

# TERM-1

# SAMPLE PAPER

## SOLVED

# SCIENCE

Time Allowed: 90 Minutes

Maximum Marks: 40

**General Instructions:** Same instructions as given in the Sample Paper 1.

### SECTION - A

(Section A consists of 24 questions. Attempt any 20 questions from this section.  
The first attempted 20 questions would be evaluated.)

1. In the reaction  $\text{PbS} + 2\text{H}_2\text{O}_2 \rightarrow \text{PbSO}_4 + 4\text{H}_2\text{O}$ , select the option that correctly identifies substance oxidized and substance reduced.

- (a) PbS is oxidized and  $\text{H}_2\text{O}$  is reduced  
 (b)  $\text{PbSO}_4$  is oxidized and  $\text{H}_2\text{O}_2$  is reduced  
 (c) PbS is oxidized and  $\text{H}_2\text{O}_2$  is reduced  
 (d)  $\text{PbSO}_4$  is reduced and  $\text{H}_2\text{O}_2$  is oxidized

2. The chemical formula of few hydrated salts is given in the table below.

	Name of salt	Chemical formula
(I)	Gypsum	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
(II)	Washing soda	$\text{Na}_2\text{CO}_3 \cdot 5\text{H}_2\text{O}$
(III)	Copper Sulphate	$\text{CuSO}_4 \cdot 10\text{H}_2\text{O}$
(IV)	Plaster of Paris	$\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

Select the rows containing the incorrect number of molecules of water of crystallization in each salt.

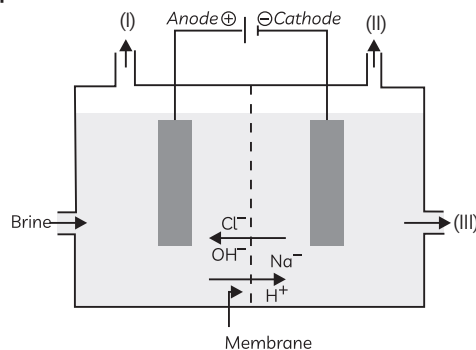
- (a) Both (I) and (II)  
 (b) Both (II) and (III)  
 (c) Both (I) and (III)  
 (d) Both (III) and (IV)
3. Hydrogen is placed along with Alkali metals in the modern periodic table though it shows non-metallic character

- (a) as Hydrogen has one electron & readily loses electron to form negative ion.  
 (b) as Hydrogen can easily lose one electron like alkali metals to form positive ion.  
 (c) as Hydrogen can gain one electron easily like Halogens to form negative ion.  
 (d) as Hydrogen shows the properties of non-metals.

4. Which of the following equations correctly represents the physical states of reactants and products?

- (a)  $2\text{FeSO}_4(\text{aq}) \rightarrow \text{Fe}_2\text{O}_3(\text{aq}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$   
 (b)  $2\text{FeSO}_4(\text{s}) \rightarrow \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$   
 (c)  $2\text{FeSO}_4(\text{s}) \rightarrow \text{Fe}_2\text{O}_3(\text{aq}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$   
 (d)  $2\text{FeSO}_4(\text{aq}) \rightarrow \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$

5. The figure below depicts the Chlor alkali process.



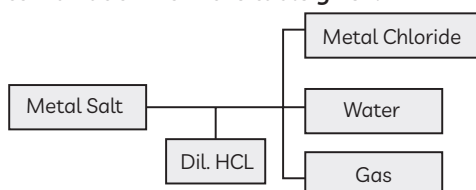
Select the row containing correct identification of the products labelled as I, II and III and their use.

	(I)	(II)	(III)
(a)	Cl <sub>2</sub>	H <sub>2</sub>	NaOH
(b)	Cl <sub>2</sub>	NaOH	H <sub>2</sub>
(c)	H <sub>2</sub>	Cl <sub>2</sub>	NaOH
(d)	H <sub>2</sub>	NaOH	Cl <sub>2</sub>

6. Observe the table given below and match the reaction given in column I with the type of reaction given in column II.

Column I	Column II
(A) $Zn_{(s)} + CuSO_{4(aq)} \rightarrow ZnSO_{4(aq)} + Cu_{(s)}$	(I) Double Displacement Reaction
(B) $NH_{3(g)} + HCl_{(g)} \rightarrow NH_4Cl_{(s)}$	(II) Displacement Reaction
(C) $AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$	(III) Decomposition Reaction
(D) $2KClO_{3(s)} \rightarrow 2KCl_{(s)} + 3O_{2(g)}$	(IV) Combination Reaction

- (a) (A)- (I) ; (B) - (IV) ; (C) - (II) ; (D) - (III)  
 (b) (A)- (I) ; (B) - (IV) ; (C) - (III) ; (D) - (II)  
 (c) (A)- (II) ; (B) - (IV) ; (C) - (III) ; (D) - (I)  
 (d) (A)- (II) ; (B) - (IV) ; (C) - (I) ; (D) - (III)
7. During reaction of which metals with cold water, hydrogen gas catches fire?  
 (I) Sodium  
 (II) Calcium  
 (III) Magnesium  
 (IV) Potassium
- (a) Both (I) and (II)  
 (b) Both (III) and (IV)  
 (c) Both (I) and (IV)  
 (d) Both (II) and (IV)
8. Observe the reaction between metal salt and dilute HCl and select the correct combination from the table given:



	Metal Salt	Gas
(I)	Calcium Chloride	H <sub>2</sub>
(II)	Calcium Carbonate	CO <sub>2</sub>
(III)	Sodium Hydrogen Carbonate	CO <sub>2</sub>
(IV)	Sodium Carbonate	H <sub>2</sub>

