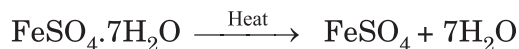


Answers to RST-DS1/Set-2

1. (c)
2. (b) Ferrous sulphate crystals ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) lose water when heated and colour of crystals change from green to white. On further heating, it decomposes to ferric oxide (Fe_2O_3) which is brownish black.



Characteristic odour of burning of sulphur is observed which are colourless gases.

3. (b)

4. (b)

5. (b)

$$I = 1 \text{ mA} = 1 \times 10^{-3} \text{ A}$$

$$t = 8 \text{ sec}$$

Number of electrons $n = ?$

We know that

$$I = \frac{Q}{t}$$

$$Q = ne$$

n – number of electrons

e – charge on an electron = $1.6 \times 10^{-19} \text{ C}$

\therefore

$$I = \frac{ne}{t}$$

$$n = \frac{I \times t}{e}$$

$$= \frac{1 \times 10^{-3} \times 8}{1.6 \times 10^{-19}} = 5 \times 10^{16}$$

6. (a)

7. (d)

8. (d)

9. (d)

10. (b) B is the best conductor as it has the least resistivity. Smaller the resistivity, higher is the conductivity.

11. (b)

12. (a)

13. (d)

14. (c) Copper reacts with acid to form poisonous substance. Bronze and brass are alloys of copper and they also react with acid.

15. (a)

16. (d) Because Zn is less reactive than Mg.
17. (b)
18. (c)
19. (d)
20. (a)
21. Given: Object distance, $u = -25$, Image distance, $v = -50$ cm, Power of lens, $P = ?$

Using lens formula,

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{f} = \frac{1}{-50} - \frac{1}{-25}$$

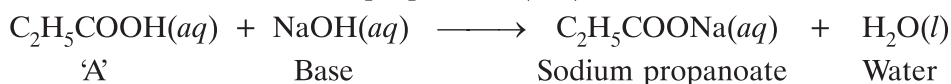
$$\frac{1}{f} = -\frac{1}{50} + \frac{1}{25} = \frac{1}{50}$$

or $f = +50$ cm = + 0.5 m

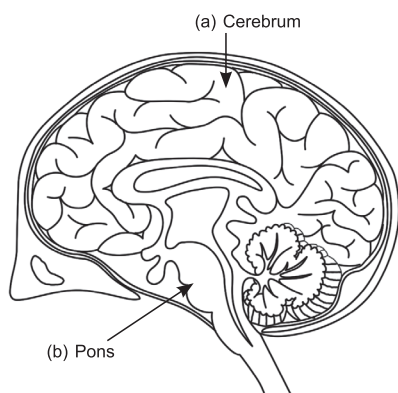
The nature of lens is convex.

and Power, $P = \frac{1}{f(\text{m})} = \frac{1}{0.5} = +2.0$ D

22. (a) Compound 'A' is $\text{C}_2\text{H}_5\text{COOH}$ (propanoic acid). The functional group present in it is carboxylic acid ($-\text{COOH}$).
- (b) If $\text{C}_2\text{H}_5\text{COOH}$ reacts with strong base (NaOH), neutralisation reaction takes place resulting in the formation of sodium propanoate (salt) and water.



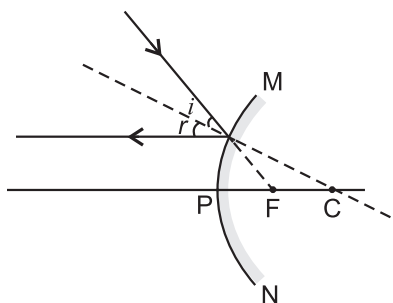
23.



OR

- (a) Human brain is protected from injuries by cranium (skull). Cerebrospinal fluid protects it from the mechanical shocks.
- (b) Spinal cord is protected from injuries by vertebral column which is a bony cage. Spinal cord begins in continuation with medulla and extends downwards.

