



CLASS : 7 SCIENCE

Ist MID TERM PORTIONS AND PATTERNS		
Measurement	Matter Around Us	The Living World of Plants
I. Choose the correct answer		5 x 1 = 5
II. Fill in the blanks		6 x 1 = 6
III. Match the following		5 x 1 = 5
IV. Answer the following (pick out, spot the error, complete the table, diagrams, problems, q & a)		12 x 1 = 24
V. Answer the detail		2 x 5 = 10
		Total 50 marks

IInd MID TERM PORTIONS AND PATTERNS		
Understanding Heat and Temperature	Changes Around Us	Functional Units of Life
I. Choose the correct answer		10 x 1 = 10
II. Short Answers: (pick out, spot the error, assertion and reasoning, who am i?)		7 x 2 = 14
III. Match the following		5 x 1 = 5
IV. Answer in brief (diagram, distinguish, problems, Q and A)		4 x 4 = 16
V. Answer the detail		2 x 5 = 10
		Total 50 marks

III rd MID TERM PORTIONS AND PATTERNS		
Light		Animals in our Daily Life
I.	Choose the correct answer	10 x 1 = 10
II.	Answer the following (any 7)	7 x 2 = 14
(match the following; true or false; pick out the add one and give reason; analogy questions;		
assertion and reasoning; spot the error and correct the mistakes; short answers)		
III.	Answer the following in brief (any 4)	4 x 4 = 16
IV.	Answer the detail	2 x 5 = 10
		Total 50 marks





Chapter 1 MEASUREMENTS

- I.
 1. Mass
 2. Speed
 3. kgm^{-3}
 4. Sinks in kerosene
 5. 1:2
- II.
 1. Length and time
 2. Area
 3. 154 mm^2
 4. Graphical method
 5. 4500 cc
 6. 8m
 7. 100 cm^3
 8. $9.46 \times 10^{15} \text{ m}$
 9. An astronomical unit
 10. Greater
- III.
 1. False
 2. False
 3. False
 4. False
 5. False
- IV.

1. Lightyear	-	Distance
2. kg/m^3	-	Density
3. cm^2	-	Area
4. g	-	Mass
5. Litre	-	Volume
- V.

1) a	2) b	3) c
------	------	------
- VI.
 1. Physical quantities that cannot be expressed in terms of any other quantities are called *fundamental quantities*. Eg. Length, time.
 2. Physical quantities that can be expressed by multiplication or division of fundamental quantities are called *derived quantities*. Eg. Area, Volume
 3. *Area* gives the amount or extent of a surface. The SI unit used to describe area is square meter (m^2).

4. Pluck a leaf with a flat surface from any plant in your school. Spread a graph sheet containing square millimeters and square centimeters on a flat surface of the table. Place the leaf on the sheet without any folds, trace its outline with a pencil and remove the leaf. Count the number of complete centimeter squares within the outline = $___ \times 100 \text{ mm}^2$. Count the number of complete millimeter squares within the outline = $______ \text{ mm}^2$. Count the number of millimeter squares that are more than half inside the outline = $______ \text{ mm}^2$. Neglect the millimeter squares that are less than half inside the outline. The Total surface area of the leaf (adding all the above) = $______ \text{ mm}^2$.
5. *Volume* is the actual space occupied by a body. It is the amount of three-dimensional space an object occupies. The SI unit to describe volume is cubic meter (m^3).
6. Fill an overflowing jar with water up to brim; keep an empty measuring jar below the spout. Using a fine silk thread, immerse the stone in the water carefully. The water overflowing is collected in the measuring jar. The volume of water collected in the measuring jar gives the volume of the stone.
7. *Density* is defined as mass of the body contained in its unit volume. The SI unit used for density is kg/m^3 .
8. When a body is heated, particles present in the body tend to move apart and it expands. There is no change in its mass, while there is an increase in its volume. Hence the density of the body decreases.
9. A solid body sinks in water (liquid) if the density of the solid is more than that of water. Stone have higher density than water, so they sink. On the other hand wood have lesser density than water, hence they float on the surface of water. We can conclude that a solid body floats in a liquid if its density is less than the density of the liquid, and it does not dissolve in the liquid.

10. An *astronomical* unit is the average distance between the earth and the sun. It is approximately 150 million kilometers. Astronomical unit is used to express distance within the solar system. One *light year* is the distance that light travels in one year. 1 light year = 9.46×10^{15} m. parsec is the unit of distance used to measure astronomical objects outside the solar system.

VII. H.O.T.S

1. a) Density of A and B are same. Equating density we get ratio of mass as 8:1.
b. Volume ratio is same as mass ratio for A and B. ie 8:1.
c. Volume of A and C are same. Equating volume we get ratio of mass as 2:1
2. Fill an overflowing jar with kerosene up to brim; keep an empty measuring jar below the spout. Put sugar in kerosene. The kerosene overflowing is collected in the measuring jar. The volume of kerosene collected in the measuring jar gives the volume of the sugar. Using balance measure the mass of sugar. Density can be found from definition, Density = mass/volume.
3. Area of cardboard piece =
Area of bigger square – area of smaller square
= $(20 \times 20) - (6 \times 6) = 364 \text{ cm}^2$.
4. Correction required. Question can be deleted.

VIII. Numerical.

1. $25 \text{ cm}^2 = 0.0025 \text{ m}^2 = 2500 \text{ mm}^2$
2. 16 cm^2
3. 750 cm^3
4. Volume of water that can be poured without spilling = volume of the cylindrical vessel = 2310 cm^3
5. Density of lead = 11.6 g/cm^3
6. Mass of water = $50.25 - 20.25 = 30 \text{ g}$.
Density of water = 1 g/cc
Volume of density bottle = mass/density = 30 cm^3
Mass of liquid = $40.75 - 20.25 = 20.5 \text{ g}$
Density of liquid = $20.5/30 = 0.683 \text{ g/cm}^3$

Chapter 2 MOTION

- I.
 1. m/s
 2. Decrease
 3. Variable speed
 4. Zero
 5. Graph b
 6. Lowering the position of centre of mass
 7. 1s to 2s
- II.
 1. False. Displacement is a vector quantity which has both magnitude and direction, but distance is a scalar quantity which has only magnitude.
 2. False. A body with more speed travels more distance in more time.
 3. False. All body has mass. It falls because of acceleration due to gravity.
 4. True.
 5. True.
 6. False. Definition of displacement- It is the shortest distance travelled by the body between two points. Displacement can be equal to distance when travelling in same direction. But it can be never more than distance.
- III.
 1. Displacement
 2. Acceleration
 3. m/s^2
 4. 36 km
 5. Velocity
 6. Acceleration
 7. 9.8 m/s^2
 8. Negative
 9. Displacement
 10. Centre of mass
- IV.
 1. Unstable
 2. Stable

3. Neutral
4. Unstable
5. Unstable
6. Unstable

- V.**
1. Stable equilibrium
 2. Unstable equilibrium
 3. Neutral equilibrium
 4. Uniform velocity
 5. Uniform acceleration

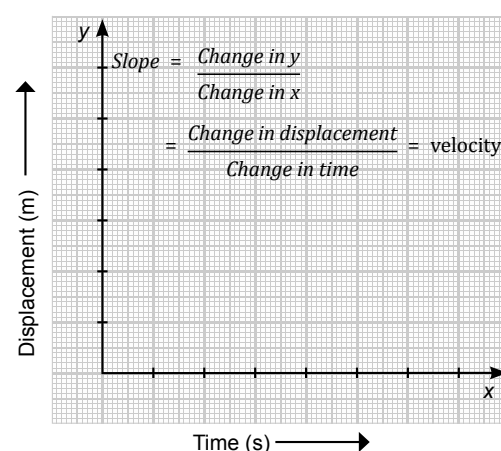
- VI.**
1. a. Distance is the path travelled by a body between two points. The shortest distance travelled by a body between two points in a fixed direction is called displacement.
 - b. Speed is the rate of change of distance travelled by the body. Speed is a scalar quantity. Velocity is the rate of change of displacement. Velocity is defined in terms of displacement, it is also a vector quantity.
 - c. Acceleration is said to be uniform when the change in velocity is equal in equal intervals of time. If the change in velocity of a body is not equal in equal intervals of time, then the body is said to undergo non-uniform acceleration.
 - d. When the centre of mass of a body lies below the point of suspension or support, the body is said to be in stable equilibrium. When the centre of mass of a body lies above the point of suspension or support, the body is said to be in unstable equilibrium. When the centre of mass of a body lies at the point of suspension or support, the body is said to be in neutral equilibrium.
2. Average velocity is the total displacement by time taken.

$$\text{Average velocity} = \frac{\text{total displacement}}{\text{total time taken}}$$
 SI unit of Average velocity is m/s.
 3. Acceleration is the rate of change of velocity. It is given by the formula,

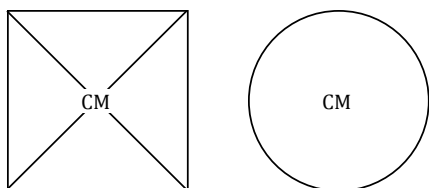
$$\text{Acceleration} = \frac{\text{change in velocity}}{\text{time interval}}$$

$$\begin{aligned} \text{Unit of acceleration} &= \frac{\text{unit of velocity}}{\text{unit of time}} \\ &= \text{m/s} \times 1/\text{s} = \text{m/s}^2. \end{aligned}$$

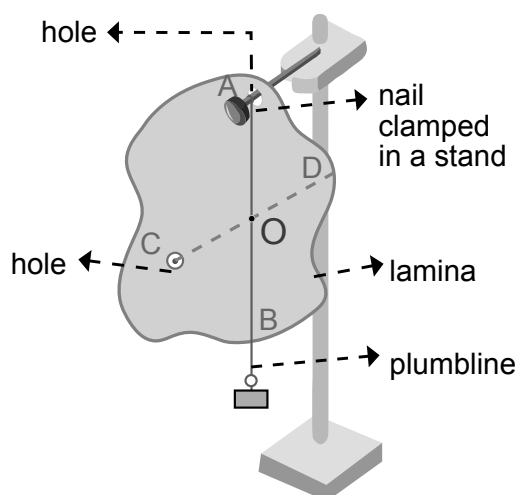
4. If the velocity of the body increases with time, it is said to accelerate (positive acceleration) If the velocity of the body decreases with time, it is said to decelerate or retard. Deceleration is negative acceleration.
5. All bodies on the surface and above the earth are pulled towards the centre of the Earth because of gravitational force of attraction. The acceleration produced due to this attraction is called acceleration due to gravity, denoted by 'g'. The average value of 'g' is taken as + 9.8 m/s² when a body falls to the ground, while it is taken as -9.8 m/s² when a body moves away from the earth. Thus a body is decelerated as it moves away from the earth and accelerated as it approaches the earth.
6. In a displacement-time graph, the time is taken on X-axis and the displacement of the body is taken on Y-axis. Velocity of the body can be found from this graph using the slope.



