

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. Which of the following includes exothermic process?

(I) Reaction of water with quick lime
(II) Dilution of an acid
(III) Evaporation of water
(IV) Sublimation of camphor (crystals)

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

2.

Sub-stance	pH	Colour shown by universal indicator
A	5.5	Greenish yellow
B	11	Blue
C	0	Dark red
D	9.5	Turquoise
E	3	Orange

Which of the following properties are shown by solution B?

(I) It is the strongest base among the given substance.

(II) It is used in antacids.

(III) It turns litmus paper to blue.

(a) (I), (II) (b) (II), (III)

(c) (I), (II), (III) (d) (I)

3. Name the metal which is liquid at room temperature.

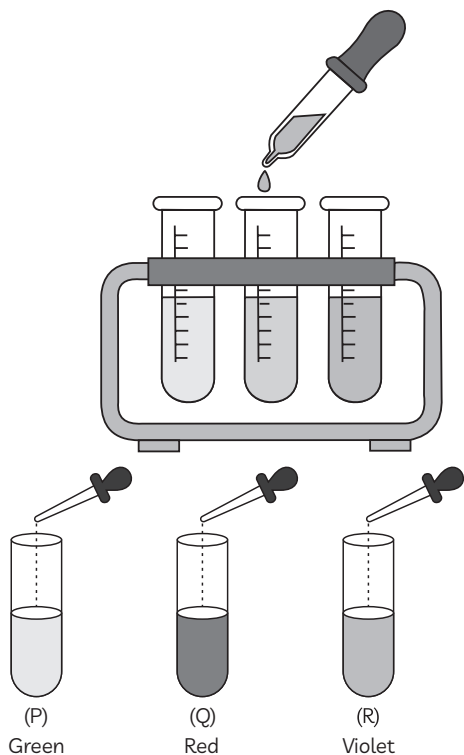
(a) Bromine (b) Mercury
(c) Gallium (d) Chlorine

4. A student performed the experiment of heating ferrous sulphate crystals in a boiling tube. She smelt fumes of a pungent gas and saw colours of ferrous sulphate disappear. Why does the colour of crystal disappear?



(a) Due to decomposition of ferrous sulphate
(b) Due to evolution of sulphur dioxide
(c) Due to formation of ferrous oxide
(d) both (a) and (c)

5. On adding a 3-4 drops of universal indicator to the unknown colourless solutions (P), (Q) and (R) taken separately in three test tubes as shown in the following diagram, Aarav observed that the colour changes to green in (P), red in (Q) and violet in (R).



What is the decreasing order of their pH.

- (a) (R) > (P) > (Q) (b) (Q) > (R) > (P)
 (c) (P) > (Q) > (R) (d) (Q) > (P) > (R)

6. Which of the following cannot be used to prevent food containing fats and oils from becoming rancid?

- (a) Adding antioxidants
 (b) Keeping food in air tight containers
 (c) Flushing food packets with oxygen gas
 (d) Storing food in refrigerator

7. Potassium iodide solution is added to lead nitrate solution in a test tube. Select the correct observation from the table below:

	Formula of Precipitate formed	Colour of precipitate
(a)	KNO_3	Yellow
(b)	KNO_3	Brown
(c)	PbI_2	Yellow
(d)	PbI_2	Brown

8. 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Red								Green						Blue
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Which of the following is/are true when $HCl_{(g)}$ is passed through water ?

- (I) It ionises in the solution.
 (II) It does not ionise in the solution as it is a covalent compound.
 (III) It forms hydronium ion in the solution

due to the combination of hydrogen ion with water molecule.

(IV) It gives both hydrogen and hydroxyl ion in the solution.

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

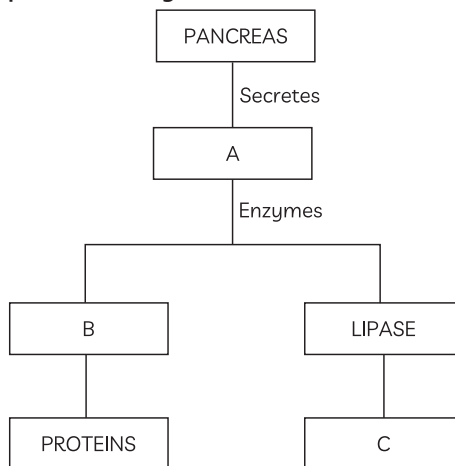
9. Which of the following salts contain water of crystallization?

- (I) Gypsum
 (II) Baking soda
 (III) Copper sulphate
 (IV) Washing soda
 (a) Both (I) and (II) (b) Both (II) and (IV)
 (c) (I), (II) and (III) (d) (I), (III) and (IV)

10. Identify the type of reaction taking place when water is added slowly to a small amount of calcium oxide in a beaker is:

- (I) Exothermic reaction
 (II) Endothermic reaction
 (III) Combination Reaction
 (IV) Displacement reaction
 (a) Both (I) and (III)
 (b) Both (II) and (III)
 (c) Both (I) and (IV)
 (d) Both (II) and (IV)

11. The figure given below shows the role of pancreas in digestion of food.



Identify A, B and C and select the correct combination from the table below:

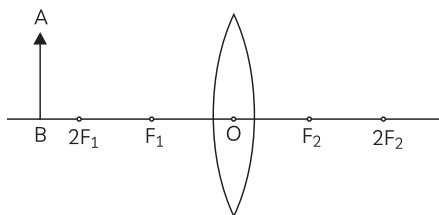
	A	B	C
(a)	Bile juice	Trypsin	Carbohydrates
(b)	Bile juice	Pepsin	Fat globules
(c)	Pancreatic juice	Trypsin	Fat globules
(d)	Pancreatic juice	Pepsin	Carbohydrates

