
A) Element B) Compound C) Mixture (alloy) D) Pure substance

3. A packet of sugar is labelled as pure sugar. According to the scientific meaning of pure substance, what does it indicate?
A) It contains different kinds of particles B) It consists of the same type of particles
C) It contains only mixtures D) It contains different metals

4. A student collects gases from the electrolysis of water. The volume of hydrogen is twice the volume of oxygen. What is the ratio?
A) 1 : 1 B) 1 : 2 C) 2 : 1 D) 3 : 1

5. During the heating of sugar, water droplets are observed on the cooler part of the test tube. Where does this water come from?
A) From the air B) From the sugar C) From the test tube D) From the flame

6. A student brings a magnet near a mixture of iron filings and sulphur powder. What happens?
A) Both iron and sulphur are attracted B) Only sulphur is attracted
C) Iron filings are attracted D) Neither is attracted

7. Two substances are mixed together. Their individual properties remain unchanged, and they can be separated by physical methods. How are they classified?
A) Elements B) Compounds C) Mixtures D) Pure substances

8. An electric current is passed through water, producing hydrogen and oxygen. Which statement is correct?
A) Water is a mixture B) Water is a compound C) Water is an element D) Hydrogen and oxygen are mixtures

9. A student observes a traditional Dokra art figure made using different metals. The process involves shaping wax, making a clay mould and pouring molten metal into it. Which scientific concept is best connected with this activity?
A) Use of metals and mixtures in everyday life B) Separation of gases from air
C) Electrolysis of water D) Formation of dust particles

10. A student observes that most rocks contain different minerals. What can be concluded?
A) All rocks are pure elements B) Rocks are generally mixtures of minerals
C) Rocks are always compounds D) All minerals are gases

11. Which gas burns with a 'pop' sound?
A) Oxygen B) Carbon dioxide C) Hydrogen D) Nitrogen

12. Which of the following is a uniform mixture?
A) Sprout salad B) Sand and iron filings C) Sugar dissolved in water D) Soil

13. Given below are three substances:
(i) Water (ii) Oxygen (iii) Air
Which of the above are pure substances?
A) only case (i) B) only case (ii) C) only cases (i) and (ii) D) all cases (i), (ii), and (iii)

14. Which of the following is a mineral?
A) Quartz B) Milk C) Air D) Fruit juice

15. A student wants to identify the components of a mixture of iron filings and sulphur powder. Which method is useful?
A) Using a magnet B) Using a thermometer C) Using a lens D) Using a prism

1- C	2-C	3-B	4-C	5- B	6-C	7-C	8-B	9- A	10-B	11-C	12-C	13-B	14-A	15-A

16. Assertion (A): Air is considered a mixture.
Reason (R): Air consists of mainly nitrogen, oxygen, argon and carbon dioxide.
Choose the correct option:
A) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
B) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
C) Assertion is true, but Reason is false. D) Assertion is false, but Reason is true.

Ans: A)

17. Assertion (A): Elements cannot be broken down into simpler substances by any chemical method.
Reason (R): Elements are made up of identical particles called atoms.
Choose the correct option:
A) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
B) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
C) Assertion is true, but Reason is false. D) Assertion is false, but Reason is true.

Ans: A)

18. Choose the CORRECT statement.
A) A mixture consists of only one substance. B) A pure substance consists of different types of particles.
C) The components of a mixture retain their individual properties.
D) Elements can be broken down into simpler substances by chemical methods.

Ans: C)

19. Match the following.

Column A	Column B
1. Air	a) Compound
2. Water	b) Element
3. Gold	c) Mixture
4. Sodium chloride	d) Compound

Ans: 1–c, 2–a, 3–b, 4–d.

20. Match the following.

Column A	Column B
1. Iron and sulphur	a) Pure substance
2. Oxygen	b) Mixture
3. Sugar	c) Element
4. Brass	d) Compound

Ans: 1–b, 2–c, 3–d, 4–b.

2 Marks Questions

1. Why do solid particles only vibrate and not flow like liquids or gases?
Ans: Solid particles have very strong interparticle attractive forces and low thermal energy, so they remain tightly packed and can only vibrate about their fixed positions.

2. Give reason as why does the water level not rise after sugar dissolves in it?
Ans: The water level does not rise after sugar dissolves in it because sugar particles fill the spaces between water molecules instead of adding to the total volume, so the level remains the same or lowers slightly.

3. Why do gases occupy the entire space of a container?
Ans: Gases occupy the entire space of a container because their particles are far apart, move freely in all directions, and spread out to fill all available space.

4. Why is air considered a mixture?
Ans: Air is a uniform mixture of mainly nitrogen, oxygen, argon, carbon dioxide and water vapour. These gases retain their individual properties.

5. A student passes carbon dioxide through lime water. The lime water turns milky. What does this observation indicate?
Ans: It indicates the presence of carbon dioxide. Insoluble calcium carbonate is formed.

6. A student heats sugar in a test tube and observes that it turns black. What does the black substance indicate?
Ans: The black substance is carbon. It indicates that sugar contains carbon.

7. Why is stainless steel preferred over pure iron for making utensils?
Ans: Stainless steel is stronger and more durable than pure iron. It is an alloy containing iron, chromium and nickel.

8. Why are elements considered the simplest substances?
Ans: Elements cannot be broken down into simpler substances by chemical methods. They are the building blocks of matter.

9. A building company uses steel and concrete for construction. Why are these materials useful?
Ans: Steel and concrete are useful building materials. Steel is an alloy, and these materials provide strength and durability.

10. Name any two methods used to separate mixtures.
Ans: Filtration, Evaporation.

4 Marks Questions

1. What are the different types of mixtures? Explain with examples.

Ans: Mixtures can be classified into two types based on the uniformity of their components.

1. Homogeneous mixtures: The components are uniformly distributed.
   The components cannot be distinguished.
   Example: Sugar dissolved in water.
2. Heterogeneous mixtures: The components are not uniformly distributed.
   The components can be distinguished.
   Example: Sand and water, oil and water.

2. What is an alloy? Give examples.

Ans: 1. An alloy is a mixture of two or more metals or a metal with other elements.
2. Alloys are generally formed to obtain improved properties.
3. Stainless steel contains iron, nickel and chromium.
4. Brass is a mixture of copper and zinc, while bronze is a mixture of copper and tin.

3. Classify the following substances into solids, liquids and gases.
Salt, Oil, Nitrogen, Stone, Vinegar, Carbon dioxide

Ans: **Solid:** Salt, Stone
Liguid: Oil, Vinegar
Gas: Nitrogen, Carbon dioxide

3. How can you identify hydrogen and oxygen gases collected during the electrolysis of water?

Ans: 1. Collect the gases in two separate test tubes.
2. Bring a burning splinter near the mouth of the first test tube.
3. Hydrogen burns with a 'pop' sound.
4. Oxygen makes a glowing splinter burn brighter.

5. A student observes that hydrogen and oxygen gases are obtained when electric current passes through water. Explain why water is considered a compound.

Ans: 1. Water is composed of two different elements, hydrogen and oxygen.
2. These elements are chemically combined in a fixed ratio.
3. Electric current breaks water into hydrogen and oxygen.
4. The properties of water are different from those of hydrogen and oxygen.

8 Marks Questions

1. Explain the different types of matter with suitable examples.

Ans: Matter around us can be classified into mixtures and pure substances.

a. Mixtures: When two or more substances are mixed, where each substance retains its properties, it is called a mixture.

- The individual substances that make up a mixture are called its components.
- The components do not react chemically with each other.
- Examples: Air, poha, sprout salad and sugar dissolved in water.

b. Pure substances:

- A pure substance consists of the same type of particles.
- It cannot be separated into other kinds of matter by any physical process.
- A pure substance can be either an element or a compound.

Types of pure substances:

i) Elements: Elements are the simplest substances that cannot be broken down into simpler substances.
Examples: Gold, silver, sulphur, carbon and oxygen.

ii) Compounds: Compounds are formed when different elements combine in fixed ratios.
Their properties are different from those of the elements forming them.
Examples: Water and sugar.

2. Explain the importance of minerals and their uses.

Ans: 1. Most rocks are a mixture of minerals.
2. Minerals can be viewed with the naked eye or by using a magnifying glass or microscope.
3. Some minerals are called native minerals, which are pure elements and not compounds.

4. Native minerals can be metals such as gold, silver and copper, or non-metals such as sulphur, carbon and others.
5. Most minerals are compounds made up of more than one element.
6. Common examples of minerals include calcite, mica, pyroxene and olivine.
7. Many things used in our everyday life are made up of minerals or elements extracted from minerals.
8. For example, cement is made from calcite, quartz, alumina and iron oxide, which are minerals or obtained from minerals. Talcum powder is made from the mineral talc.

3. Explain the formation of alloys and give their uses.

Ans: 1. Alloys are mixtures of two or more metals or a metal with other elements.
2. Alloys are generally made to obtain improved properties.
3. Stainless steel contains iron, nickel and chromium.
4. Stainless steel is stronger and more durable than pure iron.
5. Brass is a mixture of copper and zinc.
6. Bronze is a mixture of copper and tin.
7. Alloys are used in manufacturing mobile phones, including their screens, batteries and other components.
8. Alloys are also used in making utensils and various industrial materials.

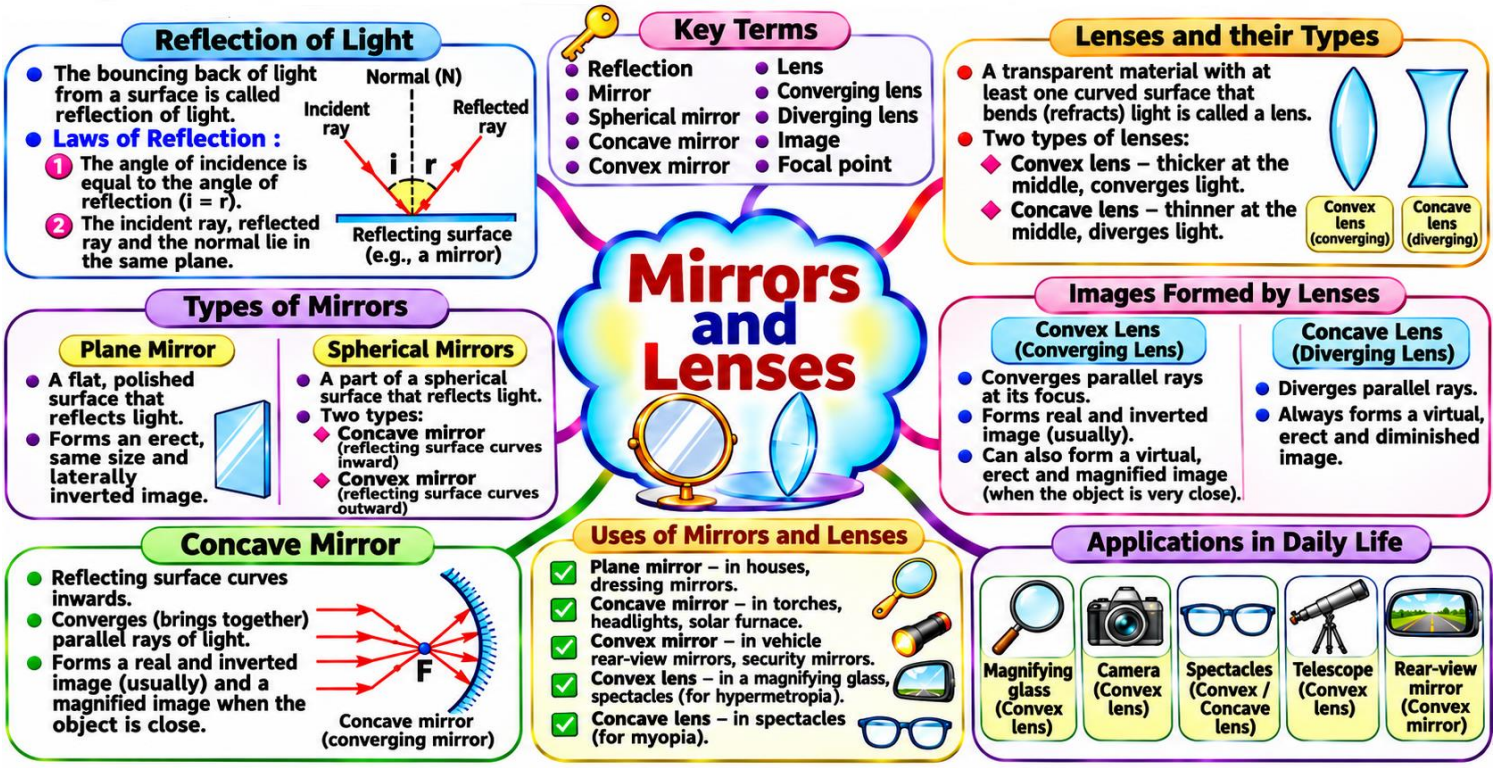
4. Differentiate between mixtures and compounds.

