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FOR GOA CLASS 9 PREPARATION

Goa Board Class 9 Sample Paper 2027 Science

EXAM	YEAR	TYPE	SUBJECT
Goa Class 9	2027	Sample Paper	Science

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM, GOA - 403521

ACADEMIC CALENDAR : 2026-27

GRADE: 9 **SEMESTER - I** **Subject: SCIENCE**

PORTION AND MARKS DISTRIBUTION

MONTH	Ch. No.	TOPICS	MARKS	PRACTICALS	HOURS
Apr-25	1	Matter in our surroundings	11	I - A	11
				I - B (1)	
				I - B (2)	
	5	Fundamental unit of life	12	V - A	5
Jun-25	5	Fundamental unit of life		V - B (1)	7
				V - B (2)	
	6	Tissues	12		6
Jul-25	6	Tissues			6
	8	Motion	12		6
Aug-25	8	Motion			6
	9	Force and Laws of motion	12		6
Sep-25	9	Force and Laws of motion			6
	10	Gravitation	11	IV - A	11
				IV - B	
Oct-25		**SEMESTER I**			
		TOTAL	**70**		
		PROJECT	**10**		5
		Practicals (20 mks)+Lab Act.(10 mks)	**20**		
		TOTAL	**100**		**75**

GOA BOARD OF SECONDARY AND HIGHER SECONDARY EDUCATION

ALTO-BETIM, GOA - 403521

ACADEMIC CALENDAR 2025-26

GRADE: 9 **SEMESTER - II** **Subject: SCIENCE**

PORTION AND MARKS DISTRIBUTION

MONTH	Ch. No.	TOPICS	MARKS	PRACTICALS	HOURS
Nov-25	2	Is matter around us pure?	11	II -A	11
				II - B	
				III - A	
				III - B	
	3	Atoms and molecules	12		5
Dec-25	3	Atoms and molecules			7
	4	Structure of atom	12		6
Jan-26	11	Work and energy	12		6
	12	Sound	12		6
Feb-26	12	Sound			6
	12	Sound	12		7
Feb-26	12	Sound			7
	14	Improvement in food resources	11		9
Mar-26	14	Improvement in food resources			2
Mar-26		**SEMESTER II**			
		TOTAL	**70**		
		PROJECT	**10**		5
		Practicals (20 mks)+Lab Act.(10 mks)	**20**		
		TOTAL	**100**		**75**

Please note that Science practicals will be conducted and assessed out of 20 marks. The marks will then be converted to a scale of 10 marks.

DESIGN OF THE QUESTION PAPER

Subject: Science SEMESTER I Grade: 9
Time: 3 hours. YEAR: 2026-27 Max. Marks: 70

The weightage or the distribution of marks over different dimensions of the question paper shall be as follows:

1. Weightage to Learning Outcomes:

Sr.No	Learning Outcomes	Marks	Percentage of Marks
1.	Knowledge	21	30%
2.	Understanding	21	30%
3.	Application	17	24%
4.	Analysis	04	06%
5.	Evaluation	04	06%
6.	Creativity	03	04 %
	Total	70	100%

2. Weightage to Content/Subject Units:

Ch. No.	Units	Marks (Flexibility of ± 1 marks is permitted for each topic, while ensuring that the total marks overall remain within 70)	Deletions
1	Matter in our Surroundings	11	No Deletions
5	The fundamental unit of life	12	No Deletions
6	Tissues	12	No Deletions
8	Motion	12	No Deletions

9	Force and Laws of motion	12	No Deletions
10	Gravitation	11	No Deletions
	Total	**70**	

3. Weightage to Forms of Questions:

Sr.No.	Form of Questions	Marks for each question	Number of questions	Total Marks
1.	Long Answer Type (LA)	4	03	12
2.	Short Answer Type (SA-II)	3	04	12
3.	Short Answer Type (SA-I)	2	14	28
4.	Very Short Answer Type (VSA)	1	18	18
	Total		**39**	**70**

