

Science
Delhi Set-1

Time Allowed: 3HRS

Maximum Mark: 80

General Instructions:

Read the following instructions very carefully and strictly follow them:

- (i) Question paper comprises three sections-A, B and C. There are 30 questions in the question paper. All questions are compulsory.
- (ii) Section A -question no. 1 to 4- all questions or part thereof are of one mark each. These questions comprise multiple choice questions (MCQ) very short answer (VSA), and Assertion-Reason type questions. Answer to these questions should be given in one word or one sentence.
- (iii) Section B-question no. 15 to 24 are short answer type questions, carrying 3 marks each. Answer to these questions should not exceed 50 to 60 words.
- (iv) Section C-question no. 25 to 30 are long answer type questions, carrying 5 marks each. Answer to these questions should not exceed 80 to 90 words.
- (v) Answer should be brief and to the point. Also, the above mentioned word limit be adhered to as far as possible.
- (vi) There is no overall choice in the question paper. However, an internal choice has been provided in some questions in each Section. Only one of the choices in such questions have to be attempted.
- (vii) In addition to this, separate instructions are given with each section and question, wherever necessary.

SECTION - A

1. Name a cyclic unsaturated carbon compound.

Answer. Benzene

2. The change in magnetic field lines in a coil in the cause of induced electric current in it. Name the underlying phenomenon.

Answer. The phenomena responsible for the induction of current in it is Electromagnetic induction (EMI)

3. **Answer question numbers 3(a) to 3(d) and 4(a) to 4(d) on the basis of your understanding of the following paragraphs and the related studied concept.**

The growing size of the human population is a cause of concern for all people. The rate of birth and death in a given population will determine

its size. Reproduction is the process by which organism increase their population. The process of sexual maturation for reproduction is gradual and takes place while general body growth is still going on. Some degree of sexual acts or for having and bringing up children. Various contraceptive devices are being used by human beings to control the size of the population.

- (a) List two common signs of sexual maturation in boy and girls.
- (b) What is the result of reckless female foeticide?
- (c) Which contraceptive method changes the hormonal balance of the body?
- (d) Write two factors that determine the size of the population.

Answer: a) Common signs of sexual maturity in Boys-

- i. Thickening of vocal cords due to which cracks in voice occurs.
- ii. Initiation of sperm production.

Common signs of sexual maturity in Girls-

- i. Shrillness in voice
 - ii. Initiation of ovulation and menstruation.
- b) Decline in the Female to Male Sex Ratio; Gender Disbalance
 - c) Oral Contraceptive Pills (OCP)
 - d) The rate of birth and death in a given population determines the size of a population.

4. Human body is made up of five important components, of which water which the main component. Food as well as potable water are essential for every human being. The food is obtained from plants through agriculture. Pesticides are being used extensively for a high yield in the fields. These pesticides are absorbed by the plants from the soil along with water and minerals and from the water bodies these pesticides are taken up by the aquatic animals and plants. As these chemicals are not biodegradable, The maximum concentration of these chemicals gets accumulated in our bodies and greatly affects the health of our mind and body

(a) Why is the maximum concentration of pesticides found in human beings ?

(b) Give one method which could be applied to reduce our intake of pesticides through food to some extent.

(c) Various steps in a food chain represent :

- (a) Food web (b) Trophic level
- (c) Ecosystem (d) Biomagnification

(d) With regard to various food chains operating in an ecosystem, man is a :

- (a) Consumer (b) Producer
(c) Producer and consumer (d) Producer and decomposer

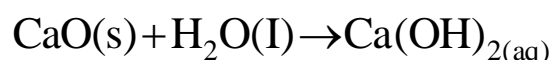
Answer: a) It is because they form the topmost trophic level in the food chain, hence the concentration of these accumulated pesticides gets increased.

b) We can switch to Organic farming where naturally-derived biopesticides and little or no amount of chemical fertilizers are used to cultivate the crops.

c) (b) Trophic level

d) (a) Consumer

5. Calcium oxide reacts vigorously with water to produce slaked lime.



This reaction can be classified as:

(A) Combination reaction (B) Exothermic reaction

(C) Endothermic reaction (D) Oxidation Reaction

Which of the following is a correct option?