7. The centre of mass of regularly shaped objects lies at the geometric centre of the object.



8. Make holes at random positions on the lamina as shown in the figure. Hang the lamina on a nail fixed on a stand so that the lamina can swing freely. Hang the lamina through hole A. It will come to rest with centre of mass vertically below the point A. To find the vertical line from A, tie a plumb line (a thread and a weight) to the nail. Mark the position of the thread on the lamina (in the figure it is AB). The centre of mass of the lamina lies somewhere on this vertical line. Now hang the lamina by the hole C. Do the same process and the centre of mass lies somewhere on the vertical line CD. The point of intersection of AB and CD, O, is the centre of mass of the lamina.

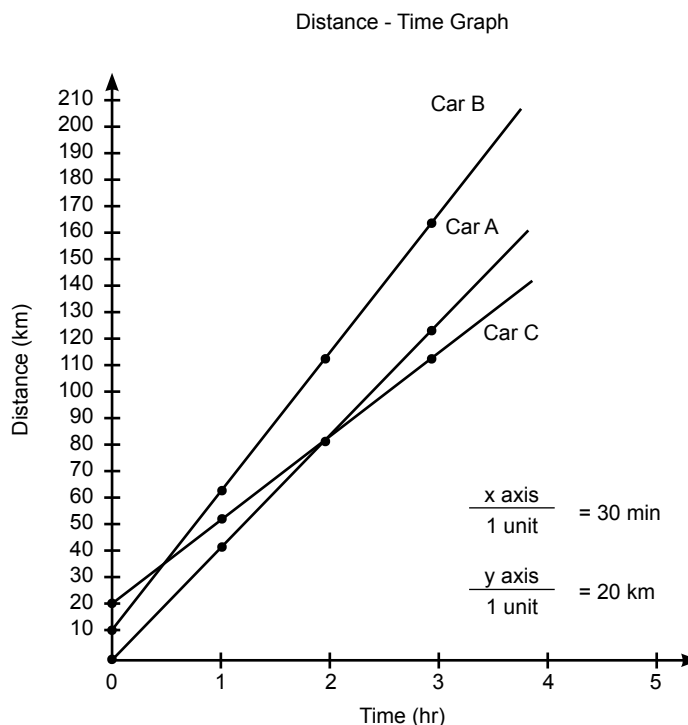


9. The position of the centre of mass of a body tells whether the body will topple over or not. This is important in the design of tall vehicles, racing cars, reading lamps etc.
10. The stability of a body is increased by
- lowering the position of its centre of mass
 - increasing the area of its base

VII. Numerical and graphs

- Distance (path ABC) = $4 + 3 = 7$ km
Distance (path AC) = Hypotenuse of the triangle = 5 km
Displacement (path AC) = shortest distance = Hypotenuse of the triangle = 5 km

2. a.



//Use Graph Sheet//

- All cars have initial velocity.
Car A = 40 km/hr
Car B = 50 km/hr
Car C = 30 km/hr
- Graph of car B is steepest. Car B has highest velocity is 50 km/hr.
- Car Average Speed
A $\frac{160 - 0}{4} = 40 \text{ km/hr}$
B $\frac{210 - 20}{4} = 50 \text{ km/hr}$
C $\frac{410 - 20}{4} = 30 \text{ km/hr}$
- Average speed = $(4 + 2 + 1) / (32 + 22 + 16) = 0.1 \text{ km/min}$
- Acceleration $(9.8 \text{ m/s}^2) = (\text{change in velocity}) / (\text{time taken, } t) = (49 - 0) / t$
Time taken, $t = 49 / 9.8 = 5 \text{ s}$.
- Average Acceleration $(3.1 \text{ m/s}^2) = (\text{change in velocity}) / (\text{time taken, } t) = (24.6 - 15.3) / t$
Time taken, $t = 9.3 / 3.1 = 3 \text{ s}$.
- Acceleration $(9.8 \text{ m/s}^2) = (\text{change in velocity}) / (\text{time taken, } t) = (\text{final velocity} - 0) / 4$
Final velocity = $4 \times 9.8 = 39.2 \text{ m/s}$

VIII. H.O.T.S

1. Since direction is not changing and magnitude of speed is constant, acceleration will be zero.
2. Moving in a circular path with constant speed. Acceleration is due to the change in direction of velocity. Acceleration is a vector quantity.
3. Constant speed does not mean constant velocity. Velocity is vector quantity.

Velocity can change due to change in magnitude or direction or both. Car can move with constant speed in curvy road. Acceleration is created at this situation. A person inside the car experiences this acceleration as force. This we will learn in higher classes as Newton's Law of Motion.

Chapter - 3 HEAT AND TEMPERATURE

Evaluation:

I. Fill in the blanks with the correct word/phrase:

1. mercury
2. Water
3. temperature
4. clinical
5. higher, lower
6. absolute zero
7. one Kelvin

II. Choose the correct answer:

1. a) Kelvin
2. c) thermal expansion
3. d) Water is a good thermometric liquid.
4. c) both a and b

III. Answer the following questions:

1.

Heat	Temperature
Heat is a form of energy.	It is a measure of degree of hotness or coldness of a body.
Transfers from a hot object to a cold object.	Higher in a hot object than in a cold object.
SI unit is Joules.	SI unit is Kelvin.

When heat is transferred the total amount of heat in the system remains the same.	When heat is transferred the temperature of the system does not remain the same.
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2. A good thermometric liquid shows thermal expansion and is a good conductor of heat.
3. 89 F and 305.15 K
- 4.

Clinical thermometer	Laboratory thermometer
Used to measure the body temperature (man and animals).	Used in laboratories used during scientific experiments.
Easier to use than a laboratory thermometer.	Harder to use than a clinical thermometer.
The liquid level does not come down on its own.	The liquid level gradually comes down on its own.

5. A digital thermometer does not use the principle of thermal expansion of liquids. Hence, it is easier to use and does not need all the precautions that need to be taken while using laboratory thermometers.

IV. Answer in detail:

1.

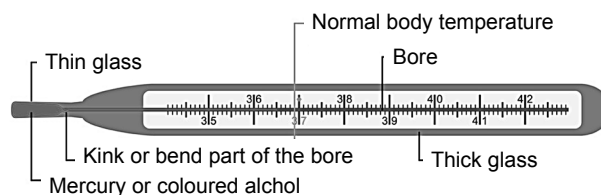


Fig. Structure of a thermometer

The most common thermometer that we use consists of a liquid in bulb, which is connected to a narrow glass column that has graduations. To measure the temperature of an object, the bulb of the thermometer is placed in contact with it. If the temperature of the object is greater than the lowest temperature on the graduations of the

thermometer, the heat energy of the object flows to the liquid in the bulb. As it expands, the liquid rises in the column. The increase in the level of the liquid in the column is proportional to the increase in its temperature. The graduations on the column help us measure the temperature.

2.

Clinical thermometer	Laboratory thermometer
Used to measure the body temperature (man and animals).	Used in laboratories used during scientific experiments.
The maximum and minimum temperatures that can be measured are 42°C and 35°C respectively.	The maximum and minimum temperatures that can be measured are 110°C and -10°C respectively.
The thermometer need not be in contact with the body while reading the temperature.	The thermometer must be in contact with the object while reading the temperature.
Has a kink that avoids the liquid to flow back to the bulb.	Does not have a kink to avoid the liquid flowing back to the bulb.
Easier to use than a laboratory thermometer.	Harder to use than a clinical thermometer.
The liquid level does not come down on its own.	The liquid level gradually comes down on its own.

3. Mercury has the following features:

- Uniform thermal expansion (equal linear expansion for equal amount of heat).
- A good conductor of heat.
- Has a high boiling point and low freezing point.
- Non-toxic and easy to handle (as much as possible).

V. Solve the problems given below:

1. Convert the following temperatures:

- | | |
|------------|-------------|
| a) 113°F | d) 262.5K |
| b) 29.93°F | e) -126.6°F |
| c) -6.6°C | f) 270.9K |

2. Kavipriya visits place A at 28°C, place B at 3°C and place C at 273K. Answer the following:

a) Temperature at place A

28°C 82.4°F 301K

Temperature at place B

3°C 37.4°F 276K

Temperature at place C

0°C 32°F 273K

b) The place with the highest temperature is A.
The place with the lowest temperature is C.

c) The difference between the highest and lowest temperatures is 28°C or 82.4°F or 301K.

VI. Give Reasons:

1. Water is transparent and it will stick to the sides of the glass tube.

2. // *Correction in question//

A clinical thermometer has a kink. Why?

Ans: Clinical thermometer has a kink because the mercury contracts very fast and we cannot see the body temperature accurately. The kink stops the mercury to cool rapidly there by helping in noting body temperature accurately.

(Or)

A clinical thermometer has a kink which prevents the mercury from falling on its own.

3. Mercury has the following features:

- Uniform thermal expansion (equal linear expansion for equal amount of heat).
- A good conductor of heat.
- Has a high boiling point and low freezing point.

4. Digital thermometers are easier to use because they do not use any liquids. This makes them easier to handle and store.

Chapter - 4 ELECTRICITY

Evaluation:

I. Choose the correct answer:

- a) 5A
- a) 2×10^6 A
- b) they deliver current for a long time

II. Fill in the blanks:

1. higher, higher
2. Ammeter, voltmeter
3. a series

III. Match the following:

- | | | |
|-------------------|---|-----------------|
| 1. Mike | - | Magnetic effect |
| 2. Fuse | - | Safety device |
| 3. Cell | - | Chemical effect |
| 4. Circuit broken | - | Heating effect |
| 5. Switch | - | Turn on and off |

IV. Analogy:

1. wire
2. volt
3. irreversible

V. Answer in 1 or 2 sentences

1. Electrons, protons and neutrons.
2. When electric charge flows from one surface to another, it is called 'current electricity'.
3. The chemical reactions that happen in primary cells cannot be reversed whereas the chemical reactions that happen in secondary cells can be reversed.
4. Conventional current flows from the positive terminal to the negative terminal. Electron flow happens from the negative terminal to the positive terminal.

