CLASS 10

SCIENCE MOST

IMPORTANT
QUESTIONS

CHAPTERWISE

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SCIENCE

📌 TOP 5 QUESTIONS

• Chemical Reactions and Equations

1. Solid calcium oxide was taken in a container and water was added slowly to it.   (CBSE 2013, 2019)
   (a) Write the observations.
   (b) Write the chemical formula of the product formed.

2. What change in color is observed when white silver chloride is left exposed to sunlight? State the type of chemical reaction in this change.   (CBSE 2014, 2019, 2023)

3. Write the chemical equation of the reaction in which the following changes take place with an example of each.   (CBSE 2023, 2015)
   (a) Change in color   (b) Change in temperature

4. In the electrolysis of water,   (CBSE 2020, 2013, SP-2018)
   A. Name of the gases liberated at anode & cathode.
   B. Why is it that the volume of gas collected on one electrode is two times that on the other electrode?
   C. What would happen if dilute H_2SO_4 is not added to water?

5. A shining metal 'M' on burning gives a dazzling white flame & changes to a white powder 'N'.   (CBSE 2020, 2022)
A. Identify 'M' & 'N'.
B. Represent the above reaction in the form of a balanced chemical equation.
C. Does 'M' undergo oxidation or reduction in this reaction? Justify.

# • Acids, Bases and Salts

1. List the important products of the chlor-alkali process. Write one important use of each.   (CBSE 2020, 2023)

2. (a) Identify the acid and the base whose combination forms the common salt that you use in your food. Write its chemical formula and chemical name of the salt.
   (b) What is rock salt?
   (c) Mention its color and the reason due to which it has this colour.
   (CBSE 2019, 2013)

3. Write the chemical equations when zinc granules react with:
   (a) Sulphuric acid   (b) Hydrochloric acid
   (CBSE 2014, 2020)

4. How is sodium hydroxide produced? Write the balanced chemical equation also. Why is this process called the chlor-alkali process? In this process name the products given off at:
   (a) anode
   (b) cathode.   (CBSE 2022, 2015)

5. Give the reasons for the following:
   (i) Only one half of water molecule is shown in the formula of plaster of Paris.   (CBSE 2020, CBSE SP - 2017)

• Metals and Non-Metals

1. Why do ionic compounds conduct electricity in molten state and not in solid state?   (CBSE 2014, 2023)

2. The reaction of metal X with Fe_2O_3 is highly exothermic and is used to join railway tracks. Identify metal X. Write the chemical equation for the reaction.   (CBSE 2016, 2023)

3. Zinc is a metal found in the middle of the activity series of metals. In nature, it is found as a carbonate ore, $ZnCO_3$. Mention the steps carried out for extraction from the ore.   (CBSE 2023, 2013)

4. Differentiate between roasting and calcination giving chemical equations for each.   (CBSE 2013, 2023)

5. Why are copper vessels corroded with a green coating in the rainy season?   (CBSE 2015, 2016, 2019)

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• Carbon and its Compounds
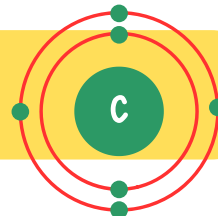
1. Draw the electron dot structure of Nitrogen.   (CBSE 2023, 2021)

2. Write the chemical formula of benzene and draw its structure.
                                                    (CBSE 2017, 2021, 2023)

3. What will you observe on adding a 5% alkaline $KMnO_4$ solution drop by drop to some warm ethanol taken in a test tube? Write the name of the compound formed during the above chemical reaction.
                                                    (CBSE 2013, 2020)

4. Why do covalent compounds have low melting and boiling points?
                                                    (CBSE 2020, 2021)

5. What is meant by a homologous series of carbon compounds? Write the general formula of   (CBSE 2015, 2014, 2016, 2019)
(a) alkenes
(b) alkynes

• Life Process:
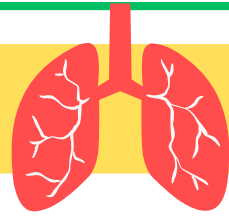
1. (a) What is double circulation?
   (b) Why is the separation of the right side and the left side of the heartful useful ? How does it help birds and mammals?

   (CBSE 2023, 2022, 2019)

2. Explain the ways in which glucose is broken down in the absence or storage of oxygen? (CBSE 2017, 2018, 2019)

3. (a) Write two water-conducting tissues present in plants. How does water enter continuously into the root xylem?
   (b) Explain why plants have low energy needs as compared to animals. (CBSE 2017, 2019, 2021)

4. In single-celled organisms, diffusion is sufficient to meet all their requirements for food, gas exchange, or removal of waste, but it is not in the case of multicellular organisms. Explain the reason for the difference. (CBSE 2015, 2019, 2022)

5. Draw a diagram of the human alimentary canal and label the following: (CBSE 2016, 2019, 2020)
   (1) part in which starch digestion is initiated
   (2) organ in which bile is stored
   (3) the gland that secretes digestive enzymes as well as hormones.
   (4) Part of the alimentary canal where water is reabsorbed.
   (5) Parts of the gut where finger-like projections are present to facilitate absorption of digested food.

• Control and coordination
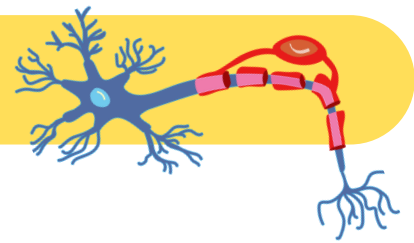
1. Name a plant hormone responsible for bending of a shoot of a plant when it is exposed to unidirectional light. How does it promote phototropism ? (CBSE 2019, 2023)

2. With the help of suitable examples explain the terms phototropism, geotropism and chemotropism, (CBSE 2016, 2020)

3. Draw a diagram of the cross-sectional view of the human brain label the parts of the brain with the functions. (CBSE 2017, 2020)

4. How does the feedback mechanism regulate hormone secretion? Explain with the help of an example ? (CBSE 2017, 2019)

5. Name the part of human brain which control the voluntary and involuntary actions. (CBSE 2017, 2018)

• How do organisms reproduce?

1. Difference between the asexual and sexual reproduction **?** Also, give one example of each.   (CBSE 2016, 2018, 2021, 2022)

2. Describe reproduction by spores in Rhizopus.
                                        (CBSE 2017, 2015, 2020, 2022)

3. List three techniques that have been developed to prevent pregnancy. Which one of these techniques is not meant for males **?** How does the use of these techniques have a direct impact on the health and prosperity of a family **?**   (CBSE 2017, 2018, 2020)

4. a. Draw a diagram of human female reproductive system and label the parts:
Which produce an egg, Where fertilization takes place
B. List two bacterial diseases which are transmitted sexually.
C. What are contraceptive devices? Give two reasons for adopting contraceptive devices in humans.
                                        (CBSE 2019, 2017, 2016)

5. Define pollination. Explain the different types of pollination. List two agents of pollination. How does suitable pollination lead to fertilization **?**   (CBSE 2019, 2016, 2021)

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• Heredity and Evolution:

1. Mention any two points of difference between acquired and inherited traits. If the tail of a mouse is cut for twenty one generations, will the tail occur in the twenty second generation of that mouse? Give reason to support your answer.

