

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.

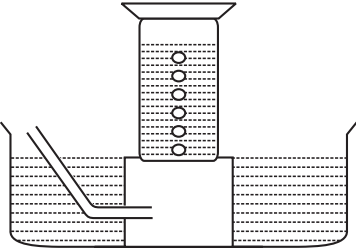
The first attempted 20 questions would be evaluated.)

- Barium chloride solution is mixed with copper sulphate solution and a white precipitate is obtained. Select the correct statements.
 - It is a displacement reaction.
 - The white precipitate obtained is BaCO_3 .
 - The question representing the chemical reaction is:

$$\text{BaCl}_{2(aq)} + \text{CuSO}_{4(aq)} \rightarrow \text{BaSO}_{4(s)} + \text{CuCl}_{2(aq)}$$
 - It is a displacement and Precipitation Reaction
- Why is hydrogen peroxide kept in coloured bottles?
 - Because it vapourise in transparent bottles
 - Because it decompose into water and oxygen in the light
 - Because it is toxic and keep it safe from children
 - Because it reacts with sunlight.
- The surfaces of which of the following metals are covered with a thin layer of oxide at ordinary temperature:

(I) Magnesium	(II) Aluminium
(III) Zinc	(IV) Sodium

 - Both (I) and (II)
 - Both (II) and (III)
 - (I), (II) and (III)
 - Only (IV)
- What change in the colour of iron nails and copper sulphate solution is observed after keeping the iron nails dipped in copper sulphate solution for about 30 minutes?
 - Iron nails becomes brown in colour
 - Solution becomes Orange in colour
 - Blue colour of solution dissappear
 - Both (a) and (c)
- A reactive metal (M) is treated with dilute acid, H_2SO_4 . The gas evolved is collected over the water as shown in the figure:



Which of the following statement is/are correct?

 - the gas is SO_2 and is lighter than air
 - the gas is lighter than air
 - the gas is hydrogen
 - Both (b) and (c)
- Which of the following are not the examples of combination reactions?
 - $$2\text{FeSO}_{4(s)} \xrightarrow{\Delta} \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$$

- (II) $MgO + H_2O \rightarrow Mg(OH)_2$
 (III) $4Al + 3O_2 \rightarrow 2Al_2O_3$
 (IV) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
 (a) (I) and (III) (b) (II) and (III)
 (c) (II) and (IV) (d) (I) and (IV)

7. On what basis is a chemical equation considered as balanced?
 (a) Law of conservation of energy
 (b) Law of conservation of atomic number
 (c) Law of conservation of mass
 (d) Law of equilibrium

8. Consider the following statements about an element 'X' with number of protons 13:
 (I) It forms amphoteric oxide
 (II) Its valency is three
 (III) The formula of its chloride is XCl_3

The correct statements (s) is/ are:

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

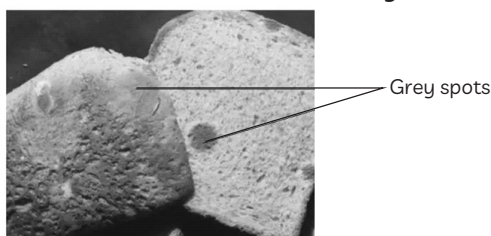
9. Select the incorrect statement: When Hydrochloric acid or acetic acid of same concentration are taken,

- (I) pH of Hydrochloric acid = pH of acetic acid
 (II) pH of Hydrochloric acid > pH of acetic acid
 (III) pH of Hydrochloric acid < pH of acetic acid
 (IV) pH is not related to concentration of acid.
 (a) Only (III) (b) Both (I) and (IV)
 (c) Both (II) and (IV) (d) (I), (II) and (IV)

10. In the reaction, $Be_2C + xH_2O \rightarrow yBe(OH)_2 + CH_4$ what will be the values of x and y.

- (a) $x = 4, y = 1$ (b) $x = 1, y = 2$
 (c) $x = 2, y = 1$ (d) $x = 4, y = 2$

11. Amit observed some greyish black spots on a slice of stale bread as shown in figure.



Based on the above observation, identify the cause of the grey spots and their mode of nutrition and select the correct combinations from the table below:

Option	Cause of grey spots	Mode of nutrition
(a)	Yeast	Parasitic

(b)	Bacteria	Saprophytic
(c)	Bread Mould	Parasitic
(d)	Bread Mould	Saprophytic

12. The table below lists the organs or glands of human digestive system in column I and its function in column II. Match the part mentioned in column I and correlate with its function in column II.

	Column I		Column II
(I)	Gastric gland	(A)	Secretes enzymes trypsin and lipase
(II)	Liver	(B)	Site for complete digestion
(III)	Pancreas	(C)	Creates acidic medium
(IV)	Small intestines	(D)	Creates alkaline medium

- (a) (I) - (C); (II) - (D); (III) - (B); (IV) - (A)
 (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. In the respiratory system, an extensive network of blood vessels is present in:

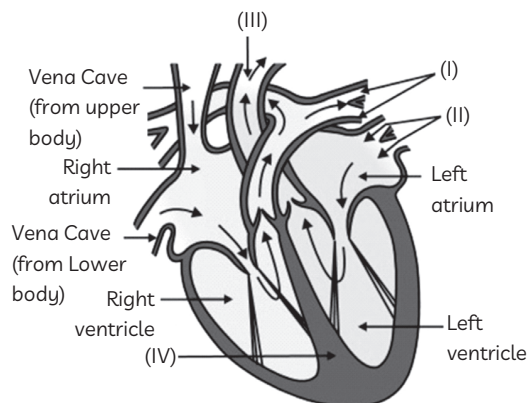
- (a) Bronchioles (b) Alveoli
 (c) Trachea (d) Pharynx

14. Select the incorrect statement:

- (a) The arteries have thick, elastic walls
 (b) The veins have thin walls
 (c) Veins have valves to ensure that blood flows in one direction only.
 (d) Arteries have valves to ensure that blood flows in one direction only.