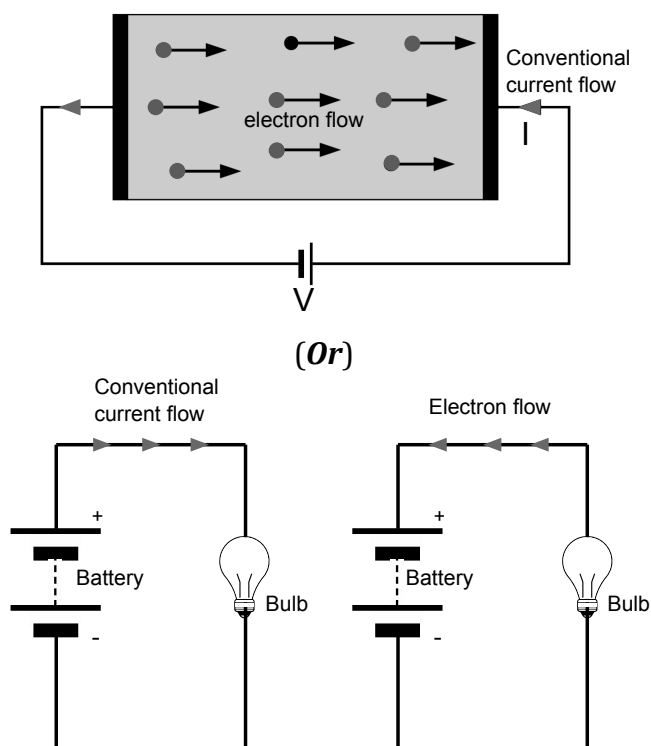
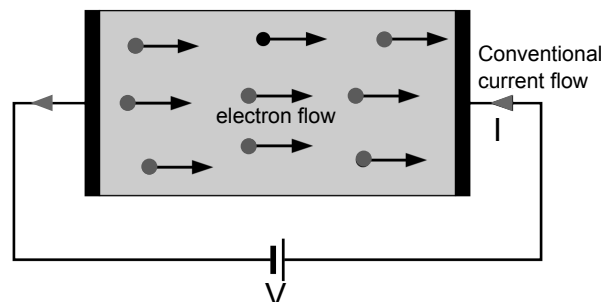


Fig. Circuit Diagrams for Direction of Current Flow

VI. Answer briefly

1. To make a circuit work, the components should be connected properly with the terminals of a power source and be 'closed' to enable the current to flow through the circuit. When a circuit is open, the flow of electric current is interrupted, and the circuit will not work. We call a circuit 'closed' when the circuit components are connected properly with a power source in such a way that it enables an uninterrupted flow of electric current. Switches are used to close or open a circuit. In other words, to let the current flow or to stop as and when required.
2. Conventional current flows from the positive terminal to the negative terminal. Electron flow happens from the negative terminal to the positive terminal.



(Or)

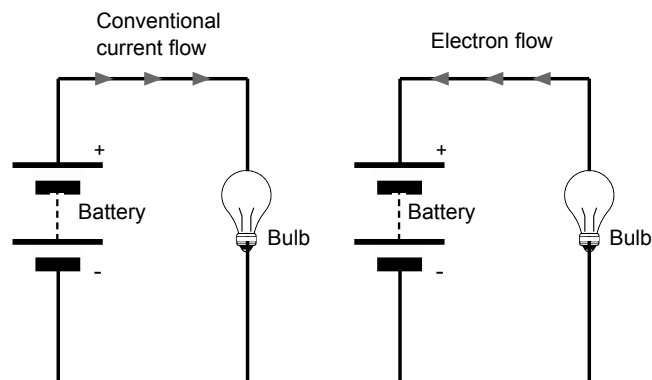
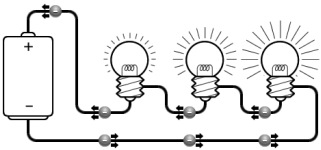
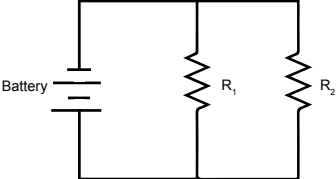


Fig. Circuit Diagrams for Direction of Current Flow

VII. Answer in detail:

1.

Series Circuit	Parallel Circuit
When the components of a circuit are connected in such a way that the current flows from one terminal of a power source to the other terminal through all the components, it is known as a series circuit.	In this type of circuit, the components branch out from the terminals of a power source enabling same voltage to flow through each of the components.
In a series circuit, same current flows through all of the components. When any one of the components does not work, it interrupts the flow of the current and the whole circuit will not work.	When supply of any one of the components is disrupted, it does not affect any other component.
In this circuit, the total voltage across the circuit is the sum of the voltages across each of the components. The total resistance across the circuit is the sum of resistances across each of the components. That is, $V = V_1 + V_2 + V_3$ and $R = R_1 + R_2 + R_3$.	As the components branch out, same voltage can be applied to each of the components. $V = V_1 = V_2 = V_3$
A circuit diagram consisting of 3 bulbs, a cell and a switch connected in series is given below. 	A circuit diagram consisting of a power source and 2 resistors connected in parallel is given below. 

Chapter - 5 LIGHT

Evaluation:

I. Choose the correct answer:

- c) rectilinear propagation, straight line
- b) opaque
- d) specular and diffused
- b) steel spoon, wood
- a) it obeys laws of reflection
- b) virtual, same size and laterally inverted
- a) earth, sun and moon
- b) (i), (ii) and (iii)
- a) perpendicular drawn to that of the reflecting surface.

II. Fill in the blanks with the correct word/phrase:

- virtual, screen
- energy
- reflection
- periscope
- umbra, penumbra

III. Complete the sentences by giving reasons:

- When an opaque object is kept in the path of the light, the object will block the light and forms a shadow.
- The pinhole acts as the lens creating an inverted image.
- The reflecting surface is shinier on a brand new spoon than an old spoon and hence the reflection is clearer.
- Because of formation of shadow when a light hits an opaque object.
- Because when white light passes through a rain drop it will separate into seven colours forming spectrum.

IV. Match the following:

- f. moon
- e. fire fly
- a. splitting of white light
- b. opaque

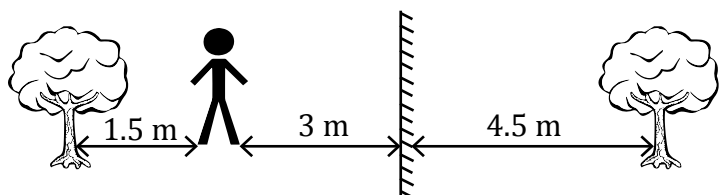
5. g. umbra
6. d. $i = r$
7. c. form of energy

V. Answer the following:

1. There are two laws of reflection:
 - i. The angle of incidence and the angle of reflection are equal.
 - ii. The incident ray, reflected ray and the normal at the point of incidence lie on the same plane.
2. Differences between natural and artificial sources of light:

Natural Sources	Artificial Sources
Sources that can naturally produce light of their own are called natural sources of light.	Light sources that do not produce their own light, but use artificial means to produce light are called an artificial light sources.
Fireflies, jellyfish, glow worms and certain sea plants are natural sources of light	Candles, Light bulbs, flash lights and neon lights are examples of artificial light sources.

3. Distance between the person and the mirror = 3 m
 Distance between the person and the tree (object) = 1.5 m
 The image formed in the mirror = $3 + 1.5 = 4.5$ m
 The distance between the image of the tree and the person = $4.5 + 3 = 7.5$ m

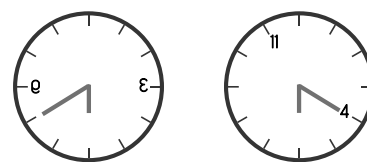


4. Difference between a mirror and a glass plate:

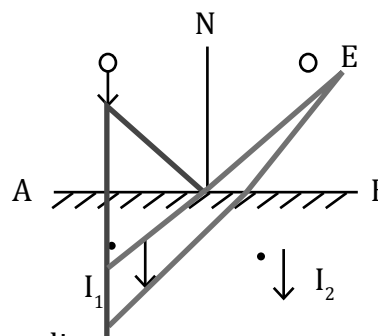
Mirror	Glass Plate
i. A mirror has a one sided polished surface.	i. A glass plate doesn't have a polished surface.

ii. Light rays can be reflected from a mirror.	ii. Light rays will pass through the glass plate.
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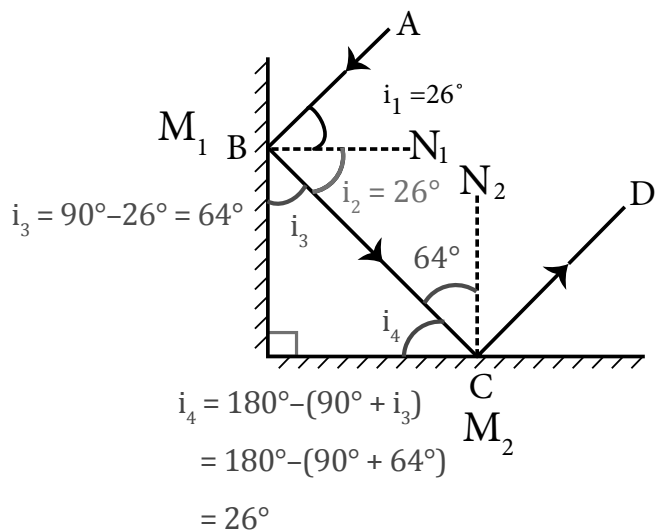
5. According to the laws of reflection, the angle of incidence and the angle of reflection are equal. Here, the angle of incidence = 300° from the surface.
 Hence, angle of incidence from the normal = $900^\circ - 300^\circ = 600^\circ$
 Therefore, angle of reflection = 600° from the laws of reflection.
6. a) Ambulance
 b) Because the mirror shows a property called "lateral inversion". It is a phenomenon in which when an object is placed in front of the mirror the right side of the object becomes left side of the image and the left side of the object becomes right side of the image. Therefore the already written inverse AMBULANCE when viewed through the rear view mirror (having convex mirror which provides a wide view of field) of the vehicle then the driver could easily get to know about the ambulance and give way to it.
7. The images are as follows:



8. a) virtual b) Ray diagram from O to E.



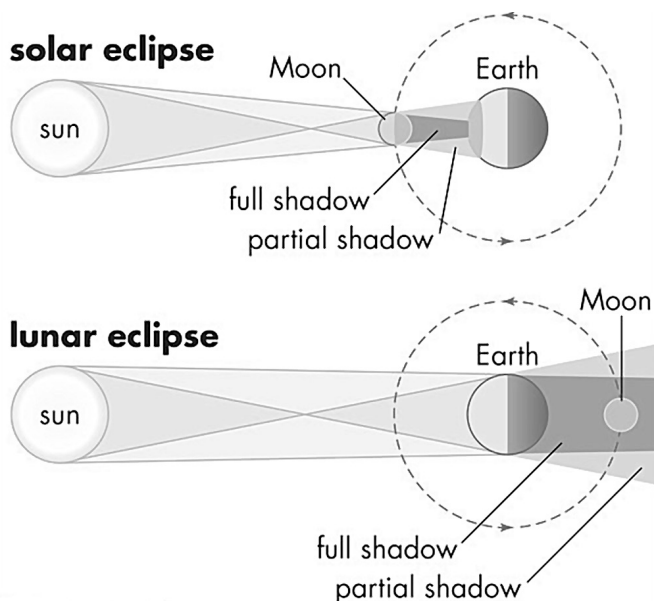
- c) image distance
9. a) AB, BC
 b) 64°
 c) 26°



VI. Answer the following in detail:

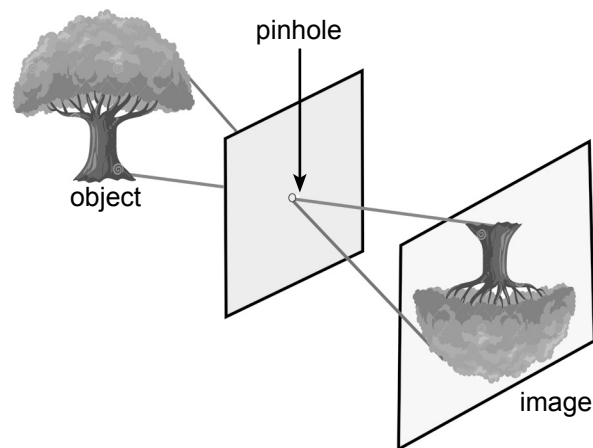
1. Formation of eclipse:

- An eclipse is a naturally occurring example of a shadow.
- When the moon comes between the sun and the earth, the shadow of the moon falls on the earth. So, we are unable to see the sun. This is a solar eclipse.
- When the earth comes between the Sun and the Moon, the shadow of the Earth falls on the moon. Hence, we are unable to see the moon. This is called a lunar eclipse.



