

CBSE
Class X Science
Sample Paper 12

Time: 3 hrs

Total Marks: 80

General Instructions:

- (i) The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
 - (ii) Section–A - question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
 - (iii) Section–B - question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should in the range of 30 to 50 words.
 - (iv) Section–C - question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should in the range of 50 to 80 words.
 - (v) Section–D – question no. - 34 to 36 are long answer type questions carrying 5 marks each. Answer to these questions should be in the range of 80 to 120 words.
 - (vi) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
 - (vii) Wherever necessary, neat and properly labeled diagrams should be drawn.
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Section A

- 1. Why is DNA copying an essential part of the process of reproduction? (1)
OR
How does the embryo get nourishment inside the mother's body?
- 2. How does the creation of variations in a species promote survival? (1)
- 3. Which of the following carries only deoxygenated blood? (1)
 - (a) Pulmonary artery
 - (b) Pulmonary vein
 - (c) Capillary
 - (d) Aorta
- 4. Name an indicator which can identify the presence of an acid? (1)
- 5. Define the following term: (1)
Water of crystallization.

6. Why 'food containing iron salts' should not be cooked in aluminium utensils? (1)

OR

Name the metal and non-metal present in abundance in the earth crust.

7. Name: a liquid non-metal. (1)

8. How does graphite act as a lubricant? (1)

9. Why does carbon form compounds mainly by covalent bonding? (1)

OR

10. Calculate the current in the circuit if 40 C of charge is passed through a point in 10 seconds. (1)

11. State whether a voltmeter has a high resistance or a low resistance. Give reason for your answer. (1)

OR

If the current in a wire is flowing in the vertically downward direction and a magnetic field is applied from west to east, what is the direction of force on the wire?

12. If an object is at an infinity in front of a convex lens, where is the image formed? (1)

OR

What is a lens?

13. State whether an electric heater will consume more electrical energy or less electrical energy per second when the length of its heating element is reduced (1)

For question numbers 14, 15 and 16, two statements are given—one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

- a) Both A and R are true, and R is the correct explanation of the assertion.
- b) Both A and R are true, but R is not the correct explanation of the assertion.
- c) A is true, but R is false.
- d) A is false, but R is true.

14. **Assertion:** Arteries are thick walled and elastic in nature. (1)

Reason: Arteries have to transport blood away from the heart.

15. **Assertion:** Sunlight reaches us without dispersion in the form of white light and not as its components.

Reason: Dispersion take place due to variation of refractive index for different wavelength but in vacuum speed of light is independent of wavelength and hence vacuum is non - dispersive medium. (1)

OR

Assertion: The bending of a stick appears to take place by different amounts in different liquids.

Reason: Light is refracted in different media by different amount.

16. Assertion: Silver is not used to make electric wires. (1)

Reason: Silver is a bad conductor.

Answer Q. No 17 - 20 contain five sub-parts each. You are expected to answer any four subparts in these questions.

17. Read the following and answer any four questions from 17 (i) to 17 (v) (1×4)

Sonia has a set of five substances. She has a chart stating resistivities of all the substances.

Observe the table

Substance	Resistivity
A	$1.6 \times 10^{-8} \Omega \text{ m}$
B	$44 \times 10^{-8} \Omega \text{ m}$
C	$2.63 \times 10^{-8} \Omega \text{ m}$
D	$2300 \Omega \text{ m}$
E	$10^{17} \Omega \text{ m}$

She has to choose an appropriate substance for performing electrical tasks. Which of the above substance according to you –

