SCIENCE

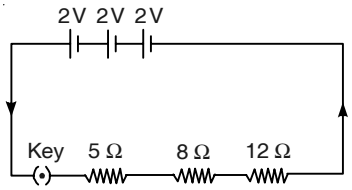
SOLUTION
SAMPLE QUESTION PAPER

6

Section 'A'

1. Combining capacity of an element is known as valency. **[1]**

2.



[1]

3. **(a)** Ethephon is the chemical which is similar with ethylene plant hormone. **[1]**

(b) No, such practices should be discouraged as the gas released from chemical may cause allergy on consumption. **[1]**

(c) Auxin **[1]**

(d) Abscisic acid inhibits the growth of plants. **[1]**

4. **(a)** **(iii)** The colour at position marked 7 is violet.

	Highest	**Lowest**
Wavelength :	Red	Violet
Frequency :	Violet	Red
Speed :	Red	Violet
Deviation :	Violet	Red

(b) Incorrect **[1]**
3- turmeric (yellow)
1- chilli powder (red)

(c) Copper sulphate : blue colour : position –5 **[1]**
Green: position: – 4

(d) Incorrect, violet bends the most. **[1]**

5. **(a)** Hydrophilic head and a hydrophobic tail **[1]**

6. **(a)** Hydrogen gas and iron chloride are produced. **[1]**

7. **(b)** Halving of chromosomes during gamete formation. **[1]**

8. **(b)** Carbon dioxide **[1]**

9. **(b)** Thyroxine **[1]**

10. **(a)** Ni and Cr **[1]**

11. **(d)** Hydrochloric acid **[1]**

12. **(b)** Forest **[1]**

13. **(b)** Alloys have higher melting point than pure metals. So, the coils made from alloys do not melt or get deformed and alloys do not get oxidized or burn readily at high temperatures. **[1]**

14. (a) Microorganisms decay the dead bodies of plants and animals and therefore, clean the environment and return the nutrients back (to the soil and air in an ecosystem). **[1]**

Section 'B'

15. (a) Hydrogen is oxidised to water.

(b) Copper oxide is reduced to copper.

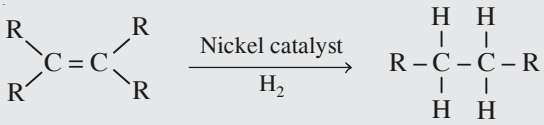
(c) Copper oxide is the oxidising agent. **[1 + 1 + 1]**

16. (a) In the electrolysis of water, the gas collected at cathode is Hydrogen.
The gas collected at anode is Oxygen.

(b) The gas which is collected in double the amount during the electrolysis of water is Hydrogen.
This is because water contains two parts of hydrogen element as compared to one part of oxygen element by volume.

(c) Pure water is a bad conductor of electricity. By adding drops of sulphuric acid; we make it a good conductor of electricity. **(CBSE Marking Scheme, 2018) [1 + 1 + 1]**

OR

- Example:  **[½]**

- Addition of hydrogen to the molecule of an unsaturated hydrocarbon/compounds is hydrogenation. **[½]**
- Essential condition for hydrogenation is the presence of a catalyst like Ni/Pd/Pt. **[1]**
- Change observed in the physical property during hydrogenation is the change of the unsaturated compound from the liquid state to the corresponding saturated compound in the solid state/its boiling or melting point will increase. **(CBSE Marking Scheme, 2015) [1]**

17. (a) The metal is zinc.

(b) Through calcination process. The carbonate ore is first heated strongly in limited supply of oxygen and changed into its oxide.

$$ZnCO_3 \longrightarrow ZnO + CO_2$$

Zinc oxide is then reduced to zinc metal by heating it with carbon.

$$ZnO + C \longrightarrow Zn + CO$$ **[1+1+1]**

18. Saturated hydrocarbon with single bond is alkane.

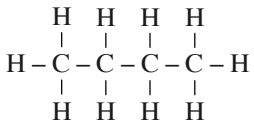
Unsaturated carbon compound with double bond is alkene.

Unsaturated hydrocarbon with triple bond is alkyne.

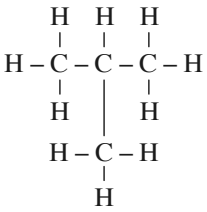
Since C_4H_{10} follows the general formula C_nH_{2n-2} therefore it is an alkane.

Structural isomers

Butane



Isobutane



[2+1]

19. **(i)** Valence electrons in 'D'= 5 **[1]**
Valency of 'D' = 3

(ii) '*A*' will have largest atomic radii. **[1]**

(iii) '*A*' will form the most basic oxide as it is most metallic. **[1]**

20. Lymphatic system and blood vascular system.

Functions of lymphatic system are:

(i) Absorb excess body fluid and return it to the blood stream.

(ii) Plays an important role in returning plasma proteins to the blood stream.

(iii) Helps in absorption of digested fats and then transport them from the villi in the small intestine to the bloodstream via the lacteals and lymph vessels.

(iv) Lymph nodes play an important role in the defence mechanism of the body. They filter out micro-organisms and foreign substance such as toxins etc. **[1+2]**

OR

Differences between aerobic and anaerobic respiration:

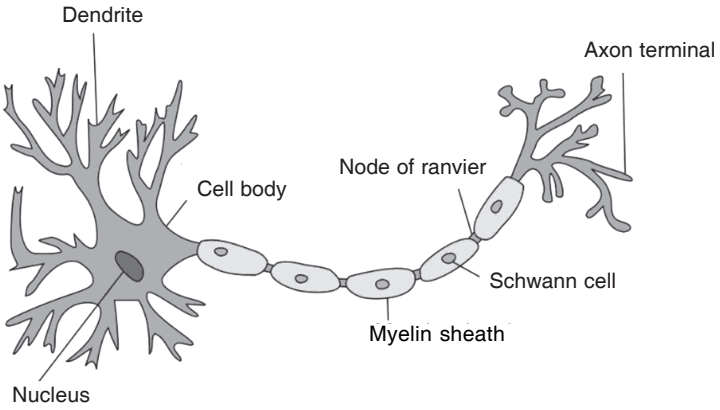
S. No.	Aerobic respiration	Anaerobic respiration
(i)	It takes place in the presence of oxygen.	It takes place in the absence of oxygen
(ii)	Complete breakdown of food takes places in this process.	Incomplete breakdown of food takes place in this process.
(iii)	End products are CO_2 and H_2O. It produces a considerable amount of energy.	End products may be C_2H_5OH, CO_2 or lactic acid. It produces much less energy.

[1+1+1]

21. **(a)** Estrogen **(b)** Glucagon, **(c)** Vasopressin **[1+1+1]**

OR

Structure of a neuron:



[3]

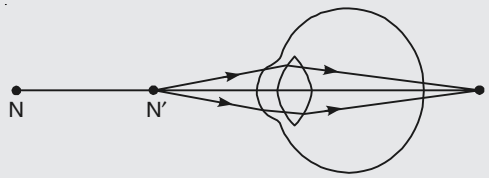
22. **(a)** Hypermetropia **[½]**

(b) **This defect arises because either:** **[½]**

(i) focal length of eye lens is too large or

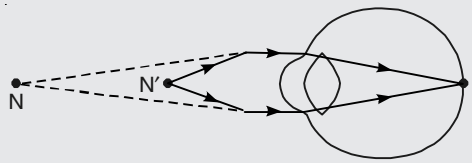
(ii) the eyeball becomes too short.

(c)



Hypermetropic eye **[1]**

(d)



Correction for Hypermetropic eye **[1]**

(CBSE Marking Scheme, 2016)

23. Joule's heating effect: It is the phenomenon of heating of a conductor by the passage of electric current through it.

Mathematical expression, $H = I^2RT$

Applications of Joule's heating effect in daily life are:

- Electric bulb
- Electric iron
- Electric geyser
- Electric kettle

[1+1+1]

24. (a) No, because, charged particle at rest does not interact with magnetic field.

(b) No, because the force is zero if current and field lines are in the same direction.

(c) Yes, because, the force is maximum when current and magnetic field are maximum.

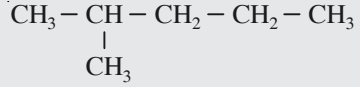
[1+1+1]

Section 'C'

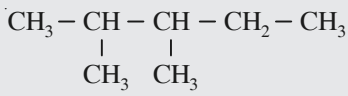
25. C_6H_{14}

(a) $CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_3$

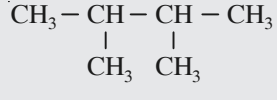
(b)



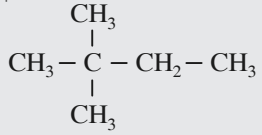
(c)



(d)



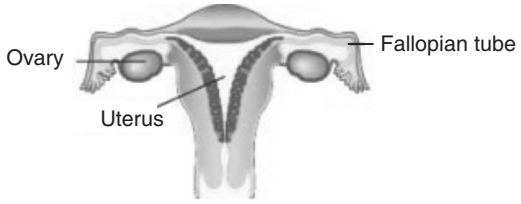
(e)



(CBSE Marking Scheme, 2016) [1+1+1+1+1]

26. Sexual reproduction is the process of the production of new living organisms by combining genetic information from two individuals of different types (sexes).
During sexual reproduction, at the time of gamete formation, meiotic cell division takes place. During meiosis, crossing over between fragments of homologous chromosomes occurs which brings about new gene combinations to be transferred to new generation. Crossing over is the fundamental cause of origin of variations in sexually reproducing organisms. Asexual reproduction does not involve meiosis and crossing over because of one parent lineage. Hence, only minute variations may occur in them due to mutation. The variations caused by crossing over in sexually reproducing organisms are subjected to the selection process. Natural selection selects those variations which have more adaptive value and guide them towards evolution of new species. In this way, sexual reproduction gives rise to more viable variations for evolution. **[1+4]**

27. (a) **[2]**



(b) When the human egg does not get fertilised, the inner lining of the uterus (endometrium) breaks down and is released in the form of blood and mucus through vagina. This process lasts for about 2-8 days and is called menstruation. **[1]**

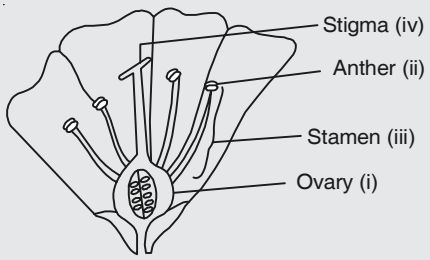
(c) **Structure of placenta:** It is a disc like structure embedded in the uterine wall connected to the embryo. It has villi on the embryo's side of the tissue and on the mother side, it has blood spaces, which surround the villi.

Function: (i) It transports nutrients/glucose and oxygen from mother's side to embryo.