Ans:

Mixtures	Compounds
1. Consist of two or more substances mixed together.	1. Formed when different elements combine chemically.
2. Components retain their individual properties.	2. Properties are different from those of the constituent elements.
3. Components can be separated by physical methods.	3. Elements cannot be separated by physical methods.
4. Components may be present in any proportion.	4. Elements combine in fixed ratios.

CHAPTER - 8: Mirrors and Lenses

Mind Map



Main Points

1. Curved mirrors are called **spherical mirrors**.
2. Spherical mirrors are shaped like a part of a hollow sphere.
3. A mirror with reflecting surface curved inward is a **concave mirror**.
4. A mirror with reflecting surface curved outward is a **convex mirror**.
5. Concave and convex mirrors can be identified from their side view.
6. A concave mirror forms an erect and enlarged image when the object is close to it.
7. A concave mirror forms an inverted image when the object is moved farther away.
8. A convex mirror always forms an erect and diminished image.
9. Plane mirrors always form erect images of the same size as the object.
10. Lateral inversion occurs in plane, concave, and convex mirrors.
11. Concave mirrors are used as reflectors in torches and vehicle headlights.
12. Dentists use concave mirrors to obtain enlarged images of teeth.
13. Convex mirrors are used as side-view mirrors in vehicles.
14. Convex mirrors provide a wider field of view.
15. Convex mirrors are used at road bends and stores for safety and surveillance.
16. The ray falling on a mirror is called the **incident ray**.
17. The ray returning from a mirror is called the **reflected ray**.
18. The perpendicular line at the point of incidence is called the **normal**.
19. The angle between incident ray and normal is the **angle of incidence**.
20. The angle between reflected ray and normal is the **angle of reflection**.
21. First law of reflection: angle of incidence equals angle of reflection.
22. Second law of reflection: incident ray, reflected ray, and normal lie in the same plane.
23. Laws of reflection are valid for all mirrors.
24. Concave mirrors converge parallel light rays.
25. Convex mirrors diverge parallel light rays.
26. A lens is a transparent material with curved surfaces.
27. A convex lens is thicker at the middle than at the edges.

28. A concave lens is thicker at the edges than at the middle.
29. A convex lens converges light rays and is called a converging lens.
30. A concave lens diverges light rays and is called a diverging lens.

-------: Definitions :-------

Spherical Mirrors: Mirrors whose reflecting surfaces are spherical are called spherical mirrors.
Concave Mirror: A spherical mirror whose reflecting surface curves inwards is called a concave mirror.
Convex Mirror: A spherical mirror whose reflecting surface curves outwards is called a convex mirror.
Plane Mirror: A mirror having a flat reflecting surface is called a plane mirror.
Incident Ray: The ray of light that falls on a mirror is called the incident ray.
Reflected Ray: The ray of light that comes back from the mirror is called the reflected ray.
Normal: The line making an angle of 90° to the mirror surface at the point of incidence is known as the normal.
Angle of Incidence: The angle between the normal and the incident ray is called the angle of incidence.
Angle of Reflection: The angle between the normal and the reflected ray is known as the angle of reflection.
Laws of Reflection: The angle of incidence is equal to the angle of reflection. The incident ray, the normal and the reflected ray all lie in the same plane.
Lenses: A lens is a piece of transparent material, usually made of glass or plastic, which has curved surfaces.
Convex Lens: A lens which is thicker at the middle compared to the edges is called a convex lens.
Concave Lens: A lens which is thicker at the edges as compared to the middle is called a concave lens.
Converging Lens: A convex lens that converges a beam of parallel light rays is called a converging lens.
Diverging Lens: A concave lens that diverges a beam of parallel light rays is called a diverging lens.
Solar Concentrators: Devices which concentrate sunlight into a small area, using mirrors and lenses, are called solar concentrators.

Probe and Ponder

Can we make mirrors which can give enlarged or diminished images?
Yes. Concave mirrors can form enlarged images, while convex mirrors always form diminished images.
On side-view mirrors of vehicles, there is a warning that says "Objects in mirror are closer than they appear". Why is this warning written there?
Convex mirrors form diminished images, making objects appear farther away than they actually are. This warning helps drivers judge distances correctly.
Why is there a curved line on some reading glasses?
The curved line indicates the boundary between two lens sections with different optical powers. Such lenses are called bifocal lenses and help people see both near and distant objects clearly.
Share Your Questions

1. What is the difference between a concave mirror and a convex mirror?
2. What is the difference between a convex lens and a concave lens?
3. State the laws of reflection.
4. What is the difference between real and virtual images?
5. What is the use of a magnifying glass?

Intext Questions

1. Can we make mirrors which can give enlarged or diminished image?
Ans: Yes, concave mirrors can form enlarged images, while convex mirrors always form smaller images.
2. Why is there a curved line on some reading glasses?
Ans: The curved line shows that the glasses have two parts to see clearly both near and far.
3. How can we distinguish between concave and convex mirrors?
Ans:

Feature	Concave Mirror	Convex Mirror
Shape	Curves inward like a cave.	Bulges outward.
Image formed	Can be big or inverted (real/virtual).	Always small and upright (virtual).
Common use	Used in shaving or dentist mirrors.	Used in vehicle rear-view mirrors.

4. How can you identify whether a mirror is plane, concave or convex just by looking at the images formed in it?
Ans: We can identify mirrors by the images they form:
Plane mirror: Forms an upright image of the same size.
Concave mirror: Forms an enlarged image when the object is close and an inverted image when it is far away.

Convex mirror: Always forms a smaller and upright image.

5. Where do we find concave and convex mirrors being used in our surroundings?

Ans: Concave mirrors: Used in shaving mirrors, dentist's mirrors and headlights to focus light.
Convex mirrors: Used in vehicle rear-view mirrors, shop security mirrors and blind turns to provide a wider view.

6. Are there any laws that govern image formation in different type of mirrors?

Ans: Yes, all mirrors—plane, concave and convex—form images according to the laws of reflection.

7. Are laws of reflections applicable to spherical mirrors also?

Ans: Yes, the laws of reflection are also applicable to spherical mirrors like concave and convex mirrors.

8. What is the difference in the way a concave mirror and a convex mirror affect a light beam?

Ans: A concave mirror converges (brings together) a light beam to a point, while a convex mirror diverges (spreads out) the light beam.

9. Why does the light get concentrated in a small area when a concave mirror converges it?

Ans: A concave mirror reflects light rays inward towards a single point called the focus, so the light gets concentrated in a small area.

10. How do objects look when viewed through transparent materials with curved surfaces?

Ans: Curved transparent surfaces can make objects appear bigger, smaller, bent or distorted due to the refraction of light.

11. What changes can be seen in the objects when viewed through lenses?

Ans: Lenses can make objects appear bigger, smaller, closer or farther depending on the type of lens used.

12. Do lenses also converge or diverge the light beam?

Ans: Yes, a convex lens converges (brings together) light rays, while a concave lens diverges (spreads out) light rays.

13. Convex lens converges a light beam, can it also burn a paper?

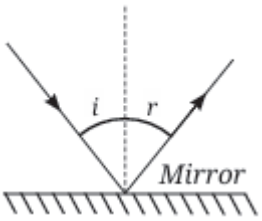
Ans: Yes, a convex lens can burn paper by focusing sunlight to a single point, which produces enough heat to ignite it.

14. Where all are the lenses used?

Ans: Lenses are used in spectacles, microscopes, magnifying glasses, cameras, telescopes, and projectors to see clearly or enlarge images.

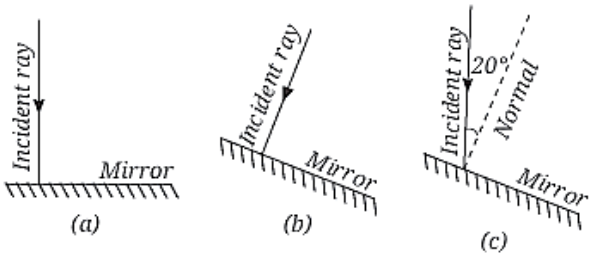


1. A light ray is incident on a mirror and gets reflected by it (Fig. 8.21).
The angle made by the incident ray with the normal to the mirror is 40°.
What is the angle made by the reflected ray with the mirror?
(i) 40°
(ii) 50°
(iii) 45°
(iv) 60°



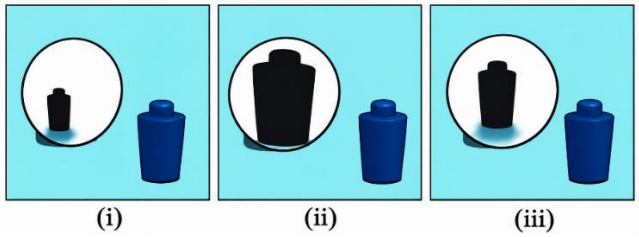
Ans: (ii) 50°

2. Fig. 8.22 shows three different situations where a light ray falls on a mirror:
(i) The light ray falls along the normal.
(ii) The mirror is tilted, but the light ray still falls along the normal to the tilted surface.
(iii) The mirror is tilted, and the light ray falls at an angle of 20° from the normal. Draw the reflected ray in each case (Use a ruler and protractor for accurate drawing).
What is the angle of reflection in each case?



Ans: i) The angle of incidence is 0°.
The light ray is reflected back along the same path. Therefore, the angle of reflection is **0°**.
ii) The angle of incidence is 0°.
The light ray is reflected back along the same path. Therefore, the angle of reflection is **0°**.
iii) According to the law of reflection, Angle of reflection = Angle of incidence
Therefore, the angle of reflection is **20°**.

3. In Fig. 8.23, the cap of a sketch pen is placed in front of three types of mirrors.



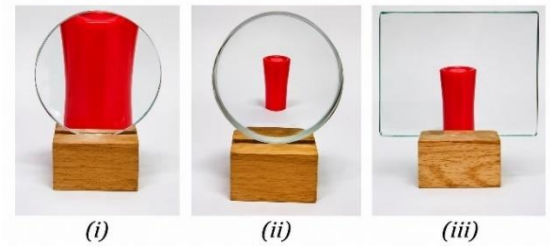
Match each image with the correct mirror.

Image	Mirror
(i)	Plane mirror
(ii)	Convex mirror
(iii)	Concave mirror

Ans:

Image	Correct mirror
(i)	Convex mirror
(ii)	Concave mirror
(iii)	Plane mirror

4. In Fig. 8.24 the cap of a sketch pen is placed behind a convex lens, a concave lens, and a flat transparent glass piece — all at the same distance. Match each image with the correct type of lens or glass.



Ans:

Image	Lens / Glass type
(i)	Convex lens
(ii)	Concave lens
(iii)	Flat transparent glass piece

5. When the light is incident along the normal on the mirror, which of the following statements is true:

(i) Angle of incidence is 90° **(ii) Angle of incidence is 0°**

(iii) Angle of reflection is 90° **(iv) No reflection of light takes place in this case**

Ans: (ii) Angle of incidence is 0°

6. Three mirrors — plane, concave and convex are placed in Fig. 8.25. On the basis of the images of the graph sheet formed in the mirrors, identify the mirrors and write their names above the mirrors.



Ans: Identify the mirrors based on the size of the reflected graph:

Concave mirror – The reflected image appears enlarged when the object is close to the mirror.

Plane mirror – The reflected image appears the same size as the object.

Convex mirror – The reflected image appears diminished.

7. In a museum, a woman walks towards a large convex mirror (Fig. 8.26). She will see that:

(i) her erect image keeps decreasing in size.

(ii) her inverted image keeps decreasing in size.

(iii) her inverted image keeps increasing in size and eventually it becomes erect and magnified.

(iv) her erect image keeps increasing in size.

Ans: (iv) her erect image keeps increasing in size.



8. Hold a magnifying glass over text and identify the distance where you can see the text bigger than they are written. Now move it away from the text. What do you notice? Which type of lens is a magnifying glass?

Ans: When a magnifying glass is held close to the text, the letters appear erect and enlarged. As it is moved away, the image changes in size and may become inverted.

A magnifying glass is a convex lens.

9. Match the entries in Column I with those in Column II.

Column I	Column II
i) Concave mirror	a) Spherical mirror with a reflecting surface that curves inwards.
ii) Convex mirror	b) It forms an image which is always erect and diminished in size.
iii) Convex lens	c) Object placed behind it may appear inverted at some distance.
iv) Concave lens	d) Object placed behind it always appears diminished in size.

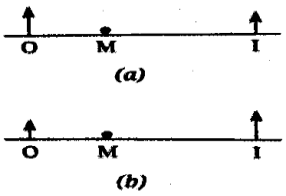
Ans: i) – a) ii) – b) iii)– c) iv) – d)

10. The following question is based on Assertion/Reason. Assertion: Convex mirrors are preferred for observing the traffic behind us. Reason: Convex mirrors provide a significantly larger view area than plane mirrors. Choose the correct option:

(i) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
(ii) Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion.
(iii) Assertion is correct but Reason is incorrect.
(iv) Both Assertion and Reason are incorrect.

