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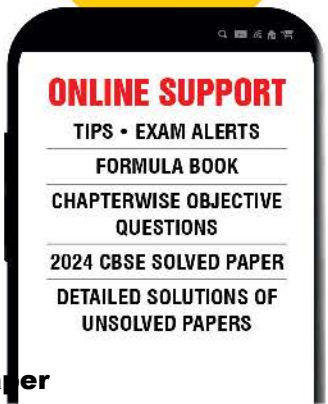
- Self Evaluation Sheet included to check your readiness

Chapterwise **COMPETENCY FOCUSED QUESTIONS** Included



SCIENCE

Sample Question Paper

SQP
9

BLUEPRINT

Time Allowed : 3 hours **Maximum Marks :** 80

S. No.		Chapter	MCQs (1 mark)	SA-I (2 marks)	SA-II (3 marks)	LA (5 marks)	Case Based (4 marks)	Total
I.		**Chemical Substances - Nature and Behaviour**						
	1.	Chemical Reactions and Equations	3(3)	–	1(3)	–	–	**13(25)**
	2.	Acids, Bases and Salts	3(3)	–	1(3)	–	–	
	3.	Metals and Non-metals	2(2)	–	–	–	1(4)*	
	4.	Carbon and its Compounds	–	1(2)	–	1(5)*	–	
II.		**World of Living**						
	5.	Life Processes	2(2)	–	1(3)*	1(5)*	–	**12(25)**
	6.	Control and Coordination	1(1)	1(2)	–	–	–	
	7.	How do Organisms Reproduce?	1(1)	1(2)	1(3)	–	–	
	8.	Heredity	1(1)	1(2)*	1(3)	–	–	
III.		**Natural Phenomena**						
	9.	Light-Reflection and Refraction	2(2)	–	–	1(5)*	–	**5(12)**
	10.	The Human Eye and the Colourful World	–	1(2)	1(3)	–	–	
IV.		**Effects of Current**						
	11.	Electricity	2(2)	–	–	–	–	**7(13)**
	12.	Magnetic Effects of Electric Current	2(2)	1(2)*	1(3)	–	1(4)*	
V.		**Natural Resources**						
	13.	Our Environment	1(1)	–	–	–	1(4)*	**2(5)**
		Total	**20(20)**	**6(12)**	**7(21)**	**3(15)**	**3(12)**	**39(80)**

*It is a choice based question.

Subject Code : **086**

SQP-9

SCIENCE

Time Allowed : 3 Hours ***Maximum Marks : 80***

General Instructions :

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

SECTION - A

Question 1 to 16 are multiple choice questions. Only one of the choices is correct.
Select and write the correct choice as well as the answer to these questions.

1. How many energy currencies are produced when 2 molecules of glucose are degraded anaerobically?

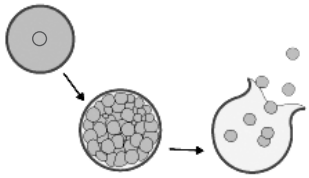
(a) 2 ATP (b) 4 ATP
(c) 6 ATP (d) 8 ATP

2. Match column I with column II and select the correct option.

Column I		Column II	
(A)	Cytokinin	(i)	Promotes wilting
(B)	Gibberellin	(ii)	Phototropism
(C)	Abscisic acid	(iii)	Delays ageing in leaves
(D)	Auxin	(iv)	Promotes fruit growth

(a) (A) – (i), (B) – (ii), (C) – (iii), (D) – (iv)
(b) (A) – (ii), (B) – (iv), (C) – (i), (D) – (iii)
(c) (A) – (ii), (B) – (iv), (C) – (iii), (D) – (i)
(d) (A) – (iii), (B) – (iv), (C) – (i), (D) – (ii)

3. Which organism reproduces by the method shown here?



(a) *Rhizopus* (b) *Planaria*
(c) *Plasmodium* (d) Cyanobacteria

4. In a grazing food chain, *X* represents T_2 level that feeds on Y. Which of the following statement is true for *X* and *Y*?
(a) *X* is a carnivore and *Y* is an autotroph.
(b) *X* is a herbivore and *Y* is an autotroph.
(c) *X* is a herbivore and *Y* is a carnivore.
(d) *X* is an autotroph and *Y* is an omnivore.

5. A man 180 cm high stands in front of a plane mirror. His eyes are at a height of 172 cm from the floor. Then to see his full image for minimum length of mirror, the lower end of the mirror should be placed at a height of
(a) 86 cm from the floor (b) 94 cm from the floor
(c) 4 cm from the floor (d) 8 cm from the floor.

6. A charged particle experiences minimum force when it travels
(a) parallel to the magnetic field. (b) normal to the magnetic field.
(c) at 45° to the field. (d) at 75° to the field.

7. A cylindrical conductor of length '*l*' and uniform area of cross section '*A*' has resistance '*R*'. The area of cross section of another conductor of same material and same resistance but of length '2*l*' is
(a) $\frac{A}{2}$ (b) $\frac{3A}{2}$ (c) $2A$ (d) $3A$

8. Two vertical plane mirrors are inclined at an angle of 60°, with each other. A ray of light travelling horizontally is reflected first from one mirror and then from the other mirror. Then the resultant deviation is
(a) 180° (b) 240° (c) 60° (d) 120°

9. When a magnetic compass needle is carried nearby to a straight wire carrying current, then
(I) the straight wire causes a noticeable deflection in the compass needle.
(II) the alignment of the needle is tangential to an imaginary circle with straight wire as its centre and has a plane perpendicular to the wire
(a) (I) is correct
(b) (II) is correct
(c) both (I) and (II) are correct
(d) neither (I) nor (II) is correct

