

Chapter 1. Exploring the Investigative World of Science

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. c) Knowledge and foundation
2. c) Observing how a puri puffs up
3. c) Refraction
4. c) Polluted water
5. b) Type of flour
6. c) To ensure fairness and accuracy
7. d) Tea

II. Fill In the Blanks

1. wonder
2. imagination / curiosity
3. pressure
4. particles
5. ecosystem
6. systematic
7. light

III. True / False

1. False
2. False
3. True
4. False
5. True
6. False
7. True

IV. Match the Column

1.

Column A	Column B
A. Mixture	3. Can be separated
B. Vaccine	4. Improves immunity
C. Moon Phases	2. Used in calendars
D. Helpful microbes	1. Helps in digestion
E. Solid particles	5. Vibrate but don't move freely

2.

Column A	Column B
A. Reflection of light	3. Polished surfaces
B. Pressure	4. Force per area
C. Refraction	2. Corrective lenses
D. Breeze	1. Movement of air
E. Investigate	5. Observe and experiment

V. Very Short Answer Type Questions

1. Curiosity encourages us to ask questions and explore how things work, which is the basis of scientific discovery.
2. The thickness of dough and the temperature of the oil.
3. It has the right distance from the Sun, liquid water, and an atmosphere with oxygen.
4. Some microorganisms help in digestion and in making medicines.
5. Air pressure differences cause winds and cyclones.
6. It helps us see objects in mirrors and understand how light behaves.
7. Change one factor at a time and carefully observe the result.

VI. Life Skills / Skill-Based Questions

1. Mix oil and water, observe separation, then vary oil amount and record results; regular notes show changes clearly and help understand the process, making experiments more reliable.
2. Vaccines, nutritious food, and exercise in a weekly routine keep the body strong, provide energy, and prevent diseases, maintaining overall health.

VII. Assertion-Reason Type Questions

1. a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
2. c) Assertion (A) is true, but Reason (R) is false.
3. a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

VIII. Picture Based Question

- c) Water inside the dough turns to steam, pushing the sides out unevenly.

IX. Case Study Based Questions

1. b) To see how each change affects the result
2. b) They help us stay healthy and fight diseases

Chapter 2. Diversity in the Living World Exploring Biodiversity

NCERT CORNER

1. The cell parts are placed in the diagram as follows:
 1. Common to bacterial, plant and animal cells:
 - Cell membrane
 - Cytoplasm
 2. Only in plant cell:
 - Chloroplast
 3. Only in bacterial cell:
 - Nucleoid
 4. Only in animal cell:
 - None of the given parts are exclusive to animal cells
2. (i) The correct explanation is (c). Yeast produced a gas inside test tube B which inflated the balloon. Yeast is a microorganism that feeds on sugar. In a warm environment, yeast respires and breaks down sugar, releasing carbon dioxide in the process. This gas fills the balloon and inflates it. No such reaction occurs in test tube A as there is no yeast.
- (ii) She wants to test the identity of the gas produced by the yeast. Lime water turns milky in the presence of carbon

dioxide. By passing the gas from the balloon through the lime water, she wants to find out if the gas produced during fermentation is carbon dioxide.

3. The farmer growing bean crops did not need to add a nitrogen fertiliser for the following reason:
Bean plants are legumes. The roots of leguminous plants have nodules that contain Rhizobium bacteria. These bacteria have the ability to take nitrogen gas directly from the atmosphere and convert it into a usable form for the plant. This process, called nitrogen fixation, naturally enriches the soil with nitrogen. Wheat crops, on the other hand, cannot fix atmospheric nitrogen and must absorb it from the soil, which is why the other farmer needed to add nitrogen-rich fertiliser.
4. Snehal is trying to test the effect of adding dried leaves on the rate of decomposition of organic waste. Microorganisms require optimal conditions of moisture and air to break down waste into manure. By adding dried leaves in pit A, she is changing the conditions such as the mixture, possibly improving air circulation. She is trying to find out if this addition helps the

microorganisms decompose the waste faster or more effectively compared to pit B, which does not contain dried leaves.

5. (i) **Bacteria** : Bacteria are found in almost every environment, and some types live in the human gut, aiding in digestion.
 - (ii) **Yeast** : Yeast is a fungus used in baking. It releases carbon dioxide during respiration, which makes the dough of bread and cakes rise, resulting in a soft and fluffy texture.
 - (iii) **Rhizobium** : This bacterium lives in the root nodules of leguminous plants (pulse crops) and fixes atmospheric nitrogen, providing essential nutrients for the plants' growth.
6. **Aim** : To show that microorganisms need warmth, air, and moisture to grow.

Materials : Four slices of bread, water, four zip-lock bags or containers.

Procedure:

1. **Sample A (Moisture test)** : Take a slice of bread and keep it dry. Place it in a bag and keep it in a warm place.
2. **Sample B (Air test)** : Moisten a slice of bread with water. Place it in a bag, remove as much air as possible, and seal it tightly. Keep the bread in a warm place.
3. **Sample C (Temperature test)** : Moisten a slice of bread with water. Place it in a bag with some air and keep it in refrigerator.
4. **Sample D (Control)** : Moisten a slice of bread with water. Place it in a bag, leaving some air in side, and keep it in a warm place.
5. Observe all four slices for a few days.

Observation and Conclusion : Fungal growth (mould) will be observed most clearly on slice D, which had moisture, air,

and a warm temperature.

Little or no growth will be seen on slices A (no moisture), B (no air), and C (low temperature). This proves that microorganisms require optimal moisture, air, and temperature for growth.

7. **Observations** : After three days, the slice of bread placed near the sink will show patches of cotton like growth, which may be white, green, or black in colour. This is bread mould. The slice of bread kept in the refrigerator will show no such growth and will appear unchanged.

Reasons : Microorganisms like bread mould are present in the air. The area near the sink is warm and moist, providing favorable conditions for these microbes to land on the bread and grow rapidly. The refrigerator has a very low temperature, which inhibits the growth of microorganisms. Therefore, mould does not grow on the bread slice kept inside the refrigerator.

8. Two possible explanations for the curd becoming more sour are:
 1. Curd contains the bacterium *Lactobacillus*. When left out at room temperature, which is warm, these bacteria multiply rapidly. They ferment more of the milk sugar (lactose) into lactic acid. An increased amount of lactic acid makes the curd taste more sour.
 2. Other acid-producing microorganisms from the surrounding air could have contaminated the curd. These microbes also grow well at warm temperature and produce acidic waste products, which would contribute to the increased sourness of the curd.
9. (i) The yeast in flask A will act on the sugar solution. Through the process of fermentation, the yeast will break down the sugar into alcohol and carbon dioxide to get energy.

(ii) After four hours, the lime water in test tube B will turn milky. This happens because the carbon dioxide gas produced by the yeast in flask A travels through the delivery tube and bubbles into the lime water. Lime water chemically reacts with carbon dioxide and turns milky, confirming the presence of this gas.

(iii) If yeast was not added to flask A, the process of fermentation would not occur. No carbon dioxide would be produced. As a result, there would be no change in test tube B, and the lime water would remain clear.

YOUR ASSIGNMENT

I. Multiple Choice Questions (MCQs)

1. b. Robert Hooke
2. c. Nucleus
3. c. Cell wall
4. b. Lactobacillus
5. c. Carbon dioxide bubbles
6. b. Chloroplasts
7. a. Yeast

II. Fill In the Blanks

1. Antonie van Leeuwenhoek
2. cell
3. Yeast
4. cell wall
5. largest
6. decomposers
7. cell membrane

III. True/False Questions

1. False 2. True 3. False
4. False 5. False 6. True
7. True

IV. Match the Column

Column A		Column B	
A.	Nerve cell	3.	Carries messages in the body
B.	Chloroplast	4.	Helps in photosynthesis
C.	Lactobacillus	2.	Converts milk to curd
D.	Vacuole in plant cell	1.	Stores water and maintains cell shape
E.	Cytoplasm	5.	Site of most life processes

V. Very Short Answer Type Questions

1. Robert Hooke
2. It controls cell activities and regulates growth.
3. Chloroplast
4. Unicellular organisms
5. Yeast
6. Vacuole
7. They decompose organic waste into manure.

VI. Life Skills / Skill-Based Questions

1. Handwashing, covering food, and proper storage prevent unwanted microbes from spreading and reduce the risk of infections, keeping you healthy.
2. Using a magnifying glass or microscope, tiny living things in pond water or curd can be seen; this shows that cells, though invisible to the eye, are key to all life forms.

VII. Assertion-Reason Type Questions

1. (c) Both A and R are true, but R is not the correct explanation.

2. (a) Both Assertion (A) and Reason (R) are true, and Reason is the correct explanation of Assertion.
3. (d) Assertion (A) is false, but Reason (R) is true.

VIII. Picture Based Question

- (c) Only plant cells have a cell wall and a large central vacuole.

IX. Case Study Based Questions

1. c) They help in fermentation and turning milk into curd or dough into bread
2. c) Practice good hygiene, like washing hands and covering food

Chapter 3. Health : The Ultimate Treasure Introduction

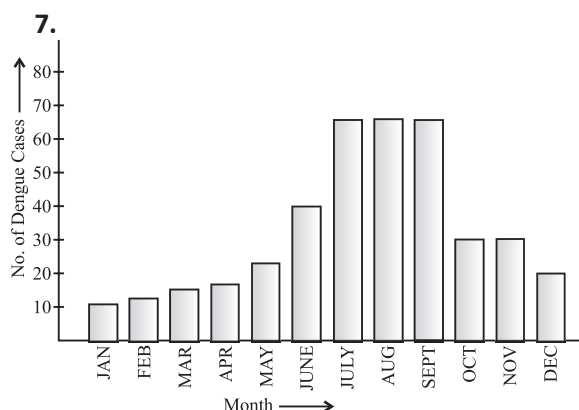
NCERT CORNER

1. 1. Communicable Diseases : Cold and flu, Typhoid, Chickenpox
2. Non-communicable Diseases : Diabetes, Asthma
2. (b) (ii) and (iii)
Asthma and diabetes fall under the category of non-communicable diseases because they do not spread from person to person and are not caused by germs. Typhoid and measles, on the other hand, are infectious diseases that can spread.
3. (i) The school should request sick students to stay at home until they recover and remind all students to follow basic hygiene habits like using a handkerchief or a mask while sneezing or coughing.
(ii) I can kindly advise my classmate to inform the teacher and rest at home so that they get better quickly and don't pass the infection to others unintentionally.
(iii) I can keep myself safe by washing my hands regularly, avoiding close contact with sick classmates, not sharing items like bottles or tiffins, and wearing a mask to reduce exposure to the virus.
4. (i) • **Before** : Carry mosquito repellents, full-sleeved clothes, and protective nets.
• **During** : Use nets at night, apply

repellent regularly, and try to keep skin covered.