Ans: (i) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

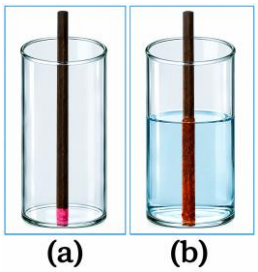
11. In Fig. 8.27, note that O stands for object, M for mirror, and I for image. Which of the following statements is true?



(i) Figure (a) indicates a plane mirror and Figure (b) indicates a concave mirror.
(ii) Figure (a) indicates a convex mirror and Figure (b) indicates a concave mirror.
(iii) Figure (a) indicates a concave mirror and Figure (b) indicates a convex mirror.
(iv) Figure (a) indicates a plane mirror and Figure (b) indicates a convex mirror.

Ans: (i) Figure (a) indicates a plane mirror and Figure (b) indicates a concave mirror.

12. Place a pencil behind a transparent glass tumbler (Fig. 8.28a). Now fill the tumbler halfway with water (Fig. 8.28b). How does the pencil appear when viewed through the water? Explain why its shape appears changed.



Ans: The pencil appears bent, distorted or displaced when viewed through the water. This is due to the refraction of light. When light passes through water, glass and air, its direction changes, making the pencil appear to have a changed shape.

Discover, Design and Debate

1. Visit a nearby hospital or the clinic of an ENT specialist, or a dentist, with your teacher or parents. Request the doctor to show you the mirrors used for examining ear, nose, throat, and teeth. Identify the kind of mirror used in these instruments.

S.No.	Instrument	Used For	Mirror Type	Shape of Mirror	Why This Mirror Is Used
1	ENT Mirror (Throat Mirror)	To see the throat and tonsils.	Concave Mirror	Circular	Concave mirror gives a magnified and upright image when the object is within its focal length. It helps the doctor see the throat clearly.
2	ENT Mirror (Ear Mirror)	To examine the ear canal and eardrum.	Concave Mirror	Circular	Concave mirror provides a magnified and bright image of small structures inside the ear.
3	ENT Mirror (Nasal Mirror)	To examine inside the nasal cavity.	Concave Mirror	Circular	Helps in seeing small and hidden areas inside the nose with a magnified image.

4	Dental Mouth Mirror	To see the teeth and inner parts of the mouth.	Concave Mirror	Circular	Concave mirror gives a magnified and upright image of teeth and surrounding areas for better examination.
5	Head Mirror (Old Type)	To reflect light into the ear, nose or throat.	Plane Mirror	Circular (Disc-shaped)	Plane mirror reflects light in a particular direction and is used to illuminate the area being examined.

2. Harnessing sunlight is key to solving future energy challenges. In devices like solar cookers (Fig. 8.29), mirrors are used to converge sunlight and generate heat. In India, such designs are used in villages, thus saving electricity and reducing fossil fuel use. Think of a design for a solar cooker for your school or home and prepare a detailed proposal for it including the budget required.

Title: Design and Construction of a Solar Cooker

Aim: To design a solar cooker using sunlight to cook food without using electricity or fossil fuels.

Materials Required:

S.No.	Materials	Estimated Cost (₹)
1	Cardboard box	150
2	Aluminium foil	100
3	Plane mirror	200
4	Transparent glass sheet	150
5	Black-coloured cooking vessel	250
6	Insulating material	100
7	Adhesive and other materials	100
	Total Budget	**1,050**

Working Principle

a) A solar cooker works on the principle of absorption and concentration of solar energy.
b) Mirrors reflect sunlight towards the cooking area.
c) The black-coloured vessel absorbs more heat.
d) The transparent glass sheet helps retain heat inside the cooker.
e) The temperature inside the cooker increases.
f) Food gets cooked using solar energy.



Advantages

a) Saves electricity and cooking gas.
b) Does not cause air pollution during operation.
c) Uses renewable solar energy.
d) Reduces the use of fossil fuels.
e) It is economical and environmentally friendly.

Conclusion: A solar cooker uses sunlight to produce heat for cooking food. It helps save electricity and reduces the use of fossil fuels.

3. Use online tools or animation to do virtual experiments with spherical mirrors and lenses. Move objects in the simulation and observe how the image changes.

We can study the formation of images by moving an object towards or away from spherical mirrors and lenses.

Spherical Mirrors

Mirror	Observation
Concave mirror	Image may be enlarged, diminished or of the same size. It may be erect or inverted depending on the object distance.
Convex mirror	Image is always erect and diminished.

Lenses

Lens	Observation
Convex lens	Image may be enlarged, diminished or of the same size. It may be erect or inverted depending on the object distance.
Concave lens	Image is always erect and diminished.

Important Observations

1. Concave Mirror

a) When the object is close to the mirror, the image is erect and enlarged.
b) When the object moves farther away, the image becomes inverted.
c) The size of the image changes with the distance of the object.

2. Convex Mirror
a) The image is always erect.
b) The image is always smaller than the object.

3. Convex Lens
a) When the object is placed close to the lens, the image is erect and enlarged.
b) As the object moves farther away, the image becomes inverted.

4. Concave Lens
a) The image is always erect and diminished.
b) The image appears on the same side as the object.

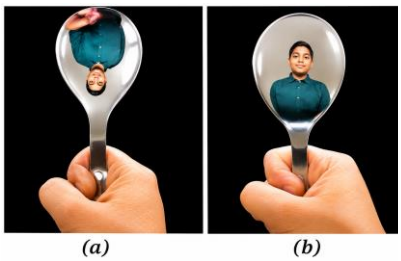
Conclusion: The size, nature and position of an image depend on the type of mirror or lens and the distance between the object and the mirror or lens.

Activites

Activity 8.1

Aim: To observe images formed by curved surfaces of a spoon.
Required materials: Shiny metallic spoon.
Procedure:

a) Hold a shiny spoon and look at your face in it.
b) Observe the image on the inner (curved inward) side.
c) Move the spoon closer and farther from your face.
d) Now observe the image on the outer (curved outward) side.
e) Note the differences.

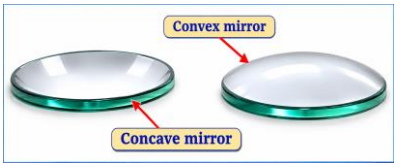

(a) (b)

Observation: The inner side shows an inverted or upright image depending on distance.
The outer side shows a small, upright image. The image changes when the distance changes.
Conclusion: Curved surfaces can form different types of images.
They act like spherical mirrors (concave and convex mirrors).

Activity 8.2

Aim: To distinguish between concave and convex mirrors.
Required materials: Concave mirror and convex mirror.
Procedure:

a) Place both mirrors on a table with their reflecting surfaces facing upward.
b) Look at the mirrors from the side at eye level.
c) Observe the shape of the reflecting surface.
d) Check whether the surface is curved inward or outward.

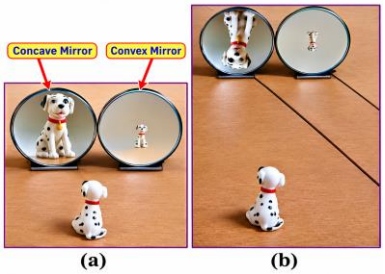


Observation: One mirror is curved inward (concave). The other mirror is curved outward (convex).
Conclusion: Concave mirrors have inward curved surfaces. Convex mirrors have outward curved surfaces.

Activity 8.3

Aim: To study the characteristics of images formed by concave and convex mirrors.
Required materials: Concave mirror, convex mirror, small object (toy/eraser).
Procedure:

a) Place both mirrors upright on a table.
b) Keep a small object in front of the mirrors at a short distance.
c) Observe the images formed in both mirrors.
d) Now slowly move the object away and observe the changes.
e) Note the size, position, and nature of the images.



(a) (b)

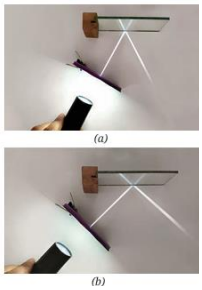
Observation: In a concave mirror, the image is large and upright when the object is close.
When the object is moved away, the image becomes inverted and smaller.
In a convex mirror, the image is always upright and smaller.

Conclusion: Concave and convex mirrors form different types of images.
Concave mirrors can form enlarged or inverted images depending on distance.
Convex mirrors always form small, upright images.

Activity 8.4

Aim: To show that the angle of incidence is equal to the angle of reflection.
Required materials: Plane mirror, torch, white paper, comb (or slit), scale, protractor, black paper.
Procedure:

a) Fix a plane mirror vertically on a white paper.
b) Make a narrow slit using a comb or black paper.
c) Pass a thin beam of light from a torch through the slit onto the mirror.
d) Mark the path of the incident ray and reflected ray on the paper.
e) Draw a normal line at the point of incidence.
f) Measure the angle of incidence and angle of reflection using a protractor.



Observation: The angle of incidence and angle of reflection are nearly equal.
The reflected ray changes direction when the angle of incidence changes.
Conclusion: The angle of incidence is equal to the angle of reflection. This is the law of reflection of light.

Activity 8.5

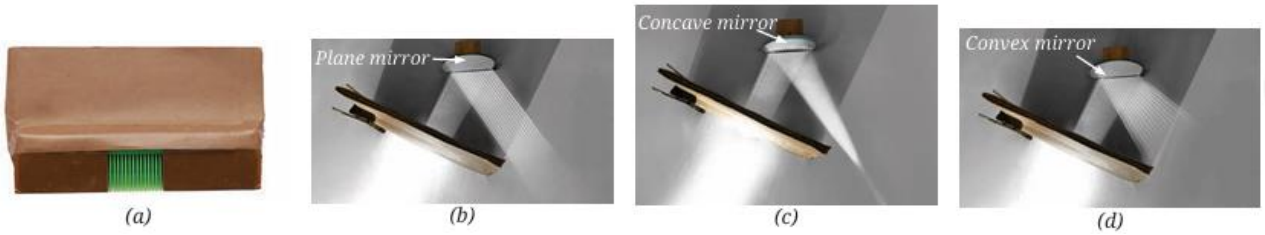
Aim: To show that the incident ray, reflected ray, and normal lie in the same plane.
Required materials: Plane mirror, torch, white paper, comb (or slit), table.
Procedure:

a) Set up a plane mirror on a white paper as in the previous activity.
b) Pass a thin beam of light onto the mirror.
c) Observe the reflected ray on the extended paper.
d) Now bend the paper along the edge of the table.
e) Check whether the reflected ray is still visible.
f) Flatten the paper again and observe.

Observation: The reflected ray is visible when the paper is flat. When the paper is bent, the reflected ray disappears. It reappears when the paper is flattened again.
Conclusion: The incident ray, reflected ray, and normal lie in the same plane.
This is another law of reflection of light.

Activity 8.6

Aim: To observe how parallel beams of light behave in plane, concave, and convex mirrors.
Required materials: Plane mirror, concave mirror, convex mirror, torch, comb, stand or holder.
Procedure:



a) Use a comb to produce multiple parallel beams of light from a torch.
b) Allow the beams to fall on a plane mirror and observe.
c) Now repeat the same with a concave mirror.
d) Then repeat with a convex mirror.
e) Compare the reflected beams in all three cases.

Observation: In a plane mirror, the reflected beams remain parallel. In a concave mirror, the beams come closer (converge). In a convex mirror, the beams spread out (diverge).
Conclusion: Plane mirrors reflect parallel beams as parallel. Concave mirrors converge light rays.
Convex mirrors diverge light rays.

Activity 8.7

Aim: To show that a concave mirror can concentrate sunlight to produce heat.

Required materials: Concave mirror, thin paper/newspaper.



Procedure:

a) Take a concave mirror and a piece of paper.
b) Face the mirror towards sunlight.
c) Reflect sunlight onto the paper.
d) Adjust the distance to get a bright sharp spot.
e) Hold it steady for a few minutes.

Observation: A bright spot of light forms on the paper.
The paper becomes hot and may start burning or produce smoke.

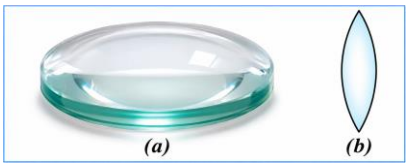
Conclusion: A concave mirror concentrates light at a point. This concentrated light produces heat and can burn objects.

Activity 8.8

Aim: To observe that a water drop acts like a convex lens and magnifies objects.

Required materials: Glass strip or plastic scale, water, dropper, paper with printed text, oil (optional).

Procedure:



a) Place a thin layer of oil on the glass/plastic surface.
b) Put a small drop of water on it using a dropper.
c) Observe the shape of the water drop.
d) Place printed paper under the glass.
e) Look at the letters through the water drop.

Observation: The water drop is curved outward. The letters seen through the drop appear bigger (magnified).