24. The required ray diagram is as follows:



OR

- (a) The extent of bending of the ray of light at the opposite parallel faces AB (air-glass interface) and CD (glass-air interface) of the rectangular glass slab is equal and opposite. That is why the ray emerges parallel to the incident ray.
- (b) When a light ray incident normally to the interface of two media, then there is no bending of light ray and it goes straight through the medium.

25. $f = -15 \text{ cm}$
 $v = -10 \text{ cm}$
 $u = ?$

By applying lens formula

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

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

$$= \frac{1}{-10} - \frac{1}{-15} = \frac{1}{-10} + \frac{1}{15} = \frac{-3+2}{30} = \frac{-1}{30}$$

$$u = -30 \text{ cm}$$

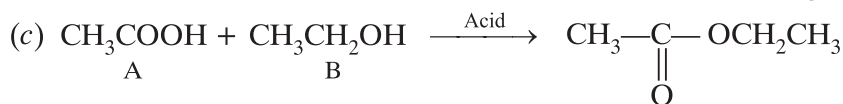
The object is placed 30 cm from the lens.

26. (a) In single-celled organisms, the entire surface of organisms is in contact with the environment. By the process of diffusion, oxygen requirement of the organism is fulfilled.
- (b) *Paramecium* is a unicellular organism. The cell has a definite shape unlike *Amoeba*. It takes its food in at a specific spot. Food is moved to this spot by the movement of cilia which cover the entire surface of the cell.

27. (a) A – Ethanoic acid (CH_3COOH)
 B – Ethanol ($\text{CH}_3\text{CH}_2\text{OH}$)
 C – Ester $\left(\begin{array}{c} \text{CH}_3-\text{C}-\text{O}-\text{CH}_2\text{CH}_3 \\ \parallel \\ \text{O} \end{array} \right)$

- (b) The water bath helps the ester to get separated from the alcohol and the acid to obtain pure ester at the end of the process.

The test tube is heated in a water bath for uniform heating. (Any one)



28. (a) Removal of stamens of a bisexual flower will not affect pollination as its pistil is intact. Therefore, formation of fruit will take place as transfer of pollen grains from the anther of another flower of the same plant or different plant of the same species to the stigma of flower will take place which causes cross-pollination.
- (b) All multicellular organisms cannot give rise to new individuals as the complex multicellular organisms have tissues, organs and organ systems. In such organisms, cell by cell division is impractical. Regeneration and fragmentation are only possible in those organisms where the entire body is made up of similar kind of cells.
- (c) During the process of cell division (meiosis) the number of chromosomes in the parent cell reduces to half in gametes. As sperms and ova are gametes, the number of chromosomes are reduced to half. Through the process of fertilisation, ovum and sperm join to make a cell, zygote with double the number of chromosome as that of parents.



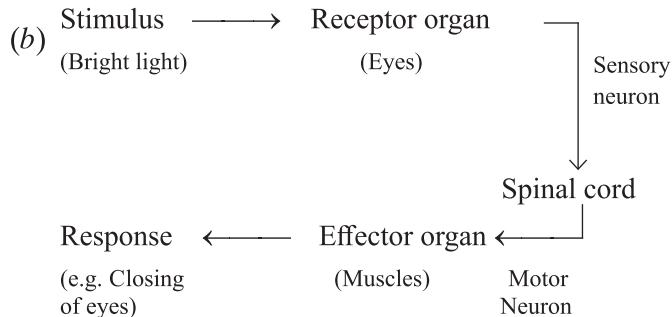
It is called chlor-alkali process.

- (b) When bleaching powder is exposed to air, it gives strong smell of chlorine because bleaching powder reacts with carbon dioxide from the atmosphere to produce calcium carbonate and chlorine.



Bleaching powder is a mixture of different calcium salts which are insoluble in water.

30. (a) Reflex action is an unconscious, spontaneous and involuntary response of effectors. Reflex arcs have evolved in animals because the thinking process of the brain is not fast enough. Whereas reflex arc is more efficient for quick response.