- **After** : Monitor for symptoms like fever or shivering and see a doctor if they appear.

- (ii) I can explain that mosquitoes spread malaria, and nets or repellents stop them from biting us, which keeps us protected from the disease.
- (iii) If health warnings are neglected, people can get infected with malaria and may fall seriously ill with high fever and weakness.
5. (i) I would politely remind him that smoking is extremely harmful and may lead to deadly diseases, and request that he think about his future health and family.
(ii) I would decline politely and refuse to take it, as it is important to avoid habits that damage health.
(iii) Schools can organise awareness drives and counselling sessions to educate students about the risks of smoking and encourage them to choose healthy lifestyle habits instead.
6. Vinita can ask questions like, "Can antibiotics treat illnesses caused by viruses such as the flu or The common cold?" and "What happens when people take antibiotics even when they are not needed?" These questions help her realise that antibiotics only act on bacteria and misuse can make them less effective.



- July, August, and September recorded the highest number of dengue cases, with 65 each.
- January recorded the minimum number of cases, with only 10 reported.
- Such months usually coincide with the rainy season, when water collects in open places, creating ideal breeding sites for mosquitoes.
- Preventive actions include removing stagnant water, spraying insecticides or fogging, and spreading awareness about protective measures like nets and repellents.

8. Imagine you are in charge of a school health campaign. What key messages would you use to reduce communicable and non-communicable diseases?

Ans. For communicable diseases, I would highlight messages like washing hands regularly, covering the mouth while

coughing, and staying updated with vaccinations. For non-communicable diseases, I would promote eating nutritious food, staying active, and staying away from harmful substances.

9. It is recommended that we do not take an antibiotic for a viral infection like a cold, a cough, or the flu. Can you provide the possible reason for this recommendation?

Ans. Antibiotics have no effect on viral infections because they are designed to fight bacteria only. Using them unnecessarily can make bacteria resistant, which makes future treatments less effective.

10. Which disease(s) among the following may spread if drinking water gets contaminated by the excreta from an infected person? Hepatitis A, Tuberculosis, Poliomyelitis, Cholera, Chickenpox.

Ans. Hepatitis A, Poliomyelitis, and Cholera can spread through polluted food or water. Chickenpox and Tuberculosis are airborne and do not spread through contaminated water.

11. When our body encounters a pathogen for the first time, the immune response is generally low but on exposure to the same pathogen again, the immune response of the body is much more compared to the first exposure. Why is it so?

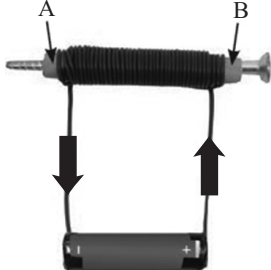
Ans. This happens because once the immune system has met a pathogen, it "remembers" it. When the same germ enters the body again, the immune system responds more quickly and powerfully, preventing serious infection.

Chapter 4. Electricity: Magnetic and Heating Effects Introduction

NCERT CORNER

- electrolyte
 - magnet
- (i) False : Dry cells are compact, leak-

proof, and easy to carry. Unlike a Voltaic cell, which uses a liquid electrolyte and can spill, a dry cell is safer and more convenient for portable electrical devices.

- (ii) **True** : The magnetic property of an electromagnet exists only as long as current flows through the coil. When the current stops, its magnetism disappears.
- (iii) **False** : A battery made up of more cells can deliver a larger current. A stronger current produces a more powerful magnetic field, allowing the electromagnet to attract more iron objects such as paper clips.
3. (c) Both statements (i) and (ii) are correct. When electric current passes through a conductor like nichrome wire, it generates heat (heating effect) and also produces a magnetic field, which can be detected if a nearby compass needle shifts from its original direction.
4. (i) Voltaic cell → (a) Produces electrical energy
 (ii) Electric iron → (d) Uses the heating effect of current
 (iii) Nichrome wire → (b) Suitable material for heating appliances
 (iv) Electromagnet → (c) Demonstrates magnetic effect of electric current
5. (ii) It produces more heat for the same amount of current.
 Nichrome has a relatively high electrical resistance compared to metals like copper or aluminium. Due to this higher resistance, more electrical energy is transformed into heat, which is why nichrome is widely used in heating devices such as irons, heaters, and toasters.
6. Electric heating appliances are preferred in modern homes because :
1. **Cleaner and healthier** : They do not emit smoke, ash, or carbon particles, reducing respiratory problems and keeping indoor air clean.
 2. **Convenience** : They start working instantly and require no fuel storage or manual ignition. A simple switch controls the heating.
 3. **Safer for home use** : Since there is no open flame, the chances of accidental fire are lower compared to charcoal or wood-based stoves.
7. (i)
- 
- (ii) The compass needle shifts because the electric current flowing through the coil generates a magnetic field around it. Since the compass needle itself is a tiny magnet, it responds to this magnetic field and changes its direction.
- (iii) If the battery's terminals are reversed, the direction of current in the coil also reverses. Consequently, the North and South poles of the electromagnet interchange, causing the compass needle to get deflected in the opposite direction.
8. The electromagnet has stopped picking up paper clips because the electric current has become too weak. This usually happens when the battery is nearly exhausted. Without sufficient current, the magnetic field produced by the coil becomes too weak to lift objects, even though a faint current may still be passing through the wire, making it slightly warm.
9. The LED will glow only in the setup using lemon juice and two different metals (case a). A Voltaic cell requires two **dissimilar metal electrodes** and a **conducting medium** (electrolyte). Lemon juice is acidic and acts as an effective electrolyte. Pure water, however, does not conduct electricity well and therefore cannot generate a usable current.
10. Yes, the coil will still deflect the compass needle even without an iron core because a current-carrying coil itself behaves like a magnet. However, without the iron core, the magnetic field produced is weaker, so

the deflection will be smaller.

11. (iv) A compass will deflect in all four circuits.

Any conductor—whether iron, copper, aluminium, or nichrome—allows current to pass through it when the circuit is complete. Wherever current flows, a magnetic field is produced around the conductor, which causes the compass needle to turn.

YOUR ASSIGNMENT

I. Multiple Choice Questions

- c. Connects or disconnects the circuit
- c. Hans Christian Oersted
- c. It deflects
- c. Iron nail
- b. Nichrome wire
- c. Electricity is produced by chemical reactions
- c. They can be reused after charging

II. Fill in the Blanks

- Hans Christian Oersted
- magnetic
- core
- resistance
- paste-like
- direction
- Voltaic cell

III. True/False

- False
- True
- False
- True
- False
- True
- False

IV. Match the Column

A	B
---	---

- | | |
|---------------------------|--|
| A. Hans Christian Oersted | 3. Magnetic effect of electric current |
| B. Iron core | 2. Stronger electromagnet |
| C. Lemon juice | 4. Electrolyte in lemon cell |
| D. Zinc container | 1. Dry cell |
| E. Nichrome wire | 5. Heating effect demonstration |

V. Very Short Answer Type Questions

- Hans Christian Oersted
- Magnetic field
- Nichrome wire
- Zinc container
- Carbon rod
- Returns to its original direction
- Lemon juice

VI. Life Skills / Skill-Based Questions

- Using irons and heaters safely means not touching live wires, unplugging devices when not in use, and keeping dry hands; these steps prevent shocks and accidents at home.
- Coil a wire around an iron nail, connect to a battery, and the nail becomes magnetic; electromagnets are important for devices like motors and doorbells due to their controllable magnetism.

VII. Assertion–Reason Type Questions

- (c) A is true, but R is false.
- (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
- (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

VIII. Picture-Based Questions

- c. Magnetic effect of current

2. c. It is heated due to electric current

IX. Case Study Based Questions

1. c) Using an iron core inside the coil
2. b) Because flowing current can produce heat, which may cause accidents

Chapter 5. Exploring Forces

NCERT CORNER

1. (i) Muscular force : (b) A child lifting a school bag
→ This is an example of muscular force because the child uses the strength of his/her muscles to raise the bag.
 - (ii) Magnetic force : (e) A compass needle pointing North
→ The compass needle aligns itself with Earth's magnetic field without any physical contact, demonstrating magnetic force.
 - (iii) Frictional force : (a) A cricket ball stopping on its own just before touching the boundary line
→ The ball slows down gradually due to the friction between the ball and the ground, which opposes its motion.
 - (iv) Gravitational force : (c) A fruit falling from a tree
→ The fruit is pulled towards Earth because of gravity acting on it.
 - (v) Electrostatic force : (d) Balloon rubbed on woollen cloth attracting hair strands
→ When rubbed, the balloon becomes electrically charged and pulls hair strands towards it due to electrostatic attraction.
2. (i) True : A force is required to either increase or decrease the speed of a moving body, or to bring it to rest.
 - (ii) False : Friction acts opposite to the direction of motion and resists the motion, thereby slowing down or stopping the object.
 - (iii) False : Electrostatic force acts even without contact and is observed between objects that carry electric charges.
3. When both balloons are rubbed with a woollen cloth and are brought near one another, they move away. This happens because rubbing gives both balloons the **same type of electric charge**, and like charges repel each other. Hence, instead of attracting, they push each other apart.
 4. An object placed in water is acted upon by two opposite forces — the **downward pull of gravity** and the **upward buoyant force** provided by the water.
 1. A coin sinks since the gravitational pull on it is greater than the upward force of buoyancy.
 2. A wooden block floats because the upward thrust by water is strong enough to balance its weight.
 5. (i) **During upward motion** : The ball faces both gravity pulling it downward and air resistance which also acts downward, opposing its path upward.
 - (ii) **During downward motion** : Gravity continues to pull it downward while air resistance now acts upward, resisting the fall.
 - (iii) **At the highest point** : Even though it is momentarily at rest, gravity is still acting downward, causing the ball to fall again.
 6. The ball eventually stops because friction acts between the ground and the ball's surface.
 - (i) To make the ball halt **before** reaching point A, the friction should be **increased**, for example by making the surface rough using sand or cloth.
 - (ii) To let the ball move beyond point A,

friction must be reduced. This can be done by using a smooth surface so that there is less resistance.