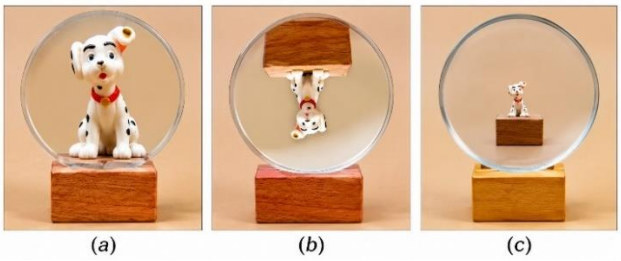
Conclusion: A water drop behaves like a convex lens. Convex lenses magnify objects.

Activity 8.9

Aim: To compare images formed by convex and concave lenses.

Required materials: Convex lens, concave lens, lens holder, small object (toy).

Procedure:



a) Fix the convex lens in a holder.
b) Place a small object in front of the lens.
c) Look at the image through the lens.
d) Move the object slowly away and observe changes.
e) Repeat the same steps using a concave lens.
f) Compare the images formed by both lenses.

Observation: In a convex lens, the image is upright and enlarged when close, and becomes smaller when moved away. In a concave lens, the image is always upright and smaller.

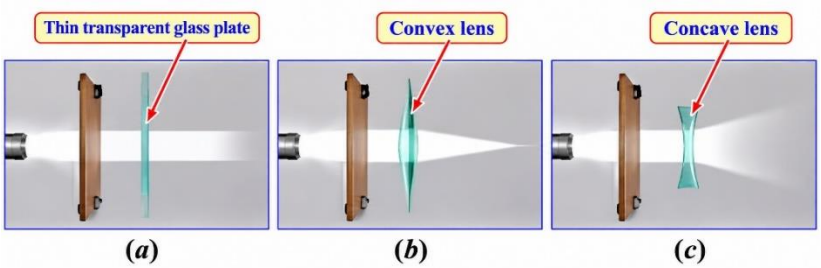
Conclusion: Convex lenses can form enlarged or diminished images depending on distance. Concave lenses always form small, upright images.

Activity 8.10

Aim: To observe how light passes through a glass plate, convex lens, and concave lens.

Required materials: Thin glass plate, convex lens, concave lens, torch, comb, white paper, stand/books.

Procedure:



a) Use a comb and torch to produce parallel beams of light.
b) Allow the beams to pass through a thin glass plate and observe.
c) Now pass the beams through a convex lens and observe.
d) Then pass the beams through a concave lens and observe.
e) Compare the behavior of light in all three cases.

Observation: Light passes straight through the glass plate. In a convex lens, light rays come closer (converge). In a concave lens, light rays spread out (diverge).

Conclusion: A convex lens is a converging lens. A concave lens is a diverging lens.

Activity 8.11

Aim: To show that a convex lens can focus sunlight and produce heat.

Required materials: Convex lens, paper.

Procedure:

a) Take a convex lens and hold it in sunlight.
b) Place a piece of paper below the lens.
c) Adjust the distance to get a small bright spot on the paper.
d) Hold it steady for some time.



Observation: A bright focused spot of light appears on the paper. The paper becomes hot and may start burning or produce smoke.

Conclusion: A convex lens converges sunlight to a point. This concentrated light produces heat and can burn objects.

Prepare Some Questions Based on Your Learnings So Far

1. **Why can we see our image in a mirror?**
2. **How does a concave mirror form different types of images?**
3. **Why do convex mirrors provide a wider view of objects?**
4. **What happens when light passes through a convex lens?**
5. **Where are mirrors and lenses used in daily life?**
6. **Why are rear-view mirrors in vehicles made of convex mirrors?**
7. **When does a lens form a magnified image?**
8. **How long does light take to travel from the Sun to the Earth?**
9. **Why do we see our reflection clearly in still water?**
10. **Why are spectacles made using lenses?**

Multiple Choice Questions

1. We are able to see objects because
A. objects produce sound
B. light reflected from objects reaches our eyes
C. air enters our eyes D. objects move continuously

2. A smooth and polished surface that reflects light is called a
A. lens B. mirror C. prism D. screen

3. The bouncing back of light from a surface is called
A. refraction B. reflection
C. dispersion D. absorption

4. The ray of light that falls on a mirror is called the
A. reflected ray B. refracted ray
C. incident ray D. normal ray

5. The ray that bounces back from a mirror is called the
A. incident ray B. reflected ray
C. normal ray D. lateral ray

6. The imaginary line drawn perpendicular to the mirror at the point of incidence is called the
A. tangent B. normal
C. angle line D. principal axis

7. The angle between the incident ray and the normal is called the
A. angle of reflection B. angle of deviation
C. angle of incidence D. angle of refraction

8. The angle between the reflected ray and the normal is called the
A. angle of incidence B. angle of reflection
C. angle of bending D. angle of projection

9. According to the law of reflection, the angle of incidence is
A. greater than angle of reflection
B. smaller than angle of reflection

C. equal to angle of reflection
D. unrelated to angle of reflection

10. The image formed by a plane mirror is
A. real and inverted B. virtual and erect
C. real and erect D. virtual and inverted

11. The image formed by a plane mirror is
A. smaller than the object
B. larger than the object
C. same size as the object D. always blurred

12. In a plane mirror, the image is formed
A. on the mirror surface B. behind the mirror
C. in front of the mirror
D. inside the mirror glass only

13. The distance of the image from a plane mirror is
A. greater than object distance
B. less than object distance
C. equal to object distance D. zero always

14. Lateral inversion means
A. upside down image B. enlarged image
C. left-right reversal in the image
D. colour change in image

15. Which mirror is used as a rear-view mirror in vehicles?
A. plane mirror B. concave mirror
C. convex mirror D. polished metal sheet

16. A convex mirror always forms an image that is
A. real and enlarged
B. virtual, erect and diminished
C. real and inverted D. virtual and enlarged

17. Which mirror can converge light rays?
A. plane mirror B. convex mirror
C. concave mirror D. all mirrors equally

18. A concave mirror is also called a
A. diverging mirror B. converging mirror
C. plane mirror D. transparent mirror

19. Which mirror is commonly used by dentists to see enlarged images?
A. plane mirror B. convex mirror
C. concave mirror D. rear-view mirror

20. Which mirror is used in torches and searchlights?
A. plane mirror B. convex mirror
C. concave mirror D. rough mirror

21. The point where parallel rays meet after reflection from a concave mirror is called
A. pole B. centre of curvature
C. focus D. aperture

22. The centre of the reflecting surface of a spherical mirror is called the
A. focus B. pole C. normal D. radius

23. The distance between pole and focus is called
A. radius of curvature B. focal length
C. aperture D. image distance

24. A convex mirror makes objects appear
A. bigger and closer B. smaller and farther
C. upside down D. invisible

25. Which mirror gives the widest field of view?
A. plane mirror B. concave mirror
C. convex mirror D. all are same

26. A lens is a transparent material bounded by
A. only one plane surface
B. two reflecting surfaces
C. two surfaces, at least one of which is curved
D. one rough and one smooth surface

27. A convex lens is thicker at the
A. edges B. centre C. top only D. bottom only

28. A concave lens is thicker at the
A. centre B. edges
C. middle only D. all parts equally

29. A convex lens is also called a
A. diverging lens B. converging lens
C. plane lens D. reflecting lens

30. A concave lens is also called a
A. converging lens B. magnifying lens
C. diverging lens D. spherical mirror

31. Parallel rays of light after passing through a convex lens
A. spread out B. meet at a point
C. get absorbed D. move backward

32. The point where parallel rays meet after refraction through a convex lens is called
A. pole B. focus C. centre D. radius

33. A convex lens can form
A. only virtual images B. only real images
C. both real and virtual images D. no image

34. A concave lens always forms an image that is
A. real and inverted
B. virtual, erect and diminished
C. real and enlarged D. virtual and enlarged

35. Which lens is used in a magnifying glass?
A. concave lens B. convex lens
C. cylindrical lens D. plane glass

36. The image formed by a magnifying glass is usually
A. real and inverted B. virtual, erect and enlarged
C. real and diminished D. virtual and diminished

37. Which lens is generally used to correct short-sightedness?
A. convex lens B. concave lens
C. bifocal lens D. plane lens

38. Which lens is generally used to correct long-sightedness?
A. concave lens B. convex lens
C. cylindrical lens D. plane glass

39. The splitting of white light into different colours is called
A. reflection B. refraction
C. dispersion D. scattering

40. A rainbow is formed due to
A. only reflection of light
B. only absorption of light
C. dispersion of sunlight by water droplets
D. blocking of sunlight by clouds

41. Refraction of light is the
A. bouncing back of light
B. bending of light when it passes from one medium to another
C. splitting of light into colours
D. absorption of light by a surface

42. Light bends during refraction because its
A. colour changes
B. speed changes in different media
C. mass changes D. direction never changes

43. The lens used in spectacles for reading by many elderly people is usually
A. concave lens B. convex lens
C. plane mirror D. convex mirror

44. Which of the following forms only virtual images?
A. plane mirror, convex mirror and concave lens
B. concave mirror and convex lens
C. concave mirror only D. convex lens only

45. In a plane mirror, if you move 1 m towards the mirror, the image appears to move
A. 1 m away B. 1 m towards you
C. 2 m away from you
D. 1 m behind the mirror only

46. The image formed by a concave mirror can be
A. only virtual B. only real
C. either real or virtual depending on object position
D. always same size

47. Which of the following is used to concentrate sunlight to a point?
A. convex mirror B. concave mirror
C. plane mirror D. concave lens

48. Which of the following statements is correct?
A. A concave lens converges light
B. A convex mirror converges light
C. A convex lens converges light
D. A plane mirror refracts light

49. The image seen in a plane mirror is
A. real B. cannot be seen
C. virtual D. always inverted

50. Mirrors work mainly by
A. refraction B. reflection
C. dispersion D. absorption

Answers

1. B	2. B	3. B	4. C	5. B	6. B	7. C	8. B	9. C	10. B
11. C	12. B	13. C	14. C	15. C	16. B	17. C	18. B	19. C	20. C
21. C	22. B	23. B	24. B	25. C	26. C	27. B	28. B	29. B	30. C
31. B	32. B	33. C	34. B	35. B	36. B	37. B	38. B	39. C	40. C
41. B	42. B	43. B	44. A	45. B	46. C	47. B	48. C	49. C	50. B

MIDDE SRINIVASA RAO

COMPETENCY BASED QUESTIONS

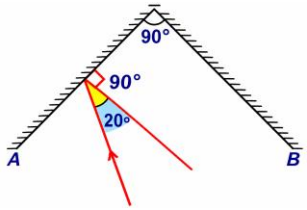
1 Mark Questions

1. Which of the following statements is NOT correct?
A) A concave mirror has an inward curved reflecting surface.
B) A convex mirror always forms a diminished image.
C) A plane mirror forms an inverted image. D) A convex lens is thicker at the middle.

2. Which mirror is commonly used as a side-view mirror in vehicles?
A) Plane mirror B) Concave mirror C) Convex mirror D) Periscope mirror

3. Ammalu placed a lens on a table. He noticed that when he looked through it, the object appeared smaller. Which type of lens is it?
A) Convex lens B) Concave lens C) Plane glass D) Magnifying glass

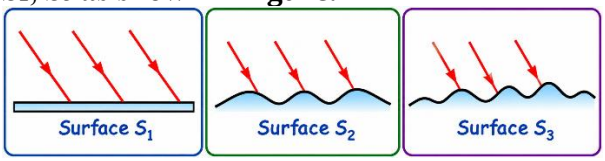
4. Two mirrors A and B are placed at right angles to each other as shown in figure. A ray of light incident on mirror A at an angle of 20° falls on mirror B after reflection. The angle of reflection for the ray reflected from mirror B would be



A) 25° B) 70°
C) 50° D) 115°

5. When light falls normally on a mirror, the angle of incidence is
A) 0° B) 45° C) 90° D) 180°

6. Light is falling on surfaces S_1, S_2, S_3 as shown in figure.



Surface on which the angles of incidence is equal to the angle of reflection is/are

A) Only S_2 B) S_1 and S_2 C) S_2 and S_3 D) All three surfaces

7. In a cinema projector, which optical components is not used?

A) Concave mirror B) Convex lens C) Plane mirror D) Convex mirror

8. If you stand in front of a plane mirror and search your right cheek, your image

A) scratches its right cheek B) scratches its left cheek C) scratches both cheeks D) does not scratch at all

9. Which of the following statements is true for a concave lens?

A) It always forms a real image. B) It is thicker at the edges than at the centre.

C) It is used in telescopes. D) It converges light rays.

10. Given below are three optical devices:

(i) Dentist's mirror (ii) Vehicle side-view mirror (iii) Torch reflector

Which of the above use concave mirrors?

A) only case (i) B) only cases (i) and (iii) C) only case (ii) D) all cases (i), (ii), and (iii)

11. Doctors use a special lens to see inside your eyes during eye check-ups. Which lens do they use?

A) Convex lens B) Concave lens C) Plane mirror D) Prism

12. A torchlight gives a strong, focused beam when a lens is placed in front. Which lens is being used and what is its function?

A) Convex lens – it converges light B) Concave lens – it scatters light

C) Plane glass – no effect on light D) Mirror – reflects light only

13. A student performs an experiment using a spoon as shown in the figure.



Which statement is correct?