(CBSE 2013, 2016, 2017, 2022, 2021)

2. Two pea plants- one with round yellow seeds (RRYY) and another with wrinkled green (rryy) seeds produce F1 progeny that have round, yellow (RrYy) seeds. When F1 plants are self-pollinated, which new combination of characters is expected in F2 progeny? How many seeds with these new combinations of characters will be produced when a total 160 seeds are produced in F2 generation? Explain with reason. (CBSE 2018, 2020, 2022)

3. List difference between dominant traits and recessive traits. What percentage of the plants in the F2 generation were round, in Mendel's dihybrid cross between round yellow and wrinkled green pea plants ? (CBSE 2016, 2015, 2019)

4. Sahil performed an experiment to study the inheritance pattern of genes. He crossed tall pea plants (TT) with short pea plants (tt) and obtained all tall plants in F1 generation.
   a. What will be the set of genes present in the F1 generation?
   b. Give reason why only tall plants are observed in F1 progeny.

   2   4   (CBSE 2016, 2021, 2022)

5. In an asexually reproducing species, if a trait X exists in 5% of a population and trait Y exists in 70% of the same population, which of the two traits is likely to have arisen earlier? Give reason.

(CBSE 2019, 2021)

• Light

1. State the two laws of reflection of light.

(CBSE 2011, 2013 2014)

2. The absolute refractive indices of glass and water are 1.5 and 1.33 respectively. In which medium does light travel faster? Calculate the ratio of speeds of light in the two media.

(CBSE 2013, 2019, 2020)

3. The image of a candle flame placed at a distance of 30 cm from a mirror is formed on a screen placed in front of the mirror at a distance of 60 cm from it pole. What is the nature of the mirror? Find its focal length. If the height of the flame is 2.4 cm, find the height of its image. State whether the image formed is erect or inverted. (CBSE 2014, 2015, 2017)

4. Draw ray diagram to show the path of the refracted ray in each of the following cases. A ray of light incident on a concave lens (i) is parallel to its principal axis, (ii) is passing through its optical centre and (iii) is directed towards its principal focus.

(Delhi 2013, CBSE 2015, 2016)

5. An object is placed at a distance of 50 cm from a concave lens of focal length 30 cm.
   (i) Use lens formula to find the distance of the image from the lens.
   (ii) List four characteristics of the image(nature, position, size, erect/inverted) formed by the lens in this case.
   (iii) Draw a ray diagram to justify your answer of pair (ii).

(CBSE 2016, 2019)

• Human eye & colorful world

1. What is 'dispersion of white light'? State its cause. Draw a ray diagram to show the dispersion of white light by a glass prism.

(CBSE 2011, 2013, 2016, 2017)

2. How will you use two identical glass prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light? Draw and label the ray diagram.

(CBSE 2016, 2017, 2019, 2020)

3.Draw a ray diagram to show the refraction of light through a glass prism. Mark on it (a) the incident ray, (b) the emergent ray and (c) the angle of deviation.

(CBSE 2011, 2013, 2017)

4. State the function of each of the following parts of human eye:
(i) Cornea
(ii) Iris
iii) Pupil

(CBSE 2013, 2016, 2018)

5.A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.

(CBSE 2017, 2018)

• Electricity

1. (a) Prove that the equivalent resistance of three resistors R1, R2 and R3 in series is R1 + R2 + R3.
(b) You have four resistors of 8 each. Show how would you connect these resistors to have effective resistance of 8Ω ?

(2013, 2015, 2016)

2. State Ohm's law. Draw a labelled circuit diagram to verify this law in the laboratory. If you draw a graph between the potential difference and current flowing through a metallic conductor, what kind of curve will you get? Explain how would you use this graph to determine the resistance of the conductor.   (2014, 2015, 2016)

3.(i)State one difference between kilowatt and kilowatt hour. Express 1 kWh in joules.
 (ii) A bulb is rated 5V; 500 mA. Calculate the rated power and resistance of the bulb when it glows.

(2013, 2016)

4. Two lamps, one rated 100 W; 220 V, and the other 60 W; 220 V, are connected in parallel to electric mains supply. Find the current drawn by two bulbs from the line, if the supply voltage is 220 V.

(2018. 2014)

5.Draw a schematic diagram of a circuit consisting of a battery of 3 cells of 2 V each, a combination of three resistors of 10Ω, 20Ω and 30Ω connected in parallel, a plug key and an ammeter, all connected in series. Use this circuit to find the value of the following:
 (a) Current through each resistor
 (b) Total current in the circuit
 (c) Total effective resistance of the circuit.   (2020)

• Magnetic effects of current
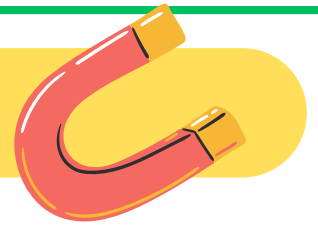
1. State whether an alpha particle will experience any force in a magnetic field if (alpha particles are positively charged particles) (i) it is placed in the field at rest.
(ii) it moves in the magnetic field parallel to field lines.
(iii) it moves in the magnetic field perpendicular to field lines. Justify your your answer in each case.

(CBSE 2016, 2022, 2023)

2. Mention and explain the function of an earth wire. Why it is necessary to earth metallic appliances?　　(CBSE 2014, 2016, 2020)

3. Name and state the rule which is used to determine the direction of force on a current carrying conductor placed in a magnetic field.　　(CBSE 2020, 2022, 2023)

4. What are magnetic field lines? Justify the following statements:
(a) Two magnetic field lines never intersect each other.
(b) Magnetic field are closed curves.　　(CBSE 2013, 2015, 2016)

5. What is solenoid? Draw the pattern of magnetic field lines of
(i) a current carrying solenoid and
(ii) a bar magnet.
List two distinguishing features between the two fields.

(Delhi 2019, 2020)

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• Our Environment

1. How is ozone formed in the higher levels of the atmosphere? " Damage to the ozone layer is a cause of concern". Justify this statement.   (CBSE 2015, 2017, 2020, 2023)

2. We do not clean ponds or lakes, but an aquarium needs to be cleaned regularly. Explain.   (CBSE 2023, 2017)

3. Why are green plants called the producers ?
                    (CBSE 2019, 2015)

4. (a) How can we help in reducing the problem of waste disposal? Suggest any three methods.
(b) Distinguish between biodegradable and non-biodegradable wastes.
                    (CBSE 2013, 2015, 2019)

5. Define an ecosystem. Draw a block diagram to show the flow of energy on an ecosystem.   (CBSE 2015, 2017, 2019)

Solutions
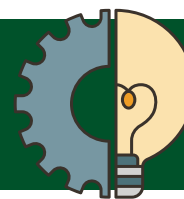
• Chemical Reactions and Equations

1. (i) Following are the two observations:
   • Calcium oxide reacts vigorously with water to form slaked lime.
   • The container becomes hot because a large amount of heat is released during this reaction.

   (ii) The product formed is slaked lime for which the chemical formula is $Ca(OH)$.

2. When white silver chloride exposed to sunlight it produces to black metallic coloured silver along with liberation of chlorine gas

   $$2AgCl \longrightarrow 2Ag + Cl$$
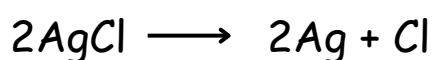
   it is photodecomposition reaction.

3. (i) Change in colour:
   The reaction between lead nitrate solution and potassium iodide solution.

   $$Pb(NO3)2(aq) + 2KI \rightarrow PbI2(s) + 2KNO3(aq)$$
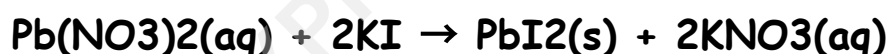
   In this reaction colour changes from colourless to yellow.

   (ii) Change in temperature:
   The action of dilute sulphuric acid on zinc.

   $$Zn(s) + H2SO4(aq) \rightarrow ZnSO4(s) + H2(g)$$
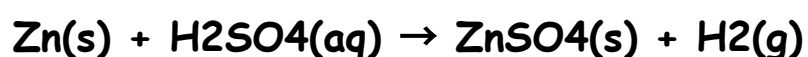
   In this reaction, heat is evolved. [4]

4. (a) At cathode, H2 is evolved and at anode O2 is evolved.