10. Element *X* reacts with element *Y* to form a compound *Z*. During the formation of compound *Z*, atoms of *X* lose one electron each whereas atoms of *Y* gain one electron each. Which of the following properties is not shown by compound *Z*?
(a) High melting point (b) Low melting point
(c) Occurrence as solid (d) Conduction of electricity in molten state

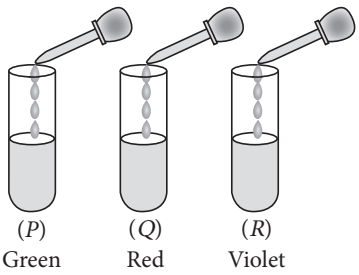
11. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?
(a) $2H_{2(l)} + O_{2(l)} \longrightarrow 2H_2O_{(g)}$ (b) $2H_{2(g)} + O_{2(l)} \longrightarrow 2H_2O_{(l)}$
(c) $2H_{2(l)} + O_{2(g)} \longrightarrow 2H_2O_{(l)}$ (d) $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(l)}$

12. Match column I with column II and select the correct option.

Column I		Column II	
P.	Metal + acid	1.	Water
Q.	Acid + base	2.	Hydronium ion
R.	Metal carbonate + acid	3.	Hydrogen gas
S.	Acid + water	4.	Carbon dioxide

(a) P-2, Q-1, R-3, S-4 (b) P-3, Q-1, R-2, S-4
(c) P-3, Q-1, R-4, S-2 (d) P-1, Q-3, R-4, S-2

13. On adding a few drops of universal indicator to three unknown colourless solutions (*P*), (*Q*) and (*R*) taken separately in three test tubes shown in the following diagrams, a student observed the changes in colour as green in (*P*), red in (*Q*) and violet in (*R*).



The decreasing order of pH of the solutions taken is

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

14. What happens when a solution of an acid is mixed with a solution of a base in a test tube?

(i) The temperature of the solution increases.
(ii) The temperature of the solution decreases.
(iii) The temperature of the solution remains the same.
(iv) Salt formation takes place.

(a) (i) only (b) (iii) and (iv) (c) (ii) and (iv) (d) (i) and (iv)

15. Phosphorus(V) chloride dissolves in water to form phosphoric acid, H_3PO_4 and hydrochloric acid. What are the values of *x*, *y* and *z* in the balanced equation for this reaction?

$$PCl_{5(s)} + xH_2O_{(l)} \rightarrow yH_3PO_{4(aq)} + zHCl_{(aq)}$$

	x	*y*	*z*
(a)	2	1	4
(b)	2	2	5
(c)	4	2	4
(d)	4	1	5

16. Which of the following statements about the reaction given below are incorrect?

$$2PbO_{(s)} + C_{(s)} \rightarrow 2Pb_{(s)} + CO_{2(g)}$$

(i) Lead is getting reduced. (ii) Carbon dioxide is getting oxidised.
(iii) Carbon is getting oxidised. (iv) Lead oxide is getting reduced.
(a) (i) and (ii) (b) (iii) and (iv)
(c) (i) and (iii) (d) (ii) and (iv)

Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:

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

17. Assertion (A) : The movement of water and dissolved salts in xylem is always upwards.
Reason (R) : The upward movement of water is due to low pressure created by transpiration.

18. Assertion (A) : In humans, height is a trait which shows variation.
Reason (R) : Some humans are very tall, some have medium height whereas others are short heighted.

19. Assertion (A) : Different metals have different reactivities with water and dilute acids.
Reason (R) : Reactivity of a metal depends on its position in the reactivity series.

20. Assertion (A) : When a wire is stretched to three times of its length, its resistance becomes 9 times.
Reason (R) : Resistance is directly proportional to length of wire.

SECTION - B

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

21. What happens when 5% alkaline $KMnO_4$ solution is added drop by drop to warm ethanol taken in a test tube? State the role of alkaline $KMnO_4$ solution in this reaction.

22. Differentiate between the two hormones insulin and testosterone on the basis of the following points:

S.No.	Feature	Insulin	Testosterone
1.	Endocrine gland from where it is secreted		
2.	Function		

23. A. A cross was made between green-stemmed tomato plants denoted by (GG) and purple-stemmed tomato plants denoted as (gg) to obtain F_1 progeny.

(i) What colour of the stem would you expect in their F_1 progeny and why?

(ii) Give the percentage of purple-stemmed plants, if F_1 plants are allowed to self-pollinate to produce F_2 progeny.

OR

B. When a red flowered plant was crossed with white flowered plant, all F_1 progeny showed only red flowers. Define the law of inheritance of Mendel which supports this result.

24. The given figure shows a method of contraception in females.

Identify the figure and answer the following questions.

A. Name the procedure shown in the figure and the part it affects.

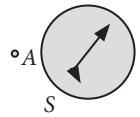
B. Why the above shown method is considered more reliable than other contraceptive methods?

C. Mention the side effects of this method.

25. A. A magnetic compass needle is placed in the plane of paper near point *A* as shown in figure.

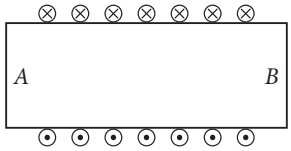
(i) In which plane should a straight current carrying conductor be placed so that it passes through *A* and there is no change in the deflection of the compass?

(ii) Under what condition is the deflection maximum and why?

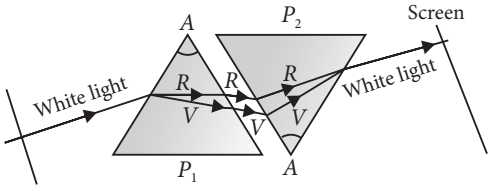


OR

B. Diagram shows the lengthwise section of a current carrying solenoid. ⊗ indicates current entering into the page, ⊙ indicates current emerging out of the page. Decide which end of the solenoid *A* or *B*, will behave as north pole. Give reason for your answer. Also draw field lines inside the solenoid.