12. The table below lists the organism in column I and its mode of nutrition in column II.

	Column I		Column II
(I)	Amoeba	(A)	Autotrophic
(II)	Blue green algae	(B)	Parasitic
(III)	Tape worms	(C)	Saprophytic
(IV)	Mushrooms	(D)	Digestion in food vacuoles

The correct matching of column I and column II is:

- (a) (I) - (D); (II) - (A); (III) - (B); (IV) - (C)
 (b) (I) - (C); (II) - (B); (III) - (D); (IV) - (A)
 (c) (I) - (D); (II) - (C); (III) - (A); (IV) - (B)
 (d) (I) - (A); (II) - (D); (III) - (C); (IV) - (B)
13. Which of the following equation is the correct representation of photosynthesis ?
 (a) $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
 (b) $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 6\text{H}_2\text{O}$
 (c) $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Chlorophyll} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{CO}_2 + 6\text{H}_2\text{O}$
 (d) $6\text{CO}_2 + \text{H}_2\text{O} + \text{Sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 + 6\text{H}_2\text{O}$
14. What happens if conducting tube of circulatory system develops a leak?
 (a) Blood pressure decrease
 (b) Efficiency of blood circulation decrease
 (c) Number of platelets increase at the site of injury
 (d) All the above
15. Select the correct statements.
 (a) Artery carries oxygenated blood, except pulmonary artery
 (b) Artery is thick walled and less elastic
 (c) Pulmonary vein carries deoxygenated blood
 (d) Veins are higher pressure than arteries
16. Name the cartilaginous flap which closes the opening of wind pipe during swallowing:
 (a) Glottis (b) Epiglottis
 (c) Gullet (d) Epivalve
17. Study the figure given below.



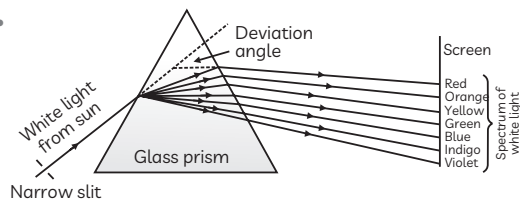
Select the row containing correct identification of the position of image and magnification produced by the lens:

	Position of image	Magnification
(a)	Between O and F_2	Greater than -1
(b)	Between O and F_2	Less than -1
(c)	Between F_2 and $2F_2$	Less than -1
(d)	Between F_2 and $2F_2$	Less than + 1

18. Which of the following statement is not true?
 (a) A concave mirror can form a magnified virtual image
 (b) A convex mirror can form a magnified real image
 (c) A concave mirror can form a diminished real image
 (d) A concave mirror can form a magnified virtual image.
19. In a given medium the speed of light is $\frac{2}{3}$ rd of its speed in vacuum. The absolute refractive index of the medium is:
 (a) $\frac{3}{2}$ (b) $\frac{9}{4}$
 (c) $\frac{4}{9}$ (d) $\frac{2}{3}$
20. An object is placed at the centre of curvature of a concave lens. The distance between the image and the pole is:
 (a) Equal to $2f$
 (b) Greater than f but less than $2f$
 (c) Equal to f
 (d) Greater than $2f$
21. The sky appears dark to passengers flying at very high altitudes mainly because :
 (a) Scattering of light is not enough at such heights.
 (b) There is no atmosphere at great heights.
 (c) The size of molecules is smaller than the wavelength of visible light.
 (d) The light gets scattered towards the earth.
22. What is the magnification of the images formed by plane mirror?
 (a) $m > 1$ (b) $m < 1$
 (c) $m = 1$ (d) $m = \infty$
23. Which of the following is true regarding laws of refraction?
 (a) $\frac{\sin i}{\sin r} = \text{constant}$

- (b) The incident ray, the reflected ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.
- (c) Snell's law of refraction is not true for angle of i is 90°
- (d) both (a) and (c)

24.



Which of the following diagram shows dispersion correctly?

- (a)
- (b)
- (c)
- (d)

SECTION - B

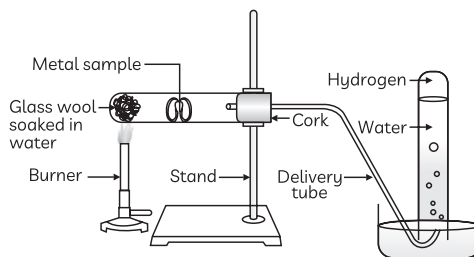
(Section B consists of 24 questions (S. No. 25 to 48). Attempt any 20 questions from this section. The first attempted 20 questions would be evaluated.)

25. The table below gives the substances oxidized and reduced in the given equations.

	Chemical Reaction	Substance Oxidized	Substance Reduced
(I)	$\text{H}_2\text{S} + \text{Cl}_2 \rightarrow \text{S} + 2\text{HCl}$	Chlorine	Hydrogen sulphide
(II)	$\text{SO}_2 + 2\text{H}_2\text{S} \rightarrow 2\text{H}_2\text{O} + 3\text{S}$	Hydrogen sulphide	Sulphur dioxide
(III)	$\text{H}_2\text{S} + \text{I}_2 \rightarrow 2\text{HI} + \text{S}$	Hydrogen sulphide	Iodine
(IV)	$\text{PbS} + 2\text{H}_2\text{O}_2 \rightarrow \text{PbSO}_4 + 4\text{H}_2\text{O}$	Hydrogen peroxide	Lead sulphide

Which of the following options are correct?