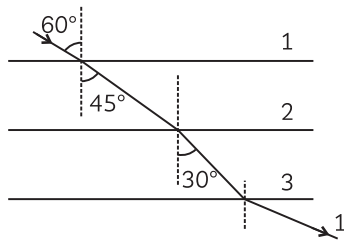
- (a) Both (I) and (II)  
 (b) Both (II) and (III)  
 (c) Both (I) and (III)  
 (d) Both (III) and (IV)
9. The effect of gas formed by heating sulphur powder on litmus paper is:  
 (a) It turns both dry blue litmus paper and moist blue litmus paper red.  
 (b) It turns dry blue litmus paper red but has no effect on moist blue litmus paper.  
 (c) It has no effect on dry blue litmus paper but turns moist blue litmus paper red.  
 (d) It has no effect on both dry blue litmus paper and moist blue litmus paper.
10. Which of the following metals form an amphoteric oxide?  
 (a) Al (b) Na  
 (c) Cu (d) Ca
11. Fungi are:  
 (a) Heterotrophic (b) Autotrophic  
 (c) Saprophytic (d) Parasitic
12. In humans, there are ..... pairs of salivary glands.  
 (a) Two (b) Three  
 (c) Six (d) Four
13. Which pancreatic enzyme helps in digesting proteins?  
 (a) Pepsin (b) Trypsin  
 (c) Chylomicrons (d) Both (a) and (b)
14. Why are arteries thick walled?  
 (a) They are under low pressure  
 (b) So that blood does not exude from the vessels  
 (c) They are under high pressure  
 (d) Both (b) and (c)
15. Name the cartilaginous flap which closes the opening of wind pipe during swallowing:  
 (a) Glottis (b) Epiglottis  
 (c) Gullet (d) Epivalve
16. Study the flow chart given below representing the transport of oxygen and carbon dioxide in human beings.

Air → Nostril → W → Windpipe → X → Lungs  
 → Y → Blood → Z

Choose the correct option in the given table:

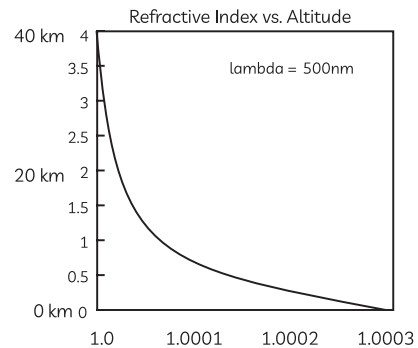
	W	X	Y	Z
(a)	Pharynx	Bronchi	Alveoli	Tissue
(b)	Alveoli	Tissue	Bronchi	Pharynx
(c)	Tissue	Alveoli	Pharynx	Bronchi
(d)	Bronchi	Pharynx	Alveoli	Tissue

17. A ray of light is incident obliquely on medium 1 and then passes through two media namely 2 and 3 before emerging into medium 1 again.



The refractive index of medium 3 with respect to medium 1 is:

- (a)  $\frac{1}{2}$                       (b)  $\frac{\sqrt{3}}{2}$   
 (c)  $\frac{1}{\sqrt{2}}$                     (d)  $\sqrt{3}$
18. The power of a lens of focal length 20 cm in diopter is:  
 (a) 0.25 D                      (b) 2.0 D  
 (c) 5.0 D                        (d) 0.05 D
19. If the magnification of a lens has a positive value, the image formed is:  
 (a) inverted  
 (b) real and inverted  
 (c) real  
 (d) Virtual and erect
20. An object is placed 40 cm from the concave mirror with a focal length of 20 cm. The image formed is:  
 (a) behind the mirror  
 (b) between the mirror and focus  
 (c) at focus  
 (d) centre of curvature of mirror
21. The graph below shows variation of refractive index of earth's atmosphere with altitude.



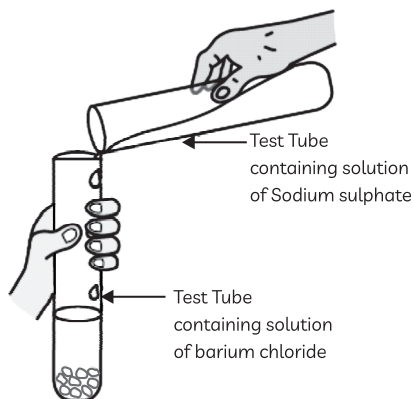
Select the correct observations:

- (I) The refractive index of earth is gradually increasing with decrease in altitude.  
 (II) Star light will get scattered more on entering the earth's atmosphere before reaching earth's surface.  
 (III) Star light will get bend more away from the normal as it reaches the earth's surface.  
 (IV) Star light will get bend more towards the normal as it reaches the earth's surface.
- (a) Both (I) and (III)  
 (b) Both (I) and (IV)  
 (c) Both (II) and (III)  
 (d) Both (II) and (IV)
22. Velocity of light in air is  $3 \times 10^8$  m/s and its velocity in a medium X is  $1.0 \times 10^8$  m/s. Then, refractive index of medium X is:  
 (a) 3                              (b) 5  
 (c) 0.5                          (d) 2
23. Which of the following phenomenons of light are involved in the formation of rainibow?  
 (a) Reflection, refraction and dispersion  
 (b) Refraction, dispersion and total internal reflection  
 (c) Refraction, dispersion and internal reflection  
 (d) Dispersion, scattering and total internal reflection
24. At the traffic signals, red light is used for stop due to the reason that it can be seen from a distance. This phenomenon is known as:  
 (a) Refraction  
 (b) Diffraction  
 (c) scattering  
 (d) Total internal reflection

## SECTION - B

(Section B consists of 24 questions (Q. No. 25 to 48). Attempt underline questions from this section.  
The first attempted 20 questions would be evaluated.)

- 25.** As red light has highest wavelength to visible spectrum, therefore red lights scatters least. Identify the precipitate formed and the type of reaction of reaction in the following experiment:



	Precipitate formed	Type of Reaction
(a)	Barium Sulphate	Double Decomposition Reaction
(b)	Barium Sulphate	Double Displacement Reaction
(c)	Sodium Chloride	Displacement Reaction
(d)	Sodium Chloride	Double Displacement Reaction

- 26.** Calcium phosphate is present in tooth enamel. What happen when we consume sweets?
- We suffer from diabetes
  - Dissolution of enamel
  - No effect on teeth is observed
  - Teeth become weak from roots
- 27.** Which of the following show a chemical reaction?
- $\text{MgSO}_4 + \text{Fe}$
  - $\text{ZnSO}_4 + \text{Fe}$
  - $\text{CaSO}_4 + \text{Pb}$
  - $\text{CuSO}_4 + \text{Fe}$
- 28.** Which of the following metals melt when kept on your palm?
- Sodium
  - Mercury
  - Caesium
  - Gallium
- (I) and (III)
  - (II) and (IV)
  - (III) and (IV)
  - (II) and (III)

- 29.** Which of the following can be used as an acid-base indicator by a visually impaired student?