(ii) It carries waste products from the embryo's side to the mother's blood. **[2]**

OR

(a)



[Diagram: 1, Labelling ½ × 4 = 2]

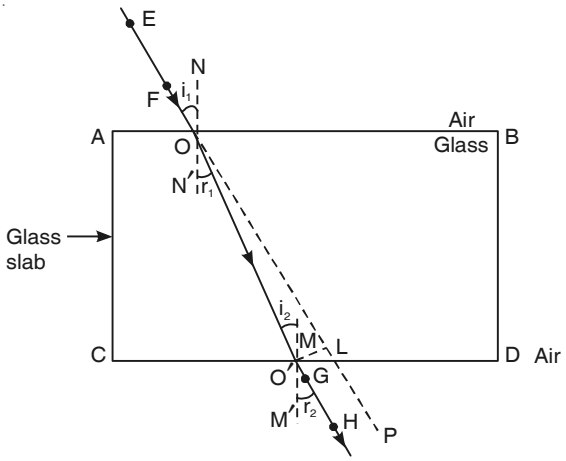
(b) A – Pollen grain, B – Pollen tube

(c) Ovary

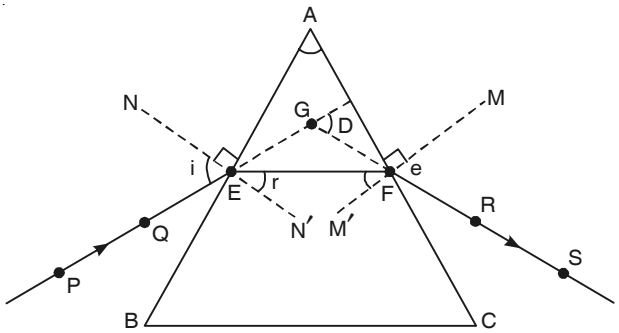
(d) Female gamete **[½ × 4] (CBSE Marking Scheme, 2016)**

28. (a) When an object is placed between the pole and focus of concave mirror, a magnified, erect and virtual image is obtained. **[1]**

(b) For glass slab, refer: **[1]**



For prism refer:



[1]

In case of rectangular glass slab, emergent rays of light are always parallel to the direction of incident rays. Whereas when an incident light passes through a prism, it bends towards the base of the prism hence incident ray and emergent ray are not parallel to each other. **[1]**

(c) $f = -50 \text{ cm } p = \frac{100}{f} D = \frac{100}{-50} = -2D$ **[1]**

OR

(a) Concave lens **[1]**

(b) Pole **[1]**

(c) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

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

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

$f = 20 \text{ cm}, u = -30 \text{ cm}$ **[1½]**

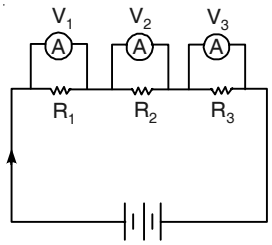
(i) $v = (-30) \times \dfrac{20}{20-30} = 60$ cm

The image is formed at a distance of 60 cm on the other side of the optical center.

(ii) $m = \dfrac{-v}{u} = \dfrac{-60}{-30} = 2$

(iii) Image formed is inverted. **[1½]**

29. (a) Let the experimental set up comprises of three resistors R_1, R_2 and R_3 of three different values which are connected in series. Connect them with a battery, an ammeter and plug, a key, as shown in figure.



The key K is closed and the ammeter reading is recorded. Now, the position of ammeter is changed to anywhere in between the resistors again, the ammeter reading is recorded each time.

Note the readings of voltmeter, let us say they are V_1, V_2, V_3 respectively across R_1, R_2, and R_3.

Now, as per ohm's law, $I_1 = V_1/R_1$, $I_2 = V_2/R_2$, $I_3 = V_3/R_3$

It's observed that there was identical reading each time, which shows that same current flows through every part of the circuit containing three resistances in series connected to a battery

(b) $R_s = R_1 + R_2 + R_3 = 5 + 10 + 15 = 30$ ohm

Since, $V = IR$ or $30 = I \times 30$

or $I = 30/30 = 1$ Ampere

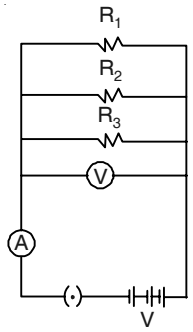
Potential difference across 15 ohm resistor,

$V = IR$

$V = 1 \times 15 = 15$ V **[3+2]**

OR

(a)



Since the arrangement is in parallel, the voltage across the circuit remains the same.

So, $I_1 = V/R_1$

$I_2 = V/R_2$

$I_3 = V/R_3$

So, $I_1 : I_2 : I_3 = i$

$V/R_1 + V/R_2 + V/R_3 = V/R_{eq}$

$1/R_{eq} = 1/R_1 : 1/R_2 : 1/R_3$

(b) Two 20 ohm resistors in parallel are connected to one 10 ohm resistor in series.

For resistor in parallel,

$1/R_p = 1/20 + 1/20 = 2/20 = 1/10$ ohm

or $R_p = 10$ ohm

For resistor in series,

R = 10 ohm + 10 ohm = 20 ohm **[3+2]**

30. (a) Qualities of an ideal source of energy are:

(i) Produces large amount of heat and energy.

(ii) Easily accessible.

(iii) Less or no production of toxic by-products.

(b) Two ways are: as biogas or as cow dung cakes.

(c) Biogas is better than cow dung. It is because of

(i) high heating capacity of biogas and

(ii) Non-polluting as it burns without smoke and leaves no residue like ash. **[2+1+2]**

SCIENCE

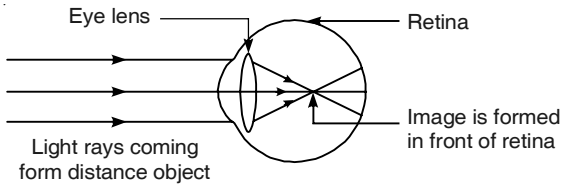
SOLUTION
SAMPLE QUESTION PAPER

7

Section 'A'

1. **(i)** Methanoic acid **(ii)** Butan-2-one **[1]**

2. **The ray diagram for myopic eye is as shown below:**



[1]

3. **(a)** The three constituents of plaque other than food are acid, saliva and bacteria. **[1]**

(b) Yes, tooth decay starts when the pH of the mouth is lower than 5·5. **[1]**

(c) Time 4.0. The lowest pH indicates the highest amount of acid produced by the bacteria. **[1]**

(d) **(iii)** The tooth paste commonly used is basic. It neutralizes the extra acid formed during tooth decay and prevents tooth decay. **[1]**

4. **(a)** Fossils are remains of hard parts of the past individuals in the strata of earth. **[1]**

(b) Yes. Fossils provide missing link between the species/ who has evolved from whom. They provide information about prehistoric organisms. **[1]**

(c) **(ii)** The similarity in layer X and Y most likely suggests that modern forms of life may have evolved from earlier forms of life. **[1]**

(d) **(ii)** The extinction of organism has occurred thousands of years ago. **[1]**

5. **(a)** Basic **[1]**

6. **(c)** $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$ **[1]**

7. **(c)** K **[1]**

8. **(a)** Light is least scattered. **[1]**

9. **(c)** Concave, plane and convex **[1]**

10. **(d)** The field consists of concentric circles centred on the wire. **[1]**

11. **(c)** The shape of the resistor is changed. **[1]**

12. **(a)** unidirectional **[1]**

13. **(a)** Ozone is an oxidising agent because it on reacting with another substance release oxygen in order to carry oxidation reactions. **[1]**

14. **(b)** Photosynthesis is an anabolic process. It takes CO_2 and H_2O and then assembles them into glucose. Conditions necessary for photosynthesis are light, chlorophyll, carbon dioxide and water. **[1]**

Section 'B'

15. Corrosion is a process of slow destruction of metals when exposed to air, moisture and pollutant gases.

$Fe + H_2O + O_2 \rightarrow Fe_2O_3$ (rust)

Examples are:

(i) Formation of green coating on copper.

(ii) Formation of thin layer of oxide on aluminium. **[1 + 1 + 1]**

16. Isomers are those compounds which have same molecular formula and different structural formula. **[1]**

In first three members of alkane, branching is not possible, therefore isomers are not possible. **[1]**

$CH_3 - CH_2 - CH_2 - CH_2 - CH_3$ $\qquad$ $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_3$

Pentane $\qquad$ 2-methyl butane **[1]**

OR

(a) Metal oxides that react with both acids and bases to produce salt and water are known as amphoteric oxides. Examples include: ZnO and Al_2O_3.

(b) Non-metals are electron acceptors. Hence, they do not donate electrons to H^+ ions to form hydrogen gas. **[2 + 1]**

17.

S. No.	Digestive enzymes	Site of production	Site of action
(i)	Salivary amylase	Salivary gland	Mouth cavity
(ii)	Trypsin	Pancreas	Duodenum (Intestine)
(iii)	Pepsin	Stomach	Stomach

[1 + 1 + 1]

18. Hormone secreted is – Adrenaline

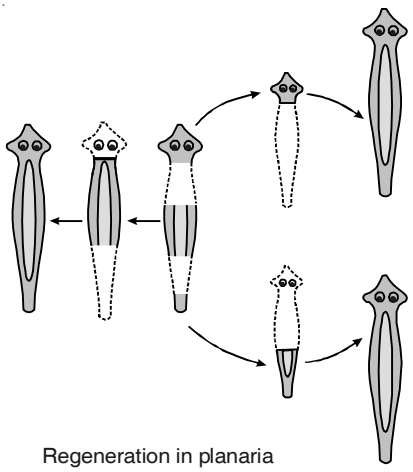
Two responses are:

(i) Increases the heart beat.

(ii) Increases the breathing rate. **[1 + 1 + 1]**

19. (a) Budding, fragmentation and regeneration, all are considered as asexual mode of reproduction as in this only one parent is involved and there is no formation of gametes, neither exchange of genetic material takes place. Also, the offsprings produced are identical to parents unlike sexual reproduction.

(b) Regeneration is considered as a type of asexual reproduction. In this process, the organism has the ability to regenerate lost or damaged part of the body. For e.g. When *Planaria* is cut into many pieces, each piece grows into a complete organism; this regeneration process is carried out by specialized cell; which proliferate; develop and differentiate into various cell types and tissues.



Regeneration in planaria

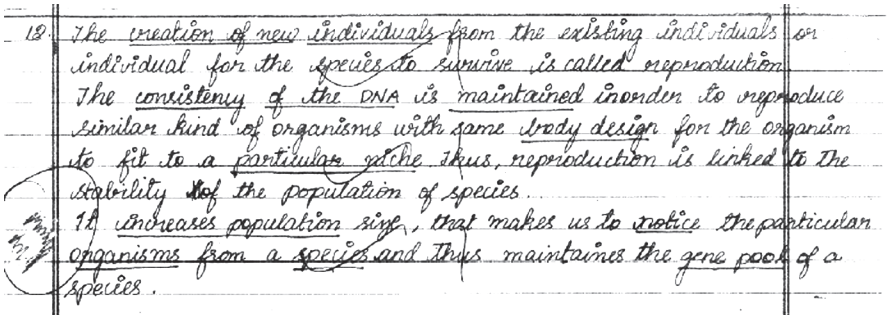
[1 + 1 + 1]

OR

Reproduction – It is a biological, process by which new individuals of the same species are produced by the existing organisms. **[1]**

- Population of organisms live in well defined places called niches in the ecosystem using their ability to reproduce. **[½]**
- Reproduction involves DNA copying which is the source of information for making proteins thereby controlling body design. **[½]**
- These body designs allow the organism to use a particular niche for the stability of the population of a species. **[½]**
- (Minor) variations may also lead to the stability of the species. **[½]**

(CBSE Marking Scheme, 2016)


18. The creation of new individuals from the existing individuals or individual for the species to survive is called reproduction. The consistency of the DNA is maintained inorder to reproduce similar kind of organisms with same body design for the organism to fit to a particular niche thus, reproduction is linked to the stability of the population of species. It increases population size, that makes us to notice the particular organisms from a species and thus maintains the gene pool of a species.

CBSE Topper's Answer, 2016

20. The water droplets act like small prisms. They refract and disperse the incident sunlight, then reflect it internally and finally refract it again when it comes out of rain drop. Due to dispersion and internal reflection of light, different colours reach the observer's eye along different pairs.

Therefore, the three phenomena involved are refraction, dispersion, internal reflection of light. **[3]**

OR

This effect is called twinkling of star.

Reason: It is due to atmospheric refraction.

Our atmosphere is constantly moving. Light travelling from the star gets bent in different directions making them twinkling. **[1 + 2]**

21. (a) Commercial unit of electrical energy is kilowatt-hour (kWh).