(i) Can be used as an insulator

- a) A
- b) B
- c) B as well as C
- d) E

(ii) Can be used for domestic wiring

- a) A
- b) B
- c) A as well as C
- d) D

(iii) Can be utilised in making solar cells and transistors

- a) A
- b) B
- c) C
- d) D

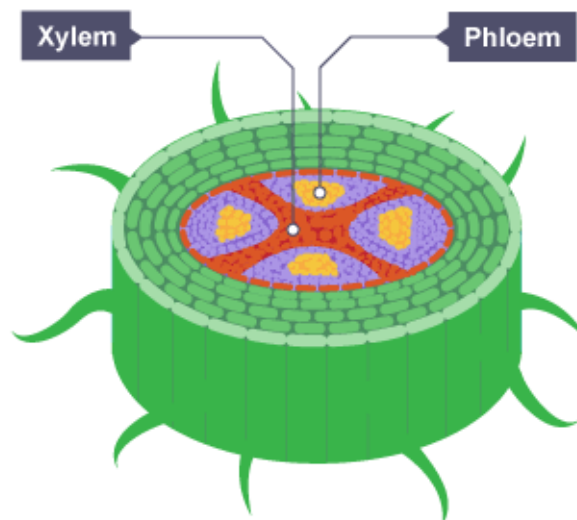
(iv) Is an alloy

- a) A
- b) B

- c) C
- d) E
- (v) Behaves as a semiconductor
 - a) A
 - b) D
 - c) C
 - d) E

18. Read the following and answer any four questions from 18 (i) to 18 (v). (1×4)

Plants have tissues to transport water, nutrients and minerals. Xylem transports water and mineral salts from the roots up to other parts of the plant, while phloem transports sucrose and amino acids between the leaves and other parts of the plant.



- (i) Which of the following processes will not occur in the absence of xylem?
 - a) Transport of water
 - b) Conduction of food
 - c) Transport of minerals
 - d) Both A and C
- (ii) Transport of food by the phloem is called
 - a) Transpiration
 - b) Translocation
 - c) Guttation
 - d) Adhesion
- (iii) Which of the following is not a characteristic of xylem?
 - a) Living cells
 - b) Lack of cytoplasm
 - c) Impermeable to water
 - d) Presence of lignin
- (iv) In phloem transport occurs between where the substances are made i.e. _____ and where they are used or stored i.e. _____.
 - a) Sink, source

- b) Source, sink
 - c) Origin, destination
 - d) Destination, origin
- (v) _____ is the process which involves transport of water and minerals.
- a) Transpiration stream
 - b) Translocation
 - c) Guttation
 - d) Adhesion

19. Read the following and answer any four questions from 19 (i) to 19 (v). (1×4)

In the following table are given eight elements A, B, C, D, E, F, G and H of the modern periodic table with the atomic numbers of the elements in brackets.

Period	Group 1	Group 2
2	A (3)	E (4)
3	B (11)	F (12)
4	C (19)	G (20)
5	D (37)	H (38)

- (i) What is the electronic configuration of B?
 - a) 2,8,2
 - b) 2,8,1
 - c) 2,8
 - d) 2,8,3
- (ii) What is the number of valence electrons in F?
 - a) 1
 - b) 2
 - c) 3
 - d) 4
- (iii) Arrange the size of atoms of E, F, G and H in the decreasing order.
 - a) $E > G > F > H$.
 - b) $G > H > F > E$.
 - c) $H > G > F > E$.
 - d) $H > F > G > E$.
- (iv) Element H is a
 - a) Metal
 - b) Non-metal
 - c) Metalloid
 - d) Inert gas
- (v) Which one has the largest atomic size?
 - a) B
 - b) E
 - c) F
 - d) A

20. Read the following and answer any four questions from 20 (i) to 20 (v). (1×4)

M is an element in the form of a powder. M burns in oxygen and the product obtained is soluble in water. The solution is tested with litmus.

- (i) If M is a metal, then the litmus will turn ____.
 - a) Red
 - b) Blue
 - c) Yellow
 - d) Orange
- (ii) If M is a non-metal, then the litmus will turn ____.
 - a) Red
 - b) Blue
 - c) Yellow
 - d) Orange
- (iii) If M is a reactive metal, then ____ will be evolved when M reacts with dilute sulphuric acid.
 - a) Carbon dioxide gas
 - b) Hydrogen gas
 - c) Nitrogen gas
 - d) Oxygen gas
- (iv) If M is a metal, it will form ____ oxide, which will form ____ solution with water.
 - a) Basic, alkaline
 - b) Acidic, acidic
 - c) Basic, acidic
 - d) Acidic basic
- (v) If M is a non-metal, it will not conduct electricity in the form of ____.
 - a) Diamond
 - b) Graphite
 - c) Cesium
 - d) Zinc

Section B

21.

