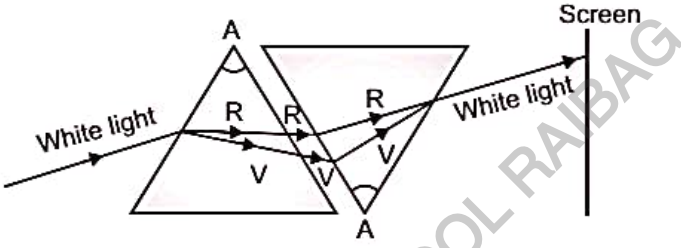
ANSWERS

1. (*c*)
2. (*c*) Because KCl (*aq*) is neutral.
3. (*c*) Aq. NaCl on electrolysis gives H_2 at cathode and Cl_2 at anode.
4. (*c*) Zn granules on reaction with dilute HCl liberate hydrogen gas.
5. (*d*)
6. (*b*) Na is reducing agent, Cl_2 is oxidising agent
7. (*d*) The process is exothermic and salt is formed in neutralisation action.
8. (*a*)
9. (*c*) $MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$
10. (*a*) 11. (*c*) 12. (*c*) 13. (*a*)
14. (*a*) 15. (*a*)
16. (*d*) Cytokinin is a plant hormone.
17. (*d*)
18. (*d*)
19. (*d*)
20. (*b*)
21. Biodegradable substances can be broken down into simpler substances by nature - decomposers, bacteria, saprophytes. e.g. Human Excreta/ Vegetable peels, etc.
Non-biodegradable substances can't be broken down into simpler substances by nature- decomposers. e.g. Plastic, glass.
22. Stomata are tiny openings found on the surface of the leaves. Stomata functions in gaseous exchange between the plant and the atmosphere. The oxygen from the air diffuses inside the leaf cells when stomata open and carbon dioxide diffuses out of the leaves through it.
23. (*a*) Gustatory receptor—Tongue
Olfactory receptor—Nose
(*b*) (*i*) Cell body/Cyton (*ii*) Axon
So, electric impulse flow chart will be as follows:

Dendrite → Cell body/Cyton → Axon → End point of Neuron

24. A second identical prism is placed in an inverted position with respect to the first prism. This allows all the colours of the spectrum to pass through the second prism where they recombine again. Hence, a beam of white light is emerged from the other side of the second prism. This is shown in the below diagram:

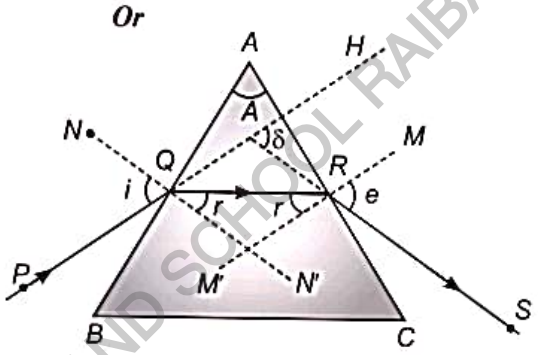


(*a*) *PQ*–incident ray

(*b*) *RS* – emergent ray

(*c*) δ – angle of deviation

Or



25. Saliva is a watery fluid secreted by the salivary glands in the mouth. The digestive functions of saliva include moistening food, and easy movement of food in the food pipe, so it can be swallowed easily. Saliva contains the enzyme salivary amylase that breaks down starch into simple sugars.

26. Put Cu strip in $FeSO_4$ solution. No reaction will take place. Put Al strip in $FeSO_4$ solution. Pale green colour will become colourless and greyish black iron metal will get deposited.

$$2Al(s) + 3FeSO_4(aq) \longrightarrow Al_2(SO_4)_3(aq) + 3Fe(s)$$

It is displacement reaction.

Or

White precipitate of AgCl is formed.

$AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$

It is classified as (*i*) Double displacement reaction

(*ii*) Precipitation reaction.

27. The stratosphere is the portion of the atmosphere located at an altitude of in between 10 to 60 km. Within the stratosphere, the ozone layer is the portion that contains the highest proportion of ozone gas. Stratospheric ozone layer absorbs virtually all the ultraviolet rays, our planet receives from the sun (particularly UVa and UVb rays), which are harmful to life. Without this protective shield, no life forms could have evolved outside the oceans.

Exposure to UV rays affects our health. It is the main factor influencing the development of skin cancers.

Severe exposure to UV rays is a cause of cataracts, it is currently believed that UV rays affect our immune systems, lowering resistance to various diseases and reducing the effectiveness of certain vaccines.

Plant life is effected, lower yields from some plants and cereal crops, negative effects on plant growth, falling plankton populations, which are a primary source of food in marine ecosystems.