4. The expected time for different types of question would be as follows:

S.No.	Form of Questions	Approx. time for each Question in mints (t)	Number of questions (n)	Approx. time for each form of Questions in mints (n x t)
1	Long Answer Type (LA)	12	03	36
2	Short Answer Type (SA-II)	7.5	04	30
3	Short Answer Type (SA-I)	05	14	60
4	Very Short Answer Type (VSA)	03	18	54
	Total		**39**	**180**

As the total time is calculated on the basis of the number of questions required to be answered and the length of their anticipated answers, it would, therefore, be advisable for the candidates to budget their time properly by cutting out the superfluous words and be within the expected time limits.

5. Scheme of Options

(There will be no overall choice, however, there is an internal choice in some questions.)

6. Weightage to Difficulty level of questions:

S.No.	Estimated difficulty level of question	Percentage
1	Easy	20%
2	Average	60%
3	Difficult	20%

A question may vary in difficulty level from individual to individual, As such, the assessment in respect of each question will be made by the paper setter on the basis of general anticipation from the group as a whole taking the examination. This provision is only to make the paper balanced in its weightage, rather than to determine the pattern of marking at any stage.

7. Number of Questions:

It has been decided to introduce serial wise question number and to do away with sub-question among the questions.

DESIGN OF THE QUESTION PAPER
SEMESTER II

Subject: Science **GRADE: 9 Time: 3 hours.**
YEAR: 2026-27 **Max. Marks: 70**

The weightage or the distribution of marks over different dimensions of the question paper shall be as follows:

1. Weightage to Learning Outcomes :

Sr.No	Learning Outcomes	Marks	Percentage of Marks
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2.	Understanding	21	30%
3.	Application	17	24%
4.	Analysis	04	06%
5.	Evaluation	04	06%
6.	Creativity	03	04%
	Total	70	100%

2. Weightage to Content/Subject Units:

Ch. No.	Units	Marks (Flexibility of ± 1 marks is permitted for each topic, while ensuring that the total marks overall remain within 70)	Deletions
2	Is matter around us pure	**11**	**No deletion**
3	Atoms and Molecules	**12**	No Deletions
4	Structure of Atom	**12**	No Deletions
11	Work and Energy	**12**	No Deletions
12	Sound	**12**	No Deletions
14	Improvement in food resources	**11**	No Deletions
	Total	**70**	

3. Weightage to Forms of Questions:

Sr.No.	Form of Questions	Marks for each question	Number of questions	Total Marks
1.	Long Answer Type (LA)	4	03	12
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4. The expected time for different types of question would be as follows :

S.No.	Form of Questions	Approx. time for each Question in mins (t)	Number of questions (n)	Approx. time for each form of Questions in mins (n x t)
1	Long Answer Type (LA)	12	03	36
2	Short Answer Type (SA-II)	7.5	04	30
3	Short Answer Type (SA-I)	05	14	60
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7. Number of Questions:

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GOA BOARD OF SECONDARY & HIGHER SECONDAR EDUCATION, ALTO BETIM-GOA

BOARD EXAMINATION BLUE PRINT **FIRST SEMESTER**

DURATION : 3 HOURS **YEAR: 2026-27** **GRADE 9** **SUBJECT: SCIENCE** **MAXIMUM MARKS: 70**

Ch. No.	Objective / CONTENT AREA	Remembering VSA	Remembering SA I	Remembering SA I	Remembering LA	Understanding VSA	Understanding SA I	Understanding SA I	Understanding LA	APPLICATION VSA	APPLICATION SA	APPLICATION SA I	APPLICATION LA	ANALYSIS VSA	ANALYSIS SA I	ANALYSIS SA	ANALYSIS LA	EVALUATION VSA	EVALUATION SA I	EVALUATION SA II	EVALUATION LA	Creativity VSA	Creativity SA I	Creativity SA I	Creativity LA	TYPE OF QUESTIONS VSA	TYPE OF QUESTIONS SA I	TYPE OF QUESTIONS SA II	TYPE OF QUESTIONS LA	TOTAL
1	MATTER IN OUR SURROUNDINGS	1(1)	2(1)			1(2)	2(2)				2(1)															3	4			(7) 11
5	THE FUNDEMENTAL UNIT OF LIFE	1(2)	2(1)	3(1)			2(1)			1(1)					2(1)											3	3	1		(7) 12
6	TISSUES	1(1)			4(1)	1(1)		3(1)		1(1)									2(1)							3	1	1	1	(6)12
8	MOTION	1(2)	2(1)			1(1)				1(1)			4(1)		2(1)											4	2		1	(7) 12
9	FORCE AND LAWS OF MOTION	1(1)					2(2)			1(1)			4(1)										2(1)			2	3		1	(6)12
10	GRAVITATION	1(1)				1(1)		3(1)				3(1)							2(1)			1(1)				3	1	2		(6)11
	TOTAL MARKS																									18	14	4	3	(39)70
	TOTAL PERCENTAGE			30% (21)				30%(21)			24%(17)				6%(4)				6%(4)				4%(3)							100%(70)

GOA BOARD OF SECONDARY & HIGHER SECONDAR EDUCATION, ALTO BETIM-GOA

GRADE 9 BOARD EXAMINATION BLUE PRINT **SECOND SEMESTER**

DURATION : 3 HOURS **SUBJECT: SCIENCE** **MAXIMUM MARKS: 70** **YEAR: 2026-27**

Ch. No.	Objective / CONTENT AREA	Remembering VSA	Remembering SA I	Remembering SA I	Remembering LA	Understanding VSA	Understanding SA I	Understanding SA I	Understanding LA	APPLICATION VSA	APPLICATION SA	APPLICATION SA I	APPLICATION LA	ANALYSIS VSA	ANALYSIS SA I	ANALYSIS SA	ANALYSIS LA	EVALUATION VSA	EVALUATION SA I	EVALUATION SA II	EVALUATION LA	Creativity VSA	Creativity SA I	Creativity SA I	Creativity LA	TYPE OF QUESTIONS VSA	TYPE OF QUESTIONS SA I	TYPE OF QUESTIONS SA II	TYPE OF QUESTIONS LA	TOTAL
1	IS MATTER AROUND US PURE?	1(2)		3(1)		1(2)	2(1)			1(2)																6	1	1		(8) 11
5	ATOMS AND MOLECULES	1(1)	2(1)			1(1)				1(1)		3(1)			2(1)				2(1)							3	3	1		7(12)
6	STRUCTURE OF ATOMS	1(1)	2(1)			1(1)	2(1)				2(1)		4(1)													2	3		1	(6) 12
8	WORK AND ENERGY	1(1)	2(1)				2(2)			1(1)			4(1)													2	3		1	(6) 12
9	SOUND	1(1)						3(1)	4(1)										2(1)				2(1)			1	2	1	1	(5) 12
10	Improvement in food	1(1)	2(1)	3(1)		1(2)									2(1)							1(1)				4	2	1		(7)11
	TOTAL MARKS																									18	14	4	3	
	TOTAL PERCENTAGE			30% (21)				30%(21)			24%(17)				6%(4)				6%(4)				4%(3)							(39) 70

