Solution

SCIENCE

Class 10 - Science

Section A

1. **(a)** Displacement reaction
   Explanation:
   Displacement reaction

2. **(b)** A and B
   Explanation:
   $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2$ (aq)
   A combination reaction is a reaction where two or more elements or compounds combine to form a single compound.
   Calcium oxide combines with water to form calcium hydroxide. Hence, it is a combination reaction.
   It is an exothermic reaction as a lot of heat liberate with hissing sound during the reaction.

3. **(c)** (ii) and (iv) only
   Explanation:
   (ii) and (iv) only

4. **(a)** 10
   Explanation:
   Total number of electrons shared are 10.

5. **(d)** Gallium
   Explanation:
   Gallium

6. **(d)** Al and Al_2O_3
   Explanation:
   Al and Al_2O_3

7. **(c)** oxidising agent
   Explanation:
   Dilute alkaline $KMnO_4$ (potassium permanganate) solution is **an oxidising agent**. It is a very useful chemical compound.

8. **(d)** Transpiration: creates a suction force which pulls water inside the plant.
   Explanation:
   The loss of water in the form of vapour from the aerial parts of the plant is known as transpiration. A process known as transpiration pull causes it to pull water from the roots to the leaves.

9. **(d)** 3 : 1
   Explanation:

All of the colours in F_1 will be Vv (violet) when VV crosses with vv. When Vv crosses with Vv, the resulting F_2 will contain VV, Vv, vV, and vV, only one of which has white flowers while the others have violet ones. Ratio is thus 3 to 1.

10.

(d) fusion of nuclei of male and female gamete

Explanation:

fusion of nuclei of male and female gamete

11.

(b) Gregor Mendel

Explanation:

Gregor Mendel is called the father of genetics because he was the first person in the world to observe the fact that characteristics were passed on from the parents to the children.

12.

(d) Valves ensure that the blood does not flow backwards.

Explanation:

i. The human circulatory system consists of many systems that are associated with each other.
ii. These systems are arteries, veins, heart, and vessels. There are further two types of vessels which are known as coronary vessel and portal vessel.
iii. The human circulatory system regulates the flow of blood in the body.
iv. Blood flows from the heart to lungs and then back to heat in a cycle.

13. **(a)** directly below the wire.

Explanation:

Line WE show a straight conductor through which current is moving from E to W. When seen from the east, the magnetic field lines appear in a clockwise direction, i.e. S to N above the wire and N to S below the wire. This is in accordance with the Right-Hand Thumb Rule.

14.

(b) two times

Explanation:

If V is constant, then H is inversely proportional to R because $H = V^2 t/R$. H will therefore double if R does.

15.

(b) Cotyledon

Explanation:

Cotyledon

16. **(a)** A and C

Explanation:

Excessive exposure of humans to UV (ultraviolet) rays results in damage to the immune system. Exposure to UV radiation is also a risk factor for most skin cancers.

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

Explanation:

Both A and R are true and R is the correct explanation of A.

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

Explanation:

Cilia have a rhythmic waving and beating motion that helps substances to travel from one place to another. Thus both assertion and reason are true and reason is the correct explanation of the assertion.

19.

(c) A is true but R is false.

Explanation:

When we use high voltages for transmission system then line losses reduces to a much extent. As high voltages are used so current will be less in those cases which in turn reduces I^2R losses occurring in the transmission lines. So, efficiency of the transmission lines increases. Thus, assertion is true but reason is false.

20.

(d) A is false but R is true.

Explanation:

The second trophic level of a food chain is occupied by herbivores that feed on plants or producers that are present in first trophic level.

Section B

21. a. (I) Methane: CH_4

(II) Propane: C_3H_8

b. Carbon compounds usually have low melting points and boiling points because they are covalent in nature.

22. The placenta is an organ that develops in the uterus during pregnancy. it is extremely essential for the development of embryo because it provides oxygen and nutrients to a growing baby. It also removes waste products from the baby's blood.

23. In lungs, balloon-like structures called alveoli are present that provide maximum surface area and the alveoli also contain extensive network of blood vessels to facilitate the exchange of gases oxygen and carbon dioxide by simple diffusion.

OR

In mammals and birds the blood goes through the heart twice during each cardiac cycle. This is known as double circulation. Deoxygenated blood which enters right auricle and then it enters the right ventricle from where it is pumped to lungs for oxygenation. From lungs after oxygenation it comes to left auricle and then enters left ventricle from where it is pumped to various parts of body.

