Class X Session 2024-25
Subject - Science
Sample Question Paper - 19

Time: 3 hours **Total Marks: 80**

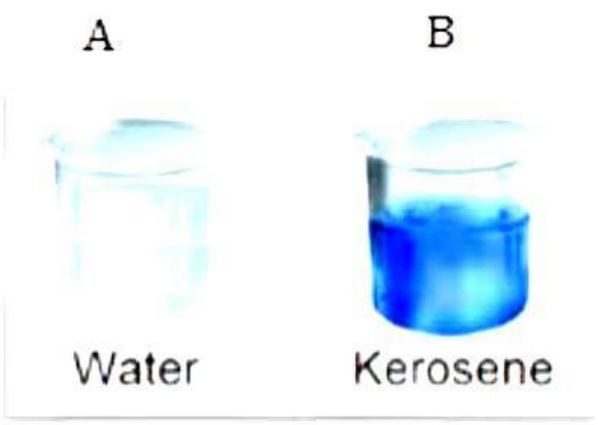
General Instructions:

i. *All questions would be compulsory. However, an internal choice of approximately 33% would be provided. 50% marks are to be allotted to competency-based questions.*
ii. *Section A would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.*
iii. *Section B would have 6 Short Answer (SA) type questions carrying 02 marks each.*
iv. *Section C would have 7 Short Answer (SA) type questions carrying 03 marks each.*
v. *Section D would have 3 Long Answer (LA) type questions carrying 05 marks each.*
vi. *Section E would have 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1/2/3 marks.*

SECTION - A

Select and write the most appropriate option out of the four options given for each of the questions 1-20. There is no negative mark for incorrect response.

1. Manasvi had to keep unused sodium metal safe. There were two beakers A and B as shown below. The beaker in which Manasvi should keep the sodium metal safe is [1]

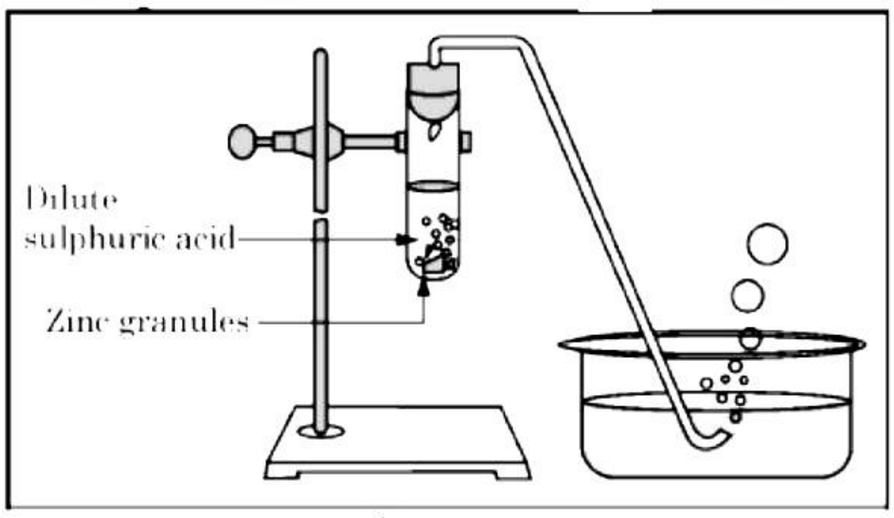


a) A or B
b) Only A
c) Only B
d) None of the above

2. A sample of soil is mixed with water and allowed to settle. The clear supernatant solution turns the pH paper yellowish orange. Which of the following would change the colour of this pH paper to greenish blue? [1]

a) Common salt
b) An antacid
c) Lemon juice
d) Vinegar

3. Study the diagram below and identify the gas formed in the reaction. [1]



a) Carbon dioxide, which extinguishes the burning candle.
b) Oxygen, which causes the candle to burn more brightly.
c) Sulphur dioxide, which produces a suffocating smell.
d) Hydrogen, which, while burning, produces a popping sound.

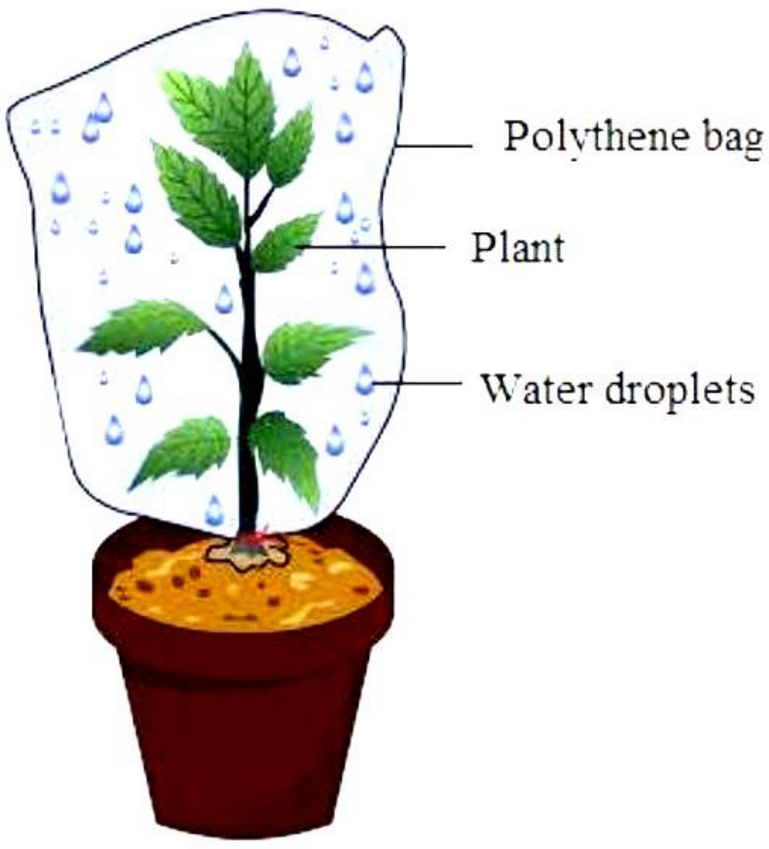
4. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained, and the sulphuric acid so formed remains in the solution. The reaction is an example of a [1]
a) Combination reaction
b) Displacement reaction
c) Decomposition reaction
d) Double displacement reaction

5. The formula for methyl propanoate is: [1]
a) $C_2H_5COOCH_3$
b) $CH_3COOC_2H_5$
c) $C_3H_7COOCH_3$
d) $C_3H_7COOC_2H_5$

6. Calcium is obtained by the electrolysis of its [1]
a) Oxides
b) Chlorides
c) Sulphides
d) Carbides

7. Preeti by mistake drank hard drink instead of water at a late-night party and started feeling drowsy. Which part of her body must have been affected? [1]
a) Central nervous system
b) Peripheral nervous system
c) Mouth
d) Stomach

8. Observe the figure carefully. Appearance of water droplets inside the polythene bag could be attributed to the process of [1]



a) Root pressure
b) Transpiration
c) Osmosis
d) Diffusion

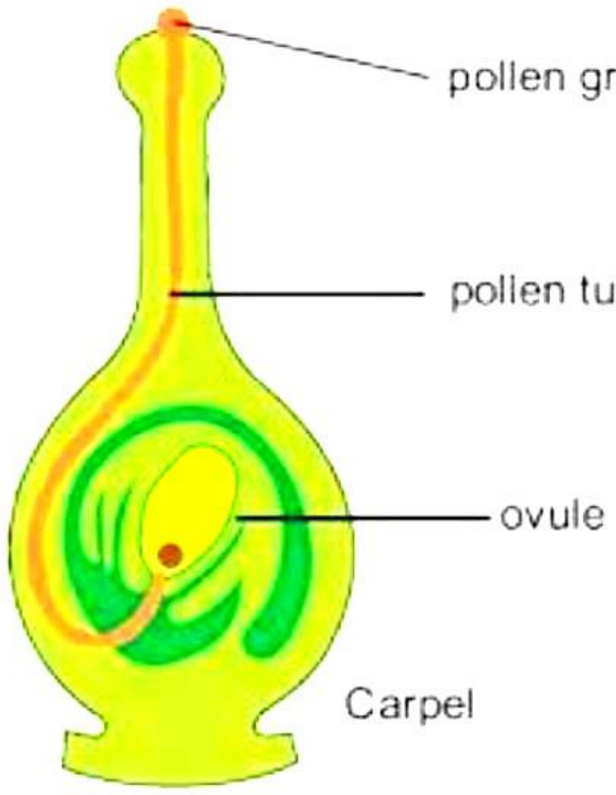
9. Soham experienced sudden coughing while swallowing food. Why did this happen? [1]

a) Incomplete closure of the epiglottis
b) Incomplete opening of the epiglottis
c) Incomplete chewing of food
d) Overeating

10. If a rabbit with black fur is crossed with another rabbit with brown fur, what percentage of F_1 and F_2 generation respectively will have brown fur? [1]

