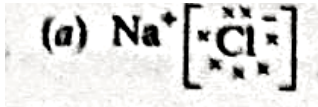


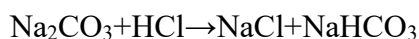
Science-Answer Key

Section-A

1. b) Iron (Fe) displaces copper (Cu) from its solution.
2. b) 6
3. b) Barium sulphate
4. c) Calcium sulphate hemihydrate
5. c) Tartaric acid and Methanoic acid
6. a) (i) and (ii)
7. 
8. a) parallel to the axis
9. a) Both (A) and (B) are correct
10. $H = I^2RT$
11. b) -0.5 D
12. (c) into the page
13. a) Trait A
14. c) T_1
15. c) Absorption of light energy by chlorophyll
16. b) Neurotransmitters and hormones
17. d) To commence the blood clotting process at the wound site
18. a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
19. c) Assertion (A) is true, but Reason (R) is false.
20. b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

Section-B

21. (a): Sodium carbonate (Na_2CO_3) on reaction with hydrochloric acid (HCl) in equal molar concentration gives sodium chloride (NaCl) and sodium hydrogen carbonate (NaHCO_3).



(b): The reaction is given by: $\text{CuSO}_4 + \text{KI} \rightarrow \text{CuI} + \text{I}_2 + \text{K}_2\text{SO}_4$

After balancing it becomes: $2\text{CuSO}_4 + 4\text{KI} \rightarrow 2\text{CuI} + \text{I}_2 + 2\text{K}_2\text{SO}_4$

22.

$$\text{Refractive index of a medium} = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in a medium}}$$

$$1.5 = \frac{3 \times 10^8}{\text{Speed of light in medium}}$$

$$\text{Speed of light in the medium} = \frac{3 \times 10^8}{1.5}$$

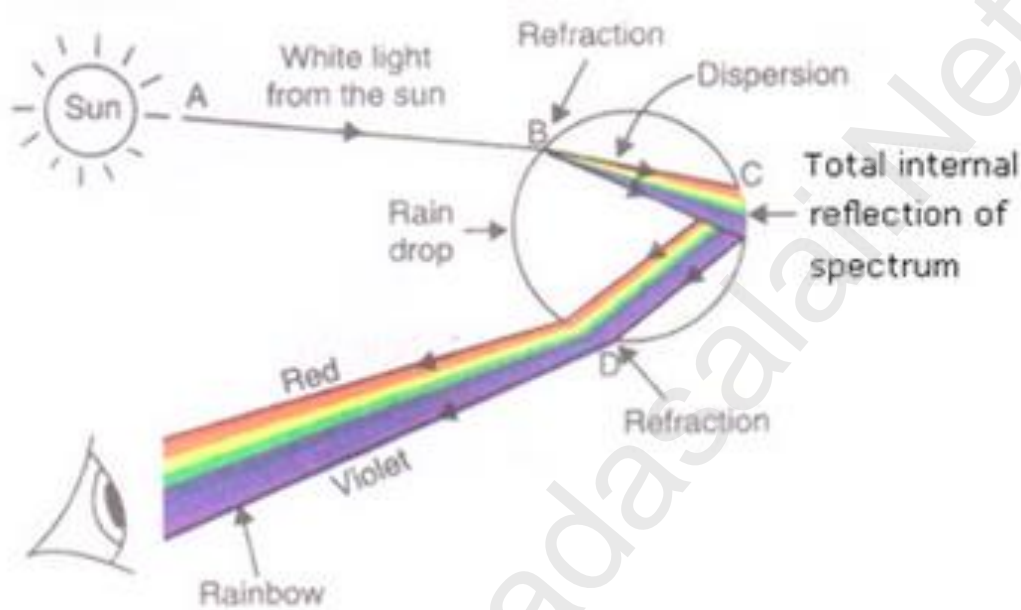
$$= 2 \times 10^8 \text{ m/s.}$$

23.

The

splitting up white light into seven colours on passing through a transparent medium like a glass prism is called dispersion of light

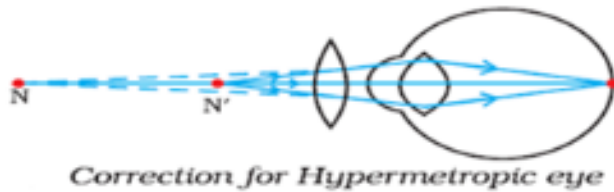
Formation of Rainbow:



The raindrops act like small prisms. When sunlight enters and leaves these raindrops, various coloured rays in white light are refracted by different amounts due to which an arc of seven colours called rainbow is formed

OR

(B) a) Hypermetropia is also known as far-sightedness. A person with hypermetropia can see distant objects clearly but cannot see nearby objects distinctly. The near point, for the person, is farther away from the normal near point (25 cm). Such a person has to keep a reading material much beyond 25 cm from the eye for comfortable reading. This is because the light rays from a close by object are focused at a point behind the retina. This defect arises either because (i) the focal length of the eye lens is too long, or (ii) the eyeball has become too small. This defect can be corrected by using a convex lens of appropriate power. Eye-glasses with converging lenses provide the additional focusing power required for forming the image on the retina.



b) Twinkling of stars is due to atmospheric refraction. When light from stars enters the earth's atmosphere, it continuously goes from rarer to a denser medium, therefore, refraction of light takes place.