15. The figure below shows the schematic sectional view of the human heart with labels (i) to (iv).

Identify the correct labels with its functions.



- (a) (I) Pulmonary arteries – Carries deoxygenated blood from heart to the lungs
- (b) (II) Aorta – Carries oxygenated blood from the lungs to the heart
- (c) (III) Pulmonary veins – Carries oxygenated blood from the heart to various body parts
- (d) (IV) Septa – Valve present between the four chambers of the heart

16. The deoxygenated blood from the body parts comes to which chamber of the heart?

- (a) Left atrium
- (b) Right atrium
- (c) Left ventricle
- (d) Right ventricle

17. A concave mirror forms a real image equal in size to the object. The position of object and magnification will be:

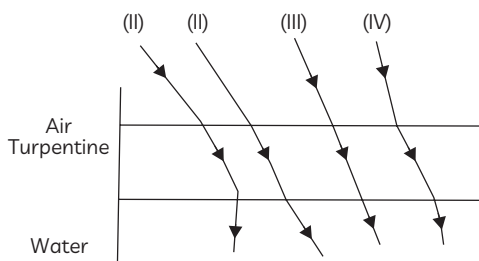
	Position of object	Magnification
(a)	C	- 1
(b)	F	-1
(c)	At infinity	+1
(d)	C	+1

18. Which of the following always produces a virtual and diminished image of an object for all positions of the object?

- (I) Concave Mirror
 - (II) Convex Mirror
 - (III) Concave Lens
 - (IV) Convex Lens
- (a) Both (I) and (II)
 - (b) Both (I) and (III)
 - (c) Both (II) and (III)
 - (d) Both (III) and (IV)

19. The ray diagram shows the refraction of light as light passes from air (refractive index 1.0003) to turpentine (refractive index 1.47) and then to water (refractive index 1.33).

Four rays have been drawn labelled as (I), (II), (III) and (IV).



Select the correct path of ray as light passes through these media:

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

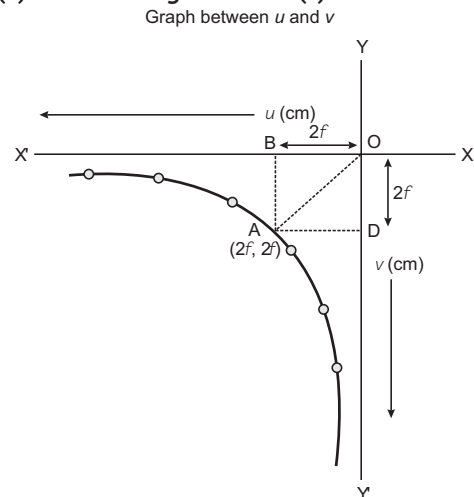
20. If the refractive index of a transparent medium is 1.2, then the speed of light in that medium will be:

- (a) 0.5×10^8 m/s
- (b) 1.2×10^8 m/s
- (c) 2.5×10^8 m/s
- (d) 3.6×10^8 m/s

21. The sky appear red instead of blue when:

- (a) atmospheric particles scatter blue light more than red light
- (b) atmospheric particles scatter all colour equally
- (c) atmospheric particles scatter red light more than blue light
- (d) the sun was much hotter

22. In order to find out the focal length of a concave mirror, a student plotted the following graph between the object distance (u) and the image distance (v) :



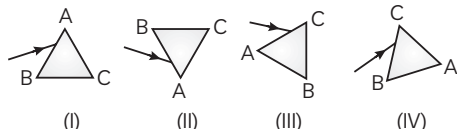
After analysing the graph a student writes the following statements.

- (I) The image distance decreases as the object is brought closer to the principal focus from infinity.
- (II) The image distance increases as the object is brought closer to the principal focus from infinity.
- (III) The image distance is equal to the object distance when object distance is $2f$, where f is the focal length of the mirror.
- (IV) The image distance is equal to the object distance when object distance is f , where f is the focal length of the mirror.

Choose from the following which of the following would be the correct statement(s).

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

23. A prism ABC is placed in different orientation. Consider BC at base. A narrow of white light is incident on the prism as shown in figure. In which of the following cases, after dispersion, the sixth colour from the top corresponds to the colour of the sun?



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

24. The sun near the horizon appear flattened at the sunset and sunrise due to:

- (a) Refraction
(b) Diffraction
(c) Polarisation
(d) Total internal reflection

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. Digestion of food represents:

- (a) Displacement reaction
(b) Decomposition reaction
(c) Combustion reaction
(d) Combination reaction

26. The table below shows the following in increasing order of their pH values - Saliva (before meal), Lemon juice, Milk of Magnesia, Tap water.

Select the row which has the substances arranged in correct order:

(a)	Saliva (before meal) < Lemon juice < Milk of Magnesia < Tap water
(b)	Lemon juice < Saliva (before meal) < Tap water < Milk of Magnesia
(c)	Saliva (before meal) < Tap water < Lemon juice < Milk of Magnesia
(d)	Lemon juice < Tap water < Saliva (before meal) < Milk of Magnesia

27. Which of the following metals will be displaced from the solution of its salts by other three metals?

- (a) Mg (b) Ag
(c) Zn (d) Cu

28. Aqua regia is:

- (a) conc. HCl and conc. HNO₃ (3 : 1)
(b) conc. HNO₃ and conc. HCl (3 : 1)
(c) HCl and HNO₃ (3 : 1)
(d) Aqueous solution of HCl and HNO₃

29. A compound X on heating at 373 K gives Y which is used for making chalk and for plastering fractured bones. 'Y' on mixing with water changes to 'X'.