   (b) At cathode, H+ ion takes two electron to convert itself into H2 gas. 2 moles of H+ gives 1 mole of H2.
   $$2H+(aq)+2e-\rightarrow H2(g)$$
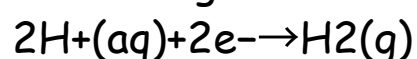
At anode, OH– ion releases two electrons to convert into water and O2. 2 mole OH– gives 0.5 mole O2, i.e why volume of one gas collected at one electron is double of another.

c) Acid is added to make the water conduct electricity as the distilled water is a non-conductor of electricity.

5. A. **Reaction of Magnesium metal:**
   1. As, it is given that the metal 'M' on burning gives the dazzling white flame and also changes to the white powder 'N'.
   2. So, the metal 'M' would be Magnesium metal as on the reaction of burning in the air, Magnesium reacts with the Oxygen present in the air and gives the white powder on burning.
   3. This Magnesium metal is basically the chemically active one.
   4. **Hence, the metal 'M' : Magnesium burns in the presence of Oxygen to form 'N' Magnesium oxide.**

B. The balanced chemical equation for the above reaction would be:

$$2Mg + O_2 \longrightarrow 2MgO$$

C. **Oxidation of Magnesium:**

   1. Oxidation is basically the loss of electrons or the increase in the oxidation state of an atom, ion or the molecule.
   2. So previously when solid Magnesium was present it's oxidation state was 0 as the element Magnesium was present with not any bond.
   3. But, as soon as it burns in the presence of Oxygen forming the Magnesium oxide, it will lose two electrons for getting stable
   4. So, the Oxidation state of Mg in MgO is +2
   5. Hence, Oxidation of Magnesium will take place.

• Acids, Bases and Salts

1. Sodium hydroxide - It is used in the manufacturing of paper.
   Chlorine - It is used to make plastics (PVC), chlorofluorocarbon (CFC), chloroform, carbon tetrachloride etc.
   Hydrogen - It is used in the hydrogenation of oils to obtain vegetable ghee.

2. (a) HCl is an acid and NaOH is a base whose combination forms the common salt. Its formula is NaCl Sodium chloride. It is obtained from seawater.
   (b) Deposits of solid salt which are large crystals and brown due to impurities is called rock salt.
   (c) This brown color is due to all the impurities present in the salt along with sodium chloride. When the impurities are removed and pure sodium chloride is obtained, it turns into white crystals.

3.
   • When zinc granules are added to the solution of sulphuric acid then
   • zinc sulfate and hydrogen gas are formed as the product.
   • The chemical reaction is as follows:
   •
   • When zinc granules are added to the solution of hydrochloric acid then zinc chloride and hydrogen gas are formed as the product.
   • The chemical reaction is as follows:

4. When electricity is made to pass through an aqueous solution of NaCl, it decomposes to form NaOH. This process is called chlor-alkali process because of two products - chlor for Chlorine and alkali for Sodium hydroxide.

(a) Anode - Cl_2 Gas
(b) Cathode - H_2 Gas

$$2\,NaCl(aq) + 2H_2O(l) \xrightarrow{\text{Electricity}} 2\,NaOH\left(aq\right) + Cl_2(g) + H_2(g)$$
(Sodium chloride)   (Water)   (Sodium hydroxide)   (Chlorine)   (Hydrogen)
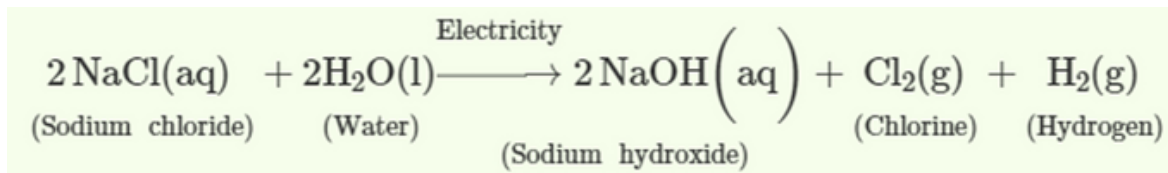
5. The Formula actually means that two molecules (or two formula units) of $CaSO_4$ share one molecule of water so that the effective water of crystallization for one $CaSO_4$ unit comes to half a molecule of water.
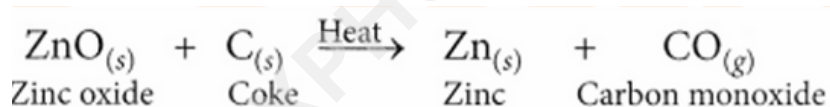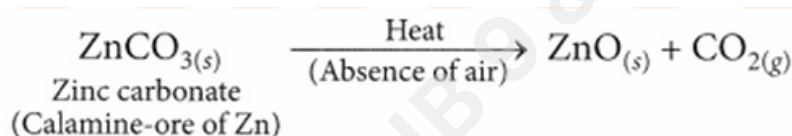
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• Metals and Non-Metals

1. Ionic compounds do not conduct electricity in solid state because ions are not free to move. In molten state, ions are free to move.

2. X is Aluminium.

$$2Al + Fe_2O_3 \longrightarrow Al_2O_3 + 2Fe$$
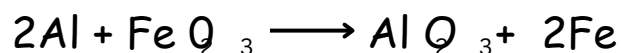
3. Conversion of the carbonate ore into metal oxide: This is done by calcination (for carbonate ores). Calcination is the process of heating the ore strongly in the absence or limited supply of air. The zinc carbonate on heating decomposes to form zinc oxide as shown:

Reduction of the metal oxide to metal :As zinc is moderately reactive, zinc oxide cannot be reduced by heating alone. Hence, it is reduced to zinc by using a reducing agent such as carbon.

$$ZnCO_{3(s)} \xrightarrow[\text{(Absence of air)}]{\text{Heat}} ZnO_{(s)} + CO_{2(g)}$$

Zinc carbonate
(Calamine-ore of Zn)

$$ZnO_{(s)} + C_{(s)} \xrightarrow{\text{Heat}} Zn_{(s)} + CO_{(g)}$$

Zinc oxide   Coke   Zinc   Carbon monoxide

4.

Roasting	Calcination
Ore is heated in excess of air.	Ore is heated in the absence or limited supply of air.
This is used for sulphide ores.	This is used for carbonate ores.
SO_2 is produced along with metal oxide.	CO_2 is produced along with metal oxide.
e.g. $2ZnS + 3O_2 \xrightarrow{\Delta} 2ZnO + 2SO_2$	e.g. $ZnCO_3 \xrightarrow{\Delta} ZnO + CO_2$

5. Solder is an alloy which is made up of lead and tin.
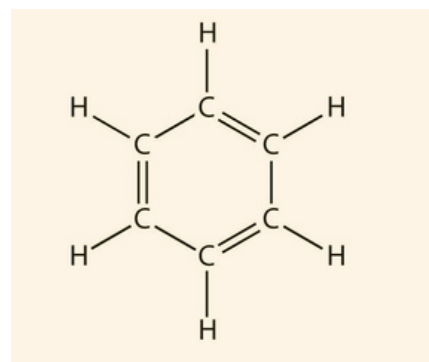   Solder has a low melting point so it is used for welding electrical wires.
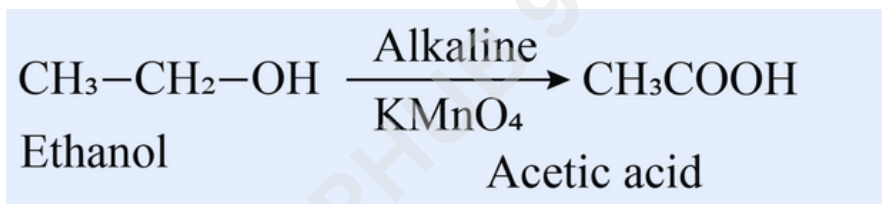
• Carbon and its Compounds

