MARKING SCHEME
2024 -25
Class X Science (086)

Section-A		
1	A. 2,2,4	1
2	B. a – (iii), b – (i), c – (iv), d – (ii)	1
3	A. C_2H_5OH **Alternate question for VI** A. Dilute acid	1
4	C. A has a pH greater than 7 and B has a pH less than 7	1
5	C. Displacement reaction	1
6	C. X is a non-metal and Y is a metal.	1
7	B. Cooking of food	1
8	D. carbon dioxide in human cells	1
9	B. contraction of left ventricle.	1
10	D. Longer small intestine.	1
11	C. Posture and balance.	1
12	D. sex is not genetically determined in snails.	1
13	B. A ray passing through the centre of curvature and incident obliquely.	1
14	C. Red Violet	1
15	C. It utilizes 10% of light energy and transfers the rest to the next trophic level.	1
16	B. Enrichment of oxygen in the atmosphere.	1
17	C. A is true but R is false	1
18	A. Both A and R are true, and R is the correct explanation of A.	1
19	B. Both A and R are true, and R is not the correct explanation of A	1
20	D. A is false but R is true.	1

Section-B

21 — 2

A. Exothermic Displacement reaction/Redox reaction. (0.5)
Heat is evolved or a More reactive element displaces a less reactive element or aluminium reduces iron (II) oxide to iron (0.5)

B. Double displacement / Precipitation reaction (0.5)
As there is an exchange of ions between reactants and products / (Yellow) precipitate (of Lead iodide) is formed (0.5)

22 — 2

S. No.	Feature	Alveoli	Nephron
1	Structure and location	Balloon like structures present at the terminal ends of bronchioles in lungs	Tubular structure present in kidneys
2	Function	Exchange of gases	Filtration of blood to form urine

23 — 2

Students to attempt either option A or B.

A. Steps of synthesis of glucose in plants:

- Absorption of light energy by chlorophyll
- Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen
- Reduction of carbon dioxide into carbohydrates.
- Desert plants take up carbon dioxide at night and prepare an intermediate which is acted upon by the energy absorbed by the chlorophyll during the day. (0.5 x 4)

OR

B.

- Salivary amylase – breaks down starch which is a complex molecule to sugar.
- Pepsin – Helps to digest proteins in stomach.
- Trypsin – It helps in digesting proteins to amino acids.
- Lipase – Breaking down of emulsified fats to fatty acids and glycerol. (0.5 x 4)

24 — 2

A. The lens is a convex lens.
B. The image is virtual.
C. Magnification for lens = $\frac{v}{u} = \frac{h_i}{h_o} = 2$.

$\frac{-30cm}{u} = 2$

Hence u = -15 cm

- - - - - - - - - - - -

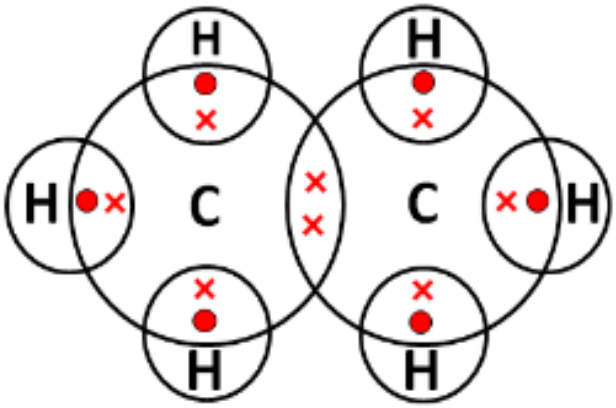
For visually impaired students

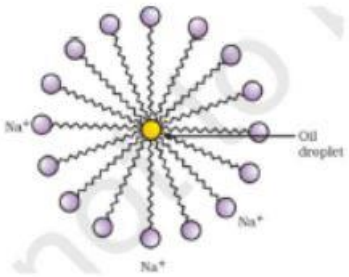
A. concave lens (1)
B. correction of myopia and peepholes of doors or any other correct alternative. (1)