A) Inner curved surface produces an erect image in every position

B) Outer curved surface produces an erect and diminished image

C) Both surfaces always produce enlarged images

D) Both surfaces produce only inverted images

14. A student uses a convex lens to focus sunlight on a piece of paper.

Which property of the lens makes this possible?

A) It diverges light B) It converges light C) It reflects light D) It absorbs light

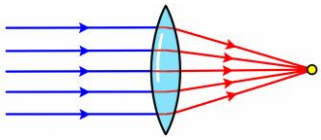
15. Identify the object given picture.

A) Concave mirror

B) Convex mirror

C) Concave lens

D) Convex lens



1-C	2-C	3-A	4-B	5-A	6-D	7-D	8-B	9-B	10-B	11-A	12-A	13-A	14-B	15-B

16. Assertion (A): A convex mirror always forms an erect and diminished image.

Reason (R): A convex mirror diverges the reflected light rays.

Choose the correct option:

A) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.

B) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

C) Assertion is true, but Reason is false. D) Assertion is false, but Reason is true.

Ans: A)

17. Assertion (A): A convex lens converges a beam of light.

Reason (R): A convex lens is thicker at the edges than at the middle.

Choose the correct option:

A) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.

B) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

C) Assertion is true, but Reason is false. D) Assertion is false, but Reason is true.

Ans: C)

18. Choose the CORRECT statement.

A) A plane mirror always forms a diminished image.
B) A convex mirror always forms an erect and diminished image.
C) A concave mirror always forms an erect image.
D) A convex mirror converges light rays.

Ans: B)

19. Match the following.

Column A	Column B
1. Plane mirror	a) Always erect and diminished image
2. Concave mirror	b) Image of same size as object
3. Convex mirror	c) Converges light rays
4. Concave lens	d) Diverges light rays

Ans: 1–b, 2–c, 3–a, 4–d.

20. Match the following.

Column A	Column B
1. Angle of incidence	a) Thicker at the middle
2. Angle of reflection	b) Angle between reflected ray and normal
3. Convex lens	c) Angle between incident ray and normal
4. Concave lens	d) Thinner at the middle

Ans: 1–c, 2–b, 3–a, 4–d.

2 Marks Questions

1. A driver observes that vehicles behind his car appear smaller in the side-view mirror. Identify the mirror and give a reason.

Ans: It is a convex mirror. It forms erect and diminished images and provides a wider field of view.

2. A dentist uses a curved mirror to examine a patient's teeth. Which mirror is used? Why?

Ans: A concave mirror is used because it provides an enlarged and erect image of the teeth when they are close to the mirror.

3. Parallel light rays spread out after reflection from a mirror. Identify the mirror and explain.

Ans: It is a convex mirror. It diverges parallel light rays after reflection.

4. Why are the laws of reflection applicable to spherical mirrors also?

Ans: The laws of reflection are valid for all kinds of mirrors, including plane, concave and convex mirrors.

5. Two lenses are given to a student. One is thicker at the centre and the other is thinner at the centre. How can the student identify them?

Ans: 1. The lens thicker at the centre is a convex lens.
2. The lens thinner at the centre is a concave lens.

6. A solar furnace uses a mirror to concentrate sunlight. Which mirror is suitable? Explain its principle.

Ans: A concave mirror is suitable. It converges sunlight into a small area and produces high temperature.

7. A student says that a concave lens can form an enlarged image of an object. Is the statement correct? Give a reason.

Ans: No. A concave lens always forms an erect and diminished image, irrespective of the distance of the object.

8. A shopkeeper wants to monitor a large area using only one mirror. Which mirror should be selected? Justify your answer.

Ans: A convex mirror should be selected because it provides a wider field of view and forms erect, diminished images.

4 Marks Questions

1. What are spherical mirrors? Explain their types.

Ans: Spherical mirrors are mirrors whose reflecting surfaces are parts of a hollow sphere.
There are two types of spherical mirrors:

a. Concave mirror: A spherical mirror whose reflecting surface curves inwards is called a concave mirror.
b. Convex mirror: A spherical mirror whose reflecting surface curves outwards is called a convex mirror.
c. The reflecting surface of a concave mirror is curved inwards.
d. The reflecting surface of a convex mirror is curved outwards.

2. Explain the characteristics of images formed by spherical mirrors.

Ans: 1. A concave mirror forms an erect and enlarged image when the object is placed close to it.
2. When the object is moved farther away, the image becomes smaller and eventually inverted.
3. A convex mirror always forms an erect and diminished image.
4. In both concave and convex mirrors, the size of the image changes with the distance of the object from the mirror.

3. State the two laws of reflection.

Ans: There are two laws of reflection:

1. The angle of incidence is equal to the angle of reflection.
2. The incident ray, the normal to the mirror at the point of incidence and the reflected ray all lie in the same plane.

4. What is a lens? Explain its types.

Ans: A lens is a piece of transparent material, usually made of glass or plastic, which has curved surfaces.

There are two types of lenses:

a. Convex lens: A lens which is thicker at the middle than at the edges is called a convex lens.
b. Concave lens: A lens which is thinner at the middle than at the edges is called a concave lens.
c. A convex lens converges light beams.
d. A concave lens diverges light beams.

5. Explain the characteristics of images formed by convex and concave lenses.

Ans: 1. When an object is placed behind a convex lens at a small distance, the image appears erect and enlarged.
2. As the object is moved farther away, the image increases in size, then becomes inverted and gradually diminishes in size.
3. An object placed behind a concave lens always appears erect and diminished in size.
4. The image formed by a concave lens always remains erect and diminished, irrespective of the distance of the object.

6. What are solar concentrators? Explain their uses.

Ans: Devices which concentrate sunlight into a small area using mirrors and lenses are called solar concentrators.

1. The concentrated sunlight is used to heat a liquid to produce steam.
2. The steam can be used to generate electricity.
3. Solar furnaces are used for melting steel.

7. Explain the uses of lenses in daily life.

Ans: 1. Convex lenses are used in magnifying glasses.
2. Lenses are used in cameras and microscopes.
3. Concave lenses are used in spectacles.
4. Lenses are used in telescopes and projectors.

8. Explain image formation by a plane mirror.

Ans: 1. Virtual and erect.
2. The same size of the object and the image.
3. Appears behind the mirror.
4. Shows lateral inversion.

8 Marks Questions

1. Differentiate between concave and convex mirrors.

Ans:

Concave mirror	Convex mirror
1. Reflecting surface curves inwards.	1. Reflecting surface curves outwards.
2. Can form enlarged images.	2. Always forms diminished images.
3. Image may be erect or inverted.	3. Image is always erect.
4. Converges light beams.	4. Diverges light beams.

2. Write the uses of concave and convex mirrors.

Ans: Uses of concave mirrors:

1. Reflectors of torches.
2. Headlights of cars and scooters.
3. Dental mirrors for inspecting teeth.

Uses of convex mirrors:

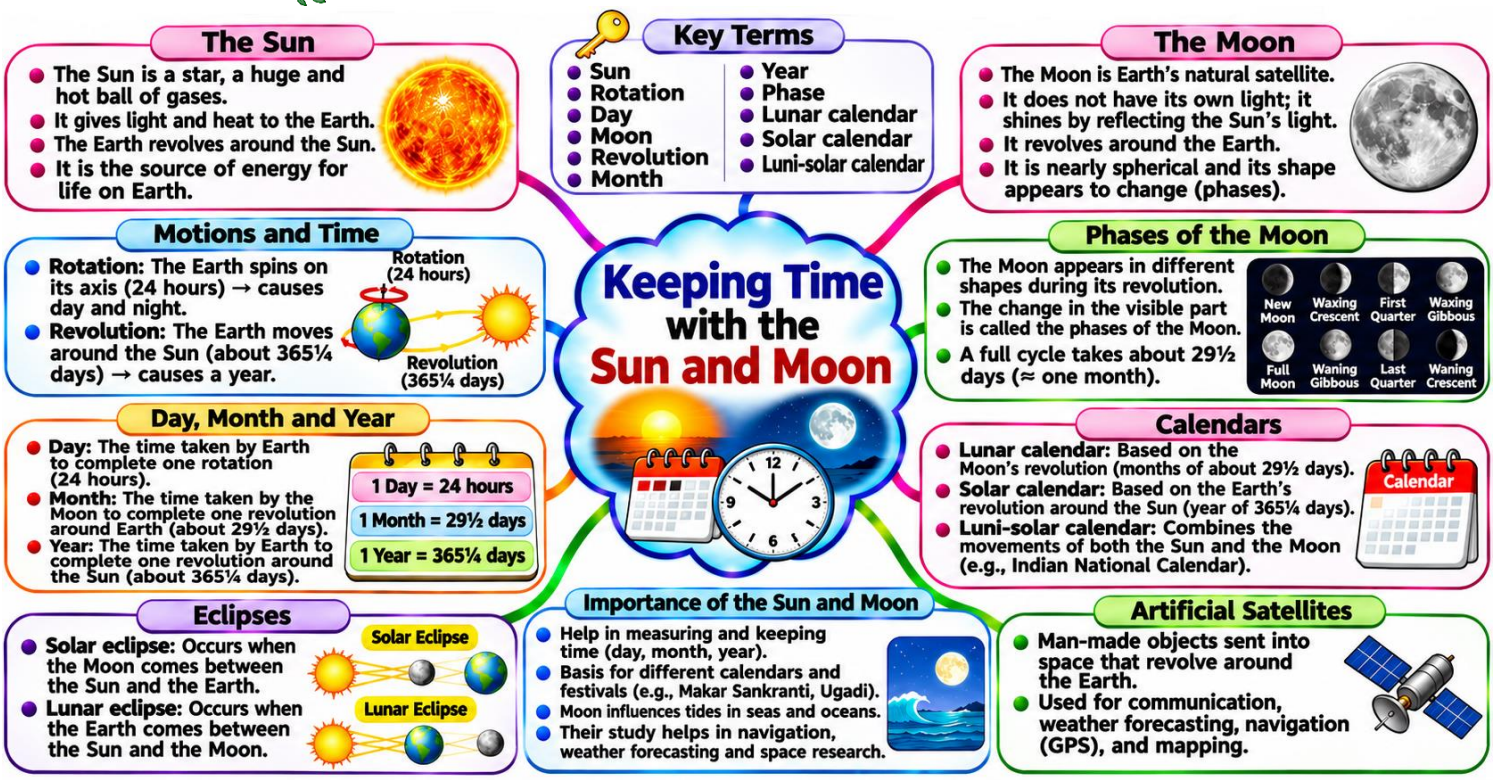
1. Side-view mirrors in vehicles.
2. Road safety mirrors at road intersections.
3. Surveillance mirrors in big stores.

3. Why is the word "AMBULANCE" written in reverse on the front of hospital vans?

Ans: 1. The word "AMBULANCE" is written in reverse on the front of hospital vans.
2. A plane mirror produces lateral inversion.
3. Therefore, the reversed word appears correctly in the rear-view mirrors of vehicles in front.
4. This helps drivers read the word quickly and give way to the ambulance.

CHAPTER - 9: Keeping Time with the Sun and Moon

Mind Map



Main Points

1. The Moon shines because it reflects sunlight.
2. The Moon is spherical, but its visible bright shape changes every day.
3. The changing visible shapes of the Moon are called **phases of the Moon**.
4. The period when the bright part of the Moon decreases is called the **waning phase**.
5. The period when the bright part of the Moon increases is called the **waxing phase**.
6. In India, waning phase is called **Krishna Paksha**.
7. In India, waxing phase is called **Shukla Paksha**.
8. The day when the Moon appears fully bright is called **Full Moon (Purnima)**.
9. The day when the Moon is not visible is called **New Moon (Amavasya)**.
10. One complete cycle from one full Moon to the next takes about one month.
11. A waxing Moon is easiest to see at sunset.
12. A waning Moon is easiest to see at sunrise.
13. The Moon rises about 50 minutes later each day.
14. The Moon does not emit its own light.
15. Half of the Moon is always illuminated by the Sun.
16. We see only the illuminated portion of the Moon facing Earth.
17. The phases of the Moon occur because the Moon revolves around the Earth.
18. The Moon revolves around the Earth in about one month.
19. Crescent phase shows less than half of the illuminated Moon.
20. Gibbous phase shows more than half of the illuminated Moon.
21. Moon phases are not caused by Earth's shadow.
22. Earth's shadow on the Moon causes a **lunar eclipse**.
23. A **solar day** is approximately 24 hours long.
24. The Moon takes about 29.5 days to complete all its phases.
25. Earth takes about 365¼ days to revolve around the Sun.
26. Lunar calendars are based on the Moon's phases.

27. Solar calendars are based on Earth's revolution and seasons.
28. Leap years are added to keep solar calendars synchronized with seasons.
29. Luni-solar calendars combine features of lunar and solar calendars.
30. Artificial satellites help in communication, navigation, weather monitoring, disaster management, and scientific research.

