FINAL SAMPLE PAPER

SOLUTION

SCIENCE

SECTION - A

1. Dilution of sulphuric acid is a highly exothermic process as a lot of heat is given out during this process.

Explanation: The process of diluting an acid is highly exothermic and that is why it is recommended to add acid to water by constantly stirring. If however, we add water to acid, the acid will splash out and may cause serious burn injuries.

OR

Copper vessels got tarnished due to the formation of green coloured layer of basic copper carbonate ($Cu(OH)_2.CuCO_3$) when copper reacts with the water vapour and carbon dioxide present in air.

Explanation: When copper metal is attacked by substances around it like moisture, air, acids etc. A green coating is formed on its surface due to the process of corrosion.

2. Hydrogen gas is not evolved when a metal reacts with dilute nitric acid as nitric acid is a strong oxidizing agent and it oxidizes the hydrogen gas produced to water and itself gets reduced to any of the nitrogen oxides (N_2O, NO, NO_2).

Related Theory

Magnesium and Manganese are the two metals which react with very dilute nitric acid to evolve hydrogen gas.

3. When a metal combines with a non-metal to form a compound Y, the compound Y will be an ionic compound formed by the transfer of electrons from the metal to the non-metal. Ionic compounds are soluble in water but insoluble in organic solvent such as alcohol.

Related Theory

Ionic compounds are formed due to strong electrostatic interactions between ions formed by the transfer of electrons. Ionic compounds have ionic or electrovalent bonds between atoms.

Properties of covalent compounds:

(1) These compounds have low melting and boiling points.
(2) They are generally poor conductors of electricity.
(3) Covalent compounds are usually insoluble in water.

OR

When a rod of zinc metal is dipped into a solution of copper sulphate then the zinc reacts with it and displaces the copper from copper sulphate solution as it is more reactive than copper. The blue colour of copper sulphate solution will change to colourless.

The chemical equation for the reaction taking place is:

$$Zn + CuSO_4 \longrightarrow Cu + ZnSO_4$$

4. Trait B is likely to have arisen earlier because in asexual reproduction traits are carried from parents to offspring with least variations and as trait B has higher percentage (60%) as compared to trait A So, it is likely to have arisen earlier.

5. The melting and boiling point of hydrocarbons increase with increase in molecular mass.

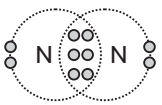
Related Theory

- *A homologous series is a group of organic compounds having similar structures and similar chemical properties in which the successive compounds differ by —CH_2 group.*
- *Characteristics of Homologous series*
  (1) All the members of a homologous series can be represented by the same general formula.
  (2) Any two adjacent homologues differ by 1 carbon atom and 2 hydrogen atoms in their molecular formula.
  (3) The difference in the molecular masses of any two adjacent homologues is 14 u.
  (4) All the compounds belonging to the same homologous series have similar chemical properties since these are determined solely by the functional group.
  (5) The members of a homologous series show a gradual change in their physical properties with increase in molecular mass.

OR

A triple covalent bond is formed when two atoms share three pairs of electrons among them to complete their octet.

For example, in order to attain an octet, each nitrogen atom (Atomic number = 7) in a molecule of nitrogen contributes three electrons giving rise to three shared pairs of electrons.



6. *(b) Hippocampus, Exocoetus, Anabas*

Explanation: The examples and the relation of animal group and heart are:

(1) Fishes have two chambered heart and exhibit single circulation

(2) Three chambered heart of amphibian and reptiles and four chambered heart of birds and mammals exhibit double circulation.

In given options, b includes all fishes which makes it the correct answer.

7. As the object moves closer to the lens, the image distance increases and size of the image increases from a point size to highly magnified image. When the object is placed with in the focal length of the lens, a virtual and magnified image is formed on the same side of the lens as the object.

8. The functions of lymph are:

(1) It contains lymphocyte cells which fight against infections.

(2) It returns proteins and fluids from circulation to fluids.

(3) It carries digested fat.