Select the row containing the correct identification of X and Y:

	X	Y
(a)	CaSO ₄ .2H ₂ O	CaSO ₄ . H ₂ O

(b)	CaSO ₄ . $\frac{1}{2}$ H ₂ O	CaSO ₄ .2H ₂ O
(c)	CaSO ₄ .2H ₂ O	CaSO ₄ . $\frac{1}{2}$ H ₂ O
(d)	CaSO ₄ .H ₂ O	CaSO ₄ .2H ₂ O

30. The ions present in Na₂O are:

	Cation	Anion
(a)	2[Na ⁺]	[O ²⁻]
(b)	[Na ²⁺]	[O ²⁻]
(c)	2[Na ⁺]	[O ⁻]
(d)	[Na ²⁺]	[O ⁻]

Two statements are given in the question below as Assertion (A) and Reasoning (R). Read the statements and choose the appropriate option.

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

31. Assertion (A): The acid must always be added to water with constant stirring.

Reason (R): Mixing of an acid with water increases the concentration of H⁺ ions per unit volume.

32. Assertion (A): Brown fumes are produced when lead nitrate is heated.

Reason (R): Nitrogen dioxide gas is produced due to the decomposition of lead nitrate as a by-product.

33. Assertion (A): Bile is essential for digestion of lipids.

Reason (R): Bile juice contains enzymes.

34. Assertion (A): A ray of light, incident obliquely on a face of a rectangular glass slab placed in air, emerges from the opposite face parallel to the incident ray.

Reason (R): Lateral displacement depends on the angle of incidence, thickness of slab, and refractive index of the material.

35. Ionic compounds are solids and hard because
 (a) of the strong force of attraction between the positive and negative ions
 (b) they are formed between metals and non-metals
 (c) due to sharing of electrons
 (d) due to formation of strong hydrogen bonds between the compounds.

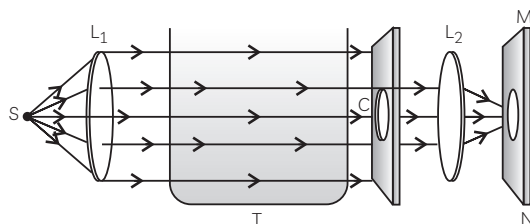
36. Which is the first enzyme to mix with food in the digestive system?
 (a) Trypsin (b) Pepsin
 (c) Salivary amylase (d) HCL

37. The carbohydrates which are not used immediately by the organism are stored in which form by plants and animals?

	Plants	Animals
(a)	Glycogen	Glycogen
(b)	Glycerol	Glycerol
(c)	Starch	Glycerol
(d)	Starch	Glycogen

38. The most common chemical means to break down molecules needed for various molecular movements in organisms is:
 (a) Combination reactions
 (b) Decomposition reactions
 (c) Oxidising-reducing reactions
 (d) Combustion reactions

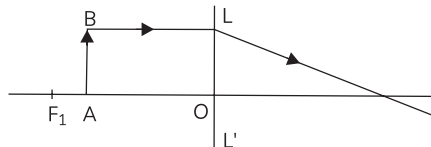
39. Study the given diagram.



The above diagram represents:

- (a) scattering of light in true solution
- (b) scattering of light in colloidal solution
- (c) Tyndall effect
- (d) Both (b) and (c)

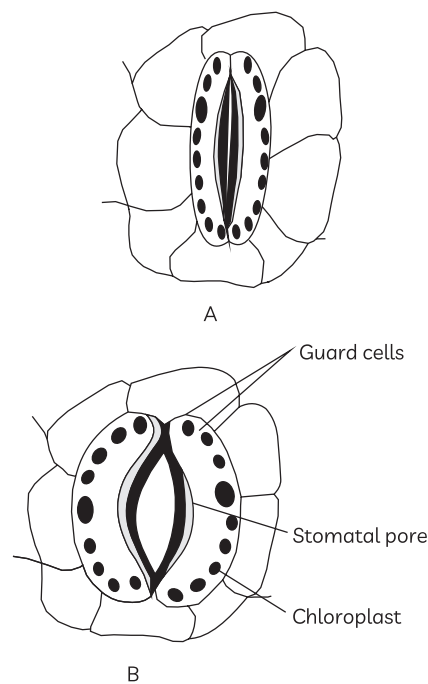
40. An object AB is placed in front of a lens LL' as shown in the figure below:



Select the row containing the correct nature of lens, position of image and magnification produced:

	Nature of lens	Position of image	Magnification
(a)	Concave lens	On the same side as lens	> -1
(b)	Concave lens	Between O and F_1	< -1
(c)	Convex lens	Between O and F_1	$< +1$
(d)	Convex lens	On the same side as lens	$> +1$

41. The figure below shows two stomatal pores labelled as A and B.



Identify the correct stomatal pore and the reasons for opening and closing of stomatal

pore from the table below:

	A	Reason	B	Reason
(a)	Open Stomatal pore	Guard cells swell	Closed Stomatal pore	Guard cells shrink
(b)	Open Stomatal pore	Guard cells shrink	Closed Stomatal pore	Guard cells swell
(c)	Closed Stomatal pore	Guard cells shrink	Open Stomatal pore	Guard cells swell
(d)	Closed Stomatal pore	Guard cells swell	Open Stomatal pore	Guard cells shrink

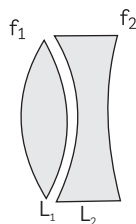
42. Which of the following statements regarding small intestines are not true?