-------: Definitions :-------

Phases of the Moon: The changing shapes of the bright portion of the Moon from one day to another, as seen from the Earth, are called the phases of the Moon.
New Moon (Amavasya): The day when the Moon appears to be completely dark or is not visible in the sky is called the New Moon day.
Full Moon (Purnima): The day when the entire illuminated portion of the Moon is visible from the Earth is called the Full Moon day.
Waxing Period: The period during which the bright portion of the Moon increases from a new moon to a full moon is called the waxing period.
Waning Period: The period during which the bright portion of the Moon decreases from a full moon to a new moon is called the waning period.
Lunar Month: The time taken by the Moon to complete one cycle of phases is called a lunar month. It is about 29.5 days long.
Solar Day: The time taken by the Sun to return to its highest position in the sky on successive days is called a solar day. It is approximately 24 hours.
Solar Year: The time taken by the Earth to complete one revolution around the Sun is called a solar year. It is approximately 365¼ days.
Lunar Calendar: A calendar based on the phases of the Moon is called a lunar calendar.
Solar Calendar: A calendar based on the Earth's revolution around the Sun is called a solar calendar.
Luni-solar Calendar: A calendar that uses the Moon's phases for counting days and months but makes adjustments to stay in sync with the cycle of seasons is called a luni-solar calendar.
Leap Year: A year in which an extra day is added to the calendar to adjust the difference between the calendar year and the solar year is called a leap year.
Leap Day: The extra day added to February in a leap year is called a leap day.
Sidereal Year: The time taken by the Earth to complete one revolution around the Sun with respect to distant stars is called a sidereal year.
Artificial Satellites: Artificial satellites are man-made objects launched into space to orbit the Earth or other celestial bodies.

Probe and Ponder

Have you ever seen the Moon during the day? Why do you think it is sometimes visible when the Sun is up?
Yes, the Moon is sometimes visible during the day because it reflects sunlight towards the Earth and is above the horizon.
Imagine you lived on the Moon instead of Earth. What would you mean by a day, a month or a year?
Day: The time taken by the Moon to complete one rotation on its axis.
Month: The time taken by the Moon to complete one revolution around the Earth.
Year: The time taken by the Moon and Earth to complete one revolution around the Sun.
What would happen if Earth had two moons instead of one? How would that change the night sky?
We would see two moons in the night sky, possibly with different phases and positions. Tides on Earth would also change.
If we didn't have clocks or calendars, how else could we measure time?
We could measure time by observing the Sun's position, shadows, phases of the Moon, sunrise, sunset and seasonal changes.
Share Your Questions

1. Why does the Moon appear to change its shape?
2. What causes day and night on Earth?
3. Why do we have leap years?
4. What is the difference between a lunar calendar and a solar calendar?
5. Why does the Moon rise about 50 minutes later each day?

Intext Questions

1. Have you ever seen the Moon during the day? Why do you think it is sometimes visible when the Sun is up?

Ans: Yes, the Moon can be seen during the day because it reflects sunlight and is sometimes in the sky at the same time as the Sun.

2. Imagine you lived on the Moon instead of Earth. What would you mean by a day, a month or a year?

Ans: A day on the Moon would be the time it takes for the Moon to rotate once on its axis about 29.5 Earth days.
A month would be the time the Moon takes to revolve around the Earth also about 29.5 days.
A year would still be based on the Earth's revolution around the Sun about 365 days.

3. What would happen if Earth had two moons instead of one? How would that change the night sky?

Ans: If Earth had two moons, the night sky would look very different. There would be two bright objects instead of one. Their phases might occur at different times, making the sky more complex. Tides in oceans would also change and become more complicated.

4. If we didn't have clocks or calendars, how else could we measure time?

Ans: We could measure time by observing natural events such as: Shadow lengths during the day, Movement of the Sun (day and night), Phases of the Moon (months), Changing seasons (years)

5. Did the Moon appear different each day? Was the Moon visible on all days? Did the Moon appear at the same position in the sky as on the previous day?

Ans: Yes, the Moon appears different each day (phases change).
No, it is not visible on all days (new moon day).
No, it does not appear in the same position; it shifts eastward each day.

6. Why does the illuminated portion of the Moon seen from the Earth decrease when it appears closer to the Sun?

Ans: As the Moon moves closer to the Sun in the sky, the visible illuminated portion decreases, causing the waning phases of the Moon.

7. Do you remember learning earlier that the Earth revolves around the Sun and takes nearly 365 and a quarter days to complete one revolution around the Sun?

Ans: Yes, Earth takes about 365¼ days to complete one revolution around the Sun. This extra ¼ day is adjusted by adding one extra day every four years, called a leap year.

8. Why do most Indian festivals fall on different dates every year?

Ans: Most Indian festivals are based on the **lunar calendar**, not the solar calendar. Which is about 11 days shorter than the solar day.

9. When I look at the night sky in early evening, I see some moving stars. What are they? Is their motion also periodic?

Ans: They are artificial satellites moving around the Earth. Yes, their motion is periodic because they move in regular orbits around the Earth.

Keep the curiosity alive

1. State whether the following statements are True or False.

(i) We can only see that part of the Moon which reflects sunlight towards us.
(ii) The shadow of Earth blocks sunlight from reaching the Moon causing phases.
(iii) Calendars are based on various astronomical cycles which repeat in a predictable manner.
(iv) The Moon can only be seen at night.

Ans: (i) True (ii) False (iii) True (iv) False

2. Ammulu was born on 6th of May on a full Moon day. Does his birthday fall on the full Moon day every year? Explain your answer.

Ans: No, Ammulu's birthday does not fall on a full Moon day every year.
A lunar month is about 29.5 days, and a lunar year is about 354 days, which is approximately 11 days shorter than a solar year. Therefore, the full Moon day occurs about 11 days earlier each year in the Gregorian calendar.

3. Name two things that are incorrect in Fig. 9.10.



Ans: 1) The stars are shown in front of the Moon, but stars are always behind the Moon.
2) The Moon is incorrectly represented in the sky with the stars and clouds.

4. Look at the pictures of the Moon in Fig. 9.11, and answer the following questions.
(i) Write the correct panel number corresponding to the phases of the Moon shown in the pictures above.
(ii) List the picture labels of the phases of the Moon that are never seen from Earth.
Hint: You can use your observations from Activity 9.1 or Fig. 9.2 as reference.

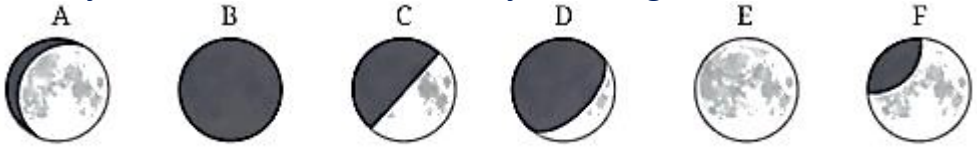


Fig. 11.11

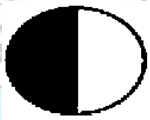
Ans: i)

Picture label	Phase of Moon
C	Three days after New Moon
E	Full Moon
F	Three days after Full Moon
A	A week after Full Moon
B	Day of New Moon

ii) None of these

5. Malini saw the Moon overhead in the sky at sunset.
(i) Draw the phase of the Moon that Malini saw.
(ii) Is the Moon in the waxing
bor the waning phase?

Ans: (i) half Moon



(ii) It is in the **Waxing phase** because the illuminated portion is **increasing** from New Moon toward Full Moon.

6. Ravi said, "I saw a crescent Moon, and it was rising in the East, when the Sun was setting." Kaushalya said, "Once I saw the gibbous Moon during the afternoon in the East." Who out of the two is telling the truth?

Ans: Kaushalya is telling the truth.
A waxing gibbous Moon can be seen in the eastern sky during the afternoon. A crescent Moon near sunset is seen in the western sky, not rising in the East.

7. Scientific studies show that the Moon is getting farther away from the Earth and slower in its revolution. Will luni-solar calendars need an intercalary month more often or less often?

Ans: As the Moon moves farther from Earth, its revolution becomes slower, making the lunar month longer. Thus, the difference between lunar and solar years decreases, so an intercalary month is needed less often.

8. A total of 37 full Moons happen during 3 years in a solar calendar. Show that at least two of the 37 full moons must happen during the same month of the solar calendar.

Ans: Three solar years contain 36 months.
There are 37 full Moons during these 36 months.
Therefore, at least one month must have two full Moons.
Therefore, **at least two full Moons must occur in the same month of the solar calendar.**

9. On a particular night, Vaishali saw the Moon in the sky from sunset to sunrise. What phase of the Moon would she have noticed?

Ans: She would have noticed the **Full Moon** phase.
During the Full Moon, the Moon rises around sunset and sets around sunrise.

10. If we stopped having leap years, in approximately how many years would the Indian Independence day happe in winter?

Ans: Without leap years, the calendar shifts by about 1 day every 4 years or 0.25 days per year.
There are roughly 183 days between August 15 and mid-February (winter).
Total years =183 x 4 = 732 years

11. What is the purpose of launching artificial satellites?

Ans: Artificial satellites are launched for the following purposes.
a) Communication.

b) Navigation.
c) Weather monitoring.
d) Disaster management.
e) Scientific research.

12. On which periodic phenomenon are the following measures of time based: (i) day (ii) month (iii) year?

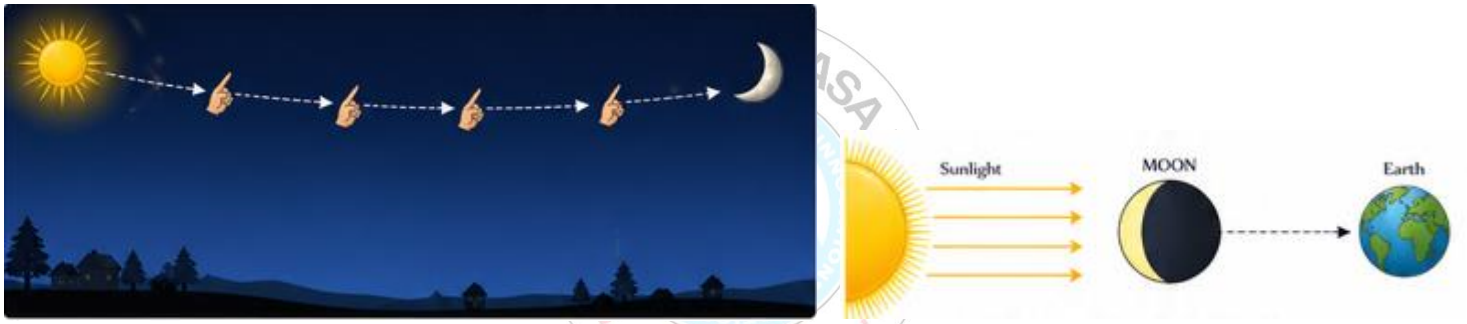
Ans: i) **Day** - Rotation of the Earth on its axis.
ii) **Month** - Revolution of the Moon around the Earth and its phases.
iii) **Year** - Revolution of the Earth around the Sun.

Discover, Design and Debate

1. The Moon's crescent always faces towards the Sun (Fig. 9.12). On days when you see the crescent Moon, point your finger towards the Sun, and slowly move it across the sky towards the Moon taking as short a path as you can. Note how your finger always crosses the illuminated part of the Moon first and clearly shows us that we see sunlight reflected off the Moon. The line joining the tips of the crescent would correspond to the diameter of the Moon.

Ans: What we observe:

a) When we move our finger from the Sun towards the Moon along the shortest path, we always cross the illuminated part (bright crescent) first.
b) The dark part of the Moon is on the side away from the Sun.
c) This shows that the Moon does not have its own light. We see the sunlight reflected from it.
d) The line joining the two tips of the crescent corresponds to the diameter of the Moon.



Conclusion: The Moon shines because it reflects sunlight. The illuminated part of the Moon always faces towards the Sun.

2. Most of the dates in the Indian National Calendar always map to the same dates in the Gregorian calendar. Can you find out which ones may differ for certain years?

Ans:

Type of Date	Event / Festival	Indian National Calendar Date	Gregorian Date (2024)	Gregorian Date (2025)	Gregorian Date (2026)	Does the Date Change Every Year?
Solar Based (Fixed Dates)	Republic Day	Magha 26	26 January	26 January	26 January	No (Same every year)
	Independence Day	Shravana 15	15 August	15 August	15 August	No (Same every year)
	Gandhi Jayanti	Asvina 2	2 October	2 October	2 October	No (Same every year)
	Children's Day	Kartika 14	14 November	14 November	14 November	No (Same every year)
	Teachers' Day	Bhadra 5	5 September	5 September	5 September	No (Same every year)
Lunar Based (Changing Dates)	Makar Sankranti	Magha 1	14 January	14 January	15 January	Yes (May change by 1 day)

	Maha Shivaratri	Phalguna Krishna 14	8 March	26 February	15 February	Yes (Changes every year)
	Holi (Holika Dahan)	Phalguna Purnima	24 March	13 March	4 March	Yes (Changes every year)
	Holi (Rangwali Holi)	Phalguna Purnima + 1	25 March	14 March	5 March	Yes (Changes every year)
	Raksha Bandhan	Shravana Purnima	19 August	9 August	28 August	Yes (Changes every year)
	Janmashtami	Bhadrapada Krishna 8	26 August	16 August	5 September	Yes (Changes every year)
	Ganesh Chaturthi	Bhadrapada Shukla 4	7 September	27 August	17 September	Yes (Changes every year)
	Dussehra (Vijayadashami)	Asvina Shukla 10	12 October	2 October	22 October	Yes (Changes every year)
	Diwali (Lakshmi Puja)	Kartika Amavasya	31 October	20 October	10 November	Yes (Changes every year)

3. Different states in India celebrate the New Year according to their local cultures. Find out the names of the New Year festival celebrated in any 10 states of India. Also find out whether it isbased on the lunar calendar or the solar calendar or the luni solar calendar.