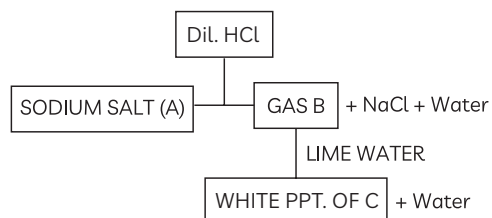
- (a) Both (I) and (II) (b) Both (II) and (III)
- (c) Both (I) and (IV) (d) Both (II) and (IV)
26. The nature of Calcium phosphate present in tooth enamel is:
- (a) Acidic (b) Basic
- (c) Neutral (d) Amphoteric
27. Generally no hydrogen gas is evolved when metal reacts with dilute nitric acid. Select the statement with correct explanation.
- (a) Nitric acid is a strong reducing agent
- (b) Nitric acid is a strong oxidising agent oxidises hydrogen into water and itself get reduced to Oxide of Nitrogen
- (c) NH_3 gas is evolved instead
- (d) Nitric acid is a strong oxidising agent oxidises hydrogen into water and itself get reduced HCL.
28. Sanket's teacher arranged the apparatus as shown below to demonstrate the action of steam on metals.



Which of the following metals do not react either with cold water or with hot water but only with steam?

- (I) Al (II) Cu
- (III) Pb (IV) Fe
- (a) Both (I) and (II)
- (b) Both (II) and (III)
- (c) Both (I) and (IV)
- (d) Both (III) and (IV)

29. Study the flowchart given below where substances have been labelled as A, B and C:

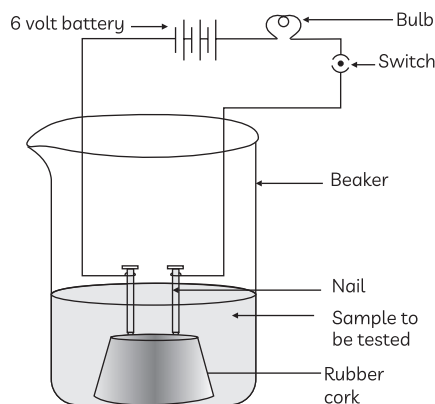


Select the row containing the correct formula of substances A, B and C:

	A	B	C
(a)	Na_2CO_3	CO_2	CaCO_3
(b)	Na_2CO_3	CO_2	$\text{Ca}(\text{HCO}_3)_2$
(c)	Na_2SO_4	SO_2	CaSO_4
(d)	NaHCO_3	H_2	$\text{Ca}(\text{HCO}_3)_2$

30. A student performed the following activity to find the electrical conductivity of some substances by dissociating into ions.

He took samples of dil.HCl, glucose, dil.NaOH and alcohol one by one and completed the circuit as shown below:



Which of the samples will conduct electricity?

- (I) DiL. HCl (II) DiL. NaOH
 (III) Glucose (IV) Alcohol
 (a) Only (I) (b) Only (II)
 (c) Both (I) and (II) (d) (I), (II) and (IV)

For question numbers 31 to 34, two statements are given- one labeled Assertion (A) and the other labeled 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 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.

31. Assertion (A): The aqueous solutions of glucose and alcohol show acidic character.

Reason (R): Aqueous solutions of glucose and alcohol give OH^+ ions.

32. Assertion (A): In a reaction between copper and oxygen, copper act as a reducing agent.

Reason (R): The compound which gains oxygen in a chemical reaction serves as a reducing agent.

33. Assertion (A): In plants there are no specialised respiratory organs.

Reason (R): Plants do not require great demands of gaseous exchange.

34. Assertion (A): On a clear summer night twinkling of stars is observed.

Reason (R): The twinkling of stars is caused by dispersion of star light by the atmosphere.

35. Identify the cations and anions present in aluminium oxide:

	Cation	Anion
(a)	Al^+	O^-
(b)	Al^{2+}	O^{2-}
(c)	Al^{3+}	O^{2-}
(d)	Al^{3+}	O^-

36. The respiratory organ of Earthworm is:

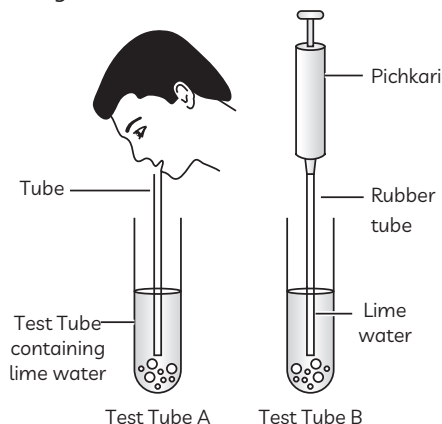
- (a) Skin (b) Trachea
 (c) Gills (d) Tracheoles

37. The amount of water re-absorbed as urine flows along the tube depends on:

- (I) How much excess water there is in the body
 I(I) How much of dissolved waste is there to be excreted
 (III) How much of excess glucose is to be excreted
 (IV) How much of salt and amino acid is to be excreted.
 (a) Only (I)
 (b) Both (I) and (II)
 (c) Both (I) and (III)
 (d) (I), (II) and (IV)

38. A student Rudra took some freshly prepared lime water in two test tubes marked A and B. He blew air through the lime water in test tube A.