GRADE :9		SUB: SCIENCE			
MAPPING SYLLABUS WITH CG, COMPETENCIES, LO'S					
CHAPTER	**CURRICULAR GOALS CG'S**	**COMPETENCIES CO's**	**LEARNING OUTCOMES LO's**	**PEDAGOGICAL OUTCOMES PO's**	**REVISED BLOOM's TAXONOMY**
MATTER IN OUR SURROUNDINGS	CG-1,	C 1.1, C 1.2, C 1.3	LO1, LO2, LO3, LO4, LO5, LO6, LO9, LO10,, LO14, LO16, LO17, LO18	PO1, PO3, PO5, PO9, PO10, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG-8	**C 8.1, C 8.2**			
THE FUNDAMENTAL UNIT OF LIFE	CG - 3	C 3.1, C3.2, C 3.3,	LO1, LO3, LO5, LO7, LO8, LO9, LO15, LO16, LO17, LO18	PO5, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG- 4	C4.1, C4.2, C4.3, C4.4, C 4.5			
	CG-7	C7.1, C7.2			
	CG-8	C8.1, C 8.2			
TISSUES	CG-3	C3.1, C 3.2, C3.3	LO1, LO2, LO3, LO4, LO5, LO7, LO15, LO16, LO17, LO18,	PO5, PO10, PO11, PO1	R/U/Ap/An/Ev/Cr
	CG-4	C4.1, C4.2, C4.3, C4.4, C4.5			
	CG-7	C7.1, C7.2			
	CG-8	C8.1, C 8.2			
MOTION	CG -2.	C 2.1, C2.2, C2.3, C 2.5	LO1, LO6, LO7, LO8, LO9, LO13, LO15, LO16, LO17, LO18	PO5, PO6, PO7, PO9, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG - 5	C5.3			
	CG - 6	C 6.1			
	CG - 7	C7.1, C7.2			
	CG-8	C8.1, C 8.2			
FORCE AND LAWS OF MOTION	CG-2,	C2.1, C2.2, C2.3,	LO1, LO3, LO5, LO6, LO7, LO8, LO9, LO10 , LO12, LO13, LO14, LO16, LO17, LO18	PO2, PO5, PO6, PO7, PO9, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG-5,	C5.3			
	CG-6,	C6.1			
	CG-7,	C7.1, C7.2			
	CG-8	C8.1, C 8.2			

GRAVITATION	CG-1,	C1.2,	LO1, LO5, LO10, LO11, LO13, LO15, LO16, LO17, LO18	PO5, PO9, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG-2,	C2.1, C2.2, C2.3, C2.5, C2.6			
	CG-5,	C5.1, C5.2			
	CG-6,	C6.1			
	CG-7,	C7.1, C7.2			
	CG-8	C8.1, C 8.2			
IS matter around us pure ?	CG-1	C 1.1, C 1.2, C1.3, C1.4	LO1, LO2, LO4, LO5, LO6, LO7, LO8, LO9, LO12, LO14, LO16, LO17, LO18	PO1, PO5, PO10, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG-5	C5.3			
	CG-7	C7.1, C7.2			
	CG-8	C8.1, C 8.2			
ATOMS AND MOLECULES	CG-1	C1.1, C1.2, C1.3	LO1, LO2, LO3, LO5, LO6, LO9, LO15, LO16, LO17, LO18	PO5, PO8, PO10, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG - 6	C6.1			
	CG-7	C7.1, C7.2			
	CG-8	C8.1, C 8.2			
STRUCTURE OF THE ATOM	CG-1,	C1.1, C1.2	LO1, LO2, LO6, LO7, LO9, LO15, LO16, LO17, LO18	PO5, PO8, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG-2,	C2.2			
	CG-5,	C5.1, C5.2, C5.3			
	CG-7,	C7.1, C7.2			
	CG-8	C8.1			
WORK AND ENERGY	CG-2,	C2.1, C2.2, C2.3, C2.6	LO3, LO5, LO6, LO9, LO10, LO15, LO16, LO17	PO9, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG-6,				
	CG-7,				
	CG-8				
SOUND	CG-2,	C2.7	LO1, LO2, LO3, LO4, LO5, LO6, LO7, LO8, LO9, LO10, LO12, LO16, LO17, LO18	PO5, PO9, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG-5,	C5.1, C5.3			
	CG-6,	C6.1			
	CG-7,	C7.1, C7.2			
	CG-8	C8.1, C 8.2			
IMPROVEMENT IN FOOD RESOURCES	CG-1,	C1.2	LO2, LO4, LO8, LO12, LO14, LO17, LO18, LO19	PO5, PO11, PO12	R/U/Ap/An/Ev/Cr
	CG-3,	C3.1, C3.2, C3.3			
	CG-4,	C4.1, C4.2, C4.3, C4.4, C4.5			
	CG-5,	C5.1, C5.2			
	CG-6,	C6.1			
	CG-7,	C7.1, C7.2			
	CG-8	C8.1, C 8.2			