Such system of circulation does not allow mixing of oxygenated and deoxygenated blood which allows efficient supply of oxygen to the body.

24. a. Medium P is optically denser than Q because in it the ray is bending more towards the normal as $\angle r_P < \angle r_Q$

b. One dioptre power of a lens indicates its ability to converge or diverge light by one meter or 1 dioptre is the power of a lens whose focal length is 1 metre.

c. f(m) = $\frac{1}{\text{P(D)}}$

$= \frac{1}{+0.5\text{D}}$

= + 2m

25. i. Harmful effects of plastic bags:

a. Plastics do not undergo degradation, thus stay in soil for many years. This may affect the soil fertility and degrades the soil quality.

b. When plastic artifacts enter the drainage and sewerage system, they block the pipes and drains causing water logging.

c. Littering of plastics in open spaces creates unhygienic conditions, as it acts as breeding ground for insects and mosquitoes.

We can reduce the use of plastic bags and carry jute bags and paper bags to carry items from the market.

ii. Measures taken for proper disposal of waste produced at our homes are:-

a. Prepare a compost pit for kitchen wastes.

b. Safe disposal of plastic bags.

c. Segregation of biodegradable and non-biodegradable wastes.

d. Fruit peels can be placed near trees or plants, which on decomposition will enrich the soil with nutrients.

e. Recycling of paper wastes.

OR

Biomass: The waste materials produced by plants and animals from which energy can be obtained on a renewal basis.

Principle: Anaerobic decomposition of biomass.

Main combustible substance: Methane / CH_4

Percentage: 75%

26. The minimum distance, at which objects can be seen most distinctly without strain, is called the least distance of distinct vision. It is also called the near point of the eye. For a young adult with normal vision, the near point is about 25 cm.
The farthest point up to which the eye can see objects clearly is called the far point of the eye. It is infinity for a normal eye. A normal eye can see objects clearly that are between 25 cm and infinity.

Section C

27. The element with an atomic number of 20 is calcium (Ca).
The electronic configuration of calcium is: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$.
Calcium is a metal because it is located in Group 2 (or Group IIA) of the periodic table, which consists of metals known as alkaline earth metals.
The valency of calcium is +2.
The compound that calcium forms with chlorine is calcium chloride. The chemical formula for calcium chloride is $CaCl_2$.

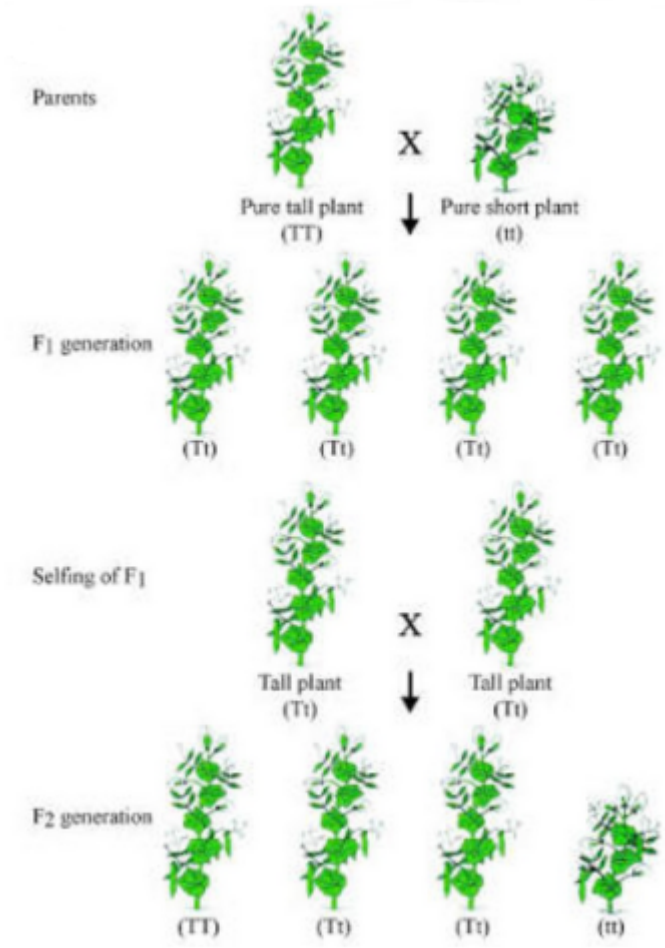
28. Hydrogen has a tendency to lose an electron and forms a positive ion H^+ like metals although hydrogen is not a metal yet it has been assigned a place in the reactivity series of metals. The metals which lose electrons less readily than hydrogen are placed below it and the metals which lose electrons more readily than hydrogen are placed above it in the reactivity series of metals.