26. Isaac Newton's experiment that led to the idea that the sunlight is made up of seven colours. He used another identical prism as shown in figure which resulted in white light. Discuss the natural phenomena based on this principle.



SECTION - C

Question No. 27 to 33 are short answer questions.

27. A. Radhika performed an experiment on garden pea and draw the following cross.

Parents: RRYY (Round, yellow) × rryy (Wrinkled, green)

Gametes: RY ry

F_1 generation : RrYy (Round, yellow)

Upon self-pollination in F_1 generation, what would be the combination of characters and their ratio in F_2 progeny?

B. A Mendelian experiment consisted of breeding pea plants bearing violet flowers with pea plants bearing white flowers. What will be the result in F_1 progeny?

28. A. (i) "Diffusion is insufficient to meet the oxygen requirement of multicellular organisms like humans". Give reason.

(ii) State the location and function of gastric glands.

(iii) Define translocation in reference to plants.

OR

B. Why is the fish heart called a venous heart? What type of blood circulation does it represent?

29. Explain the process of spore formation in fungi. How does spore formation differs from budding?

30. Balance the following chemical equations :

(i) $CaC_2 + H_2O \longrightarrow Ca(OH)_2 + C_2H_2$

(ii) $Al(OH)_3 \xrightarrow{\Delta} Al_2O_3 + H_2O$

(iii) $Pb(NO_3)_2 + Fe_2(SO_4)_3 \longrightarrow Fe(NO_3)_3 + PbSO_4\downarrow$

31. (a) Fresh milk has a pH of 6. When it changes into curd, will its pH value increase or decrease? Why?

(b) Dry hydrogen chloride gas does not turn blue litmus red whereas hydrochloric acid does. Give reason.

(c) When electricity is passed through an aqueous solution of sodium chloride, three products are obtained. Why is the process called chlor-alkali?

32. A. What is rainbow? Draw a labelled diagram to show the formation of a rainbow.

B. Define the term dispersion of light.

33. Harsh was performing an experiment with a current carrying conductor placed in a magnetic field. He observed the direction of current and force as shown in figure.

A. State the direction of magnetic field in the following case.

B. Why does a current-carrying conductor suspended in a magnetic field experience a mechanical force?

C. State two ways to increase the force on a current-carrying conductor in a magnetic field.

SECTION - D

Question No. 34 to 36 are long answer questions.

34. A. (i) What is the function of digestive enzymes?

(ii) Describe double circulation in human beings with a labelled diagram. Why is it necessary?

OR

B. (i) Differentiate between excretion and egestion.

(ii) State the difference between alveolus and nephron.

(iii) Mention differences between blood and lymph.

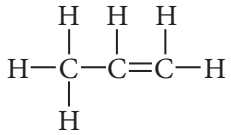
35. A. (a) State the reason why carbon can neither form C^{4+} cations nor C^{4-} anions, but forms covalent bonds.

(b) Write the structural formula of propyne.

(c) The hydrocarbon *X* is an alkane. The relative molecular mass of *X* is 72. What is the molecular formula of *X?*

OR

B. (a) Name the hydrocarbon shown below :



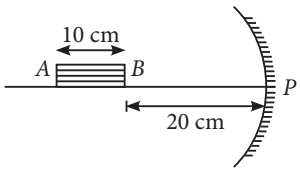
Is this molecule unsaturated? Explain your answer.

(b) Write the chemical equation to represent the complete combustion of this hydrocarbon in excess of oxygen.

(c) (i) Name the homologous series to which this hydrocarbon belongs.

(ii) Draw the full structural formula of the hydrocarbon with one more carbon atom in the same homologous series.

36. A.



Based on the above figure answer the following questions.

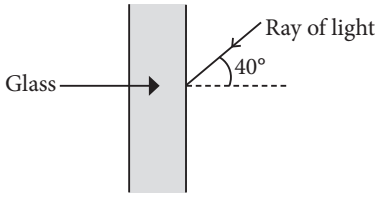
(i) A rod *AB* of length 10 cm is placed along the principal axis of a concave mirror having focal length equal to 10 cm as shown in figure. The distance *PB* = 20 cm. What is the length of the image (in cm) of the rod AB?

(ii) What happens when a ray of light falls normally (or perpendicularly) on the surface of a plane mirror?

(iii) The image seen in a plane mirror cannot be formed on a screen. What name is given to this type of image?

OR

B. Figure shows a ray of light meeting the glass of the window of a car at an angle of incidence of 40°.



(i) Assuming that the refractive index of glass is 1.5, find the angle of refraction for this ray in the glass.
(ii) Complete the diagram by sketching the path of the ray through the glass and out on the other side.
(iii) Use the diagram to explain the effect of the glass on what is seen by the driver.
(iv) You are given glass, kerosene, and water. In which of these does the light travel fastest?

SECTION - E

Question No. 37 to 39 are case-based/data-based questions.

37. The main points of differences between metals and non-metals are :

Property	Metals	Non-metals
Electronic structure	They have 1 to 3 electrons in the outermost shell of their atoms.	They have 4 to 8 electrons in the outermost shell of their atoms.
State of existence	They are mostly solid at room temperature except mercury and gallium which are liquid.	They are either solids or gases at room temperature except bromine which is a liquid.
Density	They have high density.	They have low density.
Nature of ions	They are electropositive elements and hence, lose one or more electrons to form positive ions.	They are electronegative elements and hence, gain one or more electrons to form negative ions.
Nature of chlorides	They generally combine with chlorine to form solid ionic chlorides which conduct electricity in the aqueous solution or in the molten state.	They combine with chlorine to form covalent chlorides. These are either gases or liquids. Non-metal chlorides do not contain ions, therefore, they do not conduct electricity.
Nature of oxides	They form basic oxides, though some oxides are amphoteric also.	They form acidic or neutral oxides.
Displacement of hydrogen from acids	Metals which lie above hydrogen in the reactivity series displace hydrogen from acids.	They do not displace hydrogen from acids.