SECONDARY STAGE (GRADE 9 AND GRADE 10)

CG-1 Explores the world of matter, its interactions, and properties at the atomic level.	**C-1.1** Describes classification of elements in the Periodic Table, and explains how compounds (including carbon compounds) are formed based on atomic structure (Bohr's model) and properties (valency)
	C-1.2 Investigates the nature and properties of chemical substances (distillation, crystallisation, chromatography, centrifugation, types and properties of mixtures, solutions, colloids, and suspensions)
	C-1.3 Describes and represents chemical interactions and changes using symbols and chemical equations (acid and base, metal, and non-metal, reversible, and irreversible)
CG-2 Explores the physical world around them, and understands scientific principles and laws based on observations and analysis.	**C-2.1** Applies Newton's laws to explain the effect of forces (change in state of motion - displacement and direction, velocity and acceleration, uniform circular motion, acceleration due to gravity) and analyses graphical and mathematical representations of motion in one dimension **C-2.2** Explains the relationship between mass and weight using universal law of gravitation and connect it to laws of motion **C-2.3** Manipulates the position of object and properties of lenses (focus, centre of curvature) to observe image characteristics and correspondence with a ray diagram, and extends this understanding to a combination of lenses (telescope, microscope)
	C-2.4 Manipulates and analyses different characteristics of the circuit (current, voltage, resistance) and

	mathematises their relationship (Ohm's law), and applies it to everyday usage (electricity bill, short circuit, safety measures) **C-2.5** Defines work in scientific terms, and represents the relationship between potential and kinetic energy (conservation of energy) in mathematical expressions **C-2.6** Demonstrates the principle of mechanical advantage by constructing simple machines (system of levers and pulleys) **C-2.7** Describes the origin and properties of sound (wavelength, frequency, amplitude) and differences in what we hear as it propagates through different instruments
CG-3 Explores the structure and function of the living world at the cellular level	**C-3.1** Explains the role of cellular components (nucleus, mitochondria, endoplasmic reticulum, vacuoles, chloroplast, cell wall), including the semi-permeability of cell membrane in making cell the structural basis of living organisms and functional basis of life processes **C-3.2** Analyses similarities and differences in the life processes involved in nutrition (photosynthesis in plants; absorption of nutrients in fungi; digestion in animals), transport (transport of water in plants; circulation in animals), exchange of materials (respiration and excretion), and reproduction **C-3-3** Describes mechanisms of heredity (in terms of DNA, genes, chromosomes) and variation (as changes in the sequence of DNA)
CG-4 Explores interconnectedness between organisms and their environment	**C-4.1** Applies the knowledge of cellular diversity in organisms along with the ecological role organisms play (autotrophic/heterotrophic

	nutrition) to classify them into five-kingdoms **C-4.2** Illustrates different levels of organisations of living organisms (from molecules to organisms) **C-4.3** Analyses different levels of biological organisation from organisms to ecosystems and biomes along with interactions that take place at each level **C-4.4** Analyses patterns of inheritance of traits in terms of Mendel's laws and its consequences at a population level (using models and/or simulations) **C-4.5** Analyses evidences of biological evolution demonstrating the consequences of the process of natural selection in terms of changes - in allele frequency in population, structure, and function of organisms
CG-5 Draws linkages between scientific knowledge and knowledge across other curricular areas	**C-5.1** Explores how literature and the arts have influenced Science **C-5.2** Examines a case study related to the use of Science in human life from the perspective of Social Sciences and ethics (e.g., Marie Curie, Jenner, treatment of patients with mental illness, the story of the atomic bomb, green revolution and GMOs, conservation of biodiversity) **C-5.3** Applies scientific principles to explain phenomena in other subjects (sound pitch, octave, and amplitude in music; use of muscles in dance form and sports)
CG-6 Understands and appreciates the contribution of India through history and the present times to the overall field of Science, including the disciplines that constitute it	**C-6.1** Knows and explains the significant contributions of India to all matters (concepts, explanations, methods) that are studied within the curriculum in an integrated manner
CG-7 Develops awareness of the most current discoveries, ideas, and	**C-7.1** States concepts that represent the most current understanding of the