- (I) Length of small intestines is different in different organisms.
 - (II) Small intestines is the site for complete digestion of proteins and fats only.
 - (III) Herbivores have smaller small intestines.
 - (IV) Herbivores have longer small intestines.
- (a) Both (I) and (II)
 (b) Both (II) and (III)
 (c) (I), (II) and (IV)
 (d) (II), (III) and (IV)

43. Consider an object 7.0 cm in length which is placed at a distance of 20 cm in front of a convex mirror of radius of curvature 30 cm. The size and position of image formed is:

- (a) size of image = -3 cm, position of image = $+\frac{60}{7}$ cm
 (b) size of image = +3 cm, position of image = $+\frac{60}{7}$ cm
 (c) size of image = +3 cm, position of image = $+\frac{7}{60}$ cm
 (d) size of image = -3 cm, position of image = $+\frac{7}{60}$ cm

44. Two lenses L_1 and L_2 having focal length 20 cm and -10 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)	+ 10 D	+10 cm
(b)	- 10 D	- 10 cm
(c)	- 5 D	- 20 cm
(d)	- 5 D	- 10 cm

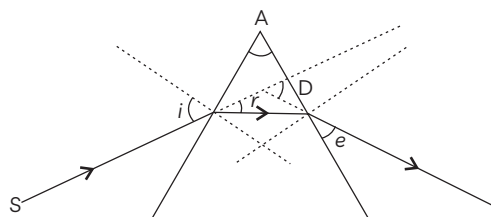
45. An object is placed at the 35 cm distance from a concave mirror of local length 15 cm. What is the nature of the image formed?

- (a) real, inverted, enlarged
- (b) real, inverted, diminished
- (c) virtual, erect, diminished
- (d) Virtual, erect, same size

46. Which of the following represent the relationship between object distance (u) image distance (v) and focal length (f), for a concave lens?

- (a) $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ (b) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$
 (c) $\frac{1}{f} = \frac{1}{u} - \frac{1}{v}$ (d) $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$

47. Study the following diagram showing refraction of light by a glass prism.



Which of the angles have not been marked correctly?

- (I) $\angle i$ (II) $\angle r$
 - (III) $\angle D$ (IV) $\angle D$
- (a) Only (I) (b) Only (II)
 (c) Both (II) and (III) (d) Both (III) and (IV)

48. Metal oxides of Mg, Al, Cu and Ca were reacted with the following metals.

Select the incorrect observations:

	Oxide of Metal	Mg	Al	Cu	Ca
(I)	MgO	-	X	X	✓
(II)	Al ₂ O ₃	X	-	X	✓

	Oxide of Metal	Mg	Al	Cu	Ca
(III)	CuO	✓	✓	-	✓
(IV)	CaO	X	X	X	-

- (a) Both (I) and (II)
 (b) Both (I) and (III)
 (c) Both (II) and (III)
 (d) Both (II) 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: The acids are sour in taste while bases are bitter in taste. However, tasting a substance is not a good way of finding out if it is an acid or a base. Acids and bases are distinguished with the help of indicators. Indicators are the substances that undergo a change of colour with a change of nature of solution, i.e., acidic, neutral or basic medium. Most of these indicators are derived from natural substances such as extracts from flower petals. Some indicators are prepared artificially. For example, methyl orange and phenolphthalein.

Indicator	Colour at pH = 7
Red cabbage	purple
Red onion water	violet
Turmeric water	yellow
Phenolphthalein	colourless
Bromothymol blue	green
Red litmus	red
Blue litmus	blue
Universal indicator	green

49. When methyl orange is added to an acid the colour changes to

- (a) pinkish red (b) blue
 (c) orange (d) yellow

50. Which solution will change blue litmus to red?

- (a) NaOH_(aq) (b) NH₄OH_(aq)
 (c) KCl_(aq) (d) H₂SO_{4(aq)}

51. Which of the following solution will turn phenolphthalein pink?

- (a) HCl_(aq) (b) CO_{2(aq)}
 (c) KOH_(aq) (d) H₂SO_{4(aq)}

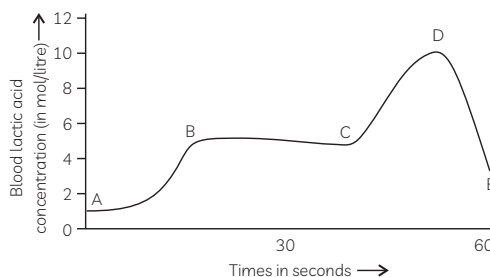
52. Which of the following statement(s) is incorrect w.r.t. the litmus paper?

- (a) In acidic solution, blue litmus paper turned red.
 (b) In neutral solution, no colour change is observed
 (c) It is a most commonly used indicator
 (d) Litmus solution is a yellow dye, which is extracted from the plant.

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

Case 2: During the process of nutrition food obtained is used in cells to provide energy for various life processes. Diverse organisms perform different processes some use oxygen to break-down the food material completely, some use other pathways that do not involve oxygen. In all cases, the first step is the break-down of food material and takes place in the cytoplasm further, the products of breakdown food may be converted into ethanol and carbon dioxide. Breakdown of food product using oxygen takes place in the mitochondria.

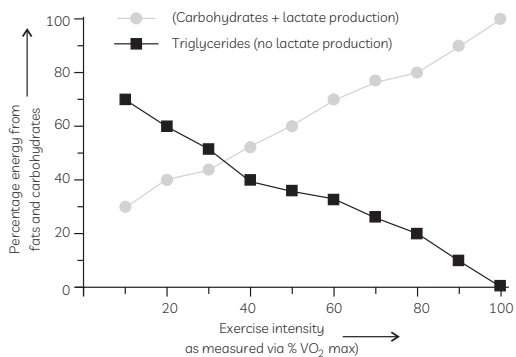
53. Study the given graph representing the blood test reports of a racer just before and after a Match.