(4) It drains excess fluid from extra cellular space back into the blood

(Any two of four functions can be written to get full marks)

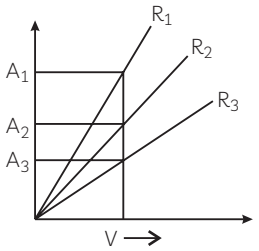
Related Theory

- *Lymph or tissue fluid is a yellow coloured circulatory fluid that flows in the lymphatic capillaries, which join to form large lymph vessels.*
- *It is formed when some amount of plasma, proteins and blood cells escape into intercellular spaces in the tissues through the pores present in the walls of capillaries.*
- *It is similar to the plasma of blood but colourless and contains less protein.*
- *Lymph drains into lymphatic capillaries from the intercellular spaces, which join to form large lymph vessels that finally open into larger veins.*

9. According to Ohm's law $V = IR \Rightarrow R = \frac{V}{I} \Rightarrow R \propto \frac{1}{I}$

As can be seen from the graph, for a given value of V, the current for R_3 is less than R_2 which is less than R_1.

Or, $I_{A3} < I_{A2} < I_{A1}$



This means that $R_1 < R_2 < R_3$

10. The relation between electric power, potential difference and current is given by P = VI.

Further, according to Ohm's law, V = IR.

So, if V is tripled, I will also be tripled for a fixed resistance R.

This means power will be P = (3V)(3I) = 9 times

11. An astronaut in space find sky to be dark because there is no atmosphere in space and hence no scattering of light takes place.

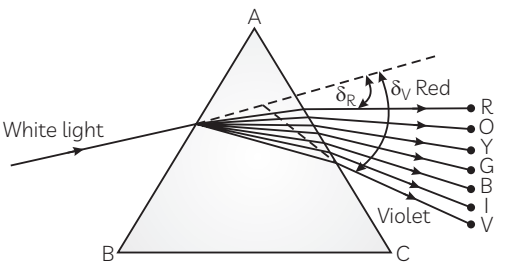
Explanation: The phenomenon of change in the direction of light on striking an obstacle like an atom, a molecule, dust particle, water droplet etc is known as scattering of light. It involves bouncing off of electromagnetic radiation by atoms/molecules of the medium through which they are travelling.

Related Theory

Very fine particles scatter mainly blue light while particles of larger size scatter light of longer wavelength. If the size of the scattering particle is large enough, then the scattered light may even appear white.

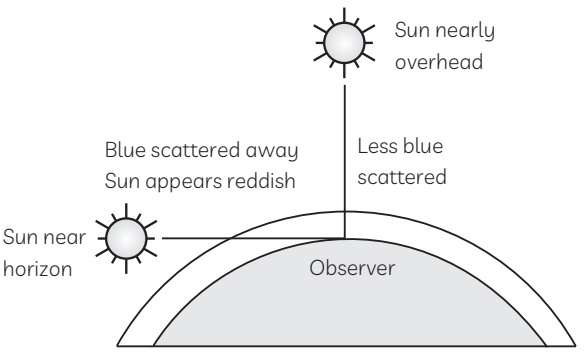
OR

Red light has the maximum wavelength and violet light has the least wavelength among the visible colours of spectrum. As the refractive index of glass is least for red and maximum for violet, red light bends the least and violet light bends the most.



Dispersion of white light by a glass prism

12. The sun appears white at noon because when the sun is nearly overhead, the sunlight has to pass through much smaller portion of earth's atmosphere due to which scattering is much less and the sun looks white.



Related Theory

Sun appears reddish at the time of sunrise and sunset as the sun is near the horizon due to which sunrays have to travel much larger part of the atmosphere. Most of the blue light is thus scattered away. The red colour having the longest wavelength is scattered the least and hence enters our eyes.

13. In this particular food chain, the plants which produce the grains are autotrophs or producers, and form the first trophic level. The rats which feed on the grains are primary consumers, (as they feed on producers) and hence form the second trophic level.

Explanation: The various steps in a food chain at which the transfer of food or energy takes place are called trophic levels. In a food chain, each step forms a trophic level.

(1) The autotrophs or the producers are at the first trophic level. They fix up the solar energy and make it available for heterotrophs or the consumers.