OR

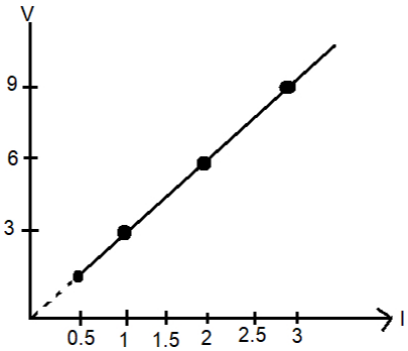
(i) Most reactive element is B as it has replaced both A and C from their compounds.
(ii) Element C is least reactive as it has been replaced both by A and B.

29. If leaves of a healthy potted plant are coated with vaseline, it will clog the stomatal pores on leaves. Blockage of stomatal will stop transpiration and exchange of gases from leaves. Transpiration plays an important role in ascent of sap in plants. Hence, lack of transpiration will stop ascent of sap. Moreover, stoppage of exchange of gases would also stop respiration and photosynthesis in leaves. This will result in death of leaves and finally the plant would die due to lack of food.

30. i. Plant used by Mendal is Garden Pea Plant (Pisum sativum).
ii. F_1 - All tall; F_2 - Tall and short
iii. The ratio in F_2 progeny is 3:1.



31. 1. If image is of same size, laterally inverted and erect, it is plane mirror.
2. If image is bigger or smaller in size and inverted or erect, it is concave mirror.
3. If image is smaller in size and erect as in rear view mirror , it is convex mirror.

32. a. 

b. According to ohm's law (V = IR). As Current (I) directly, proportional to the voltage. So, As voltage reaches to zero value current in the circuit also become zero or if we extend the line joining coordinates of voltage and current. It will pass through origin.

c. Ohm's law, It states that at constant temperature current through a conductor between two points is directly proportional to the voltage across the two points.

33. a. (i) Length of the conductor (l)
(ii) Area of cross-section of the conductor (A)

b. Radius of wire, r = 0.01 cm = 0.01×10^{-2} m
Resistance, R = 10 Ω
Resistivity, $\rho = 50 \times 10^{-8}$ Ωm

$R = \rho\frac{l}{A} = \rho\frac{l}{\pi r^2} \Rightarrow l = \frac{R\pi r^2}{\rho}$

$l = \frac{10\Omega \times 22 \times (0{\cdot}01 \times 10^{-2})^2 \text{ m}}{7 \times 50 \times 10^{-8}\Omega\text{m}}$

$= \frac{22}{35}$ m = 0.629 m = 0.628 m = 0.62 m

Section D

34. The chemical formula is C_2H_5OH.

The name of the compound which is the active ingredient of all alcoholic drinks is Ethanol or Ethyl alcohol.
Its two uses are:
(i) It is a good solvent
(ii) It is used in medicines.

a. When ethanol reacts with sodium metal, sodium ethoxide is formed. The reaction is:
$2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONa + H_2$

b. When ethanol reacts with hot conc. H_2SO_4, ethene is formed. The reaction is:

$C_2H_5OH \xrightarrow[443K]{\text{Hot Conc.}H_2SO_4} CH_2{=}CH_2 + H_2O$

OR

i. Functional Group: A hetero atom or group of atoms attached to the carbon chain, which gives specific properties to the carbon compounds. (I) Ketone (II) Carboxylic acid

ii. Ethanoic acid is formed

$C_2H_5OH \xrightarrow[\text{Acidified } K_2Cr_2O_7 + \text{ Heat}]{} CH_3COOH$

oxygen is added to ethanol and converts /oxidises ethanol to ethanoic acid.

iii. $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$

35. i.
- A - Male Germ Cell/Male Gamete; B − Pollen tube; C − Female Germ Cell/Female Gamete.
- B carries A (male germ cell) and this germ cell fuses with C (female germ cell) to form a zygote.
- Significance: Zygote is capable of growing into a new plant.

ii. Post fertilisation changes: -
- Zygote divides many times to form an embryo within ovule.
- Ovule is converted into seed
- Ovary ripens into fruit.
- Petals, Sepals, Stamens, Style and Stigma may shrivel/dry and may fall off.