7. Friction arises because of minute irregularities that lock between two touching surfaces. Smooth surfaces like polished floors or ice have fewer uneven points, therefore, friction is greatly reduced. As a result, your footwear cannot grip the surface well, leading to slipping.
8. Yes, a force definitely acts on an object in non-uniform motion. Whenever an object changes its speed or direction of travel, a force must be responsible for producing the change.
9. Weight is a measure of the gravitational pull acting on an object. Since the Moon has weaker gravity than the Earth, objects weigh less there. Mass, however, remains the same because it depends on the amount of matter present, which does not change with location.
10. (iii) $w_2 > w_3 > w_1$
When an object floats, the buoyant force acting on it is equal to its weight. The deeper an object sinks, the more water it displaces, which means a greater buoyant force, and therefore a greater weight. Object 2 is submerged the most (and is the heaviest), object 3 is less submerged than object 2, and object 1 the least submerged, so its weight is the smallest.

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. c) Friction
2. d) Weight
3. c) Friction
4. c) Electrostatic
5. d) Gravitational
6. c) Magnetic force
7. b) Newton

II. Fill In the Blanks

- | | |
|-----------------------------|-------------|
| 1. non-contact | 2. newton |
| 3. buoyant force / upthrust | 4. opposite |
| 5. weight | 6. repel |
| 7. muscular | |

III. True / False

- | | | |
|----------|----------|----------|
| 1. False | 2. True | 3. True |
| 4. False | 5. False | 6. False |
| 7. True | | |

IV. Match the Column

Column A	Column B
A. Magnetic force	3. Non-contact force
B. Muscular force	1. Contact force
C. Friction	4. Depends on surface texture
D. Weight	2. Measured in newton
E. Buoyant force	5. Upward force in liquids

V. Very Short Answer Type Questions

1. A push or pull on an object is called force.
2. Magnetic force and gravitational force.
3. Newton (N)
4. It measures weight.
5. Force produced by the action of muscles is called muscular force.
6. They repel each other.
7. Due to the gravitational pull of the Earth.

VI. Life Skills / Skill-Based Questions

1. Friction helps walk or write; using proper shoes or textured surfaces prevents slipping and injuries by increasing grip, especially on wet floors.
2. Magnets attract certain objects, and

pushing things changes their speed; recording these effects shows how forces help design safe tools, machines, and toys.

VII. Assertion–Reason Type Questions

1. (c) Assertion (A) is true, but Reason (R) is false.
2. (d) Assertion (A) is false, but Reason (R) is true.
3. (a) Both Assertion (A) and Reason (R) are true,

and Reason (R) is the correct explanation of Assertion (A).

VIII. PICTURE BASED QUESTIONS

1. c) Electrostatic force
2. b) Force in newtons

IX. Case Study Based Questions

1. c) Muscular force
2. b) It prevents us from slipping by opposing motion

Chapter 6. Pressure, Winds, Storms, and Cyclones

NCERT CORNER

1. (i) (d) equal in all the three vessels

Liquids exert pressure which depends on the height of the liquid column above a given point. In the case of connected vessels, water moves until the pressure at the same depth is equal in all the vessels. As a result, the water levels in all three vessels become identical.

- (ii) (c) M will stick but N will not stick

When a suction cup is pressed against a smooth surface, most of the air inside the cup is pushed out, creating a low-pressure region. The higher atmospheric pressure outside presses the cup against the surface, making it stick. On a rough surface, a proper seal cannot form, the air is not expelled efficiently, and the cup fails to adhere.

- (iii) (a) increase the height 'H' at which the tank is placed

The pressure exerted by a liquid increases with the height of its column. Raising the tank to a higher position increases the water column height, resulting in greater pressure at the taps and therefore stronger flow.

- (iv) (b) $P_A = P_B$, $F_A < F_B$

Pressure in a liquid depends solely on the height of the liquid column. Since the water levels in vessels A and B are equal, the pressures at the bottom are the same ($P_A = P_B$). Force, however, is the product of pressure and area. Because vessel B has a larger base area than vessel A, the force at the bottom of B is greater ($F_A < F_B$).

2. (i) [T] True : Air naturally flows from regions of high pressure to regions of low pressure.
(ii) [F] False : Liquids exert pressure not just at the bottom, but also on the walls of their container.
(iii) [F] False : The eye of a cyclone is calm, with very low wind speeds.
(iv) [T] True : Inside a bus or a car during lightning, you are comparatively safe because the metallic body conducts the electricity around you.
3. The boy will sink deeper into the sand when standing rather than when lying down. Pressure is defined as force per unit area. The boy's weight remains constant, but when standing, it is concentrated on a smaller area (his feet), resulting in higher pressure and greater sinking into the sand. Lying down distributes the weight over a larger area, reducing the pressure and limiting how much he sinks.
4. Given:
Weight of the elephant = 20,000 N

Area of one foot = 0.25 m^2

Total area for four feet = $4 \times 0.25 = 1 \text{ m}^2$

Pressure = Force / Area = $20,000 / 1 = 20,000 \text{ N/m}^2$ or $20,000 \text{ Pa}$

Thus, the elephant exerts a pressure of $20,000 \text{ Pa}$ on the ground.

5. Boat A:

Total weight = $5 \times 700 \text{ N} = 3,500 \text{ N}$

Base area = 7 m^2

Pressure = $3,500 / 7 = 500 \text{ N/m}^2$

Boat B:

Total weight = $3 \times 700 \text{ N} = 2,100 \text{ N}$

Base area = 3.5 m^2

Pressure = $2,100 / 3.5 = 600 \text{ N/m}^2$

Conclusion: Boat B experiences higher pressure at its base. Difference = $600 - 500 = 100 \text{ N/m}^2$ (100 Pa).

- 6.** No, lightning would not occur if air and clouds were good conductors of electricity. Lightning happens due to the build-up of opposite charges, which air normally insulates against. If air and clouds were conductive, electric charges would neutralize gradually, preventing the massive discharge needed for lightning.
- 7.** Yes, both balloons will bulge equally. Liquids exert pressure on the walls of containers, which depends on the height of the liquid column above it. Since the outlets for both balloons are at the same height, the liquid pressure on each balloon is identical, causing them to expand equally.
- 8.** A storm can develop into a cyclone over warm ocean waters under specific conditions:
 1. Warm ocean water heats the air above it, causing it to rise, creating a low-pressure area.
 2. Rising moist air cools, and condensation forms, raindrops, releasing latent heat.
 3. Producing the released heat further warms the air, causing it to rise faster and lowering the pressure even more.
 4. Surrounding high-pressure air rushes in to fill the low-pressure zone.

5. The Earth's rotation imparts a spin to the moving air.

This cycle continues, forming a rotating system of clouds and strong winds around a central low-pressure region, which is recognized as a cyclone.

- 9.** On a hot summer afternoon, land heats faster than water. Warm air above the land rises, forming a low-pressure area, while cooler air over the sea forms a high-pressure zone. Wind blows from the sea (high pressure) to the land (low pressure), creating a sea breeze. The trees bending toward A indicate that the wind is blowing from side B (sea) to side A (land). This suggests 'A' side is land.

- 10.** To demonstrate that air moves from high pressure to low pressure:

1. Take two identical balloons and a drinking straw.
2. Inflate one balloon fully (high pressure) and leave the other uninflated (low pressure).
3. Connect the balloons using the straw, sealing the connections.
4. Observe air moving from the inflated balloon to the uninflated one until pressures equalize.

This shows that air flows naturally from a region of higher pressure to a region of lower pressure.

- 11.** A thunderstorm is a storm with lightning and thunder. Its formation involves :

1. Warm, moist air near the ground rises, forming a low-pressure area.
2. Cooler surrounding air rushes in to replace it, creating strong wind currents.
3. Rising air cools, water vapour condenses, and clouds form. Rain may develop.
4. Upward and downward air currents cause droplets and ice particles to collide, generating static charges.
5. The discharge of these charges produces lightning and thunder.

- 12.** Lightning is the discharge of static electricity in clouds:

1. Upward and downward winds cause

ice and water droplets to rub together, generating charges.

2. Lighter positive charges move upward and heavier negative charges settle at the bottom of clouds.
 3. The ground below a negatively charged cloud becomes positively charged.
 4. When charge buildup is extreme, air breaks down as an insulator.
 5. A sudden discharge occurs, producing a bright flash called lightning.
- 13.** High-speed winds create a low-pressure area on one side of a banner. The difference in pressure between the sides generates a force that can tear the banner. Making holes allows air to flow through, reducing the pressure difference and preventing damage.

