

SECTION-A

1. Seven
2. Reproduction
3. 1000 J
4. (i) $n_g = \frac{4}{3}$; $n_w = \frac{3}{2}$; $v_g = 2 \times 10^8$ m/s

$$n_g = \frac{c}{v_g}$$

$$\therefore c = n_g v_g = \frac{4}{3} \times 2 \times 10^8 \text{ m/s} = 2.67 \times 10^8 \text{ m/s}$$

$$(ii) n_w = \frac{c}{v_w}$$

$$\therefore v_w = \frac{c}{n_w} = \frac{2.67 \times 2 \times 10^8}{3} = 1.78 \times 10^8 \text{ m/s}$$

5. Causes: Disposal of industrial effluents

Human activities like bathing, washing, immersion of ashes, etc.

Disposal of untreated sewage (any two)

Harmful effects on health - Spreads water borne diseases,

- Consumptions of contaminated fishes (or any other relevant affect)

6. Biodiversity - number and range of variety of species of life forms in an area

Effect - loss of diversity may lead to a loss of ecological stability

7. • Test 1 (Litmus Test)

Take two strips of blue litmus paper. Place a drop each of the alcohol and carboxylic acid on these strips separately. The blue litmus paper turns red in the case of carboxylic acid and remains unaffected in the case of alcohol.

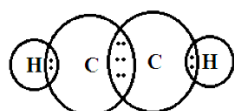
• Test 2 (Sodium hydrogen carbonate test / sodium carbonate test)

A pinch of sodium hydrogen carbonate or sodium carbonate is added, to both separately. If brisk effervescence with the evolution of a colorless gas is observed, it indicates the presence of carboxylic acid.

If no change is observed then it confirms the presence of the alcohol.

• Test 3 - Ester test or any other suitable test (any two)

8.



In pure oxygen, ethyne undergoes complete combustion and high temperature suitable for welding is attained. Whereas air contains less percentage /amount of oxygen which results in incomplete combustion of ethyne and the temperature required for welding is not attained.

9.

	Property	P	Q
(a)	No. of electrons in the atom	3 11 19	4 12 20 (any one pair)
(b)	Size of the atom	Bigger	Smaller
(c)	Metallic character	More metallic	Less metallic
(d)	Tendency to lose electrons	More	Less

(e)	Formula of oxides	P ₂ O	QO
(f)	Formula of chlorides	PCl	QCl ₂

10. Electronic configuration of element with atomic no. 16 is 2,8,6.

Since it has 3 shells, the period no. will be 3.

Since the no. of valence electrons is 6, the group no. will be $10 + 6 = 16$.

Valency of the element will be $8 - \text{valence electrons}$ ie $8 - 6 = 2$.

11. Characteristics:

Two parents are involved,

Two dissimilar gametes are formed, gamete formation involves meiosis,

Variations are produced,

Occurs in all the higher and some of the lower organisms,

Fertilization / fusion of gametes leading to zygote formation Slow.

12. Chromosomes - thread like structures made up of DNA found in the nucleus.

The original number of chromosomes becomes half during gamete formation.

Hence, when the gametes combine, the original number of chromosomes gets restored in the progeny. (or same thing explained in the form of a flow chart).

13. Significance - prevent STDs,

Advantage of small family,

Less mortality among new borns,

Reduces the cases of maternal mortality.

Areas which have improved - Family Planning,

- Decrease in STD cases (any other)

14. Homologous organs - study of homologous organs suggests that the organs having same structure but performing different functions have evolved from a common ancestor.

Ex. - forelimbs of a frog, lizard, bird and man.

Analogous organs - show adoption of organs for common use.

Ex. - wings of butterfly and wings of bat.

Fossils - provide the missing links between two species.

Ex. - Archeopteryx / fossils of some dinosaurs with feathers.

15. • Speciation - evolution of a new species from pre-existing species

• Occurring due to accumulation of variations

• By processes like genetic drift / geographical barriers like mountains, rivers etc., leading to incapability to reproduce amongst themselves in the population.

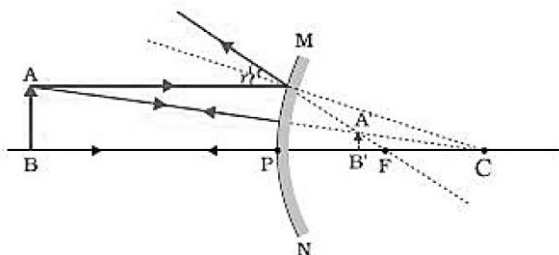
Natural selection -

• Change in frequency of some genes in a population

• Which give survival advantage to a species from elimination.