He then used a syringe or pichkari and passed air through the fresh lime water in test tube B.



Rudra recorded his observations below.

Select the correct observation.

	Test Tube A	Test Tube B
(a)	No change observed	Lime water turned milky immediately

(b)	Lime water turned milky immediately	No change observed
(c)	Lime water turned milky immediately	Lime water turned milky after a long time
(d)	Lime water turned milky after a long time	Lime water turned milky immediately

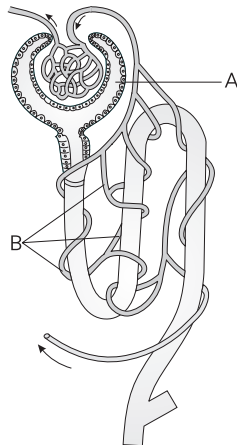
39. Power of a lens is + 3 D. What will be the focal length of the lens?

- (a) $\frac{1}{3}$ cm (b) $\frac{100}{3}$ cm
(c) 300 cm (d) $\frac{1}{300}$ cm

40. The letter appear to be raised when viewed through a glass slab placed over the document. What is the phenomenon called?

- (a) Reflection
(b) Refraction
(c) First reflection, then refraction
(d) First refraction then reflection

41. The correct function of parts labelled 'A' and 'B' in the figure below is:



	Part 'A'	Part 'B'
(a)	Filtration of blood	Reabsorption of glucose, salts and amino acids
(b)	Reabsorption of glucose, salts and amino acids	Filtration of blood
(c)	Reabsorption of hormones from blood	Filtration of blood
(d)	Collection of urine	Reabsorption of glucose, salts and amino acids

42. Select the incorrect statements:

- (I) Pyruvate can be converted into lactic acid by yeast
(II) Fermentation is a form of anaerobic respiration
(III) Fermentation takes place in mitochondria
(IV) Fermentation takes place in yeast
(a) Both (I) and (II)
(b) Both (I) and (III)
(c) Both (II) and (III)
(d) Both (II) and (IV)

43. The image formed by a convex mirror of focal length 30 cm is a quarter of the object. The object distance and image distance, along with the sign convention, are tabulated below. Select the row containing the correct values of object and image distance:

	Object Distance (u)	Image Distance (v)
(a)	-90 cm	+ 22.5 cm
(b)	-22.5 cm	+ 90 cm
(c)	-90 cm	- 22.5 cm
(d)	- 90 cm	+ 90 cm

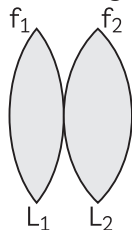
44. A security mirror used in a big showroom has radius of curvature 5 m. If a customer is standing at a distance of 20 m from the cash counter, find the position, nature and size of the image formed in the security mirror.

	Position of image	Magnification
(a)	2.22 m in front of the mirror	-0.11
(b)	2.22 m behind the mirror	+0.11
(c)	1.11 m behind the mirror	+0.22
(d)	1.11 m in front of the mirror	-0.11

45. Sonam went to a palmist to show her palm. The palmist used a special lens for this purpose. Select from the table below the correct nature of the lens and position where the palmist should hold the lens so as to have an erect and magnified image of her palm.

	Type of Lens	Position of lens
(a)	Concave lens	Between O and F_1
(b)	Concave lens	Between F_1 and $2F_1$
(c)	Convex lens	Beyond $2F_1$
(d)	Convex lens	Between O and F_1

46. Two lenses L_1 and L_2 having focal length 20 cm and 5 cm respectively are placed in contact as shown in the figure.



The power and focal length of the combination is:

	Power of combination	Focal length of combination
(a)	+ 25 D	+25 cm
(b)	+20 D	+20 cm
(c)	+40 D	+25 cm
(d)	+25 D	+ 40 cm

47. The table below gives the refractive index of four media A, B, C and D:

Refractive index	Value
A	1.33
B	1.52
C	1.44
D	1.65

Select the correct option:

- (a) The speed of light is maximum in medium A and minimum in medium D.
 (b) The speed of light is minimum in medium C and maximum in medium D.
 (c) The speed of light is maximum in medium A and minimum in medium B.
 (d) The speed of light is maximum in medium B and minimum in medium C.
48. The products formed when metals react with dilute acids are:
- (a) Salt and water
 (b) Salt and hydrogen gas
 (c) Salt and carbon dioxide gas
 (d) Salt, water and carbon dioxide gas

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: Prisha is baker. She added the ingredients according to the recipe and placed it in the oven. When the cake was ready, she took it out from the oven. She was surprised as the cake hard instead of soft and fluffy.



49. Which of the following ingredient did she miss to add while preparing the cake?
- (a) Soda water (b) Washing soda
 (c) Soda ash (d) Baking soda
50. What is the chemical formula of the missing ingredient?
- (a) NaHCO_3 (b) Na_2CO_3
 (c) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ (d) Na_2CO_3
51. NaHCO_3 formed by reaction of:
- (a) $\text{NaOH} + \text{H}_2\text{CO}_3$ (b) $\text{NaCl} + \text{H}_2\text{CO}_3$
 (c) $\text{Na}_2\text{CO}_3 + \text{HCl}$ (d) $\text{NaOH} + \text{HCl}$

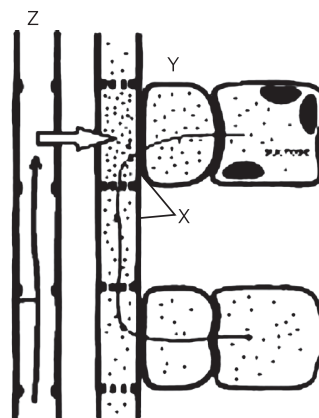
52. The nature of missing ingredient is

- (a) Acidic (b) Basic
 (c) Neutral (d) Highly acidic

Q. 53 to 56 are based on Case Study-2

Case 2: Plants use relatively slow transport system as they have low energy needs. The distances over which transport systems have to operate, however, can be very large in plants such as very tall trees. Plant transport systems move energy stores from leaves and raw materials from roots.