(a) An electric heater connected to the 240 V main supply draws a current of 10 A.

Find:

- (i) Power of the heater
- (ii) Energy consumed in 2 minutes (2)

OR

When a 6Ω resistor is connected across the terminals of an 18 V battery, Calculate the coulomb passing through the resistor per second. (2)

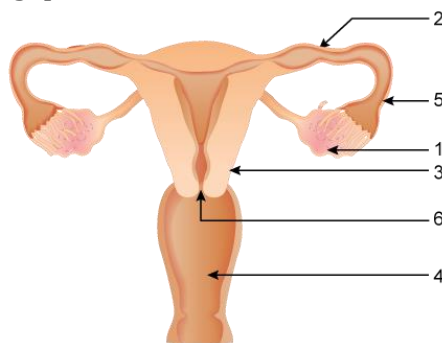
22. If the focal length of a convex mirror is 15 cm, what is its radius of curvature? (2)

23. How is oxygen and carbon dioxide transported in human beings? (2)

OR

How is food transported in plants?

24. The diagram given below represents a system in the human body. Study the diagram and answer the following questions: (2)



- (i) Label the parts marked 5 and 6.
(ii) Name the two hormones secreted by 1.
25. State which of the following chemical reactions will take place or not, giving suitable reason for each. (2)
- (i) $\text{Zn}_{(s)} + \text{CuSO}_{4(aq)} \rightarrow \text{ZnSO}_{4(aq)} + \text{Cu}_{(s)}$
(ii) $\text{Fe}_{(s)} + \text{ZnSO}_{4(aq)} \rightarrow \text{FeSO}_{4(aq)} + \text{Zn}_{(s)}$
26. Anhydrous hydrogen chloride is not an acid but its aqueous solution is a strong acid. Explain. (2)

Section C

27. (3)
- (a) What is an ecosystem? List the two main components of an ecosystem.
(b) We do not clean ponds or lakes on a regular basis, but an aquarium needs to be cleaned regularly. Explain.

OR

- (a) Give two examples of decomposers present in an ecosystem.
(b) How is the presence of decomposers crucial in the ecosystem?
28. An electric heater of resistance $10\ \Omega$ and resistance wire of $8\ \Omega$ are connected in series with a $6\ \text{V}$ battery. Find (3)
- i) Current through the circuit
ii) Potential difference across the electric heater
iii) Potential difference across electric wire

29. The face of a person is 24 cm long and 20 cm wide. What is the minimum size of the mirror required to see the full face? (3)
30. Distinguish between biodegradable and non-biodegradable substances. List two effects of each of them on our environment. (3)
31. What are the methods used by plants to get rid of excretory products? (3)
32. (3)
- (a) What is the role of the seminal vesicles and the prostate gland?
- (b) If a woman is using a copper-T, will it help in protecting her from sexually transmitted disease?
33. In one of the industrial processes used for the manufacture of sodium hydroxide, a gas 'X' is formed as a by-product. Gas 'X' reacts with lime water to give a compound 'Y' which is used as a bleaching agent in the chemical industry. Identify 'X' and 'Y' giving the chemical equation of the reaction. (3)