A. a and c

B. c and c

C. a,c and d

D. a and b

OR

When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of a :

(a) Combination reaction

(b) Displacement reaction

(c) Decomposition reaction

(d) Double displacement

Answer: D

An **exothermic reaction** is a chemical **reaction** that releases energy through light or heat and there is one product formed and hence it is a combination reaction.

OR

Answer: D

Double displacement is a type of chemical reaction where two compounds react, and the positive ions (cation) and the negative ions (anion) of the two reactants switch places, forming two new compounds or products.

Double displacement is a type of chemical reaction where two compounds react, and the positive ions (cation) and the negative ions (anion) of the two reactants switch places, forming two new compounds or products.

6. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution :

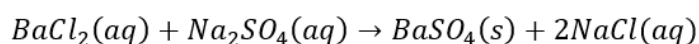
- (A) exchange of atoms takes place (B) exchange of ions takes place
(C) a precipitate is produced (D) an insoluble salt is produced

The correct option is :

- (a) (B) and (D) (b) (A) and (C)
(c) only (B) (d) (B), (C) and (D)

Answer: D

there is exchange of ions in the double displacement reaction and insoluble salt of barium sulphate is produced.



7. Baking soda is a mixture of :

- (a) Sodium carbonate and acetic acid
(b) Sodium carbonate and tartaric acid
(c) Sodium hydrogen carbonate and tartaric acid
(d) Sodium hydrogen carbonate and acetic acid

Answer: C

Baking powder is a mixture of sodium hydrogen carbonate NaHCO_3 and tartaric acid ($\text{C}_4\text{H}_6\text{O}_6$). It can be used for increasing volume and soften baked products.

8. The chemical formula for plaster of paris is :

- (a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
(c) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (d) $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$

Answer: C

The chemical name of plaster of Paris is calcium sulphate hemihydrate because half molecules of water is attached with calcium sulphate. The chemical formula of plaster of Paris is $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

9. The laws of reflection hold true for :

- (a) plane mirrors only (b) concave mirrors only
(c) convex mirrors only (d) all reflecting surfaces

OR

When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. this image is:

- (a) real (b) inverted
(c) virtual and inverted (d) virtual and erect

Answer: D

The law of reflection holds true for all the reflecting surfaces.

OR

Answer: D

When an object is kept within focus (in between focus and pole) the nature of the image formed is virtual, erect and magnified.

10. At the time of short circuit, the electric current in the circuit:
(a) vary continuously (b) does not change
(c) reduces substantially (d) increase heavily

OR

Two bulbs of 100 W and 40 W are connected in series. The current through the 100 W bulb is 1 A. The current through the 40 W bulb will be:

- (a) 0.4 A (b) 0.6 A
(c) 0.8 A (d) 1 A

Answer: D

With low resistance in the connection, a high current exists, causing the circuit to draw a large amount of energy in a very short time. Hence, during a short circuit, the current in the circuit increases heavily.

OR

Answer: D

Same amount of current flows in all devices when connected in series.

11. Which one of the following is responsible for the sustenance of underground water?
(a) Loss of vegetation cover
(b) Diversion for high water demanding crops
(c) pollution from urban wastes
(d) Afforestation

Answer: (b)

Diversion of high water demanding crops

12. Incomplete combustion of coal and petroleum:

- (A) increases air pollution.
- (B) increases efficiency of machines.
- (C) reduces global warming
- (D) produce poisonous gases

The correct option is :

- (a) (A) and (B) (b) (A) and (D)
- (c) (B) and (C) (d) (C) and (D)

Answer: (B)

it increases air pollution and produces poisonous gas.