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

	Section of race	Concentration of lactic acid	Type of respiration
(a)	A-B (spirit start)	Changing high to low	Changing from anaerobic to aerobic
(b)	B-C (main-taining speed)	High to low	Anaerobic
(c)	C-D (sprint finish)	High	Aerobic
(d)	D-E (just after sprint finishing)	Low	Aerobic

54. Swimmers suffers from muscle cramps due to:
- conversion of pyruvate to ethanol
 - conversion of pyruvate to glucose
 - non-conversion of glucose to pyruvate
 - conversion of pyruvate to lactic acid.
55. The given graph represent the effect of exercise intensity on carbohydrate consumption.



During sleeping intensity of exercise.

- the anaerobic consumption of sugar increases
 - the aerobic consumption of sugar increases
 - the anaerobic consumption of sugars decreases
 - no consumption of sugars takes place
56. Which of the following statement are true about energy released during cellular respiration?
- It is used immediately to synthesise ADP.
 - It is used to fuel all other activities in the cell.
 - ADP is the energy currency for most cellular processes.
 - An ADP molecule is formed from ATP and inorganic phosphate.
- (I) and (II) only
 - (II) only
 - (I), (II) and (III) only
 - (I), (III) and (IV) only

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

Case 3: An an example, the first row of table shows a completed set of data

S. No.	Type of mirror	Radius of curvature	Focal length	Object distance	Image			Magnification
					Distance	Real	Inverted	
I	Plane	—	—	- 45 cm	—	—	—	—
II	—	50.0 cm	—	- 5.0 cm	—	—	—	+ 0.84
III	Concave	—	- 20.0 cm	—	+ 40.0 cm	—	—	—

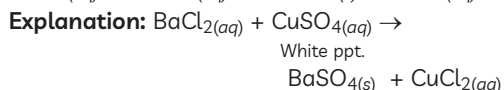
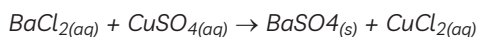
57. What is radius of curvature for a concave mirror in row III:
- 40 cm
 - 20 cm
 - + 10 cm
 - + 40 cm
58. Which type of mirror is in row II:
- Plane
 - Concave
 - Convex
 - Spherical
59. Which of the following produces a virtual images?
- Convex lens
 - Concave mirror
 - Concave lens
 - both (a) and (b)
60. Which type of mirror is used by barber during shaving beard?
- Convex
 - Concave
 - Plane
 - both (a) and (c)



SOLUTION

SECTION - A

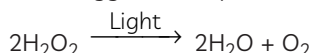
1. (c) The question representing the chemical reaction is:



It is a double displacement reaction.

2. (b) Because it decompose into water and oxygen in the light

Explanation: This is done in order to cut off light because hydrogen peroxide decomposes into water and oxygen in the presence of light.



Related Theory

Combination reaction is the reaction between two or more molecules to form larger molecule whereas decomposition reaction is defined as splitting of larger molecules into two or more smaller molecules. Thus, both reactions are opposite to each other.

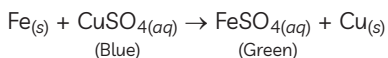
3. (c) (I), (II), and, (III)

Explanation: At ordinary temperature, the surfaces of metals magnesium, aluminium, zinc etc are covered with a thin layer of oxide.

Sodium is kept immersed in kerosene oil as it is a very reactive metal and can catch fire if exposed to air.

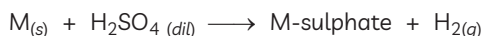
4. (d) Both (a) and (c)

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



5. (d) Both (b) and (c)

Explanation: When reactive metal (M) reacts with the acid $\text{H}_2\text{SO}_4(\text{dil})$. It evolves hydrogen gas (H_2). It is lighter than air and is collected above water



6. (d) (I) and (IV)

Explanation: When two reactants reacts to form single product, it is known as combination reaction.

7. (c) Law of conservation of mass

Explanation: Balancing the chemical equation is based on the law of Conservation of mass i.e., mas of reactants is equal to the mass of products.

8. (d) (I), (II) and (III)

Explanation: Element 'X' has 13 protons. Atom is electrically neutral so it will have number of electrons as 13. Number of protons also gives us the atomic number.

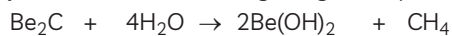
Element	X
No. of protons	13
No. of electrons	13
Atomic number	13
Electronic configuration	2, 8, 3
Valence electrons	3
Valency	3

9. (a) Only III

Explanation: If we take hydrochloric acid and acetic acid of the same concentration, the pH value of hydrochloric acid will be less than the pH value of acetic acid as the number of hydrogen ions produced by hydrochloric acid is much more than that produced by acetic acid.

10. (d) $x = 4, y = 2$

Explanation : On balancing the given equation.



Barium Carbide Water Beryllium hydroxide Methane

Hence, $x = 4$ and $y = 2$

11. (d) Cause of grey spots : Bread Mould; Mode of nutrition: Saprophytic.

Explanation: The grey spots on the stale bread is due to bread moulds and its mode of nutrition is Saprophytic. Organisms such as Bread moulds, yeast and mushroom break down the food outside the body and then absorb it.

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

Explanation: The gastric glands present in the wall of the stomach release hydrochloric acid, a protein digesting enzyme called pepsin, and mucus. The hydrochloric acid creates an acidic medium which facilitates the action of the enzyme pepsin.