1.

$$\cdot \ddot{N} \cdot \; + \; \cdot \ddot{N} \! : \; \longrightarrow \; \left(:N \; \vdots \vdots \; N : \right) \; \longrightarrow \; N \equiv N$$
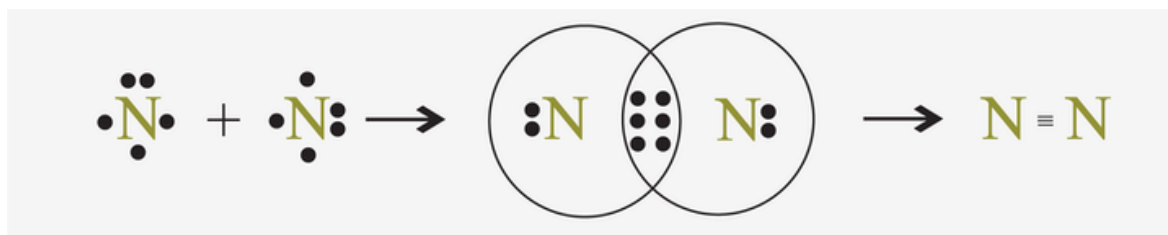
2. The molecular formula of benzene : C_6H_6

3. The purple color of $KMnO_4$ decolourises and ethanoic acid will be formed.

$$CH_3{-}CH_2{-}OH \xrightarrow[\text{KMnO}_4]{\text{Alkaline}} CH_3COOH$$

Ethanol   Acetic acid

4. The molecules of covalent compounds are held by weak intramolecular forces. Thus, a very small amount of energy is required to break the bonds between two or more molecules. That is why they have low melting and boiling points.

5. The series of organic compounds having the same functional group and similar chemical properties is called the homologous series.

$$C{=}C \qquad C_nH_{2n}$$

Alkene

$$C{\equiv}C \qquad C_nH_{2n-2}$$

Alkyne
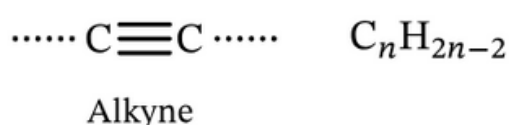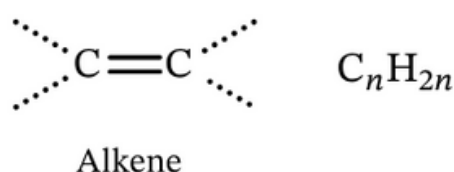
• Life Process:

1. (a) Double circulation is the circulation of blood through the heart twice during one complete cycle of the body. It is a type of circulation in which the blood passes through two different circuits of the body, namely, pulmonary circulation and systemic circulation.
(b) The separation of the right side and the left side of the heart is useful as it allows the oxygenated and deoxygenated blood to remain separate, which helps in maintaining the oxygen concentration in the body. In mammals and birds, the separation of the heart into four chambers helps 3 to increase the efficiency of oxygen delivery to the body tissues. The right side of the heart receives the deoxygenated blood from the body and pumps it to the lungs for oxygenation. The left side of the heart receives the oxygenated blood from the lungs and pumps it to the rest of the body. This separation ensures that the oxygen-rich and oxygen-poor blood do not mix, and the oxygenated blood is delivered efficiently to the body tissues

2. The anaerobic breakdown of glucose occurs in two different ways. The first stage in both processes is the cytoplasmic breakdown of the glucose molecule into pyruvate. Fermentation is the term for the anaerobic breakdown process in bacteria. Pyruvate is converted to carbon dioxide and ethyl alcohol during fermentation. Pyruvate is converted to lactic acid in our muscle cells when there is a shortage of oxygen. Note: In the two scenarios mentioned above, very little energy is emitted.

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3. (a) Xylem tracheids and xylem vessels are water-conducting tissues (vascular tissue) as part of the xylem present in plants. Xylem is responsible for the conduction of water from the roots to other parts of the plant. Due to transpiration and the resulting pressure gradient, water is absorbed into the root xylem of plants. The transpirational pull formed causes the roots to absorb water from the soil and resulting in the transportation of water.

(b) Plants have low energy needs as compared to animals due to the following reasons:

(i) Plants are autotrophic organisms, preparing their own food absorbing solar energy during the process of photosynthesis.

(ii) Plants don't move from one place to another like animals so they consume less energy.

(iii) Also, plants possess many dead cells in terms of sclerenchyma cells that do not require much energy for maintenance.

4. The surface area to volume ratio in unicellular organisms is ideal for material exchange or diffusion between the cell and its external environment, and this rate of exchange meets the needs of the unicellular organism. However, the surface area to volume ratio is low in multicellular organisms, and the only way for an organism to exchange with the outside world is through its surface, assisted by a particular structure or organ, such as the skin. Nevertheless, this exchange is insufficient to make up for the millions of cells that make up a multicellular organism, each of which has unique needs depending on its function.

5. (1) Mouth
   (2) Gall bladder
   (3) Pancreas
   (4) Large intestine
   (5) Small intestine.
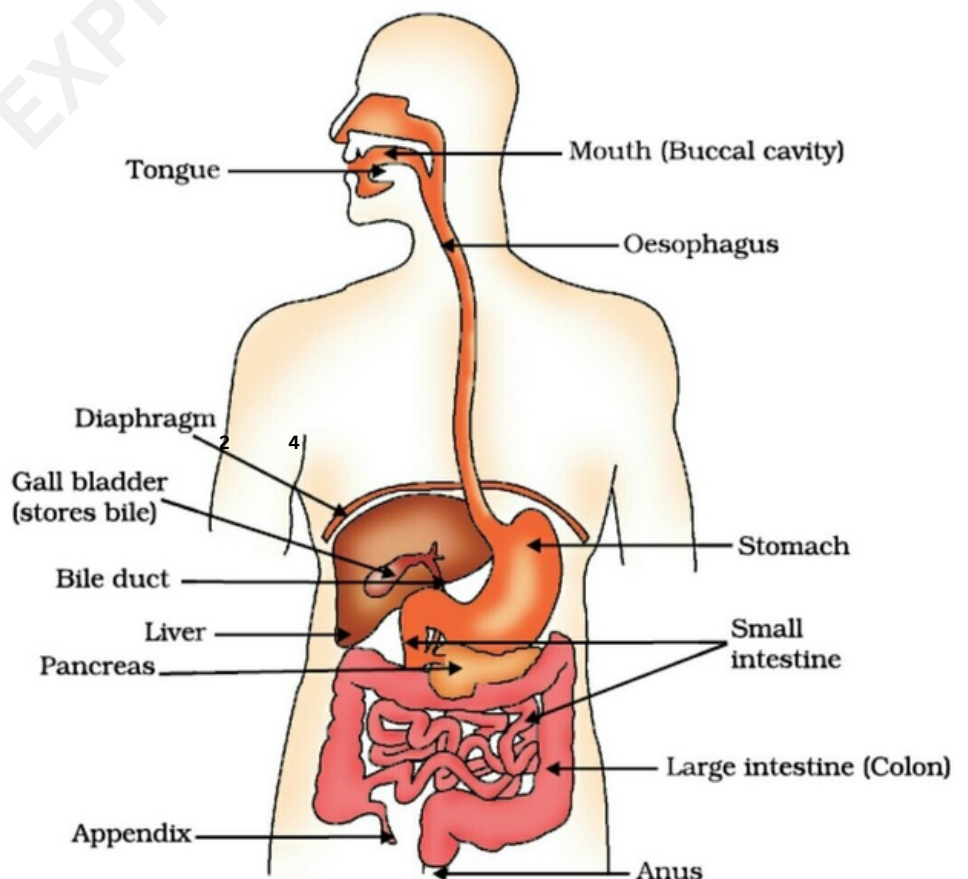
• Control and coordination

1. Phototropism is the term for a plant's bending towards light. The hormone auxins found in plants is to blame. Auxins, which are produced at the tips of the shoots of phototropic plants, aid in the extension of the cells when the growing sections of the plant sense sunlight.