- Red cabbage leaf extract
  - Turmeric
  - Vanilla essence
  - Onion extract
- Both (I) and (II)
  - Both (II) and (III)
  - Both (III) and (IV)
  - (I), (III) and (IV)

- 30.** Which acids are present in oranges and spinach?

- Citric acid in both
- Oxalic acid in both
- Oxalic acid and citric acid respectively
- Citric acid and oxalic acid respectively

Question No. 31 to 34 consist of two statements—Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

Options:

- Both A and R are true, and R is the correct explanation of A.
- Both A and R are true, but R is not the correct explanation of A.
- A is true but R is false.
- A is false but R is true.

- 31.** Assertion (A): Quicklime reacts vigorously on dissolving in water releasing a large amount of heat.

Reason (R): This chemical reaction is an exothermic reaction.

- 32.** Assertion (A): Food cans are not coated with zinc.

Reason (R): Because zinc is less reactive than tin.

- 33.** Assertion (A): Diffusion process does not meet high energy requirement of multicellular organism.

Reason (R): Diffusion is a fast process but only occurs at the surface of the body.

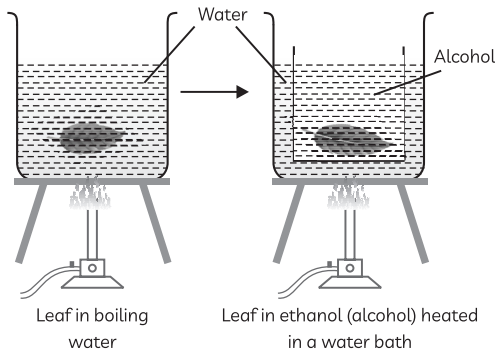
- 34.** Assertion (A): In prism, higher the refractive index, lower will be the angle of deviation.

Reason (R): The angle of deviation is inversely proportional to the angle of the prism.

- 35.** Identify the option from the table given below that correctly represents the cation and anion in the formation of Magnesium Chloride.

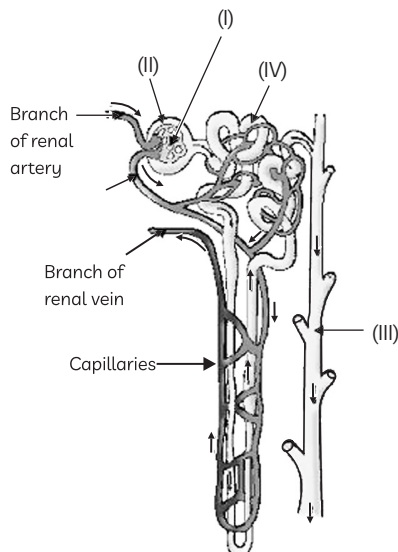
Option	Cation	Anion
(a)	[Mg <sup>+</sup> ]	[Cl <sup>-</sup> ]
(b)	[Mg <sup>+</sup> ]	2[Cl <sup>-</sup> ]
(c)	[Mg <sup>2+</sup> ]	2[Cl <sup>-</sup> ]
(d)	[Mg <sup>2+</sup> ]	[Cl <sup>2-</sup> ]

36. In the activity to demonstrate that chlorophyll is essential for photosynthesis, a potted plant with variegated leaves is first taken and kept in a dark room for three days after which it is kept in sunlight for about six hours. The leaf is then plucked, the green areas traced and then the leaf is first dipped in boiling water for a few minutes and then immersed in a beaker containing alcohol as shown in diagram below:



The reason why leaf is immersed in hot alcohol is to:

- (a) remove chlorophyll  
 (b) stop photosynthesis  
 (c) dissolve starch  
 (d) dissolve phloem
37. The part of the alimentary canal where complete digestion of food takes place is:  
 (a) Mouth cavity (b) Stomach  
 (c) Liver (d) Small intestine
38. Observe the diagram of structure of nephron.

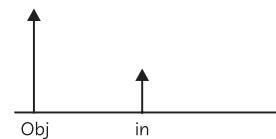


Match the labeling referred in column I and correlate with the function/structure in column II.

Column I	Column II
(I)	(A) Double walled cup shaped structure present at the upper end of the nephron.
(II)	(B) Selective reabsorption of glucose, amino acids, water, salt etc
(III)	(C) Bundle of blood capillaries present in the Bowman's capsule
(IV)	(D) Collects urine from the nephrons

- (a) (I) - (D); (II) - (B); (III) - (A); (IV) - (A)  
 (b) (I) - (A); (II) - (C); (III) - (D); (IV) - (B)  
 (c) (I) - (C); (II) - (D); (III) - (B); (IV) - (A)  
 (d) (I) - (C); (II) - (A); (III) - (D); (IV) - (B)

39. A student marked the position of an object and its image formed by a lens as shown in the figure below:



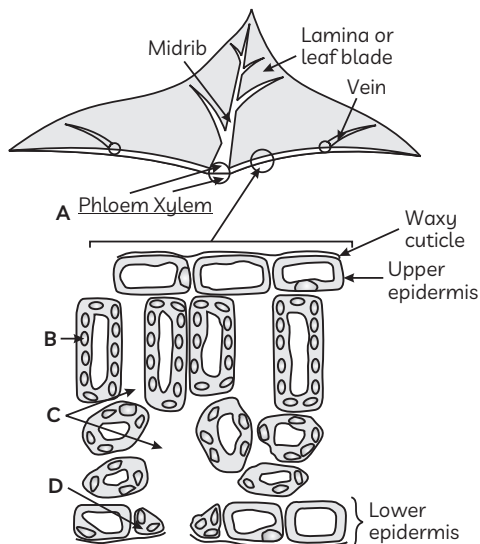
Select the row containing the correct identification of lens and position of object:

Option	Type of lens	Position of Object
(a)	Concave lens	Between infinity and Optical Centre of lens
(b)	Concave lens	Between Focus and optical Centre of lens
(c)	Convex lens	Between infinity and 2F
(d)	Convex lens	Between Focus and optical Centre of lens