24. a) I were a herbivore, I would expect the length of my small intestine to be longer than that of a carnivore, as herbivores require more time and space to digest cellulose.
- (b) Yes, the coiling of the small intestine has significance in the digestion process as it increases the surface area for more efficient digestion and absorption of nutrients.

OR

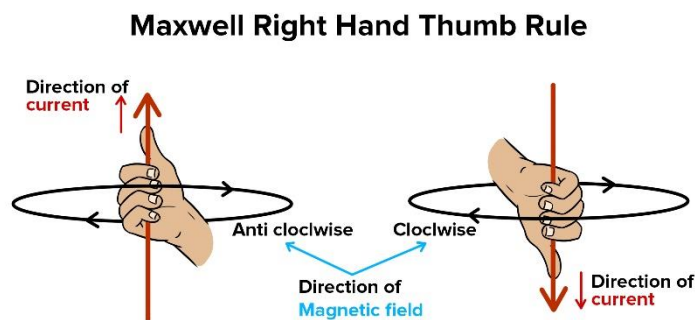
(B) Xylem facilitates the movement of water and minerals through physical forces like transpiration pull, carrying water from roots to the aerial parts.

In contrast, phloem transports organic nutrients from leaves to other plant parts (roots, fruits and seeds and to growing organs) through translocation. This process distributes products of photosynthesis, essential for plant growth and development.

25. (a) 'A' is pollen grain.
 b) Pollen grain reach stigma (B) by pollinating agents.
 (c) Pollen tube helps in transport of male gametes.
 (d) The fertilized egg cell (D) develops into a zygote and then an embryo within the ovule. The surrounding ovule transforms into a seed, and the ovary becomes the fruit.
26. Enzymes are biological catalysts and specific in their action, meaning that specific enzymes are needed for the breakdown of complex substances into simpler molecules to derive energy. In digestion, they help convert carbohydrates, proteins, and fats into sugars, amino acids, and fatty acids, respectively, facilitating absorption by the body.

Section-C

27. Magnetic Field produced around a straight current-carrying conductor:
 Maxwell's Right-Hand Thumb Rule can be used to determine the direction of magnetic field lines around a current-carrying conductor.
 It states that, if the thumb of the right hand represents the direction of the current flow, the rest of the curled fingers determine the direction of the magnetic field around it.
 The figure below represents the same.



the

conductor carrying current.

This is the rule that can determine direction of the magnetic field produced around a straight

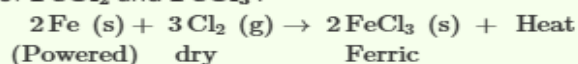
28. (a) Ore is a mineral from which metal extraction is done commercially and easily.

One ore of Iron is haematite. The chemical formula of haematite is Fe_2O_3 .

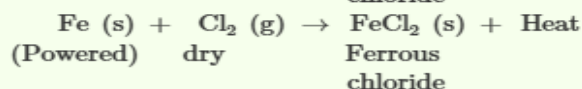
(b) The haematite ore is an oxide ore of Iron. The haematite ore is not reacted with water.

(c)

- When powdered Iron reacts with dry Chlorine gas resulting in the formation of FeCl_2 and FeCl_3 .



(Powered) dry Ferric chloride



(Powered) dry Ferrous chloride

- It depends on the ratio of Iron that reacts with Chlorine gas.

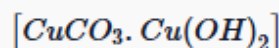
Therefore, element E is **Iron**.

OR

a. In ionic compounds the ions are held by strong electrostatic force of attraction hence the bond is very strong and require more energy to break. Therefore they have high melting and boiling points.

b. It is because these metals, themselves are strong reducing agents. Therefore carbon cannot be used as reducing agent.

c. Copper vessels reacts with CO_2 and O_2 and moisture to form green coloured basic copper carbonate.



29.