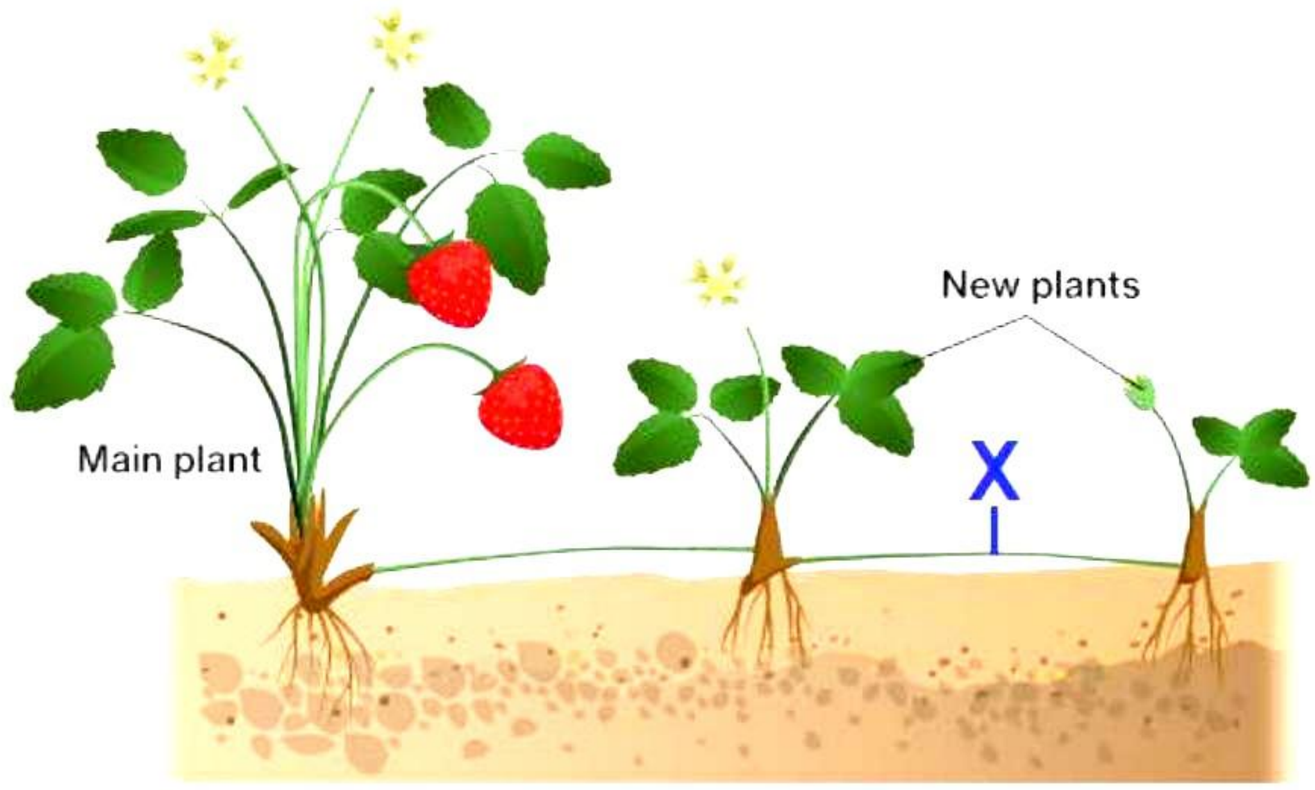
a) 0%, 25%
b) 50%, 50%
c) 75%, 100%
d) 100%, 75%

11. The growth movement of the pollen tube towards the ovule is an example of [1]



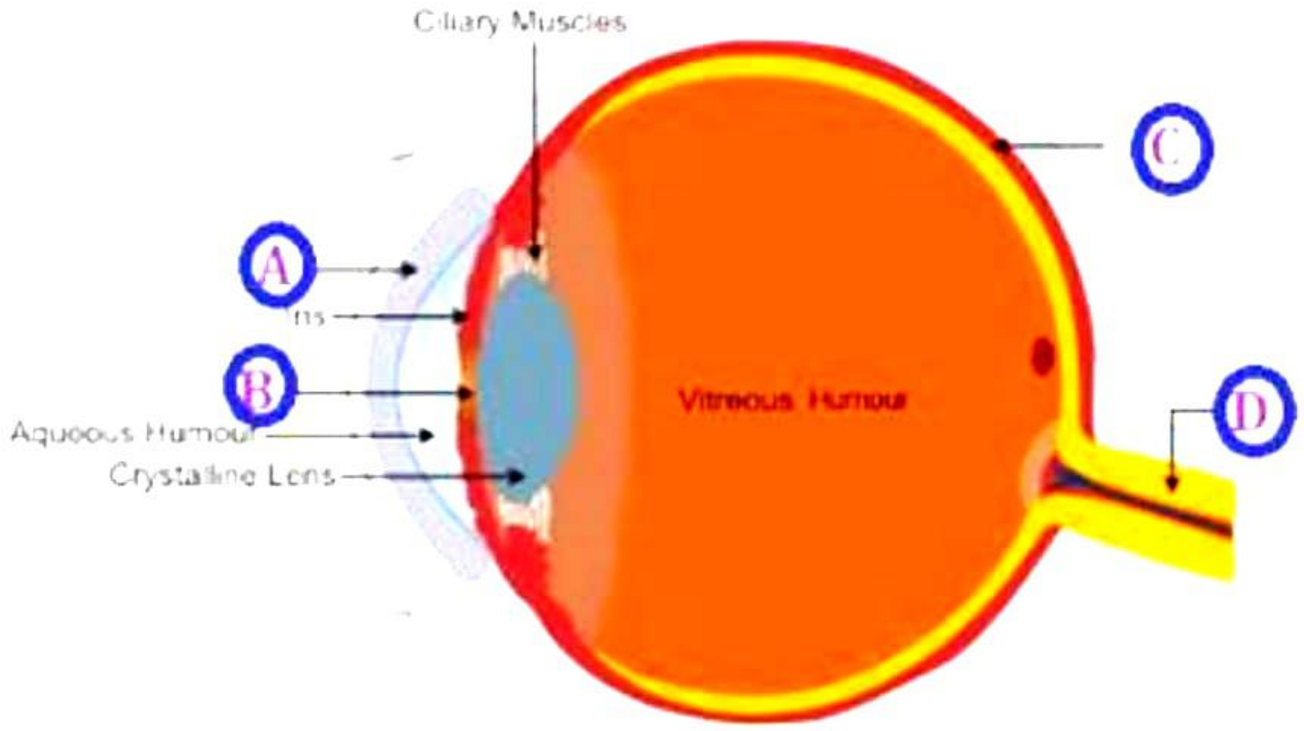
a) Hydrotropism
b) Phototropism
c) Chemotropism
d) Geotropism

12. The strawberry plant reproduces asexually by the process of vegetative propagation. What does X denote in the given figure? [1]



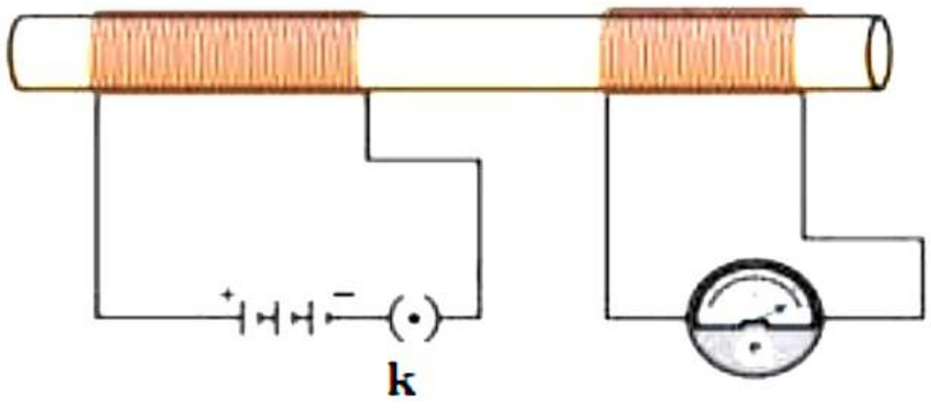
a) Leafy shoot
b) Corm
c) Tuber
d) Rhizome

13. Select the appropriate labelling (A, B, C and D) for the following diagram: [1]



a) A →Pupil, B → Optic nerve, C → Cornea, D → Retina
b) A → Optic nerve, B → Pupil, C → Cornea, D → Retina
c) A → Cornea, B → Pupil, C → Retina, D → Optic nerve
d) A → Pupil, B → Cornea, C → Retina, D → Optic nerve

14. Sagar had an arrangement in which there were two coils wound on a glass rod. [1]



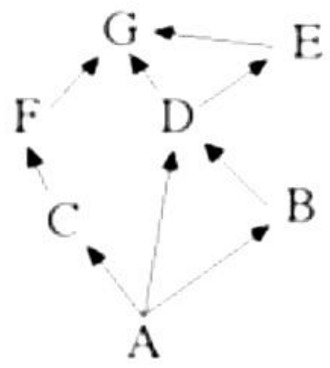
Case I: When the key is inserted.
Case II: When the key is removed.
Choose the correct observation for both cases.

a) In Cases I and II, both galvanometers will show no deflection.
b) In Cases I and II, both galvanometers will show deflection in the same direction.
c) In Cases I and II, both the galvanometer will deflect in opposite directions.
d) In Case I, the galvanometer will deflect towards the centre, whereas it will show random deflection for Case II.