(2) The herbivores or the primary consumers come at the second trophic level.

(3) Small carnivores or the secondary consumers are at the third trophic level.

(4) Larger carnivores or the tertiary consumers form the fourth trophic level.

OR

An aquarium is a man made or an artificial ecosystem which is also incomplete due to the absence of decomposers. There is no recycling and self-cleaning. However, a pond or a lake is a self-sustained, natural and complete ecosystem where there is perfect recycling of nutrients due to the presence of decomposers.

Related Theory

Decomposers are the organisms which consume the dead remains of other organisms. The micro organisms comprising bacteria and fungi break down the dead remains and waste products of organisms which comprises of complex inorganic substances into simpler inorganic substances that go into the soil and are used up once more by the plants.

The decomposers help in decomposing the dead bodies of plants and animals and in this way act as cleansing agents of environment. The various nutrients which are initially taken by plants from the soil, air and water are returned to the soil, air and water (nutrient pool) after the death of plants and animals. They help in recycling the materials in the ecosystem.

14. *(a) Both (A) and (R) are true, and (R) is correct explanation of the assertion.*

Explanation: Chemical properties of the elements belonging to the same group are the same as the elements belonging to the same group possess the same number of valence electrons.

OR

(c) (A) is true, but (R) is false.

Explanation: A correct position could not be assigned to hydrogen in the Mendeleev's periodic table as Mendeléev Periodic Law states that 'the properties of elements are the periodic function of their atomic masses.' The electronic configuration of hydrogen resembles that of alkali metals. Like alkali metals, hydrogen combines with halogens, oxygen and sulphur to form compounds having similar formulae. On the other hand, just like halogens, hydrogen also exists as diatomic molecules and it combines with metals and non-metals to form covalent compounds.

15. *(b) Both (A) and (R) are true but R is not the correct explanation of the assertion.*

Explanation: Both statements are correct butthe given reason does not explain how guard cells open and close stomatal pores.When water flows into the guard cells, they swell,become curved and cause the pore to open.Similarly, when the guard cells lose water, they shrink and the stomatal pore closes.

16. *(a) Both (A) and (R) are true, and (R) is correct explanation of the assertion.*

Explanation: Ozone is formed when the high energy UV radiations act on oxygen molecules(O_2) and split it into free oxygen atoms (O)which combine with the molecular oxygen to form ozone (O_3). Ozone thus shields the earth's surface from the harmful effects of UV radiations.

$O_2 \xrightarrow{UV} O + O$

$O + O_2 \longrightarrow O_3$

(Ozone)

17. *(A) (a) Red in acidic medium, yellow in basic medium*

Explanation: Methyl orange is a synthetic indicator which is red in acidic medium and yellow in basic medium.

(B) (b) Baking soda

Explanation: An aqueous solution turns blue litmus solution red. So, the given solution is acidic in nature. In order to reverse the change, an excess solution of a base should be added which will neutralize the acid.

Out of the given substances, vinegar, lemon juice and hydrochloric acid are acidic whereas baking soda is a basic solution.

(C) (c) Both II and III

Explanation: Both phenolphthalein and methyl orange are synthetic indicators whereas litmus and vanilla essence are natural indicators.

(D) (c) Phenolphthalein

As remarked by the teacher, an indicator must change over the "vertical" section of the curve where there is a large change in pH for the addition of a very small amount of alkali. From the graph, we observe that addition of only a small amount of Phenolphthalein brings about a large change in pH of the solution. We know that Phenolphthalein is a colourless solution which turns pink in basic medium.

(E) (c) Red cabbage leaf extract

Explanation: Out of the given substances, onion extract, vanilla essence and clove oil are olfactory indicators which can be used by visually impaired persons. On the other hand, red cabbage leaf extract is red in acidic medium but changes to green in basic medium which cannot be seen by a visually impaired person.

18. *(A) (c) Same flower or different flowers of the same plant*

Explanation: Self pollination: The transfer of pollen grains from the anther of a flower to the stigma of the same flower or another flower of the same plant.

Cross pollination: The transfer of pollen grains from the anther of a flower to the stigma of another flower of a different plant of the same species.