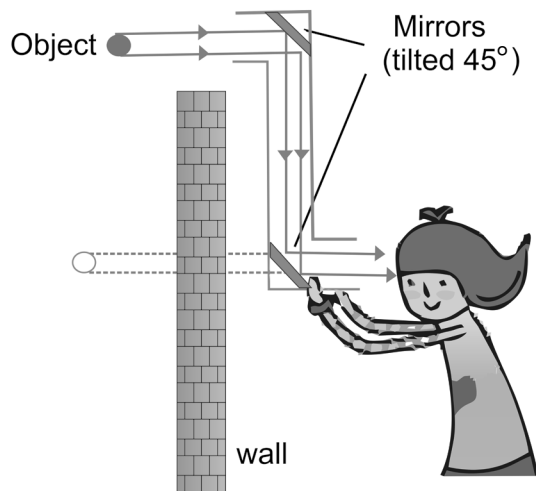
- Pinhole camera:** A pinhole camera is the simplest camera built on the principle that light travels in a straight line.

- A pinhole camera consists of a light-proof box, a light sensitive material/ film at one end and a pinhole at the other end.
- Let us consider taking an image of an object using a pinhole camera. Each point in an object emits light.
- A beam of light from each of these points passes through the pinhole and creates a point on the other side of the wall. Then, an image is formed on the film.
- Now, the pinhole acts as the lens.
- The image created is an inverted image. The smaller the pinhole, the sharper is the image obtained.

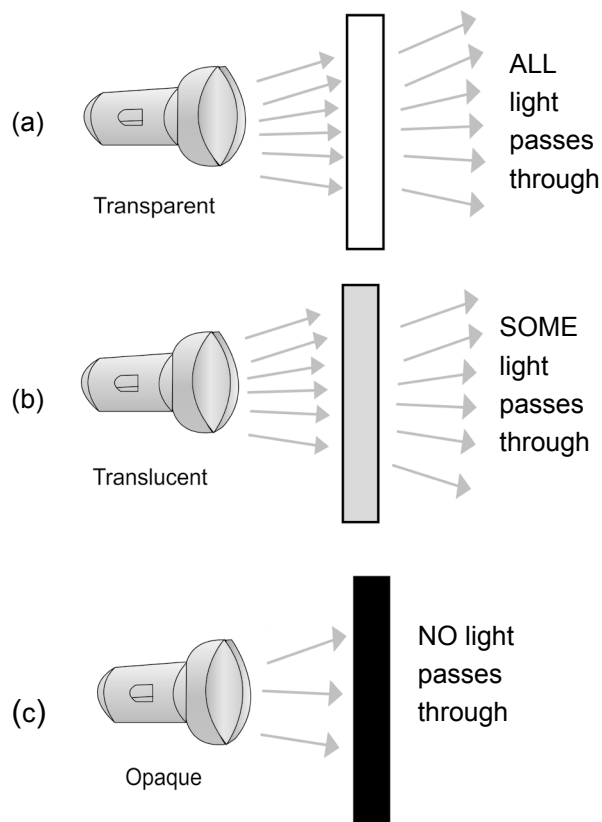


b) **Periscope:** Periscope uses the laws of reflection.

- You can use an empty agarbathi box and two plane mirrors to make a periscope.
- As shown in the figure below, two plane mirrors are kept 45 degrees to horizontal.
- As shown the figure aside, the light rays from the distant object enter through the tube at 1, and hit the mirror at 2.
- As the angle of incident must be equal to angle of reflection, the reflected rays flow through the tube downwards.
- As the light rays hit the mirror at 3 once again they are reflected. These reflected rays then travel out of the box to our eye.



3. According to the interaction of light with matter, materials can be divided into three categories.



Transparent materials: A material that allows the light to pass through it is called transparent. Some examples of transparent materials are clear water and plain glass.

Translucent materials: A material that allows light to partially pass through it is called translucent. Here, part of the light coming to the material will pass through it and the rest will be reflected by the material.

Examples of translucent materials are rough glass and thin light coloured polythene.

Opaque material: A material that does not allow the light to pass through it is called opaque. Here, the material will completely block the light that comes toward it. Examples of opaque materials are wood and cardboard.

4. **Incident ray:** The ray of light that falls on the surface of the reflection material.

Reflected ray: The ray of light that emerges out from the point where the incident ray falls on the reflection material.

Normal: The perpendicular line drawn from the point of incidence to the plane of reflecting surface is called normal.

Angle of incidence: The angle formed between the incident ray and the normal ray is angle of incidence.

5. When the tube is bent, we cannot see the source of light. When the tube is held straight we can see the flame. The two pictures infer that light travels in a straight line which is also called rectilinear propagation of light.

Chapter - 6

UNIVERSE AND SPACE

Evaluation:

I. Choose the correct answer:

1. b) 27
2. c) helio centric
3. d) spiral
4. a) Hubble
5. a) Great Bear

II. Fill in the blanks:

1. waxing, waning
2. Ptolemy, Nicolaus Copernicus
3. Aryabhata
4. 88
5. cosmic microwave background radiation

III. Match the following:

- | | |
|------------------------------|------------------|
| 1. c. SLV 3 | 3. e. PSLV C37 |
| 2. d. First Indian Satellite | 4. b. Sputnik |
| | 5. a. Mangalyaan |

IV. Analogy:

1. irregular galaxies
2. light year

V. Answer the following in brief:

1. This happens on full moon night at Triveni Sangamam of Kanyakumari. When we observe a full moon at night, its illuminated face is due to sunlight shining on it - the Earth is between the Sun and the Moon.
2. Planets like Mercury, Venus, Mars, Jupiter and Saturn not only go around the Earth but also make retrograde motion on their own are called epicycles.
3. Some matter in the space does not interact with electromagnetic radiation such as light. So it is not observable using the existing instruments. Though its influences are detected by various astrophysical instruments, they could not be explained using the existing gravitational laws and theories. Such matter is called dark matter.
4. Zodiac belt is a region in which the Sun, the Moon and other visible planets move around the Earth as we observe. There are 12 constellations in this zodiac belt. The Sun, the Moon and the planets move in this belt with these 12 constellations in their background.
5. The celestial object that has a fixed path (orbit), in which it moves around the star (the Sun), are known as Planets. Stars have their own light, whereas planets do not have their own light, they reflect the sunlight that falls on the planets.
6. This is extensively used by the scientists to observe distant stars, planets of our system and as well as the galaxies beyond our own. This is not placed on Earth to avoid the influences of the Earth's atmosphere. It is placed in space to have an unobstructed view of the universe. It is named after the scientist Edwin Hubble.

7. A constellation is a recognizable pattern of stars in the night sky when viewed from the Earth.

8. Spiral galaxy, Elliptical galaxy, Barred spiral galaxies, Irregular galaxy

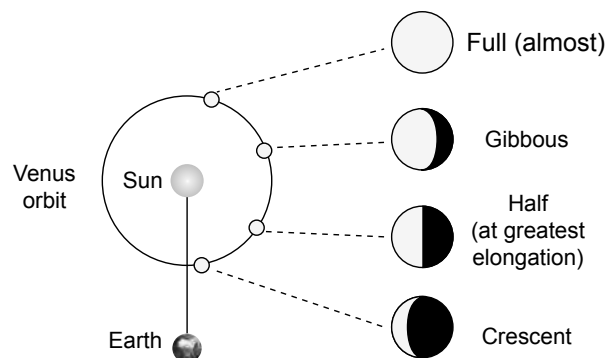
9. PSLV – Polar Satellite Launch Vehicle

GSLV – Geosynchronous Satellite Launch Vehicles

VI. Answer in detail:

1. The waxing and waning phases of Venus:

- i. As the Venus went around the epicycle, it would exhibit phases as shown in the figure aside.
- ii. Also at times the planet would be nearer, making the apparent size grow bigger and at times farther making the apparent size smaller.
- iii. If the Venus was going around the Sun, and its orbit is inside that of the Earth, Venus would appear always near the Sun in the sky. It can never be seen in the midnight sky.
- iv. Secondly, when it is near the Earth, it would be brighter and bigger compared to when it is on the other side of the Sun.
- v. Thirdly, only if the Venus is revolving around the Sun, it can exhibit gibbous phase, and the size of the gibbous phase is smaller than the crescent phase.
- vi. If the Venus was revolving around the Earth, we can never see the gibbous phase of the Venus and it would be seen only if it is orbiting around the Sun.



2. The Big Bang Theory:

- i. According to the Big Bang Theory, space and time emerged together around 14 billion years ago.
- ii. Then, the entire universe was condensed in one single point which was thousands of times smaller than a pinhead. That point was unimaginably denser and hotter. Then suddenly it exploded. Time, space and matter began with the Big Bang.
- iii. In a matter of a fraction of a second, the universe grew from smaller than an atom into bigger than a galaxy. Over the next three minutes, the temperature of the universe dropped below 1 billion degrees Celsius.
- iv. After 3, 00,000 years, it cooled to about 3000 degrees Celsius. Atomic nuclei were finally able to capture electrons at this stage which lead to the formation of atoms and molecules.
- v. At this stage, the universe was covered with giant clouds of Hydrogen and Helium gases. Gradually, these gases were pulled towards where the dark matter was denser and were later formed into the first stars and galaxies.
- vi. As millions of years passed, the denser areas pulled in matter as they had larger gravity. About 100 million years after the Big Bang, the gas that gathered together was hot and dense enough for the first stars to form. Back then during this time, new stars were forming at the rate of at least 10 times higher than the present day universe. Large clusters of stars gathered to form the first galaxies.
- vii. The only evidence we have of this Big Bang is, the faint glow in the space which is called the 'cosmic microwave background radiation'.

3. **Types of galaxies:** A galaxy is a cluster or collection of stars, dust, dark matter, gas, etc. which are held together by gravitational attraction.

Spiral galaxy: This is the most common type of galaxy. It makes up more than two thirds of all observed galaxies so far. A spiral galaxy has a flat disc and a bulging centre. The disc spins at a speed of hundreds of

kilometers per second and the bulge is surrounded by spiral arms. The bulge is brighter than the arms. The spinning motion of the disc causes the matter in the galaxy to take the distinctive spiral shape. It looks like a large cosmic pinwheel. Our Milky Way galaxy is an example for a spiral galaxy.

Elliptical galaxy: These galaxies are generally round but elongated along one axis. The universe's largest known galaxies are elliptical. The star clusters inside of this galaxy moves more randomly than that of the star clusters in a spiral galaxy. These are giant galaxies whose arms sprawl across around 2 million light years. They have mostly older stars with less interstellar matter and dust.