15. All food chains begin with plants because plants [1]

a) Can be easily grown
b) Are nutritious
c) Can produce their own energy
d) Do not require energy

16. In the given food web, which two organisms are competing for food? [1]



a) A and B
b) A and C
c) D and F
d) B and D

Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:
(a) Both A and R are true, and R is the correct explanation of A
(b) Both A and R are true, and R is not the correct explanation of A
(c) A is true but R is false
(d) A is False but R is true

17. Assertion (A): When iron nails are exposed to air, it forms rust by combining with oxygen present in the air.
Reason (R): During rusting, iron combines with oxygen in the presence of water. [1]

18. Assertion (A): If mother is homozygous for black hair and father has red hair then their child can inherit black hair. [1]
Reason (R): Gene for black hair is recessive to gene for red hair in humans.

19. Assertion (A): The embryo is implanted in the fallopian tube. [1]
Reason (R): The uterine lining is richly supplied with blood.

20. Assertion (A): An object is placed at a distance of 'f' from a convex mirror of focal length 'f' then its image will be formed at infinity.
Reason (R): The distance of image in convex mirror is only up to the distance of the radius of curvature. [1]

SECTION - B

Question No. 21 to 26 are very short answer questions.

21. Virat burnt a magnesium ribbon in oxygen to give a white compound A accompanied by light emission. Then he placed the burning ribbon in the atmosphere of nitrogen, where it continued to burn and formed a compound B. [2]

(a) Write the chemical formulae of A and B.

(b) Write a balanced chemical equation when A is dissolved in water.

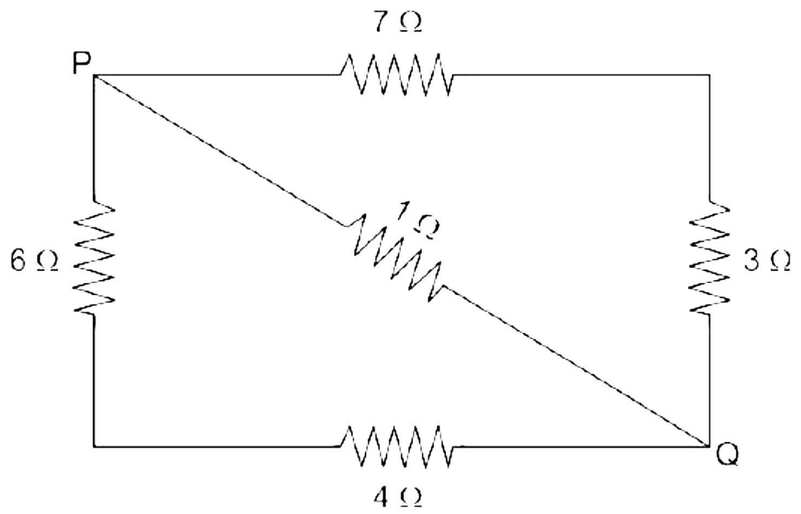
22. Describe the biological process of regeneration and its role in reproduction. Using *Hydra* as an example, explain how this process occurs in multicellular organisms. [2]

23. How does glucose undergo metabolic breakdown to generate energy in different organisms? [2]

OR

Why is three-chambered heart of a frog not as efficient as four-chambered human heart?

24. Calculate the effective resistance between P and Q [2]



25. If the object is placed at a distance of 15 cm in front of the concave mirror of focal length of 10 cm, then what will be the nature of the image? [2]

OR

A concave mirror produces a three times larger real image of an object placed at a distance of 20 cm in front of it. Find the position of the image and the nature of the image. Also, find the focal length of the mirror.

26. Observe the given food chain. [3]

Plant (1000 kJ) → Goat → Lion

(a) If autotrophs occupying the first trophic level are called producers what are herbivores called?

(b) How much energy does the lion get in the above food chain?

SECTION - C

Question No. 27 to 33 are short answer questions.

27. A neutral organic compound X of molecular formula C_2H_6O on oxidation with acidified potassium dichromate gives an acidic compound Y. Compound X reacts with Y on warming in the presence of conc. H_2SO_4 to give a sweet-smelling substance Z.
Identify X, Y and Z with explanations and reactions. [3]

28. A hydrocarbon (X) has the molecular formula $C_{10}H_{22}$. A hydrocarbon (Y) has two carbon atoms less than (X) and belongs to the same homologous series. A hydrocarbon (Z) has two carbon atoms more than (X) and belongs to the same homologous series. [3]

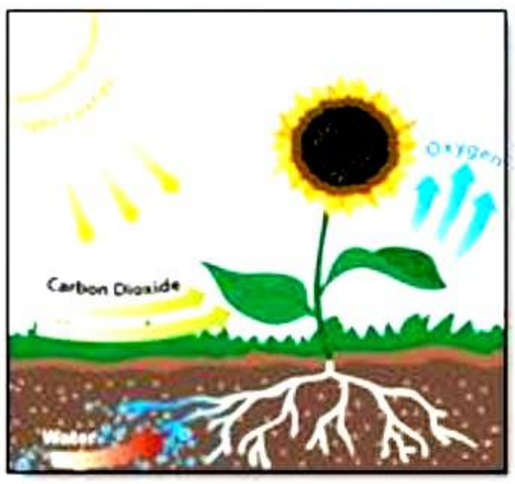
(a) What is the molecular formula of Y and Z?

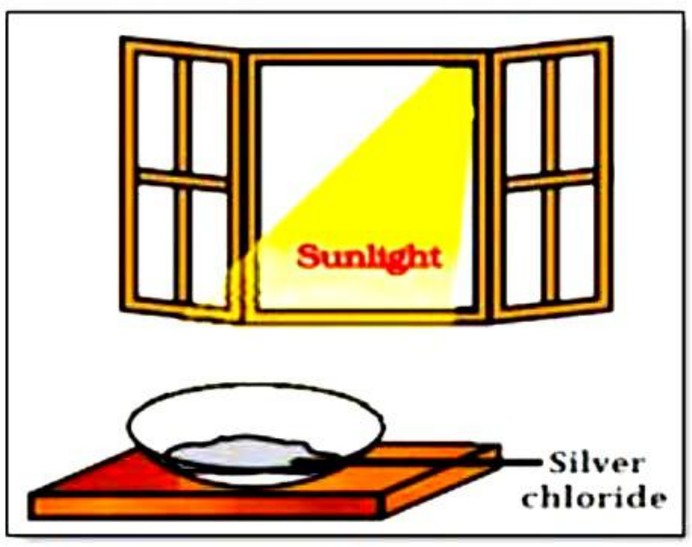
(b) Write the general formula and name of the homologous series from which compounds (X), (Y) and (Z) belong.

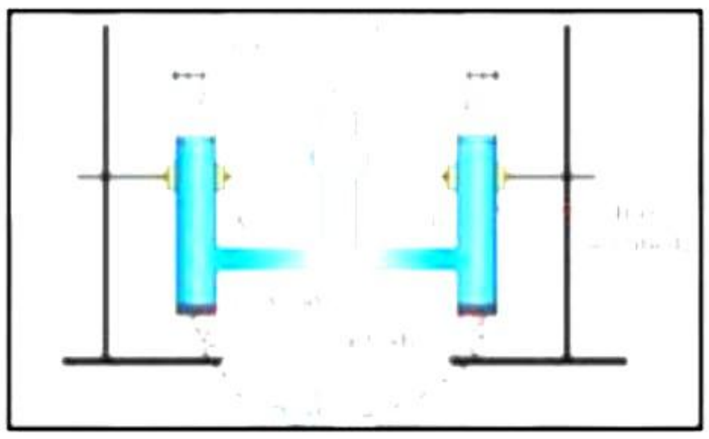
(c) Write characteristics of homologous series based on the following points:
(i)Physical properties
(ii)Method of preparation

OR

Identify the type of reaction from the given images below and explain the same. [3]







29. How does feedback mechanism regulate hormone secretion? [3]

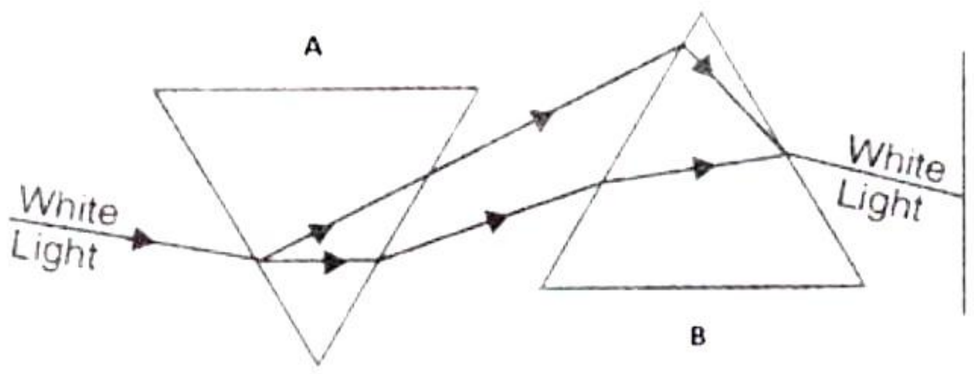
30. After self-pollination in pea plants with round, yellow seeds, following types of seeds were obtained by Mendel: [3]

Seeds	Number
Round, yellow	630
Round, green	216
Wrinkled, yellow	202
Wrinkled, green	64

Analyse the result and describe the mechanism of inheritance which explains these results.