For question numbers 13 and 14, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a) (b), (c) and (d) as given below:

13. Assertion (A) : Esterification is a process in which a sweet smelling substance is produced.

Reason (R) : When esters react with sodium hydroxide an alcohol and sodium salt of carboxylic acid are obtained.

- (a) Both A and R are true and R is correct explanation of the Assertion.
- (b) Both A and R are true but R is not the correct explanation of the Assertion.
- (c) A is true but R is false.
- (d) A is false but R is true.

Answer: (B)

A- It is an esterification process.

B- It is a saponification process.

14. Assertion (A) : In the process of nuclear fission, the amount of nuclear energy generated by the fission of an atom of uranium is so tremendous that it produces 10 million times the energy produced by the combustion of an atom of carbon from coal.

Reason (R) : The nucleus of a heavy atom such as uranium, when bombarded with low energy neutrons splits apart into lighter nuclei. The mass difference between the original nucleus and the product nuclei gets converted to tremendous energy.

- (a) Both A and R are true and R is correct explanation of the Assertion.
- (b) Both A and R are true but R is not the correct explanation of the Assertion.
- (c) A is true but R is false.
- (d) A is false but R is true.

Answer: A

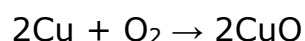
The amount of energy liberated during nuclear fission is tremendous; almost 10 million times the energy produced by a single carbon atom.

Section-B

15. 1 g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance, a visible change is seen in it. Give the chemical equations of reactions, the name and the color of the products formed in each case.

Answer. When copper powder is heated in the presence of air (oxygen), copper reacts with oxygen to form copper oxide. The copper oxide formed is black in colour. The black colour is formed due to the oxidation of copper takes place.

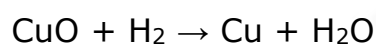
The chemical equation of the reaction that takes place is given below:



Copper oxide (Black)

When hydrogen gas is passed over hot copper oxide, the black coating on the surface turns brown as the reverse reaction takes place and copper is obtained.

The reaction that takes place is:



Copper (brown)

16. List the important products of the Chlor-alkali process. Write one important use of each.

OR

How is washing soda prepared from sodium carbonate? Give its chemical equation, State the type of this salt, Name the type of hardness of water which can be removed by it?

Answer: Important products of Chlor-alkali process are

(i) Sodium Hydroxide

Use: It is used for making soaps and detergents.

(ii) Chlorine

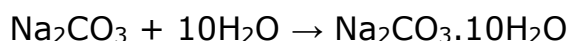
Use: It is used in the production of bleaching powder.

(iii) Hydrogen

Use: It is used in the production of Hydrochloric Acid,

OR

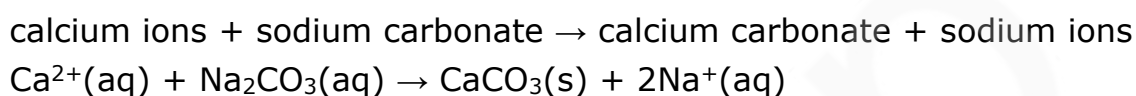
Washing soda is obtained by rehydration of anhydrous sodium carbonate.



It is the basic salt.

Na_2CO_3 can remove temporary and permanent hardness from water. Sodium carbonate is soluble but calcium carbonate and magnesium carbonate are insoluble.

The carbonate ions from sodium carbonate react with the calcium and magnesium ions in the water to produce insoluble precipitates. For example:



17. 3 mL of ethanol is taken in a test tube and warmed gently in a water bath. A 5% solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess.

(i) How is 5 % solution of KMnO_4 , prepared?

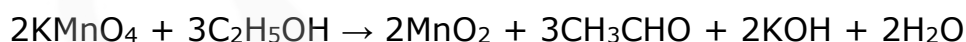
(ii) State the role of alkaline potassium permanganate in this reaction. What happens on adding it in excess?

(iii) Write chemical equation of this reaction.

Answer: (i)The preparation of potassium permanganate can be done by taking 5g of KMnO_4 in 100ml solution. This is weight/volume (strength) calculation.