OR

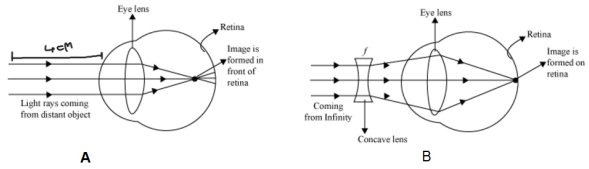
i. Plant growth movements in response to stimuli in a particular direction/directional movements due to light, gravity etc. Is known as tropic movement.

- Plant growth inhibitor: Abscisic Acid
- Promotes cell division - Cytokinins

ii. When the tendrils come in contact with any support, auxins move away from the point of contact of the support. More growth occurs on the side away from the support. As a result, unequal growth occurs on its two sides and thus tendrils coil/ circle around the support.
Hormone - Auxins

36. i. Given:
distance of image from the lens, i = 10 cm
power of the lens, P = -25 D
<u>Now the focus of the lens:</u>
$P = \frac{1}{f}$
where:
f = focal length
$-25 = \frac{1}{f}$
f = -0.04 m = -4 cm
From the equation of lens:
$\frac{1}{f} = \frac{1}{i} + \frac{1}{o}$
where:
o = distance of the object
$-\frac{1}{4} = \frac{1}{10} + \frac{1}{o}$
$\rho = -\frac{20}{7}$ cm i.e. negative sign means that the image formed is on the same side as that of the object.

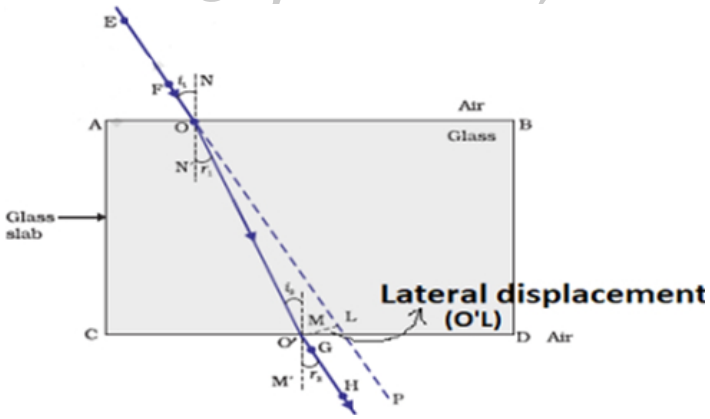
ii.



OR

i. The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.
The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media.
$\frac{\sin i}{\sin r}$ = constant

ii.



The emergent ray is parallel to the incident ray.
Labelling of lateral displacement.

Section E

37. a. Acid - HCl, Base - NaOH

b. Cation Ca^{2+} Anion SO_4^{2-},

c. Salts having same cations but different anions belong to the same family of salts. e.g. sodium chloride (NaCl) and Washing Soda/sodium carbonate (Na_2CO_3) both have Na+ as cation.

OR

A scale for measuring hydrogen ion (H^+) concentration in a solution is called pH scale.
Potassium Sulphate/K_2SO_4

pH = 7

38. i. Nerve cell is the largest cell present in the body.

ii. Axon is a large, single, unbranched nerve fibre arising from the cyton. It carries impulses from cyton located in CNS to the effectors.

iii. **Gustatory receptor:** Taste buds on the tongue. The receptors for gustation are located in the oral cavity, which brings food and fluids from outside the body into the gastrointestinal tract.

Olfactory receptor: Receptor in the nose. These receptors are common to arthropods, terrestrial vertebrates, fish, and other animals.

OR

a. Dendrites

b. Axon.

39. i. i. If the polarity of the magnet and the direction of current both are reversed,using Fleming's left hand rule it gets displaced towards the left.

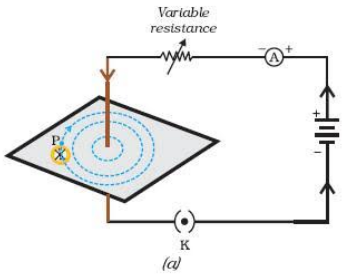
ii. Devices that use current-carrying conductors and magnetic fields are electric motor, electric generator etc.

ii. When a current-carrying conductor is placed in a magnetic field, it experiences a force, due to which the rod gets displaced.

iii. The rule that determines the direction of the force on the conductor AB is Fleming's left-hand rule.
According to Fleming's left-hand rule, stretch the thumb, forefinger and middle finger of your left hand such that they are mutually perpendicular.
If the first finger points in the direction of the magnetic field and the second finger in the direction of current, then the thumb will point in the direction of motion or force.

OR

The magnetic field lines around a current carrying conductor can be represented by concentric circles which can be determined by right hand thumb rule.



(a)


(b)