Two steps to limit this damage are as follows:

(*i*) Reduce the use of aerosol spray propellants such as fluorocarbon and chloro-fluorocarbons which cause depletion or hole in ozone layer.

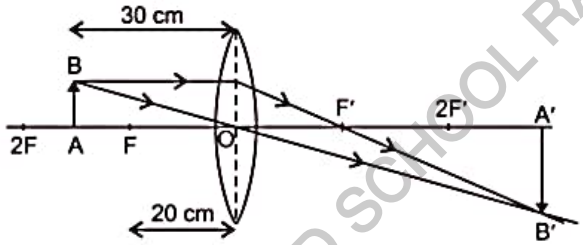
(*ii*) Control over large scale nuclear explosions and limited use of supersonic planes.

28. (*a*) $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$

(*b*) $2Pb(NO_3)_2(s) \xrightarrow{\text{Heat}} 2PbO(s) + 4NO_2(g) + O_2(g)$

(*c*) $Cu(s) + 2AgNO_3(aq) \longrightarrow Cu(NO_3)_2(aq) + 2Ag(s)$

29. $u = -30$ cm, $f = 20$ cm



(*a*) Using, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ we get,

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{20} + \frac{1}{-30} = \frac{3-2}{60}$$

$\Rightarrow$ $v = 60$ cm

Image is formed at a distance of 60 cm from the lens on the right side.

(*b*) $m = \frac{v}{u} = \frac{60}{-30} = -2$

So, image is inverted and double the size of the object.

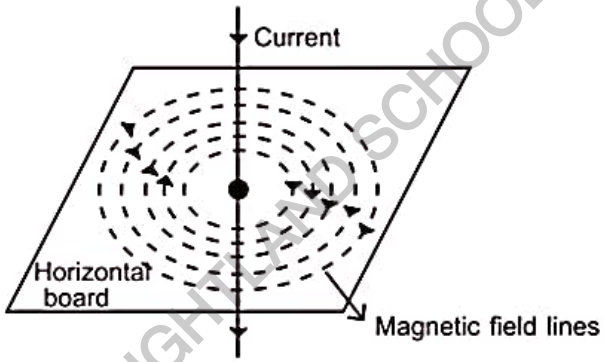
(*c*) Image is real as $v > 0$, inverted and enlarged.

30. (*a*) K > Ca > Mg > Al

(*b*) Be < C < N < O

(*c*) F > P > Si > Be

31. (*a*) Direction of magnetic field produced around a straight current-carrying conductor is given by **right-hand thumb rule.**



Right-Hand Thumb Rule. This rule is used to find the direction of magnetic field due to a straight current carrying wire.

It states that if we hold the current carrying conductor in the right hand in such a way that the thumb is stretched along the direction of current, then the curly finger around the conductor represent the direction of magnetic field produced by it. This is known as right-hand thumb rule.

(*b*) Direction of force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it, is given by **Fleming's left hand rule.**

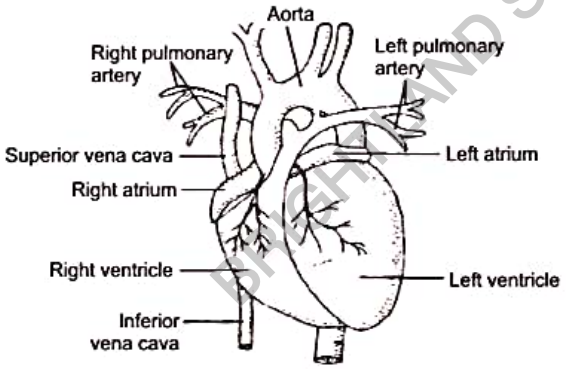
Fleming's Left-Hand Rule: Stretch the thumb, forefinger and middle finger of the left hand such that they are mutually perpendicular to each other. If the forefinger pointed towards the direction of magnetic field and middle finger in the direction of current, then the thumb will indicate the direction of motion or force experienced by the conductor.

32. (*a*) The focal length of the eye lens will be more in case (*i*), i.e. when ciliary muscles of a normal eye is most relaxed.

Reason: When ciliary muscles are relaxed, the eye lens becomes thin. Thus, its focal length increases. In case when ciliary muscles is in most contracted state, radius of curvature of eye lens increases. Lens becomes thicker. This decreases the focal length of eye lens.