2. a. **Phototropism:** It is the direction of growth of a plant in response to the direction of the light. Eg - Movement of shoots of plants upwards towards light.
b. **Geotropism:** It is the term used to describe the directional movement of growth that plants display in response to gravity. Geotropism is the growth of roots in the direction of gravity.
c. **Chemotropism:** The directed movement of growth in response to a chemical stimulation is known as chemotropism.
When the pollen tube expands in the direction of the substance released by the ovary during pollen tube germination, this is known as chemotropism.

3. The following are the functions of several brain regions:
The medulla oblongata is responsible for regulating reflex responses and involuntary actions. Moreover, it regulates vomiting, salivation, and blood pressure.
Cerebellum: It directs and synchronizes various muscle movements. It is in charge of voluntary movements and keeps the body balanced whether one is walking, drinking, catching, etc.
Parts of the forebrain include the following:
1. Cerebrum: Responsible for thinking, speaking, reasoning, intelligence, and information utilization.
2. Olfactory: Lobes in this area are in charge of identifying odors from various receptors.
3. Diencephalon: Regulates body temperature, appetite, thirst, and other impulses.
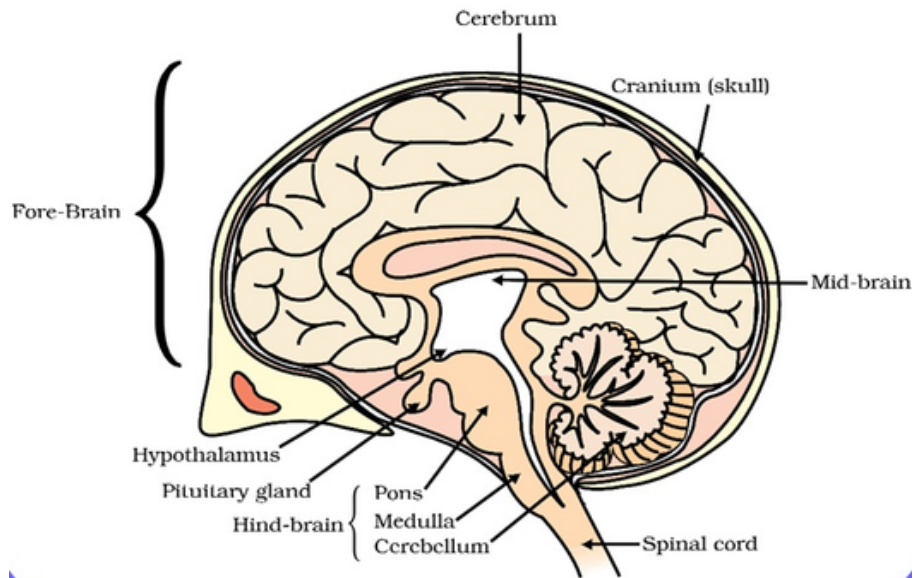
4. The system that keeps the body's and blood's hormone balance stable is known as the hormone feedback mechanism. That specific hormone's concentration can either increase or decrease, which will either encourage or hinder the hormone's secretion. We refer to this as feedback.

There are two different kinds of feedback. Positive feedback is referred to as such, but negative input is not. The hormone is secreted or produced more when there is a positive feedback loop. On the other hand, the hormone's release is suppressed by the negative feedback.

For instance, eating food high in carbohydrates raises blood glucose levels. The pancreas secretes insulin when blood glucose levels rise. The cells will be signaled by this insulin to start absorbing blood glucose. Therefore The blood's glucose content drops. There would be a shortage of glucose in the circulation if insulin was still present because more and more glucose would be carried inside the cell. In order to stop this, low blood glucose levels provide negative feedback, which in turn stops the blood's production of insulin.

5. The medulla controls the involuntary actions whereas the forebrain is responsible for controlling the voluntary actions in the body.

• How do organisms reproduce?

1.

S.No.	Sexual Reproduction	Asexual Reproduction
1.	It is a kind of reproduction where there is the involvement of one or two organisms or individuals.	It refers to the kind of reproduction that involves only one organism.
2.	Two parents are involved.	one parent is involved.
3.	Gamete formation occurs	It does not occur
4.	Sex organs are formed	No formation of sex organs
5.	Zygote forms through a fusion of gametes	The zygote does not form
6.	Higher invertebrates and all vertebrates	Lower organisms

2. They reproduce asexually by the formation of the spores.
The body of the fungus is composed of hyphae which develop the sporangium. The sporangium is a swollen structure at the tip of the filaments bearing the spores. The spores are tough and resistant structures which are dispersed by the breaking of the sporangium.

Spore formation in **Rhizopus**
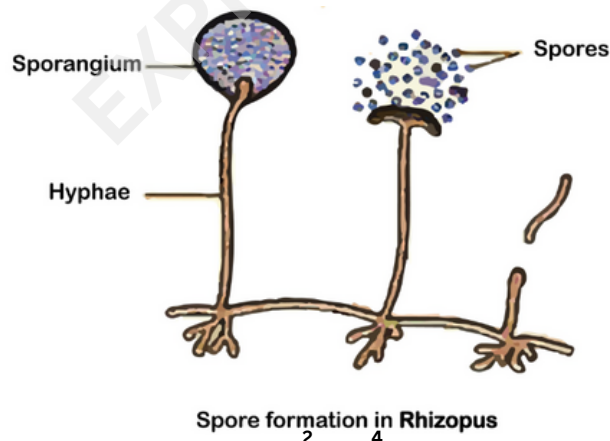
3. Barrier method: Use of condoms.
Surgical methods: vasectomy (in male), tubectomy (in female).
Intrauterine devices: copper T.
Oral contraception: oral hormonal pills.
These methods help to take care of mother and child. It also helps in maintaining a gap between the children so that they can use resources properly.

4.
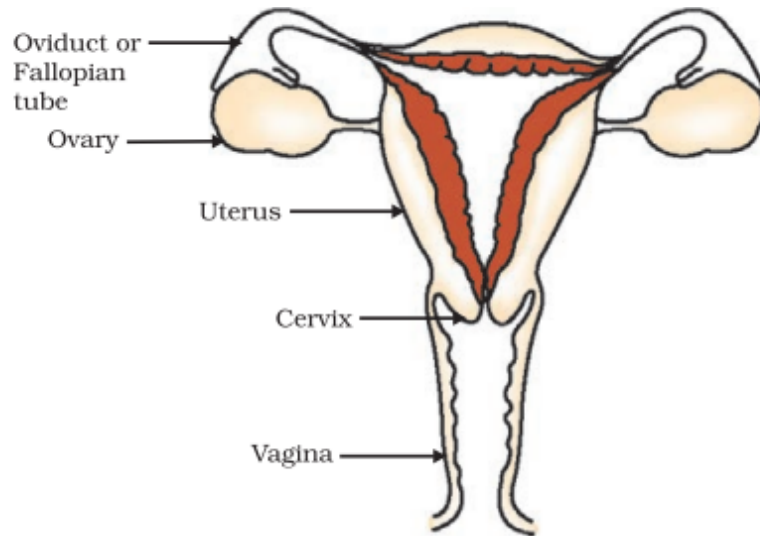
B. Bacterial infections include chlamydia, gonorrhea, and syphilis. Viral infections include human papillomavirus (HPV), herpes (HSV or herpes simplex virus), human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) and Hepatitis B.

