

Answers to RSPL/1 (DS1)

- Using Fleming's Left-Hand Rule, electron beam will be deflected towards the west.
- Silicon. No, they are very reactive.
- We need to think before we take printouts unnecessarily because to make paper we are cutting trees and for more paper we cut more trees, thereby causing harm to the surroundings.
 - Schools can create awareness about how to save the environment and also train students to make paper products like folders, penholders, material for the display board, lampshades, teaching/learning aids and certificates for the school. Parents can make their children understand the importance of natural resources and also by bringing changes in their day to day life style.
 - Cutting of trees affect the food chain in an ecosystem by reducing the prey and predator balance.
 - Use of chemicals improves the production of crops but the scientists are discouraging the use of chemicals as these are getting accumulated in water bodies, in air and also inside the bodies of the consumers, which is the cause of many diseases and extinction of many plants and animals.
- Element E
 - | | | |
|---|---|---|
| K | L | M |
| 2 | 8 | 6 |
 - 'X' and 'Z'
 - 'X' and 'Z'
- Renewable and Non-renewable:**
Whether the energy source is available continuously or not.
 - Exhaustible and Inexhaustible:**
If the form of energy is formed as a result of large time taking processes, then it will be exhaustible, e.g. coal, petroleum. If it is formed in short time by a continuous process, it will be inexhaustible.
- Geothermal, solar, biomass, water, wind are the non-convention source of energy. (*any two*)
- 4 and 2 because value of x and y as 4 and 2 satisfies the equation for balancing

OR

- $\text{Zn} + 2\text{AgNO}_3 \longrightarrow \text{Zn}(\text{NO}_3)_2 + 2\text{Ag}$
- "The photochemical reaction is none other than a chemical reaction that starts with light being absorbed as a form of energy".
- This group is generally called as the saprophytes.
- Adrenaline

11. (c) Iris control the size of pupil.

OR

(d) Objects are not visible through the fog because droplets scatter the light rays.

12. (d) Natural selection can alter frequency of an inherited trait.

OR

(d) 4 tall plants and 1 medium height plant.

13. (a) Both the Assertion and the Reason are correct and Reason is the correct explanation of the Assertion. A moving charge experiences a force in magnetic field.

14. (c) Assertion is true but the Reason is false. Diffusion is a slow process and cannot meet the energy requirements of the multicellular organisms.

15. (a) The reaction in which oxygen is either gained or hydrogen is lost by a substance is called oxidation reaction. The reaction in which hydrogen is gained or oxygen is lost by a substance is called reduction reaction.

(b) Here HCl is oxidised to Cl_2 and MnO_2 is reduced to MnCl_2 .

OR

Combination reaction	Decomposition reaction
(i) It is a chemical reaction in which two or more reactants combine with each other to form a new single product.	(i) It is a chemical reaction in which one reactant breaks down into simpler compounds.
(ii) It releases heat during the chemical reaction. This means that it is exothermic reaction.	(ii) It absorbs heat from the surroundings during the chemical reaction. This means that it is endothermic reaction.
Examples: $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O} + \text{Heat}$ $2\text{Mg} + \text{O}_2 \longrightarrow 2\text{MgO} + \text{Heat}$	Examples: $\text{CaCO}_3 \xrightarrow{\text{Heat}} \text{CaO} + \text{CO}_2$ $2\text{H}_2\text{O} \xrightarrow{\text{Heat}} 2\text{H}_2 + \text{O}_2$

16. **Hydrogenation:** The process in which unsaturated compounds reacts with hydrogen in the presence of nickel (as a catalyst) to form saturated compounds are called hydrogenation. This reaction is commonly used in the hydrogenation of vegetable oils. Vegetable oils have long unsaturated carbon chains, which are converted into vegetable ghee, i.e., saturated fatty acids.



17. Electronic configuration of

X \longrightarrow 2, 5

Y \longrightarrow 2, 8

Z \longrightarrow 2, 8, 4

- (i) Group number of X is 15
Group number of Y is 18
Group number of Z is 14
- (ii) Y is a noble gas whereas, Z is a non-metal.
- (iii) X and Y belong to the same period as number of shells are equal of X and Y.