$1\ \text{kWh} = 1\ \text{kW} \times 1\ \text{h}$

$= (1000\ \text{W}) \times (3600\ \text{s})$

$= (1000\ \text{J/s}) \times (3600\ \text{s}) = 3.6 \times 10^6\ \text{J}$

(b) Energy used by 250 W TV set in 1 h = 250 W × 1 h = 250 Wh

Energy used by 1200 W toaster in 10 minutes = 1200 W × 10 minutes

= 1200 × 10 × 1/60 h = 200 Wh **[2 + 1]**

22. (a) Short circuiting is the term used for defining the situation in which the neutral and live wires of an electric circuit come in direct contact.

When too many electrical appliances are connected to a single socket, the appliances draw much more current or power than the permissible limit from the main circuit. This situation is called overloading.

(b) A fuse wire is a thin wire made of alloy of lead and tin or copper. It is used as a safety device in domestic wiring to avoid the danger of electric short circuit and fires. When the current in wire

increases to a safe value due to over-loading or short circuit, the fuse wire becomes heated and melts hence it breaks the circuit. This prevents the overheating and hence prevents electric fire. **[1 ½ + 1 ½]**

23. The main function of the ozone layer is to absorb the Sun's ultraviolet radiation, hence protecting the Earth from its harmful effects.

Ozone is formed in the upper atmosphere when solar UV radiation dissociates molecules of oxygen (O) and then this oxygen atom (O) combines with an oxygen molecule.

$$O_2 \rightarrow O + O$$
$$O + O_3 \rightarrow O_3$$

Chemical responsible is: Chlorofluorocarbons (CFCs).

Ozone layer can be protected by:

(a) Stopping the release of chlorofluorocarbon.

(b) Removing the pollutant nitrogen monoxide.

(c) Reduce the usage of air conditioners. **[1 ½ + 1 ½]**

24. **(a)** The existence of decomposer is essential in a biosphere because they breakdown complex organic substances into simple inorganic substances that can be absorbed by the plants. Thus, decomposers **[½]**

- replenish the soil naturally. **[½]**
- help in removing the biodegradable waste. **[½]**

(b) In a food chain, the energy moves progressively through the various trophic levels, it is no longer available to the previous level (autotrophs) and the energy captured by the autotrophs does not go back to the solar input. Hence, the flow of energy is unidirectional. **[1½]**

(CBSE Marking Scheme, 2016)

Section 'C'

25. Carbon has 4 electrons in its outermost shell. It cannot lose 4 electrons to form C^{4+} because very high energy is required to remove 4 electrons. **[1½]**

It cannot gain 4 electrons to form C^{4+} ions because it is difficult for 6 protons to hold on to 10 electrons. **[1½]**

(i) Ionic/Electrovalent Bonds **[½]**

(ii) Covalent bonds. **[½]**

(iii) There are no charged particles in carbon compounds and hence poor conductors of electricity. **[1]**

(CBSE Marking Scheme, 2015)

26. **(a)** **(i)** Noble gas-G

(ii) Halogen-F **[½ + ½]**

(b) Most active metal-B **[1]**

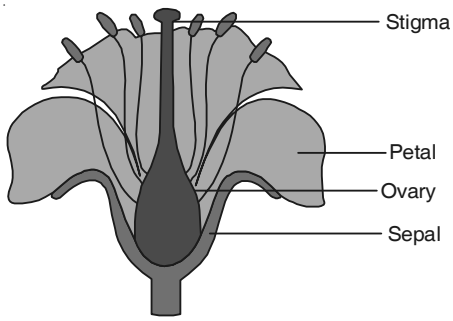
(c) Most electronegative in 3rd period-F **[1]**

(d) Ionic bond **[1]**

(e) Oxide formed by C would be basic. **[1]**

[CBSE Marking Scheme, 2016]

27. (a) Longitudinal section of flower:



(b) Male reproductive part of a flower is stamen while female reproductive part of a flower is pistil.

(c) Ovary contains ovule. After fertilisation, ovary matures into a fruit while ovule turns into seeds.

[2 + 2 + 1]

28. (a) Dominant trait: Trait which appears in the F_1 porgeny, is dominant trait.

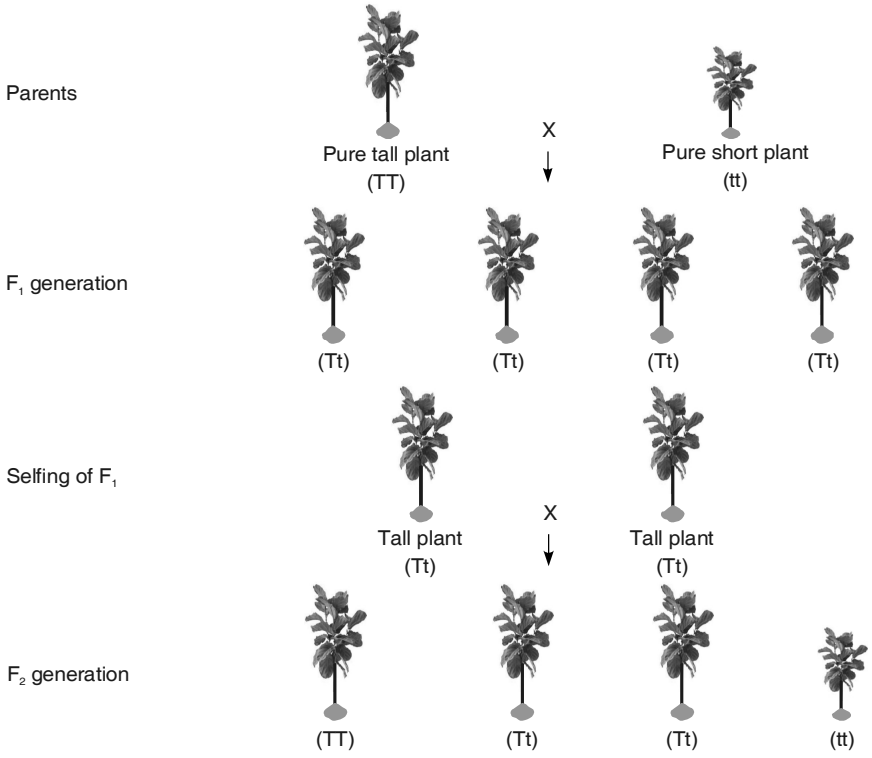
Recessive trait: Trait which remains hidden or which does not appear in the F_1 progeny is recessive trait.

(b) Yes, it is possible.

Example: When pure tall pea plants are crossed with pure dwarf pea plants, only tall pea plants are obtained in F_1 generation.

On selfing tall plants of F_1, both tall and dwarf plants are obtained in F_2 generation in the ratio 3 : 1.

Reappearance of the dwarf character, a recessive trait in F_2 generation shows that the dwarf trait/character was present in individuals of F_1 but it did not expressed (due to the presence of tallness, a dominant trait/character).



[3 + 2]

29. (a) Optical centre. The central point of a lens. **[1]**

(b) $f = -20$ cm

$h_1 = 4$ cm, $v = -10$, $u = ?$, $h_2 = ?$ **[½]**

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$ **[½]**

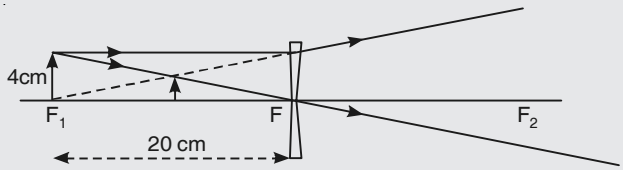
$$= \frac{-1}{-10} \frac{-1}{-20} = \frac{-1}{10} + \frac{1}{20}$$ **[½]**

$$= \frac{-2+1}{20} = \frac{-1}{20}$$

$u = -20$ cm **[1]**

$$h_1 = \frac{v}{u} h_o$$

$$= \frac{-10 \text{ cm}}{-20 \text{ cm}} \times 4 = 2 \text{ cm}$$ **[½]**



(CBSE Marking Scheme, 2016) [1]

30. (a) (i) Maxwell's right hand thumb rule: The direction of the magnetic field produced by a current carrying conductor is given by Maxwell's right hand thumb rule. It states that if you are holding the current-carrying conductor in your right hand such that the thumb points in direction of the current, then the direction in which the fingers encircle, gives the direction of magnetic lines.

(ii) Fleming's Left-Hand Rule: Force experienced by a current carrying straight conductor placed in a magnetic field which is perpendicular to it can be determined by Fleming's left hand rule. Hold the thumb and the first two fingers of your left hand mutually at right angles to each other. Then if the forefinger points in the direction of the field, and the second finger in the direction of the current, the thumb will point in the direction of Motion of the conductor.

(iii) Fleming's right hand thumb rule: The direction of induced current in a coil due to its rotation in a magnetic field can be determined by right hand thumb rule. The thumb, the first and the second finger on the right hand are held such that they are at right angles to each other. If the first finger points in the direction of magnetic field and the thumb in the direction of the motion of the conductor then the second finger will point in the direction of the induced current in the conductor.

(b) The deflection increases. It is because, the strength of magnetic field is directly proportional to the magnitude of current passing through the straight conductor. **[3 + 2]**

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Section 'A'

1. It is because biogas is made up of gobar (cow dung). **[1]**

2. $\frac{\text{Real depth}}{\text{Apparent depth}} = \mu \quad \therefore \text{App depth} = \frac{6}{1.5} = 4 \text{ cm}$

(CBSE Marking Scheme, 2016) [1]

3. **(a)** Organisms X and Y are vertebrates. X is a mammal whereas Y is a bird. Z is an insect (invertebrate). **[1]**

(b) Forelimbs of vertebrates are homologous organs, i.e., organs having same fundamental structure but perform different functions. **[1]**

(c) Wings of insects and wings of birds are analogous organs, i.e., organs having similar functions but different in their structural details and origin. **[1]**

(d) The two basic characteristics that decide about analogy and homology are origin, structures and function. **[1]**

4. **(a)** Element — E **[1]**

(b) K L M **[1]**

2 8 6 **[1]**

(c) X and Z. **[1]**

(d) **(ii)** decreases **[4]**

5. **(d)** **(ii)** and **(iii)** **[1]**

6. **(c)** Increasing atomic masses **[1]**

7. **(b)** very near to the focus of the reflector. **[1]**

8. **(b)** refraction of light by different layers of varying refractive indices **[1]**

9. **(b)** Use of fuse **[1]**

10. **(d)** 5 A **[1]**

11. **(c)** I, III and IV are mineral acids. **[1]**

12. **(b)** IR^2 **[1]**

13. **(c)** Dobereiner could classify only three triads from the elements known at that time. It is not found useful because all the elements known at that time could not be arranged in triads. **[1]**

14. **(b)** Hydrogen gas is liberated when an acid reacts with a metal. It can be tested by bringing a burning candle near the gas. The candle continues burning with a pop sound. **[1]**

Section 'B'

15. (a) (i) Third member of aldehyde series- Propanal (CH_3CH_2CHO) **[1]**

(ii) Second member of carboxylic series- Ethanoic acid **[1]**

(b) (i) 2, 2-dimethyl propane **[1]**

(ii) 2 Butanol **[1]**

16. (a) Silver metal does not react with dilute HCl because it is located below hydrogen and is not able to displace hydrogen from acid.

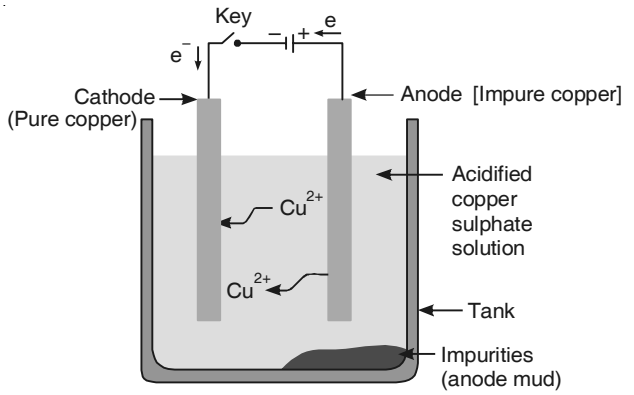
(b) When lead is treated with hydrochloric acid, bubbles of hydrogen gas are evolved.

$$Pb + 2HCl \longrightarrow PbCl_2 + H_2$$

(c) Reaction of sodium metal is found to be highly explosive because it is an exothermic reaction.