The bile juice from liver makes the food alkaline for the pancreatic enzymes to act as the food coming from the stomach is acidic.

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

The small intestine is the site of the complete digestion of carbohydrates, proteins and fats. It receives the secretions of the liver and pancreas for this purpose.

13. (b) Alveoli

Explanation: Within the lungs, the passage divides into smaller and smaller tubes which finally terminate in balloon-like structures which are called alveoli. The alveoli provide a surface where the exchange of gases can take place. The walls of the alveoli contain an extensive network of blood-vessels.

14. (d) Arteries have valves to ensure that blood flows in one direction only.

Explanation: Arteries do not have any valves as they carry blood away from the heart. They have thick and elastic walls as the blood is under high pressure. Veins have valves to ensure that the blood flows in one direction only.

15. (a) (I) Pulmonary arteries – Carries deoxygenated blood from heart to the lungs

Explanation: The pulmonary arteries carries deoxygenated blood from heart to the lungs for oxygenation. (1) is Pulmonary veins which carries oxygenated blood from the lungs to the left atrium of the heart.

(2) is Aorta which carries oxygenated blood from the heart to different body parts.

(3) is Septa which is the dividing wall between the left and right side of the heart.

16. (b) Right atrium

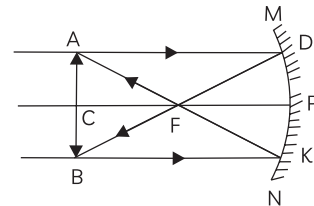
Explanation: The deoxygenated blood from the various body parts comes to the right atrium when it relaxes. It then goes to the right ventricle which in turn pumps it to the lungs for oxygenation.

17. (a) Position of object: C;

Magnification: – 1

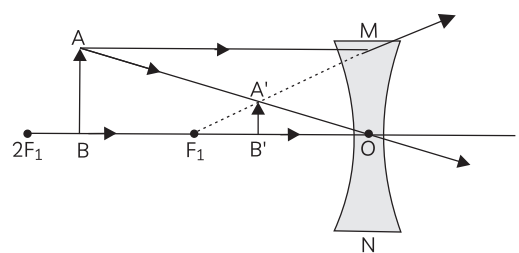
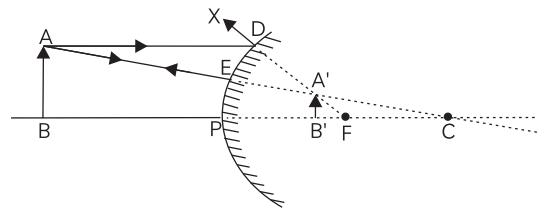
Explanation: A concave mirror forms a real image equal in size to the object when the object is placed at C, the centre of curvature of the mirror. As the image formed is real and of same size as the object, $m = -1$.

Ray diagram for the image formation is given below:



18. (c) Both (II) and (III)

Explanation: A concave mirror and convex lens form real and inverted image for all positions of the object except when the object lies between pole (optical centre in case of lens) and focus. The ray diagram for formation of image by a convex mirror and concave lens is shown below:



19. (b) (II)

Explanation: As the ray of light first passes from air (a rarer medium) to turpentine (a denser medium), it will bend towards the normal. Then it passes from turpentine (a denser medium) to water (a rarer medium) and will bend away from the normal.

20. (c) 2.5×10^8 m/s

Explanation: The relation between refractive index of a medium and the speed of light in that medium is given by

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

$$\Rightarrow 1.2 = \frac{3 \times 10^8}{v}$$

$$\Rightarrow v = \frac{3 \times 10^8}{1.2} = 2.5 \times 10^8 \text{ m/s}$$

21. (c) atmospheric particles scatter red more than blue light

Explanation: During sunrise and sunset, light have to travel longer distance to reach observer. Loss of energy due to scattering is more for high frequency wave. Longer wavelength wave has minimum loss due scattering, and can travel long distance. Red colour has longer wavelength, its intensity reach to the observer is more compare to other colours. Hence the sun appears red during sunrise and sunset.

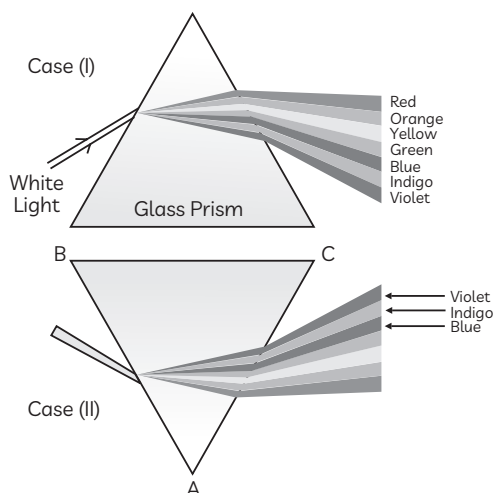
22. (c) (I) and (III)

Explanation: It is observed that as the object is brought closer to the principal focus from infinity, the image distance also increases.

Also, the image distance is equal to the object distance when object distance is $2f$, where f is the focal length of the mirror.

23. (b) II

Explanation: Generally in case of a prism (I) and (II), the formation of spectrum is shown below



In the above figure, from top the sixth colour is indigo. But we can see that from bottom the sixth colour is orange which is the colour of sun. So, we can obtain the correct situation by inverting the prism. Thus, the required orientations can be found in case II.

24. (a) Refraction

Explanation: At sunrise and sunset, the sun is near the horizon. The rays of light from the upper part and lower part of the periphery of the sun bend unequally on travelling through earth's atmosphere. That is why the sun appears oval or flattened at the time of sunrise and sunset.