(B) (b) The fruit setting rate depends on pollination frequency and increases with increase in pollination frequency.

Explanation: As the pollination frequency increases, the fruit setting rate also increases as it increasesthe probability of fertilization.

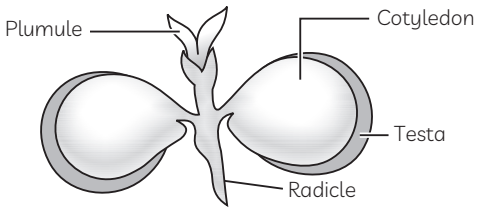
(C) (b) Ovule

Explanation: Embryo sac is the structure within a plant ovule that contains the egg cell: develops from the megaspore and contains the embryo plant and endosperm after fertilization.

(D) (d) Cotyledon—Food store; Plumule—Future shoot; Radicle—Future root

Explanation: The seed contains the future plant or embryo which develops into a seedling under appropriate conditions. This process is known as germination.

The cotyledon is the food store for the growing embryo, the plumule is the future shoot and radicle is the future root. The diagram below shows the structure of a gram seed.



(E) (c) Best growth was observed in seeds which were watered with pH 6.5.

Explanation: Seed germination is affected by the pH of the soil as seeds require an optimum pH range between 6.5 – 7.5. Too much acidic soil or too much basic soil will adversely affect seed germination.

19. *(A) (a) scattering of light*

Explanation: The Tyndall effect is scattering of light by particles in a colloid or in a very fine suspension. The fine particles present in a true solution or a colloid scatter the beam of light thereby making the path of light visible.

(B) (c) refraction of light by atmosphere

Explanation: When the star light enters the earth's atmosphere, where its refractive index is increasing gradually, the star light is bent towards the normal. Moreover, this light entering our eyes fluctuates randomly with time as the physical conditions of our atmosphere is changing continuously.

(C) (a) Blue

Explanation: The blue colour of sky is due to the scattering of light by the large number of molecules present in the earth's atmosphere. As the size of the scatterer is much smaller than the wavelength of light, light of smaller wavelength is scattered the most. If the earth had no atmosphere, the sky would appear black in the day time as no colour of sunlight would be scattered then.

(D) (c) larger wavelength

Explanation: The scattering of light and the colour of the scattered light depends upon the size of the particles. Smaller particles scatter the light of shorter wavelength, like blue and violet and larger particles scatter longer wavelength like, red and orange.

(E) (a) Both I and II

Explanation: Fine microscopic particles of sulphur start precipitating in about 2 to 3 minutes and blue light is observed from the three sides of the glass tank due to scattering of short wavelengths by minute colloidal sulphur particles. However, the colour of the transmitted light from the fourth side of the glass tank facing the circular hole is at first orange red colour which then changes to bright crimson red colour on the screen.

20. *(A) (a) Voltage is induced in secondary coil due to change of voltage in primary coil.*

Explanation: A changing voltage in the primary coil induces a voltage (and hence current) in the secondary coil according to the principal of electromagnetism. A changing magnetic field in a conductor induces a voltage in another conductor.

(B) (c) Both (ii) and (iii)

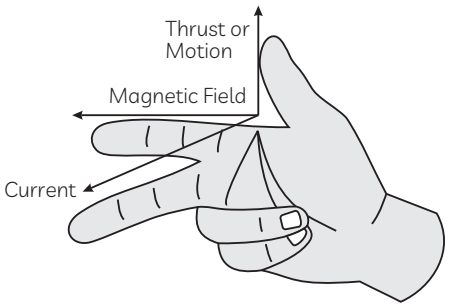
Explanation: Current can be induced in a coil due to the relative motion between the coil and a magnet. This is practically achieved either by moving a coil in a magnetic field or by changing the magnetic field around the coil.

(C) (d) Ammeter

Explanation: Ammeter is a device which is used to measure current in a circuit. Electric motor is a device which converts electrical energy to mechanical energy. Voltmeter is a device used to measure the potential difference across a circuit component. Galvanometer is a device which is used to detect the presence of current in a circuit.