(d) The temperature of the reaction mixture rises when aluminium is added because it is an exothermic reaction. **[3]**

OR



[3]

Fig: Electrolytic refining of copper

17. (a) (i) $C_6H_{12}O_6 + O_2 \longrightarrow CO_2 + H_2O + Energy$

(ii) $C_6H_{12}O_6 \longrightarrow C_2H_5OH + CO_2 + Energy$

(b) During strenuous exercise, our body requires instant energy which is fulfilled through anaerobic respiration. The muscle cells break down glucose to produce lactic acid and energy. Accumulation of large amount of lactic acid in our muscles causes muscle cramps. **[1 + 2]**

18. Differences between pollination and fertilization are:

S. No.	Pollination	Fertilisation
(i)	It is transfer of pollen grains from the anther to the stigma of a flower.	It is the fusion of male gamete with female gamete.
(ii)	It is achieved by agents like a wind, water or animals.	It is achieved by the growth of pollen tube so that the male gamete reaches the female germ cells.
(iii)	It leads to fertilization.	It leads to formation of seed.
(iv)	It is an external process.	It is an internal process.

[Any three] [1+1+1]

19. Regeneration- It is the ability of an organism to give rise to a new organism/ individual from their body parts. **[1]**

Regeneration in *Hydra*:

- The body of hydra cut into number of pieces by any means. **[½]**
- Each piece contains specialized cells. **[½]**
- These cells proliferate and make large number of cells. **[½]**
- From this mass of cells, different cells undergo changes to become various cell types and tissues finally developing into a new organism. **(CBSE Marking Scheme, 2016) [½]**

OR

(a) **(i)** Involvement of two different individuals.

(ii) Creation of new combination of variants. **[½, ½]**

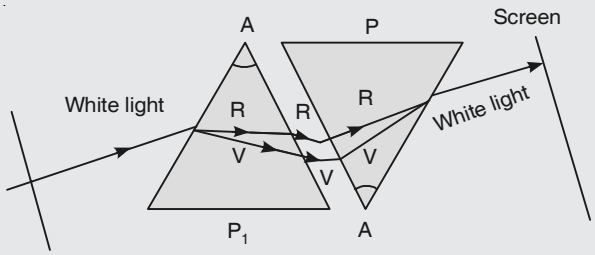
(b) **(i)** pollen/pollen grain

(ii) by pollination / agents of pollination

(iii) it (pollen tube) helps male gamete to reach egg (ovule)

(iv) Converts into embryo **(CBSE Marking Scheme, 2016) [4 × ½]**

20. Description of activity: When a glass prism is used to obtain a spectrum of sunlight, a second identical prism in an inverted position with respect to the first position will allow all the colours of spectrum to recombine. Thus a beam of white light will emerge from the other side of the second prism. **[1½]**



(CBSE Marking Scheme, 2016) [1½]

21. A motor converts electrical energy into mechanical energy while a generator converts mechanical energy into electrical energy.

Four appliances wherein electric motor is used are: Washing machines, Mixers, Cooler and Exhaust Fan **[2 + 1]**

22. Given, $P = 1$ kW $= 1000$ W, $V = 220$ V

$$I = \frac{P}{V} = \frac{1000}{220} = 4.54 \text{ A}$$

This current is greater than the rating of the fuse (i.e. 3A). Hence, the fuse will melt and circuit breaks. So, electric iron will not work. **[3]**

OR

(a) As a bar magnet is pushed into the coil, a deflection is observed in galvanometer, it means that current is produced in coil.

(b) When a bar magnet is held stationary, then there is no deflection in galvanometer, hence, no current is produced in coil.

(c) When the bar magnet is withdrawn from the coil, then the deflection is in opposite direction indicating that current is produced but direction is opposite. **[1 + 1 + 1]**

23. Ozone is a molecule containing three atoms of oxygen (O_3)/a highly poisonous gas present in the upper layers of the atmosphere. **[1]**

Formation of ozone: The UV radiations split some molecular oxygen (O_2) apart into free oxygen atoms (O + O). Atomic oxygen then combines with molecular oxygen to form ozone. **[½ + ½]**

OR

$$O_2 \xrightarrow{UV} O + O \qquad O + O_2 \xrightarrow{UV} \underset{\text{Ozone}}{O_3}$$

Effect: Ozone layer shields the surface of the earth from the damaging UV radiations of the sun. **[1]**

(CBSE Marking Scheme, 2015)

24. Food chain is a linear sequence of organisms which starts from producer organisms and ends with decomposer species.

Example of terrestrial food chain:

Grass (Producer) —— Rat (Primary Consumer) —— Snake (Secondary consumer) —— Eagle (Tertiary consumer)

The phenomenon is known as biomagnification. **[1 + 1 + 1]**

Section 'C'

25. (a) Hydrogenation reaction: Process in which unsaturated hydrocarbons add hydrogen in the presence of nickel catalyst to give saturated hydrocarbons.

Example: $CH_2 = CH_2 + H_2 \longrightarrow CH_3 - CH_3$

(b) Oxidation reaction: Chemical reaction that involves addition of oxygen.

Example: $\underset{\text{Ethyl alcohol}}{C_2H_5OH} + O_2 \xrightarrow[KMnO_4]{\text{alkaline}} \underset{\text{Acetic acid}}{CH_3COOH} + H_2O$

(c) Substitution reaction: Reactions in which an atom or group of atoms of a compound are replaced by other atom or group of atoms.

Example: $CH_4 + Cl_2 \longrightarrow CH_3Cl + HCl$

(d) Combustion reaction: Chemical reaction between substances, usually including oxygen and usually accompanied by the generation of heat and light.

Example: $C_2H_5OH + 3O_2 \longrightarrow 2CO_2 + 2H_2O$

(e) Saponification reaction: Reaction in which an ester reacts with sodium hydroxide to form sodium salts of acid and alcohol.

$CH_3COOC_2H_5 + NaOH \longrightarrow CH_3COONa + C_2H_5OH$ **[1 + 1 + 1 + 1 + 1]**

26. (a) The number of valence electron in element *A* = 1 while in element *B* = 2

(b) The valency of element *A* is 1 and that of *B* is 2.

(c) Element *A* is more metallic than element *B*.

(d) The size of atom *A* is more than that of *B*.

(e) The formula of oxide of element *A* is A_2O and that of element *B* is *BO*.

(f) The formula of chloride of element *A* is ACl and that of element *B* is BCl_2. **[5]**

27. (a) Photosynthesis is the process by which green plants transform light energy into chemical energy. It takes place in chloroplast (plastid) of leaves. The site is grana and stroma of chloroplast. **[1+ ½ + ½]**

(b) Reaction of photosynthesis is:

$$\underset{\text{Carbon dioxide}}{6CO_2} + \underset{\text{Water}}{6H_2O} \xrightarrow{\text{Light}} \underset{\text{Sugar}}{C_6H_{12}O_6} + \underset{\text{Oxygen}}{6O_2}$$ **[1]**

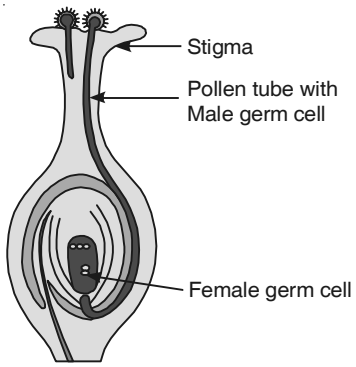
(c) Raw materials required are: Carbon dioxide (enters the leaves through stomata) and water (absorbed by the roots from the soil). **[2]**

OR

(a) Pollination: The process of transfer of pollen grains from the anther to the stigma of the flower. **[1]**

Two types: Self-pollination and Cross-pollination. **[½ + ½]**

(b)

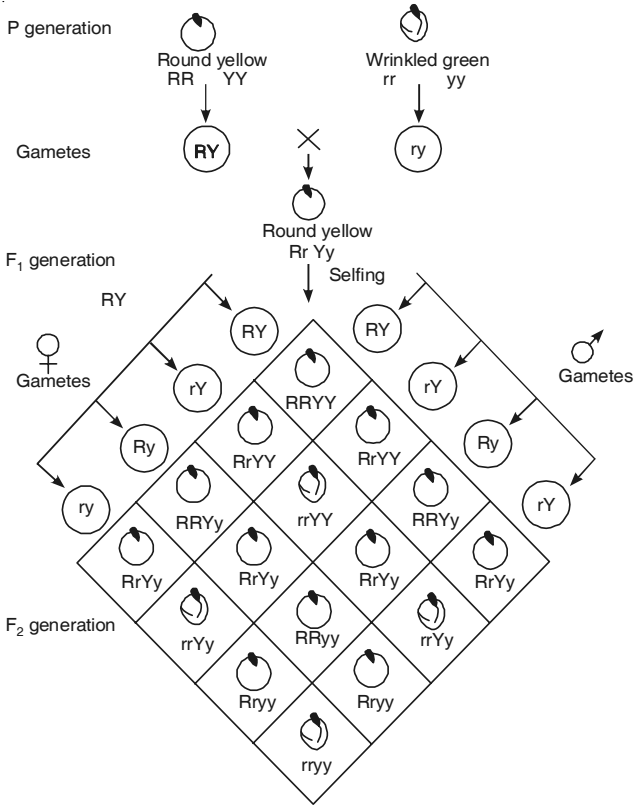


[3]

28. Mendel performed a dihybrid cross between two plants having Round-yellow (RRYY) and wrinkled green seeds (rryy). It produced four pairs of gametes (YR, yR, Yr, yr). Each of these segregate independent of each other, each having a frequency of 25% of the total gametes produced.

Thus, he concluded that when two pairs of traits are combined together in a hybrid, one pair of character segregates independent of the other pair of character. This is known as law of independent assortment.

Statement of law of independent assortment: It states that when two pairs of traits are combined in a hybrid, one pair of character segregates independent of the other pair of character.



Phenotypic ratio: round yellow : round green : wrinkled yellow : wrinkled green

9 3 3 1 **[1 + 4]**

29. (a) The three common refractive defects of vision are as follows:

- **Myopia:** Corrected using spectacles having concave lenses.
- **Hypermetropia:** Corrected using spectacles having convex lenses.
- **Presbyopia:** Corrected using bifocal lenses of appropriate power, in which upper part comprises concave lens and lower part comprises convex lens.

(b) Eyes of the dead person can be donated to a person having corneal blindness. It will help him/her to see the world. We can register to eye donation camps to donate our eyes to the needy. **[3 + 2]**

OR

(a) Given, h = + 1.5 cm; f = – 12 cm; u = – 18 cm; v = ? h' = ?