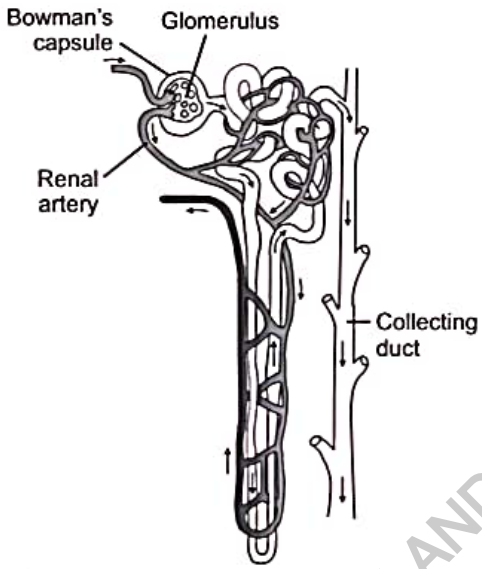
(*b*) Retina

33.



(*any six*)

Or



34. (*a*) **Case I:**

Using, $P = VI$, we get

$$I = \frac{P}{V} = \frac{880}{220} = 4 \text{ A}$$

and $$P = \frac{V^2}{R} \Rightarrow R = \frac{(220)^2}{880} = 55\ \Omega$$

Case II:

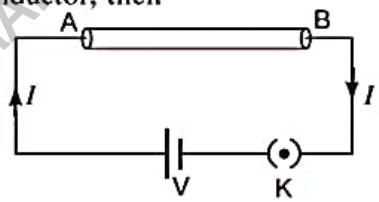
- $$I = \frac{P}{V} = \frac{330}{220} = 1.5 \text{ A}$$
- $$R = \frac{V^2}{R} = \frac{(220)^2}{330} = 146.67\ \Omega$$

(*b*) When an electric current passes through a purely resistive circuit (like very high resistance wire), the source energy continually get dissipated entirely in the form of heat. This known as heating effect of electric current.

(*c*) **Heat produced in a resistor:** Consider a wire AB having a resistance '*R*' connected across the terminals of a cell. Let *V* be the potential difference applied by cell across the ends of a wire.

Let W be the work done in carrying the charge q across the conductor, then

$$V = \frac{W}{q} \text{ or } W = V \times q \quad \ldots(i)$$



but $q = I \times t$

So, $W = V \times It \quad \ldots(ii)$

This work done will appear in the form of heat produced in the wire, i.e.

$$H = VIt \quad \ldots(iii)$$

Using Ohm's law, $V = IR$

So, $H = (IR)\, It = I^2Rt$

This is the expression for the heat produced in the wire. This is called Joule's law of heating.

Or

(*a*) Bulbs in parallel provide more illumination. This is because

(*i*) each bulb gets same voltage and is equal to the applied voltage.

(*ii*) each bulb draws required current from the mains. Hence, they work properly.

(*b*) When one bulb in each circuit get fused,

In series: Rest of the bulbs will not glow. This is because in series arrangement, there is only a single path available for the flow of current.

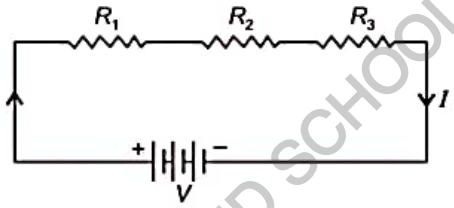
In parallel: Rest of the bulbs will continue to glow as in parallel connection,

(*a*) individual branch in the circuit completes its own circuit.

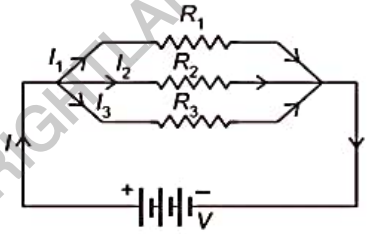
(*b*) different paths are available for the flow of current.

(*c*) Circuit diagram

For series,

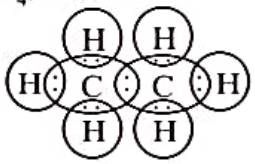


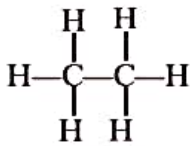
For parallel,



35. (*a*) Carbon shares four electrons to become stable and form covalent bond. Simplest hydrocarbon is CH_4, methane.