18. Steps to take to conserve forests:

- (i) Reforestation and afforestation.
- (ii) Government planning out programmes like Van Mahotsav.
- (iii) Controlling forest fire.
- (iv) Proper utilisation of forest and forest products.
- (v) Grasslands should be generated.
- (vi) Planning out programmes like Chipko Movement.

19. (a) Brain is located in a bony box called skull. There are three membranes surrounding the brain called meninges. Between these 3 membranes there is a fluid called cerebrospinal fluid which protects the brain from mechanical shocks.

(b) **Parts of Hindbrain:**

- (i) **Cerebellum:** It lies at the roof of the hindbrain. This region controls the coordination of body movements and posture.
- (ii) **Pons:** It lies above the medulla and takes part in regulating respiration .

20. **Homologous organs:** The homologous organs are similar in form (or are embryologically same), but perform different functions in different organisms. These provide strong evidence in favour of evolution.

For example: The bone structure observed in wings of birds, wings of bats, flippers of dolphins, and arms of human beings resemble with each other, though they look strikingly different on the outside and though they vary in function but they are very similar in skeletal structure. Thus in these animals, the same structure developed along different directions due to adaptations to different needs. This represents a case of divergent evolution.

OR

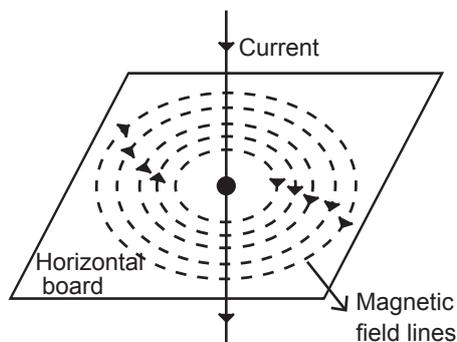
(a) Mendel's experiments

- When a cross is made between a tall pea plant with round seeds and a short plant with wrinkled seeds, the F_1 progeny plants are all tall with round seeds, indicating that tallness and round seeds are the dominant traits.
- When the F_1 plants are self pollinated, the F_2 progeny consists of some tall plants with round seeds and some short plants with wrinkled seeds.
- There are also some new combinations of traits, such as tall plants with wrinkled seeds and short plants with round seeds.
- Thus, it is clear that tall and short traits and round and wrinkled seed traits have been inherited independently of the other pair of contrasting traits.

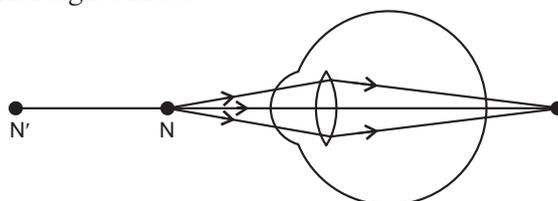
(b) Gene flow refers to the exchange of genes between the inbreeding populations of a species, resulting in increased variations.

21. The pattern of magnetic field lines on the card around the current carrying conductor for the downward direction of current is shown. They are concentric in circle with their centre lies on the axis of wire.

Direction of magnetic field lines can be checked experimentally by placing a magnetic compass needle anywhere on the card board. Direction of its North pole indicating the direction of magnetic field.



22. (a) Hypermetropia/far sightedness



Hypermetropic eye

- (b) Convex lens

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

$$= \frac{1}{(-50 \text{ cm})} - \frac{1}{(-25 \text{ cm})} = \frac{1}{50 \text{ cm}}$$

Hence, $f = 50 \text{ cm} = 0.5 \text{ m}$

Therefore, power, $P = \frac{1}{f(m)} = \left(\frac{1}{0.5}\right) \text{ D} = 2 \text{ D}$

OR

- (a) (i) The emergent beam, refracted through a rectangular glass slab, emerges parallel to the incident ray and is shifted sideward slightly. Therefore, no dispersion occurs.
- (ii) A prism splits the incident thin narrow beam of white light into a band of seven colours which are violet, indigo, blue, green, yellow, orange and red. These coloured rays emerge out through the prism along different direction and become distinct, hence the incident white light beam gets dispersed.
- (iii) The emergent beam from the second identical inverted prism is again a beam of white light and emerges parallel to the incident beam and shifted sideward slightly.
- (b) The similarity between the emergent beam in cases (i) and (iii) is the same as in both the cases, the emergent beam emerges from the opposite parallel faces and parallel to the incident ray.