Barred spiral galaxies: These galaxies are nothing but spiral galaxies with a linear bar in the centre which gives a slightly elongated shape to the galaxy but not very long like elliptical galaxies. This also has a brighter bulging centre with not-so-bright arms spiraling around it. The peculiarity about these types of galaxies is they tend to form in the densely populated spaces of the universe. Just like elliptical galaxies, they also have less interstellar matter and dust.

4. Constellations:

- i. A constellation is a recognizable pattern of stars in the night sky when viewed from the Earth.
- ii. International Astronomical Union has classified 88 constellations to cover the entire celestial sphere.
- iii. Many of the old constellations have Greek or Latin names and are often named after mythological characters.
- iv. Ursa Major (Saptha Rishi Mandalam) is a large constellation and it covers a large part of the sky.
- v. The most striking feature of this constellation is a group of seven bright stars known as big dipper (seven Sages in Indian astronomy).
- vi. Ursa Minor in Latin means 'THE LITTLE BEAR' and it lies in the northern sky.
- vii. The Pole star, Polaris (Dhruva) lies within this constellation.

- viii. The main group, 'little dipper', consists of seven stars and is quitesimilar to that found in Ursa Major.

Chapter 7 MATTER AROUND US

I. 1. Elements and compounds

2. Mixtures
3. Metals, nonmetals and metalloids
4. Elements, mass
5. Nitrogen and oxygen
6. Atomicity

II. 1) Nitrogen, Oxygen

- 2) Sulphur, Carbon
- 3) Elements and compounds
- 4) Water, Ammonia

III. 1. The smallest particle of an element is called its atom. Some elements exist in nature as a combination of two or more of its atoms. The general name given to such combined atoms of elements that occur in nature is molecule.

2. An element is the basic and simplest form of matter that cannot be broken down into a simpler chemical substance. A compound is defined as a pure substance containing two or more elements combined with each other in a fixed ratio by mass.
3. Pure substances mean that they contain only one type of particle; all others that have more than one type of particle are impure substances or mixtures.
4. Elements that show most or all of the following properties are called metals.
 - They are shiny (lusture).
 - They can conduct heat and electricity.
 - They can be beaten into sheets (malleable).
 - They can be drawn into thin wires (ductile).
 - They can make a ringing noise when hit (sonorous).

Elements that show most or all of the following properties are called non-metals.

- They do not shine.
- They generally do not conduct heat or electricity.
- They are not malleable, ductile or sonorous.
- They are soft.
- They exist in all three states of matter.

IV. 1. Mercury – Liquid metal (all other are solid metals)

2. Bromine – Liquid (all others are solids)
3. Iron – Element (all others are compounds)
4. Milk – Impure substance (all others are pure sustances)

VI. 1. Gaseous at room temperature.

2. Carbon.
3. Compounds combined to form molecules of compounds
4. Elements

VII. 1. Elements can be represented by symbols. Originally the symbols were all diagrammatic as proposed by Dalton. He also made it clear that the symbol will represent one particle of the element.

2. The number of atoms present in one molecule of the element is also called its atomicity.
3. Elements that have intermediate properties between that of metals and non-metals are called metalloids. Some common examples of metalloids are boron, silicon, arsenic, germanium and antimony.
4. Glucose – $C_6H_{12}O_6$; Ammonia – NH_3 ; Carbon monoxide – CO
5. Latin name of sodium is Natrium. We use 'Na' first two letters as symbol for sodium.
6. Molecule of an element contains more atoms of same kind. Molecules of compounds are formed by different atoms.
7. A change of state directly from solid to gas without changing into liquid state is called

sublimation. Some solids like camphor and iodine do not become liquids but directly become vapors on heating.

- VIII.** 1. False 4. False
2. True 5. True
3. False

- IX.** 1. The particles in a solid are closely packed and cannot move. When we heat a solid in a container, the particles absorb the heat energy and start vibrating in their own positions. When more heat is supplied the particles gain more energy, break away from their positions and start moving; at this stage the solid slowly gets converted into a liquid and this process is called melting. Let us continue heating, the particles gain more and more energy and start moving faster and the liquid changes into a gaseous state. This process is called boiling. When we continue heating the gaseous particles move faster and further away from each other and eventually move out of the container.
2. Refer question III 4 and let students try themselves.

X. H.O.T.S

1. On heating the particles in all the three physical states (solid, liquid and gas) gain kinetic energy and expand as they move apart and occupy more spaces. This phenomenon is called 'thermal expansion'. Gases show more expansion than liquids and solids.

2. a.  b.  c. 

Chapter 8 ATOMIC STRUCTURE

- I.** 1. Rutherford 1803 - Planetary model of an atom
2. Thomson 1911 - Water-melon model of atom
3. Dalton 1897 - Atoms cannot be created or destroyed

- II.** 1. Protons and neutrons

2. Protons, electrons
3. Neutrons
4. Valency
5. 3
6. 0.0000000001 m

- III.** 1. Both assertion and reason are true. And it is the correct explanation.
2. Both assertion and reason are true. And it is the wrong explanation.

Correct reason: Mass of the electrons is negligible compared to mass of nucleus

3. Assertion is wrong. Reason statement is correct.
Assertion: The number of protons is atomic number.

Reason: The mass number is sum of protons and neutrons.

This is the way how atomic number and mass number is defined.

- IV.** 1. Electrons
2. Number of protons or number of electrons
3. Carbon

- V.** 1. Postulates of Dalton's theory are
- Matter is made up of tiny indivisible particles called atoms, which can neither be created nor destroyed.
 - Atoms of same elements were similar while those of different elements were different in size and mass.
 - Atoms of different elements combined to form compounds.

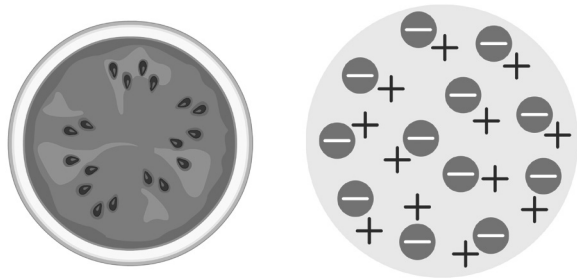
2. Nucleus contains protons and neutrons. Their masses are almost same. Their masses are 2000 times greater than mass of electron. So nucleus is heavier than rest of the atom.

3. Thomson's model proposed the following about the atom:
- Atoms are spherical in shape with positive charge spread throughout them.
 - The electrons carrying negative charges were embedded in the sphere randomly,

like seeds in a watermelon.

- The positive and negative charges cancelled each other, making the atom neutral in nature.

The model looks similar to a watermelon. So it is also called 'watermelon model'.



- The total number of electrons in an atom is called its atomic number and is represented by Z .

$Z = \text{atomic number} = \text{no. of } e \text{ in an atom} = \text{no. of } p \text{ in an atom.}$

The total number of particles present in the nucleus of the atom is called its mass number and is represented by A . It is also called the atomic mass of the atom.

$A = \text{total number of particles in atom nucleus} = \text{No. of } p + \text{No. of } n.$

- In SO_2 , 1 S combines with 2 O; valency of S will be $2 \times 2 = 4$.
- Na has a valency of 1 and O has a valency of 2. 2 Na will combine with 1 O forming Na_2O .

- VI.** 1. Elements with same atomic number but different mass numbers are called isotopes. Isotopes will have same number of electrons and protons but different number of neutrons.

Eg: C_6^{12} and C_6^{14} are isotopes.

Elements with the same mass number but different atomic number are called isobars.

Eg: Ca_{20}^{40} and Ar_{18}^{40} are isobars.

- All elements have atoms with neutrons except for one. A normal hydrogen (H) atom does not have any neutrons in its tiny nucleus. That tiny little atom (the tiniest of all) has only one electron and one proton. You can take away the electron and make an ion, but you can't take away any neutrons.

But in a natural state, atoms are neutral. So it should have equal number of electrons as much number of protons it has.

- Protons, neutrons, and electrons are the three main subatomic particles found in an atom.

Protons have positive charge, electrons have negative charge and neutrons do not possess any charge.

Electrons are the least massive of an atom's subatomic particles, with a mass of 9.11×10^{-31} kg. Protons have a mass (1,836 times that of the electron) 1.6726×10^{-27} kg, while neutrons are the most massive of the three, at 1.6929×10^{-27} kg (1,839 times the mass of the electron).

- a. KCl b. FeCl_3 c. Fe_2O_3
- d. Ca_2O_2 e. K_2O

- VII.** 1. Most of the mass of an atom is possessed by nucleus. So an atom without electrons will have mass (mass cannot be neither created nor destroyed). A normal hydrogen (H) atom has only one electron and one proton. You can take away the electron and make an ion. (ion – unbalanced charged atom).
- Common salt is sodium chloride, the ionic compound with the formula NaCl , representing equal proportions of elements, sodium (Na) and chlorine (Cl). Ions in common salt are positive sodium ion and negative chlorine ion.

Element	Atomic number	Mass number
Sodium, Na	11	23
Chlorine, Cl	17	37

Chapter - 9 CHANGES AROUND US

Evaluation:

I. Fill in the blanks:

- Mass
- Physical change
- Exothermic physical change
- Melting

5. Vapour
6. Condensation

II. Choose the correct answer:

- | | |
|-----------------------|------------------------|
| 1. b. evaporation | 5. b. carbon dioxide |
| 2. b. crystallization | 6. b. solid to gaseous |
| 3. a. physical | 7. a. melting |
| 4. b. curdling | 8. b. crystallization |

III. State true or false:

- | | |
|----------|-----------|
| 1. True | 6. True |
| 2. True | 7. False |
| 3. False | 8. True |
| 4. False | 9. False |
| 5. False | 10. False |

IV. Answer in 1 or 2 sentences.

1. Properties such as colour, size, shape, smell, texture, density, solubility, mass, volume, lustre, malleability (flexibility) and ductility (ability to be drawn into a thin wire) are termed as physical properties.
2. The process in which only physical properties of a substance undergo a change and there is no change in its chemical composition is a physical change.

Examples - shredding of paper, melting of ice, etc.

3. Upon heating a substance or an object, the arrangement of particles in it gets disturbed. The particles move away from each other, substance expands and volume increases.
4. Water vapours that evaporate from the earth's surface cool and condense as water droplets. Many water droplets collect together to form clouds.
5. There are certain solid substances, such as camphor and naphthalene, which can be converted into gas directly on heating without becoming liquid. This process in which a solid is converted into vapour is called sublimation.
6. Changes in which there is formation of a new substance with different chemical composition or transformation of a substance into another

substance are called chemical changes. Examples – Rusting of iron, rotting of fruits, etc.