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. b. Pressure
2. b. Newton per square metre
3. b. Air exerts pressure on the walls
4. c. Wind
5. c. To reduce pressure by increasing area
6. b. Low air pressure above the roof
7. c. Calm centre with lowest pressure

II. Fill in the Blanks

1. force
2. N/m^2 or pascal
3. bottom
4. drop
5. atmospheric
6. warm
7. lightning conductor

III. True/False

1. False 2. False 3. True
4. False 5. False 6. True
7. True

IV. Match the Columns

Column A	Column B
A. Broad straps	4. Exerts less pressure
B. Pressure	3. Force per unit area
C. Lightning	1. Caused by rubbing of charges
D. Cyclone	2. Spinning storm with strong wind
E. Atmospheric pressure	5. Acts in all directions

V. Very Short Answer Type Questions

1. Pressure is the force acting per unit area.
2. Pascal (Pa) or N/m^2
3. They move towards each other due to reduced pressure between them.
4. To increase water pressure at the taps.
5. Difference in air pressure causes winds to blow.
6. A spinning storm system formed over warm ocean water with very low pressure at the centre.
7. It safely transfers electric charge from lightning into the ground.

VI. Life Skills / Skill-Based Questions

1. For thunderstorms or cyclones, stay inside, unplug devices, and stick to safe areas to avoid lightning or damage, ensuring home safety.
2. Wind direction and air temperature change daily; noting these shows how shifts in pressure and heat create wind, helping predict weather.

VII. Assertion-Reason Type Questions

1. (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
2. (d) A is false, but R is true

3. (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

the bottom

VIII. Picture Based Questions

1. C. Balloons move towards each other
2. C. To withstand higher water pressure at

IX. Case Study Based Questions

1. a) Differences in air pressure between regions
2. b) By allowing electric charges to safely pass into the ground

Chapter 7. Particulate Nature of Matter

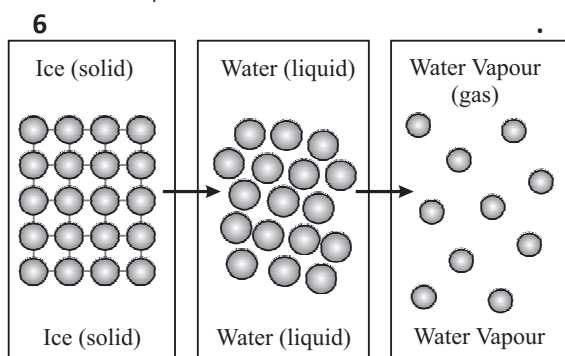
NCERT CORNER

1. In solids, the particles are very closely packed together due to strong interparticle forces of attraction. These strong forces hold the particles firmly in fixed positions, allowing them to vibrate only about their mean positions without moving from one place to another. In contrast, in liquids, the particles are tightly packed and the forces of attraction between them are comparatively weaker. This allows the particles to move past one other freely enabling liquids to flow and take the shape of their container, unlike solids, which have a definite shape.
2. (i) **True** : Melting is the process by which a solid changes into its liquid state when heat is applied.
(ii) **True** : During melting, the thermal energy supplied to the solid weakens the interparticle forces of attraction, allowing the particles to move away from their fixed positions and slide past one another.
(iii) **True** : Solids have a definite shape and volume because their particles are held firmly in fixed positions by strong interparticle forces of attraction.
(iv) **True** : The particles in a solid are very closely packed, leaving almost no space between them. This results in strong interparticle attraction.
(v) **True** : The fragrance of camphor spreads throughout the room because the particles vaporize and mix with the continuously moving air particles. This allows the smell to disperse in all

direction by diffusion.

- (vi) **False** : The correct explanation is that when camphor is heated, thermal energy is supplied to it. This added energy increases the motion of its particles, allowing them to escape into the air and mix with air particles, producing a noticeable fragrance. The smell is not due to energy being released but due to energy being absorbed and converted into particle motion.
3. If all the particles that make up a chair are removed, nothing of the chair would remain. This is because all matter, including the chair, is composed of countless tiny constituent particles. The chair exists as a visible and tangible object only because its particles are held together in a specific arrangement. Once these particles are removed, the chair ceases to exist.
 4. Gases mix easily because their particles are widely spaced and experience negligible interparticle attraction. They move freely and randomly in all directions, allowing particles of different gases to intermingle rapidly and uniformly. In contrast, solids do not mix easily because their particles are tightly packed, strongly attracted to one another and fixed in rigid positions. They restrict their movement and prevent mixing with particles of another solid.
 5. **Milk**, spills and spreads on a table because it is a liquid and does not have a definite shape. It takes the shape of the container in which it is kept. When

spilled, the particles of milk can move past one another easily, allowing it to flow and spread on a surface. In contrast, a **glass tumbler** is a solid. Its particles are held tightly together in a fixed, orderly arrangement, giving it a definite shape and volume. Therefore, unlike milk, the tumbler does not change its shape or flow when placed in a container.



7. Different states of matter can be illustrated through examples. **Aluminium foil**, being a solid, has its particles arranged in a regular, closely packed structure with very little space between them. **Glycerine**, a liquid, has particles that remain close together but are arranged irregularly, allowing them to move past one another. **Methane gas**, has particles that are very far apart and move randomly in all directions, showing the properties of gases.
8. In the case of an extinguished candle, all three states of matter—solid, liquid, and gas—can be observed in the wax. The **solid wax** forms the main body of the candle. Its particles are tightly packed in an orderly structure, representing the solid state. The **liquid wax** found near the wick is the melted portion. Its particles remain close but can move freely past one other, showing the properties of liquids. The **gaseous wax** appears as the smoke or vapour rising from the wick; its particles are far apart and move rapidly, representing the gaseous state.
9. The ocean tastes salty because the salt present in it dissolves completely in water.

When salt dissolves, it breaks down into extremely small constituent particles—ions—which are invisible to the naked eye. These particles occupy the interparticle spaces between the water molecules and spread uniformly throughout the liquid. Although the dissolved salt cannot be seen, it is evenly distributed, which allows us to taste the saltiness of seawater.

10. Both rice grains and rice flour consist of solids. Each grain of rice and each tiny particle of flour has a definite shape and volume. However, when many grains or flour particles are together, the collection behaves somewhat like a liquid, as it can flow and take the shape of its container. This occurs because the particles slide over one another when poured. Despite this behaviour, each individual grain or flour particle remains a solid, and retains the fundamental properties of the solid state.

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. c) Grinding of chalk
2. b) Atoms
3. c) Iron nail
4. c) It breaks into tiny particles and fits into the spaces between water particles
5. c) Gas
6. c) 1538°C
7. d) One end binds with oil and the other with water

II. Fill In the Blanks

1. Melting point
2. constituent
3. volume, shape
4. negligible
5. Acharya Kanad
6. hot
7. insoluble

III. True / False

1. False 2. True 3. False
4. True 5. False 6. False
7. True

IV. Match the Column

Column A	Column B
A. Solids	5. Fixed shape or volume
B. Liquids	3. Definite volume, no definite shape
C. Gases	2. Spread rapidly in all directions
D. Interparticle space (gases)	4. Maximum
E. Interparticle attraction (solids)	1. Strongest

V. Very Short Answer Type Questions

1. They are the smallest building blocks that make up a substance.
2. It is the space between particles of matter.
3. Solid
4. The movement of water particles spreads the colour.
5. Mortar and pestle
6. Because it dissolves into very tiny particles and mixes into water.

7. 100°C

VI. Life Skills / Skill-Based Questions

1. Ice is rigid, water flows, air moves freely; differences in particle arrangement and movement explain the unique properties of solids, liquids, and gases.
2. Properties like water's flow, gas's ability to fill balloons, and solid's strength help solve daily problems, and knowing these aids safe cooking and storage

VII. Assertion-Reason Type Questions

1. (c) Assertion (A) is true, but Reason (R) is false.
2. (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
3. (d) Assertion (A) is false, but Reason (R) is true.

VIII. Picture-based Questions

1. d) Liquid and Gas
2. d) Particles are in motion and spread the colour

IX. Case Study Based Questions

1. b) Because its particles are tightly packed and held by strong interparticle forces
2. c) Because its particles are far apart and move freely

Chapter 8. Nature of Matter: Elements, Compounds, and Mixtures

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1. The correct statement is (iv) A and B are elements, while C is a compound having a fixed composition.

Explanation:

- Elements are the simplest pure substances that cannot be broken

down into simpler substances by any physical or chemical means. Hence, A and B are classified as elements.

- When two or more different elements combine chemically, they form a compound, which has properties different from those of its constituent elements. Therefore, C is a compound.

- A compound is always formed in a definite and fixed ratio of elements by mass, which is why C has a fixed composition.
2. The correct option is (i) Both the Assertion and the Reason are true, and the Reason correctly explains the Assertion.

Explanation:

- The **Assertion** is true because **air** is a **uniform mixture** of several gases such as nitrogen, oxygen, carbon dioxide, and small amounts of other gases.
 - The **Reason** is also true because it correctly defines a **mixture** as a physical combination of two or more substances that do not react chemically and retain their original properties.
 - Therefore, air fits the definition of a **mixture**, and the Reason correctly explains the Assertion.
3. The **properties of a compound are entirely different from those of the elements** that form it.

Illustration – The Case of Water:

1. **Hydrogen** is a flammable gas and acts as a fuel.
2. **Oxygen** is a gas that supports burning and helps substances combust more vigorously.
3. When hydrogen and oxygen combine chemically in a fixed ratio (2:1), they form **water (H₂O)**, a liquid that is neither flammable nor supports combustion; in fact, it extinguishes fire.

Hence, **water**, the compound, exhibits completely new properties compared to **hydrogen and oxygen**, the elements from which it is formed.

4. The correct option is (iii) **Pure substances – carbon dioxide, iron, oxygen, and sugar.**

Explanation:

- A **pure substance** has a definite composition and distinct chemical properties.
- **Carbon dioxide** and **sugar** are **compounds**, as they are formed by the chemical combination of elements.
- **Iron** and **oxygen** are **elements**, which

are the simplest forms of matter.