40. When an object is placed in front of a converging lens, a magnified erect image is formed. The distance of the object from the lens will be:

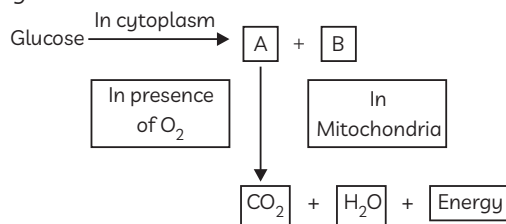
- (a) Equal to two focal lengths  
 (b) Between one and two focal lengths  
 (c) Equal to one focal length  
 (d) Less than one focal length

41. The following diagram show the cross-section of leaf.



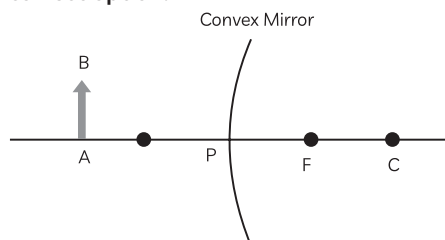
Choose the correct option with respect to the function of labelled parts:

- (a) A- Helps in transportation of gases throughout the length of plants  
 (b) B- Convert chemical energy into light energy via the photosynthetic process.  
 (c) C- Allows gaseous exchange between the leaf and the outside atmosphere through the stomata  
 (d) D- Guard cells from pathogen attacks
42. The glucose breakdown pathway in case of aerobic respiration is shown in the flow chart given below.



The breakdown of pyruvate to give carbon dioxide, water and energy takes place in

- (a) cytoplasm (b) mitochondria  
 (c) chloroplast (d) nucleus.
43. Look at the figure given below and select the correct option.



- (a) Image formed is virtual, erect and magnified  
 (b) Image formed is virtual, erect and diminished  
 (c) Image formed is real, inverted and magnified  
 (d) Image formed is real, inverted and diminished.

44. A convex lens of local length 20 cm is placed in contact with a concave lens of local length 40 cm. The local length of this combination of lenses will be:

- (a) + 40 cm  
 (b) + 20 cm  
 (c) - 40 cm  
 (d) - 20 cm

45. To obtain an image of magnification (-3), an object should be in which position in case of concave mirror?

- (a) Between F and 2 F  
 (b) At F  
 (c) Between F and C  
 (d) Beyond 2 F

46. Why the sun appears white at noon?

- (a) scattering is reduced if the distance to be travelled in air is increased.  
 (b) scattering is increased if the distance to be travelled in air is reduced.  
 (c) scattering is reduced if the distance to be travelled in air is reduced.  
 (d) the sun is overhead at noon

47. Which colour suffers least deviation on passing through a prism?

- (a) Blue  
 (b) Red  
 (c) White  
 (d) Violet

48. A compound is formed between A and B by transfer of electrons from A to B. Which of the following properties will be shown by the compound?

- (I) It has high melting point  
 (II) It occurs as solid  
 (III) It is generally malleable  
 (IV) It conducts electricity in solid state.

- (a) Both (I) and (II)  
 (b) Both (I) and (III)  
 (c) Both (II) and (IV)  
 (d) Both (III) and (IV)

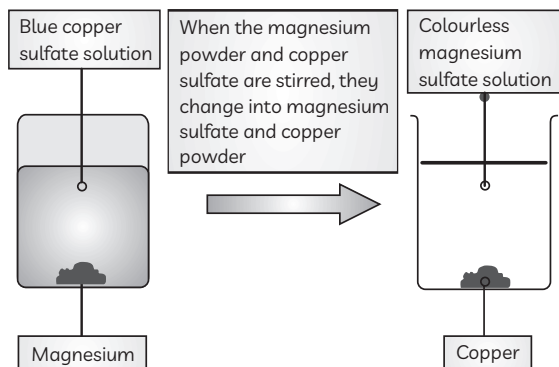


## SECTION - C

(Section C consists of three Cases followed by questions. There are a total of 12 questions in this section. Attempt any 10 questions from this section. The first attempted 10 questions would be evaluated.)

Q. 49 to 52 are based on Case Study-1

Case 1:



Some metals are more reactive than others. In an experiment, a strip of metal is added to a solution of a compound of another metal. A more reactive metal displaces (pushes out) a less reactive metal from its compound.

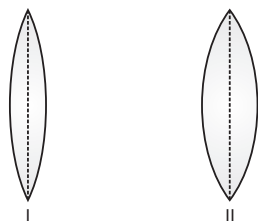
49. On keeping the iron nails dipped in copper sulphate solution for about 30 minutes the changes you will observe is:
- Iron nails become brownish in colour and the blue colour of copper sulphate solution fades.
  - Iron nails become brownish in colour and the blue colour of copper sulphate solution changes to orange.
  - Iron nails become bluish in colour and the blue colour of copper sulphate fades.
  - No reaction takes place.
50. When hydrogen sulphide gas is passed into an aqueous solution of copper sulphate?
- Displacement reaction takes place
  - Black precipitate of copper sulphide is obtained
  - Yellow precipitate of copper oxide is obtained
  - Both (a) and (b)
51. Displacement reaction is also known as:
- precipitation reaction
  - combination reaction
  - substitution reaction
  - none of the above
52. On adding dilute hydrochloric acid to the reaction mixture of sodium sulphate and barium chloride, white precipitate disappears. Which of the following is correct explanation?
- HCl decomposes barium sulphite
  - barium chloride is insoluble in water
  - displacement reaction takes place
  - barium sulphite is a salt of strong acid
- Q. 53 to 56 are based on Case Study-2
- Case 2: The human heart, is an organ that pumps blood throughout the body via circulatory system, supplying oxygen and nutrients to the tissues and removing carbon dioxide and other wastes. A heart attack occurs when the flow of blood to the heart is blocked. The blockage is most often a buildup of fat, cholesterol and other substances, which form a plaque in the arteries that feed the heart (coronary arteries). The plaque eventually breaks away and form a clot. The interrupted blood flow can damage or treatment has improved dramatically over the years.
- Not all people who have heart attacks have the same symptoms or have the same severity of symptoms'
53. The function of heart is:
- To lubricate the food for swallowing and helps in digestion of starch.
  - To receive blood from the veins and pumps it into the arteries.
  - To carry digested and absorbed fat from intestine and drains excess fluid from extra cellular space back into the blood.
  - To receive blood from the arteries and pump it into the veins
54. Which of the following statement is not correct?
- Human heart allows mixing of oxygenated and deoxygenated blood.
  - Deoxygenated blood poured into right artium of heart.
  - Human heart does not allow mixing of deoxygenated and oxygenated blood.
  - Both (b) and (c) are incorrect.
55. Which of the following statement(s) is incorrect?
- Vein are thin walled
  - Arteries are thick walled
  - Capillaries are thick walled
  - Both (b) and (c) are incorrect.