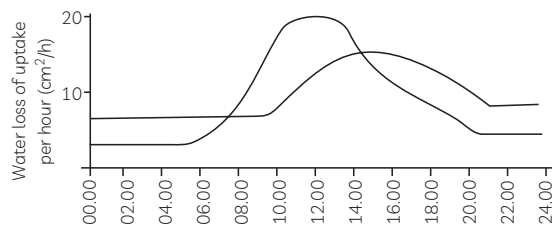
53. The given figure represents the movement of water and minerals is xylem and movement of food in phloem.



Choose the correct combination of plots provided in the following table.

	X	Y	Z
(a)	Major conducting cells in xylem	Denucleated	Flow is bidirectional
(b)	Major conducting cells in phloem	Nucleated	Flow is unidirectional
(c)	Major conducting cells in xylem and phloem	Denucleated	Flow is unidirectional
(d)	Cells of xylem but function is not defined	Nucleated	Flow is bidirectional

54. Given graph shows the rates of water absorption and transpiration of a plant during a 24-hour period.



The difference between the rates of transpiration and water absorption between 00:00 and 06:00 hours is due to :

- Rate of absorption is always higher than rate of transpiration
- The rate of absorption is higher than the rate of transpiration during the day but decreases at night.
- Rate of absorption is always equal to rate of transpiration
- The rate of absorption fell behind the rate of transpiration during the days, but exceeds it at night.

55. Select the incorrect match:

	Cell	Tissue
(a)	Vessels and tracheids	Xylem
(b)	Sieve tubes cells	Phloem
(c)	Sieve tube cells and tracheids	Xylem
(d)	Companion cell	Phloem

56. Which of the following statements are true with respect to transport in plants?

- This transport of soluble products of photosynthesis occurs in phloem.
 - Beside water, xylem also transports amino acids and other substances.
 - The translocation in phloem is achieved by utilising energy.
 - Transpiration helps in the absorption.
- (I) and (II) only
 - (II) and (III) only
 - (I), (II) and (III) only
 - (I), (III) and (IV) only

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

Case 3: When a beam of light strikes such fine particles, the path of the beam becomes visible. The light reaches us after being reflected diffusely by these particles. The phenomenon of scattering of light by the colloidal particle is known as Tyndall effect. Tyndall effect can be observed when sunlight passes through a canopy of dense forest.

57. If the size of the scattering particles is large then:

- The scattered light may appear red
- The scattered light may appear blue
- The scattered light may appear white
- The scattered light may appear yellow

58. The colour of scattering light depends upon:

- Nature of particles
- Size of particles
- Volume of particles
- Density of Particle

59. The phenomenon of scattering of light by colloidal particles is known as:

- Tyndall effect
- Corona effect
- Dispersion effect
- Both (a) and (c)

60. The blue colour of the sky is due to the:

- Red light is absorbed
- Red light is preferentially scattered
- Blue is the natural colour of sky
- Blue light is preferentially scattered



SOLUTION

SAMPLE PAPER - 8

SECTION - A

1. (a) (I) and (II)

Explanation: Evaporation and sublimation are endothermic reaction, as they required energy for the process to take place.

2. (a) (I), (II)

Explanation: The pH of B is highest. Thus, it is a strongest base. It is used in antacids for e.g., milk of magnesia.

3. (b) Mercury

Explanation: Mercury (Hg) is liquid at room temperature.

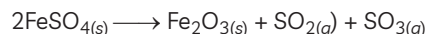


Related Theory

→ Bromine is a non-metal, which exist in liquid form at room temperature.

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

Explanation: The ferrous sulphate crystals are light green. The gas given out smells the characteristic odour of burning sulphur. On heating colour changes from light green (Ferrous sulphate) to white colour (Ferric oxide).



(Ferrous sulphate) (Ferric oxide)

5. (a) (R) > (P) > (Q)

Explanation: (A) 'R' is violet, basic i.e., higher pH.

'P' is green, neutral i.e., pH = 7

'Q' is red, acidic, i.e. pH < 7

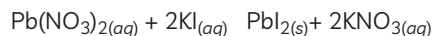
∴ R > P > Q

6. (c) Flushing food packets with oxygen gas

Explanation: Chips manufacturers usually flush bags of chips with gas such as nitrogen to prevent the chips from getting oxidized.

7. (c) Formula of precipitate formed : PbI_2 ; colour of precipitate : Yellow.

Explanation: When potassium iodide solution is added to lead nitrate solution in a test tube, a yellow precipitate of lead iodide is formed. The equation of the reaction taking place is:



8. (c) (I) and (III)

Explanation: Although HCl is a covalent compound, it ionise in water. This is because when HCl dissolves in water, its components dissociate into H^+ ions and Cl^- ions when the covalent bond is broken between them.

9. (d) (I), (III) and (IV)

Explanation: Gypsum, copper sulphate and washing soda are salts having molecules of water attached to them.