frontiers in all areas of scientific knowledge in order to appreciate that Science is ever evolving, and that there are still many unanswered questions	matter being studied - ranging from mere familiarity to conceptual understanding of the matter as appropriate to the developmental stage of the students **C-7.2** States questions related to matters in the curriculum for which current scientific understanding is well-recognised to be inadequate
CG-8 Explores the nature of Science by doing Science	**C-8.1** Develops accurate and appropriate models (including geometric, mathematical, graphical) to represent real-life events and phenomena using scientific principles and use these models to manipulate variables and predict results **C-8.2** Designs and implements a plan for scientific inquiry (formulates hypotheses, makes predictions, identifies variables, accurately uses scientific instruments, --in represents data primary and secondary multiple modes, draws inferences based on data and understanding of scientific concepts, theories, laws, and principles, communicates findings using scientific terminology)

Grade 9 science

Learning Outcomes

The learner—

LO1: differentiates materials, objects, organisms, phenomena, and processes, based on properties or characteristics, such as, prokaryotes and eukaryotes, plant cell and animal cell, diffusion and osmosis, simple and complex tissues, distance and displacement, speed and velocity, balanced and unbalanced forces, elements, compound and mixture, solution, suspension and colloid, isobars and isotopes, etc.

LO2: **Classifies materials, objects, organisms, phenomena, and processes, based on properties or characteristics**, classification of plants and animals

under various hierarchical sub-groups, natural Such as classification, resources, classification of matter, based on their states, (solid / liquid / gas) and composition (Elemen / compound /mixtures), etc.

LO3: plans and conducts investigations or experiments to arrive at and verify the facts, principles, phenomena or to seek answers to queries on their own, such as, how does speed of an object change? How do an objects float / sink when placed on the surface of a liquid? Is there any change in mass when chemical reaction takes place? What is the effect of heat on the state of substances? What is the effect of compression on different states of matter? Where are stomata present in different types of leaves? Where are growing tissues present in plants?

LO4: **relates processes and phenomena with causes and effects,** such as, symptoms with diseases and causal agents, tissues with their functions, production with use of fertilisers, process of evaporation with cooling effect, various processes of separation with the physical and chemical properties of the substances, production of sound with vibrations of source, etc.

LO5: **explains processes and phenomena**, such as, functions of different organelles, spread of diseases and their prevention, effect of force on the state of motion of objects, action and reaction, rotation and revolution of planets and satellites, conservation laws, principle of separation of different gases from air, melting, boiling, freezing, how bats use ultrasonic waves to catch prey, etc.

LO6: **calculates using the data given,** such as, distance, velocity, speed, frequency, work done, number of moles in a given mass of substance, concentration of solution in terms of mass by mass percentage of substances, conversion of Celsius scale to Kelvin scale and vice versa, number of neutrons in an atom from atomic number and mass number, speed of sound, kinetic and potential energies of an object, boiling points of liquids to predict the order of their separation from the mixture, etc.

LO7: draws labelled diagrams, flow charts, concept maps, graphs, such as, biogeochemical cycles, cell organelles and tissues, human ear, distance-time and speed-time graphs, distribution of electrons in different orbits in an atom, process of distillation and sublimation, etc.

LO8: analyses and interprets graphs, and figures, such as, distance-time and velocity-time graphs, computing distance, speed, acceleration of objects in motion, properties of components of a mixture to identify the appropriate method of separation, crop yield after use of fertilisers, etc.