(a) Total Resistance (R_{total}) = $R_1 + R_2 = 12 \Omega + 18 \Omega = 30 \Omega$
Now, calculate the current:

$$\text{Current (I)} = \frac{V}{R_{\text{total}}} = \frac{36\text{V}}{30\Omega} = 1.2 \text{ A} \quad (1 \text{ M})$$

(b) In a series circuit, the current remains constant, but the potential difference across each resistor depends on its resistance.

$$\text{Potential Difference across } R_1 = I \times R_1 = 1.2 \times 12 = 14.4 \text{ V} \quad (1 \text{ M})$$

(c) Potential Difference across $R_2 = I \times R_2 = 1.2 \times 18 = 21.6 \text{ V} \quad (1 \text{ M})$

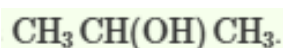
30. a) Carbon cannot form C^{4+} cation because of removal of 4 electrons from a carbon atom would require a large amount of energy. b Carbon cannot form C^{4-} anion because it would be difficult for the nucleus with 6 protons to hold on to 10 electrons. c Hence carbon atoms share electrons forming covalent compounds. d Covalent compounds do not form ions/ charged particles and therefore do not conduct electricity. e Inter molecular forces of attraction are weak hence low melting and boiling points

OR

(B) X is ethanoic acid an organic acid. $X \rightarrow CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2 + H_2O$ Organic acid decomposes sodium bicarbonate and gives brisk effervescence of carbon dioxide gas.

ii) The melting point of pure ethanoic acid is 290 K and hence it often freezes in cold climate to form a colourless, ice-like liquid. This has given it the name glacial acetic acid.

iii) a) Thus, the formula of propan -2-ol is



b) $CH_3CH_2CH_2COCH_3$

31. A will represent more energy transfer as compared to C and E.

B will represent more energy transfer as Compared to d

When green plants are eaten by primary consumers, a great deal of energy is lost as heat to the environment, some amount goes into digestion and in doing work and the rest goes towards growth and reproduction. An average of 10% of the food eaten is made available for the next level of consumers. This loss of energy takes place at every trophic level.

32. a) When we touch the leaf of the sensitive plant like Mimosa pudica, electrical signals are generated, causing cells at the base of leaflets to lose water rapidly, leading to the folding of leaves. This response is communicated via chemical signals and changes in cell turgor pressure.

(b) (i) Gibberellin

(ii) Cytokinin

SECTION-D

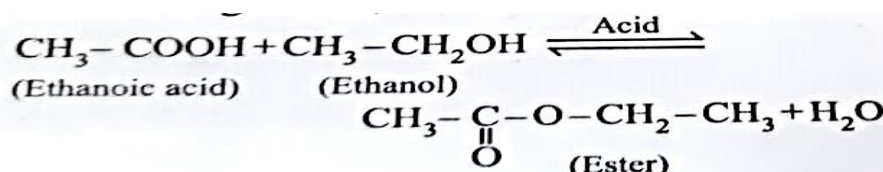
33. a) A) (i) Consumption of methanol causes blindness 34. (because it affects the optic nerves. Ethanol causes mental confusion by depressing the central nervous system.

(ii) Ethanol (ethyl alcohol) gives ethene on heating with concentrated sulphuric acid. This is called dehydration of ethanol

The complete reaction is given as

(iii) $CH_3-CH_2OH \xrightarrow[H_2SO_4]{Hot\ Conc.} CH_2=CH_2 + H_2O$ The reaction in which ester is formed by the reaction of an acid and an alcohol in the presence of acid catalyst is called esterification reaction.

When ethanoic acid reacts with ethanol in the presence of an acid catalyst, ester is formed. The reaction is given as,



OR

Length of the rod = 10 cm Focal length of the concave mirror (f) = - 10 cm (since it is concave) Distance of the end of the rod closer to the pole from the mirror ($u_{\{1\}}$) = - 20 cm (object distances are taken as negative mirror calculations) The other end of the rod will be at a distance ($u_{\{2\}}$) = - 20cm + 10cm = - 30 cm Using the Mirror Formula:

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

Let's calculate the image distances for both ends of the rod.

Image distance for the closer end (v_1):

$$\frac{1}{-10} = \frac{1}{v_1} + \frac{1}{-20}$$

$$\frac{1}{v_1} = \frac{1}{-10} - \frac{1}{-20}$$

$$\frac{1}{v_1} = \frac{1}{(-10)} + \frac{1}{(-30)}$$

$$\frac{1}{v_1} = -\frac{3}{30} + \frac{1}{30}$$

$$\frac{1}{v_1} = \frac{-3+1}{30}$$

$$\frac{1}{v_1} = \frac{-2}{30} = \frac{-1}{15}$$

$$v_1 = -15 \text{ cm}$$

Length of the image:

The length of the image of the rod will be the absolute difference between the two image distances:

$$\begin{aligned} \text{Length of the image} &= |v_1 - v_2| = |-20 \text{ cm} - (-15 \text{ cm})| \\ &= |-20 + 15| = |-15| = 5 \text{ cm} \end{aligned}$$