C. Contraceptive methods are mainly adopted because of the following reasons:

- To prevent unwanted pregnancies.
- To control population rise or birth rate.
- To prevent the transfer of sexually transmitted diseases.

5. Pollination: Is defined as the deposition of pollen grains on the stigma of a flower from anthers belonging to the same flower, same plant or a different plant.

Pollination is of two types

Self pollination - Stigma receives pollen grains from the same flower

Cross pollination - Stigma receives pollen grains from a flower on the same plant or a different plant

Wind and insects are two agents of pollination, called as Anemophily and Entomophily respectively.

Example of wind pollination - Grasses, Gymnosperms, etc.
Example of insect pollination - Rose, Euphorbia sps, etc.
Pollination and fertilization - Suitable pollination leads to compatible pollen grains being deposited on the stigma, leading to pollen tube development and fertilization.

• Heredity and Evolution:

1. **Inherited trait:** Inherited traits are those that are passed down from parents to children. An individual's inherited traits are determined by their genes.

   1.Characters are passed down from generation to generation.

   2. These characteristics are caused by changes in genes or DNA.

   3. Human inherited traits include hair, skin, eye color, body type, height, and susceptibility to certain diseases.

   Acquired trait: An acquired trait is a personality trait that develops in a person as a result of environmental influences.

   1. Characters are not passed down from generation to generation

   2. These characteristics emerge in response to their surroundings or lifestyle.

   3. These characteristics are not encoded by a living organism's DNA and thus cannot be passed down to future generations. The mouse will continue to have information for presence of tail in its DNA. So, it will- continue to have a tail because absence of tail is an acquired trait

2. Two pea plants, one with round green seeds (RRyy) and another with wrinkled yellow (rrYY) seeds produce F1 progeny that has round, yellow (RrYy) seeds. When F1 plants are selfed, the F2 progeny will have a new combination of characters, the combination will be round, yellow and wrinkled green.

3. Dominant traits are always expressed when the connected allele is dominant, even if only one copy of the dominant trait exists. Recessive traits are expressed only if both the connected alleles are recessive. If one of the alleles is dominant, then the associated characteristic is less likely to manifest.

4. (a) Dominant trait is tallness which is represented by TT and recessive trait is dwarfness which is represented by it . Thus, on crossing the dominant trait with dwarf trait , Tt will be obtained Hence , Tt will be the set of genes present in the F1 Generation .

(b) According to Mendel's law of monohybrid inheritance and law of segregation , if a single pair of contrasting characteristics were cross-bred by self-pollination , then , in F1 progeny , plants with dominant traits are produced . Thus only tall plants are observed in the F1 Progeny because T are called dominant traits and they express themselves.

5. In asexual reproduction, DNA is copied as it is from one generation to another, there is no mating or mixing of genes. Asexual reproduction results in offspring with identical genetic information. There is very little genetic variation between parent and offspring It takes large amount of time for different trait to develop in case of asexual reproduction Hence, if a trait exist in 70% of population, it would have arisen earlier as it would have been replicated over more number of generations.

• Light

1. Laws of reflection of light states that:

   (i) The angle of incidence is equal to the angle of reflection.

   (ii) The incident ray, the reflected ray and the normal to the mirror at the point of incidence all lie in the same plane.

2. Refractive index (RI) if glass is 1.5

   Refractive index (RI) of water is 1.33

   Now, RI of glass with respect to water = RI of glass/RI of water
   $$= 1.5/1.33 = 1.127$$

   RI of water with respect to glass = RI of water/RI of glass
   $$= 1.33/1.5 = 0.89$$

   Since velocity of light in medium is inversely proportional to its refractive index, the light will travel faster in optically rarer medium i.e. water.

3. Here, $u = 30$, $v = -60$

   As $1/f = 1/u + 1/v = 1/(-60) + 1/(-30) = -1/20$

   $f = 20$, The mirror is concave.

   As the image is formed on the screen, it is real and inverted.

   From $h_2/h_1 = -v/u = +60/-30 = -2$

   $h_2 = -2 \times h_1 = -2 \times 2.4 = -4.8$ cm

   This is the size of inverted image.

4. (i) A ray of light incident on a concave lens is parallel to its principal axis, the diagram can be drawn as follows:
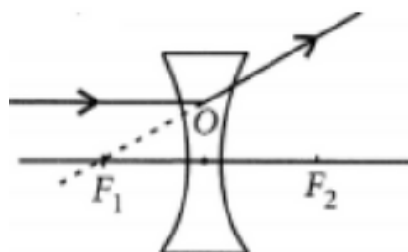
4. The refracted ray appears to pass through focus on the same side
   of the lens.
   (ii) If a ray of light incident on a concave lens is passing through its
       optical centre then the refracted ray will go without deviation.
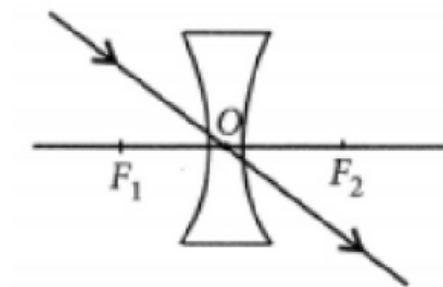
   (iii) If a ray of light incident on a concave lens is directed towards
       its principal axis then it will go parallel to principal axis.
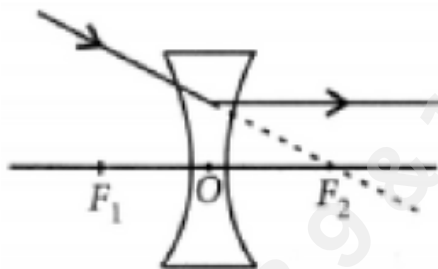
5. Object distance, u = -60 cm
   Focal length of the lens, f = -30 cm
   Step 2: Finding the image distance using the lens formula:
   Using the lens formula, we get
   1/f = 1/v -1/u
   1/v = 1/f + 1/u
   1/v = 1/(-30) + 11/(-60)
   1/v = 1/-20
   v = -20cm
   Thus, the distance of the image from the lens is 20 cm.

(ii) The four characteristics of the image formed by the lens in this
case are:
   1. The image formed is virtual as the given lens is a concave lens.
   2. The image is erect as it formed above the principal axis.

3. Image is diminished (smaller than the object).
4. Image is formed at a distance of 20 cm from the optical centre of the concave lens on the same side of the object.