LO9: Uses scientific conventions, symbols, and equations to represent various quantities, elements, and units, such as, SI units, symbols of elements, formulae of simple compounds, chemical equations, etc.

LO10: measures physical quantities using appropriate apparatus, instruments, and devices, such as, weight and mass of an object using spring balance, mass using a physical balance, time period of a simple pendulum, volume of liquid using measuring cylinder, temperature using thermometer, etc.

LO11: applies learning to hypothetical situations, such as, weight of an object at moon, weight of an object at equator and poles, possibility of life on other planets, etc.

LO12: applies scientific concepts in daily life and solving problems, such as, separation of mixtures, uses safety belts in automobiles, covers walls of large rooms with sound absorbent material, follows intercropping and crop rotation, takes preventive measures to control disease causing agents, etc.

LO13: derives formulae, equations, and laws, such as, mathematical expressions for Newton's second law of motion, law of conservation of momentum, expression for force of gravity, equations of motion from velocity-time graphs, etc.

LO14: draws conclusion, such as, classification of life forms, is related to evolution, deficiency of nutrients affects, physiological processes in plants, matter is made up of particles, elements, combine chemically in a fixed ratio to form compounds, effect of action and reaction on two different bodies, etc.

LO15: describes scientific discoveries, and inventions, such as, discovery of various atomic models, discovery of cell with invention of microscope, experiments of Lavoisier and Priestley, beliefs regarding motion, discovery of real cause for peptic ulcers, Archimedes principle, classification of living things, etc.

LO16: designs models using eco-friendly resources, such as, 3D model of a cell, water purification system, stethoscope, etc.

LO17: exhibits values of objectivity, honesty, rational thinking, freedom from myths, superstitious beliefs while taking decisions, respect for life, etc., such as, records and reports experimental data exactly, myth that sexually transmitted diseases are spread by casual physical contact, belief that vaccination is not important for prevention of diseases, etc.

LO18: communicates the findings and conclusions effectively, such as, those derived from experiments, activities, and projects both in oral and written form using appropriate figures and tables graphs, and digital forms, etc.

LO19: applies the interdependency and interrelationship in the biotic and abiotic factors of environment to promote conservation of environment, such as, organic farming, waste management, etc.

GRADE 9 SCIENCE

Suggested Pedagogical Processes

The learners may be provided with opportunities individually or in groups and encouraged to—

PP1: observe, group or classify materials, such as mixtures, based on their properties, viz. solubility, passage of light, etc., by performing various activities. Based on the observations, a discussion may be facilitated to help arrive at the appropriate conclusions. Students with visual impairment or low vision may be motivated to observe solubility of the materials by touching the materials. (Caution should be taken while using the materials.)

PP2: design and carry out activities. For example, Tug of war to understand balanced and unbalanced forces. They may be encouraged to experiment by applying forces (equal and unequal) on an object in same and opposite directions, followed by peer group discussion to generalise.

PP3: study the daily life experiences, using interdisciplinary approach such as the cause behind cooling of water in earthen pots. They may be encouraged to measure and compare the temperatures of water both in earthen pot and metal containers, thereby helping them to relate process of evaporation with cooling effect. Students with visual impairment or low vision may be encouraged to feel the difference in temperature by touching the surface of the containers.

PP4: conduct survey to understand the process of spreading of diseases. They may be encouraged to collect data from doctors and nurses about various diseases. They can prepare a report on spread, causes, prevention, and cure of diseases. They may share their findings with the community through role plays, skits and also campaign for prevention.

PP5: present their observations/ ideas/ learning through flow charts/ concept maps/ graphs and ICT tools.

PP6: gather data for calculating different physical quantities, such as distance, displacement, velocity, which can be shared and discussed in groups or with peers. Rubrics can be used to assess the conversion of units and reporting results.