Their formula is given below:

Gypsum: $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

Copper sulphate: $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

Washing soda: $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

However, baking soda (NaHCO_3) does not contain any molecules of water of crystallization.

10. (a) Both (I) and (III)

Explanation: When water is added slowly to a small amount of calcium oxide taken in a beaker, calcium oxide reacts vigorously with water to produce calcium hydroxide (or slaked lime) and a large amount of heat is released. So, it is an exothermic reaction.

The equation for the reaction taking place is:



It is also a combination reaction as the two reactants water and calcium oxide combine to form a single product, calcium hydroxide.

11. (c) A: Pancreatic juice B: Trypsin C: Fat globules

Explanation: The pancreas secretes pancreatic juice which contains enzymes like trypsin for digesting proteins and lipase for breaking down emulsified fats.

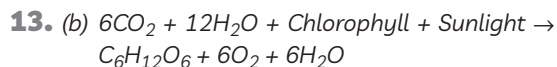
12. (a) (I) – (D); (II) – (A); (III) – (B); (IV) – (C)

Explanation: Amoeba takes in food using pseudopodia and digests the food in the food vacuole.

All green plants and blue green algae contain the green pigment chlorophyll and hence make their own food in the presence of sunlight. Their mode of nutrition is autotrophic mode.

Tapeworms are parasitic in nature as they derive their nutrition from other plants and organisms without killing them.

Mushrooms are saprophytic in nature as they feed on dead and decaying substances.



Explanation: During photosynthesis, carbon dioxide and water, in presence of chlorophyll and sunlight combine to form glucose and release oxygen.

14. (b) (d) All the above

Explanation: Leakage in the conducting tubes circulatory system would lead to a loss of pressure which would reduce the efficiency of the pumping system. After a leak the number of platelets would get increased that minimize the leakage by clotting of blood.

15. (a) Artery carries oxygenated blood, except pulmonary artery

Explanation: Two differences between an artery and a vein.

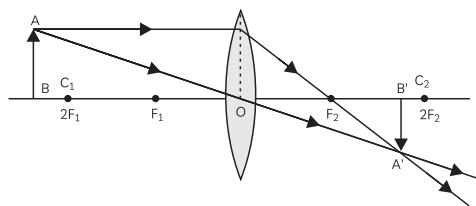
An artery	A vein
Artery is a blood vessel that carries pure oxygenated blood.	The vein carries impure deoxygenated blood.
It is thick-walled and more elastic.	It is thin-walled and less elastic.

16. (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.

17. (c) Position of image : Between F_2 and $2F_2$; magnification : Less than -1

Explanation: When the object is placed beyond $2F_1$, the image is formed between F_2 and $2F_2$ as shown in the ray diagram below.



Since the image is real, inverted and diminished, magnification $m < -1$.

18. (c) A concave mirror can form a diminished real image.

Explanation: A convex mirror always forms a virtual erect and diminished image.

19. (a) $\frac{3}{2}$

Explanation: Let Speed of light in air or vacuum = x

Speed of light in the given medium = $\frac{2}{3}x$

Since, $n_m = \frac{\text{Speed of light in air}}{\text{Speed of light in the medium}}$

$$= \frac{c}{v}$$

$$n_m = \frac{x}{\left(\frac{2}{3}x\right)} = \frac{3}{2}$$

Therefore, refractive index of the medium is $\frac{3}{2}$

20. (a) equal to $2f$

Explanation: Radius of curvature $R = 2 \times$ focal length of lens or mirror.



Related Theory

→ The image formed by a concave lens is always diminished irrespective of the position of the object.

21. (a) Scattering of light is not enough at such heights.

Explanation: At higher altitude the atmospheric medium is very rare, thus the scattering of light taking place is not enough at such heights. Hence, the sky appears dark to the passengers flying at very high altitude.

22. (c) $m = 1$

Explanation: The magnification of the images formed by plane mirrors is 1 as the size of the image is equal to the size of the object.

23. (a) $\frac{\sin i}{\sin r} = \text{constant}$

Explanation: The laws of refraction of light are:

(1) The incident ray, the refracted ray and the normal to the interface of

two transparent media at the point of incidence, all lie in the same plane.

- (2) The ratio of sine of angle of incidence to the sine of angle of refraction is a constant, for the light of a given colour and for the given pair of media. This law is also known as Snell's law of refraction. (This is true for angle $0 < i < 90^\circ$).

! Caution

Students ignore the word reflection, instead of refraction in option (b).

24. (a) 

Explanation: The deviation is more for blue and minimum for red.

SECTION - B

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

Explanation: Those reactions in which addition of oxygen to a substance or removal of hydrogen from a substance takes place are called oxidation reactions.

Those reactions in which addition of hydrogen to a substance or removal of oxygen from a substance takes place are called reduction reactions.

26. (b) Basic

Explanation: Calcium phosphate present in teeth is basic in nature which gets corroded when pH of mouth becomes less than 5.5 due to the secretion of acid by bacteria.

27. (b) Nitric acid is a strong oxidising agent oxidises hydrogen into water and itself get reduced to Oxide of Nitrogen.

Explanation: Nitric acid (HNO_3) is a strong oxidising agent so, as soon as hydrogen gas is formed in the reaction between a metal and dilute nitric acid, A nitric acid oxidises this hydrogen to water and itself gets reduced to NO_2 or NO or N_2O

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

Explanation: Metals like Al, Zn and Fe react with steam to form a metal oxide.