(ii)Alkaline potassium permanganate is an oxidizing agent due to nascent oxygen which adds oxygen or removes hydrogen and thus oxidizes ethanol to ethanoic acid. Adding alkaline permanganate to ethanol, the pink colour of potassium permanganate vanishes, as it is being used up for the oxidation process.

(iii)Potassium permanganate react with ethanol as:



18. A squirrel is in a scary situation. Its body has to prepare for either fighting or running away. State the immediate changes that take place in its body so that the squirrel is able to either fight or run?

OR

Why is chemical communication better than electrical impulses as a means of communication between cells in a multi cellular organism?

Answer: In the scary situation, the Adrenal Glands of the squirrel starts producing Adrenaline Hormone which helps us in responding to the 3 F situations - Fight, Flight and Fright. Release of Adrenaline in the bloodstream will cause an increase in breathing rate, blood pressure

and the flow of blood towards the limbs (Hands and Feet) so that the muscle can contract at a faster speed, helping the squirrel to fight or run from the situation.

OR

Electrical impulses are transmitted through the neurons, whereas the chemical communication initiated by the hormones are passed directly into the bloodstream. The nervous system has its limitations as it cannot reach all the parts of the body, unlike the blood flow through which the chemical communication by the hormones can reach to all parts of the body.

19. Define the term pollination. Differentiate between self pollination and cross pollination. What is the significance of pollination?

Answer: Pollination is the process in which transfer of Pollen grains from the anther of the flower to the stigma of the same/another flower takes place.

Self-Pollination	Cross-Pollination
Transfer of pollen from an anther to stigma of the same flower.	Transfer of pollen from the anther to the stigma of the different flowers.
Chances of the introduction of variations are lesser.	Chances of the introduction of variations are more due to mixing of genetic material from two unrelated plants of same species (for Xenoqamy only)
Higher chances of assured seed setting	Relatively lower chances of seed setting as it requires pollinators.

Significance of Pollination -

The significance of Pollination is to bring the male gametes near the female reproductive part (Pistil) so as to facilitate meeting of male and female gametes and this will result in fertilization, with Seed as the final product of sexual reproduction in plants.

20. What are homologous structures? Give an example. Is it necessary that homologous structures always have a common ancestor. Justify your answer.

Answer: Homologous structures are organs that have common origin/ same ancestors but perform different functions. For example, a dolphin's flipper, a bird's wing, a cat's **leg**, and a human arm are considered homologous structures.

Yes, it is necessary that they should have a common ancestor, otherwise there won't be any similarity in the basic structure and body plan of the organisms.

21. Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect.

OR

Differentiate between a glass slab and a glass prism. What happens when a narrow beam of (i) a monochromatic light, and (ii) white light passes through

(a) glass slab and

(b) glass prism?

Answer: The Tyndall effect is the phenomenon in which the particles in a colloid scatter the beams of light that are directed at them. This effect is exhibited by all colloidal solutions and some very fine suspensions as governed by the Rayleigh scattering.

The intensity of scattered light depends on the density of the colloidal particles as well as the frequency of the incident light.

Instances of Tyndall effect: -

1. The visible beam of headlights in fog is caused by the Tyndall effect. The water droplets scatter the light, making the headlight beams visible.
2. Shining a flashlight beam into a glass of milk is an example of the Tyndall effect.
3. Sunlight entering in a room full of dust

OR

(a)

Glass Prism	Glass Slab
In glass prism the incident ray of light is not parallel to emergent.	In glass slab it is parallel.
The phenomenon of dispersion occurs in a glass prism	Dispersion does not occur in a glass slab

Glass slab:

(i) Monochromatic:

When a monochromatic beam of light passes through a glass slab, the light ray suffers a lateral displacement while the incident light ray is parallel to the emergent ray

(ii) White Light:

In case of white light also the beam of light will be deviated from its original path with a lateral displacement but the opposite sides are parallel and therefore different colors emerge parallel to each other and are seen simultaneously. Therefore, dispersion doesn't occur in a glass slab.