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$ **[½]**

$$\therefore \quad \frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{(-12)} - \frac{1}{(-18)}$$ **[½]**

$$= \frac{-1}{12} + \frac{1}{18} = \frac{-3+2}{36} = \frac{-1}{36}$$

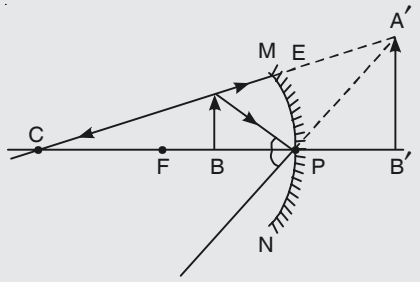
$$\therefore \quad v = -36 \text{ cm}$$ **[1]**

(b) $$h' = -\frac{v}{u} \times h$$

$$= -\frac{-36 \text{ cm}}{-18 \text{ cm}} \times 1.5 \text{ cm} = -3 \text{ cm}$$ (Magnified Inverted image) **[1]**

If $u = -10$ cm

No distinct image would be formed on the screen. In this case, the image formed will be virtual (object will be within focal length) **[1]**

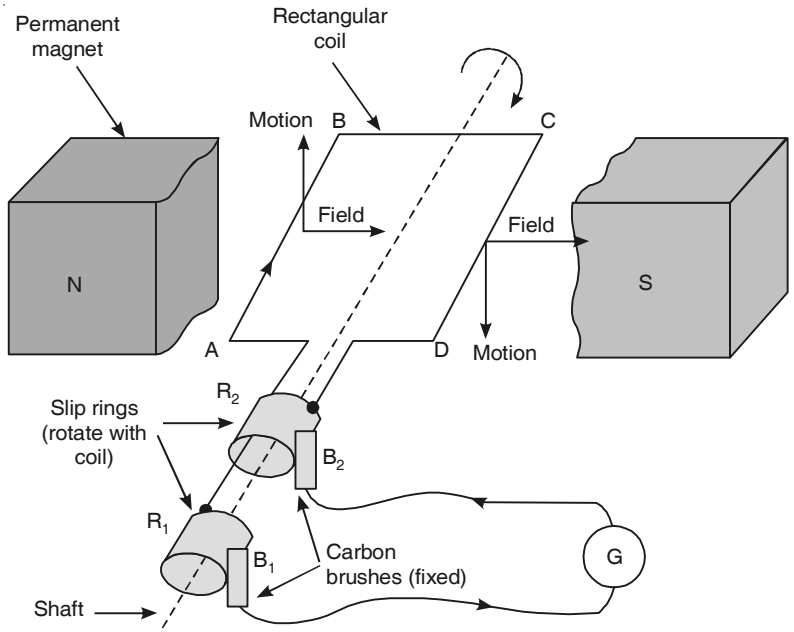


(CBSE Marking Scheme, 2015) [1]

30. AC generator is a device that converts mechanical energy into alternating current.

It is based upon the principle of electromagnetic induction. When a coil rotates between the two poles of a strong magnet, a current is induced in the coil.

When the armature coil ABCD rotates in the strong magnetic field, it cuts the magnetic field lines and produces current in the coil and the current begins to flow through the brush B_1. The direction of this current can be found by the Fleming's right hand rule. When the armature has rotated through 180°, the induced current flows through B_2. This process is repeated and induced current is produced which is of alternating nature.


Permanent magnet
Rectangular coil
Motion
B
C
Field
Field
N
S
A
D
Motion
R_2
Slip rings (rotate with coil)
B_2
R_1
B_1
Carbon brushes (fixed)
G
Shaft

[1 + 1 + 3]

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Section 'A'

1. + sign of m indicate that the image is erect and hence virtual. **[1]**

2. Jute bags are eco- friendly as they are biodegradable. **[1]**

3. **(a)** It is due to deficiency of iodine in food of the village children. **[1]**

(b) The disease caused due to deficiency of iodine is Goitre. **[1]**

(c) The problem can be overcome by adding iodine in food which can be done by consuming iodised salt in place of ordinary salt. **[1]**

(d) **(i)** The hormone secreted by thyroid gland is thyroxin. It regulates carbohydrate, protein and fat metabolism in the body. **[1]**

4. **(a)** Element 'A' is a metal because it is present in group I (1 valence electron) and can lose electron easily. **[1]**

(b) Element B has larger size than 'C' because it has more number of shells than 'C'. Also, B lies in the third period and has three shells whereas C lies in second period and has two shells. **[1]**

(c) 'C' being an element of 3^{rd} group has three valence electrons, therefore its valency is 3. **[1]**

(d) **(i)** There are seven horizontal rows known as periods. **[1]**

5. **(c)** Vanilla essence **[1]**

6. **(b) (ii), (iii)** and **(iv)** **[1]**

7. **(b)** Accumulation of variations over several generations. **[1]**

8. **(c)** A person with myopia can see nearby objects clearly. **[1]**

9. **(a)** A **[1]**

10. **(c)** Same at all points **[1]**

11. **(a) (i)** **[1]**

12. **(d)** Pupil

13. **(d)** Reuse is better than recycle because it prevents environmental pollution. **[1]**

14. **(a)** Wings of birds and wings of bat are homologous. Since they have same basic design however their origin is different **[1]**

Section 'B'

15. Oxidising agent: Alkaline potassium permanganate.

Litmus test	Reaction with sodium	Hydrogen carbonate
Ethanol	No colour change	It does not react with $NaHCO_3$.
Ethanoic acid	Turns blue litmus red.	It reacts with $NaHCO_3$ give rise to CH_3COONa, CO_2 and H_2O

[1 + 2]

16. (a) pH– It is the negative logarithm of H^+ ion concentration in a given solution.
pH stands for Power of hydrogen ion concentration.

(b) (i) Carbonate salts react with acid (A) to liberate CO_2 gas. Thus, its pH is less than 7.

(ii) Since, B is an alkali as it liberates NH_3 gas, pH of solution B is more than 7. **[1 + 1 + 1]**

17. Addition reaction with hydrogen can take place by:

- Alkene - C_nH_{2n}
- Alkyne - C_nH_{2n-2}

Essential conditions required for an addition reaction to occur are:

- Presence of multiple bonds between carbon atoms in the chain of hydrocarbon.
- Presence of catalyst such as nickel or platinum.

Chemical reactions are:

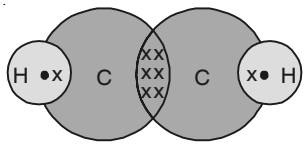
$$\underset{\text{Ethene}}{CH_2=CH_2} + H_2 \xrightarrow{\text{Ni or Pt}} \underset{\text{Ethane}}{CH_3-CH_3}$$

$$\underset{\text{Ethyne}}{CH\equiv CH} + 2H_2 \xrightarrow{\text{Ni or Pt}} \underset{\text{Ethane}}{CH_3-CH_3}$$

[1 + 1 + 1]

OR

Electron dot structure of ethyne:



When ethyne is burnt with oxygen, it gives a clean oxyacetylene flame with temperature of around 3000° C because of complete combustion. This flame is used for welding.

However, when ethyne is burnt with air, it gives a sooty flame, due to incomplete combustion caused by limited supply of oxygen obtained from air. Therefore, such an huge temperature is not attained. Thus, a mixture of ethyne and air is not used for welding purpose. **[1 + 2]**

18. Term used is Rancidity.

Antioxidants are substances which prevent oxidation.

When they are added to fat and oil containing food, the fats and oil do not get oxidised easily, hence, the food do not get rancid, thus remains good to eat for longer time. **[1 + 1 + 1]**

19. Atomic number = 35 – 18 = 17

Electronic configuration = 2, 8, 7

Group = 17

Period = 2

Valency = 7 **[½ + 1 + ½ + ½ + ½]**

20. Leaves have tiny openings called stomata for the exchange of gases. When the leaves of a healthy potted plant are coated with vaseline, their stomata will get blocked. Therefore,

- There would be no intake of CO_2, hence, there would be no photosynthesis.
- Oxygen will not enter the leaf nor will it be produced as there is no photosynthesis. So, respiration will not take place.
- In the absence of transpiration, transpiration pull will not be created. Therefore, absorption and rising up of water in stem would also be affected adversely. **[1 + 1 + 1]**

21. Vegetative reproduction is a mode of reproduction in which new plants are obtained from vegetative parts of the plants.

Advantages:

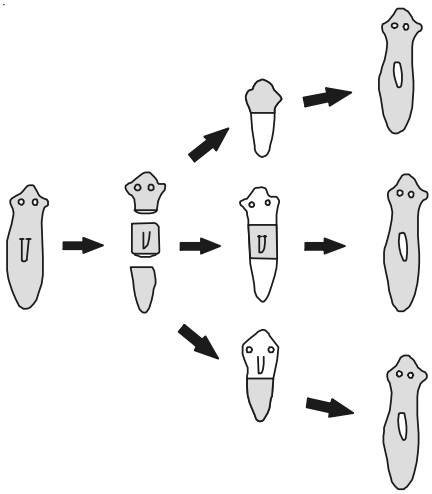
(i) Seedless plant can be easily propagated by this method.

(ii) It is a cheaper, easier, and rapid method of propagation.

Potato and sugarcane can be grown by this method. **[1 + 1 + 1]**

OR

Diagram is as follows:



Regeneration can be observed in *Hydra* also. **[2 + 1]**

22. Given,

Height of object, h_0 = 10cm

Focal length, f = 12 cm

Object distance, u = –18cm

Using lens formula,

$1/v + 1/u = 1/f$

$1/v = 1/12 - 1/18$

$1/v = 3/36 - 2/36$

$1/v = 1/36$

$v = 36$ cm

Now $m = v/u = h_i/h_o$

or $36/-18 = h_i/10$

$h_i = -20$ cm

Nature of image: Magnified, real and inverted image. **[3]**

23. (a) Highest total resistance is obtained when resistance are connected in series.

$R = R_1 + R_2 + R_3 + R_4$

$R = 4 + 8 + 12 + 24$

$R = 48\ \Omega$

(b) Lowest total resistance is obtained when resistances are connected in parallel.

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$$

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{8} + \frac{1}{12} + \frac{1}{24}$$

$$\frac{1}{R} = \frac{(6+3+2+1)}{24} = \frac{12}{24} = \frac{1}{2}\Omega \quad \text{or} \quad R = 2\ \Omega$$ **[1½ + 1½]**

OR

(a) The colour of the sky is blue during day time. Sky appear blue due to scattering of light by atmosphere. Blue colour gets scattered maximum due to shorter wavelength than red.

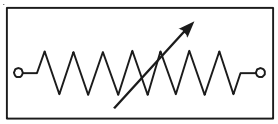
(b) The sky appears dark to passengers flying at a very high altitudes due to absence of atmosphere. As a result, scattering of light does not take place, as scattering of light takes place because of the particles present in atmosphere. **[1½ + 1½]**

24. A fuse is a safety device having a wire of alloy of tin and lead with low melting points.

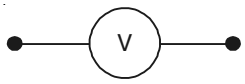
It is used so as to avoid the danger of electric short circuit and fires. When the current in wire increases due to overloading or short-circuit, the fuse wire become heated and melt. Hence, it breaks the circuit, thereby preventing overheating and electric fire. **[1 + 2]**

OR

Rheostat:



Voltmeter:



Electric bulb:

[1 + 1 + 1]

Section 'C'

25. (a) The arrangement of metals in the vertical column in the order of decreasing reactivity is called reactivity series or activity series. A metal placed above hydrogen in the activity series will displace hydrogen from water or acids. A metal placed at the top of the activity series would displace metal below it. Thus a more reactive metal displaces a less reactive metal from its salt solution. **[2]**

(b) (i) For obtaining metals that are in the middle of the reactivity series, oxides of such metals can be reduced with coke (carbon) which acts as a reducing agent. **[1½]**

Example: $2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$

(ii) For obtaining metals that are high in the reactivity series, their oxides are reduced to metals by the process of electrolysis.

Example: electrolysis of sodium chloride

At cathode: $Na^+ + e^- \rightarrow Na$

At anode: $2Cl \rightarrow Cl_2 + 2e^-$ **[1½]**

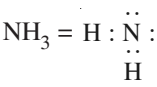
OR

(a) Element X is Nitrogen. It has 5 valence electrons.

(b) Electron dot structure of N_2 = : N : : : N :

It has triple covalent bond.