31. (a) The deflection of the compass needle gets affected and it also decreases. As we know magnetic field due to a current carrying straight conductor is directly proportional to the strength of the current passing through it.
- (b) A thin beam of alpha particles are charged, behave like a straight conductor carrying current and produce magnetic field. While neutrons are neutral particles, do not behave like a straight conductor carrying current and do not produce magnetic field.
- (c) In right hand thumb rule, thumb indicates the direction of current in the straight current carrying wire. In Fleming's left hand rule, the thumb gives the direction of force experienced by the conductor.

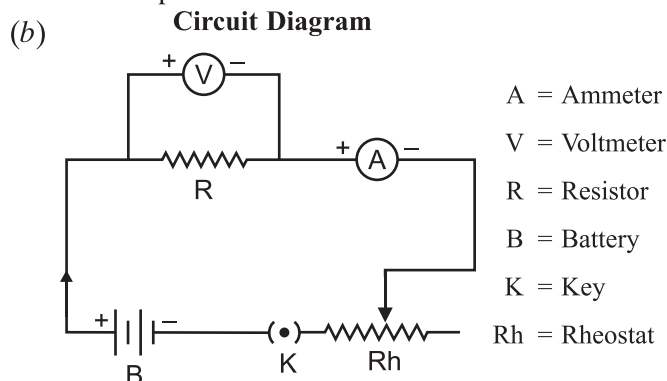
32. (a) A – 1 M NaOH solution
 B – Distilled water
 C – Tomato juice
 D – Lemon juice
- (b) When baking soda is heated it decomposes to form anhydrous sodium carbonate
- $$2\text{NaHCO}_3(s) \xrightarrow{\text{Heat}} \text{Na}_2\text{CO}_3(s) + \text{CO}_2(g) + \text{H}_2\text{O}(g)$$
- Anhydrous Na_2CO_3 is dissolved in water and subjected to recrystallisation
- $$\text{Na}_2\text{CO}_3(s) + 10\text{H}_2\text{O}(l) \longrightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}(s)$$
33. (a) Biodegradable waste – Leather purse, Fruit peels, Egg shells.
 Non-biodegradable waste – Plastic bag
- (b) **Disposal of waste**
 Biodegradable waste – Composting
 Non-biodegradable waste – Recycling
- (c) **Effects of biodegradable waste on environment**
- Accumulated biodegradable waste act as a breeding ground for houseflies which act as vectors of various diseases.
 - Decomposition of biodegradable waste is accompanied by foul smell. *(Any one)*
- Effects of non-biodegradable waste on environment**
- Some non-biodegradable wastes enter the food chain and affect the various biotic components of the environment.
 - Non-biodegradable waste do not decompose easily so it produces land and water pollution. *(Any one)*

OR

- (a) Since there is only 10% energy which is transferred to the next level and there is gradual reduction in the amount of energy, the loss of energy at each trophic level is so great that very little usable energy remains after three levels. So the organisms belonging to 4th or 5th trophic levels will get a very little energy to sustain.
- (b) The pesticides and fertilisers are non-biodegradable, their concentration in the bodies of living organisms increases progressively at each trophic level in a food chain. Increase in concentration of these toxic materials at each trophic level of a food chain is called biological magnification. Whenever this cereal plant is eaten, the human beings would have the maximum concentration of these chemicals as they occupy the highest trophic level.
- (c)
- As plastic bags are non-biodegradable they will remain as such and pollute the environment.
 - Burning of plastic bags produces harmful gases.
 - Cows and other stray animals eat the discarded bags containing left over food materials which can harm them.
 - Littering of plastic bags can choke the drains.
 - When plastic bags are thrown in water, they can cause water pollution. *(Any one)*

34. (a) A V-I graph for a nichrome wire as shown is a straight line passing through the origin. We infer that current is directly proportional to the potential difference. This means if the potential difference decreases, the current also decreases and the ratio $\left(\frac{V}{I}\right)$ remains constant.

Ohm's law 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 the temperature remains constant.



- (c) **For first wire**

$$R_1 = \frac{\rho l}{A} = 10 \Omega$$

For second wire

$$\begin{aligned} R_2 &= \frac{\rho \frac{l}{2}}{2A} = \frac{1}{4} \left(\frac{\rho l}{A} \right) \\ \Rightarrow R_2 &= \frac{1}{4} R_1 \\ &= \frac{1}{4} \times 10 = 2.5 \Omega \end{aligned}$$

Thus, the resistance of the new wire is 2.5Ω .