(b) Glass Prism :

(i) Monochromatic:

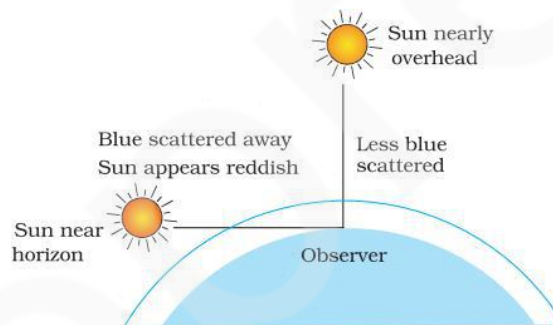
In the case of monochromatic light the ray will bend due to refraction but it will not show dispersion of light.

(ii) White Light:

When a white beam of light is allowed to pass through the prism, it will get dispersed into its 7 color component of spectrum of light. The splitting of light into its component colours is called dispersion.

22. Draw a labelled diagram to show (i) reddish appearance of the sun at the sunrise or the sunset and (ii) white appearance of the sun at noon when it is overhead.

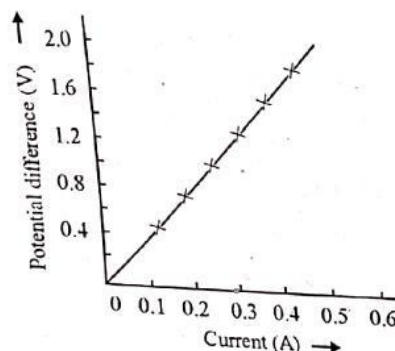
Answer:



(i) The diagram demonstrates the reddish appearance of sun due to the phenomena of scattering of light.

(ii) When the sun is nearly overhead than the light emerging from the sun undergoes less scattering compared to when the sun is at the horizon. Hence appears to be white.

23. A V-I graph for a nichrome wire is given below. What do you infer from this graph? Draw a labelled circuit diagram to obtain such a graph.



Answer: The graph suggests that the current flowing in the conductor is directly proportional to the potential difference across the conductor. The slope of the graph is the resistance of the conductor.

$$R = (V_2 - V_1)/(I_2 - I_1)$$

$$R = (0.8 - 0.4)/(0.3 - 0.2) = 0.4/0.1 = 4 \text{ ohm}$$

24. (a) Write the mathematical expression for Joule's law of heating.
(b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40 V.

Answer: The amount of work done when an electric charge, move against a potential difference which is denoted by V is given by;

$$W = V \times Q \dots\dots (1)$$

From the above expression,

$$V = W/Q$$

We know that,

$$V = IR \dots\dots (2)$$

$$Q = It \dots\dots (3)$$

Therefore,

$$I = Q/t$$

Let us substitute (2) and (3) in (1) we get,

$$W = (IR)(It)$$

$$W = H$$

Where H is the amount of heat produced, it is expressed in Joules J and I is expressed in terms of Ampere.

Therefore, we can write

$$\mathbf{H = I^2Rt}$$

(b) Given

Charge given, $Q = 96000 \text{ C}$

Time given (t) = 2 hour = $2 \times 60 \times 60 \text{ s} = 7200 \text{ s}$

Voltage (V) = 40 V

We know that, current can be found out by using the formula,

$$I = Q/t$$

$$I = 96000/7200 = 40/3 \text{ A}$$

Amount of heat generated can be found out using the formula,

$$H = Vit = 40 \times 40/3 \times 7200 = 3840 \text{ kJ}$$

Thus, the "amount of heat" generated is 3840 kJ

SECTION - C

25. Carbon cannot reduce the oxides of sodium, magnesium and aluminium to their respective metals. Why? Where are these metals placed in the reactivity series? How are these metals obtained from their ores? Take an example to explain the process of extraction along with chemical equations.