56. Which of the following are common heart attack symptoms?
- Nausea or heartburn
  - Shortness of breath, Cold and Cough
  - Chest tightness and chest pain
  - Both (a) and (c)

Q. 57 to 60 are based on Case Study-3

**Case 3:** Lenses made of transparent materials such as glass or plastic with curved surfaces. Diverging lenses are thicker at their edges than at their centres and make light rays passing through them spread out. Converging lenses are thicker in middle than at edges and make light rays passing through them focus at a point.

57. Abhishek uses two lenses I and II of same size and same material as shown  $P_1$  and  $P_2$  are the powers of A and B. An object is kept at the same distance from the lenses between  $F$  and  $2F$  of each lens on the principal axis in turn. Let  $I_1$  and  $I_2$  be the image formed by two lenses respectively. Which one of the following statements is correct for the images formed?



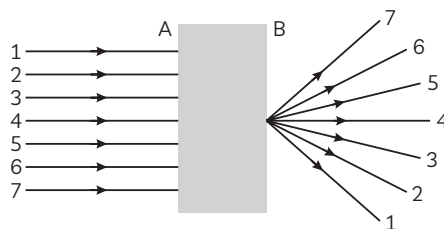
- Distance of image  $I_2$  will be less than distance of image  $I_1$  from the lens
- Size of image  $I_1$  will be equal to size of image  $I_2$ .

- Distance of image  $I_2$  will be greater than distance of image  $I_1$  from the lens.
- Size of image  $I_1$  will be lesser than size of image  $I_2$ .

58. For lenses I and II :

- $P_1 = P_2$
- $P_1 < P_2$
- $P_1 > P_2$
- $P_1$  is positive and  $P_2$  is negative

59. A beam of light is incident on the box through the holes on side A and emerges out of the holes on the side B of the box:



Which of the following is present in the box?

- Concave lens
  - Rectangular glass plate
  - Prism
  - Convex lens
60. Sakshi conducts an experiment to produce an image of an object on a screen which is placed at 20 cm from the lens. She uses a convex lens of focal length 15 cm. Produce the sharpest image?
- 20 cm in front of the lens
  - 8 cm in front of the lens
  - 15 cm in front of the lens
  - 60 cm in front of the lens



# SOLUTION

## SAMPLE PAPER - 3

### SECTION - A

- (c)  $PbS$  is oxidized and  $H_2O_2$  is reduced  
**Explanation:** Lead sulphide is oxidized to lead sulphate as there is addition of oxygen atom and Hydrogen peroxide is reduced to water as it loses oxygen atom.
- (b) Both (II) and (III)

**Explanation:** The correct formula of washing soda is  $Na_2CO_3 \cdot 10H_2O$ , as it contains ten molecules of water of crystallization. The correct formula of copper sulphate is  $CuSO_4 \cdot 5H_2O$ , as it contains five molecules of water of crystallization.



3. (b) As Hydrogen can easily lose one electron like alkali metals to form positive ion



### Related Theory

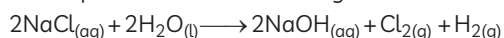
There is an anomaly when it comes to the position of hydrogen because it can be placed either in group 1 or group 17 in the first period. Like elements of group 17, it can also form diatomic molecule  $C_{12}$  and  $H_2$ .

4. (b)  $2FeSO_{4(s)} \longrightarrow Fe_2O_{3(s)} + SO_{2(g)} + SO_{3(g)}$

**Explanation:** When crystals of ferrous sulphate (solid) are heated, it decomposes to ferric oxide ( $Fe_2O_3$ ), sulphur dioxide ( $SO_2$ ) and sulphur trioxide ( $SO_3$ ). Ferric oxide is a solid, while  $SO_2$  and  $SO_3$  are gases.

5. (a) I -  $Cl_2$ , II -  $H_2$ , III -  $NaOH$

**Explanation :** In chlor-alkali process, when electricity is passed through an aqueous solution of sodium chloride or brine, it decomposes to form sodium hydroxide.



Chlorine gas is given off at the anode, and hydrogen gas at the cathode and Sodium hydroxide solution is formed near the cathode.

6. (d) (I) - (B) ; (II) - (D) ; (III) - (A) ; (IV) - (C)

**Explanation:**  $Zn_{(s)} + CuSO_{4(aq)} \rightarrow ZnSO_{4(aq)} + Cu_{(s)}$  is a displacement reaction as Zn, which is more reactive than Cu, displaces Cu from its salt solution.

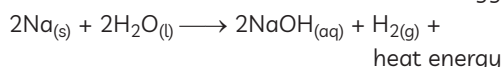
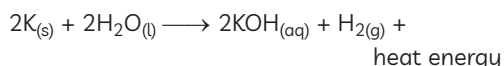
$NH_{3(g)} + HCl_{(g)} \longrightarrow NH_4Cl_{(s)}$  is a combination reaction as the two reactants combine to form a single product.

$AgNO_{3(aq)} + NaCl_{(aq)} \longrightarrow AgCl_{(s)} + NaNO_{3(aq)}$  is a double displacement reaction as the two reactants exchange their ions and form new compounds.

$2KClO_{3(s)} \longrightarrow 2KCl_{(s)} + 3O_{2(g)}$  is a decomposition reaction as a single reactant gives two products on heating.

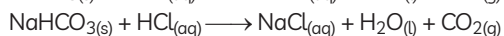
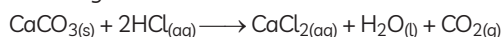
7. (c) Both (I) and (IV)

**Explanation:** Reaction of both sodium and potassium with cold water is so violent and exothermic that the hydrogen gas evolved catches fire. Reaction of calcium with cold water is less violent whereas magnesium does not react with cold water but reacts with hot water.