25	*Student to attempt either A or B.* A. P = VI (1) = 230 × 3.5 = 805 W I $\propto \frac{1}{R}$, so half the resistance means double the current. Therefore, current in Y = 7.0 A. (1) **OR** B. For series total resistance is R+2R = 3R (0.5) $P_1 = \frac{V^2}{3R}$. (0.5) For parallel total Resistance is $\frac{2R}{3}$. (0.5) $P_2 = \frac{V^2}{2R/3} = \frac{3V^2}{2R}$. $\frac{P_1}{P_2} = \frac{2}{9}$. (0.5) - - - - - - - - - - - - *For visually impaired students* A. The resistance will be lowest/minimum if all the resistors are connected in parallel. The equivalent resistance in parallel combination is given by (0.5) $$\frac{1}{R_{eqv}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$$ (0.5) Substituting the values, we get $$\frac{1}{R_{eqv}} = \frac{1}{3} + \frac{1}{6} + \frac{1}{9} + \frac{1}{12}$$ (0.5) $$= \frac{12+6+4+2}{36} = \frac{24}{36} = \frac{2}{3}$$ $$R_{eqv} = \frac{3}{2} = 1.5\,\Omega$$ (0.5) **OR** B. $P = V \times I$ (0.5) $I = \frac{P}{V} = \frac{1000}{220} = 4.54\,A$ (0.5) We will be using fuse B with is rated as 5A. This is because it will be able to sustain the current (4.54 A) passing through it. Whereas fuse A will melt and break the circuit as the current exceeds its rating. (1)	2
26	Pesticide is non-biodegradable/keep getting accumulated at each trophic level, persist for longer time/ and thus last trophic level has highest concentration/ humans will have the highest concentration of pesticides/leads to bio-magnification. (any 2 points) - - - - - - - - - - - - *For visually impaired students*	2

	Cabbage/plant-> rabbit-> snake-> owl (Any other relevant food chain) (1) Pesticides are non-biodegradable and persist for long. So when humans consume plants or any animal that consume this plant, the pesticide enters the food chain and keeps getting accumulated at each trophic level, thus the organism in the last trophic level-human being has the highest concentration of pesticide and this is called **biological magnification.** (1)	
Section-C		
27	A. Aqueous solution of magnesium oxide turns red litmus to blue. Aluminium oxide is amphoteric and insoluble in water. Thus, it does not change the colour of either blue or red litmus. **OR** Magnesium oxide reacts with acid only whereas Aluminium oxide reacts with both acids and bases, being amphoteric in nature. (1) B. $2Cu_2S + 3O_2(g) \xrightarrow{Heat} 2Cu_2O(s) + 2SO_2(g)$ $2Cu_2O + Cu_2S \xrightarrow{Heat} 6Cu(s) + SO_2(g)$ (1+1) - - - - - - - - - - - - *For visually impaired students* A. Certain metals (like aluminium/ copper) are used for making cooking utensils as they are good conductors of heat and have high melting points. (0.5 + 0.5) B. Hydrogen gas is not evolved when a metal reacts with nitric acid. This is because HNO3 is a strong oxidising agent. It oxidises the H_2 produced to water and itself gets reduced to any of the nitrogen oxides (N_2O, NO, NO_2). But magnesium (Mg) and manganese (Mn) react with very dilute HNO_3 to evolve H_2 gas. (1+1)	3
28	*Students to attempt either A or B.* A. (i) X = $NaHCO_3$; Z = Na_2CO_3 (0.5+0.5) (ii) Decomposition reaction (0.5) (iii) Solution A (0.5) (iv) Increasing order or H+ ions C<B<A (1) **OR** B. (i) As bee sting is acidic and wasp sting is basic. (1) (ii) To change the nature of soil to (neutral or basic). (1) (iii) To protect sculptures from the effects of certain gases present in environment and acid rain. (1)	3
29	• In plants, the water is absorbed by the plants from the soil through the roots. Xylem tissue of the roots, stems and leaves are interconnected to form a continuous system of water conducting channels. (1) • During the day, when stomata are open, the transpiration pull becomes	3