Section D

34. (5)
- (a) What is the advantage of having a four-chambered heart? Support your answer with a diagram of the section of the human heart.
- OR**
- (a) Explain transport of food and other substances in plants.
- (b) Diffusion will not be sufficient to provide raw materials in leaves and energy in roots in plants; therefore, a proper system of transpiration is essential. Explain.
- 35.
- (a) What do you mean by linear magnification produced by mirrors?
- (b) The power of a lens is +1.5 D. What kind of lens is it and what is its focal length?
- (c) Draw a ray diagram of an image when an object is placed on the principal axis of a convex lens between the focus and the optical centre. (5)
36. (a) A student was given Mg, Zn, Fe and Cu metals. He put each of them in dil. HCl contained in different test tubes. Identify which of them
- (i) will not displace H_2 from dil. HCl
- (ii) forms a pale green substance
- (iii) will give H_2 with 5% HNO_3
- (iv) will be displaced from its salt solution by all other metals
- (b) List any two observations when a highly reactive metal is dropped in water. (5)
- OR**
- (a) What is a homologous series? Explain with an example.

- (b) State two characteristics of a homologous series.
- (c) The molecular formula of an organic compound is $C_{18}H_{36}$. Name its homologous series.
- (d) Select the hydrocarbons which belong to the same homologous series. Give the name of each series.
 CH_4 , C_2H_2 , C_2H_4 , C_2H_6 , C_4H_{10} , C_3H_4 , C_3H_6
- (e) What is meant by 'heteroatom'? Give examples. Write the names and formulae of two organic compounds containing different heteroatoms.

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Sample Paper 12 – Solution

Section A

1. DNA copying is essential for inheritance of features from parents to the next generation.

OR

The embryo gets nourishment through the placenta.

2. Variations enable a species to adapt according to the changes and new needs and thus provide survival of species.
3. (a) Pulmonary artery carries only deoxygenated blood.
4. An indicator for identification of acid are methyl red.
5. Water of crystallization: It is the fixed amount of water that is present in a crystal as an integral part of its constitution. Hydrated salts are salts having water of crystallisation.
6. Aluminium comes before iron in the metal activity series so it can displace iron from iron salts; thus, food containing iron salts should not be cooked in aluminium utensils.

OR

The metal which is present in abundance in earth's crust is aluminium.

The non-metal which is present in abundance in the earth crust is oxygen.

7. Bromine
8. Graphite is used as a lubricant in the form of graphite powder or mixed with petroleum jelly or with any lubricant oil to form graphite grease.
9. Carbon forms covalent bonds because it can achieve the inert gas electron arrangement only by sharing of electrons.

OR

10. $I = \frac{Q}{T} = \frac{40}{10} = 4 \text{ A}$

11. Voltmeter has a high resistance so that it takes a negligible current from the circuit.

OR

According to Fleming's left-hand rule direction of force will be in South direction.

12. At focus F

OR

A lens is a piece of transparent glass bound by two spherical surfaces.

13. By reducing the length of element, the resistance will decrease.

14. b) Both A and R are true, but R is not the correct explanation of the assertion.
Arteries carry blood under high pressure and hence, they are thick walled.

15. a) Both A and R are true and R is the correct explanation of A.
In vacuum speed of light is independent of wavelength and hence no dispersion occurs in vacuum. Thus, vacuum is non - dispersive medium in which all colours travel with the same speed.

OR

a) Both A and R are true, and R is the correct explanation of the assertion.
The bending of the stick appears to take place by different amounts in different liquids because light is refracted in different media by different amounts.

16. c) A is true but reason R is false
Silver is a good conductor of electricity but it is not used to make electric wires because it is expensive.

Section B

17.

(i) d) E

Substance E can be used as an insulator.

(ii) c) A as well as C

Substances A and C can be used for the purpose of domestic wiring.

(iii) d) D

Substance D can be used to make solar cells.

(iv) b) B

An alloy has resistivity higher than a pure metal but lesser than a semiconductor.
Thus, substance B is an alloy.

(v) b) D

Substance D is semiconductor.

18.

(i) d) Xylem helps in the transport of water and minerals in the plant.

(i) b) Transport of food by the phloem is called translocation.

(ii) a) Xylem tissue consists of dead cells.

- (iii) b) From the left ventricle the blood is pumped through the aorta to different parts of the body.
- (iv) b) In phloem transport occurs between where the substances are made i.e. source and where they are used or stored i.e. sink.
- (v) a) Transpiration stream is the process which involves transport of water and minerals.