23. (a) Potential difference across $6\ \Omega = 12\ \text{V}$

$$\therefore \text{Current through } 6\ \Omega, \quad I = \frac{V}{R} = \frac{12}{6} = 2\ \text{A}$$

As R and $6\ \Omega$ are connected in series. So, the current through R is $2\ \text{A}$.

$$\text{Using Ohm's law,} \quad R = \frac{V}{I} = \frac{6}{2} = 3\ \Omega$$

(b) Reading of ammeter = $2\ \text{A}$

(c) Potential difference across the terminals of the battery

$$V = V_1 + V_2 = 6 + 12 = 18\ \text{V}$$

As R and $6\ \Omega$ are connected in series. So, the current through R is $2\ \text{A}$.

24. (a) Refractive index of a transparent medium with respect to vacuum or air is called absolute refractive index.

Mathematically:

$$\text{Absolute refractive index of a medium} = \frac{\text{Speed of light in vacuum or air}}{\text{Speed of light in the medium}}$$

$$\text{or} \quad n = \frac{c}{v}$$

(b) **Mistakes:**

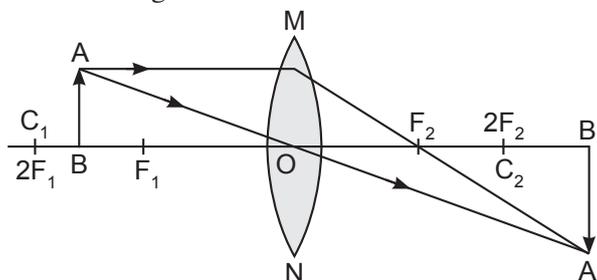
(i) F_1 and F_2 are not equidistant from the optical centre of the lens, i.e. $OF_1 \neq OF_2$;

(ii) $2OF_1 \neq 2OF_2$

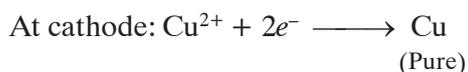
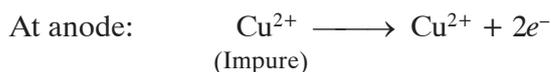
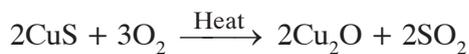
(iii) Image should form beyond $2F_2$.

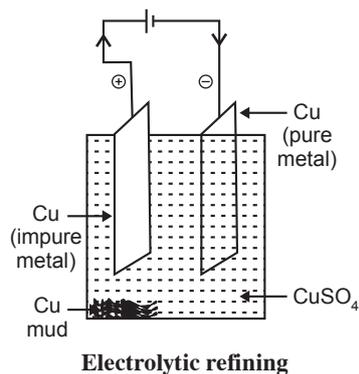
(iv) Image should be magnified.

(any two)



25. When sulphide ore is heated in the presence of air, it converts sulphide ore into copper oxide, and it leaves SO_2 . Again when the copper oxide is heated, it gets reduced to copper. Finally, pure copper will be obtained by the electrolysis process.





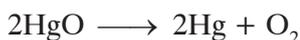
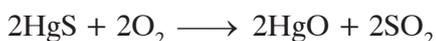
OR

(a) Electrolytic reduction.

(b) Cinnabar (HgS)

By roasting and then self reduction, mercury is obtained from its ore.

Chemical equations involved:



(c) Reaction of Fe_2O_3 with Al is used to join railway tracks and machine parts as it is exothermic reaction (energy is released). This reaction is known as thermite reaction.



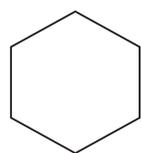
The amount of heat evolved is so large that the metal (Fe) is produced in the molten state.

26. (i) Saturated hydrocarbons contain only single covalent bond whereas, unsaturated hydrocarbons contain at least one or more double or triple carbon-carbon bond. Hence, unsaturated hydrocarbons are more reactive than saturated hydrocarbons.