⚠ Caution

→ At noon, the sun is overhead. The rays of light from the sun enter earth's atmosphere normally. Therefore, they suffer no refraction or bending on passing through earth's atmosphere. Hence the sun appears circular at noon.

SECTION - B

25. (b) Decomposition reaction

Explanation: During digestion, food is broken down into simpler and soluble compounds.

26. (b) Lemon juice < Saliva (before meal) < Tap water < Milk of Magnesia

Explanation: The pH values of the substances referred in the questions are given below:

Saliva (before meal): 6.5 to 6.9

Lemon juice: 2.2 to 2.4

Milk of Magnesia: 10

Tap water: 7

💡 Related Theory

→ The pH value of saliva after meals is 5.5 to 5.9 as saliva becomes more acidic after meals due to secretion of gastric juices in stomach which contain hydrochloric acid.

27. (b) Ag

Explanation: Ag is the least reactive metal.

28. (a) conc. HCl and conc. HNO₃ (3 : 1)

Explanation: It is a freshly prepared mixture of concentrated hydrochloric acid and concentrated nitric acid in the ratio of 3 : 1.

💡 Related Theory

→ Aqua regia is a highly corrosive, fuming liquid. It can dissolve gold and platinum, even though neither of these acids (HCl and HNO₃) can do alone.

29. (c) X : CaSO₄·2H₂O CaSO₄ · $\frac{1}{2}$ H₂O

Explanation: On heating gypsum at 373 K, it loses water molecules and becomes

calcium sulphate hemihydrate ($\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$)

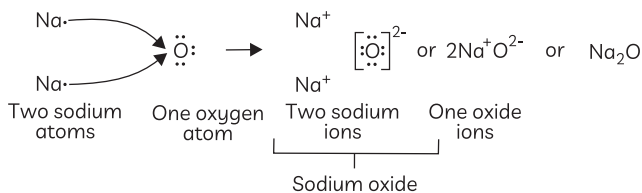
Therefore X is Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) and Y is

plaster of Paris ($\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$).



30. (a) Cation: $2 [\text{Na}^+]$; Anion: $[\text{O}_2^{2-}]$

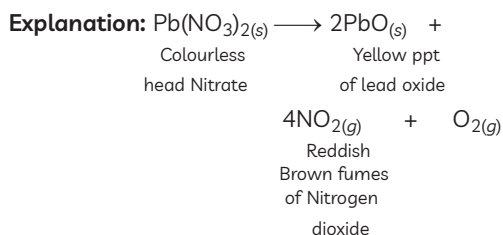
Explanation: Na_2O is formed by the transfer of one valence electron each from the two atoms of Na (2, 8, 1) to O (2, 6).



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

Explanation: When acid is added to water, the solution that forms is very dilute and the small amount of heat released is not enough to vaporize and spatter it. However, if water is added to acid, then an extremely concentrated solution of acid initially and the solution may boil very violently, splashing concentrated acid.

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



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

Explanation: Bile juice contains no digestive enzymes, yet it is important for digestion.

34. (b) Both A and R are true, but R is not the correct explanation of the A.

Explanation: When a light ray passes through a glass slab it is refracted twice at the two parallel faces and finally emerges parallel to its incident direction.

35. (a) of the strong force of attraction between the positive and negative ions

Explanation: Ionic compounds are solids and hard because of the strong force of attraction between the positive and negative ions, due to transfer of electrons between the elements.



Related Theory

Electrovalent compounds are generally soluble in water and insoluble in solvents such as kerosene, petrol, etc.

36. (c) Salivary amylase

Explanation: Salivary amylase is the first enzyme to mix with food in the digestive tract. It is the primary enzyme of saliva.



Related Theory

Salivary amylase, also called as Ptyalin is secreted from the salivary glands (mainly parotid glands) in the buccal cavity.

37. (d) Plants : Starch : Animals : Glycogen.

Explanation: The carbohydrates which are not used immediately are stored in the form of starch in plants, which serves as the internal energy reserve to be used as per plant's requirement. In animals, it is stored in the form of glycogen.

38. (c) Oxidising-reducing reactions

Explanation: The various molecules obtained from the environment as sources of energy have to be broken down chemically for maintaining living structures for which oxidizing reducing reactions are the most common.

39. (d) Both (b) and (c)

Explanation: The phenomenon of scattering of light by particles in a colloid or in a very fine suspension is called Tyndall effect. The individual suspension particles scatter and reflect light, making the beam visible.



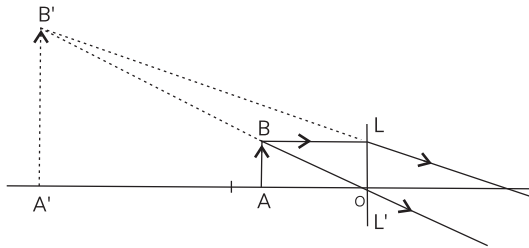
Related Theory

Sunlight path becoming visible when lots of dust particles are suspended in the air such as light passing through the canopy of a dense forest. In case of fog or smog present in the atmosphere, the beam of headlights becomes visible.

40. (d) Convex lens; On the same side as lens; $> + 1$

Explanation: As the ray of light converges towards the principal axis after refraction, it is a convex lens. When object is placed between optical centre and focus of a convex lens, the

image will be formed on the same of the lens and will be magnified, virtual and erect. Therefore, $m > +1$.



41. (c) Closed Stomatal pore; Guard cells swell;
Open Stomatal pore; Guard cells shrink

Explanation: Figure A shows a closed stomatal pore while figure B shows an open stomatal pore.

The opening and closing of stomatal pore is due to the guard cells which swell when water flows into them (open stomatal pore) and shrink when water flows out of them (closed stomatal pore).