19.

- (i) (b) B has electronic configuration 2, 8, 1.
- (ii) (b) F has 2 valence electrons.
- (iii) (c) The decreasing order of the size of atoms is $H > G > F > E$.
- (iv) (a) H is a metal.
- (v) (a) B has the largest atomic size.

20.

- (i) (b) blue
- (ii) (a) red
- (iii) (b) hydrogen gas
- (iv) (a) basic, alkaline
- (v) (b) graphite

Section B

21.

- (i) $P = VI$
 $P = 240 \times 10 = 2400 \text{ W}$
- (ii) Energy consumed = $VIt = 2400 \times 120 = 28800 \text{ Joules}$

OR

$$V = IR; 18 = I \times 6; I = 3 \text{ A}$$

$$3 \text{ A} \Rightarrow 3 \text{ C/s}$$

- 22.** Focal length (f) = 15 cm
 Radius of curvature (R) = ?
 We know that
 $f = R/2$
 $15 = R/2$
 $R = 15 \times 2$
 $R = 30 \text{ cm}$

- 23.** Oxygen and carbon dioxide are transported in human beings with the help of transportation system.
- Transport of oxygen:** The air present in the alveolar sacs have high concentration of oxygen, while the blood capillaries surrounding the alveolar sacs are deficient in

oxygen. Oxygen diffuses from the alveoli to the blood capillaries where it combines with the haemoglobin to form oxyhaemoglobin. Then the blood reaches the tissues where oxyhaemoglobin breaks into haemoglobin and oxygen. This oxygen enters the cells.

Transport of carbon dioxide: The tissues have high concentration of carbon dioxide than the blood entering them. Therefore, carbon dioxide diffuses from the tissues into the blood. Then it reaches the lungs where it diffuses into the alveoli, and expelled out into the atmosphere through the respiratory tract.

OR

The food is transported in plants both in upward and downward direction through phloem tissues, which consist of sieve tubes and companion cells. The translocation in

phloem occurs with the expenditure of energy. Sucrose is the main form of carbohydrate which is transferred into the phloem tissues using energy from ATP. When sucrose is synthesised in the leaf cells, the osmotic pressure of the cells increases causing water to move into it. This causes translocation of sucrose in the form of solution from the point of synthesis to the points having less pressure. This allows the phloem to move material according to the plant needs.

24.

(i) 5: Funnel of the fallopian tube/oviduct
6: Cervix

(ii) Hormones secreted by 1 (ovary):

- Oestrogen
- Progesterone

25.

(i) $\text{Zn}_{(s)} + \text{CuSO}_{4(aq)} \rightarrow \text{ZnSO}_{4(aq)} + \text{Cu}_{(s)}$

In this reaction, zinc displaces copper from copper sulphate solution, so that copper is set free. This displacement reaction takes place because zinc is more reactive than copper.

(ii) $\text{Fe}_{(s)} + \text{ZnSO}_{4(aq)} \rightarrow \text{FeSO}_{4(aq)} + \text{Zn}_{(s)}$

This reaction does not take place because Fe is less reactive than Zn.

26. Anhydrous hydrogen chloride is not an acid but its aqueous solution is a strong acid because anhydrous means without water and we know that the property of acidity is shown by a substance only when it is dissolved in water or its aqueous solution is prepared.

Section C

27.

- (a) An ecosystem is a self-sustaining system where the two main components—biotic and abiotic components—of various communities live together and interact with each other.

The biotic system consists of all the living organisms of a particular area including humans, animals etc. The abiotic system consists of the non-living components including air, minerals, soil, water and sunlight.

- (b) A pond is an example of a natural ecosystem, whereas an aquarium is an example of an artificial ecosystem. Ponds do not need to be cleaned on a regular basis because they have natural flora and fauna present in them which helps in cleaning the pond ecosystem. However, an aquarium does not contain soil and decomposing bacteria which help in degrading complex organic substances into simpler inorganic substances. Therefore, an aquarium needs to be cleaned regularly.