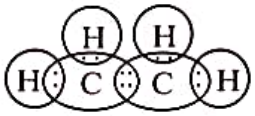
(*b*) (*i*)

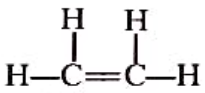




Ethane

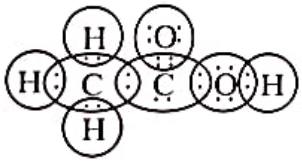
(*ii*)

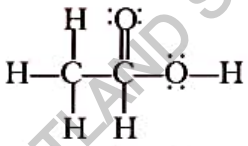




Ethene

(*iii*)





Ethanoic acid

Or

(*a*) (*i*) They have low melting and boiling point

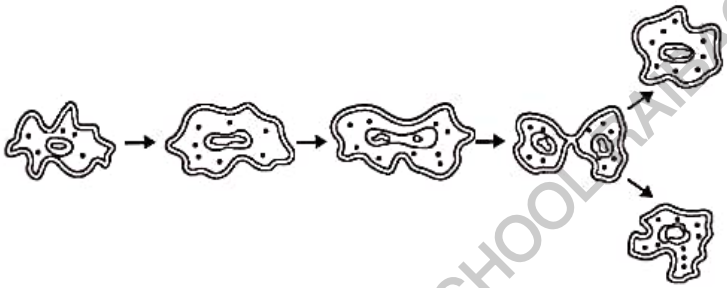
(*ii*) They do not conduct electricity.

(*b*) It is because a large number of molecular ions of soaps get aggregated and form colloidal solution. Soap has hydrophobic tail (hydrocarbon) which dissolves in hydrocarbon part and hydrophilic part dissolves in water. Ethanol is non-polar solvent therefore micelles are not formed because hydrocarbon part gets attracted towards ethanol and ionic end will not dissolve in alcohol.

36. (*a*) (*i*) Fission (*ii*) Fragmentation

(*iii*) Regeneration (*iv*) Budding

(*b*) *Amoeba* divides by binary fission where the organisms divides equally into two daughter cells.



During binary fission, the nuclear division is followed by appearance of a constriction in the cell membrane. Constriction deepens and two cells separate having cytoplasm and nucleus in each cell (daughter cells).

(*c*)

Fission	Fragmentation
It takes place in unicellular organisms.	It takes place in multicellular organisms.

Or

(*a*) An organism that reproduces by spores: *Rhizopus*/ *Mucor*

Advantages:

(1) Large number of new individuals are produced at a time.

(2) The spores have thick wall which protects them from unfavourable conditions.

(*b*) **Function of:**

Plumule: Give rise to future shoot or stem of the plant.

Radicle: Give rise to future root.

Cotyledons: Store food for germinating seed until it bears leaves.

37. (*a*) (*i*) Convex mirror

(*ii*) Convex mirror has larger field of view.

(*b*) The ray passing through the centre of curvature is incident normally to the mirror. So $\angle i = \angle r = 0$. Therefore, the ray retraces its path after reflection from the mirror.

(*c*) The angle of incidence is between the normal and incident ray so the angle of incidence is $90° - 30° = 60°$.

We know angle of incidence is equal to angle of reflection. Therefore, the angle of reflection will be 60°.

$$\angle i = \angle r = 60°$$

Or

(*d*) The centre of curvature of a mirror is always located at a distance equal to its radius of curvature which is twice of its focal length. Therefore, centre of curvature is

(*i*) 25 cm away from the pole, and

(*ii*) 12.5 cm away from the focus of the mirror.

38. (*a*) 'X' is $CaCO_3$ 'Y' is CaO.

(*b*) $\underset{\text{'X'}}{CaCO_3(s)} \xrightarrow{\text{Heat}} \underset{\text{'Y'}}{CaO(s)} + \underset{\text{'P'}}{CO_2(g)}$

Calcium carbonate — Calcium oxide — Carbon dioxide

Or

(*c*) $\underset{\text{'Y'}}{CaO(s)} + H_2O(l) \longrightarrow \underset{\text{'Z'}}{Ca(OH)_2(aq)}$

Calcium oxide — Calcium hydroxide

(*d*) (*i*) dil. HCl (Hydrochloric acid).

(*ii*) $\underset{\text{Lime water}}{Ca(OH)_2(aq)} + \underset{\text{'P'}}{CO_2(g)} \longrightarrow \underset{\text{(White ppt.)}}{CaCO_3(s)} + H_2O(l)$

$$CaCO_3 + H_2O + CO_2 \longrightarrow \underset{\text{(Q)}}{Ca(HCO_3)_2}\ \text{[soluble]}$$

39. (*a*) **Parents** TT × tt

Tall plants — Dwarf plants

Gametes T, t

F_1 generation Tt

Self pollination of F_1 Tt × Tt

Gametes F_2 generation

	T	t
T	TT Tall	Tt Tall
t	Tt Tall	tt Dwarf

(*b*) Genotype of

(*i*) Parents TT × tt

(*ii*) F_2 generation TT : Tt : tt

1 : 2 : 1

Or

(*c*) Phenotypic ratio of F_1 generation – All round

Genotypic ratio of F_1 generation – Rr

Phenotypic ratio of F_2 generation –

3 round : 1 wrinkled

Genotypic ratio of F_2 generation –

1	:	2	:	1
RR	:	Rr	:	rr