A. (i) Give the general name for the elements with the characteristics of both metals and non-metals. Give two examples.
(ii) Name two metals which will not displace hydrogen from dilute acids.

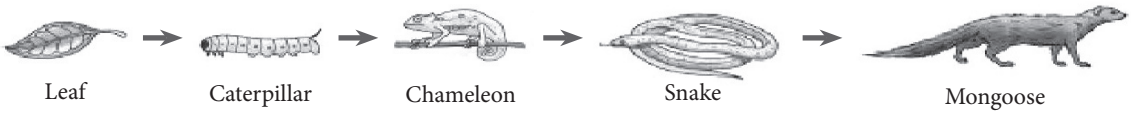
Attempt either subpart B or C.

B. Name one metal which has a very low melting point and one non-metal which is lustrous.

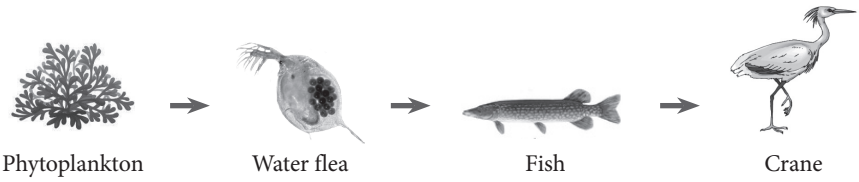
OR

C. A metal '*M*' has the electronic configuration 2, 8, 3 and occurs in nature as M_2O_3. It is more reactive than zinc. Name the metal '*M*' and the ore from which this metal is extracted.

38. A group of five students performed a study and constructed the following two food chains.



Food chain X



Food chain Y

Study the food chains and answer the following questions.

Attempt either subpart A or B.

A. Construct a food pyramid for food chain X and food chain Y in terms of mass.

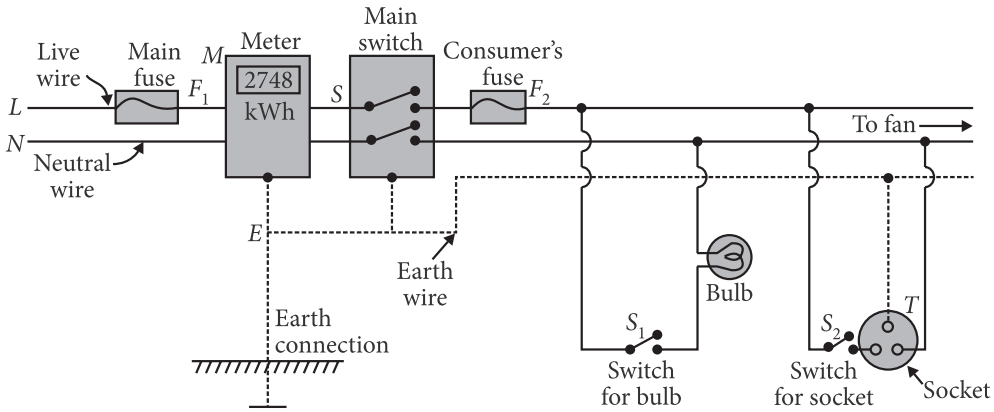
OR

B. Name the type of ecosystem in which each of the food chain exist. Is it possible to have three more trophic levels in food chain X just before the fourth trophic level?

C. What will be the flow of energy in food chain Y? How the top consumers in both food chains differ in terms of energy?

D. In food chain X, if the amount of energy available at second trophic level is 200 J, then how much energy will be available to top consumer?

39. In house hold electric circuits, the mains supply is delivered to our homes using three core cable. The cable consists of three wires, live wire, neutral wire and earth wire. The live wire is at potential difference of 220 V for the domestic supply and the potential difference between live and neutral wire is 220 volts. The live wire is connected to electric meter through a fuse or a circuit breaker of higher rating. The neutral wire is connected directly to the electric meter.



A. What is a short circuit?

B. How switches are connected in the circuit?

Attempt either subpart C or D.

C. What is usual current rating of the fuse wire in the line if electric iron, geysers, room heater etc. are in use?

OR

D. Why is earthing of all electrical appliances recommended?

Self Evaluation Sheet

*Once you complete **SQP-9**, check your answers with the given solutions and fill your marks in the marks obtained column according to the marking scheme. Performance Analysis Table given at the bottom will help you to check your readiness.*