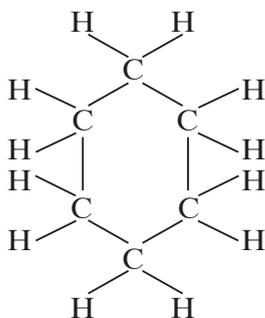
(ii) (a) We get a yellow sooty flame if some of the holes in the bottom of burner are blocked and the burning does not get sufficient oxygen.

(b) We get a blue flame if all the holes are open and sufficiently oxygen rich air is available.

(iii) (a) Cyclohexane (C_6H_{12})

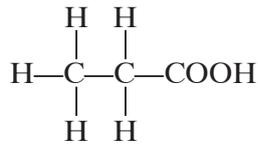


Cyclohexane

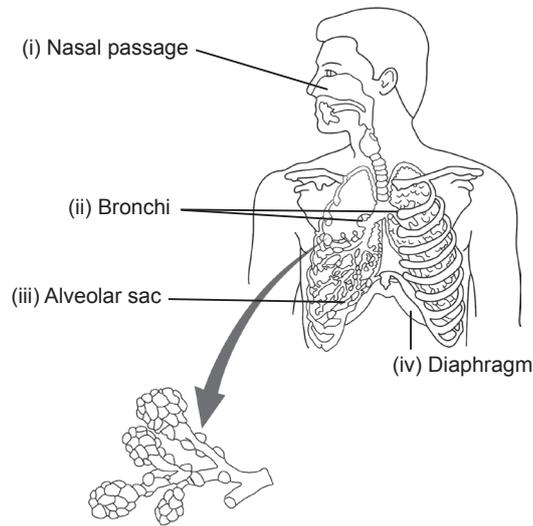


Structural formula

(b) Propanoic acid (C_2H_5COOH)



27. (a)



Human Respiratory System

- (i) Nasal passage
- (ii) Bronchioles
- (iii) Alveolar sac
- (iv) Diaphragm

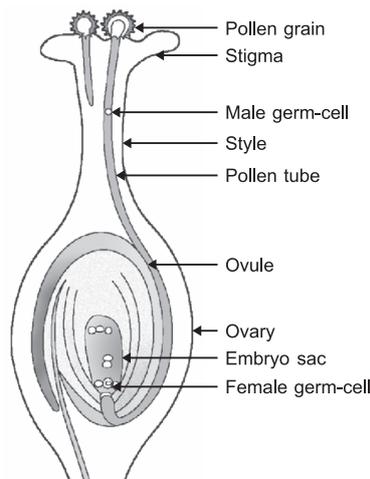
(b) Since the amount of dissolved oxygen in water is fairly low as compared to the amount of oxygen in the air, the rate of breathing in aquatic organisms is much faster than that in terrestrial organisms.

28. • **Pollination:** It is a type of asexual reproduction in which the pollen grains are transferred from the anther of a stamen to stigma of a carpel. Pollination is of two types:

- (a) self-pollination
- (b) cross pollination

• **Fertilisation** is a mode of sexual reproduction in which the male gamete is fused with the female gamete to form zygote. This process occurs in both plants and animals. There are two types of fertilization which are as follows:

- (a) External fertilization
- (b) Internal fertilisation.



Fertilization in a flowering plant

OR

- (a) Testes produce sperms and testosterone which regulates the formation of semen and for the development of male characteristics.
- (b) Seminal vesicles secrete fluids onto the sperms for ease of transport and nutrition.
- (c) Vas deferens transports the sperms from testicles to the urethra for ejaculation.
- (d) Ureter brings the urine from the kidneys to the urinary bladder.
- (e) Prostate gland's function is similar to that of the seminal vesicle.