(D) (c) direction of the induced current

Explanation: The direction of Induced current is given by Fleming's right hand rule. Hold the forefinger, the central finger and the thumb of the right hand perpendicular to each other so that the forefinger indicates the direction of the field, and the thumb is in the direction of motion of the conductor. Then, the central finger shows the direction of current induced in the conductor.



(E) (b) Both II and III

Explanation: The galvanometer pointer instantly deflects to one side and quickly returns to zero. The galvanometer pointer deflects to the other side when key is switched off. This happens because as soon as current in coil X reaches either a steady value or zero, the galvanometer connected to coil Y shows no deflection. A potential difference is induced in coil Y whenever current in coil X is changing.

SECTION - B

21. Recessive trait is expressed only when the recessive alleles are present in a homozygous condition, i.e the individual has both the alleles as recessive alleles.

Short plant height(t) is the recessive trait in a plant. It is expressed when the individual plant has both the alleles as 't'. The genotype of a plant with short height will be 'tt'. A recessive trait can express itself only when both the alleles carry the recessive genes. On the other hand, a plant will be tall even when it has a single 'T', which is a dominant allele.

22. The two properties of carbon that give rise to a large number of carbon compounds or organic compounds are as follows:

Catenation: Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules. This property is called catenation. These compounds may have long chains of carbon, branched chains of carbon or even carbon atoms arranged in rings.

Tetravalency: Since, carbon has a valency of four, it is capable of bonding with four other atoms of carbon or atoms of some other mono-valent element. Compounds of carbon are formed with oxygen, hydrogen, nitrogen, sulphur, chlorine and many other elements

23. (A) Elements in a group show similar properties as all elements belonging to the same group have similar electronic configuration as they have same number of valence electrons. And properties of elements depend upon the number of valence electrons.

(B) Element M is in the third group, therefore it will have a valency of 3. Formula of its chloride and oxide are MCl_3 and M_2O_3 respectively as valency of chlorine is 1 and that of oxygen is 2.

24. (A) Minimum change is seen as light moves between 1.50 and 1.52, i.e. B and C. This is because the refractive index of a medium is inversely proportional to the speed of light in that medium. As refractive index of both B and C are nearly equal, minimum change in speed of light will be seen here.

(B) Maximum change is seen when light moves between 1.33 and 2.40, i.e. A and D due to the big difference in their refractive indices.

25. The requisites of any respiratory to become highly effcient are:

(1) Large surface area which is in contact with the oxygen-rich atmosphere.

(2) The surface should be fine and delicate so that exchange of oxygen and carbon dioxide gases can take place by diffusion.

(3) It should be richly supplied with blood capillaries.

OR

The factors on which the amount of water reabsorbed depends upon:

(1) how much excess water is there in the body.

(2) how much of dissolved waste is there to be excreted.

26. When copper sulphate solution is placed in an iron pot, iron reacts with copper sulphate and forms iron sulphate and copper. The blue colour of copper sulphate solution fades to light green due to the formation of iron sulphate and holes are produced at places where iron metal has reacted.

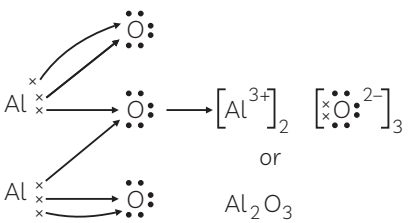
In reactivity series, iron is placed above copper. So, we can say that iron is more reactive as compared to copper and it can displace copper from its compounds.

The equation of the displacement reaction taking place is:

$$Fe + CuSO_4 \longrightarrow FeSO_4 + Cu$$

OR

The electronic configuration of oxygen is (2, 6) and that of aluminium is (2, 8, 3). Oxygen requires only 2 electrons in the valence shell to acquire the nearest noble gas (Neon) configuration and form O^{2-}. ion Al has to lose 3 electrons to attain the nearest inert gas configuration and form Al^{3+} ion. As one oxygen atom can gain only 2 electrons, therefore 2 atoms ofAl and 3 atoms of oxygen are required to form Al_2O_3 by the transfer of electrons as shown below:



SECTION - C

27. (A) When silver chloride is kept in sunlight for some time, we will observe white crystals of silver chloride turning grey in sunlight.