Q.No.	Chapter	Marks Per Question	Marks Obtained
1	Life Processes	1	
2	Control and Coordination	1	
3	How do Organisms Reproduce?	1	
4	Our Environment	1	
5	Light-Reflection and Refraction	1	
6	Magnetic Effects of Electric Current	1	
7	Electricity	1	
8	Light-Reflection and Refraction	1	
9	Magnetic Effects of Electric Current	1	
10	Metals and Non-metals	1	
11	Chemical Reactions and Equations	1	
12	Acids, Bases and Salts	1	
13	Acids, Bases and Salts	1	
14	Acids, Bases and Salts	1	
15	Chemical Reactions and Equations	1	
16	Chemical Reactions and Equations	1	
17	Life Processes	1	
18	Heredity	1	
19	Metals and Non-metals	1	
20	Electricity	1	
21	Carbon and its Compounds	2	
22	Control and Coordination	2	
23	Heredity/Heredity	2	
24	How do Organisms Reproduce?	2	
25	Magnetic Effects of Electric Current/Magnetic Effects of Electric Current	2	
26	The Human Eye and the Colourful World	2	
27	Heredity	3	
28	Life Processes/Life Processes	3	
29	How do Organisms Reproduce?	3	
30	Chemical Reactions and Equations	3	
31	Acids, Bases and Salts	3	
32	The Human Eye and the Colourful World	3	
33	Magnetic Effects of Electric Current	3	
34	Life Processes/Life Processes	5	
35	Carbon and its Compounds/Carbon and its Compounds	5	
36	Light-Reflection and Refraction/Light-Reflection and Refraction	5	
37	Metals and Non-metals	3 + 1	
38	Our Environment	2 + 1 + 1	
39	Magnetic Effects of Electric Current	1 + 1 + 2	
	Total	**80**	.....
		Percentage	.....%

Performance Analysis Table

If your marks is		
> 90%	TREMENDOUS!	➢ *You are done! Keep on revising to maintain the position.*
81-90%	EXCELLENT!	➢ *You have to take only one more step to reach the top of the ladder. Practise more.*
71-80%	VERY GOOD!	➢ *A little bit of more effort is required to reach the 'Excellent' bench mark.*
61-70%	GOOD!	➢ *Revise thoroughly and strengthen your concepts.*
51-60%	FAIR PERFORMANCE!	➢ *Need to work hard to get through this stage.*
40-50%	AVERAGE!	➢ *Try hard to boost your average score.*

SQP 9 SOLUTIONS

1. (b) : In anaerobic condition, when 1 molecule of glucose is degraded, 2 ATPs are released. So, when 2 molecules of glucose are degraded, 4 ATP molecules would be released.

$$\underset{(2\text{ mol.})}{\text{Glucose}} \xrightarrow{\text{Glycolysis}} \underset{(4\text{ mol.})}{\text{Pyruvate}} \xrightarrow[(\text{yeast})]{\text{without } O_2} \text{Ethanol} + 2CO_2 + \underset{(4\text{ mol.})}{\underset{(\text{ATP})}{\text{Energy}}}$$

2. (d)

3. (c) : *Plasmodium* reproduces by the method shown in the image, *i.e.*, multiple fission.

4. (b) : In a grazing food chain, primary consumers (herbivores) represent T_2 level and the green plants (autotrophs) form T_1 level.

5. (a) : Length of mirror for full size image is $\frac{180}{2}$ = 90 cm. The lower end of mirror is 180 – (90 + 4) = 86 cm from the floor.

6. (a) : Parallel to magnetic field.

7. (c) : The resistance of a conductor of length l, and area of cross section, A is

$$R = \rho\frac{l}{A}$$

where ρ is the resistivity of the material.

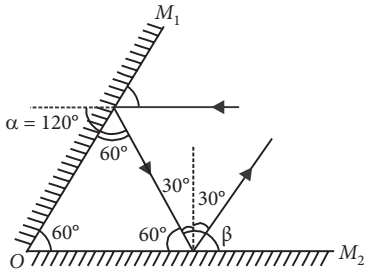
Now for the conductor of length $2l$, area of cross-section A' and resistivity ρ.

$$R' = \rho\frac{l'}{A'} = \rho\frac{2l}{A'}$$

But given, $R = R' \Rightarrow \rho\frac{l}{A} = \rho\frac{2l}{A'}$ or $A' = 2A$

8. (b) : Deviation after the reflection from first mirror is $\alpha = 120°$.

Deviation after reflection from the 2nd mirror is $\beta = 120°$.



Total deviation is 120° + 120° = 240°.

9. (c) : Both points are correct and these are the result of experiments done by Danish physicist Hans Christian Oersted in 1820.

10. (b)

11. (d) : $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(l)}$

Hydrogen gas reacts with oxygen gas to give water.

12. (c)

13. (b) : The universal indicator gives red colour in acidic medium (pH < 3), green colour in neutral medium (pH = 7) and violet colour in basic medium (pH > 10).

14. (d) : Neutralisation reaction takes place when an acid is reacted with a base. Salt and water are formed with the evolution of heat.

Acid + Base ⟶ Salt + Water + Heat

15. (d) : $PCl_{5(s)} + 4H_2O_{(l)} \rightarrow H_3PO_{4(aq)} + 5HCl_{(aq)}$

16. (a) : Carbon is getting oxidised to carbon dioxide and lead oxide is being reduced to lead.

17. (a) : The plants take in water (containing dissolved minerals) from the soil through their roots. This water, called xylem sap is carried by the xylem vessels to all the parts of the plant. The xylem vessels of the root, stem and leaves of the plant are interconnected. When transpiration occurs, loss of water from leaf of xylem vessels create low pressure in the corresponding vessels. Hence, the pressure at the top of the xylem vessels (in the leaves) is lowered whereas the pressure at bottom of the xylem vessels (in root) remains high. Due to this, water flows up in the xylem vessels.

18. (b)

19. (a) : The metals placed at the top of the series are most reactive.

20. (b) : Volume of material on stretching remains same. *i.e.*, Al = constant. When l becomes three times, its area of cross section (A) becomes 1/3rd. From $R = \rho\frac{l}{A}$, R would becomes 9 times.

21. When 5% alkaline $KMnO_4$ solution is added drop by drop to warm ethanol then it gets oxidised to ethanoic acid.

$$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow[KMnO_4]{\text{alkaline}} \underset{\text{Ethanoic acid}}{CH_3COOH}$$

Here, alkaline $KMnO_4$ acts as an oxidising agent *i.e.*, the substance which is capable of adding oxygen to others. Thus, alkaline $KMnO_4$ provides oxygen to ethanol to form ethanoic acid.