35. (A) (1) Bacterial Infections: Gonorrhoea and Syphilis (JM)

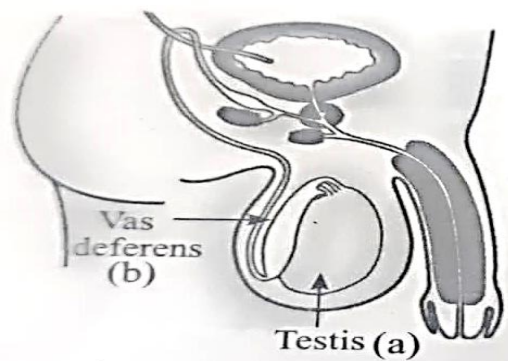
Viral Infections: Warts and HIV-AIDS.

Prevention: Using condoms during sexual acts helps to prevent the transmission of these infections.

(ii) (a) Fallopian Tubes Blocked: The egg cannot travel to the uterus, preventing fertilization and pregnancy.

(b) Vas Deferens Cut: Sperm cannot be transported from the testes to the urethra, preventing fertilization and pregnancy.

Or



Testes are located outside the abdominal cavity in scrotum because sperm formation requires a lower temperature than the normal body temperature.

ii) Various parts of a male reproductive system are

1. Testes: A pair of testes produces the male gamete, sperm and secrete the male sex hormone testosterone, which helps regulate spermatogenesis, maintains the structure and function of male reproductive system and development of secondary sexual characteristics in male. (M)
2. Vas deferens: The vas deferens is a long tube that carries the sperms from the epididymis to the urethra
3. Seminal vesicles and prostate gland: Secrete fluids that provide a medium for the sperm and also provide nutrition to the sperm, making transport easier.
4. Penis: Delivers semen into the female reproductive tract.

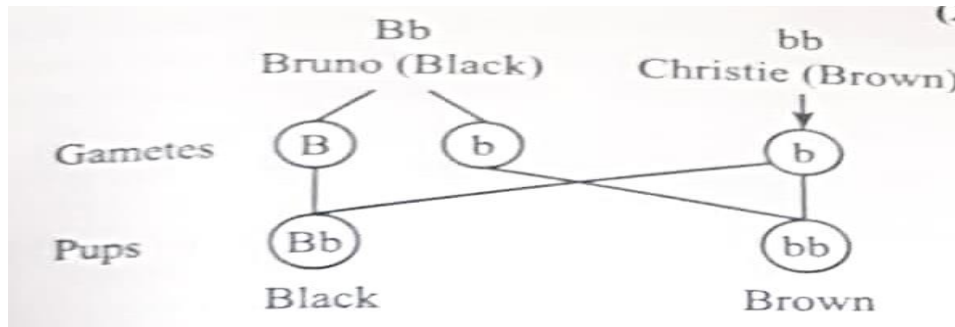
Section-E

36. (a) Element X conducts electricity due to the presence of free electrons that can move and carry electric current. Element Y, being a non-metal, lacks these free electrons and therefore does not conduct electricity
- (b) The hypothesis could be that element X reacts with concentrated hydrochloric acid to form a salt and hydrogen gas, while element Y remains unreactive.
- (c) $2X + 2H_2O \rightarrow 2XOH + H_2$ (for element X) and no reaction for element Y. Solutions of XOH are basic in nature, while Y does not form any significant solution

OR

- (c) Elements X and Y would likely form an ionic bond. Element X, being a metal, would lose electrons to form positive ions, while element Y, as a non-metal, would gain electrons to form negative ions. The attraction between the oppositely charged ions would result in the formation of an ionic compound between the two. (2 M)
37. a) Bruno was black colour dog. Since black colour is the dominant trait, it showed in half of the pups.

(b) The genotype of Bruno is Bb (heterozygous). If it was homozygous, all the pups would have been black colour. It can be explained by the following cross



c) The possible genotypes of Christie's pups are - Bb and bb.

OR

(c) If Christie (bb) were bred with another brown-furred dog, Max (bb), the expected fur colour ratio of the pups would be:

bb (brown-furred) = 100%

All the pups would have brown fur since both parents contribute only the recessive b allele.

38.

a) The blood vessel is

A – Artery

B – Vein

C – Capillary

b) The parts labelled A to B are:

1. Connective tissue layer (tunica adventitia)

2. Lumen

3. Muscular layer (tunica media)

4. Endothelium layer (tunica intima)

c) The difference is:

A is an artery and has thick muscular walls which are elastic in nature.

B is a vein which has thin muscular walls which are less elastic in nature.

d) A: Pureblood or oxygenated blood.

B: Impure blood or deoxygenated blood.

OR

C. In C – Capillary - the exchange of gases actually take place.