(B) This reaction is known as photo-decomposition reaction.

(C) Reaction taking place is:

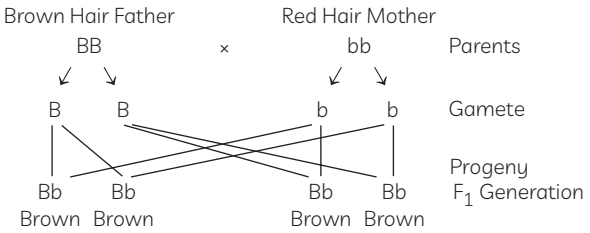
$$2AgCl(s) \xrightarrow{\text{sun light}} 2Ag(s) + Cl_2(g)$$

(D) Decomposition of silver chloride into silver and chlorine takes place due to sunlight.

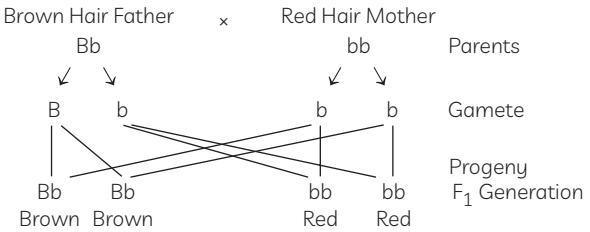
28. A red haired woman marries a brown haired man, and all the children are brown haired. The brown hair colour genes are dominant to the red hair colour genes.

A brown haired man can have BB factors or Bb as only one dominant factor expresses itself in the next generation.

Situation I:



Situation II:



(1) In situation 1 brown hair man has a pure strain i.e. BB and all the children are brown haired.

(2) In situation 2 brown hair man carries recessive red coloured hair trait gametes which fertilized and results into 50% brown and 50% red haired children. So in the given situation, brown haired man has passed the pure factors i.e., BB because all the children are brown haired.

That is why the children were having brown coloured hairs.

29. (A) Elements in decreasing order of their atomic radii:

Li	Be	B	C	N	O	F
152	111	88	77	74	66	64

(B) Atomic radius decreases from left to right in a period. This is due to increase in nuclear charge which tends to pull the electrons closer to the nucleus and hence the atomic size decreases.

(C) As elements belonging to the second period have only two occupied shells, the elements of 2nd period have L shell as their outermost shell.

Consider Li (Atomic Number = 3): Its electronic configuration is (K: 2, L: 1)

Similarly, the last element of 2nd period is Neon (Atomic Number = 10) and its electronic configuration is: (K: 2, L: 8)

30. (A) Xylem is a water-conducting tissue in plants. It transports water and minerals from the roots to the different parts of the plant. If the xylem of the plant is removed, upward movement of water will stop leading to wilting of leaves and ultimately causes the death of a plant. In the absence of water, the plant will not be able to prepare food and also perform other essential activities.

(B) A - Epidermal cell

B - Subsidiary cell

C - Guard cell

D - Stomatal aperture

31. Properties of Magnetic field lines:

(1) They emerge from the north pole of a magnet and enter at the south pole of the magnet.

(2) Inside the magnet, the direction of field lines is from south pole to its north pole. Hence, magnetic field lines are closed curves.

(3) The relative strength of the magnetic field is shown by the degree of closeness of the field lines. Crowded field lines represent the strong magnetic field.

(4) The magnetic field at any point is represented by the tangent at that point. No two field lines intersect each other. If they intersect, it would mean that at point of intersection there would be two field directions, which is not possible.

(5) They are dense close to the poles and sparse away from them. It means magnetic field is strongest around poles of the magnet.

32. Distance of object u = –20 cm.

Focal length of concave mirror f = –15 cm.

Height of object h = +6 cm.

Distance of image v = ?

Height of image h' = ?