22.

S.No.	Feature	Insulin	Testosterone
1.	Endocrine gland from where it is secreted	Pancreas	Testes

2.	Function	Lower's the blood glucose level, *i.e.*, it controls the metabolism of sugar.	Development of male gamete and secondary sexual features such as deeper voice, moustache, beard and body hair.

23. A. (i) F_1 progeny will have green stemmed tomato plants (Gg) as green is dominant over purple stemmed tomato plants.

(ii) If F_1 plants are self pollinated, then the percentage of purple stemmed plant will be 25%. This can be illustrated as follows :

F_1 Generation : Gg × Gg

Gametes : G, g, G, g

F_2 Progenies :

♂ \ ♀	G	g
G	GG Green stemmed	Gg Green stemmed
g	Gg Green stemmed	gg Purple stemmed

Phenotypic ratio : 3 : 1
Green : Purple
Stemmed Stemmed

OR

B. It is the first law of Mendel or the principle of dominance which states that out of the two alternative factors or alleles, only one expresses itself in offsprings which is known as dominant allele and other one which does not show its effect on the offsprings in first generation is termed as recessive allele.

24. A. The given figure is showing surgical removal of small part of fallopian tubes where they are cut and tied.

B. Surgical method is considered more reliable than other contraceptive methods because it is safe in the long run and have very less side-effects.

C. Side effects of surgical removal are :

(i) It has no reversibility.

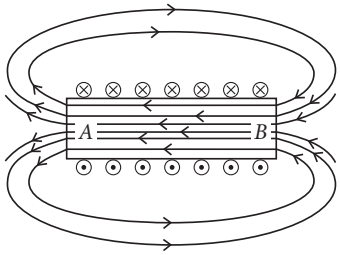
(ii) It causes pain or cramping in stomach area.

25. A. (i) For no change in the deflection of the compass, magnetic field produced by the straight current carrying conductor should be perpendicular to the plane of paper, that is current direction must lie in the plane of paper or conductor should be placed in the plane of paper.

(ii) When the conductor is placed perpendicular to the plane of paper, magnetic field produced by it will be in the plane of paper and therefore there will be maximum deflection in the galvanometer.

OR

B.

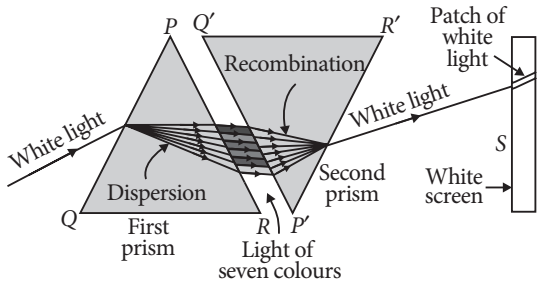


Using right hand thumb rule, we can draw the magnetic field lines around the solenoid as shown.

From figure, end *A* of solenoid act as north pole and end *B* will act as south pole. Inside the solenoid field lines are in the form of parallel straight lines.

26. Newton was the first person who tried to split the colours of sunlight (white light). He showed that reverse of dispersion of light is possible.

Newton kept two identical glass prisms close to each other one in an erect position and other in inverted position.



Rainbow is a natural phenomena which shows dispersion of light and acts as natural prism.

27. A. Round yellow (RrYy) plants upon selfing will produce the following plants in F_2 generation.

F_2 generation:

♀ \ ♂	RY	rY	Ry	ry
RY	RRYY	RrYY	RRYy	RrYy
rY	RrYY	rrYY	RrYy	rrYy
Ry	RRYy	RrYy	RRyy	Rryy
ry	RrYy	rrYy	Rryy	rryy

Round yellow : Round green : Wrinkled yellow : Wrinkled green
9 : 3 : 3 : 1

B. According to the Mendelian experiment, violet colour (VV) is a dominant trait while white colour (vv) is a recessive trait. Hence, the colour of the flower in F_1 progeny will be violet (Vv).

28. A. (i) Due to higher metabolic rate and the large body size, oxygen cannot diffuse into all cells of the human body quickly as oxygen will have to travel large distances to reach each and every cell. So, diffusion is insufficient to meet the oxygen demand of multicellular organisms.

(ii) Gastric glands are present in the wall of the stomach. They secrete gastric juices containing mucus, protein digesting enzymes-pepsin, rennin and hydrochloric acid (HCl).

(iii) The transport of food prepared in the leaves, by the process of photosynthesis, to various parts (roots, stem, branches, etc.) of the plant *via* phloem is called translocation.

OR

B. Fish heart is two-chambered - one atrium and one ventricle. Since, the heart always contains deoxygenated (impure) blood, thus the fish heart is called a venous heart. Fish heart represents single blood circulation, as the blood passes only once through the heart during a single cardiac cycle.

29. Spore formation is the most common method of asexual reproduction seen in fungi and bacteria. During spore formation, a structure called sporangium develops from the fungal hypha. The nucleus divides several times within the sporangium and each nucleus with a bit of cytoplasm, develops into a spore. The spores are liberated and they develop into new hypha after reaching the ground. *e.g.*, *Rhizopus*, *Mucor* and *Penicillium*.

Difference between budding and spore formation is as follows :

Budding	Spore Formation
Process of asexual reproduction where bud develops as an outgrowth of body due to repeated cell division. *E.g.*, *Yeast*, *Hydra*	Spore formation is the process in which tiny bulb like structures called sporangia develop in organisms like *Rhizopus*.