7. Fermentation is the process in which certain microorganisms break down sugar solution into alcohol and carbon dioxide. It is an irreversible process as the alcohol formed cannot be turned back into sugar.
8. Conditions needed for a chemical change are:
 - physical contact of substances
 - change in pressure
 - heat
 - electricity

V. Answer the following in detail:

1. When we add or remove heat, there is a change in the state of a substance. Due to addition of heat, the particles move faster. Processes such as melting and vapourization occur on heating. Hence these processes are called endothermic processes. Due to removal of heat, the particles slow down in their movement. Processes such as freezing and condensation occur when heat is removed. Hence these processes are called exothermic processes. Similar to physical changes, chemical changes can also be either endothermic or exothermic. During a chemical change, there may be absorption or release of heat. For example, when a paper is burnt, heat is absorbed, but while adding water to quicklime heat is given out.

2.

Freezing	Crystallization
Exothermic physical change	Endothermic physical change
Fast process	Slow process
Take place at fixed temperature	Take place at any temperature
Good preservation technique	Helps to remove solid impurities

3. The particles of liquids move randomly at different speeds. Some of the particles, especially the ones at the surface, could be moving in a direction away from the liquid. These particles have adequate energy to overcome the attractive forces of the liquid and escape into the air. Thus, slowly and steadily the

liquid escapes into air in the form of vapours. This process is evaporation. Evaporation is a separation technique used to separate dissolved solids from a solid-liquid mixture. This is the technique used to extract salt from sea water.

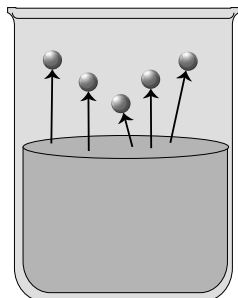


Fig. Behaviour of particles during evaporation

4. Characteristics of a chemical change are:
 - a) new substance is formed
 - b) heat, light or any other radiation may be given off or absorbed
 - c) sound may be produced
 - d) gas may be formed
 - e) smell may change or new smell may be given off
 - f) colour may change
5. Characteristics of a physical change are:
 - a) the physical properties of the substance may undergo a change
 - b) no new substances are formed
 - c) the chemical properties of the substance do not change
 - d) the change is usually temporary and reversible in nature

VI. H.O.T.S:

1. Sublimation is endothermic because it requires energy to convert a solid into a gas. The atoms or molecules in a solid substance are tightly packed. In order to excite the atoms or molecules enough to turn into a gas, energy must be added, which makes sublimation an endothermic process.

Example: Naphthalene, an organic compound commonly found in pesticides such as mothballs, sublimates easily because it is made

of molecules that are held together only by weak intermolecular forces. Naphthalene is a solid that sublimates at normal room temperature (solid form of naphthalene evaporates into gas). On cool surfaces, the naphthalene vapours will solidify to form needle-like crystals.

2. Curdling is a process in which liquid gradually turns into solid by forming clumps. It is an irreversible and permanent change. Melting of butter is a reversible change because on freezing, the melted butter changes back to its solid form. Whereas curdling of milk is an irreversible change because on curdling, milk changes to curd and cream (solid lumps), and gets spoilt when not refrigerated, and cannot be changed back to milk (liquid) by any process.
3. Food must be broken down into a form that our cells can use. Our bodies physically and chemically digest food. When we eat, our bodies physically break down food into small pieces. When food is physically changed, mechanical digestion occurs. Mechanical digestion occurs in the mouth, stomach, and small intestine. Our bodies also chemically break down those small pieces of food into tiny organic (simple sugar) molecules. This process is called digestion. Chemical digestion begins in the mouth when enzymes in saliva begin to break down carbohydrates. Most chemical changes in digestion occur in the small intestine. Large molecules of food are broken down into smaller molecules that can be absorbed by our cells. Carbohydrates, proteins, and fats are broken down in different parts of the digestive system using different kinds of enzymes. Different kinds of small molecules are formed by these processes.
4. When heat is added to a body, various things can result:
 - a) *Expansion* – When heat is added to a solid, the particles gain energy and vibrate more vigorously about their fixed positions, forcing each other further apart. As a result expansion takes place. Similarly, the particles in a liquid or gas gain energy and are forced further apart. The degree of expansion depends on the substance.

- b) *Increase in temperature* – When heat energy is added to a substance, this results in an increase in the kinetic energy of its particles, that is, the particles move at higher speeds. Since temperature is a measure of the average kinetic energy, the temperature increases.
- c) *Change of state* – When a solid changes to a liquid or a liquid changes to a gas, the temperature does not change while the change of state is taking place. The heat absorbed is being used to separate the particles and there is no rise in temperature. When the change is reversed exactly the same amount of heat is released. The heat energy involved in a change of state is called the latent heat.
- d) *It may also undergo a chemical change* – In order for a chemical reaction to take place, the particles require threshold energy. Heating helps these particles to attain this energy. It produces different substances with different properties.
5. A physical change is a change to a sample of matter in which some properties of the material change, but the identity of the matter does not. Change in state of a substance is a physical change. When we heat the liquid water, it changes to water vapor. But even though the physical properties have changed, the molecules are exactly the same as before.

Chapter - 10

THE CHEMISTRY OF POLYMERS

Evaluation:

I. Fill in the blanks with the correct word/phrase:

- artificial silk
- cellulose or chitin
- amorphous
- 500 years
- Non-biodegradable

II. Choose the correct answer:

- d) all of the above
- d) Rayon
- b) bakelite
- d) landfill
- a) PYREX

III. Match the following:

- c. fibre
- a. thermoplastic
- b. thermosetting plastic
- e. nonstick cookwares
- d. wood pulp

IV. Answer the following questions:

- Proteins, carbohydrates, cellulose, chitin, rubber, lignin.

2. Characteristics of synthetic fibres:

- Do not wrinkle easily.
- Dries quickly and durable.
- Easy to maintain, lightweight.
- Less expensive, readily available and resists oils and chemicals.

3. Differences between thermoplastics and thermosetting plastics:

Thermoplastics	Thermosetting Plastics
Long, straight chained polymers form thermoplastics.	Cross-linked polymers form thermosetting plastics.
They change their shape upon heating and cooling.	Once formed they do not undergo shape conversion upon heating and cooling.
Expensive	Cheap
Recyclable	Not recyclable
Eg., polyethene, PVC, PET bottles	Eg., bakelite and melamine

Note: Any two of the above differences can be given excluding the examples.

- Silica sand and boric oxide are the two raw-materials.
- Flammable materials, plastics, paints, electronics, and batteries are some of the house-hold hazardous wastes.

V. Answer in detail:

1. The stages of processing wool:

Step 1:

Shearing: The hair of the animal is usually removed in hot weather by a machine or a large razor. This will not hurt the animal as the uppermost layer of the skin is dead.

Step 2:

Scouring: The sheared hair is washed vigorously with soapy water to remove the oils, dirt and dust.

Step 3:

Sorting: The cleaned hair is sent to the factories and separated as fibres of different thickness/textures.

Step: 4:

Dyeing: Thus collected fibres are coloured as the natural fleece of these animals is black, brown or white.

Step 5:

The wool thus obtained is smoothened, washed, combed and spins into yarn used for making sweaters and others are spun and woven into other wooleen cloths.

- Plastics are non-biodegradable and once introduced into the environment it takes several years to decompose. On burning plastic, it releases poisonous gases which are harmful to the living beings. The plastics even choke the respiratory tract of animals like cows when consumed leading to death. Hence, the usage of plastic should be avoided.

3. Differences between bio-degradable and non-biodegradable plastics:

Biodegradable Plastics	Non-biodegradable Plastics
------------------------	----------------------------

These can be broken down into simple, non-poisonous substances by the action of microorganisms in nature.	These cannot be broken down into simple, non-poisonous substances by the action of microorganisms in nature.
They can be recycled naturally and do not pollute the environment.	They cannot be recycled naturally and causes environmental pollution.
They persist for small time intervals in the environment.	They persist for longer time intervals in the environment.
Examples – PLA (Polyactide Acid), PHA (Polyhydroxyalkanoate)	Examples – Glass objects, polythene bags

VI. Give Reasons:

- As they are not softened on heating.
- As they are very strong in nature and are stronger than the steel wires.

Chapter - 11

CHEMISTRY IN DAILY LIFE

Evaluation:

I. Fill in the blanks:

- Analgesics
- Oral Rehydration Solution
- 12.683
- Acidity
- Ampicillin, amoxicillin and penicillin G
- Antiseptics
- Ignition temperature
- Combustion
- Exothermic
- Calorific value

II. Match the following:

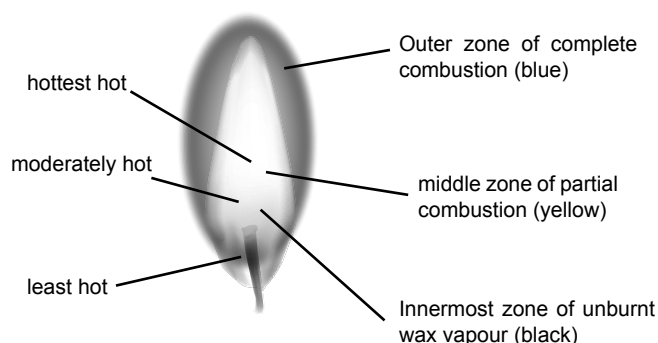
- b. reduce body temperature

2. a. reduce pain
3. d. ORS solution
4. c. spontaneous combustion
5. e. leads to respiratory problem

III. Answer the following in 1 or 2 sentences:

1. Some microorganisms and plants synthesize chemicals which are toxic in nature to protect them from invading organisms. The biosynthesized chemicals isolated from the plants/microorganisms and used as medicines against infectious diseases. These substances were called as antibiotics.
2. The reaction in which heat and light is emitted in the form of energy is called exothermic reaction. Ex: burning candle
3. The chemical process in which a substance reacts with oxygen to produce heat is called combustion.
4. The term analgesic means a medication that provides relief from pain without putting one to sleep or making one lose consciousness.
5. It is used to replace fluids and minerals (such as sodium, potassium) lost due to diarrhea and vomiting. It helps prevent or treat the loss of too much body water (dehydration).
6. There are five types of combustion namely - complete combustion, incomplete combustion, rapid combustion, spontaneous combustion and explosive combustion.

7. Parts of flame:



8. Antacids are a class of medicines that help neutralize the acid in the stomach. They are made of ingredients such as aluminium,

calcium, magnesium, or sodium bicarbonate which act as bases (alkalis) to counteract the stomach acid.

9. Cumin, witch hazel, ashwaganda, pineapple, coptis, chrysanthemum, sheabutter are some of the non-inflammatory herbs.

10. The story of discovery of Penicillin:

- i. When people were suffering from deadly diseases like pneumonia; sour throat etc. caused by bacterium *Staphylococcus aureus*, in 1928, the **Scottish bacteriologist Dr. Alexander Fleming** was taking a lot of interest to find an effective medicine to kill these bacteria.
- ii. One day, he left the petri dishes containing the bacterium ***Staphylococcus aureus***, without storing it properly and when he returned he noticed that the petri dishes containing the bacterium *Staphylococcus aureus* had been contaminated with a mould because of his carelessness.
- iii. He took time to examine the growth of the mould (*Penicillium Notatum*) under his microscope. He observed that the mould had created a germ-free zone in which the bacteria did not grow any further.
- iv. He concluded that the mould must be producing an antibacterial agent, which not only inhibited the growth of the bacteria but, more importantly, it might also be harnessed to combat infectious diseases.
- v. Thus, Penicillin was accidentally discovered and he received the Noble Prize for this discovery.