2   4
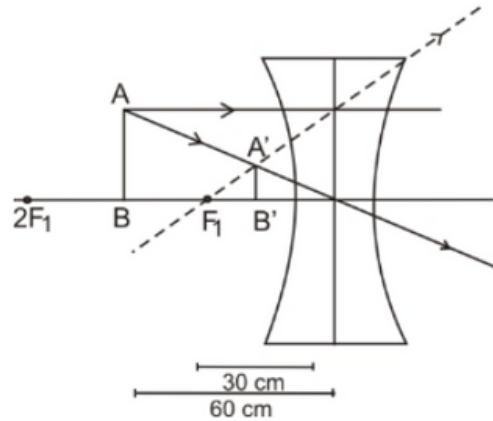
# • Human eye & colorful world

1. Splitting of white light into its seven constituent colors due to refraction is known as dispersion of white light.

Cause of dispersion: When a beam of white light enters a prism, it gets refracted and splits into seven constituent colors. The splitting of the light ray occurs due to the different bending angle for each color. Thus, each color ray when passing through the prism bends at different angles with respect to the incident beam, thus giving rise to a spectrum.
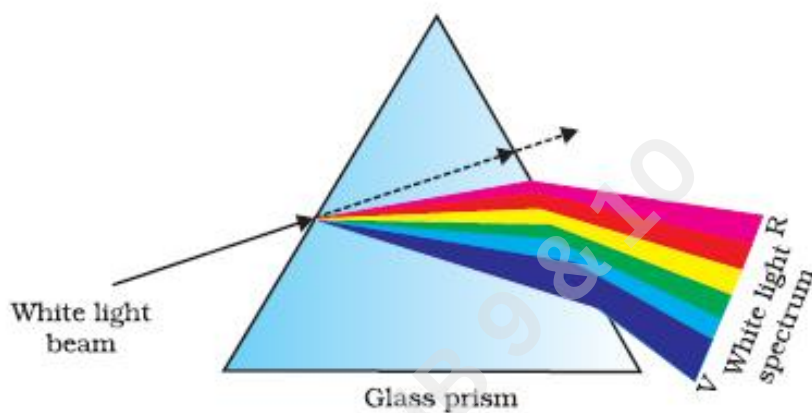
2. Newton was the first to use a glass prism to obtain the spectrum of a white light. He then placed a second identical prism in an inverted position with respect to the first prism. This allowed all the colors of the white light to pass through the second prism combining to form a white light emerging from the other side of the second prism. This made him believe that white light was composed of different colors.
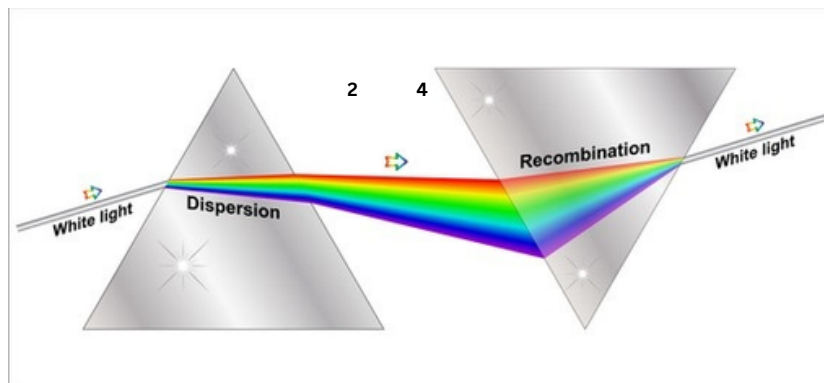
3.
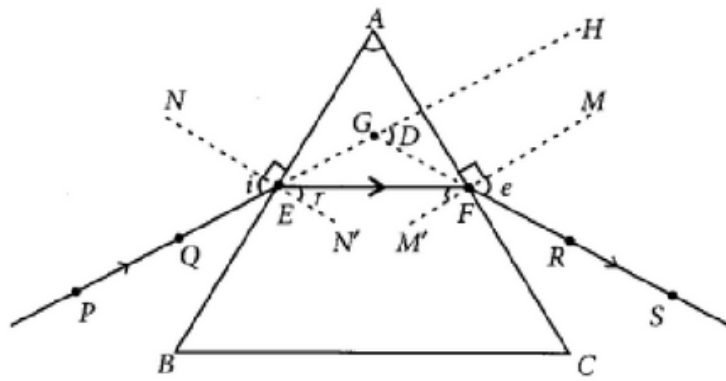
i = angle of incidence
(a) PE = incident ray
(b) FS = emergent ray
(c) ∠D = angle of deviation

4. (i) Cornea: It is a transparent bulge on the front surface of eyeball which refracts most of the light rays entering the eye.
(ii) Iris : A thin, pigmented structure found in the eye that can regulate the amount of light that can enter the retina.
(iii) Pupil: Black hole in the centre of the iris of the eye which permits light towards retina.

5. The student is suffering from myopia.
The two possible reasons due to which the defect of vision arises are: excessive curvature of the eye lens and elongation of the eye ball.
A student with myopia has the far point nearer than infinity, thus, the image of a distant object is formed in front of the retina.
Correction of myopia: This defect can be corrected by using a concave lens of suitable power as it brings the image back on to the retina, thus the defect is corrected.

• Electricity

1. The total potential difference across a combination of resistors in series is equal to the sum of a potential difference across the individual resistors. V=V1+V2+V3

Let I be the current in the circuit. The current through each resistor is also I. It is possible to replace the three resistors joined in series by an equivalent resistor of resistance R.
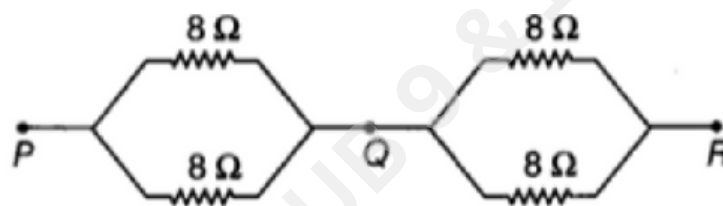
Applying Ohm's law, V=IR

V1= IR1

V2= IR2

V3= IR3

V=V1+V2 + V3

IR= IR1+ IR2 + IR3

R=R1+ R2+R3

Two parallel combinations must be connected in series with each other to get the effective resistance of 8Ω. The effective resistance of each of the parallel combination is 4Ω resistors are added together to get 8Ω effective resistance.

2. It states that the potential difference V, across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains the same. Mathematically,
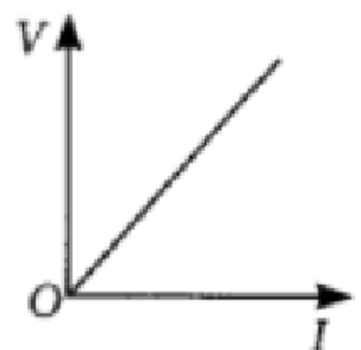
$V \propto I$

$V = RI$

where R is resistance of the conductor.

or $R = V/I$

So the slope of V-I graph at any point represents the resistance of the given conductor.

3. Kilowatt (kW) - a large unit of electric power Kilowatt hour (kWh) - a commercial unit of energy.

1 kWh = -3.6 × 10^6 Joules.

Potential difference = 5V, Current = 500 mA = 500 × 10^(-3) A

P = VI

$\quad$ = 5V × 500 × 10^(-3) = 2.5W

R = V/I

$\quad$ = 5/500 × 10^(-3) × 10Ω

$\quad$ = 100Ω

4. Since both the bulbs are connected in parallel and to a 220 V supply, the voltage across each bulb is 220 V. Then

Current drawn by 100 W bulb,

I_1 = power/voltage = 100W/220V = 0.454A

Current drawn by 60 W bulb,

I_2 = 60W/220V = 0.273 A

Total current drawn from the supply line,

I = I_1 + I_2 = 0.454 A + 0.273 A = 0.727 A = 0.73 A

5. (a) Given, voltage = 2V + 2V + 2V = 6V

Current through 10Ω resistance,
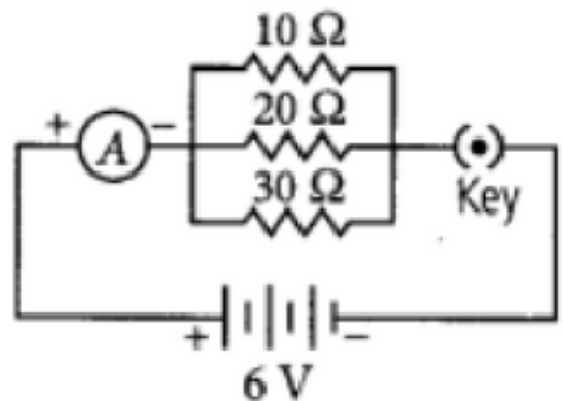
I(10) = V/R=6/10 = 0.6 A

Current through 20Ω resistance,

I(20) = V/R =6/20 = 0.3 A

Current through 30Ω resistance,

I(30) = V/R=6/30 = 0.2 A

(b) Total current in the circuit, I = I(10) + I(20) + I(30)

$\quad$ = 0.6+0.3 +0.2 = 1.1 A

(c) Total resistance of the circuit,

1/Rp=1/10+1/20+1/30=11/60

• Magnetic effects of current

1. (i) No, alpha particle will not experience any force if it is at rest, because only moving charge particle can experience force when placed in a magnetic field.