8. (b) Both (II) and (III)

**Explanation:** When a metal carbonate or a metal hydrogen carbonate reacts with a dilute acid, it produces metal salt, water and carbon dioxide gas.

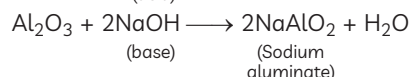
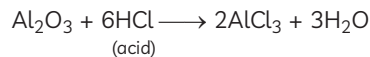


9. (c) It has no effect on dry blue litmus paper but turns moist blue litmus paper red.

**Explanation:** When sulphur powder is heated, it forms sulphur dioxide gas, which is acidic in nature. However, it shows acidic behaviour only in presence of water. Therefore, it has no effect on dry blue litmus paper, but turns moist blue litmus paper red.

10. (a) Al

**Explanation:** Aluminium form amphoteric oxides, which have both acidic and basic characteristics.



11. (c) Saprophytic

**Explanation:** Fungi feed on dead and decaying matter. They release chemicals to break complex organic matter into simple forms and absorb them. This is called saprophytic mode of nutrition

12. (b) Three

**Explanation:** There are three pairs of salivary glands present in humans, namely the parotid glands, submandibular and sublingual glands.

13. (b) Trypsin

**Explanation:** Trypsin is the pancreatic enzyme which is effective in digesting proteins.

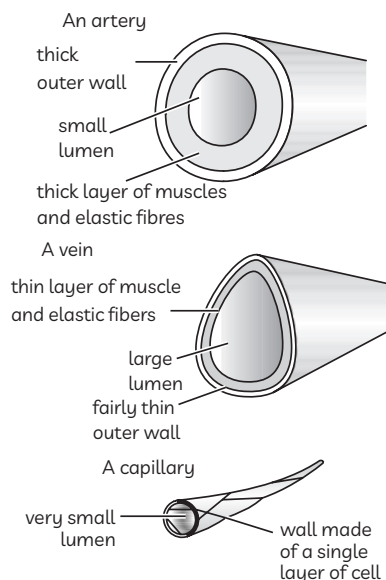


### Caution

*Pepsin is a gastric enzyme and trypsin is a intestinal enzyme, both responsible for the digestion of proteins.*

14. (c) They are under high pressure

**Explanation:** Blood flows with pressure in arteries so as to withstand the pressure therefore, arteries are thick walled.



Sections through the three types of blood vessels

**15.** (b) Epiglottis

**Explanation:** The epiglottis is flap of cartilage located in the throat behind the tongue and in front of the larynx. The function of epiglottis is to cover the mouth of trachea (or wind pipe) when we swallow food so that the food may not enter the trachea.

**16.** (a) W : Pharynx ; X : Bronchi ; Y : Alveoli ;  
Z : Tissue

**17.** (d)  $\sqrt{3}$

**Explanation:** According to Snell's law,

$$\begin{aligned} n_{21} &= \frac{\sin i}{\sin r} = \frac{\sin 60^\circ}{\sin 45^\circ} \\ &= \frac{\frac{\sqrt{3}}{2}}{\frac{1}{\sqrt{2}}} = \frac{\sqrt{3}}{2} \times \sqrt{2} \\ &= \frac{\sqrt{3}}{\sqrt{2}} \end{aligned}$$

Similarly,

$$\begin{aligned} n_{32} &= \frac{\sin 45^\circ}{\sin 30^\circ} \\ &= \frac{\frac{1}{\sqrt{2}}}{\frac{1}{2}} \\ &= \frac{1}{\sqrt{2}} \times 2 = \sqrt{2} \end{aligned}$$

As

$$\begin{aligned} n_{31} &= n_{32} \times n_{21} \\ &= \frac{\sqrt{3}}{\sqrt{2}} \times \sqrt{2} = \sqrt{3} \end{aligned}$$

**18.** (c) 5.0 D

**Explanation:**  $P = \frac{100}{20} = 5.0 \text{ D}$

 **Caution**

↪ Convert focal length into metre for calculating power.

**19.** (d) virtual and erect

**Explanation:** If magnification is positive, then image will always be virtual and erect. If magnification is negative, then image will be real and inverted.

 **Caution**

↪ No image formed is real and erect or virtual and inverted.

**20.** (d) centre of curvature of mirror

**Explanation:** Given focal length of concave mirror,  $f = -20 \text{ cm}$

Distance of object from concave mirror,  $u = -40 \text{ cm}$

From the mirror formula

$$\begin{aligned} \frac{1}{u} + \frac{1}{v} &= \frac{1}{f} \\ \Rightarrow \frac{1}{-40} + \frac{1}{v} &= \frac{1}{-20} \\ \frac{1}{v} &= \frac{1}{-20} + \frac{1}{40} \\ &= \frac{-2+1}{40} \\ &= \frac{-1}{40} \\ v &= -40 \end{aligned}$$

Hence image is formed at the centre of curvature of the mirror

**21.** (b) Both (I) and (IV)

**Explanation:** The refractive index of earth's atmosphere is gradually increasing with decrease in altitude. So, when starlight enters the earth's atmosphere, it bends continuously towards the normal as it reaches the earth's surface.

**22.** (a) 3

**Explanation:** Refractive index of medium with respect to air,

$${}^a n_m = \frac{\text{Speed of light in air}}{\text{Speed of light in medium}}$$

$${}^a n_m = \frac{3 \times 10^8}{1.0 \times 10^8} = 3$$

**23.** (b) Refraction, dispersion, total internal reflection

**Explanation:** During the formation of rainbow phenomenon of dispersion refraction and total internal reflection takes place.

**24.** (c) Scattering

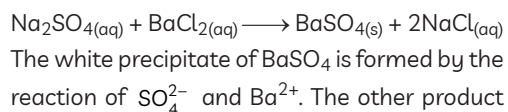
**Explanation:** The phenomena involved here is scattering. When size of scatterer is much smaller than wavelength of light then

$$S \propto \frac{1}{\lambda^2}$$

## SECTION - B

25. (b) Barium sulphate and Double displacement reaction respectively

**Explanation:** In the reaction between barium chloride solution and sodium sulphate solution, an insoluble substance or precipitate of Barium sulphate is formed. Any reaction that produces a precipitate can be called a precipitation reaction.



formed is sodium chloride which remains in the solution. Such reactions in which there is an exchange of ions between the reactants are called double displacement reactions.