30. (i) $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$

(ii) $2Al(OH)_3 \xrightarrow{\Delta} Al_2O_3 + 3H_2O$

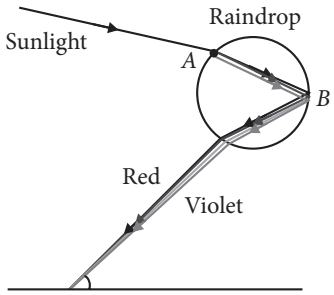
(iii) $3Pb(NO_3)_2 + Fe_2(SO_4)_3 \longrightarrow 2Fe(NO_3)_3 + 3PbSO_4\uparrow$

31. (a) When milk, changes into curd, its pH value will decrease because curd contains acid, so H^+ ion concentration increases.

(b) Acids give $H^+_{(aq)}$ ions in aqueous solution, which are responsible for turning blue litmus red. Dry HCl does not give $H^+_{(aq)}$ ions in the absence of water and hence does not turn blue litmus red.

(c) Electrolysis of an aqueous solution of sodium chloride gives NaOH, Cl_2 and H_2. Due to the formation of products like Cl_2 and NaOH, the process is called chlor-alkali process (chlor for chlorine and alkali for sodium hydroxide).

32. A. After a rain-shower, the sunlight gets dispersed by tiny droplets, present in the atmosphere. The water droplets acts like small glass prisms. They refract and disperse the incident sunlight, then reflect it internally, and finally refract it again when it comes out of the raindrop. Due to dispersion of light and internal reflection, different colours reaches the observer's eye, which is called a rainbow.



A rainbow is a natural spectrum caused by dispersion of sunlight by tiny water droplets, present in the atmosphere. Point *A* denotes dispersion and point *B* denotes internal reflection.

B. The phenomena of splitting of white light into its constituent colours in called dispersion of light

33. A. Using Fleming's left hand rule, the direction of magnetic field will be perpendicular to the plane of paper in the outward direction.

B. When current carrying conductor is placed in a magnetic field, the conductor experiences a magnetic force due to field produced by the moving charges in conductor.

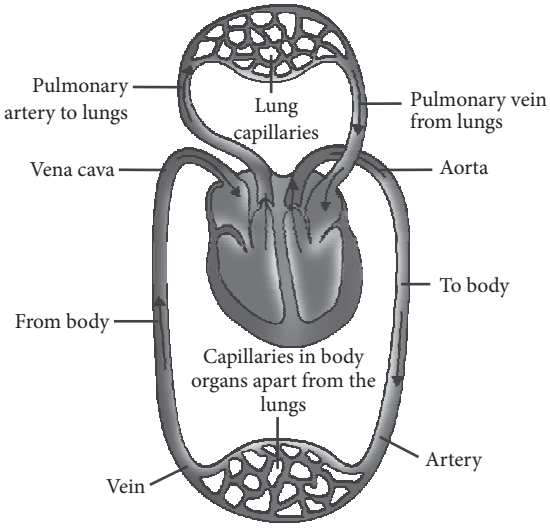
C. Ways to increase magnetic force on current carrying conductors are :

(i) by increasing the amount current flowing in conductor.

(ii) by using strong magnet (by increasing the strength of magnetic field).

34. A. (i) The major constituents of the diet are relatively complex, such as carbohydrate, protein, fat, etc., which cannot be absorbed unless they are broken down into simple compounds. The function of digestive enzymes is to help in breaking down of complex food materials into simpler compounds which can be readily used by animals through absorption and assimilation. As such, digestive enzymes help in converting proteins into amino acids, fats into fatty acids and glycerols and polysaccharides into monosaccharides.

(ii) The heart of human beings consists of two sides: right and left. The right side of the heart receives deoxygenated blood and sends it further for purification to lungs. The left side of heart receives oxygenated blood from the lungs which is pumped further and sent to all the parts of the body through blood vessels. The blood passes through the heart twice by two separate pathways, this is called double circulation. Double circulation is necessary for the human body as the energy demands for human beings are too high and hence, the separation of oxygenated and deoxygenated blood is necessary to meet fulfil energy requirements.



OR

B. (i) Difference between excretion and egestion is as follows :

Excretion	Egestion
Removal of waste products formed in the body due to metabolic activities is called excretion.	Elimination of undigested materials through the anus is called egestion.

(ii) Differences between alveolus and nephron are as follows :

S.No.	Alveolus	Nephron
(i)	It is the structural and functional unit of lungs.	It is the structural and functional unit of kidneys.
(ii)	It helps in exchange of oxygen and carbon dioxide.	It removes nitrogenous wastes from the blood.

(iii) Differences between blood and lymph are as follows:

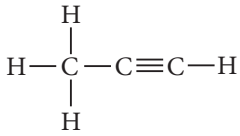
S.No.	Blood	Lymph
(i)	Blood is red due to presence of pigment haemoglobin in red blood cells.	The lymph is light yellow or colourless because it does not have haemoglobin.
(ii)	Blood flows in blood vessels and does not come in contact with body tissues.	The lymph bathes the body tissues.
(iii)	Blood flows from heart to body organs and return to heart.	The lymph flows from the tissues to the heart.
(iv)	Blood contains RBCs, WBCs, platelets and plasma.	Lymph contains some amount of plasma, proteins and white blood cells.

35. A. (a) Ionic compounds are formed either by gaining or losing electrons from the outermost shells, but carbon which has four electrons in its outermost shell cannot form ionic bonds because

– If carbon forms ionic bonds by gaining four electrons to attain a noble gas configuration then it would be difficult for six protons in the nucleus to hold ten electrons.
– If carbon forms ionic bonds by loss of four electrons then it would require a lot of energy to remove these electrons from outermost shell.

Due to these reasons, carbon forms covalent bonds by sharing the valence electrons.