OR

- (a) Bacteria and fungi are examples of decomposers present in an ecosystem.
- (b) Decomposers breakdown or decompose the dead remains of plants and animals and their waste organic products into simpler, inorganic substances. The latter are released into the environment for their reuse as raw materials by producers. Thus, decomposers provide space for new life to settle in the biosphere. Hence, their presence is crucial to the functioning of the ecosystem.

28.

i)

$$V = IR$$

$$6 = I \times (8 + 10)$$

$$I = 6 / 18 = 1 / 3 \text{ A}$$

ii)

$$V_{\text{electric heater}} = \frac{1}{3} \times 10 = \frac{10}{3} \text{ V}$$

iii)

$$V_{\text{electric wire}} = \frac{1}{3} \times 8 = \frac{8}{3} \text{ V}$$

29. The size of the mirror required to see the full face should be half the size of the face. Hence, the mirror should be $24/2 = 12$ cm long and $20/2 = 10$ cm wide. The mirror should be placed with the longer side vertical and the eyes kept at proper height.

30. Biodegradable substances: Substances which can be broken down by microorganisms such as bacteria and fungi are called biodegradable substances. Examples: Paper, vegetable and fruit peels, human excreta

Non-biodegradable substances: Substances which cannot be broken down by microorganisms into simpler and harmless substances are called non-biodegradable substances. Examples: Polythene bags, aluminium cans, DDT

Effects of biodegradable substances:

- They produce a foul smell causing air pollution. If thrown in water, they cause water pollution.
- They serve as a breeding ground for flies and mosquitoes which are carriers of malaria.

Effects of non-biodegradable substances:

- Non-biodegradable pesticides and fertilisers run off with rainwater into water bodies and cause water pollution and affect the soil making it acidic or alkaline.
- Some non-biodegradable pesticides enter the food chain and badly affect humans and other organisms.

31. Methods used by plants to get rid of excretory products:

- Plants get rid of the oxygen produced during photosynthesis by its diffusion through stomata and lenticels.
- They get rid of excess water by transpiration.
- Many waste products are stored in cell vacuoles.
- Some wastes are removed in the falling leaves.
- Other, wastes are stored as resins and gums, especially in old xylem.
- Plants also get rid of some waste products by excreting into the surrounding soil.

32.

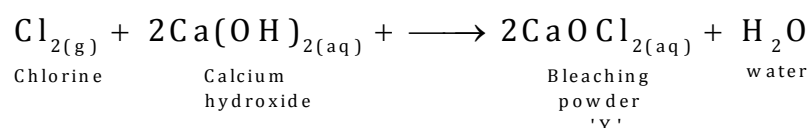
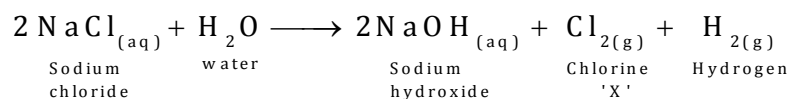
(a) The prostate gland makes the medium of semen alkaline as sperms require an alkaline medium to thrive. The seminal vesicle adds fluid content to the semen.

(b) No, because the copper-T just hampers the process of implantation of embryo in the uterine wall but not provides protection against sexually transmitted diseases.

33. X is chlorine gas.

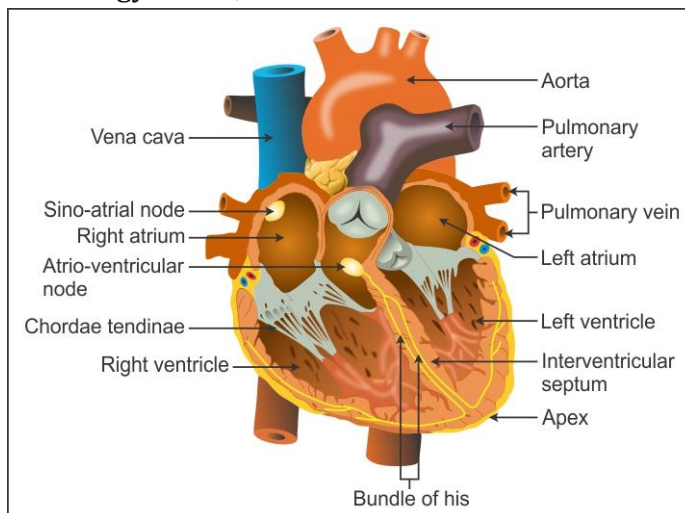
Y is bleaching powder.