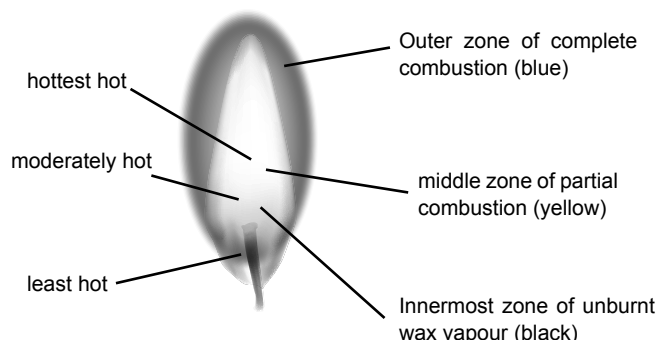
IV. Answer the following in 1 or 2 sentences:

1. Preparation Of ORS at home:

- i. One can make ORS at home using salt, sugar and water.
- ii. Take 4 cups of clean drinking water.
- iii. Mix $\frac{1}{2}$ small spoon of salt.
- iv. Add 6 small spoons of sugar.
- v. Mix it thoroughly.
- vi. Drink this homemade ORS several times a day until you recover from dehydration and

diarrhea.

2. Structure of the flame:



The flame has three distinct colours in it namely, inner part, middle part and outer part.

Inner Part: It is the least hot part of the flame. This is the black part of the flames that contains unburnt vapour of the fuel of the carbon from the wick i.e. unburnt fuel.

Middle Part: This is the biggest part of the flame. The colours in this are varying shades of yellow and orange. This is the luminous flame because it emits light. This part is also not extremely hot. This is because this part gets a limited supply of oxygen that results in incomplete combustion.

Outer Part: This is the hottest part of the flame. As this is the outer most part of the flame, it has a high supply of oxygen. As a result, complete combustion takes place at this part, hence the highest temperature of all the three parts. Also, this part of the flame burns with a blue colour. It is non-luminous, which means it does not emit any light.

3. **Types of combustion:** There are five types of combustion namely – complete combustion, incomplete combustion, rapid combustion, spontaneous combustion and explosive combustion.

Complete Combustion: Complete or clean combustion occurs when there is an unlimited supply of air, oxygen in particular. Here the hydrocarbon will burn out completely with the oxygen and leave only two by-products, water, and carbon dioxide. E.g.: Combustion of propane gas.

Incomplete Combustion: Incomplete

or dirty combustion takes place when the air is in limited supply. Due to lack of oxygen, the fuel will not react with the oxidizing agent completely. As a result this type of combustion produces carbon monoxide and soot. E.g.: Burning of paper and coal.

Rapid Combustion: It needs external heat energy for the reaction to start. This combustion produces a large amount of heat and light energy rapidly. It will last as long as the fuel is available. E.g.: Burning of LPG in a gas stove, Kerosene fueled stove.

Spontaneous Combustion: It happens on its own and requires no external energy for the combustion to start. A substance with low-ignition temperatures gets heated. E.g.: Phosphorous and sulphur burn instantaneously at room temperature.

Explosive Combustion: Explosive Combustion happens when the combustion reaction occurs very rapidly. The reaction occurs when something ignites to produce heat, light and sound energy. E.g.: Firecrackers

4. Fire extinguishers are used to cut off the supply of air or to bring down the temperature of the burning fuel or both and then put out the fire or control it.

Types of fire extinguisher:

The most common types of fire extinguishers are:

1. Air pressurized water extinguishers
2. Carbon-di-oxide extinguishers.
3. Dry chemical powder extinguishers.

Fire extinguishers are further broadly classified into five types:

- | | |
|----------------|----------------------|
| 1. Water, | 4. CO ₂ , |
| 2. Foam, | 5. Wet Chemical |
| 3. Dry Powder, | |

The classes of fire: There are five classes of fire: Class A, Class B, Class C, Class D, and Class E.

Class A fires – **Combustible materials:** caused by flammable solids, such as wood, paper, and fabric

Class B fires – **Flammable liquids:** such as petrol, turpentine or paint

Class C fires – **Flammable gases:** like hydrogen, butane or methane

Class D fires – **Combustible metals:** chemicals such as magnesium, aluminum or potassium

Class E fires – Typically a chip-pan fire

Electrical fires – **Electrical equipment:** once the electrical item is removed, the fire changes class

5. **a. Antacids:** Antacids are a class of medicines that help neutralize the acid in the stomach. They are made of ingredients such as aluminium, calcium, magnesium, or sodium bicarbonate which act as bases (alkalis) to counteract the stomach acid. As we know, mixing a base with an acid or vice versa will reduce the pH level of acid and make it neutral.

Some of the common symptoms of acidity are burning sensation in the chest or throat area, bitter taste in the mouth, persistent dry cough, pain when lying down and regurgitation.

Commonly used antacids that help treat acidity are Sodium Bicarbonate (NaHCO_3), Calcium Carbonate (CaCO_3), Magnesium Hydroxide ($\text{Mg}(\text{OH})_2$), Magnesium Carbonate (MgCO_3), Aluminium Hydroxide $\text{Al}(\text{OH})_3$

b. Antibiotics: Antibiotics (antibacterial) are medications that destroy or reduce the growth of bacteria. They are powerful medicines that have the ability to fight certain infections. Some microorganisms and some plants synthesise certain toxic chemicals to protect from other invading microbes. This toxic chemical can be productively extracted and used to support the human immune system in fighting against pathogens.

E.g: Ampicillin, amoxicillin, and penicillin are some penicillin-based antibiotics. Chloramphenicol, tetracyclines, cephalosporins, streptomycin are some antibiotics.

c. Antiseptics: Antiseptics are against pus formation. Antiseptics are substances that are applied on the body's surface only, to prevent or slow down the growth of microorganisms. They are predominantly used in hospitals and other medical settings such as clinics and

laboratories to reduce the risk of infection during surgery and other procedures.

Antiseptics are very effective against bacteria, viruses, fungi and other harmful microorganisms. There are plants with antiseptic properties like aloe vera, ginger and turmeric.

d. Antihistamines: An allergy is an immune response, or reaction by our body, to substances (allergens) that are usually not harmful.

For someone with allergies, the immune response is oversensitive. When the body recognizes an allergen, the immune system launches a response releasing chemicals such as histamines. These chemicals cause allergy symptoms.

For example: A person who is allergic to strong scent develops head ache or begins to sneeze when exposed to strong perfumes. Here perfume smell is the allergen which is not harmful but the body senses it and produces histamine which causes symptoms like headaches or sneezing.

Some of the allergy symptoms that are treated using antihistamines are:

- Congestion, runny nose, sneezing or itching
- Swelling of the nasal passages
- Hives and other skin rashes
- Itchy, runny eyes

Properties of antihistamines are present in some plants, vegetables and fruits too.

Chapter 12 THE LIVING WORLD OF PLANTS

I. **Choose the correct answer from the following:**

1. wind
2. fragmentation
3. mesophyte
4. fresh
5. male

II. **Match the following:**

Mint	Herb
Xerophytes	Deserts

Seas	Marine habitat
Unisexual flowers	Papaya
Banyan	Taproots
Corolla	Petals

III. State True or False

1. false 2. true 3. false 4. false

IV. Answer the following questions in one or two lines.

- Depending on their water requirements, plants are classified as hydrophytes, mesophytes and xerophytes.
- Reproduction is the process by which plants produce new individuals or offspring like themselves. Plants reproduce sexually or asexually
- A stamen has two parts – a thin long stalk called the filament and a knob like structure on top called the anther. The anther contains pollen grains, which contain the male gametes.
- Bees and insects are attracted to both the brightly coloured petals and the sweet fragrance of flowers. While they collect the nectar from flowers, they also help in pollination by transferring pollen grains from the anther to the stigma of flowers.

V. Answer the following questions.

- New plants are produced from other vegetative parts of the plant like the roots, stem and leaves. A part of the plant body gets detached and develops in to a new independent plant. You may have observed 'eyes' or buds on the skin of the potato. These can form new plants. In plants, like Bryophyllum, small plantlets develop along the leaf margins. These break off and grow into new plants. Plant parts as you will learn later in the lesson are also modified for vegetative propagation.
- In the taproot system mainly seen in dicots the thick primary root is the dominant root that performs all the important functions. It gives rise to smaller secondary and tertiary roots that spread out in the soil. In the fibrous root system as seen in grasses and other monocots the radicle of the embryo stops growing after a while, and a bunch

of roots begin to grow from the base of the stem. These thread like roots increase the surface area and help in absorption of water and nutrients from the soil.

- Pollination is the transfer of pollen grains from the anther to the stigma of a flower. Self pollination occurs when the pollen from one flower pollinates the same flower or other flowers on the same plant. Cross pollination takes place when pollen grains from one flower are transferred to a flower from a different plant.
- Based on their shape there are three main types of roots. In fusiform the modified taproot is thickened in the middle and tapers towards both the ends like a spindle. E.g. Radish. When the modified root is broad at the apex and gradually tapers towards the base like a cone, it is called a conical root or coniform. E.g. Carrot. In Napiform the modified root is swollen at the top and broad at the centre and abruptly tapers into a tail-like portion at the base, giving a top-like appearance E.g. Turnip.

Chapter 13 HEALTH AND HYGIENE

I. Fill in the blanks:

- balanced diet
- Flossing
- Gingivitis
- obesity

II. Say whether the following statements are true or false

- False
- False
- True
- False

III. Match the columns

Column A	Column B
Vitamin C deficiency	Bleeding gums
Haemoglobin	Red blood cells
Cod liver oil	Anemia

Mycobacterium tuberculosis	Tuberculosis
Communicable disease	Cholera

IV. Answer the following questions in one or two lines.

1. 'Health' is a state of complete physical and mental well being. According to the World Health Organization (WHO), 'Health is a state of complete, physical, mental and social wellbeing and not merely the absence of diseases'.
2. Hygiene is following certain practices that help to ensure cleanliness and good health. Personal hygiene means taking care of our own body, while social hygiene is keeping our surroundings clean.
3. Cataract is a disorder of the eye related to age. The lens in the eye loses its transparency. This condition can be cured by surgery in which the lens of the eye is replaced.
4. A good posture is very important and we must sit up straight, stand straight and walk upright. Good posture gives a graceful appearance to your body and also improves the flexibility of your joints.

V. Answer the following questions.

1. Some ways of protecting our eyes are as follows:
 - Keeping our eyes clean, and washing them two to three times a day with clean, clear water.
 - Eating a balanced diet with plenty of fruits and vegetables
 - Certain diseases like diabetes and high blood pressure affect the eyes. Regular exercise helps control these diseases and lowers the risk of eye problems.
 - Protecting our eyes from direct sunlight by wearing sunglasses.
 - Wearing protective eye wear while playing different sports and while working in factories.
 - Avoid sharing towels with others, even at home among family members.
2. Hair must be washed frequently, to remove all the excess oil, dead cells and sweat that

collects on it making it look greasy and dirty. Washing, shampooing, combing and brushing it regularly, keeps it clean and healthy. It also keeps away parasites like lice that can irritate the scalp and make it itch. Massaging the scalp also helps improve circulation of blood in the scalp and promotes healthy hair growth.