(c) Electron dot structure of NH_3 =

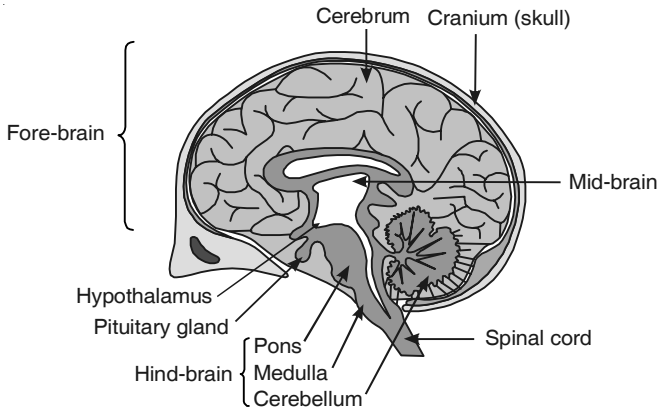


It has three single covalent bonds.

(d) **(i)** F < N < Be < Li

(ii) Cl < Br < I < At **[1 + 1 + 1 + 2]**

26. (a) **(i)**



[2]

(ii) Medulla controls blood pressure, salivation and vomiting.

Cerebellum controls precision of voluntary movements and equilibrium (any one function each of Medulla and Cerebellum) **[2]**

(b) Over production of growth hormone leads to gigantism and it's underproduction leads to dwarfism. **[1]**

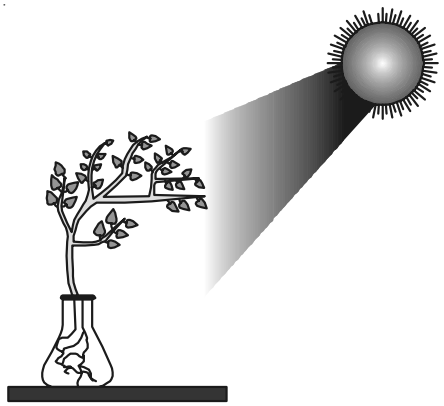
OR

Phototropism is the bending of shoots or other parts of a plant in response to light while Geotropism is the bending of growth of roots towards gravity. **[1 + 1]**

Activity to show that light and gravity change the direction of plant parts:

- Take a conical flask and fill it with water.
- Then cover its neck with a wire mesh.
- Now place few germinating seeds on the wire mesh.
- Then, take a cardboard box that is open from one side.
- Place the flask in the box and keep this set up near a window.

- After 4-5 days, you will find that shoot start bending towards light, while the roots bend away from light.



[3]

27. (a) Evolution is descent of organisms from common ancestors with the development of changes over time.

(b) Evolution cannot be equated with progress because:

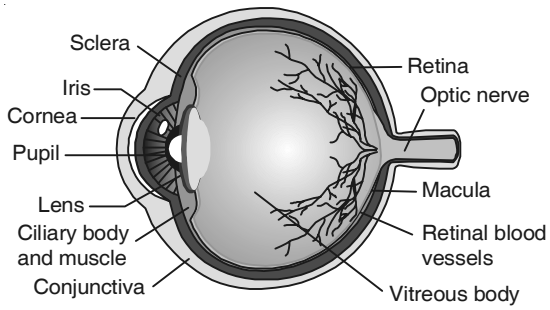
(i) Evolution does not always lead to formation of new species.

(ii) The newly formed species as a result of evolution may have complex organisation but cannot be considered better to the earlier species.

(iii) Evolution simply leads to diversification.

(c) Classification means the grouping of organisms on the basis of their similarities and differences. On the other hand, the evolution means the descent with modification. Both are closely inter-related. Classification is based on evolutionary history of organisms. If two organisms share many characteristics, it means they are closely related. Closely related individuals have a recent common ancestor. Similarly, more differences mean divergence from common ancestor in remote past. **[1 + 2 + 2]**

28. Structure of human eye:



Functions of following parts of human eye are:

(i) Cornea: It acts like a window that controls and focuses the entry of light into the eye.

(ii) Iris: It controls the diameter and size of the pupil and thus the amount of light reaching the retina.

(iii) Pupil: It determines the amount of light entering in the eye.

(iv) Ciliary muscles: It holds the eye lens in position.

(v) **Retina:** It receives light that the lens has focussed, convert the light into neural signals and send these signals on to the brain for visual recognition. **[2 ½ + 2 ½]**

29. **(a)** Red colour wire is used as live wire, green colour wire used as earth wire and black colour wire is used as neutral wire.

(b) The live wire carries the current while the neutral wire produces the return path for the current.

(c) Live wire

(d) **i**-Fuse, **ii**- Earth wire

(e) The metal body of any electrical appliance is connected to earth through a metal wire to avoid the risk of electric shock. When live wire touches the metal body of electric appliance then the current passes directly to the earth and prevent our body from electric shock. **[1 + 1 + 1 + 1 + 1]**

30. **(a)** **Reduce:** Less use of natural resources/avoid wastage of food, water, electricity etc.

Recycle: Collection of materials like plastic, glass, metal, paper etc and recycle these materials to make required items instead of synthesizing fresh one. This would save natural resources.

Reuse: Better than recycling as no energy is required here and the already used things/ items are used again and again. **[3]**

(b) **(i)** Essential for living organisms.

(ii) It has limited availability.

(iii) Conservation of water allows its equitable distribution.

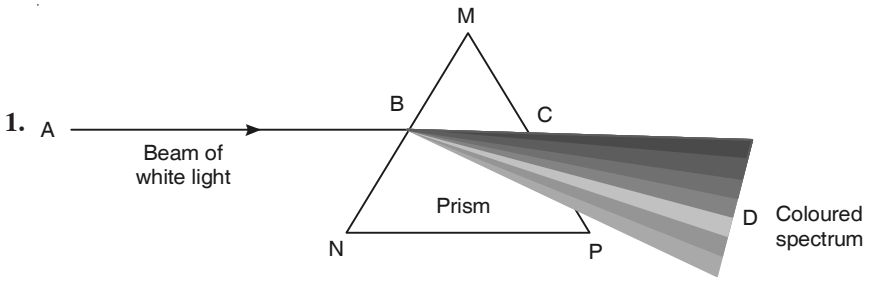
(iv) Essential for sustainable development. **[½+½+½+½] (CBSE Marking Scheme, 2017)**

SCIENCE

SOLUTION SAMPLE QUESTION PAPER 10

Section 'A'

1.



[1]

OR

To get a real image of the size of the object, the object must be placed at twice the focal length of the lens. **[1]**

2. Problems associated are:

(i) Destruction of huge areas of forest.

(iii) Loss of livelihood of people who depend on these forests. **(Any one)**

Solution: Relocate the people to other areas and provide them other means of livelihood.

[½ + ½]

3. (a) An alloy consisting of 22 parts by weight of pure gold and 2 parts by weight of copper or silver is called 22 carat gold. **[1]**

(b) No, because it is very soft. **[1]**

(c) An alloy is a homogeneous mixture of different metals or a metal and a non-metal. **[1]**

(d) Yes. Pure gold is very soft and is known as 24 carat gold. **[1]**

4. (a) It is the female reproductive system of humans. **[1]**

(b) The part labeled as **1** is oviduct/fallopian tube. It is the site of fertilisation. **[1]**

(c) The part labeled as **2** is ovary. Ovum is produced by ovaries which are paired. **[1]**

(d) One egg is produced every month by one of the ovaries. **[1]**

5. (c) (ii) and (iv) **[1]**

6. (c) Group 18 **[1]**

7. (c) (i) and **(ii)** **[1]**

8. **(d)** all the above **[1]**

9. **(c)** Producing induced current in a coil due to relative motion between a magnet and the coil **[1]**

10. **(d)** Nature of the material **[1]**

11. **(c)** Refraction, dispersion and internal reflection **[1]**

12. **(b)** very near to the focus of the reflector **[1]**

13. **(d)** The flow of energy through different steps in the food chain is unidirectional. This means that energy captured by autotrophs does not revert back to the solar input and it passes to the herbivores. **[1]**

14. **(a)** Oil and fats containing articles are flushed with nitrogen to prevent them from getting oxidised, to protect them from becoming rancid. **[1]**

Section 'B'

15. **(i)** $CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$

(ii) $2Al + 6HCl \longrightarrow 2AlCl_3 + 3H_2$

(iii) $MnO_2 + 4\ HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$ **[1 + 1 + 1]**

16. When an acid reacts with a base, salt and water are produced.

Example: $NaOH + HCl \longrightarrow NaCl + H_2O$

This type of reaction is known as neutralisation reaction. **[1 + 1 + 1]**

17. Homologous series of carbon compounds are compounds that have similar general formula that belong to a series. The chemical properties of these compounds are same because of the presence of same functional group.

Classification of given homologous series are as follows:

Alkene	Alkynes
C_3H_6 (Propene)	C_3H_4 (Propyne)
C_4H_8 (Butene)	C_4H_6 (Butyne)
C_5H_{10} (Pentene)	C_5H_8 (Pentyne)

[1 + 2]

OR

The three steps involved in extraction of a metal after its ore is mined are:

(i) Concentration of the ore to remove impurities.

(ii) Reduction of the ore to get the metal.

(iii) Purification of the ore. **[1 + 1 + 1]**

18. Combination reaction is a type of reaction in which two elements or compounds combine to form a new compound.

$$2Mg + O_2 \longrightarrow 2MgO$$

Decomposition reaction is a type of reaction in which a compound decomposes to give two or more elements or compounds.

$$CaCO_3 \longrightarrow CaO + CO_2$$

Thus, combination and decomposition reactions are opposite of each other. **[3]**

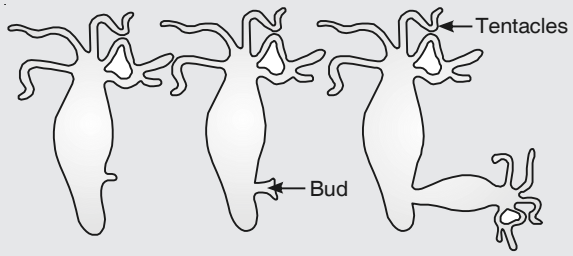
19. **(a)** $_{19}K$ has one electron in the outermost shell.

Electronic configuration: 2, 8, 8, 1

(b) $_4$Be and $_{20}$Ca belong to the same group *i.e.* Group 2.
Electronic configuration of $_4$Be = 2, 2
Electronic configuration of $_{20}$Ca = 2, 8, 8, 2
The number of electrons in the outermost shell of $_4$Be and $_{20}$Ca is same hence they belong to the same shell.

(c) $_9$F and $_4$Be belong to the same period *i.e.* Period 2.
Electronic configuration of $_9$F = 2, 7 while of $_4$Be = 2, 2
$_4$Be has bigger atomic size than $_9$F because the atomic radius decreases as we move from left to right due to increase in nuclear charge which tends to pull the electrons closer to the nucleus and hence size of F reduces. **[1 + 1 + 1]**

20. Drawing **[2]**
Two labeling – Bud, Tentacles **[½, ½]**



[CBSE Marking Scheme, 2015]

21. (a) Yes, we can group eyes of these animals together, as they have evolved over generation from imperfect eyes in *Planaria* to perfect eyes in vertebrates. The eyes of *Planaria* is simple without lens, insects have compound eyes and vertebrates have highly specialised eyes, however, all of them have same function *i.e.* vision.

(b) *Archaeopteryx*, a type of flying dinosaur is a reptile which has wings. Birds also have wings, which proves that birds have evolved from reptiles and *Archaeopteryx* is a connecting link between reptiles and birds. **[1 ½ + 1 ½]**

OR

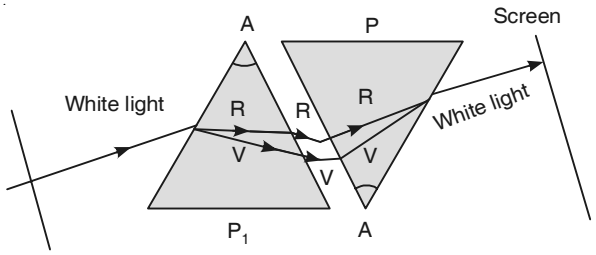
- Acquiring knowledge/skill in one's lifetime such as learning dance, music, physical fitness or any other suitable example. **(Any two) [½, ½]**
- **Reason:** **[1]**
  (i) Such characters/experiences acquired during one's lifetime do not bring any change in the DNA of the reproducing cell/germ cell.
  (ii) Only germ cells are responsible for passing on the characters from the parents to the progeny.