OR

- (a) The bulbs in parallel combination i.e. circuit (ii) will glow brighter than the bulbs in series combination i.e. circuit (i).

In parallel combination, the effective resistance is always less than the resistance in the series combination. According to Ohm's law

$$R = \frac{V}{I}$$

Resistance is inversely proportional to current.

In parallel combination, resistance is less so current is more in circuit (ii). Hence, the bulbs glow brighter in circuit (ii).

In series combination, resistance is more, so the current is less in the circuit (i) and the bulbs in circuit (i) will not glow as brighter as in circuit (ii).

- (b) The bulbs B_1 and B_2 will glow with the same brightness. Bulb B_4 not glow.

As these bulbs are connected in series, if one bulb fuses, the other bulb B_4 in the circuit will not glow as the circuit is broken. The same current is drawn by all the bulbs. Bulbs B_1 and B_2 will go on getting the current whereas B_4 will not get any current due to the broken circuit.

$$(c) (i) \quad P = 750 \text{ W}, \quad V = 220 \text{ V} \quad I = ?$$

$$P = VI$$

$$\therefore \quad I = \frac{P}{V} = \frac{750}{220} = 3.41 \text{ A}$$

Current of 3.41 A is drawn from the mains.

$$(ii) \quad P = 750 \text{ W} = 0.75 \text{ kW}$$

$$t = 10 \text{ minutes} = \frac{10}{60} = \frac{1}{6} \text{ hours}$$

Days in the month of November = 30

Energy consumed (E) = ?

$$E = P \times t$$

$$= 0.75 \times \frac{1}{6} \times 30 = 3.75 \text{ kWh}$$

$$(iii) \quad \text{Total cost} = 3.75 \times ₹ 6 = ₹ 22.5$$

So total cost of energy consumed is ₹ 22.5

35. (a) (i) A – Magnesium

B – Magnesium oxide

(ii) Type of reaction – Combination reaction

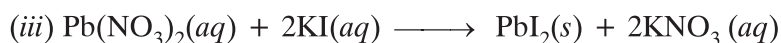
Type of oxide – Basic oxide

(b) (i) Colour of precipitate – yellow.

Name of the precipitate – Lead (II) iodide

(ii) Type of reaction – Double displacement reaction.

The reaction in which there is an exchange of ions between the reactants is called double displacement reaction.



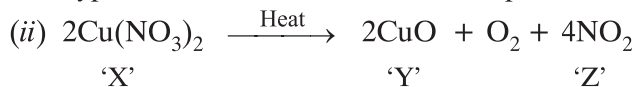
OR

(a) (i) X – Copper (II) nitrate [$\text{Cu}(\text{NO}_3)_2$]

Y – Copper (II) oxide (CuO)

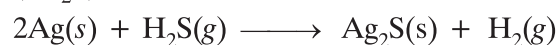
Z – Nitrogen oxide (NO_2)

Type of reaction – Thermal decomposition.



(iii) The pH range of aqueous solution of gas ‘Z’ would be between 0 and 7. The gas ‘Z’ (NO_2) is an oxide of a non-metal and its aqueous solution will be acidic.

(b) (i) Silver articles turn black when kept in the air for a few days because hydrogen sulphide present in the air attack silver articles forming a coating of silver sulphide (Ag_2S).

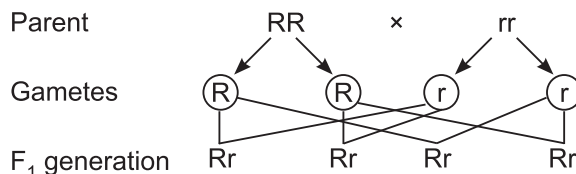


(ii) The taste and smell of some food materials change when left for a long time. As the food containing fats and oils are oxidised, they become rancid.

The phenomenon involved in (i) is corrosion and in (ii) is rancidity.