	the major driving force for the movement of water in the xylem. (1) ● Evaporation of water molecules from the stomata creates a suction which pulls water from the xylem cells of roots to the stem and then to the leaves. (1)	
30	(Any letter which clearly indicated dominant and recessive ears, example, L or E or any other) A. LL × ll F1= Ll Ll X Ll 1LL:2Ll:1ll. (2) B. No change in ratio/the ratio of F2 generation will still be 1LL:2Ll:1ll/ ratio will be the same. As the cross is still between a pure dominant and recessive allele/ genes/ traits/characters /as shown in the cross above. (1)	3
31	A. Hypermetropia is a defect that causes difficulty in focusing on near objects, with clearer vision observed for distant objects. In Myopia distant objects appear blurry while near objects are seen clearly. (1) B. (i) The image shows a case of hypermetropia. (0.5) (ii) shortening of the eyeball or focal length of the eye lens becomes too long. (0.5) (iii) No the concave lens would diverge the rays coming to the eyeball and will push the image even further, but a convex lens should be used which will help to converge the rays and create the image at the exact place on the retina. (1) - - - - - - - - - - - - <u>*For visually impaired students*</u> A. Hypermetropia is a defect that causes difficulty in focusing on near objects, with clearer vision observed for distant objects. In Myopia distant objects appear blurry while near objects are seen clearly. (1) B. High converging power of eye lens, elongation of eye-ball. (2)	3
32	A. $R \propto l$ $R \propto \frac{l}{A}$ $R = \rho \frac{l}{A}$. (1.5) B. $R = \rho \frac{l}{A}$ $\rho = R\frac{A}{l}$ for $A = 1m^2$ and $l = 1m$, we have $\rho = R$ Hence resistivity is the resistance offered by a wire of length 1 m having a cross sectional area of 1 m^2. (1.5)	3
33	A. Magnetic field strength is inversely proportional to the distance from the current carrying wire. Hence when Mona moved the compass away from	3

	the current carrying wire, the magnetic effect was less on it and hence the deflection was less. (1) B. Magnetic field strength is directly proportional to the current in the wire. So, Mona could increase the current in the circuit to observe a greater deflection in the compass needle. (1) C. The battery suggests that the current is going from top of the plane to the bottom of the plane. Using the right hand thumb rule we can say that the magnetic field will be clockwise. (1) - - - - - - - - - - - - *For visually impaired students* A. Magnetic field strength is inversely proportional to the distance from the current carrying wire. Hence when Mona moved the compass away from the current carrying wire, the magnetic effect was less on it and hence the deflection was less. (1) B. Magnetic field strength is directly proportional to the current in the wire. So, Mona could increase the current in the circuit to observe a greater deflection in the compass needle. (1) C. When the polarity of the battery is reversed, the direction of the current flowing in the wire and the direction of the magnetic field will also be reversed. (1)	
Section-D		
34	*Student to attempt either option A or B.* A. (i) Keerthi's thinking is correct as substitution reactions occur in saturated hydrocarbons, hydrogen atoms are replaced with heteroatoms in saturated hydrocarbons. Whereas in unsaturated hydrocarbons an addition reaction occurs, simple molecules are added across double and/or triple bonds. (1) (ii) Methane and propane undergo combustion reaction in presence of oxygen and produce large amount of energy. (1) The lower homologue of propane is ethane has the following electron dot structure:  (1)	5