Equations involved are



Section D

34. In a four-chambered heart, the left half is completely separated from the right half by septa. This prevents oxygenated and deoxygenated blood from mixing. It allows a highly efficient supply of oxygenated blood to all parts of the body. This is useful in animals that have energy needs, such as birds and mammals.



OR

- (a) The transport of soluble products of photosynthesis is called translocation and it occurs in the part of the vascular tissue known as phloem. Besides the products of photosynthesis, the phloem transports amino acids and other substances. These substances are especially delivered to the storage organs of roots, fruits and seeds and to growing organs.

The translocation of food and other substances takes place in the sieve tubes with the help of adjacent companion cells in both upward and downward directions.

- (b) If the distances between soil-contacting organs and chlorophyll-containing organs are small, energy and raw materials can easily diffuse to all parts of the plant body. But if these distances become large because of changes in the plant body design, diffusion processes will not be sufficient to provide raw material in leaves and energy in roots. A proper system of transportation is therefore essential in such situations.

35.

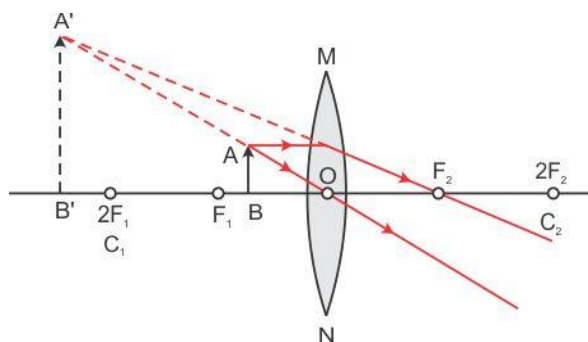
- (a) The linear magnification produced by a mirror is defined as the ratio of the height of the image to the height of the object.
- (b) The power of the lens has a positive sign; so, it is a convex lens.

$$\text{Power, } P = \frac{1}{f}$$

$$f = \frac{1}{P} = \frac{1}{2.5}$$

$$f = 0.4 \text{ m} = 40 \text{ cm}$$

So, focal length, $f = 40 \text{ cm}$



- (c) When the object is between the focus and the optical centre of a convex lens, the image formed is
- Beyond the focus
 - Virtual and erect
 - Enlarged

36.

(a)

- Cu
- Fe
- Cu
- Cu

(b) (i) Highly exothermic; (ii) the metal starts floating in water

OR

(a) A homologous series is a group of organic compounds having similar structures and similar chemical properties in which the successive compounds differ by a CH_2 group.

Homologous series of alkanes: Methane, CH_4 ; Ethane, C_2H_6 ; Propane, C_3H_8 ; Butane, C_4H_{10} ; Pentane, C_5H_{12}

(b) (i) All the members of the homologous series can be represented by the same general formula.

(ii) Any two adjacent homologues differ by 1 carbon atom and 2 hydrogen atoms in their molecular formulae.

(c) Alkene, C_nH_{2n}

(d) Alkanes: CH_4 , C_2H_6 , C_4H_{10}

Alkenes: C_2H_4 , C_3H_6

Alkynes: C_2H_2 , C_3H_4

(e) In an organic compound, any atom other than carbon and hydrogen is called a heteroatom. Examples: Chlorine (Cl), Bromine (Br), Oxygen (O). In chloromethane (CH_3Cl), chlorine is the heteroatom. In methanol (CH_3OH), oxygen is the heteroatom.