(ii) No, alpha particle will not experience any force if it moves in the magnetic field parallel to field lines because charge particle experiences force only when it moves at an angle other than 0° with magnetic field.

(iii) Alpha particle will experience a force in the direction perpendicular to the direction of magnetic field and direction of motion of alpha particle.

2. Many electric appliances of daily use like electric press, heater, toaster, refrigerator, table fan etc. have a metallic body. If the insulation of any of these appliances melts and makes contact with the metallic casing, the person touching it is likely to receive a severe electric shock. This is due to the reason that the metallic casing will be at the same potential as the applied one. Obviously, the electric current will flow through the body of the person who touches the appliance. To avoid such serious accidents, the metal casing of the electric appliance is earthed. Since the earth does not offer any resistance, the current flows to the earth through the earth wire instead of flowing through the body of the person.

3.Fleming's left hand rule: Stretch the forefinger, middle finger and the thumb of your left hand mutually perpendicular to each other. If the forefinger indicates the direction of magnetic field and the middle finger indicates the direction of current, then the thumb will indicate the direction of motion of conductor
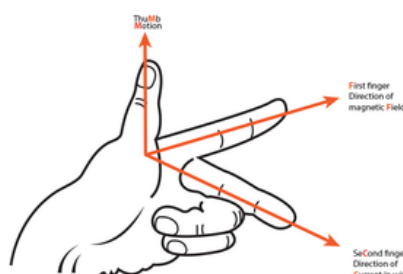
4. Imaginary continuous closed curves used to represent the magnetic field in a region is known as magnetic field lines. It is directed from north pole to south pole outside the magnet and south pole to north pole inside the magnet.
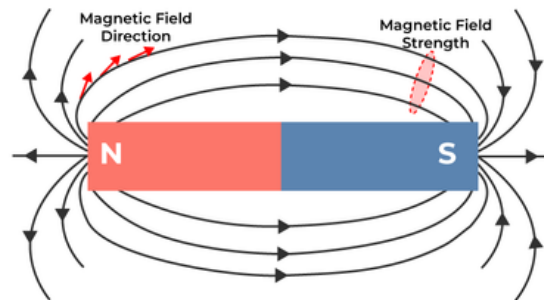
(a) The direction of magnetic field (B) at any point is obtained by drawing a tangent to the magnetic field line at that point. In case, two magnetic field lines intersect each other at the point P as shown in figure, magnetic field at P will have two directions, shown by two arrows, one drawn to each magnetic field line at P, which is not possible.
(b) It is taken by convention that the field lines emerges from north pole and merge at the south pole. Inside the magnet, the direction of field lines is from its south pole to its north pole. Thus, the magnetic field lines are closed curves.

5. Solenoid: A coil of many circular turns of insulated copper wire wrapped in the shape of cylinder is called solenoid.

i)
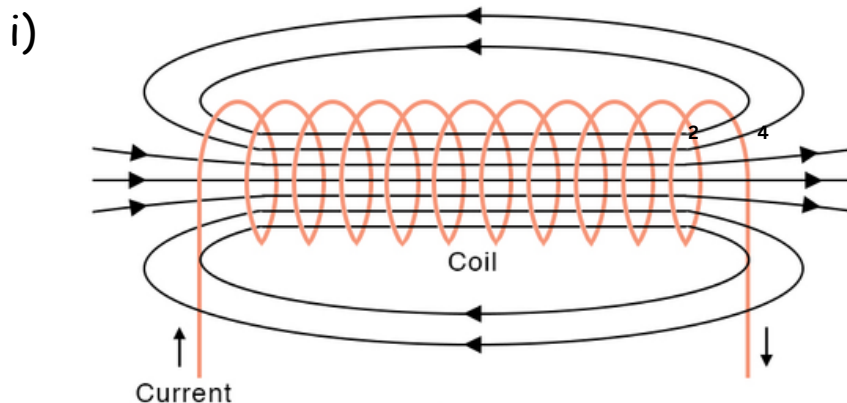
(ii) Magnetic field lines around a bar magnet.
Following are the distinguishing features between the two fields.
(a) A bar magnet is a permanent magnet whereas solenoid is
an electromagnet, therefore field produced by solenoid is
temporary and stay till current flows through it.
(b) Magnetic field produced by solenoid is more stronger than
magnetic field of a bar magnet.

2   4
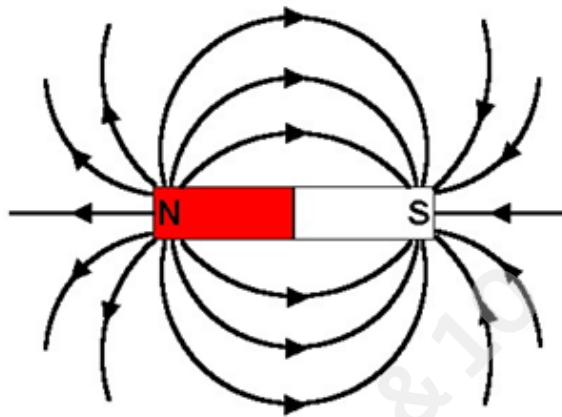
• Our Environment

1. When UV rays interact with oxygen molecules, they release a free oxygen atom, which then joins with another oxygen molecule to generate ozone. $O + O_2 \rightarrow O_3$ (Ozone) Because ozone absorbs and shields us from the Sun's harmful UV rays, its decrease is a reason for concern.

2. Ponds and lakes being natural ecosystems have natural decomposers and cleaners embedded as an integral part of the ecosystem, hence we do not have to clean them. Aquariums are artificially built ecosystems which generally do not contain every aspect of a natural ecosystem.

3. Because they rely only on simple inorganic compounds like carbon and water to manufacture their own food, green plants are considered producers because they not only sustain all other species but also produce their own food.

• 4. By encouraging the use of recycled materials and reducing the use of throwaway things, we can lessen the issue of garbage disposal.
• Separating garbage that is biodegradable from that that is not before disposing of it.
• Recycling the garbage that isn't biodegradable.

	Biodegradable pollutants	Non-biodegradable pollutants
(i)	These are the pollutants which can be easily degraded by micro-organisms	These are the pollutants which can not be degraded into harmless materials
(ii)	These can be used to produce energy (through biogas), compost, manure, etc.	These are difficult to manage as natural method of degradation is baset
(iii)	These usually do not enter biogeochemical cycles	These become a part of rapid turnover in biogeochemical cycles
(iv)	Ex.: DDT, BHC, plastics, polyethylene, glass, etc.	Ex.: Sewage, garbage, animal waste, etc.

5. Ecosystem can be defined as a system composed of biotic and abiotic components and the interactions between them The energy flow in an ecosystem is always from producers to consumers moving in the upward direction, that is from

2   4