	ANY TWO CHARACTERISTICS - Difference in -CH2- / 14u molecular mass of any two adjacent homologues. - Same general formula/ functional group - Similar chemical properties - Gradual change in physical properties (1) (iii) The mixture of ethyne and oxygen in sufficient amounts undergoes complete combustion to fire a clean blue flame. In pressure of insufficient supply of oxygen or in presence of air, ethyne does not undergo complete combustion and produces sooty flame. (1) **OR** B. (i) 'B' is preferred for cleansing action. The calcium and magnesium salts present in underground water are precipitated with carboxylic acids. The Ca^{++} and Mg^{++} salts of sulphonic acid are soluble in water. 'B' is a more effective cleansing agent in presence of Ca and Mg salts. (1) (ii) • Soaps are molecules in which the two ends have differing properties, one is hydrophilic, that is, it dissolves in water, while the other end is hydrophobic, that is, it dissolves in hydrocarbons. • The molecules of soap are sodium or potassium salts of long-chain carboxylic acids. The ionic end of soap dissolves in water while the carbon chain dissolves in oil. The soap molecules, thus form structures called micelles where one end of the molecules is towards the oil droplet while the ionic end faces outside. This forms an emulsion in water. The soap micelle thus helps in dissolving the dirt in water and we can wash our clothes clean.  (Labelled fig - 1 + 2) (iii) $CH_3(CH_2)_{16}COOR + NaOH \longrightarrow CH_3(CH_2)_{16}COONa + ROH$ The process is saponification. (0.5 + 0.5)	
35	*Students to attempt either option A or B.* A. (i) Vegetative propagation/ asexual reproduction. (0.5+0.5) (ii) More crops in same time interval, genetically identical, flower fruit faster, no need to depend on pollinators. (1+1) (iii) Cross pollination, the pollen from anther will be transferred the stigma of another banana plant using agents like wind, water, or insects etc. (0.5+0.5)	5

	(iv) There would be minor changes/some variation during the process of copying of the DNA. (1) - - - - - - - - - - - - *For visually impaired students* (i) Vegetative propagation/ asexual reproduction. (0.5+0.5) (ii) More crops in same time interval, genetically identical, flower fruit faster, no need to depend on pollinators. (1+1) (iii) Cross pollination, the pollen from anther will be transferred the stigma of another banana plant using agents like wind, water, or insects etc. (0.5+0.5) (iv) There would be minor changes/some variation during the process of copying of the DNA. (1) **OR** B. (i) Nutrients/glucose/oxygen/waste. (any two) (1) (ii) less surface area for nutrients (glucose/oxygen) to pass from mother to embryo slow growth. (1) (iii) uterus; has thick lining with rich supply of blood to nourish the embryo. (1) (iv) a) male child b) misused as if the foetus is female, some people engage in aborting the child leading to female foeticide. (2) - - - - - - - - - - - - *For visually impaired students* A. (i) Nutrients/glucose/oxygen/waste. (any two) (1) (ii) less surface area for nutrients (glucose/oxygen) to pass from mother to embryo slow growth. (1) (iii) uterus; has thick lining with rich supply of blood to nourish the embryo. (1) (iv) a) male child b) misused as if the foetus is female, some people engage in aborting the child leading to female foeticide. (2)	
36	*Students to attempt either option A or B.* A. (i) p.d. across 4 Ω resistor = p.d. Across R2 as both are in parallel. (0.5) 1.5 (A) × 4 (Ω) = 6 V (0.5) (ii) Total Current through 4 Ω and R_2 = 2.0 A (given). Current through 4 Ω = 1.5 A (given) (0.5) Hence current through R_2 = 2-1.5= 0.5 A	5

Using Ohm's law for R_2 we get (0.5)
6 V= 0.5 A x R_2
Hence R_2 = 6/0.5 = 12 Ω (0.5)

(iii) p.d. across R_1 = Total p.d. - (p.d. across R_2) - (p.d. across 2.0 Ω) (0.5)
p.d. across 2.0 Ω = 2x2 = 4 V
p.d. across R_2 = 6 V (calculated before) (0.5)

Hence p.d. across R_1 = 12 − 6 − 4 = 2 V (0.5)
Current through R_1 = 2A (0.5)
Using Ohm's Law, we get
R_1 = 2V/2A = 1Ω (0.5)

Alternative method

Total Resistance = R1 + $\frac{(4\ x\ 12)}{(4+12)}$ + 2 = 12V/2 A = 6Ω (0.5)
R1 = 6 – (3 + 2) = 1 Ω (0.5)

OR

B.

(i) Use of P = IV (0.5)
I = P ÷ V = 24 W ÷ 12V
Current in lamp A – 2 A (0.5)

(ii) Voltmeter reading = 12 V (0.5)
Lamp A and Lamp B are in parallel.
Hence p.d. across the arm containing A = p.d. across arm containing B
= 12 V (from a) (0.5)

(iii) p.d. across R_2 + p.d. across B = 12 V. (0.5)
p.d. across B = 6 V (given)
Hence p.d. across R_2 = 12 V - 6 V = 6V (0.5)

Current through R_2 = Current through B = 3A (given) (0.5)
Use of R = V/I
R_2 =6V/3A = 2Ω (0.5)

(iv) Current through R_1 = Total Current = 3A+2A = 5A
p.d. across R_1 = 15V -12 V = 3V (0.5)
R_1=3V/5A = 0.6 Ω (0.5)

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For visually impaired students

A.