42. (d) (II), (III) and (IV)

Explanation: Small intestines is the site for complete digestion of carbohydrates, proteins and fats. Herbivores have longer small intestines as they eat grass which contains cellulose which needs longer to be digested.

Carnivores on the other hand eat meat which is easier to digest and hence they have smaller small intestines.

43. (b) size of image = +3 cm, position of image =
 $+\frac{60}{7}$ cm

Explanation: Here, height of object = $h_1 = 7$ cm; $u = -20$ cm, $f = +\frac{30}{2} = 15$ cm.

Applying the mirror formula, we get,

$$\begin{aligned} \frac{1}{f} &= \frac{1}{v} + \frac{1}{u} \\ \Rightarrow \frac{1}{v} &= \frac{1}{f} - \frac{1}{u} \\ &= \frac{1}{15} - \frac{1}{-20} \\ &= \frac{4+3}{60} \\ &= \frac{7}{60} \\ \Rightarrow v &= +\frac{60}{7} \end{aligned}$$

Applying the magnification formula, we get,

$$\begin{aligned} m &= \frac{h_2}{h_1} = -\frac{v}{u} \\ &= \frac{h_2}{7} = -\frac{60/7}{-20} = \frac{3}{7} \\ &= h_2 = \frac{21}{7} \\ &= 3 \text{ cm} \end{aligned}$$

44. (c) -5 D; -20 cm

Explanation:

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

If P_1 and P_2 are the power of the lenses L_1 and L_2 ,

$$P_1 = +\frac{1}{0.2} = +5 \text{ D}; P_2 = -\frac{1}{0.10} = -10 \text{ D}$$

The power of combination

$$\begin{aligned} P &= P_1 + P_2 \\ &= +5 \text{ D} - 10 \text{ D} = -5 \text{ D} \end{aligned}$$

The focal length of the combination =

$$\begin{aligned} f &= \frac{1}{P} = -\frac{1}{5} = -0.2 \text{ m} \\ &= -20 \text{ cm} \end{aligned}$$

45. (b) real, inverted, diminished

Explanation: Focal length of the mirror = 15 cm.

\therefore Radius of curvature of the mirror = $15 \times 2 = 30$ cm. As radius of curvature is less than the object distance, the image is formed between focus and centre of curvature.

This image formed is real, inverted and diminished.

46. (b) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

Explanation: A concave lens always form virtual, erect image on same side of an object, so, $u, v, f = -ve$

Using lens formula $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\begin{aligned} &= \left(\frac{-1}{f}\right) = \left(\frac{-1}{v}\right) - \left(\frac{-1}{u}\right) \\ &= \frac{1}{f} = \frac{1}{v} - \frac{1}{u} \end{aligned}$$

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

Explanation: $\angle i$ is the angle of incidence, which is the angle between the incident ray and the normal at the point of incidence and is marked correctly.

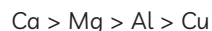
$\angle D$ is the angle of deviation, which is the angle between incident ray and emergent ray, and is marked correctly.

$\angle r$ is the angle of refraction, which is the angle between the refracted ray and the normal at the point of incidence but is not marked correctly.

$\angle e$ is the angle of emergence, which is the angle between the emergent ray and the normal at the point of emergence but is not marked correctly.

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

Explanation: The reactivity of the metals is as given below:



And a more reactive metal can displace a less reactive metal from its compound. Therefore, Al cannot displace Mg from MgO and similarly Mg can displace Al from Al_2O_3 .

SECTION - C

49. (a) pinkish red

Explanation: Methyl orange indicator gives pinkish red colour with acidic solution and yellow colour with basic solutions.

50. (d) $\text{H}_2\text{SO}_4(\text{aq})$

Explanation: $\text{H}_2\text{SO}_4(\text{aq})$ being acidic in nature, changes blue litmus to red.

51. (c) $\text{KOH}(\text{aq})$

Explanation: $\text{KOH}(\text{aq})$ is basic in nature while other given options are acidic in nature therefore it will turn phenolphthalein pink.

52. (d) Litmus solution is a yellow dye, which is extracted from the plant

Explanation: Litmus solution is a purple dye, which is extracted from Lichen, a plant belonging to the division thallophyte and is commonly used as an indicator.

53. (d) D-E (just after sprint finishing); Low; Aerobic

Explanation: After race, there would be decrease in concentration of Lactic acid aerobic respiration will be there in presence of increased oxygen supply.

54. (d) conversion of pyruvate to lactic acid.

Explanation: When there is a lack of oxygen in our muscle cells. Pyruvate is converted into Lactic acid. This build-up of lactic acid in our muscles during sudden activity causes cramps.

55. (a) the anaerobic consumption of sugar increases

Explanation: At high intensities, the aerobic consumption of fats is decreased while the anaerobic consumption of sugars increases.

56. (b) (II) only

Explanation: The energy released during cellular respiration is immediately used to synthesise a molecule called ATP which is used to fuel all other activities in the cell. Hence ATP is the energy currency for most cellular processes. The energy released during the process of respiration is used to make an ATP molecule from ADP and inorganic phosphate.

57. (a) - 40 cm

Explanation: Focal length = $\frac{R}{2}$

In case of concave mirror, $f = -20$ cm
So, $R = f \times 2 = -40$ cm

58. (c) convex

Explanation: For convex mirror, magnification is always positive.

59. (d) both (a) and (b)

Explanation: Plane and convex mirrors always give virtual and erect image. However, in concave mirror, when an object is placed between f and P , image formed is virtual and erect.

60. (b) Concave mirror

Explanation: Concave mirror gives magnified image of an object.