29. New Cartesian sign convention for reflection of light by spherical mirrors:

- (i) The object is always placed to the left of the mirror.
- (ii) All the distances parallel to the principal axis are always measured from the pole of the spherical mirror.
- (iii) All the distances measured along the direction of incident light, i.e. along +ve x -axis, the corresponding quantities are considered to be positive.
- (iv) All the distances measured opposite to the direction of incident light, i.e. along $-ve$ x -axis, the corresponding quantities are taken as negative.
- (v) The distances measured in upward direction, i.e. perpendicular to and above the principal axis along +ve y -axis, are taken as positive.
- (vi) The distances measured in the downward direction, along $-ve$ y -axis, i.e. perpendicular to and below the principal axis, are taken as negative.

According to question, for a virtual image

$$m = +\frac{1}{3}, u = -18 \text{ cm}$$

But,
$$m = -\frac{v}{u} = +\frac{1}{3}$$

$$\Rightarrow v = -\frac{u}{3} = -\frac{-18}{3} = +6 \text{ cm}$$

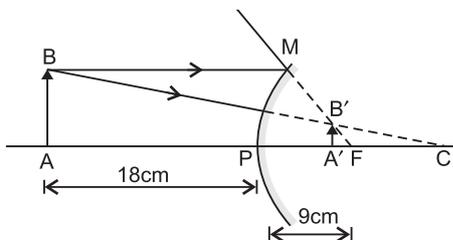
Using mirror formula,

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u} = \frac{1}{6} + \frac{1}{-18}$$

$$= \frac{1}{6} - \frac{1}{18} = \frac{3-1}{18} = \frac{2}{18} = \frac{1}{9}$$

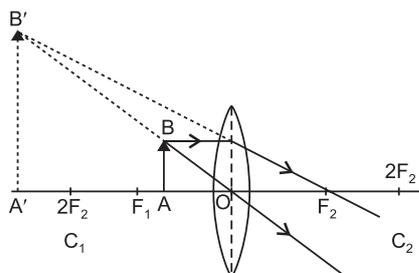
$\therefore f = +9 \text{ cm}$

So, the focal length of the given spherical mirror is 9 cm. The positive sign shows the given mirror is convex in nature.

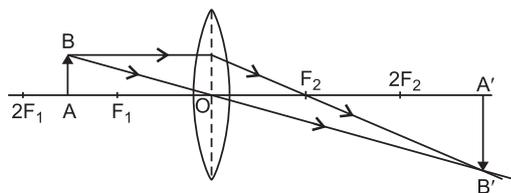


OR

- (a) When the child holds the book between the optical centre O and F_1 , an enlarged, virtual and erect image is formed as shown below.



Again when the child holds the book between F_1 and $2F_1$, words again become distinctly visible as the image is formed beyond $2F_2$, and is real, inverted and enlarged as shown below.



- (b) Linear magnification is the ratio of the height of the image to the height of the object. It is represented by the letter 'm'.

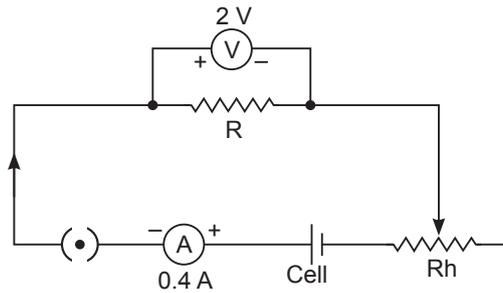
$$m = \frac{\text{Height of image } (h_i)}{\text{Height of object } (h_o)} = \frac{h_i}{h_o}$$

where h_i is the height of the image and h_o is the height of the object.

If the image formed is virtual and erect, then the magnification is positive and if the image formed is real and inverted, then the magnification is negative.

- (c) Between the optical centre (O) and its focus (F).

30. (a)



(b) Resistance of resistor is

$$R = \frac{V}{I} = \frac{2}{0.4} = \frac{20}{4} = 5 \Omega$$

(c) **Ohm's law:** When the physical conditions such as temperature etc. remain same, the current flowing through the conductor is directly proportional to the potential difference applied across the ends of the conductor, i.e.

$$I \propto V \quad \text{or} \quad V \propto I$$

$$\Rightarrow \frac{V}{I} = \text{constant}$$

$$\Rightarrow V = IR$$

where R is constant of proportionality and is called resistance of the wire.

Since current varies linearly with potential difference, the graph between V and I will be a linear in nature as shown