(i) Ohm's Law is the law, which states that the electric current (I) flowing through a conductor is directly proportional to the voltage (V) applied across it and inversely proportional to the resistance (R) of the conductor. Mathematically, it can be represented as: (1)

$V \propto I$
$V = IR$ (1)

(ii) Let the energy consumed by the fans be E_f and the energy consumed by the electric press be E_p.

- $E_f = P \times t = \frac{100 \times 4}{1000} = 0.4\ kWh$
- $E_p = P \times t = \frac{500 \times 2}{1000} = 1\ kWh$ (1)
- Total energy consumed in 1 day = $E_p + E_f = 1.4\ kWh$

Total energy consumed in 60 days = $1.4 \times 60 = 84\ kWh$.
Total cost = $84 \times Rs.6.5 = Rs.546.00$ (2)

OR

B.

(i) Joule's Law of Heating states that the amount of heat produced in a conductor is directly proportional to the square of the electric current passing through it, the resistance of the conductor, and the time for which the current flows. Mathematically, it can be expressed as

$$H = I^2Rt$$

- *H* is the heat produced (in joules),
- *I* is the electric current (in amperes),
- *R* is the resistance of the conductor (in ohms),
- *t* is the time for which the current flows (in seconds).

(ii) Let the equivalent resistance in series be denoted by R_s and that for parallel be denoted by R_p. Total voltage of the circuit is given by V in both cases and the time is denoted by t.

- $R_s = 2 + 4 = 6\Omega$
- $\frac{1}{R_p} = \frac{1}{2} + \frac{1}{4} = \frac{3}{4}, R_p = \frac{4}{3}$
- $H_s = \frac{V^2}{R_s}t, H_p = \frac{V^2}{R_p}t$
- $\frac{H_s}{H_p} = \frac{R_p}{R_s} = \frac{2}{9}$

SECTION – E

37

A. A - Sodium chloride
Y - Chlorine gas,
Z - Hydrogen gas,
M - Sodium metal,
P - Sodium ethanoate &
R - Ethyl ethanoate/ester (0.5 X 6 = 3)

4

Student to attempt either subpart B or C.

B. Any activity similar to the given figure (1)

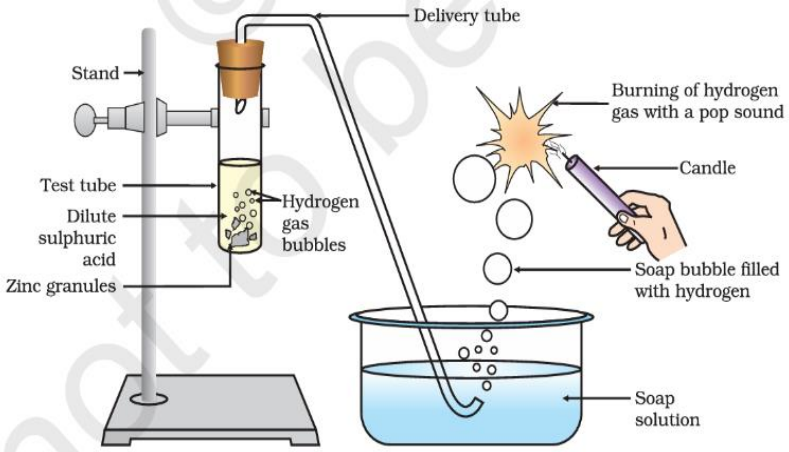

Figure 2.1 *Reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning*

OR

C. Chlor alkali process

The process is called the chlor-alkali process because of the products formed from chlorine and alkali for sodium hydroxide. (1)

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For visually impaired students

A.