(CBSE Marking Scheme, 2015) [1]

22. When a beam of light enters a prism, it gets refracted and splits into its seven constituent colours. This splitting of the light ray occurs because of the different angles of bending of each colour. Hence, each colour passing through the prism bends at different angles with the respect to the incident beam. This gives rise to the formation of the colour spectrum.

Red colour bends the least and violet bends the most.

When a glass prism is used to obtain a spectrum of sunlight, a second identical prism in an inverted position with respect to the first position will allow all the colours of spectrum to recombine. Thus a beam of white light will emerge from the other side of the second prism. **[1 ½ + 1 ½]**



OR

(a) During Sunrise/sunset, the sun is reddish in colour.

It is because, sunlight travels longer distance at this time of the day, so the short wavelength colour gets scattered away and the sunlight is left with only longer wavelength light which is reddish or orange. So the sun appears reddish in colour.

(b) During noon, the sun is white in colour.

It is because, the sun rays travel shorter distance at noon and contain all the wavelength of light which combine to form white colour. This makes the colour of sun white. **[1 ½ + 1 ½]**

23. (a) (i) Heating element of electric geysers - Nichrome

(ii) Filament of incandescent bulbs - Tungsten

(b) Given, P = 750 W, V= 220 V

(i) As we know, $P = V I$

Therefore, $I = P/V$ = 750/ 220 = 3.4 A

(ii) As we know, $R = V/ I$ = 220 / 3.4 A = 64.5 ohm **[1 + 2]**

24. An electromagnet is a solenoid coil that attains magnetism due to flow of current.

It works on the principle of magnetic effect of current.

We determine North and South Pole of an electromagnet with the help of magnetised iron bar by:

- Suspending magnetised bar and identifying its north and south poles.
- Finding the polarity of electromagnet using the property like poles repel. **[1 + 1 + 1]**

Section 'C'

25. Distinction between ethanol, ethanoic acid and soap solution:

- **Blue litmus paper test.** It turns into red when it comes in contact with acid. So ethanoic acid will turn blue litmus paper red.
- **Red litmus paper test.** It turns blue when it comes in contact with base. So, the soap solution will turn the red litmus paper into blue.
- **Sodium metal test.** When ethanol reacts with sodium metal, it gives bubbles of hydrogen gas. This burns with pop sound.

Scum is formed when soaps are used with hard water. This is because of reaction of soap with calcium and magnesium salts. This leads to hardness of water. **[3 + 2]**

26. Vegetative propagation is the ability of plants to reproduce by producing new plants from vegetative plants parts like roots, stems and leaves.

Advantages of vegetative reproduction are:

(i) Plants like banana, seedless grapes, rose etc, which cannot produce viable seeds can be propagated by this method.

(ii) It produces an identical copies of plant. So it is helpful in obtaining genetically identical copies of parents to preserve selected varieties.

(iii) It is easier, rapid and less expensive method of reproduction.

Banana and jasmine can be grown by vegetative propagation. **[1 + 3 + 1]**

27. (a) Reasons for choosing garden pea for his experiments are:

(i) Pea plants are self-fertilising.

(ii) They have short life cycle.

(b) Two contrasting visible characters of garden pea are used by Mendel for his experiments are:

(i) Tall/short plants

(ii) Purple/White flowers

(c) Mendel crossed tall pea plants with dwarf pea plants. He found that all F_1 plants were tall. Then, he self-pollinated all F_1 plants. On self-pollination, he found that all progenies obtained in F_2 generation were not at all tall plants. Instead one-fourth of F_2 plants were dwarf. He concluded that the F_1 tall plants were not true breeding. They were carrying both the traits. However, they appeared tall, because tall trait was dominant over the dwarf trait. **[1 + 1 + 3]**

OR

(a)

S. No.	Acquired Traits	Inherited Traits
(i)	Trait acquired during its lifetime.	Traits inherited from its predecessors.
(ii)	Not inheritable.	Inheritable.
(iii)	Not present in the genetic makeup.	Present in the genetic makeup.
(iv)	Change in DNA will not result in any change in such traits.	Change in DNA will bring about change in such traits.

(Any two difference) **[2]**

(b) The mouse continue to have information for presence of tall in its DNA. **[1]**

So, it will continue to have tail, because it is an acquired trait. **[1]**

(c) Nature selects the best trait in a species, leading to survival of fittest and evolution of species. **[1]**

(Any other)

28. (a) Concave lens **[1]**

(b) Pole **[1]**

(c) As we know, $$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

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

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

Given, $f = 20$ cm , $u = -30$ cm **[1½]**

(i) $v = (-30) \times 20 / 20 - 30 = 60$ cm

The image is formed at a distance of 60 cm on the other side of the optical center.

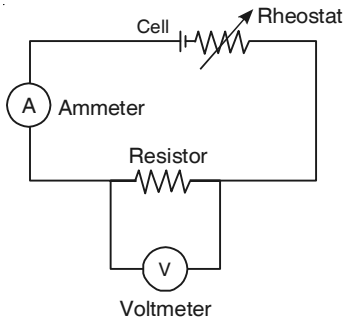
(ii) $m = \dfrac{-v}{u} = \dfrac{-60}{-30} = 2$

(iii) Image formed is inverted. **[1½]**

29. (a) Ohm's law: It states that potential difference across two points of a metallic conductor is directly proportional to current through the circuit provided that temperature remains constant.

Mathematical relation, $V = IR$

Electric circuit for studying Ohm's law is as follows:



(b) Given, $V = 12$ V, $I = 2.5$ mA $= 2.5 \times 10^{-3}$ A

As we know, $V = IR$

On putting values, we get,

$$12 = 2.5 \times 10^{-3} A \times R$$

$$R = \frac{12}{2.5} \times 10^{-3}$$

$$= 12 \times \frac{10^3}{2.5} = 4.8 \text{ k ohm}$$ **[3 + 2]**

30. (a) Characteristics of a food chain:

(i) Unidirectional.

(ii) Helps in understanding the food relationship and interaction among various organisms in an ecosystem.

(iii) Helps to understand movement of toxic substances and the problem of their biological magnification.

(b) (i) If lions are removed, the number of deer increases which will result in less amount of grass leading to soil erosion.

(ii) If deer are removed, food available for lions would be less. Also, the amount of grassland will increase.

(c) Pesticides used for crop protection, when washed away down into the soil, are absorbed by the plants or producers. On the consumption of these plants, they enter into our food chain. Being biodegradable, these chemicals get accumulated progressively and enter our body. **[1½ + 2 + 1½]**

OR

Solar cell is a device that converts solar energy into electricity.

Since the output of single solar cell is quite low, a large number of solar cells are combined using silver for interconnection.

This arrangement of solar cell is called solar panel. This delivers enough electricity for practical uses.

Use of solar cells:

(i) Used in artificial satellites

(ii) Traffic lights, calculators

(iii) At TV relay station **(Any two)**

Disadvantages:

(i) Highly expensive

(ii) Low efficiency

(iii) Fabrication is a complex process. **(Any two)** **[1 + 2 + 1 + 1]**

SCIENCE

SOLUTION SAMPLE QUESTION PAPER 11

Section 'A'

1. **Ammeter:**
   (i) It is used to measure the current
   (ii) It is connected in series in the circuit. **(Any one)** [½]
   Voltmeter:
   (i) It is used to measure the potential difference.
   (ii) It is always connected in parallel to the circuit **(Any one)** [½]
2. **Two objectives are**: Judicious use of resources and planned development. **[1]**
3. **(a) (i)** Chemically, baking soda is known as sodium hydrogen carbonate. **[1]**
   (b) The carbon dioxide produced by reaction of baking soda and acid in the soda acid fire extinguisher helps in extinguishing fire. **[1]**
   (c) $2NaHCO_3\ (s) \rightarrow Na_2CO_3\ (s) + H_2O\ (l) + CO_2\ (g)$ **[1]**
   (d) Higher than 7 i.e. it is alkaline. **[1]**
4. **(a)** The part labeled as A is male germ cells. **[1]**
   (b) (ii) Style **[1]**
   (c) Each pollen grain produces two male gametes. **[1]**
   (d) Zygote **[1]**
5. **(b)** Na > Mg > Al > Si > Cl **[1]**
6. **(a)** Only single bond **[1]**
7. **(c)** Antacid **[1]**
8. **(b)** Starch breaking down into sugars **[1]**
9. **(c)** Wrinkled and green **[1]**
10. **(c)** All the colours of the white light move with the same speed. **[1]**
11. **(a)** Are relaxed and lens becomes thinner **[1]**
12. **(a)** Split ring type commutator must be used. **[1]**
13. **(d)** Green plants are producers as they can prepare their own food by the process of photosynthesis. Animals including humans are directly or indirectly dependent on plants for their food. **[1]**
14. **(d)** Ethanoic acid have one oxygen atom more and two hydrogen atoms less than ethanol. In general, Loss of hydrogen is known as oxidation and gain of oxygen is known as oxidation. Therefore, it is an oxidation reaction. **[1]**

Section 'B'

15.

S. No.	Metals	Non-metals
(i)	All metals react with oxygen to form metal oxide.	Non-metals do not react with oxygen to form acidic oxides.
(ii)	Only reactive metals react with water to form oxides or hydroxides and liberate hydrogen gas.	Non-metals do not displace hydrogen from water.
(iii)	All metals react with diluted acids to produce salt and hydrogen gas.	Non-metals do not react with dilute acids.

[1 + 1 + 1]

16. X is chlorine while Y is $CaOCl_2$ (calcium oxychloride)

$$Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$$ **[1 + 1 + 1]**

17.
- For systematic and simplified study of elements and their compounds. **[½]**
- Basic property: Atomic Number. **[½]**
- **Modern periodic Law:** The properties of elements are a periodic functions of their atomic number. **[½]**
- Metals are found on the left side and centre of the Modern Periodic Table. **[½]**
- Metalloids are found in a zig-zag manner between the metals and the non-metals. **[½]**
- Non-metals are found on the right side of the Modern Periodic Table. **[½]**

(CBSE Marking Scheme, 2015)

OR

Elements	Valence electrons	Period
A	1	3
B	3	3
C	5	3
D	7	3

Electronic configuration of *A*- $1s^2$, $2s^2$ $2p^6$, $3s^1$

Electronic configuration of *B*- $1s^2$, $2s^2 2p^6$, $3s^2 3p^5$

Molecular formula of the compound formed with *A* and *D*:

Atomic number of *A* = 11

Electronic configuration of *A* = 2, 8, 1

Number of valence electron of *A* = 1

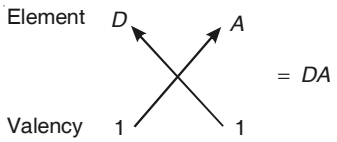
Valency of *A* = 1

Atomic number of *D* = 17

Electronic configuration of *D* = 2, 8, 7

Number of valence electron of *D* = 7

Valency of *D* = 8 – 7 = 1



So, the formula of the compound formed when elements *A* and *D* combine is *AD*. **[1 + 1 + 1]**

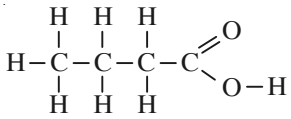
18. $C_2H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy

It is exothermic reaction because a large amount of heat is released.

Example: Decomposition of vegetable watter into compost. **[1 + 1 + 1]**

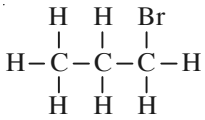
19. An atom or group of atoms/heteroatoms which determine the chemical properties of an organic compound is known as functional group.