Answer. The metals high up in the reactivity series are very reactive. They cannot be obtained from their compounds by heating with carbon. For example, carbon cannot reduce the oxides of sodium, magnesium, calcium, aluminium, etc., to the respective metals. This is because these metals have more affinity for oxygen than carbon. These metals are obtained by electrolytic reduction. For example, sodium, magnesium and calcium are obtained by the electrolysis of their molten chlorides. The metals are deposited at the cathode (the negatively charged electrode), whereas, chlorine is liberated at the anode (the positively charged electrode). The reactions are – At cathode $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$

At anode $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$

26. The position of certain elements in the Modern Periodic Table are shown below.

Group/→ ↓ Period	1	2	3 to 12	13	14	15	16	17	18
1	G								H
2	A			1			B		C
3		D			E				F

Using the above table answer following questions giving reasons in each case :

- Which element will form only covalent compounds?
- Which element is a non-metal with valency 2 ?
- Which element is a metal with valency 2 ?
- Out of H, C and F which has largest atomic size?
- To which family does H, C and F belong?

OR

Define atomic size. Give its unit of measurement. In the modern periodic table what trend is observed in the atomic radius in a group and a period and why is it so?

Answer:

- E
- B

(III)D

(IV)F

(V)Halogen

OR

Atomic radius is defined as the distance from the center of the nucleus to the boundary of the surrounding cloud of electrons. The atomic radius can be further specified into 4 types as:

• **Covalent radius:** half the distance between two atoms of a diatomic compound, singly bonded.

• **Van der Waals radius:** half the distance between the nuclei of atoms of different molecules in a lattice of covalent molecules.

• **Metallic radius:** half the distance between two adjacent nuclei of atoms in a metallic lattice.

• **Ionic radius:** half the distance between two nuclei of elements of an ionic compound.

This term is measured in Angstroms or picometers (pm).

• Atomic radius **decreases** from left to right within a period. This is caused by the **increase** in the number of protons and electrons across a period. One proton has a greater effect than one electron; thus, electrons are pulled towards the nucleus, resulting in a smaller radius.

• Atomic radius **increases** from top to bottom within a group. This is caused by addition of new shell.

27. (a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.

(b) Draw a diagram of human respiratory system and label – pharynx, trachea, lungs, diaphragm and alveolar sac on it.

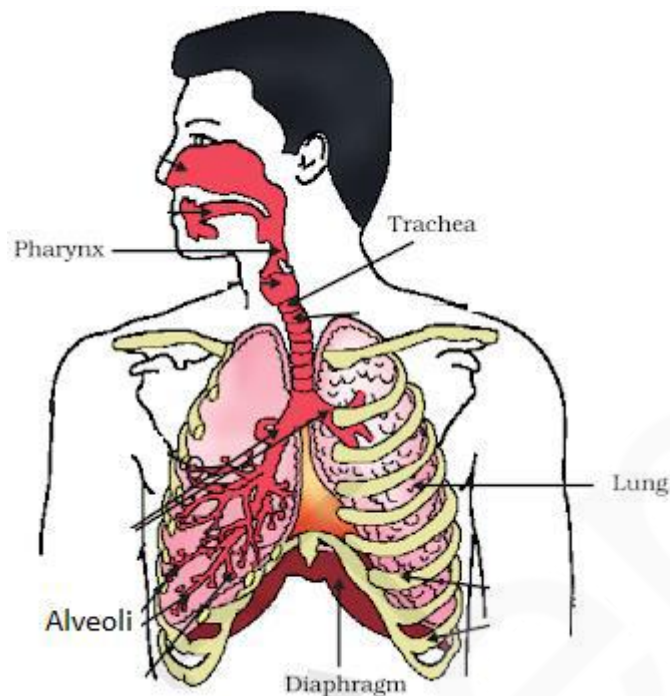
OR

(a) Name the organs that form the excretory system in human beings.

(b) Describe in brief how urine is produced in human body.