31. [3]

(a) Explain how Sunil could pass white light through two identical prisms so that it emerged as white light, as shown below.



(b) Name all the colours of the spectrum in the decreasing order of their wavelengths.

32. The values of potential difference V applied across a resistor and the corresponding values of current I flowing in the resistor are given below: [3]

Potential difference, V (in volts)	2.5	5.0	10.0	15.0	20.0	25.0
Current, I (in amperes)	0.1	0.2	0.4	0.6	0.8	1.0

a) What is the nature of the V-I graph plotted for the above values of potential difference and current?
b) Which law is illustrated by such type of graph?
c) Calculate the resistance of the given resistor.

33. How does the strength of the magnetic field at the centre of a circular coil of a wire depend on? [3]
(a) Radius of the coil
(b) Number of turns of wire in the coil
(c) Draw the magnetic lines of force in case of a circular coil of a wire

SECTION - D

Question No. 34 to 36 are long answer questions.

34. [5]

(a) Distinguish between saturated and unsaturated hydrocarbons.

(b) Name one metal each which is extracted by

(i) reduction with carbon (ii) electrolytic reduction

(iii) reduction with aluminium (iv) reduction with heat alone

OR

An organic compound A (molecular formula C_2H4O_2) reacts with Na metal to form a compound B and evolves a gas which burns with a pop sound. Compound A on treatment with an alcohol C in the presence of a little of concentrated sulphuric acid forms a sweet-smelling compound D (molecular formula $C_3H_6O_2$). Compound D on treatment with NaOH solution gives back B and C. Identify A, B, C and D and give the chemical reactions involved.

35. [5]

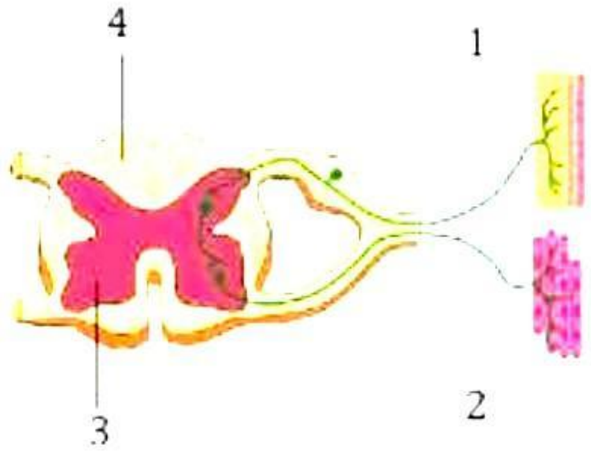
(a) Describe the role of prostate gland, seminal vesicle, and testes in the human male reproductive system.

(b) How is the surgical removal of unwanted pregnancies misused?

(c) Explain the role of oral contraceptive pills in preventing conception.

OR

The diagram given below shows the internal structure of spinal cord depicting a phenomenon. Study the diagram and answer the following questions.



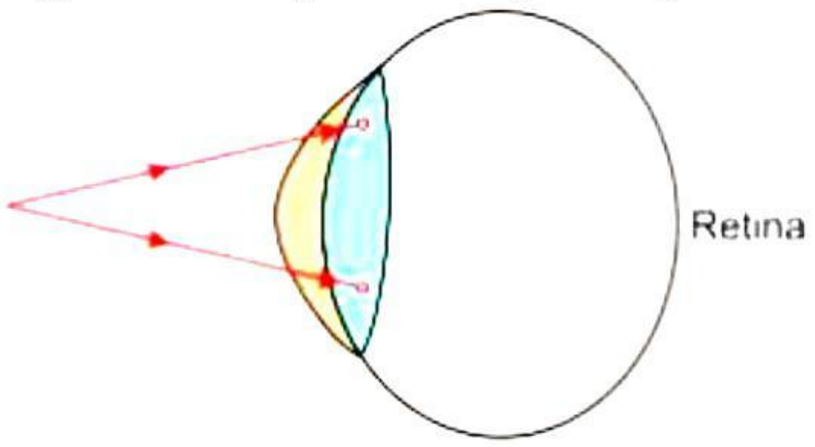
(a) Name the phenomenon shown in the figure and define the same.
(b) Identify the parts labelled as 1 and 2. Write one functional difference between these two.
(c) Label the guidelines 3 and 4. How is part 3 different from part 4 with respect to its composition (part of neuron)?

36. [5]

(a) Show formation of rainbow with the help of a ray diagram.
(b) What are the conditions to observe rainbow?
(c) Mention the reasons for the following phenomena:
(i) Dispersion of light
(ii) Tyndall effect

OR

(a) Copy the following diagram on your answer sheet showing the formation of the image, assuming that the given eye is a hypermetropic eye.



(b) State two causes of this defect.
(c) Name the type of lens that would correct this defect.
(d) Draw a ray diagram to illustrate how this lens helps to correct hypermetropia.

SECTION - E

Question No. 37 to 39 are case - based/data -based questions with 2 to 3 short sub - parts. Internal choice is provided in one of these sub-parts.

37. The teacher asked Divya to take a copper wire which was kept along with other metal wires and hold it with a pair of tongs to burn it over the flame of Bunsen burner. Divya took one of the wires and followed the procedure told by his teacher. She could notice that wire was burning with a bright light and formation of a white powder. The teacher asked Divya to repeat the whole experiment with the copper wire given by her teacher.

(a) What observations would Divya have observed after the teacher made him repeat the whole experiment with the wire provided by the teacher himself? Write observation if copper wire is held for a longer time in flame. [2]

(b) Can you guess which metal Divya burnt in the first experiment? Write a balanced chemical equation for the observations. [2]

OR

(b) Write conclusions drawn by comparing both observations. [2]

38. In a cross between plants with axial flowers and plants with terminal flowers, the F1 generation had all axial flowers. When the F1 generation was self-bred, the F2 generation gave rise to 800 individuals, 600 of which had axial flowers. Construct a cross and answer. [4]

(a) What is the ratio of axial flowered plants in F_2 generation?

(b) What are the genotypes and genotypic ratio of F_2 individuals?

(c) If F_2 generation gave rise to 400 individuals, how many flowers would be pure homozygous? Give the genotype of these plants.

OR

(c) Instead of the above cross, if there was a cross between tall and dwarf plants resulting in 100 individuals in F_2 generation, how many plants would have been dwarf? Give reason for your answer.

39. A concave mirror has focal length 10 cm. Answer the questions using the following table:

(A)	u	-20
(B)	u	-15
(C)	u	Infinity
(D)	u	-5

(a) If object size is 2 cm, what would be the size of the image in case A? [1]

(b) Position of the image in case (C) [1]

(c) What is nature of the image in case (D) [2]

OR

(c) What is nature of the image when u = -15 cm [2]

Solution

SECTION - A

1. Correct option – c: Only B
As sodium metal violently reacts with water producing lot of heat, it is always kept immersed in kerosene to protect it even from atmospheric moisture.

2. Correct option – b: An antacid
Yellowish orange colour on pH paper is shown by acidic substances hence to change the colour of pH paper to greenish blue (pH = 8), an antacid should be added since antacids are basic in nature.

3. Correct option – d: Hydrogen, which, while burning produces a popping sound.
When a metal reacts with acid then hydrogen gas is evolved. When a burning stick is brought near the mouth of the test tube then the evolving hydrogen gas is burnt with a pop sound.

4. Correct option – d: double displacement reaction
When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained, and the sulphuric acid so formed remains in the solution. The reaction is an example of a double displacement reaction.

5. Correct option – a: $C_2H_5COOCH_3$
The formula for methyl propanoate is $C_2H_5COOCH_3$

6. Correct option – b: Chlorides
Calcium is obtained by electrolysis of its molten chlorides.

7. Correct option – a: Central nervous system
Drinking of ethanol affects central nervous system causing mental confusion, drowsiness, etc.

8. Correct option – b: Transpiration
Transpiration results in the loss of water vapour from the leaves of the plant.

9. Correct option – a: Incomplete closure of the epiglottis
A person experiences sudden coughing while swallowing food because of incomplete closure of the epiglottis which directs the food into the windpipe instead of the food pipe.

10. Correct option – a : 0%, 25%

Black colour fur is dominant over brown colour fur. In a monohybrid cross, in F_1 generation, only dominant traits are expressed. So, all rabbits will bear black fur only. In F_2 generation, 75% of the rabbits will have black fur while 25% will have brown fur.

11. Correct option – c : Chemotropism

The growth of the pollen tube towards the ovule occurs in response to the presence of sugars in the style. Hence it is an example for chemotropism.