Ans:

S.No.	State	New Year Festival	Approx. Month (Usually)	Calendar
1	Andhra Pradesh	Ugadi	March / April	Luni-solar
2	Telangana	Ugadi	March / April	Luni-solar
3	Karnataka	Ugadi	March / April	Luni-solar
4	Maharashtra	Gudi Padwa	March / April	Luni-solar
5	Tamil Nadu	Puthandu	14 April	Solar
6	Kerala	Vishu	14 or 15 April	Solar
7	Punjab	Baisakhi	13 or 14 April	Solar
8	West Bengal	Pohela Boishakh	15 April	Solar
9	Assam	Bohag Bihu	14 or 15 April	Solar
10	Jammu and Kashmir	Navreh	M	Luni-solar

Conclusion: Different states in India celebrate New Year according to their local traditions and calendars. These festivals are based on solar, lunar or luni-solar calendars.

4. Collect Gregorian calendars (the regular calendar you use every day) for the last five years with the help of your family members or teachers or the internet. For each year, look for the dates on which the festivals Eid-ul-Fitr and Diwali were celebrated and list them year wise in a tabular form. Do you notice that the date of Eid-ul-Fitr moves earlier each year — by about 11 days? If you have a corresponding lunar calendar at home or on the internet, check that the month and the day for Eid-ul-Fitr according to the lunar calendar remains the same. Does Diwali follow the same steady pattern, or are there some sudden jumps? Based on your chart, try to guess which year might have included an intercalary month (Adhikamaasa). Obtain a luni-solar calendar and confirm if there is an intercalary month between Diwali in the previous year and that year.

Ans: Festival Dates

Year	Eid-ul-Fitr	Diwali
2021	14 May	4 November

2022	3 May	24 October
2023	22 April	12 November
2024	11 April	31 October
2025	31 March	20 October

The dates are based on Indian holiday calendars. Eid-ul-Fitr dates may vary by a day depending on local Moon sighting.

Why Does Eid-ul-Fitr Move Earlier Every Year?

a) Eid-ul-Fitr is based on the Islamic lunar calendar.
b) A lunar year is about 354 days long.
c) A Gregorian year is about 365 days long.
d) Therefore, Eid-ul-Fitr generally occurs about 10–11 days earlier each year in the Gregorian calendar.

Why Does Diwali Not Follow the Same Pattern?

a) Diwali is based on the Hindu luni-solar calendar.
b) A lunar year is shorter than a solar year.
c) To keep the lunar months aligned with the seasons, an additional month called **Adhik Maas** is added in certain years.
d) Therefore, Diwali may sometimes occur later instead of moving earlier.

Which Year Included Adhik Maas?

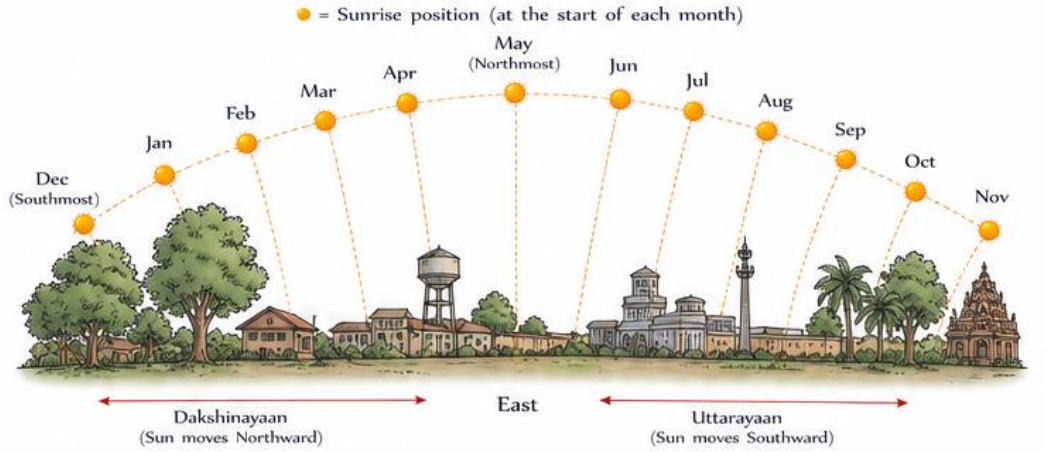
a) The year **2023** included Adhik Maas. An additional lunar month occurred between Diwali in 2022 and Diwali in 2023.
b) The dates show a sudden change: Diwali moved from 24 October 2022 to 12 November 2023, rather than becoming earlier.

Conclusion: Adhik Maas helps keep the luni-solar calendar aligned with the solar year.

5. Every morning on your way to school, notice the direction in which the Sun rises. Decide on a spot and look towards east, with trees, poles, or buildings acting as markers. Sketch the eastern horizon in your notebook. For the next one year, at the start of each month, stand at the same spot and mark the Sun's position on your sketch. Label it with the name of the month. At the end of the year analyse your sketch. Do you find that the positions of sunrise shift in particular direction? Can you identify it with the Uttarayaan and Dakshinayaan that our ancestors noticed? (Refer the 'A step further' box on page 181).

Ans: Procedure

a) Select a fixed place from which you can observe the eastern horizon.
b) Identify trees, buildings or poles as reference points.
c) Observe the sunrise at the beginning of each month.
d) Mark the Sun's position in your notebook.
e) Compare the positions recorded throughout the year.



Observations

Period	Apparent movement of sunrise position
December to June	Gradually shifts towards the north
June to December	Gradually shifts towards the south

What Are Uttarayan and Dakshinayan?

Uttarayan: The period during which the Sun's apparent position shifts northward.

Dakshinayan: The period during which the Sun's apparent position shifts southward.

Conclusion: The sunrise position changes gradually throughout the year because of the Earth's revolution around the Sun and the tilt of its axis. This apparent northward and southward movement is associated with Uttarayan and Dakshinayan, respectively. The changing position of the Sun is also related to the seasons.

Activites

Activity 9.1

Aim: To observe how the appearance of the Moon changes over days.
Required materials: Notebook, pencil.
Procedure:

Day	Date and Time	Moon Seen At	Appearance of the Moon in the Sky	Size of the Bright Portion Compared to the Previous Day	Moon and Sun Separation in the Sky Compared to the Previous Day
1		Sunrise / Sunset		—	—
2		Sunrise / Sunset		Increased / Decreased	Closer / Farther
3		Sunrise / Sunset		Increased / Decreased	Closer / Farther
4		Sunrise / Sunset		Increased / Decreased	Closer / Farther
5		Sunrise / Sunset		Increased / Decreased	Closer / Farther
6		Sunrise / Sunset		Increased / Decreased	Closer / Farther
7		Sunrise / Sunset		Increased / Decreased	Closer / Farther

a) Observe the Moon daily at the same time (sunrise or sunset).
b) Draw the shape of the Moon in your notebook.
c) Note the date and time of observation.
d) Continue this for several days.
e) Compare the changes in shape and size.

Observation: The shape of the Moon changes gradually each day. The bright portion increases and then decreases over time. The Moon's position in the sky also changes.
Conclusion: The Moon appears to change its shape over time. These changes are called phases of the Moon.

Activity 9.2

Aim: To understand the phases of the Moon using a model.
Required materials: Small ball, stick, bright light source (lamp), open space.
Procedure:

a) Fix the ball on a stick (represents the Moon).
b) Stand in an open space with a light source (represents the Sun).
c) Hold the ball at arm's length.
d) Turn slowly and observe the illuminated part of the ball.
e) Look at the ball from different positions.



Observation: Only a part of the ball is illuminated at a time. The shape of the bright portion changes as you move. Different shapes like full, half, and crescent are seen.
Conclusion: The Moon shows different shapes called phases.
These phases occur due to changing positions of the Moon, Earth, and Sun.

Activity 9.3

Aim: To measure the duration of a day using the Sun's shadow.
Required materials: Straight stick, ground/open space, chalk, clock/watch, notebook.
Procedure:

Date	Time of Shortest Shadow (hh:mm)	Duration of Day (hh:mm)
22 March 2025	12:20	—
23 March 2025	12:20	24:00
24 March 2025	12:19	23:59
25 March 2025	12:19 (approx.)	24:00 (approx.)

a) Fix a stick vertically in the ground.
b) Start observing at 11:00 a.m.
c) Mark the position of the shadow tip every 10 minutes.
d) Note the time when the shadow is shortest.
e) Repeat the activity for a few days.
f) Calculate the time difference between two consecutive shortest shadows.

Observation: The shadow changes its length and direction during the day.
Conclusion: The duration of a day is approximately 24 hours. The shortest shadow occurs at noon.

Activity 9.4

Aim: To observe artificial satellites in the night sky.
Required Materials: Clear night sky and binoculars (optional).
Procedure:

a) Go outside on a clear night.
b) Look carefully at the sky.
c) Observe small points of light moving across the sky.
d) Note their movement.
e) Use binoculars if necessary.

Observation: Some small points of light move steadily across the sky.
Conclusion: Artificial satellites are man-made objects that revolve around the Earth.

DDE SRINIVASA R

Prepare Some Questions Based on Your Learnings So Far

1. **Why do we experience day and night on Earth?**
2. **How does the movement of the Earth help us measure time?**
3. **Why do shadows change their direction and length during the day?**
4. **What happens during a solar eclipse and a lunar eclipse?**
5. **Where can we observe constellations in the night sky?**
6. **Why is the Moon seen in different shapes on different days?**
7. **When does the Sun appear highest in the sky during the day?**
8. **How long does the Earth take to complete one rotation?**
9. **Why do stars appear to move across the sky at night?**
10. **Why did ancient people use the sky to measure time and seasons?**

Table

1. Table 9.1 – Documenting Changes in the Moon's Appearance
Textbook page 126

Day	Date	Moon seen at	Appearance of the Moon in the sky	Size of bright portion compared to previous day	Moon and Sun separation compared to previous day
1	First day	Sunrise	Waning gibbous	Decreased	Closer
2	Second day	Sunrise	Waning gibbous	Decreased	Closer
3	Third day	Sunrise	Last quarter (approaching)	Decreased	Closer

Multiple Choice Questions

1. Ancient people observed the sky mainly to
A. make mobile phones
B. measure time and seasons
C. build computers D. produce electricity

2. The apparent daily movement of the Sun across the sky is due to
A. revolution of Earth B. rotation of Earth
C. movement of clouds D. phases of the Moon

3. A day is mainly measured by
A. one revolution of Earth around the Sun
B. one rotation of Earth on its axis
C. one phase of the Moon D. one eclipse

4. A year is the time taken by Earth to
A. rotate once on its axis
B. revolve once around the Sun
C. complete one lunar phase D. complete one week

5. The Moon appears to change its shape because of
A. Earth's shadow every night
B. its own light changing
C. different portions of its sunlit side being visible from Earth
D. clouds covering it

6. The different apparent shapes of the Moon are called
A. shadows B. phases C. stars D. seasons

7. The time between two full moons is approximately
A. 1 day B. 7 days C. 15 days D. 29 days

8. The instrument used in ancient times to tell time using the Sun's shadow is
A. barometer B. sundial
C. telescope D. compass

9. A sundial works on the basis of
A. speed of light B. colour of sunlight
C. changing position of shadow during the day
D. phases of the Moon

10. The shadow on a sundial is shortest at about
A. sunrise B. noon C. sunset D. midnight

11. The Pole Star is important because it appears
A. brightest in the sky B. fixed in the northern sky
C. nearest to Earth D. red in colour

12. The Pole Star helps in finding
A. time only B. direction
C. rainfall D. temperature

13. Which constellation is commonly used to locate the Pole Star?
A. Orion B. Ursa Major
C. Cassiopeia only D. Scorpius

14. A constellation is
A. a group of planets
B. a pattern of stars in the sky
C. a group of clouds D. a type of telescope

15. The Great Bear is another name for
A. Orion B. Ursa Major C. Cassiopeia D. Leo

16. The shape of Ursa Major is often compared to a
A. plough or ladle B. bow C. triangle D. fish

17. The Moon does not have its own light; it
A. produces heat only B. reflects sunlight
C. reflects starlight only D. glows due to electricity