Answer: (a) The aquatic organisms depend only on the oxygen present in the dissolved form in the water body. Since the amount of dissolved oxygen is fairly low compared to the amount of oxygen in the air, the rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms.

(b)



Human Respiratory System

OR

a. The organs of the Human Excretory System are

1. A pair of Kidneys
2. A pair of Ureters
3. Urinary Bladder
4. Urethra

(b) The main excretory organ in human beings is the kidney that releases about 80% of liquid waste from the body. Urine formation occurs in the kidney in 3 parts-

1. Glomerular Filtration or Ultrafiltration
2. Selective Reabsorption
3. Tubular Secretion.

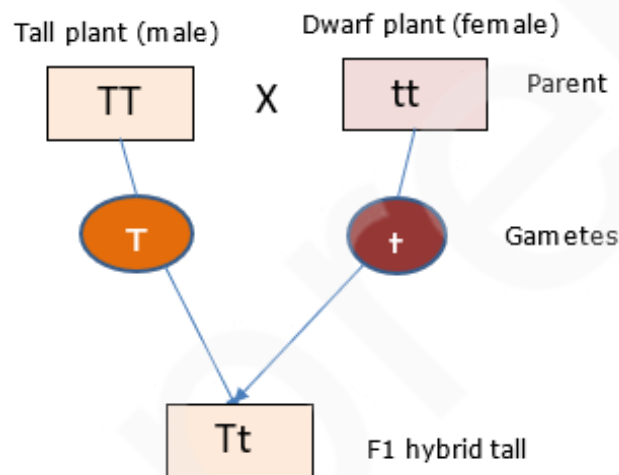
The afferent arteriole brings blood to the kidney and forms a bunch of capillaries in the Bowman's capsule. Glomerular filtration occurs in the Bowman's capsule where glucose, salts, amino acids, urea enters the filtrate. Water and solutes that are smaller than proteins are forced into the renal tubule where reabsorption of water, glucose, amino acids and needed ions occurs and returns them back to the blood. Tubular secretion removes additional wastes from the blood and adds them to the filtrate. Further, water is removed from urine and returned to blood. Urine is sent to the collecting ducts.

28. (a) What is the law of dominance of traits? Explain with an example.
 (b) Why are the traits acquired during the life time of an individual not inherited? Explain.

Answer: (a) Law of Dominance was based on the results of monohybrid cross (crossing plants with one contrasting characters).

- When two homozygous plants with one contrasting character are crossed, the character which is expressed in the F₁ generation is known as the dominant character while the character which is not expressed in the F₁ generation is known as recessive character.

- Example: If pure or homozygous tall plants (TT) are crossed with pure homozygous dwarf plant (tt), then we obtain all the plants in F₁ generation (100%) as tall plants.



The appearance of all tall plants proves the law of dominance.

(b) Acquired traits are the changes in the body which are not passed onto the offspring because these do not cause any change in the DNA/Germplasm of the gametes/reproductive tissues.

The absence of tail in the mouse after surgical removal and low weight of a starving beetle cannot be passed on to the progeny as they are acquired traits and they do not cause any change in the DNA of germ cells. These changes occur in somatic tissues hence are not transmitted to their progeny. Whereas a rudimentary eye of Planaria is controlled by specific genes present in germ cells which can be transmitted from generation to generation.

29. Draw a ray diagram in each of the following cases to show the formation of image, when the object is placed:
- between optical centre and principal focus of a convex lens.
 - anywhere in front of a concave lens.
 - at 2 F of a convex lens. State the signs and values of magnifications in the above-mentioned cases (i) and (ii).

OR

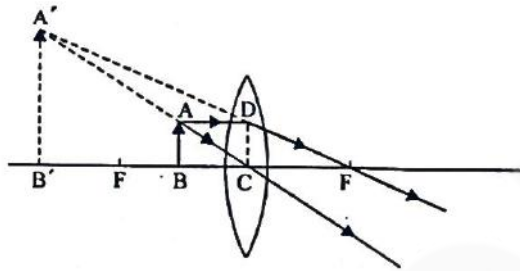
An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm

(i) At what distance from the mirror should a screen be placed in order to obtain a sharp image?