26. (b) Dissolution of enamel

**Explanation:** Calcium phosphate is a basic salt, as it is a salt of weak acid (phosphoric acid) and slightly stronger base (calcium hydroxide). Thus, when pH of our mouth falls below 5.5 due to eating of sweets etc. *i.e.*, mouth is acidic the dissolution of tooth enamel (calcium phosphate) starts which shows that calcium phosphate is basic in nature.

27. (d)  $\text{CuSO}_4 + \text{Fe}$

**Explanation:** According to activity series,  $\text{Ca} > \text{Mg} > \text{Zn} > \text{Fe} > \text{Pb} > \text{Cu}$ . Thus, Fe can displace Cu from  $\text{FeSO}_4$ .

### ⚠ Caution

↳ **Mnemonics for activity series:** Please send little charlies Monkeys and Cute Zebras in hard lead cages safely, Gloria → Potassium, Sodium, Lithium, Calcium, Magnesium, Aluminium, Carbon, Zinc, Iron, Hydrogen, Lead, Copper, Silver, Gold.

28. (c) (III) and (IV)

**Explanation:** Gallium and cesium have very low melting points. They melt from the heat of the palms.

### ⚠ Caution

↳ Students consider mercury as one of the correct options as it is liquid at room temperature.

29. (c) Both (III) and (IV)

**Explanation:** Olfactory indicators are the substances whose odour or smell changes in acidic or basic medium. These can therefore be used by visually impaired persons to

identify acids and bases. Examples of olfactory indicators are vanilla essence and onion extract.

30. (d) Citric acid and oxalic acid respectively

**Explanation:** Orange contains citric acid and spinach contains oxalic acid. Both are organic acids.

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

**Explanation:** In exothermic reaction heat is released along with the formation of products.

32. (c) A is true, but R is false

**Explanation:** Food cans are not coated with zinc because being more reactive than tin, Zinc react with organic acids present in the food.

33. (c) A is true, but R is false.

**Explanation:** Diffusion is very slow process and cannot meet the energy requirement of multicellular organisms.

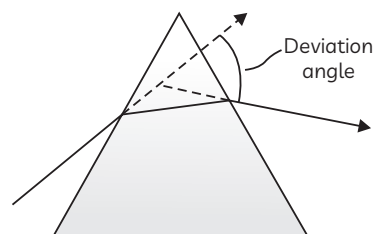
34. (c) A is true, but R is false.

**Explanation:** For a given angle of incidence, the prism with higher refractive index produces a greater deviation than the prism which has a lower refractive index. Thus, the angle of deviation increases with an increase in the refractive index of the medium.



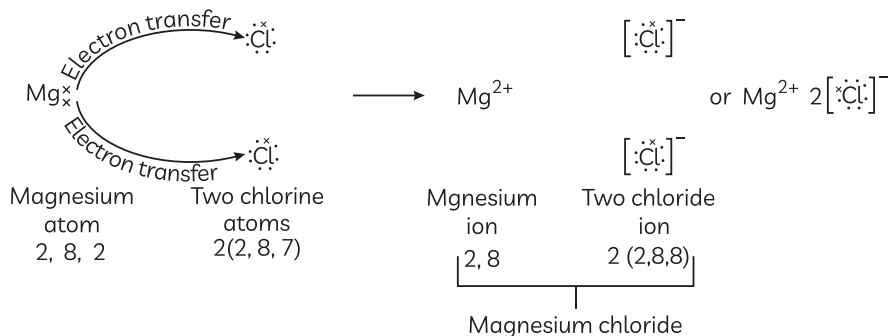
### Related Theory

↳ Light is deflected as it enters a material with refractive index  $> 1$ . A ray of light is deflected twice in a prism. The sum of these deflections is the deviation angle.



35. (c) Cation :  $[\text{Mg}^{2+}]$   
Anion :  $2[\text{Cl}^-]$

**Explanation:** Magnesium Chloride is formed by transfer of two electrons from Magnesium atom to the two chlorine atoms. Magnesium atom loses two electrons and forms  $[\text{Mg}^{2+}]$  ion and chlorine atom forms chloride ion.



36. (a) remove chlorophyll

**Explanation:** We boil the leaf in alcohol when we are testing it for starch to remove the green pigment chlorophyll present in it. For the starch test, we need to observe the colour change from brown to blue when iodine is put on the leaf. But, as the leaf is green in colour it does not show the required observation. Hence to remove the green pigment present in the leaf we boil the leaf in alcohol when we are testing it for starch.

37. (d) Small intestine

**Explanation:** The small intestine is the site of the complete digestion of carbohydrates, proteins and fats. The walls of the small intestine contain glands which secrete intestinal juice. The enzymes present in it finally convert the proteins to amino acids, complex carbohydrates into glucose and fats into fatty acids and glycerol.

38. (d) (I) – (C); (II) – (A); (III) – (D); (IV) – (B)

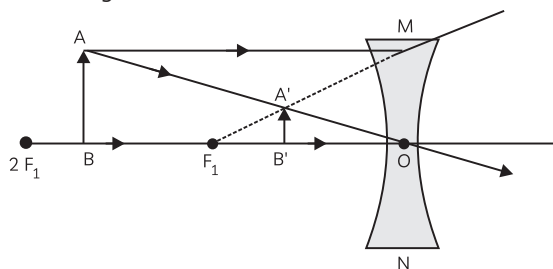
**Explanation:** The parts marked (I), (II), (III) and (IV) are:

- (1) **Glomerulus:** These are a bundle of blood capillaries present in the Bowman's capsule. One end of the glomerulus is attached to the renal artery (it brings dirty blood containing wastes into the kidney) and the other end is attached to the renal vein (it carries away the cleansed blood from the kidney). The function of glomerulus is to filter the blood passing through it.
- (2) **Bowman's Capsule:** It is a double walled cup shaped structure present at the upper end of the nephron.
- (3) **Collecting duct:** The last part of a long, twisting tube that collects urine from the nephrons (cellular structures in the kidney that filter blood and form urine) and moves it into the renal pelvis and ureters.
- (4) **Tubular part of Nephron:** Selective reabsorption of glucose, amino acids, large amount of water and salts etc.