- Therefore, all four substances—carbon dioxide, iron, oxygen, and sugar—are correctly classified as **pure substances**.

5. Reaction 1:

Iron + Moist Air → Iron Oxide (Rust)

- **Iron:** An **element**, as it cannot be broken down further.
- **Moist Air:** A **mixture** of gases such as nitrogen, oxygen, and water vapour.
- **Iron Oxide:** A **compound** formed by the chemical reaction between iron and oxygen.

Reaction 2:

Magnesium + Oxygen → Magnesium Oxide

- **Magnesium:** An **element**.
- **Oxygen:** An **element**.
- **Magnesium Oxide:** A **compound** formed by the chemical combination of magnesium and oxygen, showing new properties.

Thus, both reactions demonstrate how **elements combine chemically to form compounds**.

6.

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

Pure Substances:

Pure substances include all materials listed under **Elements** and **Compounds**, namely:

Aluminium, Gold, Oxygen, Nitrogen, Sulfur, Hydrogen, Carbon dioxide, Magnesium oxide, Rust, Iron sulfide, Glucose, Water, Sodium chloride, and Baking soda.

These are called **pure substances** because

they have **definite compositions** and **uniform properties** throughout.

7. When a mixture of iron filings and sulfur is heated, a new substance called iron sulfide is formed. This new substance is a compound, not a mixture.

Differences between Mixture and Compound:

1. **Appearance:** The mixture is non-uniform, showing yellow sulfur and black iron separately, whereas iron sulfide is a uniform black solid.
2. **Magnetic Property:** Iron in the mixture is attracted to a magnet, but the compound iron sulfide is not attracted to a magnet.
3. **Reaction with Acid:** The mixture produces hydrogen gas (which is odorless, and burns with a pop sound), while the compound produces hydrogen sulfide gas, which has a rotten egg-like smell.

Word Equation:

Iron + Sulfur → Iron Sulfide

This proves that heating causes a **chemical change** leading to the formation of a compound.

8. No, it is not possible for a substance to be both an element and a compound at the same time.

Explanation:

- An **element** is the simplest form of matter that cannot be broken down into simpler substances.
 - A **compound** is formed when **two or more elements combine chemically** in a fixed ratio.
 - Therefore, a substance can not be classified as both an element and a compound simultaneously.
9. If water were a mixture of hydrogen and oxygen gases, life as we know it would not exist.

Explanation:

- In a mixture, components retain their own properties.

- **Hydrogen** is flammable, while **oxygen** supports burning.
- If water were merely a mixture, it would be a **dangerous and explosive combination of gases**, not a safe liquid.
- Consequently, oceans, rivers, and rain would not exist, and **life would be impossible**.

This clearly shows that water is a compound, not a mixture.

10. Gas A is Hydrogen.

Explanation:

- When iron filings react with dilute hydrochloric acid, hydrogen gas is produced.
- Hydrogen is **colourless, odorless**, and burns with a characteristic 'pop' sound.
- The reaction can be written as:
Iron + Dilute Hydrochloric Acid → Iron Chloride + Hydrogen Gas

This experiment confirms the gas produced is **hydrogen**.

11. 1. **Water (H₂O)**

- **Constituents:** water is Formed by the chemical combination of hydrogen and oxygen both of which are non-metals.
- **Uses:**
 - ❑ Essential for survival of all living organisms.
 - ❑ Used for extinguishing fires because it does not support burning.

2. **Carbon Dioxide (CO₂)**

- **Constituents:** Carbon dioxide is formed from carbon and oxygen (both non-metals).
- **Uses:**
 - ❑ Used in aerated beverages such as soda water.
 - ❑ Utilised by plants in **photosynthesis** to produce food and maintain the balance of gases

in the atmosphere.

12. 1. Gold is classified as a metal because it is an **element** that exhibits typical metallic properties such as lustre, malleability, ductility, and good conductivity.
2. Gold is also considered a mineral because it is a **naturally occurring solid substance** found in the Earth's crust. It exists in a **pure elemental form**, known as a **native mineral**, meaning it is not combined with other elements in nature.

Thus, gold is both a metal (based on physical properties) and a mineral (based on geological origin).

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. c) Air
2. b) Copper and zinc
3. d) Chemical change
4. c) Iron sulfide
5. c) Air
6. b) Hydrogen
7. c) Water

II. Fill In the Blanks

1. mixture
2. Hydrogen, Oxygen
3. copper, zinc
4. oxygen
5. physical
6. brass, bronze
7. Air Quality Index (AQI)

III. True / False

- | | | |
|----------|---------|----------|
| 1. False | 2. True | 3. False |
| 4. False | 5. True | 6. False |

7. True

IV. Match the Column

Column A	Column B
A. Air	2. Mixture of gases
B. Stainless steel	3. Alloy
C. Sprout salad	1. Non-uniform mixture
D. Hydrogen	4. Element
E. Water	5. Compound

V. Very Short Answer Type Questions

1. A mixture is formed when two or more substances are combined without any chemical change.
2. A pure substance has only one kind of particle and cannot be separated by physical methods.
3. Gold and sulfur.
4. Water.
5. Alloys are uniform mixtures of two or more metals or metals with non-metals.
6. Iron sulfide, a compound.
7. Carbon dioxide.

VI. Life Skills / Skill-Based Questions

1. Flour and water, salad, and tea are mixtures; salt and sugar are pure substances. Mixtures retain individual properties, while pure substances don't; understanding this helps cook and clean effectively.
2. Knowing if a product is a mixture or compound keeps you safe and ensures best results in baking or cleaning, as ingredients and chemicals react differently.

VII. Assertion-Reason Type Questions

1. c) Assertion (A) is true, but Reason (R) is false.

2. a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
3. d) Assertion (A) is false, but Reason (R) is true.

VIII. Picture-based Questions

1. c) Hydrogen

2. d) Reaction with carbon dioxide

IX. Case Study Based Questions

1. b) Salt
2. a) Because the substances in mixtures do not react chemically and keep their properties

Chapter 9. The Amazing World of Solutes, Solvents, and Solutions

NCERT CORNER

1. (i) The given statement is false. The solubility of gases in liquids decreases with an increase in temperature. This is because as the temperature rises, gas particles gain more kinetic energy and escape more easily from the surface of the liquid. Therefore, oxygen gas dissolves more in cold water than in hot water.
- (ii) The statement is false. A mixture of sand and water is not a uniform or homogeneous mixture. It is a heterogeneous mixture because sand particles do not dissolve in water and remain unevenly distributed throughout the liquid.
- (iii) The given statement is false. The amount of three-dimensional space occupied by any object is called its volume, not mass or density.
- (iv) The given statement is false. A saturated solution contains the maximum amount of solute that can dissolve in a solvent at a particular temperature. An unsaturated solution, on the other hand, can still dissolve more solute at the same temperature.
- (v) The given statement is true.
2. (i) The volume of a solid can be measured using the water displacement method. In this method, the solid object is completely immersed in water, and the rise in the water level

in a measuring cylinder gives the volume of the solid.

- (ii) The solubility of a substance refers to the maximum amount of solute that can be dissolved in a fixed amount of solvent at a particular temperature to form a saturated solution.
- (iii) In general, density decreases when temperature increases. This happens because heating causes the particles of matter to move farther apart, increasing the volume while the mass remains constant, thereby reducing the density.
- (iv) A saturated solution of glucose is a solution in which no more glucose can dissolve in water at a particular temperature because the solution has already reached its maximum solubility limit.
3. Water is denser than oil, hence, oil floats on water. Objects or substances that have lower density than the liquid in which they are placed will float, while those that have higher density will sink.
4. to find the density, we use the formula;

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Given :

$$\begin{aligned} \text{Mass} &= 225 \text{ g} \\ \text{Volume} &= 90 \text{ cm}^3 \\ \text{Density} &= \frac{225}{90} = 2.5 \text{ g/cm}^3 \end{aligned}$$

Thus, the density of the stone sculpture

is 2.5 g/cm^3 . Since the density of water is approximately 1 g/cm^3 , the sculpture is denser than water, and therefore, it will sink when placed in water.

5. Correct Statement: Statement (iii) is the most appropriate.

A saturated solution is defined as a solution that contains the maximum amount of solute dissolved in a solvent at a particular temperature. Under these conditions no more solute can dissolve.

Statement (i) is incorrect because it describes an unsaturated solution.

Statement (ii) is incorrect as it explains a saturated solution, not an unsaturated one.

Statement (iv) is also incorrect because saturation can occur at any temperature, temperature only determines how much solute is needed to reach saturation.

6. Given

Total volume of the bottle = 2 litres = 2000 mL

Water poured = 500 mL

Remaining capacity = $2000 - 500 = 1500$ mL

Hence the bottle can still hold 1500 mL of water.

7. Using the formula :

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Density} = \frac{400}{40} = 10 \text{ g/cm}^3$$

Therefore the density of the object is 10 g/cm^3 .

8. An unpeeled orange floats because its outer peel contains tiny air-filled pores. These air pockets increase the volume of orange without adding much mass, making its overall density lower than that of water.

When the peel is removed, the orange loses these air pockets. Its volume decreases while the mass remains almost the same. As a result, its density becomes greater than that of water, causing the peeled orange to sink.

9. For Object A :

$$\text{Density}_A = \frac{200}{40} = 5 \text{ g/cm}^3$$

For Object B:

$$\text{Density}_B = \frac{240}{60} = 4 \text{ g/cm}^3$$

Since $5 \text{ g/cm}^3 > 4 \text{ g/cm}^3$. Object A is denser.

10. The density of modelling clay remains unchanged even if its shape is altered.

Density depends on the mass and volume of the substance, not on its shape.

When the clay is flattened or reshaped, its mass (120 g) and volume remain constant, so its density remains the same. Therefore, density is an intrinsic property of matter.