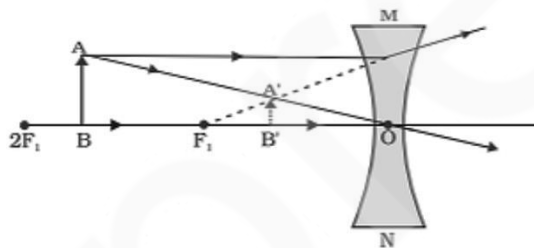
(ii) Find the size of the image.

(iii) Draw a ray diagram to show the formation of image in this case.

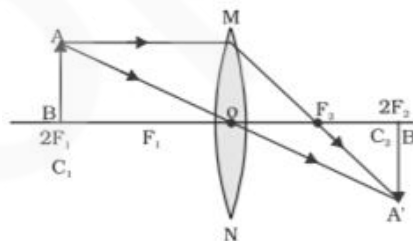
Answer: (i)



(ii)



(iii)



Magnification = Height of Image/Height of Object

Sign Convention

(i) Distances measured perpendicular to and above the principal axis (along + y-axis) are taken as positive.

(ii) Distances measured perpendicular to and below the principal axis (along -y-axis) are taken as negative.

Magnification is positive for erect images and negative for inverted images.

Thus, magnification is positive in part (i) and (ii).

OR

(i) First we find the position of the image that will form
Using mirror formula,

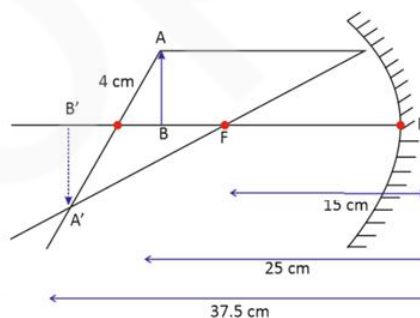
$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$
$$\Rightarrow \frac{1}{v} + \frac{1}{-25} = \frac{1}{-15} \Rightarrow \frac{1}{v} = -\frac{1}{15} + \frac{1}{25}$$
$$\frac{1}{v} = \frac{-5+3}{75}$$
$$\Rightarrow \frac{1}{v} = \frac{-2}{75}$$
$$\Rightarrow v = -\frac{75}{2} = -37.5 \text{ cm}$$

so, we place screen at a distance 37.5 cm from the place, in front the mirror.

(ii) We know,

$$\frac{h_i}{h_o} = -\frac{v}{u}$$
$$\frac{h_i}{u} = -\left(\frac{-37.5}{-25}\right)$$
$$\Rightarrow h_i = -\frac{37.5}{25} \times 4$$
$$= 6 \text{ cm}$$

(iii)



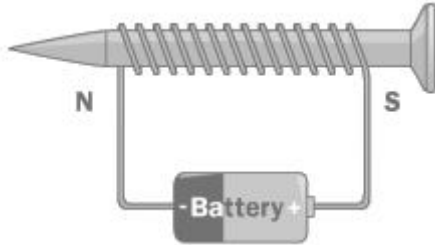
30. (a) What is an electromagnet? List any two uses.
(b) Draw a labelled diagram to show how an electromagnet is made.
(c) State the purpose of soft iron core used in making an electromagnet.
(d) List two ways of increasing the strength of an electromagnet if the material of the electromagnet is fixed.

Answer: (a) Electromagnet is a device which is used to generate magnetism when electric current is passed through it. It can be made by winding conducting wire around the core.

Uses:

1. In magnetic latches
2. Used in cranes for lifting metallic objects

(b)



(c) Soft iron core is used in electromagnet to increase its magnetic strength.

(d) The strength of the electromagnet can be increased by:

1. Increase the number of turns of the coil.
2. By increasing the magnitude of current.