• Ex. - in a population of beetles, a new variation (green colour) get survival benefit / advantage to green beetles whereas other (red) perishes.

16. Convex mirror



Use: As rear view mirror in vehicles/ Also in Malls, Hotels, Airports for security reasons.

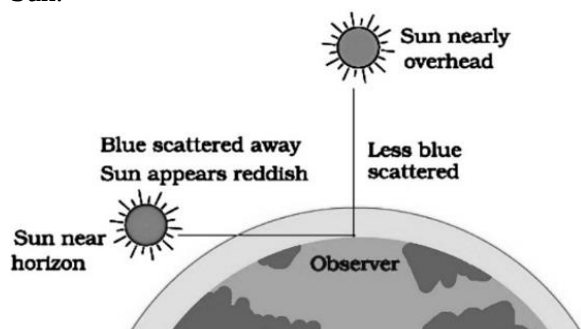
Why: • Forms erect image,

• Wider field of view.

17. (i) Scattering - Phenomenon of spreading of light (diffused reflected light) caused by minute particles (dust, smoke etc.) in the atmosphere.
(ii) Sky appears blue because blue color of sunlight scatters more strongly (due to shorter wavelength) than the red color by the fine particles in the air.

OR

At sunrise the blue color of sunlight get scattered due to smaller wave length while passing through the thicker layers of the atmosphere. The red component (due to longer wavelength) reaches us, giving red appearance, of the Sun.



18. Biodegradable substances - can be broken down into simpler substances by nature / decomposers/ bacteria/ saprophytes/ saprobionts.
Ex. - Human Excreta/ Vegetable peels, etc. (any one)
Non-biodegradable substances - can't be broken down into simpler substances by nature / decomposers.
Ex. - Plastic/ glass (or any other) (any one)
Habits:
-Use of separate dustbins for biodegradable and non biodegradable waste,
-Reuse of things such as poly-bags, etc.,
-Recycle of waste
-Use of cotton/jute bags for carrying vegetables etc.
19. • Soaps are sodium or potassium salts of long chain carboxylic acids.
• Detergents are ammonium or sulphonate salts.
• Cleansing action of soap - One part of soap molecule is ionic / hydrophilic and dissolves in water. The other part is non-ionic / carbon chain / hydrophobic part which dissolves in oil.
• Thus soap molecules arrange themselves in the form of a micelle / diagram of a micelle.
On rinsing with water, soap is washed off, lifting the oily dirt particles with it. Soap does not form lather in hard water because of the reaction of soap with Ca and Mg ions present in hard water which forms insoluble ppt. / scum.
Problems due to the use of detergents are:
• Detergents are non-biodegradable.
• It leads to water or soil pollution.
• It can also cause skin problems.(any two)
20. (a) Testis - secrete male hormone - testosterone
Functions – (i) formation of sperms,
ii) development of secondary sexual characters.
(b) (i) fallopian tube / oviduct.
(ii) uterus.
• Placenta is a special disc like tissue embedded in the mother's uterine wall and connected to the foetus/embryo.
• Placenta provides a large surface area for glucose and oxygen/ nutrients to pass from the mother's blood to the embryo/ foetus.
21. (a) When Mendel cross pollinated pure tall pea plants with pure dwarf pea plants, only tall plants were obtained in F1 generation. On self pollinating the F1 progeny, both tall and dwarf plants appeared in F2 generation in the ratio 3:1

Appearance of tall character in both the F₁ and F₂ shows that it is a dominant character. The absence of dwarf character in F₁ generation and its reappearance in F₂ shows dwarfness is the recessive character.

(b) When Mendel conducted a dihybrid cross having two sets of characters, he obtained only one set of parental characters in F₁ generation whereas in F₂ generation he obtained both the set of parental characters now recombined in the ratio of 9: 3: 3: 1.

The appearance of new recombinants in the F₂ generation along with parental type shows that traits are inherited independently.

Or

Flow chart with explanation.

22. • Power of lens:- Ability of a lens to converge or diverge the light rays falling on it/ The degree of convergence or divergence of light rays achieved by a lens/ Reciprocal of focal length of the lens.