12. Correct option – d : Rhizome

Rhizome or stolons are fleshy, creeping underground stems. They send out roots and shoots to reproduce asexually.

13. Correct option – c) A → Cornea, B → Pupil, C → Retina, D → Optic nerve

Cornea: Light enters the eyes through cornea.

Pupil: It dilates and contracts and thus enables us to in bright and dark light.

Retina: Part of the eyes where image is formed

Optic nerve: It helps to carry the signals from the retina to the brain.

So, appropriate labelling of the given diagram is:

A → Cornea, B → Pupil, C → Retina, D → Optic nerve

14. Correct option – c) In Cases I and II, both the galvanometer will deflect in opposite directions.

When the key is inserted into the circuit of coil 1, there is a momentary increase in the current, which results in a change in the magnetic field. This change in the magnetic field induces a current in the circuit of coil 2, causing a momentary deflection.

Likewise, when the key is removed, the current in coil 1 quickly becomes zero, leading to a change in the magnetic field, which in turn induces a current in coil 2. But this time, the deflection occurs in the opposite direction.

15. Correct option – c) Can produce their own energy

Plants are producers. They can capture light energy and convert it into chemical energy in the form of food through the process of photosynthesis. Hence, all food chains begin with producers which can produce food.

16. Correct option – d) B and D

All food chains in the given food web start at A. Hence, A is a producer. B, C and D are primary consumers, and E, G and F are secondary or tertiary consumers. Since B and D occupy the same trophic level in the given food web, they are said to be competing for food.

17. A is false but R is true.

When iron nails and iron screws are exposed to moisture, the iron combines with oxygen from the air in the presence of water to form a red-brown flaky substance called rust.

$$4Fe + 3O_2 + 2xH_2O \xrightarrow{\text{water}} 2Fe_2O_3.xH_2O$$

Iron — Hydrated iron oxide (Rust)

18. A is true but R is false.

Gene for black hair colour is dominant to gene for red hair colour in humans. So, the reason is false.

Mother with black hair and father with red hair can be represented as BB and bb, respectively. So, the child will be heterozygous for black hair colour (Bb). So, the assertion is true.

19. A is false but R is true.

The embryo is implanted in the lining of the uterus where it continues to grow and develop organs to become a foetus. The uterus prepares itself every month to receive and nurture the growing embryo. So, the assertion is false.

The uterine lining thickens and is richly supplied with blood to nourish the growing embryo. So, the reason is true.

20. A is false, but R is true.

The distance of image formed by convex mirror is always finite.

SECTION - B

21.

(a) The chemical formula of X = MgO

The chemical formula of Y = Mg_3N_2

(b) The following chemical reaction occurs when A is dissolved in water:

$MgO + H_2O \rightarrow Mg(OH)_2$

22. The process of formation of an entire organism from the body parts of a fully differentiated organism is called regeneration. It occurs through the process of growth and development.

Simple, multicellular animals like *Hydra* show regeneration. When a small piece of *Hydra* breaks off, it grows into a completely new *Hydra*. During regeneration, the cells of the cut body part of the organism divide rapidly to produce a mass of cells. These cells get organised within the mass to form different types of tissues. In this way, a completely new organism is regenerated.

23. Breaking down of glucose involves two processes. In the first step, it is broken into a three-carbon molecule called pyruvate. The pyruvate is further broken down into energy in the following different ways in various organisms:

1) Aerobic respiration: Here, pyruvate is broken down into water and carbon dioxide along with the release of energy. It commonly occurs in mitochondria of cells.

2) Anaerobic respiration in yeast: In yeast cells during fermentation pyruvate is converted into ethanol and CO_2 in the absence of O_2.

3) Anaerobic respiration in muscles: Due to lack of oxygen, e.g., during vigorous running or exercise, in human muscles, pyruvate is converted to lactic acid.

OR

In a three-chambered heart, there are two atria and one ventricle. Both the atria empty into a single ventricle due to which oxygenated and deoxygenated blood get mixed.

In a four-chambered heart, deoxygenated blood and oxygenated blood remain in separate compartments and hence, they are not mixed. So, the oxygenated blood pumped by a four-chambered heart has more oxygen content than the three-chambered heart.

Hence, three-chambered heart of a frog is not as efficient as four-chambered heart of humans.

24.

In series $R_2 = 7\Omega + 3\Omega = 10\Omega$

$R_3 = 6\Omega + 4\Omega = 10\Omega$

In Parallal

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

$$= \frac{1}{1} + \frac{1}{10} + \frac{1}{10}$$

$$= \frac{10+1+1}{10} = \frac{12}{10} = \frac{6}{5}$$

$R = 5.6\ \Omega$

25. The object is placed at 15 cm; this means that the object is placed between the focus and the centre of curvature of the concave mirror. When the object is placed between the focus and the centre of curvature of a concave mirror, the image formed is real, inverted and magnified.

OR

$m = -3$

$u = -20$ cm

$m = -v/u$

$-3 = -v/(-20)$

$v = -60$ cm

The image is located at a distance of 60 cm, and the nature of the image is enlarged, real and inverted.

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

$$\frac{1}{f} = \frac{1}{-60} + \frac{1}{-20}$$

$$\frac{1}{f} = \frac{-80}{1200}$$

$f = -15$ cm

Thus, the focal length of a concave mirror is 15 cm.

26.

(a) Herbivores feed on producers and occupy the second trophic level of a food chain. They are regarded as primary consumers.

(b) Plant (1000 kJ) → Goat → Lion

According to the 10% law of energy transfer, the goat gets 100 kJ and lion gets 10 kJ of energy.

SECTION – C

27. The molecular formula of ethanol is C_2H_6O. Ethanol on heating with alkaline potassium permanganate or acidified potassium dichromate gets oxidised to ethanoic acid.

$$\underset{\text{Ethanol}}{C_2H_5OH} + 2[O] \xrightarrow{\text{Acidified } K_2Cr_2O_7} \underset{\text{Ethanoic acid}}{CH_3COOH} + H_2O$$

Ethanoic acid reacts with alcohols in the presence of a little concentrated sulphuric acid to form ethyl methanoate which is a sweet-smelling ester. This is called as esterification reaction as shown below:

$$\underset{\text{Ethanol}}{C_2H_5OH} + \underset{\text{Ethanoic acid}}{CH_3COOH} \xrightarrow{\text{Conc. } H_2SO_4} \underset{\text{Ethyl methanoate}}{CH_3COOCH_3} + H_2O$$

Hence, X = Ethanol, Y = Ethanoic acid, Z = Ethyl methanoate

28.

(a) The molecular formula of Y = C_8H_{18} as Y has 2 carbon atoms less than X.
The molecular formula of Z = $C_{12}H_{26}$ as Z has 2 carbon atoms more than X.

(b) Compounds X, Y and Z belong to the alkane homologous series having general formula C_nH_{2n+2}.

(c) <u>Characteristics of homologous series:</u>

(i) Physical properties: Physical properties of the members show a gradation in properties as the molecular mass increases.

(ii) Method of preparation: All members of a homologous series can be prepared by the same general method of preparation.

For example: Alcohols can be prepared from alkyl halides.

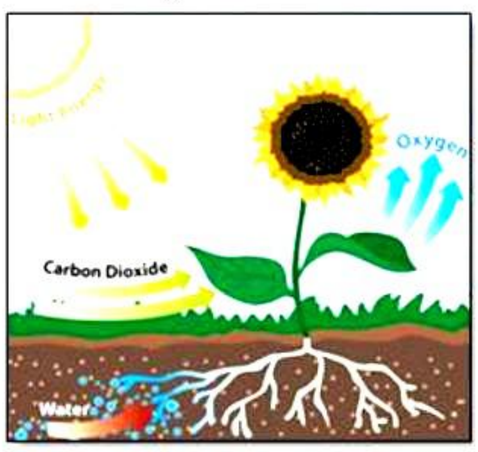
$$CH_3Br + KOH \xrightarrow{\text{Boil}} CH_3OH + KBr$$

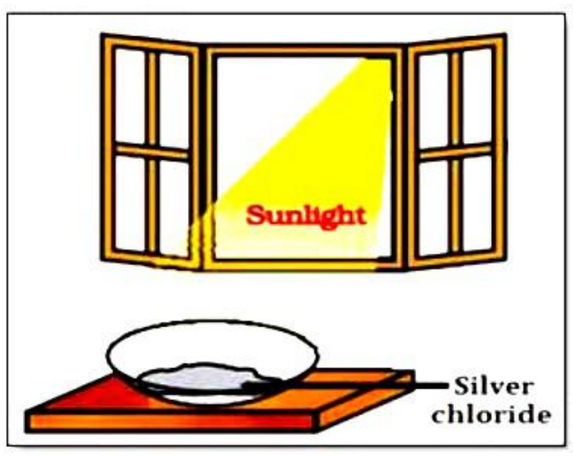
$$C_2H_5Br + KOH \xrightarrow{\text{Boil}} C_2H_5OH + KBr$$

OR

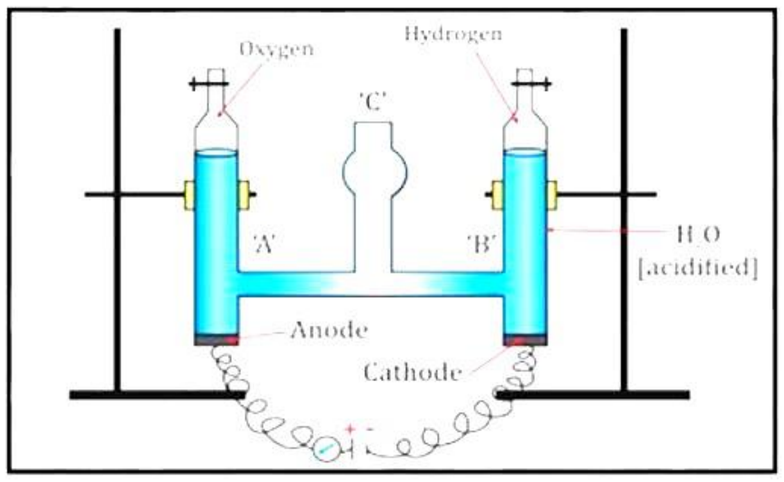
Given pictures are the examples of different types of decomposition reactions.