18. The time period from one new moon to the next is called a
A. solar day B. lunar month
C. leap year D. season

19. Stars appear to move from east to west because of
A. rotation of Earth from west to east
B. revolution of Earth C. movement of Moon
D. clouds in the atmosphere

20. The Sun rises in the east and sets in the west due to
A. Earth's revolution B. Earth's rotation
C. the Moon's revolution
D. the Sun orbiting Earth daily

21. Ancient calendars were often based on
A. only rainfall
B. movements of the Sun and Moon
C. earthquakes D. volcanoes

22. The phases of the Moon repeat after about
A. 7 days B. 15 days C. 29.5 days D. 365 days

23. When the entire visible face of the Moon is illuminated, it is called
A. new moon B. crescent moon
C. full moon D. quarter moon

24. When the Moon is not visible from Earth, it is called
A. full moon B. new moon
C. gibbous moon D. half moon

25. The first quarter moon appears about
A. one week after new moon
B. one day after full moon
C. two weeks after new moon
D. one month after new moon

26. A leap year has
A. 365 days B. 366 days C. 364 days D. 360 days

27. Leap year is needed because
A. Earth takes exactly 365 days to revolve around the Sun
B. Earth takes about 365¼ days to revolve around the Sun
C. Moon takes 30 days exactly
D. sundials are not accurate

28. Which of the following is a natural timekeeper?
A. wristwatch B. wall clock
C. movement of the Sun in the sky D. stopwatch

29. The length of a shadow changes during the day due to
A. the movement of clouds only
B. the changing position of the Sun in the sky
C. changes in temperature D. wind speed

30. Midnight occurs when
A. the Sun is highest in the sky
B. the Sun is below the horizon and it is halfway through the night C. the Moon is full
D. the Pole Star is overhead everywhere

31. The brightest object in the daytime sky is the
A. Moon B. Venus C. Sun D. Pole Star
32. The Moon revolves around the
A. Sun B. Earth C. Pole Star D. Mars
33. One complete revolution of the Moon around the Earth takes about
A. 1 day B. 7 days C. 27 days D. 365 days
34. Seasons occur mainly because of
A. Earth's rotation only
B. Earth's revolution and tilted axis
C. phases of Moon D. movement of stars
35. Which of the following helps in identifying north direction at night?
A. Orion B. Pole Star C. Moon D. Venus
36. A crescent moon is seen when
A. less than half of the Moon is illuminated
B. the full Moon appears
C. exactly half of the Moon is illuminated only
D. the Moon disappears
37. Which of the following repeats regularly and helps measure time?
A. random lightning B. phases of the Moon
C. volcanic eruptions D. earthquakes
38. The apparent path of the Sun in the sky is useful for
A. only drawing maps B. only measuring rainfall
C. estimating time during the day
D. predicting earthquakes
39. The Moon appears to rise in the east and set in the west because
A. Earth rotates from west to east
B. the Moon does not move
C. Earth rotates from east to west D. clouds push it
40. Which statement is correct?
A. The Sun moves around Earth every day
B. Earth's rotation causes day and night
C. Moon produces its own light
D. Pole Star rises in east and sets in west daily
41. The traditional use of sky observation helped people in
A. agriculture and navigation B. making plastics
C. running motors D. building electric circuits
42. The Pole Star is seen close to the
A. southern horizon B. northern direction
C. eastern direction D. western direction
43. The apparent motion of stars around the Pole Star is due to
A. revolution of Moon B. rotation of Earth
C. movement of clouds D. magnetic field of Earth
44. Which of the following is not a phase of the Moon?
A. crescent B. gibbous C. quarter D. eclipse
45. People in ancient times used lunar cycles mainly to
A. make satellites B. keep track of months
C. produce energy D. measure electricity
46. The shadow cast by an object is longest
A. around noon
B. when the Sun is low in the sky
C. when the Sun is overhead D. at midnight only
47. Which celestial object is most useful in a sundial?
A. Moon B. Sun C. Pole Star D. Venus
48. Which of the following is a pattern of stars?
A. constellation B. satellite
C. comet tail D. eclipse
49. A month in many traditional calendars is related to
A. one rotation of Earth B. one lunar cycle
C. one season D. one eclipse
50. The study of skies helped humans to understand
A. time, direction and seasons
B. only colours of stars C. only distance of clouds
D. only shape of Earth

Answers

1. B	2. B	3. B	4. B	5. C	6. B	7. D	8. B	9. C	10. B
11. B	12. B	13. B	14. B	15. B	16. A	17. B	18. B	19. A	20. B
21. B	22. C	23. C	24. B	25. A	26. B	27. B	28. C	29. B	30. B
31. C	32. B	33. C	34. B	35. B	36. A	37. B	38. C	39. A	40. B
41. A	42. B	43. B	44. D	45. B	46. B	47. B	48. A	49. B	50. A

COMPETENCY BASED QUESTIONS

1 Mark Questions

1. Teja observes that the illuminated portion of the Moon decreases every night after the Full Moon. What is this period called?
A) Waxing period B) Waning period C) Solar period D) Equinox period

2. A student notices that the Moon appears in a different position at the same time on successive days. What is the main reason?
A) Earth's revolution around the Sun B) Moon's revolution around Earth
C) Sun's rotation D) Earth's shadow

3. Why does the Moon rise approximately 50 minutes later each day?
A) Earth rotates more slowly every day. B) The Moon revolves around Earth while Earth rotates.
C) The Sun moves around Earth. D) The Moon stops moving at night.

4. During a solar eclipse, which celestial body comes between the Sun and Earth?
A) Mars B) Moon C) Jupiter D) Venus

5. A lunar eclipse can occur only on which Moon phase?
A) New Moon B) Crescent Moon C) Full Moon D) Half Moon

6. A student wants to observe a solar eclipse safely. Which precaution should be followed?
A) Look directly at the Sun. B) Use ordinary sunglasses.
C) Use appropriate certified solar viewing protection. D) Observe through a telescope without a solar filter.

7. A calendar is based on the Earth's revolution around the Sun. Identify the calendar type.
A) Lunar calendar B) Solar calendar C) Weekly calendar D) Festival calendar

8. How many days are there in a leap year according to the Gregorian calendar?
A) 364 B) 365 C) 366 D) 367

9. Which is the first month of the Indian National Calendar?
A) Vaisakha B) Chaitra C) Jyestha D) Ashadha

10. In which year was the Indian National Calendar adopted with effect from 22 March 1957?
A) 1947 B) 1950 C) 1957 D) 1962

11. Diwali is generally celebrated on which lunar phase?
A) Full Moon B) New Moon C) First Quarter D) Last Quarter

12. A student records the shortest shadow at 12:20 p.m. on one day and 12:19 p.m. on another day. What does this observation help determine?
A) Lunar month B) Solar day C) Lunar eclipse D) Moon phase

13. Which Indian mission studies the Moon?
A) Chandrayaan B) AstroSat C) Cartosat D) INSAT

14. A student observes that the Sun appears to move from east to west during the day. What causes this apparent movement?
A) Earth's rotation from west to east B) Sun's revolution around Earth
C) Moon's rotation D) Earth's revolution around the Moon

15. Given below are some observations about the Moon:
(i) Full Moon (ii) Crescent Moon (iii) New Moon
In which phase is the Moon not visible from Earth?
A) only case (i) B) only case (ii) C) only case (iii) D) both cases (ii) and (iii)

1-B	2-B	3-B	4-B	5-C	6-C	7- B	8-C	9-B	10-C	11-B	12-B	13-A	14-A	15-C

16. Assertion (A): A solar day is approximately 24 hours long.
Reason (R): The Earth takes about 24 hours to complete one rotation about its axis.
Choose the correct option:
A) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
B) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
C) Assertion is true, but Reason is false. D) Assertion is false, but Reason is true.
Ans: A)

17. Assertion (A): Lunar eclipses can occur only on a full Moon day.
Reason (R): A lunar eclipse occurs when the Earth comes between the Sun and the Moon.
Choose the correct option:

A) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
B) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
C) Assertion is true, but Reason is false. D) Assertion is false, but Reason is true.

Ans: A)

18. Choose the CORRECT statement.

A) The Moon produces its own light. B) The Moon revolves around the Earth.
C) The Moon completes one revolution around the Earth in 24 hours.
D) The phases of the Moon are caused by the Earth's shadow falling on the Moon.

Ans: B)

19. Choose the INCORRECT statement.

A) A lunar calendar is based on the phases of the Moon.
B) A solar calendar is based on the Earth's revolution around the Sun.
C) The Indian National Calendar is a solar calendar. D) A lunar year is longer than a solar year.

Ans: D)

C. Match the Following (2)

20. Match the following.

Column A	Column B
1. New Moon	a) Entire illuminated portion is visible
2. Full Moon	b) Moon is not visible
3. Waxing Moon	c) Illuminated portion increases
4. Waning Moon	d) Illuminated portion decreases

A) 1-a. 2-b, 3-c, 4-d B) 1-a, 2-c, 3-b, 4-d C) 1–b, 2–a, 3–c, 4–d D) 1–d, 2–c, 3–a, 4–b

Ans: C)

2 Marks Questions

1. Why does the Moon appear to change its shape every night?

Ans: The Moon does not change its actual shape. As it revolves around the Earth, we see different portions of its illuminated half. These changes are called phases of the Moon.

2. Why is the Moon sometimes visible during daytime?

Ans: The Moon reflects sunlight. When it is above the horizon during daytime, it can be visible even in the presence of sunlight.

3. Why does the Moon rise approximately 50 minutes later each day?

Ans: The Moon revolves around the Earth while the Earth rotates on its axis. Therefore, the Moon takes about 50 minutes longer each day to return to nearly the same position in the sky.

4. Why do eclipses not occur every month?

Ans: The Moon's orbit is tilted with respect to Earth's orbit around the Sun. Therefore, the Sun, Earth and Moon do not align perfectly during every New Moon and Full Moon.

5. Why is an extra month added to some luni-solar calendars?

Ans: Twelve lunar months are shorter than a solar year. Therefore, an extra month is added occasionally to keep the lunar and solar calendars in step.

6. Why do Indian festivals fall on different Gregorian calendar dates every year?

Ans: Many Indian festivals are based on lunar or luni-solar calendars. Their dates do not remain fixed with the Gregorian calendar.

4 Marks Questions

1. Explain the different phases of the Moon.

Ans: 1. The Moon revolves around the Earth and reflects sunlight.
2. We see different portions of its illuminated half from Earth.
3. The bright portion increases during the waxing period and decreases during the waning period.
4. The main phases include New Moon, Crescent, Half Moon, Gibbous and Full Moon.

2. Explain the Indian National Calendar.

Ans: 1. The Indian National Calendar is a solar calendar.
2. It was adopted with effect from 22 March 1957.
3. Chaitra is its first month.
4. It is used along with the Gregorian calendar for multiple official purposes in India.

3. Explain how the length of a shadow helps us measure a solar day.

Ans: 1. Fix a vertical stick in a place that receives sunlight.

2. Observe and mark the tip of its shadow at regular intervals.
3. Find the time at which the shadow is shortest.
4. The shortest shadow occurs when the Sun reaches its highest position in the sky.
5. The time between two successive shortest shadows gives the duration of a solar day.

4. Differentiate between waxing and waning phases of the Moon.

Ans:

Waxing phase	Waning phase
Bright portion increases.	Bright portion decreases.
Occurs after New Moon.	Occurs after Full Moon.
Continues towards Full Moon.	Continues towards New Moon.
Called Shukla Paksha.	Called Krishna Paksha.

8 Marks Questions

1. Explain the importance of artificial satellites and their applications.

Ans:

Communication: Satellites help in communication across long distances.
Navigation: They help us identify locations and find routes.
Weather monitoring: They provide information about clouds, storms and weather conditions.
Disaster management: Satellite images help monitor natural disasters.
Mapping: Cartosat satellites capture high-quality images used for mapping.
Scientific research: Satellites help scientists study stars and other celestial objects.
Astronomy: AstroSat is used for scientific observations of celestial objects.
Space exploration: Missions such as Chandrayaan and Aditya-L1 support India's space research.

2. Differentiate between solar and lunar eclipses.

Ans:

Solar eclipse	Lunar eclipse
Moon comes between the Sun and Earth.	Earth comes between the Sun and Moon.
Moon's shadow falls on Earth.	Earth's shadow falls on the Moon.
Occurs on New Moon day.	Occurs on Full Moon day.
The Sun is partially or fully obscured from some locations on Earth.	The Moon becomes darkened as it passes through Earth's shadow.

3. Explain the difference between lunar and solar calendars.

Ans:

Lunar calendar	Solar calendar
Based on phases of the Moon.	Based on Earth's revolution around the Sun.
A lunar month is about 29.5 days.	A solar year is about 365 days.
Twelve lunar months total about 354 days.	A solar year is about 365¼ days.
Requires adjustments to synchronise with seasons.	Closely follows the cycle of seasons.

PHYSICAL SCIENCE HANDBOOK



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