36. (a) A male human being has one 'X' chromosome and one 'Y' chromosome. Thus, half the sperms will have 'X' chromosome and the other half will have 'Y' chromosome. A female has 'XX' chromosomes and all the female gametes (ova) have only 'X' chromosome. If a sperm carrying 'X' chromosome fertilises an ovum, then the child born will be a girl. If a sperm carrying 'Y' chromosome fertilises an ovum, then the child born will be a boy. Hence, we can say that the chromosomal difference between sperms and eggs of human beings determines the sex of the child.
- (b) 'Chromosomes' are long thread-like structures which contain hereditary information of the individual and are therefore the carriers of genes. Chromosomes are located in the nucleus of a cell.
- (c) **Law of dominance.** This law states that when two alternative forms of a trait or character are present in an organism, only one factor expresses itself in F_1 progeny and the factor is dominant while the other does not express itself and is recessive.

In a cross between red coloured (RR) flowers and white coloured flowers (rr)



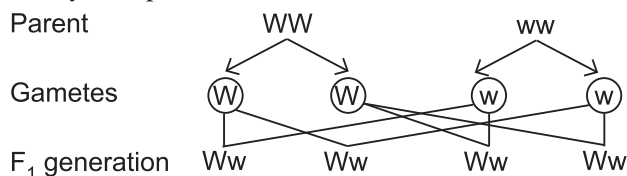
All plants of red coloured flowers.

It was found that only plants with red coloured flowers were obtained in the first generation or F_1 generation. No white flowered plants were obtained in F_1 generation. From this, we can conclude that the F_1 generation showed the traits of only one of the parent plants. Red colour being the dominant trait appears in F_1 generation. The trait of other parent plant, white colour, being recessive did not appear in the F_1 generation.

OR

- (a) During reproduction, the basic event is the creation of a DNA copy. The DNA in the cell nucleus is the information source for making proteins. If the information is changed, different proteins will be made. Different proteins will eventually lead to altered body design.

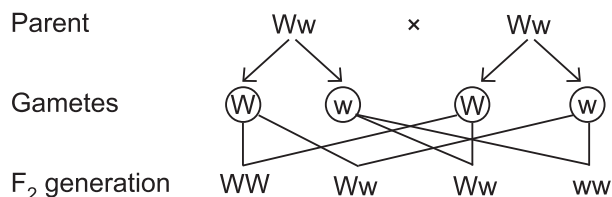
- (b) **Law of segregation of traits** – This law states that the factors or alleles of a pair segregate from each other during gamete formation such that one gamete receives only one of the factors. By taking white fur and brown fur animals, obtain F_1 generation by cross-pollination and F_2 generation by self-pollination.



All white offsprings

F_1 generation can also be shown from gametes by Punnett square

	W	W
w	Ww	Ww
w	Ww	Ww



We see that the trait for white fur and brown fur were together in F_1 generation but these got segregated during gamete formation to produce F_2 generation. This explains the law of segregation.

- (c) In the monohybrid cross between animals having white fur and brown fur as shown in the part (b) of the same question.

All the offsprings of F_1 generation have genetic make up as Ww. The phenotypic ratio is 1:1:1:1 i.e. all have white fur. The offsprings of F_2 generation have genetic make up as WW, Ww, Ww and ww.

Phenotypic ratio – 3 : 1

White : Brown

Genotypic ratio 1 : 2 : 1

Out of four offsprings only 1 offspring has brown fur. It means only 25% of the offsprings are with brown fur.

or Total offspring 4

Brown fur 1

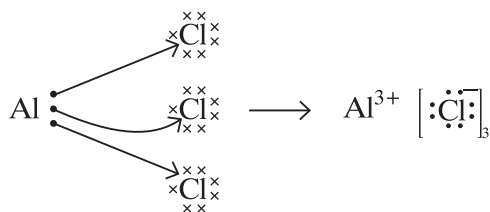
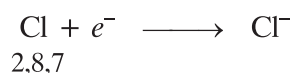
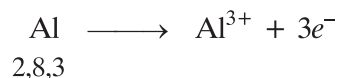
Percentage of offspring with brown fur = $\frac{1}{4} \times 100 = 25\%$

37. (a) The compounds which are solids and have high melting and boiling points are ionic or electrovalent compounds. Ionic compounds are solids and hard because of the strong force of attraction between the positive and negative ions. These compounds have high melting and boiling points as a considerable amount of energy is required to break the strong inter-ionic attractions.