Ethanoic Acid	**Ethanol**
Reaction with carbonates and hydrogen carbonates: Ethanoic acid reacts with carbonates and hydrogen carbonates to give rise to salt, carbon dioxide and water. The slat produced is commonly called Sodium acetate. $2CH_3COOH + Na_2CO_3 \longrightarrow 2CH_3COONa + H_2O + CO_2$	No reaction

B. Ethene

C_2H_5OH-------Hot Conc. Sulphuric acid$\longrightarrow CH_2=CH_2 + H_2O$

C. In combustion reactions oxygen is added hence all combustion reactions are oxidation, whereas in oxidation reactions, energy may or may not be released (along with the products), hence all oxidation reactions are not combustion reactions.

38	*Students to attempt either subpart A or B.* A. ● Bending of shoots of plants is a response to the stimulus and a directional, growth-related movement. ● When growing plants detect sunlight, a hormone called auxin, synthesized at shoot tip helps the cells to grow longer. ● When light is coming from one side of the plant, auxin diffuses to the shady side of the shoot. ● This concentration of auxin stimulates the cells of the shoot to grow	4

longer on the side of the shoot which is away from the light. Thus, plant appears to bend towards light. (0.5 x 4 =2)

OR

B.

- Leaves of 'Touch me not' plant respond to the stimulus by showing growth independent movement.
- These plants use electrical–chemical means to convey the information from cell to cell.
- Movement happens at a point different from the point of touch.
- Plant cells change shape by changing the amount of water in them, resulting in swelling or shrinking, and therefore in changing shape.

(0.5 x 4 =2)

C. Growth of pollen tubes towards the ovule is an example of chemotropism whereas bending of shoots towards sunlight is an example of phototropism. (1)

D.

i) Although both plants and animals show electrical–chemical means to convey the information from cell to cell but unlike nerve cells in animals there is no specialized tissue in plants for conduction of information. (0.5)

ii) In animal cells, change in shape occurs because of the specialized proteins found in muscle cells; plant cells change shape by changing the amount of water in them. (0.5)

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For visually impaired students

Students to attempt either subpart A or B.

A.

- Bending of shoots of plants is a response to the stimulus and a directional, growth-related movement.
- When growing plants detect sunlight, a hormone called auxin, synthesized at shoot tip helps the cells to grow longer.
- When light is coming from one side of the plant, auxin diffuses to the shady side of the shoot.
- This concentration of auxin stimulates the cells of the shoot to grow longer on the side of the shoot which is away from the light. Thus, plant appears to bend towards light. (0.5 x 4 =2)

OR

B.

- Leaves of 'Touch me not' plant respond to the stimulus by showing growth independent movement.
- These plants use electrical–chemical means to convey the information from cell to cell.

	● Movement happens at a point different from the point of touch. ● Plant cells change shape by changing the amount of water in them, resulting in swelling or shrinking, and therefore in changing shape. (0.5 x 4 =2) C. Growth of pollen tubes towards the ovule is an example of chemotropism whereas bending of shoots towards sunlight is an example of phototropism. (1) D. i) Although both plants and animals show electrical–chemical means to convey the information from cell to cell but unlike nerve cells in animals there is no specialized tissue in plants for conduction of information. (0.5) ii) In animal cells, change in shape occurs because of the specialized proteins found in muscle cells; plant cells change shape by changing the amount of water in them. (0.5)	
39	A. Real Image (the final image is formed due to the lens at the eye-piece) (1) B. Concave Mirror (1) <u>*Student to attempt either subpart C or D.*</u> C. A converging lens is used at the eyepiece to collect the rays from the plane mirror and help the viewer to see a real erect image of the star. (2) **OR** D. The plane mirror laterally inverts the image formed by the curved mirror and its position helps to direct the rays towards the eye-piece. (2) - - - - - - - - - - - - <u>*For visually impaired students*</u> A. Convex lens. (1) B. Converging property. The lens can converge parallel rays to one point. (1) <u>*Student to attempt either subpart C or D*</u> C. To correct hypermetropia, lenses of telescopes, microscopes and slide projectors. (2) **OR** D. If the object is kept between the optical centre and the focus the image obtained is virtual, rest in all cases the image is real.	4

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