- <u>Thermal Decomposition</u>: A chemical compound breaks into simpler compounds on heating; simpler compounds do not reunite to form the original compound on cooling.





- <u>Photochemical reaction</u>: Chemical reaction which proceeds with the absorption of light energy.

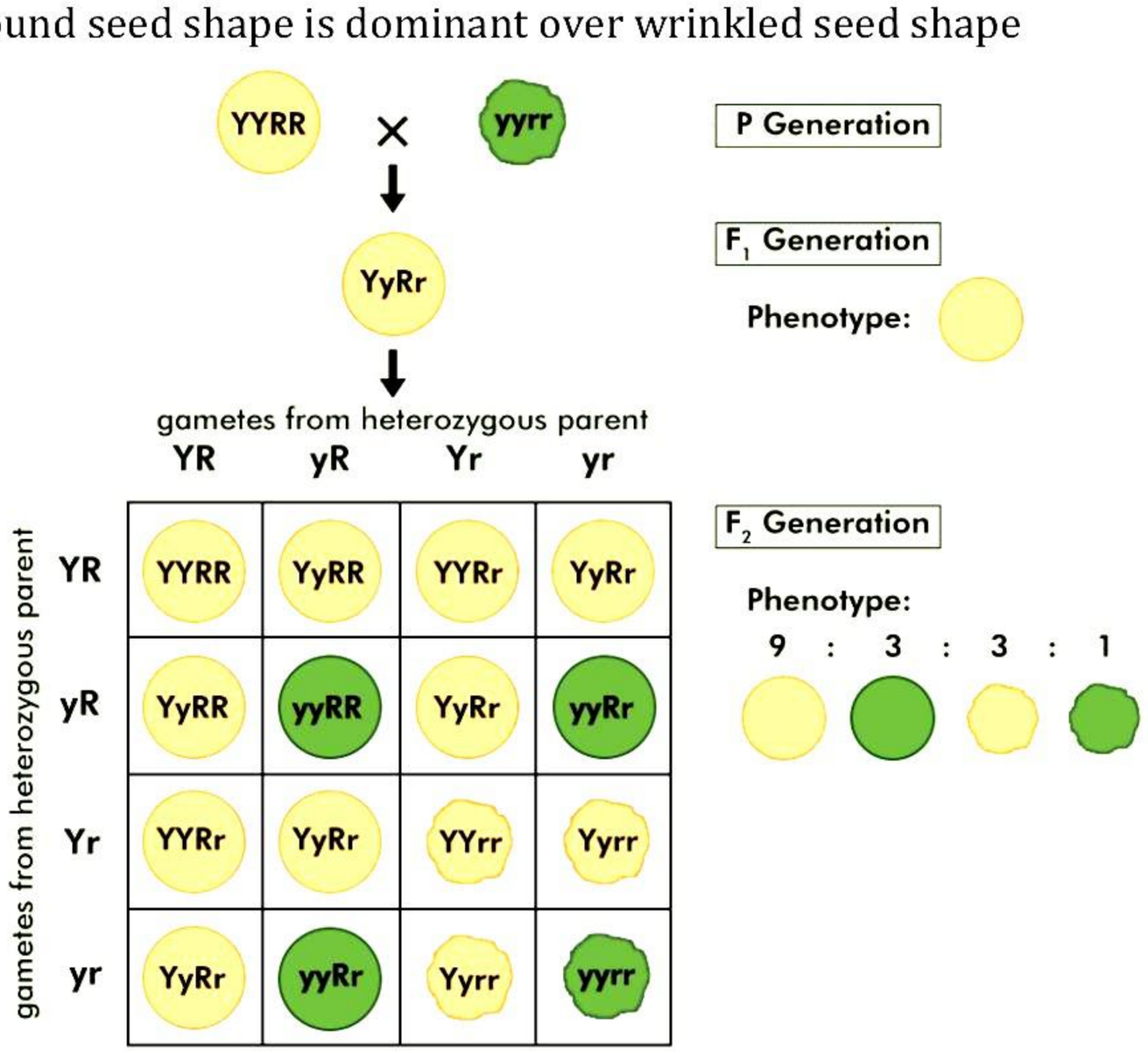


- <u>Electrochemical reaction</u>: Chemical reaction which proceeds with the absorption of electric energy.

29. The feedback mechanism of hormones ensures that the balance of hormone in the blood/body is maintained. Increase or decrease in the concentration of a hormone can either stimulate the secretion of that hormone or inhibit the hormone secretion. This mechanism is called feedback.
    <u>There can be two types of feedback mechanisms:</u>
    - Positive feedback, which stimulates the secretion or production of the hormone.
    - Negative feedback, which inhibits the secretion of the hormone.

    <u>Feeback mechanism for insulin secretion:</u>
    - When we eat carbohydrate rich food, the glucose level in the blood increases. As a result, the pancreas secretes insulin.
    - The insulin signals the cells to take up the blood glucose. Hence, the glucose level decreases in the blood.
    - Now, if insulin is still present in the blood, then more and more glucose will be transported inside the cell, and there would be a scarcity of glucose in the blood.
    - Hence, to prevent this, negative feedback is generated due to low glucose level which inhibits the insulin secretion in the blood.

30. <u>With respect to seed colour and seed shape in pea plants-</u>
    Yellow colour seeds are dominant over green colour seeds
    Round seed shape is dominant over wrinkled seed shape



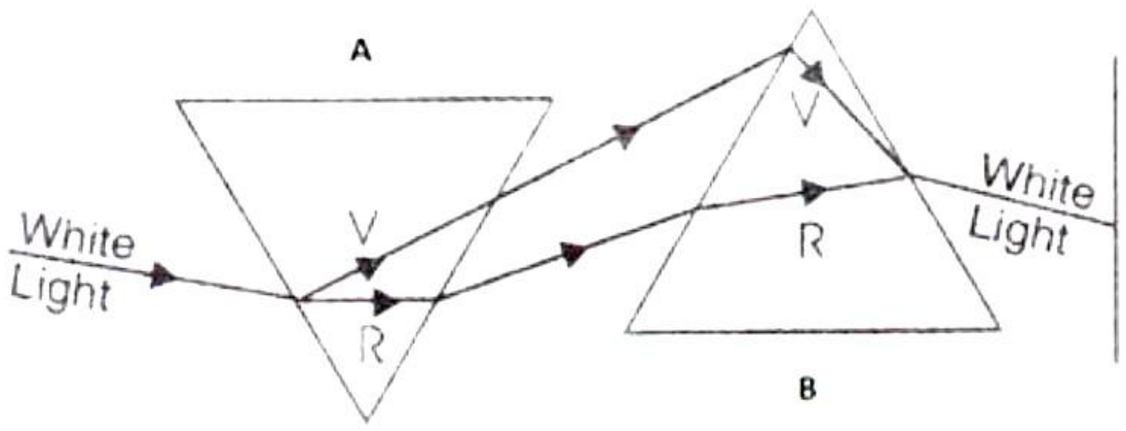
Seeds	Number
Round, yellow	630
Round, green	216
Wrinkled, yellow	202
Wrinkled, green	64

- The ratio obtained is 9:3:3:1 in which parental as well as new combinations, can be seen.
- This shows that progeny plants did not inherit a single complete gene set from each parent.
- Every germ cell takes one chromosome from the pair of maternal and paternal chromosomes.
- When two germ cells combine, the segregation of one pair of characters is independent of another pair of characters.

31.

(a) White light, when passed through a prism, gets dispersed into seven constituent colours due to the difference in the velocities of different colours through the prism. i.e., the refractive index of the glass is different for different colours.

The first prism disperses the light into seven colours, while the second prism, kept upside down, recombines these rays into white light again.



This reverse refraction occurs due to the refracting sides being parallel to each other.

(b) The colours of the spectrum in the decreasing order of their wavelengths are:
Red, Orange, Yellow, Green, Blue, Indigo and Violet.

32.

a) Straight line graph
b) Ohm's law is illustrated when nature of V- I graph is straight line.
c) We know, V = IR... (Ohm's law)
R = V/I
R = 10/4 = 2.5 Ω

33.