11. Given :

$$\text{Mass} = 600 \text{ g}$$

$$\text{Density} = 7.9 \text{ g/cm}^3$$

$$\text{Volume} = \frac{600}{7.9} = 75.95 \text{ cm}^3 \text{ (approx.)}$$

12. When a test tube containing water is placed in hot water, the water inside heats up. The particles gain energy and move farther apart, causing an increase in volume while the mass remains constant. This expansion is observed as a rise in water level in the glass tube.

Since density = mass ÷ volume, and the volume increases but the mass stays the same, the density of water decreases.

This shows that heating reduces the density of most substances, including water.

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. c. Solution
2. b. Solute
3. c. The solute remains undissolved
4. b. Solute
5. c. cm/g
6. c. Increases with temperature
7. a. It is heavier than water

II. Fill in the Blanks

1. saturated solution 2. 1 mL
3. Nitrogen
4. mass ÷ volume 5. g/mL
6. less dense
7. Measuring cylinder

III. True / False

1. False 2. False 3. True
4. False 5. False 6. True
7. True

IV. Match the Column

Column A	Column B
A. Saturated solution	3. No more solute dissolves
B. Solvent	1. Water in sugar solution
C. Relative density	5. Ratio without unit
D. Measuring cylinder	4. Measures volume
E. Digital balance	2. Measures mass

V. Very Short Answer Type Questions

1. A solution is a uniform mixture of solute and solvent.
2. Because ice is less dense than liquid water.
3. It is the ratio of the density of a substance to the density of water.
4. When added solute no longer dissolves and settles at the bottom.

5. Density of liquids is expressed in g/mL or g/cm³.
6. It is the maximum amount of solute that dissolves in a fixed amount of solvent at a given temperature.
7. Density generally decreases because volume increases.

VI. Life Skills / Skill-Based Questions

1. Dissolve salt or sugar in water and note when it stops dissolving (saturation); this experiment shows solubility and highlights that higher temperatures let more solute dissolve, just like in cooking.
2. Measuring solute amounts in drinks or medicines ensures safety; too much salt or sugar can harm health, causing issues like dehydration or hypertension.

VII. Assertion-Reason Type Questions

1. (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
2. (c) Assertion (A) is true, but Reason (R) is false.
3. (d) Assertion (A) is false, but Reason (R) is true.

VIII. Picture-Based Questions

1. c. Sugar in water
2. a. Beaker A shows a solution, Beaker B shows a suspension

IX. Case Study Based Questions

1. c) Sugar
2. b) No more solute can dissolve at that temperature

Chapter 10. Light: Mirrors and Lenses

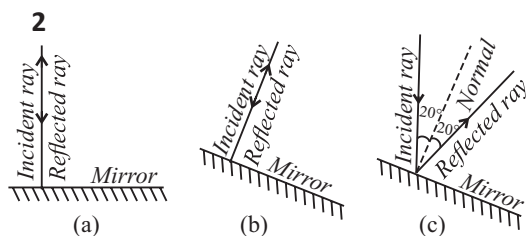
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1. (ii) 50°

According to the **law of reflection**, the angle at which a light ray strikes a surface (angle of incidence) is always equal to the angle at which it bounces off (angle of reflection). Since the given angle of incidence is 40° , the angle of reflection is also 40° .

The normal line is drawn at 90° to the surface of the mirror. Therefore, the angle between the reflected ray and the mirror's surface is obtained by subtracting the angle of reflection from 90° :

$90^\circ - 40^\circ = 50^\circ$, which is the required answer.



3. (i) **Convex mirror** – It always forms an erect image which is smaller than the object. This is why it is useful for viewing a wider area.
- (ii) **Concave mirror** – When an object is placed close to this mirror, it forms an upright and enlarged image. Such mirrors are often used for makeup or shaving purposes.
- (iii) **Plane mirror** – It produces an upright image that is identical in size to the object and appears to be located at the same distance behind the mirror as the object is in front of it.
4. (i) **Convex lens** – When the object is placed close to it, it creates a magnified, upright image. Thus, it is used in magnifying glasses.
- (ii) **Concave lens** – This lens always forms an erect and reduced (diminished) image of the object.
- (iii) **A flat transparent glass sheet** – The image formed is of the same size as the object and does not change in shape or orientation.
5. (ii) The angle of incidence is the angle

between the incoming ray and the normal. When the light ray travels exactly along the normal, there is no angle formed between them. Hence, the angle of incidence in such a case is 0° .

6. • **First mirror (left): Convex mirror** The image of the graph sheet appears smaller, and a larger region is visible due to its wide field of view.
- **Second mirror (middle): Plane mirror** The image formed is the same size as the graph sheet and shows no distortion.
- **Third mirror (right): Concave mirror** The graph sheet appears magnified or enlarged, indicating that the reflecting surface curves inward.
7. (iv) A **convex mirror** always forms a smaller and upright image. When a woman moves closer to such a mirror, the image still remains erect, but it gradually becomes larger in size. Therefore, as she approaches the mirror, her erect image appears to enlarge.
8. A **magnifying glass**, which is actually a convex lens, produces a larger and upright image when placed very close to the text. However, when the same lens is moved farther away from the object, the image appears inverted because the nature of the image changes depending on the position of the object relative to the focal length of the lens.

9.

Column I	Column II
(i) Concave mirror	(d) A spherical mirror that curves inward like the inside of a bowl.
(ii) Convex mirror	(a) Always forms an upright and diminished image.

Column I	Column II
(iii) Convex lens	(b) Can produce an inverted image if the object is placed at some distance.
(iv) Concave lens	(c) Always gives a smaller and up-right image of the object.

10. (i) Both the Assertion and the Reason are correct, and the Reason properly explains the Assertion. A **convex mirror** is widely used as a vehicle's side-view mirror because its outward bulging surface allows drivers to see a broader stretch of the road behind them as compared to a plane mirror of same size.
11. (ii) Fig. (a) represents a convex mirror as the image formed is upright but smaller than the object which is a typical characteristic of convex mirror.
12. When a pencil is partially dipped in water and observed from the side, the submerged part appears bent and slightly thicker. This optical effect occurs due to the **refraction of light**. Light rays coming from the pencil travel from water (denser medium) into air (rarer medium) and bend away from the normal. Additionally, the curved glass surface filled with water behaves like a **convex lens**, which magnifies the underwater portion of the pencil, making it appear thicker and raised upward.

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. c) Convex mirror
2. c) Inverted and enlarged
3. b) Torch reflector

4. b) Increases
5. d) Converging lens
6. c) It curves inward
7. c) Diverges them

II. Fill in the Blanks

1. concave mirror
2. convex mirror
3. convex lens
4. concave
5. angle of incidence
6. reflected ray
7. laws of reflection

III. True / False

1. False
2. True
3. False
4. False
5. True
6. True
7. True

IV. Match the Column

Column A	Column B
A) Concave mirror	2) Reflector in torches
B) Convex mirror	3) Used in vehicle side mirrors
C) Convex lens	4) Magnifying glass
D) Concave lens	1) Diverging lens
E) Plane mirror	5) Same size erect image

V. Very Short Answer Type Questions

1. An erect, laterally inverted image of the same size as the object.
2. Concave mirror, because it gives an enlarged image when held close.
3. To monitor wide areas and prevent theft.
4. It can damage our eyes due to concentrated sunlight.
5. A transparent material with curved surfaces that bends light.

6. Convex mirror.
7. Convex lens.

VI. Life Skills / Skill-Based Questions

1. With a concave or convex mirror, images appear larger or smaller as you move closer or farther; this helps use mirrors safely for tasks like shaving or driving.
2. Correct lenses in glasses or cameras let us see clearly at different distances; picking the right lens protects eye health and helps with precise work.

VII. Assertion-Reason Type Questions

1. (c) Assertion (A) is true, but Reason (R) is false.

2. (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
3. (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

VIII. Picture-Based Questions

1. b) To burn the paper using focused sunlight
2. c) Divergence of light by a convex mirror

IX. Case Study Based Questions

1. b) Diminished and erect
2. c) The angle of incidence is equal to the angle of reflection

Chapter 11. Keeping Time with the Skies

NCERT CORNER

1. (i) True. We are able to view only the portion of the Moon that is illuminated by sunlight and faces the Earth. The Moon does not emit its own light; instead of, it shines because it reflects the light coming from the Sun.
- (ii) False. The regular changes in the Moon's shape, known as its phases, occur because different portions of its sunlit half become visible as the Moon revolves around the Earth. The Earth's shadow falling on the Moon causes a *lunar eclipse*, which is a rare event and not responsible for the monthly phases.
- (iii) True. Human timekeeping systems are based on natural celestial movements. A day is based on Earth's rotation on its axis, a month is linked to the Moon's revolution around the Earth, and a year is determined by Earth's revolution around the Sun.
- (iv) False. The Moon can also be seen during the daytime. For example, during the waning phase, it is commonly visible in the early morning sky shortly after sunrise.
2. No, Amol's birthday will not always fall on a full Moon day every year. The Earth follows a solar year of about 365 days, whereas the Moon completes one full cycle of phases approximately every 29.5 days. Twelve lunar months total about 354 days, which is around 11 days shorter than the solar year. Due to this difference, the date of the full Moon shifts each year, so it does not coincide with the same calendar date annually.
3. There are two mistakes in the given figure:
 1. **Stars are visible through the dark side of the Moon.** This is incorrect because the Moon is a solid, opaque object. It blocks the light from stars behind it, therefore stars cannot be seen "through" the Moon.
 2. **The illuminated crescent is shown at the top.**
The Moon is illuminated by sunlight. At night, the Sun is positioned below the horizon, so the bright part should always face toward where the Sun is

located—generally from the side or slightly from below, not from the top.

4. (i) Correct matching of phases to pictures:

Moon Phase	Label
Three days after New Moon	D
Full Moon	E
Three days after Full Moon	A
A week after Full Moon	C
Day of New Moon	B

- (ii) Picture D cannot represent an actual Moon phase as seen from Earth. The bright region in that picture is illuminated from the top, which never happens in reality. Crescents are always lit from the left or right side, depending on the Sun's position in the sky.
5. (i) Malini observed the First Quarter Moon, which appears like a perfect half-circle with the right side illuminated.