39. (a) Type of lens: Concave lens

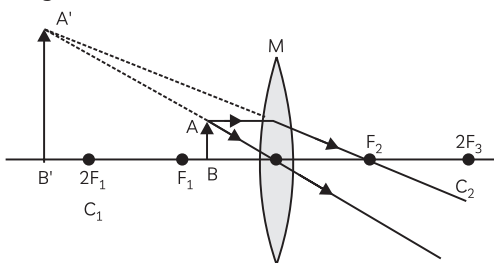
Position of object: Between infinity and optical centre of lens

**Explanation:** The image of the object is virtual and erect, which is always formed in front of the lens. As the size of the image is smaller than the size of the object, that is, a diminished image is formed, it is a concave lens and object is placed anywhere between infinity and Optical Centre of the lens as shown in the ray diagram below.



40. (d) Less than one focal length

**Explanation:** A converging or convex lens forms a real and inverted image of an object for all positions except when the object is placed between the focus and optical centre of the lens. It forms a virtual, erect and magnified image of the object when placed between optical centre and focus, as shown in the ray diagram below:



41. (c) C- Allows gaseous exchange between the leaf and the outside atmosphere through the stomata

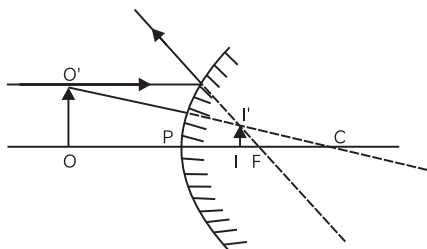
**Explanation:** 'C' is stomatal aperture. They allow the exchange of gases ( $\text{CO}_2$  and  $\text{O}_2$ ) with the atmosphere.

42. (b) mitochondria

**Explanation:** Breakdown of pyruvate oxygen takes place in the mitochondria. This process breaks up the three-carbon pyruvate molecules to give three molecules of carbon dioxide and the other products is water. Since the process takes place in presence of oxygen, it is called aerobic respiration.

43. (b) Image formed is virtual, erect and diminished

**Explanation:** A convex mirror always forms a virtual, erect and diminished image of an object as shown in the following ray diagram.



44. (a) + 40 cm

**Explanation:** Given,  $f_1 = + 20$  cm (for convex lens)

$F_2 = - 40$  cm (for concave lens)

The focal length of the combination of lens =

$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$$

$$\frac{1}{f} = \frac{1}{20} + \left(-\frac{1}{40}\right)$$

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

45. (c) Between F and C

**Explanation:** For  $m = - 3$ , the image is real, inverted and enlarged. The object must be placed between F and C of the concave mirror.

46. (c) scattering is reduced if the distance to be travelled in air is reduced.

**Explanation:** At noon, the sun appear white because light from the sun travel relatively shorter distance in atmosphere and therefore is least scattered.



### Related Theory

At sunset or sunrise, the sun appears red because it is near the horizon, and sunlight has to travel a relatively longer distance through the earth's atmosphere to reach us.

47. (b) Red

**Explanation:** On passing through a prism red colour deviates the least while the violet colour deviates the most.

48. (a) Both (I) and (II)

**Explanation:** Ionic compounds are generally solids, hard and brittle. They have high melting and boiling points and conduct electricity only in molten state or in solution.

## SECTION - C

49. (a) Iron nails become brownish in colour and the blue colour of copper sulphate solution fades.

**Explanation:** Iron nails become brownish in colour and the blue colour of copper sulphate solution fades. This is because iron displacement copper from copper sulphate solution and forms ferrous sulphate which is light green in colour.

50. (b) Black precipitate of copper sulphide is obtained

**Explanation:** When hydrogen sulphide gas is passed into an aqueous solution of copper sulphide double displacement of ions takes place and sulphuric acid and a black precipitate of copper sulphide are formed.

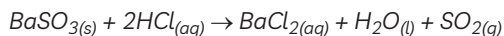
51. (b) substitution reaction

**Explanation:** Displacement reactions are also known as substitution reactions. In general a more reactive element displaces a less reactive element from the compound.

52. (a) HCl decomposes barium sulphite

**Explanation:**  $\text{BaSO}_3$  is a salt of a weak acid ( $\text{H}_2\text{SO}_3$ ), therefore dilute acid such as HCl

decomposes barium sulphite produce sulphur dioxide gas which has the smell of burning sulphur  $\text{BaCl}_2$  is soluble in water and therefore white precipitate disappears.



53. (b) To receive blood from the veins and pumps it into the arteries.

**Explanation:** The heart is responsible for pumping deoxygenated blood to the lungs and pumps oxygenated blood around the body.

54. (a) Human heart allows mixing of oxygenated and deoxygenated blood.

**Explanation:** The septum is the wall that separates the chambers on left and right sides of the heart. The wall prevents blood from mixing between the two sides of the heart

55. (c) Capillaries are thick walled

**Explanation:** Capillaries are blood vessels that are one-celled thick and connect arteries with veins.

56. (d) both (a) and (c)

**Explanation:** Some of the symptoms of a heart attack are chest pain, pressure, fullness,

difficulty breathing and dizziness, nausea and cold sweats etc.

57. (a) Distance or image  $I_2$  will be less than distance or image  $I_1$  from the lens

**Explanation:** Because thicker has less focal length than thinner lens.

58. (b)  $P_1 < P_2$

**Explanation:** Because thin lens has more focal length than thick lens

i.e,  $f_1 > f_2$

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

$\Rightarrow P_1 < P_2$

59. (d) Convex lens

**Explanation:** Because convex lens is converging in nature.

60. (d) 60 cm in front of the lens

Here,  $v = + 20$  cm  $f = + 15$  cm:  $u = ?$

Using lens formula

**Explanation:**  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

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

$$\frac{1}{u} = \frac{1}{20} - \frac{1}{15}$$

$$= \frac{-1}{60}$$

$\therefore u = - 60$  cm

The negative sign indicates that the object is placed in front of the lens.