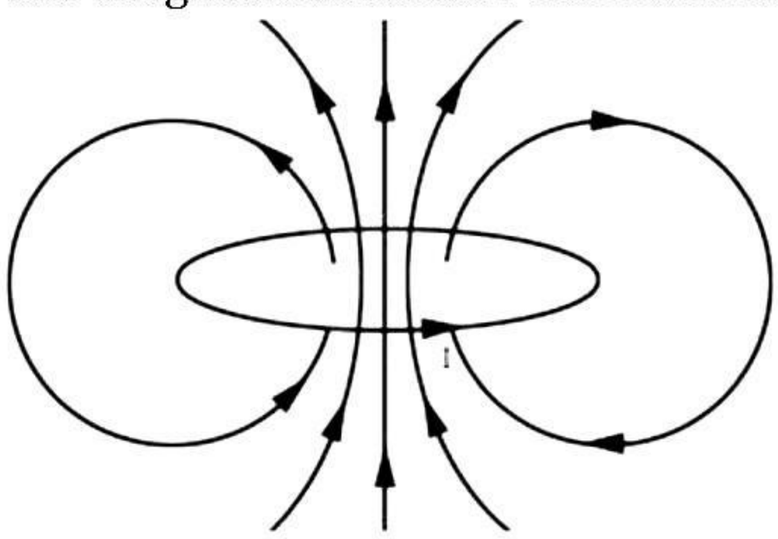
a) The strength of the magnetic field (B) is inversely proportional to the radius of the circular loop (r).

$$B \propto \frac{1}{r}$$

b) The strength of the magnetic field (B) is directly proportional to the number of turns in the coil (N).

$$B \propto N$$

c) The magnetic field lines will be as shown below.



SECTION - D

34.

(a) Differences between between saturated and unsaturated hydrocarbons:

	Saturated Hydrocarbons		**Unsaturated Hydrocarbons**
i	Saturated hydrocarbons contain C-C single bond.	i	Unsaturated hydrocarbons contain C-C double or triple bonds.
ii	Saturated hydrocarbons are termed as alkanes.	ii	Unsaturated hydrocarbons are termed as alkenes and alkynes depend on double and triple bonds.
iii	The general formula of alkanes or saturated hydrocarbons is C_nH_{2n+2}.	iii	The general formula of alkenes and alkynes are C_nH_{2n} and C_nH_{2n-2}.
iv	Alkanes do not undergo addition reaction. Alkanes generally undergo substitution reaction.	iv	Alkenes and alkynes undergo addition reaction across the double or triple bonds.
V	Alkanes are less reactive or more stable.	v	Alkenes and alkynes are more reactive than alkanes due to presence of double and triple bonds.
vi	Examples: Methane, Ethane	iv	Examples: Alkene: Ethene Alkyne: Ethyne

(b)

(i) Zinc
(ii) Sodium
(iii) Manganese
(iv) Mercury

OR

An organic compound A (molecular formula $C_2H_4O_2$) reacts with Na metal to form a compound B and evolves a gas which burns with a pop sound.
A is ethanoic acid, CH_3COOH
B is sodium ethanoate, CH_3COONa

$$2CH_3COOH + 2Na \longrightarrow 2CH_3COONa + H_2\uparrow$$
$$A(C_2H_4O_2) \qquad\qquad B$$

Compound A (ethanoic acid) on treatment with an alcohol C in the presence of a little concentrated sulphuric acid forms a sweet-smelling compound D (molecular formula $(C_4H_8O_2)$

C is methanol, CH_3OH

D is methyl ethanoate, CH_3COOCH_3

$$CH_3COOH + CH_3OH \longrightarrow CH_3COOCH_3 + H_2O$$

A C D($C_3H_6O_2$)

Compound D (methyl ethanoate) on treatment with NaOH solution gives back B (sodium ethanoate) and C (methanol).

$$CH_3COOCH_3 + NaOH \longrightarrow CH_3COONa + CH_3OH$$

D B C

35.

(a) Role of prostate gland and seminal vesicles: They secrete fluids that are alkaline in nature. This ensures that the sperms are in a fluid medium which helps in the transportation of sperms and makes it easier to provide nutrition to the sperms. This secretion also activates the sperms and helps to prevent the coagulation of semen.

Role of testes: They are responsible for the production of sperms. Testes secrete the male sex hormone testosterone which brings about changes in the appearance of boys at the time of puberty.

(b) Surgical removal of unwanted pregnancy is called MTP (Medical Termination of Pregnancy). But this procedure can be misused in countries where the male to female sex ratio is very low, and there are still rural areas where female foeticide is prevalent. Thus, sex determination during pregnancy and further, the abortion of female foetuses can lead to a further declination of the female population in the country. This procedure if misused can also affect the health of the mother, and can cause long-term illness, sometimes infertility, or even maternal deaths.

(c) Oral contraceptives are a combination of female hormones. They increase the levels of progesterone. Hence, they prevent ovulation or the release of the egg. In the absence of ovulation, there is no fertilisation and hence, no pregnancy.

OR

(a) The phenomenon shown in the figure is a reflex action.

Reflex action is an automatic, quick, immediate, involuntary action in the body brought about by a stimulus.

(b) 1 - Sensory neuron, 2 - Motor neuron

Sensory neurons are responsible for transmitting sensory impulses from sensory organs (receptors) to the central nervous system.

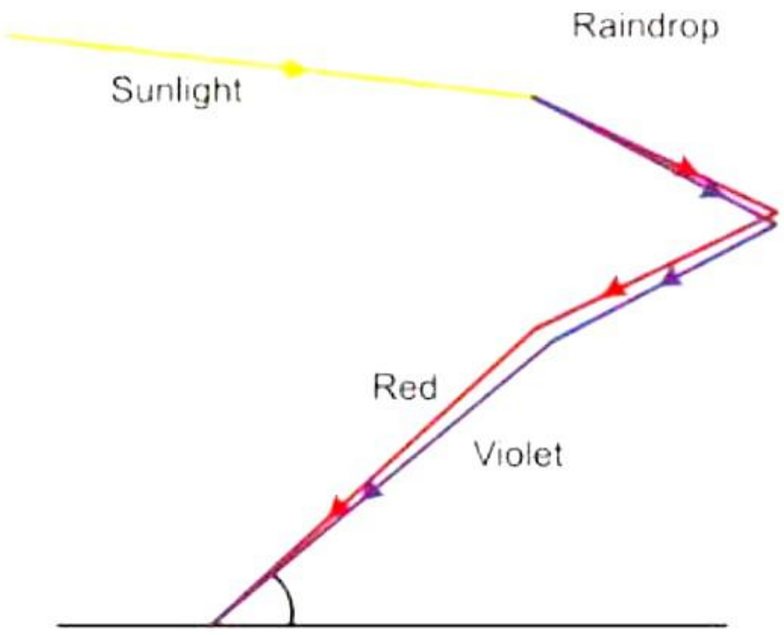
Motor neurons are in charge of transmitting motor commands from the central nervous system to the effector organs (muscle/gland) to initiate responses.

(c) 3 - Gray matter, 4 - White matter

Gray matter is made up of cell bodies of neurons, while white matter primarily consists of axons of neurons.

36.

(a)



Rainbow is caused due to dispersion of sunlight by raindrops suspended in air. Water drops act like tiny prisms. Water drops refract the sunlight, disperse, then reflect internally and then refract it again. This is how a rainbow is formed.

(b) During rainfall or after rainfall when sun shines at the back of the observer.

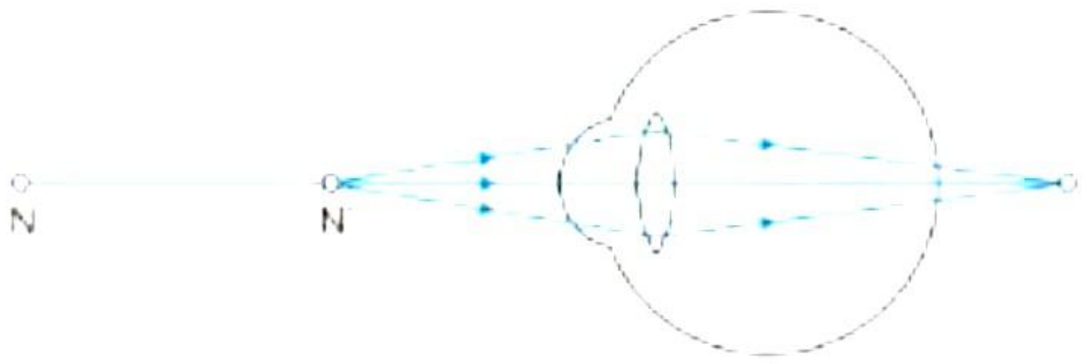
(c)

(a) Difference in speed in medium for different wavelengths/colours of light.