(b) The structural formula of propyne is



(c) As the molecular mass of X is 72 and general formula of alkanes is C_nH_{2n+2}, thus

$(12 \times n) + (2 \times n + 2) = 72 \Rightarrow n = 5$

Thus, formula of X is C_5H_{12}.

OR

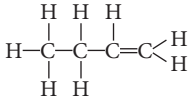
B. (a) $\overset{3}{C}H_3 - \overset{2}{C}H = \overset{1}{C}H_2$; Propene

Yes, this molecule is unsaturated as it contains a double bond (C = C).

(b) $C_3H_6 + \frac{9}{2} O_2 \rightarrow 3CO_2 + 3H_2O$

(c) (i) The hydrocarbon is an alkene.

(ii) The higher homologue of propene is butene.



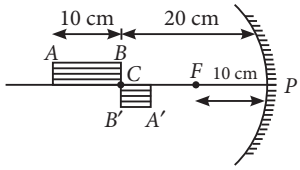
36. A. (i) Given, length of the rod AB = 10 cm.

Focal length, $f = PF$ = 10 cm

∴ Radius of curvature, $R = PC = 2f$ = 20 cm

Also, PB = 20 cm

Now, it is clear from the figure that the end B of the rod AB lies at the centre of curvature of the mirror.



So, the image of B will be formed at B'. Obviously, the points, B, B' and C are the same point.

Now, for the end A,

Object distance, u = – 30 cm

Focal length, f = – 10 cm

Applying mirror equation, we get

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f} \quad \text{or} \quad \frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{-10} - \frac{1}{-30} = -\frac{1}{15}$$

∴ v = –15 cm

So, if A' be the position of the image of the end A, then $PA' = 15$ cm

Hence, the size of the image = $A'B' = 20 - 15 = 5$ cm.

(ii) When a ray of light falls normally on the surface of a plane mirror, the incident ray is reflected back along the same path. Here, the incident angle of ray is zero, therefore the angle of refraction will be zero.

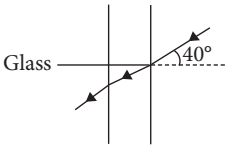
(iii) Virtual image cannot be formed on screen.

OR

B. (i) Applying Snell's law, let r be the angle of refraction. Given, $i = 40°$, $n = 1.5$

$\therefore$ Refractive index, $n = \dfrac{\sin i}{\sin r}$

$\Rightarrow \sin r = \dfrac{\sin i}{n} = \dfrac{\sin 40°}{1.5} \Rightarrow r = 25° 22'$

(ii) 

(iii) The object is seen slightly displaced from its original position.

(iv) We know from the definition of refractive index, that the speed of light is higher in a medium with lower refractive index. So, the light travels fastest in water relative to kerosene and glass.

37. A. (i) Those elements are called semi-metals or metalloids. Antimony (Sb) and Germanium (Ge) are semi-metals.

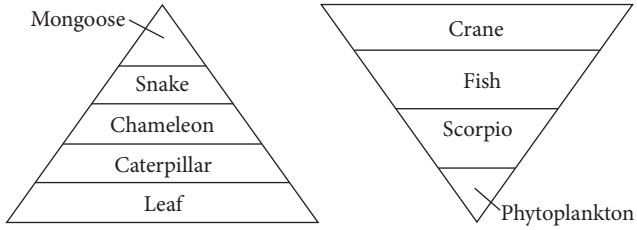
(ii) Copper, platinum do not react with dilute acids.

B. Gallium has a very low melting point. Iodine is a non-metal which is lustrous.

OR

C. Metal '*M*' is aluminium. Al is extracted from Bauxite ($Al_2O_3.2H_2O$).

38. A. Food pyramid for food chain X and Y will be:



OR

B. Food chain X exists in terrestrial ecosystem while food chain Y exists in aquatic ecosystem. No, it is not possible, since the loss of energy at each trophic level is so great that very little usable energy will remain after fourth trophic levels.

C. The flow of energy in food chain B will be

Phytoplankton → Scorpio → Fish → Crane

The top consumers in food chain Y will have more energy than those found is food chain X.

D. 0.2 J energy will be available to top consumer in food chain X because only 10% energy is transferred from one trophic level to another.

39. A. The condition when the live wire comes in direct contact with the neutral wire, high current flows through the wire.

B. Switches are connected in the live wire because when the switch is in the off position, no point of the connected electrical appliance will be at higher potential (220 V).

C. A fuse of rating 15 A is usually used for appliances like electric iron, geysers and room heater etc.

OR

D. The earthing of any electrical appliance is done to protect the user from any accidental electrical shock due to leakage of current.

☺☺☺

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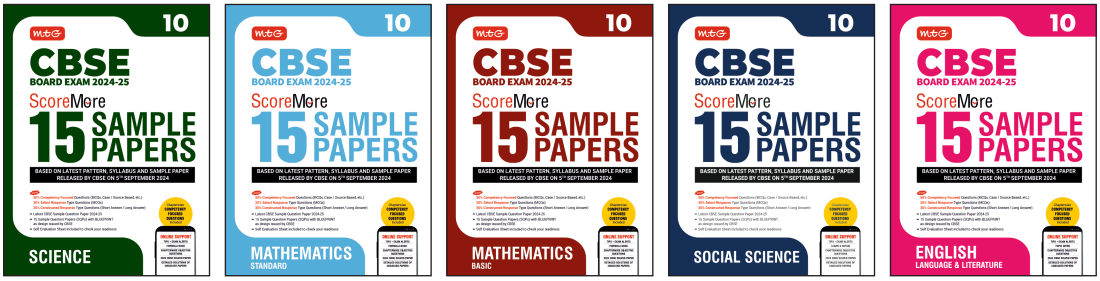

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