3.

Communicable diseases	Non-communicable diseases
Communicable diseases can be spread from one person to another	Non-communicable diseases do not spread from one person to another
These diseases are spread by germs / microbes	These diseases are not spread by germs / microbes
Antibiotics and other medicines can be used as a cure	Antibiotics cannot be used as a cure

4. Anemia is a condition when the blood does not contain sufficient healthy red blood cells or haemoglobin. Foods rich in iron that are recommended for people suffering from anemia are green leafy vegetables like spinach, Moringa leaves, peas, beans and lentils and sheep or chicken liver. Supplements like Cod liver oil tablet can also be taken.
5. Burns are classified as follows :
 - First degree burns affect only the top layer of the skin and cause reddening.
 - Second-degree burns affect the deeper layers of the skin and can cause blisters.
 - In third-degree burns the tissues of the deepest layer are damaged completely.

Chapter - 14 FUNCTIONAL UNITS OF LIFE

Evaluation:

I. Choose the correct answer from the following:

1. cell
2. red
3. membrane
4. rough

II. State true or false:

1. False
2. True
3. False
4. True

III. Analogy:

1. Multicellular
2. Chloroplasts
3. Brain of the cell

IV. Answer the following questions in brief:

1. Stem cells, are cells that are able to divide again and again to produce more cells. They have the unique ability to develop into other types of specialised cells like muscle cells, etc.
2. In plant cells, the cell membrane is surrounded by an outer membrane called the cell wall. It is made up of a non living substance called cellulose which gives it shape and rigidity.
3. Chromoplasts are plastids with different colours and are found in the petals of flowers and in vegetables. They contain pigments like carotene and xanthophyll.
4. Cells are interconnected with neighbouring cells through cytoplasmic bridges called plasmodesmata that allow transport of materials between cells.

V. Answer the following questions in detail:

1. The functions of the cell wall are as follows:
 - It acts as a framework and provides the cell with strength and support.
 - It protects the cell.
 - It gives shape and rigidity to the cell (due to the presence of cellulose)
 - It is freely permeable and allows the movement of substances in and out of the cell.
2. The food that we eat has to be broken down to release energy. This function is carried out by the mitochondria during cell respiration. They use up oxygen from the air to oxidise carbohydrates and fats and release energy. This energy is stored as an energy rich compound Adenosine triphosphate (ATP) and can be used for all the other cell activities. This is why mitochondria are often referred to as the powerhouse of the cell.

3 Centrioles are tiny micro tubular structures found in a small clear area of the cytoplasm called the centrosome. They are seen only in animal cells and are located near the nucleus. Their main function is to initiate and regulate cell division in animal cells. They help with the separation of chromosomes by forming spindle fibres.

4. The nucleus is the most important part of the cell. It is a small spherical organelle surrounded by a double membrane called the nuclear membrane. It is filled with nucleoplasm, within which are thread like structures called chromatin fibres and at least one nucleolus. The chromatin fibres change to chromosomes during cell division. Chromosomes contain DNA, the genetic material of the cell. The main functions of the chromosomes are to store and carry hereditary material from one generation to the next.

The nucleus plays an important role in cell division and regulates and coordinates all the activities and reactions that take place within the cell.

5. The difference between plant and animal cells are as follows:

Animal Cell	Plant Cell
Size is usually smaller with no distinct boundaries.	Size is larger with distinct boundaries.
Cell wall absent. This helps it to have different shapes.	Cell wall made of cellulose present. It restricts the cell membrane.
Cytoplasm occupies most of the space inside the cell.	Cytoplasm forms a thin lining along the periphery.
Plastids are absent.	Plastids are present.
Vacuoles, if present are small.	Vacuoles are large taking up almost 80% of the cell.
Centrosomes are present with one or two centrioles.	Centrosomes are absent.

VI. Assertion and Reason Questions:

1. a. Assertion and Reasoning are correct
2. b. Assertion is correct, Reasoning is incorrect

Chapter - 15 BASIS OF CLASSIFICATION

Evaluation:

I. Choose the correct answer from the following:

1. Fungi
2. Linnaeus
3. Symbiosis
4. Mammalia
5. Cold blooded

II. a. Match the organism with the kingdom:

1. Euglena - Protista
2. Bacteria - Monera
3. Pinus - Plantae
4. Penicillium - Fungi
5. Frog - Animalia

II. b. Match the organism with the class:

Class	Plant Cell
1. Pisces	Catla
2. Amphibia	Salamander
3. Aves	Peacock
4. Reptilia	Snake
5. Mammalia	Man

III. Place the following organisms under the correct Phylum:

ORGANISM	PHYLUM
1. Starfish	Echinodermata
2. Snail	Annelida
3. Roundworm	Aschelminthes
4. Housefly	Arthropoda
5. Leech	Mollusca
6. Tapeworm	Platyhelminthes
7. Hydra	Coelenterata
8. ponges	Porifera

IV. Answer the following questions in brief:

1. Classification is the arrangement of plants and animals into groups based on their similarities. It is nothing but categorisation.
2. An American ecologist, R. H. Whittaker, proposed the five kingdom classification. It was based on cell structure, mode and source of nutrition and so has been accepted by all scientists, worldwide.
3. Organisms like bacteria, cyanobacteria and mycoplasma belong to Monera.
4. The Linnaean hierarchy is the system of arranging taxonomic categories in a descending order based on their relationship with other groups of organisms. The seven main categories are Kingdom, Phylum, Class, Order, Family, Genus and Species. Species is the smallest, basic group of the classification.

V. Answer the following questions in detail:

1. Classification is important to us because it gives us an idea about the diverse forms found on the earth. It helps us to identify different living organisms easily, since they are all grouped. It provides us with information about the origin and evolution of different groups of organisms. It also helps us to study different plants and animals, their features, similarities and dissimilarities. It provides information about inter relationships between different categories of organisms.

//Note to the teachers: students can mention any 3 from the above//

2. The dichotomous key is one of the tools used to identify and classify organisms based on their similarities and differences. A key has a series of statements that leads you to identify the correct name of an unidentified thing or organism. There are two choices in each step with characteristics that describe the unidentified organism. You find the answer to identify a species by using a series of questions with two possible answers. The correct answer is the choice that best describes the unknown organism. Based on the choice, you move to the next set of statements, and then again to the next, till finally you are able to identify the

unknown organism.

3. The phyla in Kingdom Plantae are as follows:

- Algae: E.g. Chara, Ulva, Spirogyra
- Bryophyta: E.g. Riccia, Funaria
- Pteridophyta: E.g. Fern, Marsilea
- Gymnosperms: E.g. Cycas, Pinus
- Angiosperms: E.g. Rice, maize, mango, neem

4. The ground rules of binomial nomenclature are as follows:

- The scientific names must be from the Latin language or Latinised.
- The generic name (genus) must begin with a capital letter.
- The specific name (species) must begin with a small letter.
- When printed, the scientific name has to be in Italics.
- When written by hand, the generic and specific names must be underlined separately.

VI. Assertion and Reason Questions:

1. b. Assertion is correct, Reasoning is incorrect
2. a. Assertion and Reasoning are correct

Chapter - 16

ANIMALS IN OUR DAILY LIFE

Page No. 73 and 74:

Evaluation:

I. Fill in the blanks:

1. Vanamahotsava
2. Queen bee
3. Apiculture
4. Aspergillosis
5. Apis mellifera
6. Protein

II. State whether the following sentences are True or False. Correct the statement if false:

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

III. Match the following:

- | | |
|------------|-------------|
| 1. Wool | b. sheep |
| 2. Eggs | a. hen |
| 3. Silk | d. silkworm |
| 4. Leather | e. goat |
| 5. Pearl | c. oysters |

IV. Choose the correct answer from the following:

- | | |
|----------------|----------------|
| 1. Silk | 4. Apis florae |
| 2. Angora wool | 5. Jute |
| 3. Sterile | |

V. Analogy:

1. (*//Correction in text book) Increase in silk production : White revolution :: Increase in milk production : Silver revolution
2. caused by bacteria
3. sericulture
4. Types of silk

VI. Answer the following questions in one or two lines.

1. The process of shaving the fleece of the sheep along with a thin layer of skin is called shearing.
2. Hens sit on the eggs to give them warmth for hatching. This is known as incubation.
3. Organisations involved in wild life conservation are World Wide Fund for nature (WWF), International Union for Conservation of Nature (IUCN) and Blue cross is an animal welfare society. (Note: students can mention any one.)
4. The silk thread is taken out from the cocoon, by a process called reeling.

VI. Answer the following questions:

1. The uses of silk are as follows:

- Silk has natural beauty and elegance and is used in the manufacture of beautiful sarees, classical and high fashion clothes and other modern day dresses.
- Silk is used to make draperies, curtains, rugs and carpets that we use in our homes, as well as wall hangings.

- Silk fibre is used to make ribbons for typewriters and computers.
- Silk is used as an insulator in space vessels, and in making parachutes.
- It is used in the manufacture of surgical threads for sutures.

2. Ahimsa means 'non violence'. Kusuma Rajaiah a Government officer from Andhra Pradesh, with many years of experience in the silk industry, in 1972, proposed a new, humane way of producing silk, with no killing or no cruelty to the worms. The silk is also known as 'Peace silk', because not a single silkworm is killed during the entire process of manufacturing the fabric.

The process involves allowing the worms to stay inside the cocoons till they are mature enough to pierce the cocoon and fly away as moths. Only then are the vacant cocoons used to produce silk. As in traditional methods, there is no boiling of the cocoons and sorting of fibres, which are later used to produce silk. Several people and animal welfare groups interested in caring for animals have been supporting the manufacture of this type of silk. Ahimsa silk has all the properties of regular silk, but it is less lustrous.

3. Domestic animals live with us, and help us in various activities. They can be taken care of in the following ways.

- Providing them good food and clean water to stay healthy.
- Providing them clean and ventilated shelters with proper lighting.
- Preventing diseases by regular check-ups, and timely vaccinations.

4. Sorter's disease or anthrax is a disease contacted by the sorters who have a very risky job. They can get infected with anthrax bacterium (*Bacillus Anthracis*) while handling contaminated animal fleece and from direct contact with the animals, while processing the fleece. This leads to this fatal blood disease - Sorter's disease. The symptoms include a cough and shortness of breath along with a fever which is similar to those seen in pneumonia. At times, it can also cause nausea and diarrhoea. The most effective medicine for the treatment of anthrax is penicillin or ciprofloxacin. Animals are vaccinated to control the spread of the disease. Other measures to control the spread include burning and burial of the carcasses of infected animals.

VII. Assertion and Reason Questions:

1. a. Assertion is correct, Reasoning is correct
2. b. Assertion is correct, Reasoning is incorrect