Fig. V

- (ii) This Moon is in its waxing phase, meaning the illuminated portion is increasing day by day. Waxing Moons are usually visible in the evening sky, shortly after sunset.
6. Kaushalya's statement is correct. A waxing gibbous Moon rises in the eastern sky during the late afternoon or early evening. Ravi is mistaken because a crescent Moon seen near sunset is a waxing crescent, which stays close to the Sun in the sky and is observed setting in the west, not rising in the east.
7. If the Moon's revolution around Earth slows down, the time it takes to complete one lunar cycle will increase. As a result, a lunar year (made up of 12 lunar months) will become closer in length to the solar year. Since the difference between the two will decrease calendars that follow both the Sun and the Moon—called luni-

solar calendars—will require the addition of an extra (intercalary) month far less frequently to keep the years align.

8. Three solar years contain 36 months (3 years $\times$ 12 months). If 37 full Moons occur during this period, there will be one more full Moon than the number of months available. Since each month can have at most one full Moon initially, this extra (37th) full Moon must occur in a month that already had one. Therefore, at least one month must contain two full Moons.
9. She would have observed the Full Moon. The Full Moon rises almost exactly at sunset and remains in the sky throughout the night, finally setting around sunrise. That is why she could observe it at night.
10. It would take approximately 730 years for Independence Day to shift from summer to winter if leap years were not added. The solar year is slightly 365.25 days long, but without leap years, the calendar would count only 365 days. This creates a difference of about 0.25 days per year. To accumulate a seasonal shift of half a year (about 182.5 days):
 $182.5 \div 0.25 = 730$ years.
11. Artificial satellites serve a wide variety of important purposes such as:
- **Communication** (e.g., satellite TV, internet, and telephone signals),
 - **Navigation** (GPS and similar systems),
 - **Weather forecasting** (predicting storms and monsoons),
 - **Disaster warning and management** (cyclones, floods, droughts),
 - **Scientific observation and exploration.**
- For example, India's Cartosat satellites help in map-making and urban planning, while AstroSat is used to study distant stars and cosmic events.
12. (i) **Day** – A day is determined by the time the Earth takes to complete one full rotation on its axis, which causes the Sun to appear to move across the sky.
- (ii) **Month** – A month is based on the

time the Moon takes to complete one revolution around the Earth, leading to the cycle of lunar phases.

- (iii) **Year** – A year is the time Earth takes to complete one revolution once around the Sun, and this motion is responsible for the change in seasons.

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. b) It reflects sunlight
2. c) Waning gibbous
3. d) ~29.5 days
4. c) Adjust the difference in seasons
5. d) Panchang calendar
6. b) Cartosat
7. b) Moon's changing position relative to the Sun and Earth

II. Fill In the Blanks

1. 29.5 days
2. 24 hours
3. New Moon Day or Amavasya
4. luni-solar calendar
5. leap year
6. 22 March
7. Meghnad Saha

III. True / False

1. False
2. True
3. False
4. False
5. True
6. True
7. False

IV. Match the Column

Column A		Column B	
A)	Full Moon	2)	Appears close to the Sun
B)	New Moon	1)	Not visible at all
C)	Waxing phase	3)	Moon's bright side grows
D)	Waning phase	4)	Moon's bright side shrinks
E)	AstroSat	5)	Studies stars and celestial bodies

V. Very Short Answer Type Questions

1. The phases are caused by the changing positions of the Moon relative to the Earth and the Sun.
2. Because as the Moon revolves around Earth, Earth has to rotate a little more to bring the Moon into view.
3. It is the average time between two successive noons, about 24 hours.
4. A year in which one extra day (29 Feb) is added every 4 years to align the calendar with Earth's revolution.
5. Waxing means the bright part of the Moon is increasing; waning means it's decreasing.
6. Cartosat, Chandrayaan-3.
7. It is the time taken by Earth to return to the same position relative to distant stars (about 365.25 days).

VI. Life Skills / Skill-Based Questions

1. Observing the Moon's changing shape reveals its phases; understanding these natural cycles helps plan festivals and outdoor activities better.
2. Lunar and solar calendars track time and festival dates; knowing them explains why

holidays shift each year and helps people plan important events.

VII. Assertion–Reason Type Questions

1. (d) Assertion (A) is false, but Reason (R) is true.
2. (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
3. (d) Assertion (A) is false, but Reason (R) is true.

VIII. Picture Based Questions

1. c) Full Moon
2. d) Summer

IX. Case Study Based Questions

1. c) Because we see different parts of the Moon's illuminated side as it orbits Earth
2. c) To plan activities based on the Moon's phases or the Earth's seasons

Chapter 12. How Nature Works in Harmony

NCERT CORNER

1. • An ecosystem is a functional unit formed by the interaction between living organisms (biotic components) and non-living things (abiotic components) such as air, water, and soil.
 - A community refers only to all the living organisms — plants, animals, and microorganisms — living together in an area.
 - Therefore, a community is only a part of the ecosystem, where as the ecosystem also includes the non-living environment.
 - Hence, it is incorrect to say that an ecosystem is part of a community; instead, a community, exists within an ecosystem and interacts with the abiotic surroundings to form it.
2. • If decomposers such as bacteria and fungi were to disappear from the environment, dead plants, animals, and waste materials would accumulate everywhere, as there would be no organisms to break them down.
 - Decomposers perform a vital process called decomposition, in which they convert complex dead matter into simpler substances.
 - This process is essential for two major reasons:
 1. **Nutrient Recycling:**
 - Decomposers release nutrients such as nitrogen and phosphorus back into the soil.
 - These nutrients are then absorbed by plants (producers), completing the nutrient cycle.
 - Without decomposers, soil fertility would decrease, and plant life would eventually die out.
 2. **Environmental Cleanliness:**
 - Decomposers prevent the accumulation of dead organic matter, thereby keeping the environment clean and balanced.
 - Thus, in nature, nothing goes to waste because of decomposers.
3. • Yes, mangrove forests play a vital role in protecting coastal villages.
 - They act as natural barriers against tsunamis, cyclones, and floods.
 - The dense, interlocking roots of mangroves firmly hold the soil firmly and absorb the force of strong waves and winds.
 - This reduces speed of water and lessens its destructive power, thereby protecting nearby villages from severe damage.
 - Mangroves also protect soil erosion, and serve as a natural defence system for humans and wildlife.
4. • If frogs were to disappear from a food chain, the entire ecosystem balance would be disturbed.

1. **Increase in Grasshopper Population:**
 - Frogs feed on grasshoppers. Without frogs, grasshoppers would reproduce rapidly and damage to plant life.
2. **Decrease in Snake Population:**
 - Snakes feed on frogs. If frogs disappear, snakes would lose a major food source, leading to a decline in their population.
 - This example shows that all organisms in an ecosystem are interdependent.
 - Removing one species affects others — a concept known as ecological interconnection.
5. **Possible Causes for Fewer Butterflies**
 1. **Excessive Use of Chemical Pesticides:**
 - o These chemicals harm both caterpillars and adult butterflies.
 2. **Lack of Flowering Plants:**
 - o Fewer native nectar producing plants mean butterflies have no food sources.
 3. **Environmental Changes:**
 - o Air pollution, habitat loss, or changes in weather pattern can reduce butterfly populations.

Ways to Attract More Butterflies

 1. **Plant Nectar-Rich Flowers:**
 - o Grow local varieties of flowering plants that provide nectar for butterflies and leaves for caterpillars.
 2. **Avoid Chemical Pesticides:**
 - o Use natural pest control like neem or companion planting.
 3. **Provide Water Sources:**
 - o Small, shallow dishes filled with clean water help butterflies drink and stay hydrated.
 4. **Add Host Plants:**
 - o Include specific plants where butterflies can lay eggs and caterpillars can feed.
6. • It is not possible to have an ecosystem consisting only of producers (plants) for the following reasons:
 1. **Nutrient Depletion:**
 - Producers absorb nutrients from the soil but cannot return them.
 - Without decomposers, nutrients from dead plants would never be recycled, making the soil infertile.
2. **Overpopulation of Producers:**
 - Without consumers (herbivores) to feed on them, plant populations would grow excessively, competing for sunlight, space, and water.
3. **No Energy Flow:**
 - Energy captured from sunlight by producers would not pass to higher levels (consumers and decomposers).
 - This would disrupt the energy flow, ultimately stopping the functioning of the ecosystem.
7. **Living (Biotic) Components**
 - Park Ecosystem: Grass, trees, flowering plants, birds, squirrels, insects, and earthworms.
 - Roadside Ecosystem: A few weeds, ants, stray dogs or cats, and fewer insects.

Non-Living (Abiotic) Components

 - Park Ecosystem: Soil, sunlight, air, water (from pond or tap), benches, and shade.
 - Roadside Ecosystem: Tar or asphalt, dust, stones, vehicle fumes, and intense sunlight.

Observation and Deduction

 - The park ecosystem supports greater biodiversity and has healthier abiotic conditions.
 - The roadside ecosystem is harsh and polluted, supporting fewer living organisms.
 - Human activities have a stronger negative impact on the roadside environment, reducing its ecological balance.
8. • The statement is correct. Human-made ecosystems such as farms and crop fields are essential for food production.
 - However, unsustainable farming practices like excessive use of fertilizers and pesticides can:
 - o Reduce soil fertility,
 - o Pollute groundwater and rivers, and
 - o Harm useful organisms such as bees and earthworms.
 - Therefore, to ensure long-term

food security, farmers should adopt sustainable practices such as:

- o Organic farming, crop rotation, and use of natural fertilizers.
 - o Protecting soil health and conserving biodiversity.
 - Sustainable ecosystems ensure that food can be produced without harming nature for future generations.
9. • Based on the food web, a decrease in the Indian hare population would lead to a chain reaction:
1. **Decrease in Fox Population:**
 - Foxes depend on hares for food. With fewer hares available, foxes would face starvation or competition for food.
 2. **Increase in Grass and Plant Population:**
 - Fewer hares feeding on grass would allow plants grow more freely.
 3. **Indirect Effects on Other Animals:**
 - Foxes may start hunting other small animals, increasing pressure on their populations.
 - Eagles and other predators may also be affected due to change in prey availability.
 - Thus, the decline of a single species such as the hare can cause ripple effects throughout the food web, showing that all species are interlinked in maintaining ecological stability.