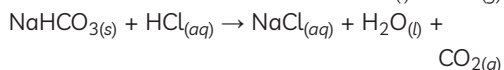
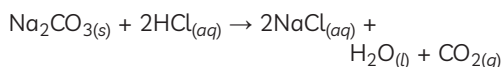


However, metals like Pb, Cu, Ag and Au do not react with water at all.

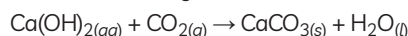
29. (a) A: Na_2CO_3 , B: CO_2 , C: CaCO_3

Explanation: Acids react with Metal carbonates and Metal hydrogen carbonates to form carbon dioxide gas.

Metal carbonate or hydrogen carbonate + Acid \rightarrow Salt + carbon dioxide + water



When carbon dioxide is passed through lime water, the lime water turns milky due to the formation of a white precipitate of calcium carbonate, CaCO_3 .



30. (c) Both (I) and (II)

Explanation: The bulb glows when electrolyte is an acid or a base as in both cases ions are produced in aqueous solution due to which current flows through the solution. Therefore, correct answer is dil.HCl and dil.NaOH

31. (d) A is false R is true.

Explanation: The aqueous solutions of glucose and alcohol do not show acidic character, as they do not yield H^+ ions.

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

Explanation : $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$

The substance which gains oxygen is considered as reducing agent and itself get oxidised. Thus, Cu act as an reducing agent and itself get oxidised by accepting oxygen.

! Caution

Oxidising agents add oxygen to another substance or remove hydrogen from it or gain electrons. Reducing agents remove oxygen from another substance or add hydrogen to it or lose electrons.

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

Explanation: Plants do not require a respiratory system because the parts of plants such as stems, leaves, roots etc exchange gases independently for respiration.

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

Explanation: The twinkling of a star is due to atmospheric refraction of starlight. The starlight, on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth. The atmospheric refraction occurs in a medium of gradually changing refractive index.

35. (c) Cation : Al^{3+} ; Anion : O^{2-}

Explanation: Aluminium oxide or Al_2O_3 is formed by the transfer of electrons from aluminium atoms to oxygen atoms.

Aluminium (Atomic number=13) has 3 valence electrons whereas oxygen (atomic number=8) has 2 valence electrons.

So, each aluminium atom donates its 3 valence electrons to the oxygen atoms and forms cations $[Al^{3+}]$, whereas each oxygen atom gains two electrons and forms anions $[O^{2-}]$.

36. (a) Skin

Explanation: The skin of earthworm is quite thin and moist and has rich blood supply. So, it respire through its skin.

37. (b) Both (I) and (II)

Explanation: Some substances in the initial filtrate such as glucose, amino acids, salts and a major amount of water are selectively reabsorbed as the urine flows along the tube. The amount of water re-absorbed as urine flows along the tube depends on how much excess water there is in the body and how much of dissolved waste is there to be excreted.

38. (c) Test Tube A: Lime water turned milky immediately; Test Tube B: Lime water turned milky after a long time

Explanation: Lime water turns milky when carbon dioxide gas is passed through it as a white precipitate of calcium carbonate is formed when lime water (calcium hydroxide) reacts with carbon dioxide gas.

Lime water turns milky in test tube A as the exhaled air is rich in carbon dioxide. Whereas, lime water takes a lot of time to turn milky in test tube B as the amount of carbon dioxide present in atmospheric air is very less as compared to exhaled air and hence carbon dioxide is produced after a long time.

39. (b) $\frac{100}{3}$ cm

Explanation: Focal length of lens, $f = \frac{1}{P} = \frac{1}{3}$ m

$$= \frac{1}{3} \times 100 = \frac{100}{3} \text{ cm .}$$

40. (b) Refraction

Explanation: Due to refraction of light through the water medium a virtual image of the object is produced nearer to the glass slab

surface and hence it appears to be raised by some height above the surface of the paper on which slab is kept.

41. (a) part 'A' : Filtration of blood; part 'B' : Reabsorption of glucose, Salts and amino acids

Explanation: Part labelled A is the Bowman's capsule which is a cup-like sac at the beginning of the tubular component of a nephron in the mammalian kidney. Fluids from blood in the glomerulus are collected in the Bowman's capsule and further processed along the nephron to form urine.

Part labelled B is the tubular part of the nephron where some substances in the initial filtrate, such as glucose, amino acids, salts and a major amount of water, are selectively re-absorbed as the urine along the tube.

42. (b) Both (I) and (III)

Explanation: Fermentation is a form of anaerobic respiration and takes place in yeast. Breakdown of pyruvate using oxygen takes place in the mitochondria.

During anaerobic respiration by yeast, pyruvate is converted into ethanol, carbon dioxide and energy.

43. (a) Object Distance : -90 cm ; Image Distance : $+22.5$ cm

Explanation: It is given that focal length, $f = +30$ cm and size of image = $\frac{1}{4}$ times size

of object. Therefore, $m = +\frac{1}{4} = -\frac{v}{u}$

$$\Rightarrow u = -4v$$

Applying the mirror formula,

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

$$\Rightarrow \frac{1}{30} = \frac{1}{v} - \frac{1}{4v}$$

$$= \frac{4-1}{4v} = \frac{3}{4v}$$

$$\Rightarrow v = +\frac{90}{4}$$

$$= 22.5 \text{ cm}$$

$$u = -90 \text{ cm}$$

44. (b) Position of Image : 2.20 m behind the mirror; Magnification : $+0.11$

Explanation : Security mirror is a convex mirror

Radius of curvature $R = +5$ m

Object distance $u = -20$ m

Image-distance $v = ?$

Size of image $h' = ?$

$$\text{Focal length } f = \frac{R}{2} = \frac{5}{2} = +2.5 \text{ m}$$

(as the principal focus in a convex mirror is behind the mirror).