(b) Scattering of light by colloidal particles

OR

(a) Eye defect: Hypermetropia



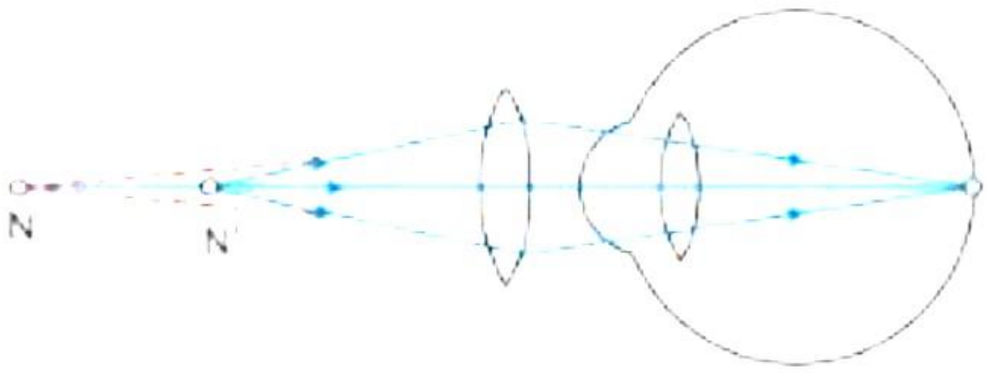
(b) <u>Two causes of the defect:</u>

(i) decrease in length of the eyeball

(ii) increase in focal length of the eye lens

(c) Convex lens.

(d) Correction of Hypermetropia:



SECTION - E

37.

(a) Observations of repeated experiment would be as follows:

- No change in the copper wire.
- No bright flame.
- On heating for longer time, a black layer of copper oxide is formed over the wire. The balanced chemical reaction is as follows:

$$2Cu_{(s)} + O_{2(g)} \xrightarrow{\text{Heating}} 2CuO_{(s)}$$

(b) In first experiment, the metal burnt was Magnesium instead of copper. On heating, magnesium reacts with oxygen in air and burns vigorously producing intense heat and light to form a white powder of magnesium oxide.

$$2Mg_{(s)} + O_{2(g)} \xrightarrow{\text{Heating}} 2MgO_{(s)}$$

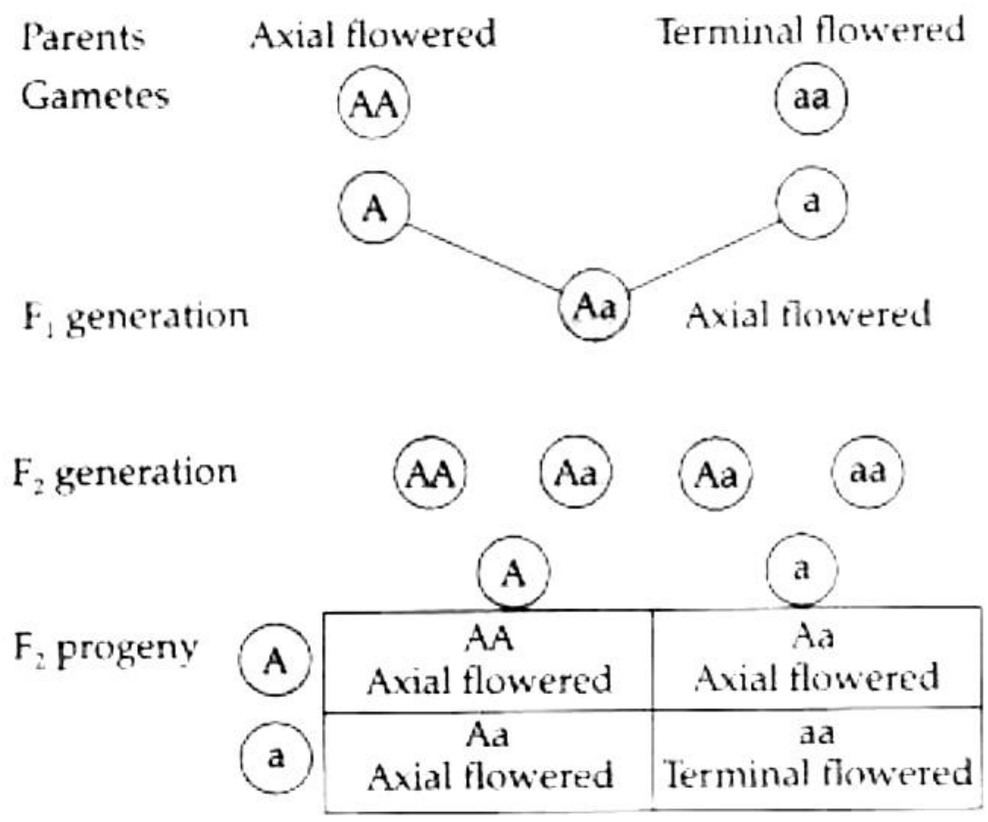
OR

(b) Conclusions drawn from two experiments:

- Both copper and magnesium do not react with oxygen at room temperature.
- Both copper and magnesium react with oxygen on heating in the flame to form corresponding oxides.
- But copper is less reactive than magnesium as copper requires longer heating than magnesium to react with oxygen. Instead, magnesium immediately burns in air and react with oxygen producing intense heat and light.

38. The cross is depicted as under:

AA = Axial, aa = Terminal



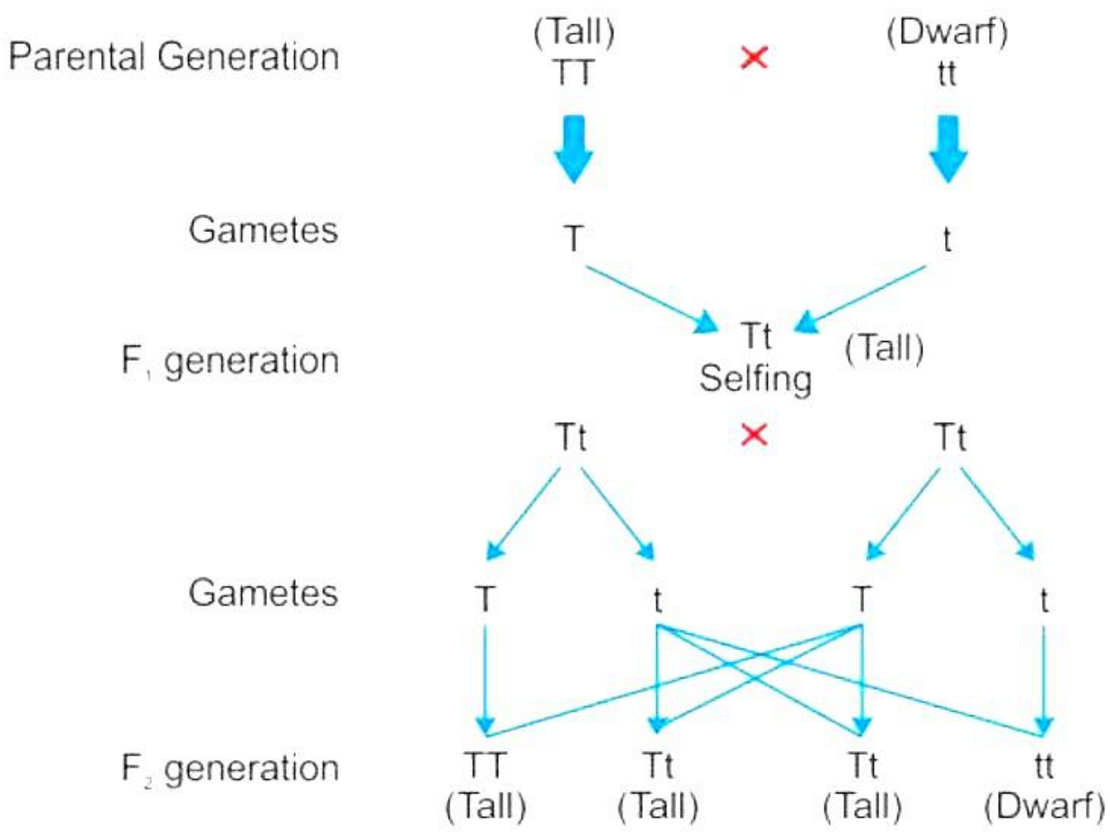
a) Ratio of axial flowered plants in F_2 generation is:
Axial : Terminal = 3 : 1

b) The genotypes and genotypic ratio of F_2 individuals are:
AA (Axial) : Aa (Axial) : aa (Terminal) = 1 : 2 : 1

c) Homozygous is a genetic condition where an individual inherits the same alleles for a particular gene from both parents.
In the above cross, the pure homozygous individuals have the genotype AA (Axial) and aa (Terminal). So, if there are 400 individuals obtained in the F_2 generation, then there would be 100 individuals each with genotype AA and aa. Thus, there would be a total of 200 flowers which are pure homozygous.

OR

The cross is depicted as under:



With respect to height of the plant, the trait for tallness is dominant over trait for dwarfness. Thus, the phenotypic ratio of tall and dwarf plants in F_2 generation would be 3 : 1. Hence, out of 100 individuals, 25 individuals would have been dwarf and 75 would have been tall.

39.

(a) As the object is placed at C, the size of the image is the same as that of the object, i.e., 2 cm.

(b) The image will be at the focus and point sized.

(c) Virtual and erect

OR

(c) Real and inverted