YOUR ASSIGNMENT

I. Multiple Choice Questions

1. c) Due to scarcity of food and water in their natural habitat
2. c) Soil
3. b) Group of same kind of organisms living together
4. b) Mushroom
5. c) Food chain

6. c) Both benefit

7. c) Fish pond

II. Fill in the Blanks

1. mangrove
2. omnivores
3. trophic
4. decomposition
5. habitat
6. producers/autotrophs
7. Jim Corbett

III. True / False

- | | | |
|----------|----------|----------|
| 1. False | 2. True | 3. False |
| 4. True | 5. False | 6. True |
| 7. True | | |

IV. Match the Columns

Column A	Column B
A. Producer	2. Plants and trees
B. Herbivore	1. Deer and hare
C. Decomposer	3. Mushroom and bacteria
D. Mutualism	4. Bees and flowers
E. Omnivore	5. Bengal fox

V. Very Short Answer Type Questions

1. A living component of a habitat like animals, plants, or fungi.
2. The process by which decomposers break down dead matter into simpler substances.
3. Forest
4. A group of different populations living and interacting in the same habitat.
5. Plants and plant products.
6. They recycle nutrients back into the soil.
7. A relationship where both organisms benefit.

VI. Life Skills / Skill-Based Questions

1. Plants, animals, soil, water, and air depend on each other for survival; planting trees or cleaning water sources are small ways to protect these connections in nature.
2. Reducing litter and saving trees lessens pollution and conserves resources; these actions keep ecosystems healthy and ensure a better environment for all.

VII. Assertion–Reason Questions

1. (c) Assertion (A) is true, but Reason (R) is false.
2. (a) Both Assertion (A) and Reason (R)

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

3. (c) Assertion (A) is true, but Reason (R) is false.

VIII. Picture-Based Questions

1. c) Frog
2. b) Farmland

IX. Case Study Based Questions

1. c) Grass
2. c) By planting trees and encouraging others to conserve resources

Chapter 13. Our Home: Earth, a Unique Life Sustaining Planet

NCERT CORNER

1. (iii) Mars does not possess a dense or protective atmosphere like Earth, nor does it have stable liquid water on its surface. Its extremely thin atmosphere cannot retain heat or support water in liquid form, both of which are essential conditions for sustaining life.
2. (ii) Geodiversity refers to the wide range of physical features found on Earth's surface— such as hills, mountain chains, river valleys, plateaus, deserts, and various types of rocks and soil. It relates specifically to non-living components of nature, unlike biodiversity which describes the variety of plants, animals, and other living organisms.
3. (ii) If a planet were much smaller than Earth, its weaker gravitational pull would be insufficient to hold atmospheric gases close to its surface. Over time, these gases would gradually escape into outer space, leaving the planet exposed and unable to maintain a stable atmosphere.
4. (iv) They receive mixed genetic

instructions from both parents.

- In sexual reproduction, a new organism develops from a combination of genetic material (genes) contributed by two parents— the male and the female.
 - Each parent passes on half of their genetic information, which merges during fertilisation to form a unique set of genes in the offspring.
 - This mixing of genetic instructions leads to variation, so the offspring inherits some traits from both parents but is not identical to either of them.
 - For example, a child may have the father's eyes and the mother's hair colour, showing the blending of traits through genetic recombination.
5. The seeds were most likely carried and dropped by a bird.
 - A bird may have eaten a fruit containing seeds and later excreted the seed while sitting on or flying over a wall.
 - The seed then fell into a small crack or crevice in the wall, where it found suitable conditions to germinate.
 - The main factors that supported the growth of the plant were:
 1. Water: The monsoon rains provided

sufficient moisture for germination.

2. Nutrients: The soil particles, dust, and organic matter collected in the crack acted as a nutrient source.
3. equate sunlight for photosynthesis and air for respiration.
 - Thus, even in an unlikely place like a wall crack, nature finds a way for life to grow when all essential conditions are met.
6. Cutting down forests causes serious damage to both the environment and living organisms.

Effect on Climate and Biodiversity:

- Deforestation destroys the natural habitats of countless species, leading to loss of biodiversity as plants and animals lose their homes and food sources.
- Fewer trees result in less absorption of carbon dioxide, leading to an increase in atmospheric CO₂. This causes global warming and rise in local temperature rise.
- The disturbance of the forest ecosystem also disrupts rainfall patterns, resulting in unpredictable weather conditions and frequent droughts.

Effect on Water Resources:

- Forests help maintain the water cycle by absorbing rainwater and recharging underground water tables.
 - When trees are removed, the topsoil gets eroded, and less water seeps into the ground, leading to reduced groundwater levels.
 - Increased surface runoff carries mud, chemicals, and waste into rivers and lakes, causing water pollution and damaging aquatic life.
7. Although Earth's climate has changed naturally over millions of years, the current rise in global temperatures is unusual because it is happening at a much faster rate and is mainly driven by human activities. Burning coal, oil, and other fossil fuels releases large amounts of carbon dioxide into the atmosphere. This excess carbon dioxide traps heat more efficiently, disturbing Earth's natural balance and triggering rapid climate

change beyond what natural processes alone could create.

8. If Earth were suddenly stripped of its magnetic field, life would be severely threatened. This magnetic field acts as a powerful protective barrier that shields the planet by deflecting dangerous charged particles coming from the Sun and outer space. Without this shield, harmful radiation would continuously bombard Earth, gradually eroding the atmosphere, damaging the ozone layer, and making the surface highly unsafe for living organisms.
9. For humans to survive on Mars, we would first need to artificially create the basic living conditions that Earth naturally provides. This includes an oxygen-rich atmosphere for breathing, a controlled and reliable source of liquid water for drinking and growing food, and strong protection from harmful space radiation. However, the greatest challenge would be generating a thick, planet-wide atmosphere and a protective magnetic field—which would require technology far beyond what is currently available.
10. The changes observed in rainfall, temperature, and crop yield in the village are most likely the result of long-term climate change, which is being accelerated by global warming. Rising greenhouse gas levels are altering weather patterns worldwide. To adapt, the village could conserve water through such as rainwater harvesting, and shift to drought-tolerant crops, methods, soil management practices to retain moisture and sustain agriculture under changing climatic conditions.
11. If Earth had no atmosphere, life would not be possible. Without air, there would be no oxygen for breathing, no ozone layer to life from harmful ultraviolet radiation, and no greenhouse effect to keep the planet warm. As a result, temperatures would drop sharply, and liquid water could not exist on the surface—it would either freeze completely or evaporate into space.

12. Examples of Vegetative Propagation:**1. Potato:**

- The potato is a modified underground stem called a tuber.
- Small depressions on its surface, known as 'eyes', contain buds that can grow into new plants when planted in moist soil.

2. Ginger:

- Ginger reproduces through its rhizome, an underground stem that stores food.
- Each piece of the rhizome has buds that sprout into a new ginger plant when placed under suitable conditions.

3. Money Plant:

- A stem cutting of a money plant can develop roots when placed in water or moist soil.
- This method shows that a new plant can grow without seeds.

4. Sugarcane:

- The sugarcane stem has nodes (joints), which contain buds.
- When a stem piece with at least one node is planted, new shoots grow from these buds, develop into a complete plant.

5. Rose:

- Roses can be grown from stem cuttings taken from a healthy parent plant.
- When planted in moist soil, these cuttings develop roots and grow into new rose plants with the same characteristics as the parent.

5. d. Photosynthesis**6. c. Asexual reproduction****7. c. 1.5°C****II. Fill in the Blanks****1. water****2. atmosphere****3. magnetic****4. crust****5. fertilisation****6. greenhouse****7. ozone****III. True / False****1. False 2. True 3. False****4. False 5. False 6. True****7. True****IV. Match the Column**

A	B
A. Mangalyaan	3. Study of Mars
B. Asexual re-production	1. Reproduction using one parent
C. Earth	2. Blue Planet
D. Ozone layer	5. Protects from UV rays
E. Venus	4. Thick CO ₂ atmosphere

YOUR ASSIGNMENT**I. Multiple Choice Questions**

1. b. Thick atmosphere with carbon dioxide
2. c. Zone where temperatures allow liquid water
3. d. Carbon dioxide
4. a. They use unrealistic colours to show information

V. Very Short Answer Type Questions

1. Its suitable distance from the Sun allows liquid water to exist.
2. The region around a star where conditions allow liquid water to exist.
3. It protects Earth from harmful solar wind and cosmic rays.
4. Air and water
5. A type of asexual reproduction where

new plants grow from parts of the parent plant.

6. Because about 70% of its surface is covered with water.
7. The transfer of pollen from the anther to the stigma of a flower.

VI. Life Skills / Skill-Based Questions

1. Air, water, soil, and living things interact to support life; actions like conserving water or planting saplings help protect these resources in your neighborhood.
2. Saving water, avoiding pollution, and protecting plants and animals at home or school helps preserve biodiversity and sustain life for future generations.

VII. Assertion–Reason Type Questions

1. (c) Assertion (A) is true, but Reason (R) is false.
2. (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
3. (a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

VIII. Picture-Based Questions

1. c. It is in the zone where liquid water can exist
2. b. Vegetative propagation

IX. Case Study Based Questions

1. b) Because it has water, suitable gravity, and protective atmosphere
2. b) Reducing plastic use and planting trees