• 1 dioptre - It is the power of a lens whose focal length is 1 metre.

• $f_A = +10 \text{ cm} = 0.1\text{m}$

Converging/ Convex lens

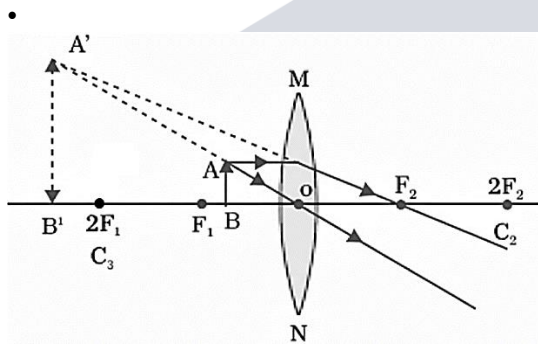
$$P_A = \frac{1}{f_A} = \frac{1}{+0.1\text{m}} = +10\text{D}$$

$f_B = -10 \text{ cm} = -0.1 \text{ m}$

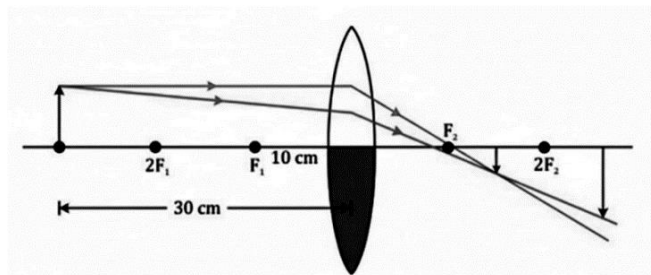
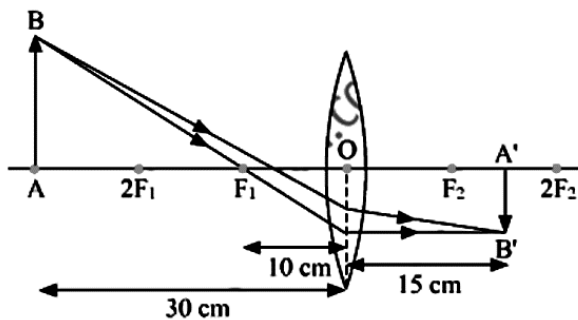
Diverging/ Concave lens

$$P_B = \frac{1}{f_B} = \frac{1}{-0.1\text{m}} = -10\text{D}$$

• In this case the object will be between the optical center and principal focus of the lens. Hence the convex lens, i.e., lens A will form virtual and magnified image of the object.\



23. • yes



$$h = 4 \text{ cm } f = +20 \text{ cm } u = -15 \text{ cm } v = ? \quad h' = ?$$

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

$$\therefore \frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{(+20)} + \frac{1}{(-15)} = \frac{3-4}{60} = \frac{-1}{60}$$

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

Nature - Virtual, erect

$$h' = \frac{v}{u} \times h = \frac{-60 \text{ cm}}{-15 \text{ cm}} \times (+4 \text{ cm}) = +16 \text{ cm}$$

24. • Ciliary muscles modify the curvature of the eye lens to enable the eye to focus objects at varying distances/ help in adjusting the focal length of the eye lens

- Presbyopia
- Bifocal lens

(a) Defect-Myopia/ Nearsightedness

Corrective lens - Concave/ Diverging lens

(b) Values - Concerned, Caring etc. (one value of teacher, one value of Salman)

(c) By thanking the teacher and Salman

SECTION-B

25. (a)

26. (d)

27. (a)

28. (c)

29. (b)

30. (b)

31. (d)

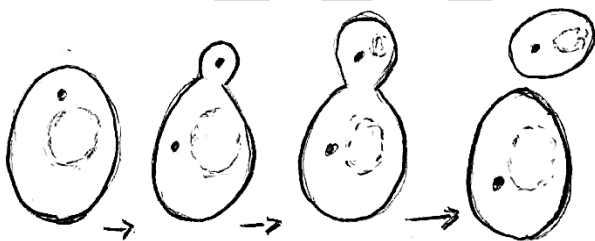
32. (d)

33. (b)

34. • Carbon dioxide / CO₂.

• Lime Water turns milky when CO₂ is passed through it. / CO₂ extinguishes a burning splinter.

35. Fine



36. • Towards the lens

- Magnification decreases