According to mirror formula:

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

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

or $$\frac{1}{v} = \frac{1}{-15}-\frac{1}{-20} \text{ or } \frac{1}{-15}+\frac{1}{20}$$

$$= \frac{-4+3}{60} = -\frac{1}{60}$$

$$v = -60 \text{ cm.}$$

Thus, a screen placed infront of mirror at a distance of 60 cm from it.

$$\text{Magnification } m = \frac{h'}{h}=\frac{-v}{h}$$

$$\frac{h'}{+6} = -\frac{(-60)}{(-20)}$$

$$h' = -\frac{-60\times 6}{20} = 18 \text{ cm}$$

Thus, an inverted image of height 18 cm is formed.

OR

Given:

Radius of curvature, R = 2 m

Focal length, f = R/2 = 2/2 = +1 m. (A convex mirror has a virtual focus and hence focal length is +ve)

= 2/2 = 1

= +1m (convex mirror)

Object distance, u = –3.5 m

We know that

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

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

$$= \frac{1}{1}-\frac{1}{-3.5}$$

$$= 1+\frac{1}{3.5}$$

$$= \frac{4.5}{3.5}$$

$$v = \frac{3.5}{4.5} = 0.77m$$

Therefore image distance v = 0.77 m

Image will be formed at a distance of 0.77 m from the mirror.

Now, magnification (m)

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

$$= -\frac{0.77}{-3.5} = 0.22 \text{ m}$$

Thus, we see that the magnification is less than 1.

Therefore the image will be diminished, virtual and erect.

Therefore image distance v = 0.77 m

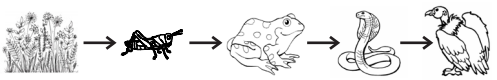
Image will be formed at a distance of 0.77 m from the mirror. Now, magnification (m)

Thus, we see that the magnification is less than 1.

Therefore the image will be diminished, virtual and erect.

33. (A) The various levels or steps in a food chain are called trophic levels. They represent the successive stages of nourishment like primary producer, primary consumer, secondary consumer, tertiary consumer etc.

(B) Below is an example of food chain:



In this example, an insect (example: grasshopper) eats plants. Insect is then eaten by the frog which is in turn eaten by the snake. The snake is then eaten by the kite.

(C) Decomposers are microorganisms which breakdown complex organic substances into simple inorganic substances and help in recycling of nutrients. They feed on the dead and decaying bodies of plants and animals. They return the nutrients back to the soil and thus help in making this ecosystem stable e.g. fungi, bacteria.

(D) Only 10% of the energy gets transferred from one trophic level to the next. So after 3 or 4 trophic levels, the energy available for passing on is too less to support another trophic level. Very little usable energy remains after 4 trophic levels. Hence the number of trophic levels in a food chain is limited.

SECTION - D

34. (A) Oxidizing agent: It is a substance which gives oxygen or gains hydrogen and in the process it itself gets reduced.

For example in the given reaction:

$$CuO + H_2 \longrightarrow Cu + H_2O$$

CuO has given oxygen atom to H_2, hence it is an oxidizing agent.

(B) (i) Hydrogen gas combines with nitrogen to form ammonia.

$$H_2 + N_2 \longrightarrow NH_3$$

Balanced: $3H_2\,(g) + N_2\,(g) \longrightarrow 2NH_3\,(g)$

(ii) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

$$H_2S + O_2 \longrightarrow H_2O + SO_2$$

Balanced: $2H_2S\,(g) + 3O_2\,(g) \longrightarrow 2H_2O\,(l) + 2SO_2\,(g)$

(iii) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

$$BaCl_2\,(aq) + Al_2\,(SO_4)_3\,(aq) \longrightarrow AlCl_3\,(aq) + BaSO_4\,(s)$$

Balanced: $3BaCl_2\,(aq) + Al_2\,(SO_4)_3\,(aq) \longrightarrow 2AlCl_3\,(aq)\downarrow + 3BaSO_4\,(s)$

(iv) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

$$K + H_2O \longrightarrow KOH + H_2$$

Balanced: $2K\,(s) + 2H_2O\,(l) \longrightarrow 2KOH\,(s) + H_2\,(g)$

OR

(A) Balanced chemical equations for the reactions taking place are:

(i) Calcium hydroxide + Carbon dioxide ⟶ Calcium carbonate + Water

$$Ca\,(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$$

(ii) Zinc + Silver nitrate ⟶ Zinc nitrate + Silver

$$Zn + 2AgNO_3 \longrightarrow Zn(NO_3)_2 + 2Ag$$

(iii) Aluminium + Copper chloride ⟶ Aluminium chloride + Copper

$$2Al + 3CuCl_2 \longrightarrow 2AlCl_3 + 3Cu$$

(B) Respiration is considered an exothermic reaction because a large amount of heat is produced in respiration by the oxidation of glucose.