By applying mirror formula

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

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

$$= \frac{1}{25} - \frac{1}{(-20)}$$

$$= \frac{40 + 5}{100}$$

$$= \frac{45}{100}$$

$$v = \frac{100}{45}$$

$$= +2.22 \text{ m}$$

The image is +2.22 m behind the mirror

$$m = -\frac{v}{u}$$

$$= -\frac{2.22}{-20}$$

$$= +0.11$$

The image is smaller in size by a factor of 0.11

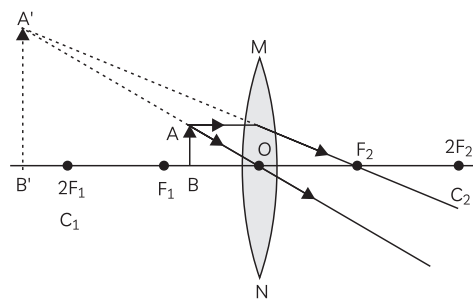
Position of image: Behind the mirror

Size of image: diminished

45. (d) *Type of lens : Convex lens ; Position of lens : Between O and F₁*

Explanation: The nature of lens used by the palmist to see her palm is convex lens so as to have a virtual, magnified and erect image of her palm.

The palmist should place or hold the lens between O and F₁ to have an erect and magnified image of her palm.



46. (d) *Power of combination : + 25 D ;
Focal length of combination : +40 cm*

Explanation:

The power of a lens is given by $P = \frac{1}{f(\text{in m})}$.

If P₁ and P₂ are the power of the lenses L₁ and

$$L_2, P_1 = +\frac{1}{0.2} = +5D; P_2 = +\frac{1}{0.05} = +20D$$

The power of combination = $P = P_1 + P_2 = 5 D + 20 D = 25 D$

The focal length of the combination = $f =$

$$\frac{1}{P} = +\frac{1}{25} = 0.04 \text{ m} = +40 \text{ cm}$$

47. (a) *The speed of light is maximum in medium A and minimum in medium D.*

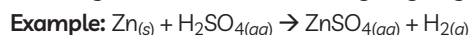
Explanation: The speed of light is more in a rarer medium (having lower refractive index) and is less in a denser medium (having higher refractive index) since refractive index of a medium $n = \frac{c}{v}$, where v is the speed of light in that medium.

Therefore, speed of light in a medium $v \propto \frac{1}{n}$.

As the refractive index of medium A is the least, speed of light will be maximum in A and refractive index of medium D is the greatest meaning that speed of light in D will be minimum.

48. (b) *Salt and hydrogen gas*

Explanation: Most metals react with dilute acid to give the metal salt and hydrogen gas.



SECTION - C

49. (d) *baking soda*

Explanation: Baking soda is a leavening agent used in baked goods like cakes, muffins, and cookies. Soda ash can be used as an anti-caking agent, to help baked goods to rise, and to help control the acidity of some foods. When soda

ash is dissolved with carbon dioxide, it forms baking soda.

50. (a) *NaHCO₃*

Explanation: Sodium bicarbonate (NaHCO₃), also known as baking soda or bicarbonate of soda.

51. (a) $\text{NaOH} + \text{H}_2\text{CO}_3$

Explanation: $\text{NaOH} + \text{H}_2\text{CO}_3 \rightarrow \text{NaHCO}_3 + \text{H}_2\text{O}$

52. (b) Basic

Explanation: Baking soda is an alkaline (basic) substance. When it mixes with an acid, it alters the pH level. That's why it can quickly soothe an upset stomach or cover a bad smell.

53. (b) X : Major conducting cells in phloem;

Y : Nucleated; Z : Flow is unidirectional.

Explanation: In the given figure, X represents the sieve tube elements, Y represents the companion cell and Z represents the Xylem. Sieve tube elements are the major conducting cells of phloem tissues. Companion cell is usually closely associated with a sieve element and it is nucleated though sieve tube elements don't possess nucleus.



Related Theory

→ The transport of water in the xylem takes place only from the roots to the leaves. Therefore the movement of water and nutrients in the xylem is unidirectional.

54. (d) The rate of absorption fell behind the rate of transpiration during the days, but exceeds it at night.

Explanation: According to given graph there is a difference between the rates of transpiration and water absorption between 00:00 and 06:00 hours because the rate of absorption fell behind the rate of transpiration during the day, but exceeded at night.

55. (c) Sieve tube cells and tracheids - Xylem

Explanation: In xylem tissue, vessels and tracheids of the roots, stems and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant while in phloem, the translocation of food and other substances takes place in the sieve tubes with the help of adjacent companion cells both in upward and downward directions.

56. (d) (I), (III), and (IV) only.

Explanation: Besides the products of photosynthesis, the phloem transports amino acids and other substances.

57. (c) The scattered light may appear white

Explanation: The scattered light may appear white particle of larger size scatter light of longer wavelengths.

58. (b) Size of particles

Explanation: Lesser the size of particle more scattering of light and more size less scattering of light. Thus, scattering of light depends on wavelength of colour.

59. (a) Tyndall Effect

Explanation: The scattering of light colloidal particle is called Tyndall effect.

60. (d) Blue light is preferentially scattered

Explanation: Because of dust and fine particles in the sky, blue colour is scattered more.