(b) Properties of ionic compounds

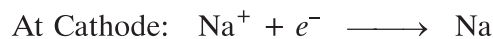
- They are generally soluble in water and insoluble in solvents such as kerosene and petrol.
- They conduct electricity in the molten state.

(c) Formation of aluminum chloride

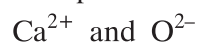


OR

(c) (i) Sodium is a highly reactive metal. It can be obtained by the electrolysis of the its chloride. i.e. NaCl. The metal Na is deposited at cathode (the negatively charged electrode), whereas chlorine is liberated at the anode (the positively charged electrode).



(ii) Ions present in calcium oxide are:



38. (a) (i) A rainbow is seen after the rain shower. It is usually formed in a direction opposite to that of the Sun.

(ii) The rainbow is seen when the sun is behind us.

(iii) We can see rainbow on a sunny day when we look at the sky through a waterfall or through a water fountain with the Sun behind us.

(b) The phenomena involved in the formation of rainbow are refraction, total internal reflection and dispersion of light.

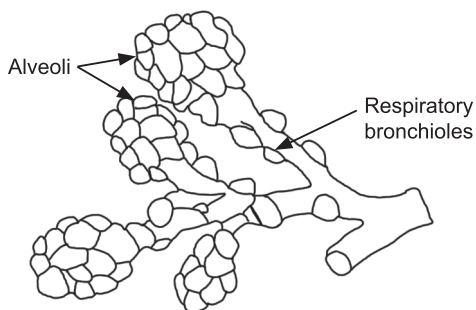


Rainbow in the sky

OR

- (b) (i) A rainbow is formed by dispersion of sunlight by tiny water droplets, present in the atmosphere which act like small prisms. The tiny droplets of water refract, disperse the sunlight, then reflect it internally and finally refract the light again when it comes out of rain drop. Due to the dispersion of light and internal reflection, different colours reach the observer's eyes.
- (ii) The red colour appears on the outer edge of the rainbow.

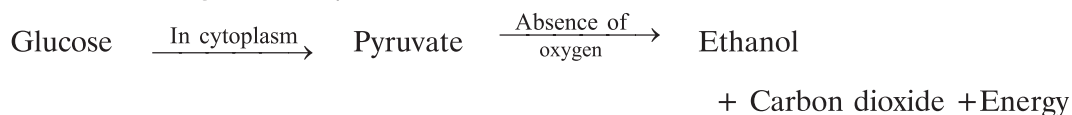
39. (a) The balloon like structures present in the lungs are alveoli.



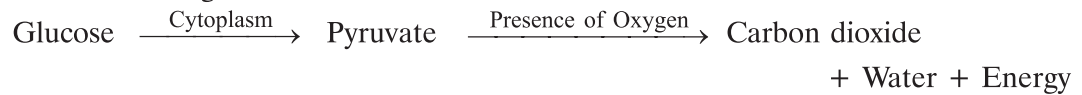
Functions of alveoli

- They provide a large surface area where exchange of gases takes place.
- The walls of alveoli contain an extensive network of blood vessels where exchange of gases take place.

(b) (i) Breakdown of glucose in yeast cells



(ii) Breakdown of glucose in mitochondria



More energy is released when breakdown of glucose takes place in mitochondria as the food is completely broken down into carbon dioxide and water and release 36 ATP molecules of energy.

OR

(b) (i) This is due to lack of oxygen in our muscle cells where pyruvate is converted into lactic acid. Due to the build up of lactic acid in our leg muscles we get cramps.

(ii) Blood is red in colour due to the presence of respiratory pigment haemoglobin.

Haemoglobin is present in red blood cells.

Haemoglobin takes up oxygen from the air in lungs and carry it to tissues which are deficient in oxygen before releasing it.