The chemical equation for the process of respiration is shown below:

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy}$$

(C) Magnesium is a reactive metal. When kept exposed in air for a long time, a layer of MgO (magnesium oxide) is formed on the surface of metal. The oxide layer does not burn when flame is brought in contact with metal.

35.

	Power P	**Voltage V**	**Current I = P/V**	**Resistance R = V/I**
Heater A	100W	220V	.45 A	489 ohms
Heater B	150W	220V	.68 A	324 ohms

(A) Electric Power, $P = VI \Rightarrow I = \frac{P}{V}$

Also, according to Ohm's law, $V = IR \therefore R = \frac{V}{I}$.

Using these relations, the values of current and resistance of heaters A and B have been calculated below:

For heater-A:

I = 100/220 A = 0.45 A

R = 220/0.45 Ohm = 489 Ohm

For heater-B:

I = 150/220 A = 0.68 A

R = 220/0.68 Ohm = 324 Ohm

Resistance of heater A is 489 Ohm and that of heater B is 324 Ohms. Therefore, heater A has higher resistance

(B) Electrical Energy consumed by heater-A: E = P × t = 100 × 1 = 100 Wh = 0.1 KWh

Heater-B: E = P × t = 150 × 1 = 150 Wh = 0.15 KWh

Cost of operating heater-A for 1 hour = Rs. 5 × 0.1 = Rs 0.50

Cost of operating heater-B for 1 hour = Rs. 5 × 0.15 = Rs 0.75

So heater B will be costly as it consumes more energy.

OR

(A) Advantages of connecting electrical devices in parallel are:

(1) Different appliances need different values of current for their proper operation. Whereas, in a series circuit, the current is constant throughout the circuit.

(2) When one component fails in a series circuit, the entire circuit is broken and none of the components work. On the other hand, a parallel circuit divides the current through the electrical gadgets.

(3) There is no division of voltage among the appliances when connected in parallel. The potential difference across each appliance is equal to the supplied voltage.

(4) The total effective resistance of the circuit can be reduced by connecting electrical appliances in parallel.

(B) For parallel combination of resistors, the potential difference will be same.

Let the potential difference = V

Then the current passing through the resistance 20 ohm will be,

$$I_1 = \frac{V}{20}.$$

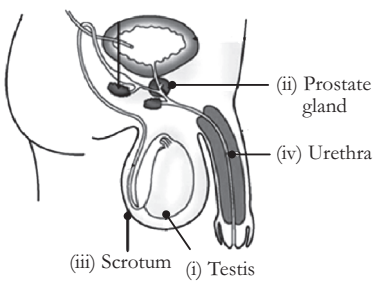
The current passing through the resistance 40 ohm will be,

$$I_2 = \frac{V}{40}$$

Clearly we see that, $I_1 = 2I_2$

Hence current in 20W is double as compared to the current in 40 W resistor.

36. (A) The parts of human male reproductive system performing the following functions:



(i) Production of sperms: Testis

(ii) Gland which provides fluid: Prostate gland

(iii) Provides low temperature for the formation of sperms: Scrotum

(iv) Common passage for sperm and urine: Urethra

(B) Testis is the human male reproductive organ that produces sperm and secretes a hormone. The name of the hormone secreted is Testosterone.

Functions of hormone:

(1) It regulates development of secondary sexual characters.

(2) It regulates the formation, development and maturation of sperm

(C) A disease which can be transmitted through sexual contact is called sexually transmitted disease or STD. This includes warts or syphilis or HIV-AIDS. They can be prevented by using condoms during sexual intercourse.