(a) Butanoic acid:



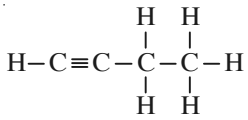
Functional group present is -COOH.

(b) Bromopropane:



Functional group present is – Br.

(c) Butyne:



Functional group present is Triple bond. **[1 + 1 + 1]**

20. Pollination is transfer of pollen grains from anther to stigma. Its two types are- self-pollination and cross-pollination.

Self-pollination	Cross-pollination
Transfer of pollen grain from anther to stigma of the same flower or different flower of same plant.	Cross-pollination is transfer of pollen grain from anther to stigma of flowers of different plant.

[1 + 1 + 1]

OR

Sexual reproduction is a mode of reproduction in which two parents of different sexes (male and female) are involved.

Significance of sexual reproduction are:

(i) It brings about genetic variations among populations.

(ii) It produce individual more adapted to the environment.

(iii) It helps in survival of species.

(iv) It helps in evolution of species. **[1+ 2]**

21. Some traits like swimming, dancing, cooking etc. cannot be passed on to the next generation. Such traits are known as acquired traits.

Acquired traits are experienced by an individual during his life time and involves changes in somatic cells, which are not transferred to germ cells. Hence, such traits cannot be passed on to next generation. **[3]**

OR

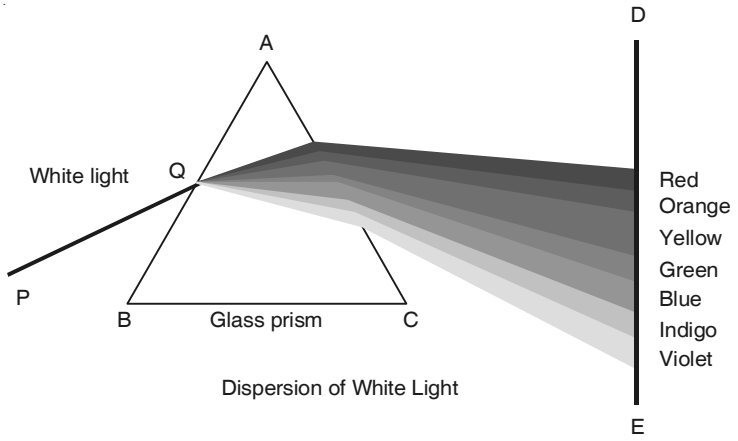
Yes, it is possible. **[1]**

Example – When pure tall plants are crossed with pure dwarf pea plants, only tall pea plants are obtained in F_1 generations. **[½]**

On selfing tall plants of F_1, both tall dwarf plants are obtained in F_2 generation in the ratio 3 : 1. **[½]**

Reappearance of the dwarf character, a recessive trait in F_2 generation shows that the dwarf trait/character was present in individuals of F_1 but it did not express (due to the presence of tallness, a dominant trait/character) **(CBSE Marking Scheme, 2015) [1 + 2]**

22.



Dispersion of White Light

(a) Phenomenon is dispersion of light.

It is caused because different constituent colours of light offer different refractive indexes to the material of the prism.

(b) Formation of rainbow

(c) Based on above observation, it can be concluded that:

(i) White light consist of seven colours

(ii) Violet light suffers maximum deviation while red light suffers minimum deviation.

[½ + 1+ ½ + ½ + ½]

23. (i) It is directly proportional to current flowing through it.

(ii) It is directly proportional to the number of turns per unit length of the solenoid.

(iii) Nature of the material inside the solenoid. **[1 + 1 + 1]**

24. In series circuit, same current flows through all the resistors current through 15 Ω resistor.

Hence, $$I = \frac{V}{R} = \frac{3V}{15\ \Omega} = \frac{1}{5} = 0.2\,\text{A}$$

∴ Current in the circuit = 0.2 A

∴ Potential drop across 10 Ω resistor is

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

$$V = IR$$

$$= 0.2\ \text{A} \times 10\ \Omega = 2\ V$$

[1 + 1 + 1]

Section 'C'

25. (a) Three physical properties of carbon are:

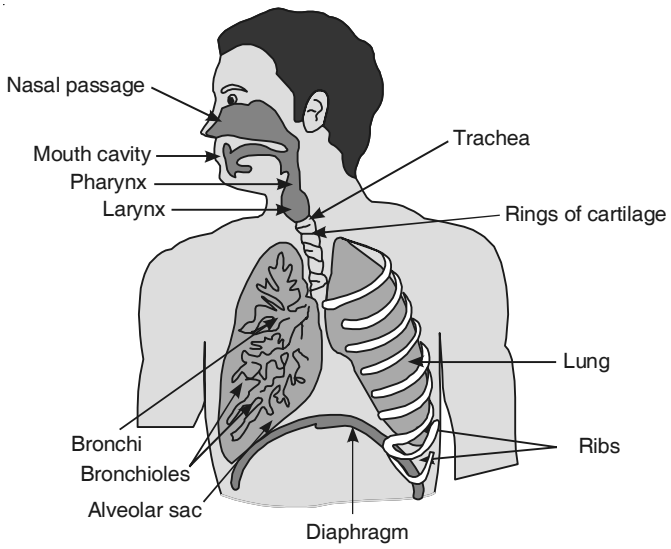
(i) Carbon compounds have low boiling and melting points.

(ii) Tertravalency which helps in long carbon chains.

(iii) Don't conduct electricity (Some exceptions are there).

(b) Carbon is a versatile element because it forms covalent bonds with large number of elements and has catenation capacity to form compounds by chain of bond with itself. **[3 + 2]**

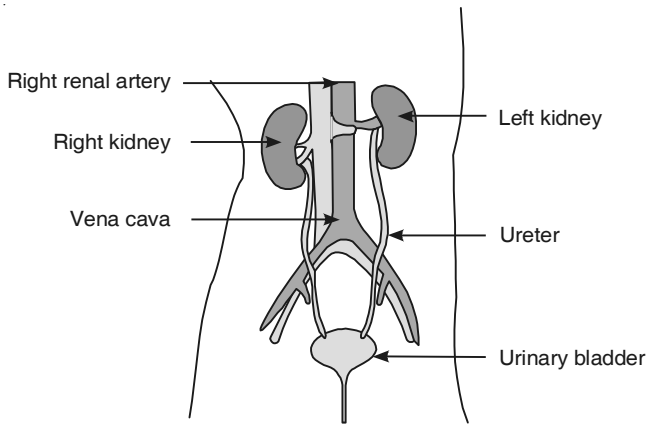
26. (a) Human respiratory system:



(b) Residual volume of air in the lungs corresponds to the air that remains inside the person's lungs after complete exhalation. It prevents out lungs to burst out. It also prevents sticking of lung walls and provide nourishment to inner lungs during exhalation. **[4 + 1]**

OR

(a) (i) Kidney, **(ii)** Urinary bladder, **(iii)** Ureter, **(iv)** Urethra



(b) The amount of water reabsorbed depends on the quantity of excess water in the body and the quantity of dissolved waste to be excreted. **[4 + 1]**

27. Fossils are remains of dead plants and animals that got buried deep inside the earth millions of years ago.

Uses of fossils are: To find racial history of plants and to study past climatic conditions of earth.

Three factors that provide evidence in favour of evolution are:

(a) Homologous organs: These are organs which are similar in form but perform different functions in different organisms. *e.g*. the bone structure observed in wings of birds, flipper and dolphins and arms of human being are similar but they perform different functions. They belong to same group of animals, the vertebrates and therefore show homology.

(b) Analogous organs: These are organs that perform same functions in different organisms of different origins. For example, wings of birds and wings of bats exhibit analogy. Both are used for flight, but they are structurally different.

(c) Fossils: Fossils are remains of organisms that once existed on earth. They represent ancestors of plants and animals which are alive even today.

[1 + 1 + 3]

28. She is suffering from presbyopia. It is a common defect of vision, which occurs at old age. A presbyopic eye has its near point greater than 25 cm and it gradually increases as the eye becomes older. **[1]**

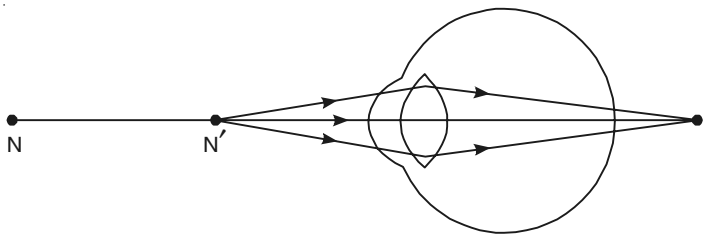
Presbyopia is caused by:

(i) Weakening of the ciliary muscles.

(ii) Reduction in the flexibility of the eye lens. **[2]**

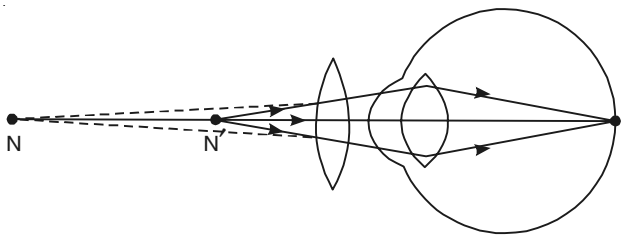
This defect can be corrected by using a convex lens of appropriate power.

(i) Ray diagram showing presbyopia:



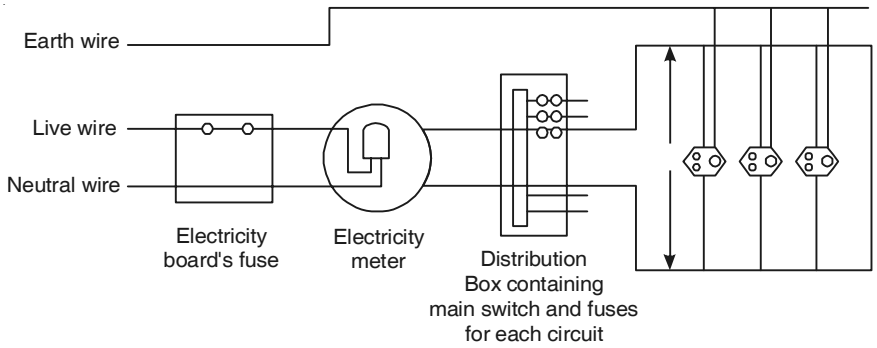
[1]

(ii) Ray diagram showing correction of Presbyopia:



[1]

29. (a) A schematic labelled diagram of domestic electric circuit:



(b) (i) It prevents damage to appliance due to overloading or short-circuiting.

(ii) Earth wire is connected to a metallic body buried deep inside the earth. It is used as safety measure.

It provides a low resistance conducting path for the current. As a result, any leakage of current to a metallic body does not give shock to user. **[3 + 2]**

30. (a) A solar cooker is a device that uses sunlight for energy.

(b) Black surfaces absorb more heat as compared to white surfaces. Therefore, for making solar cookers, black surfaces are used.

Advantages:

(i) It saves fuel.

(ii) It does not cause any pollution.

(iii) In solar cooker, the nutrients of food are not destroyed as the temperature of solar cooker is not so higher.

Disadvantages:

(i) During night and cloudy day, its working is not possible.

(ii) The direction of its reflector has to be adjusted according to the position of the sun.

(iii) It cannot be used for making chapattis. **[1 + 2 + 2]**

OR

(a) Chlorofluorocarbons are carbon compounds which contain chlorine and fluorine.
CFCs react with ozone in stratosphere and depletes ozone.

(b) Consequences of ozone hole:

(i) It may lead to skin burns.

(ii) It may cause skin cancer.

(c) Step to limit this damage: We should reduce or control the use of ozone depleting substances like CFCs. **[2 + 2 + 1]**