PP7: collect and analyse wide variety of graphs from newspapers, magazines or the internet. They may be encouraged to draw, analyse and interpret the graphs
(for example, distance – time graph, speed - draw, analyse and interpret the graphs time, or acceleration-time graphs of motion of a vehicle on a straight road)
PP8: write chemical formulae of simple compounds, chemical equations, etc., using play way methods such as a game of cards.

PP9: select and use appropriate devices for measuring physical quantities. They may be encouraged to find the minimum and maximum value that can be measured by an instrument and note down the readings correctly.

PP10: collect information from books, e-books, magazines, internet, etc., to appreciate the efforts of scientists made over time, for example, various models of **atoms, discovery of microscope**, etc., and showcase it in the form of a project or role play.

PP11: observe various technological devices and innovative exhibits such as waste management kits, **water filtration syste**m, using low-cost or no-cost eco-friendly materials, develop them and showcase it in science exhibitions, clubs and parent-teacher meets.

PP12: share and discuss their beliefs and views regarding myths, taboos, superstitions, etc. by initiating an open-ended debate, leading to the alignment of their beliefs to the scientifically proven facts. They may also be involved in awareness campaigns in the community.

RUBRICS FOR PRACTICAL (ACTIVITIES)

CRITERIA	WOW (2.5)	WELL DONE (1.5)	ACCEPTABLE (1.0)	NOT THERE YET (.5)
HANDLING EQUIPMENTS	-Proper use of equipments with safety and manages without any help	Not very well versed with use of equipments and needs assistance	Needs assistance in the use of equipments and to take readings	Needs extra help in safety and the use of equipments
RECORDING DATA	Records data accurately in tabular column	Records data somewhat accurately	Records data in an unorganised manner with no accuracy	Very poor in recording data and in accuracy
INTERPRETATION OF DATA	Very well interpreted data and inference	Somewhat well interpreted data and inference	Somewhat well interpreted data but cannot infer	No interpretation of data and no inference
APPLICATION OF CONCEPT AND COMMUNICATION	Able to explain the concept and its applications in daily life very well	Able to explain the concept and its applications	To some extent can explain the concept but not its application	Unable to explain anything related to the concept.

RUBRICS FOR ASSIGNMENTS (WRITTEN)

CRITERIA	EXCELLENT (2.5)	GOOD (1. 5)	FAIR (1.0)	NEEDS IMPROVEMENT(0.5)
NEATNESS & ORGANIZATION	- Neatly presented - Very well organised - Makes 100% sense	- Neatly presented - Mostly organised - Makes 90% sense	- somewhat neatly presented - some parts are organised - makes 50% sense -	- quite sloppy presentation - is very unorganised
CONTENT ACCURACY	information provided is 100% correct, clear and detailed	Information provided is mostly correct and to some extent clear	Information provided are somewhat correct with many mistakes	Information provided are mostly incorrect with lots of mistakes
REQUIRED ELEMENTS	All necessary information and facts provided	All necessary information is provided	Some information is provided	Necessary information and facts are missing
ILLUSTRATION & DIAGRAMS	Diagrams and illustrations are neatly presented with many details	Diagram and illustrations are neatly presented with few details	Diagrams and illustrations are not presented neatly and few details shown	Diagrams and illustrations missing with no details

RUBRICS FOR PRESENTATION

CRITERIA	EXCELLENT (2.5)	GOOD (1.5)	FAIR (1.0)	NEEDS IMPROVEMENT(0.5)
CONTENT KNOWLEDGE (SCIENTIFIC KNOWLEDGE)	All information is accurate and in correct sequence	Almost all information is accurate and in correct sequence	Most of the information is correct and to some extent in correct sequence	Very little information is accurate and is in incorrect sequence
USE OF SCIENTIFIC METHODOLOGY	Very well use of scientific methods	Well use of scientific methods	Somewhat well use of scientific methods	Very little use of scientific methods
CREATIVITY, ORIGINALITY, ATTRACTIVENESS	Shows exceptional degree of creativity and originality	Shows some degree of creativity and originality	Shows little degree of creativity and originality	Shows very little degree of creativity and originality
RELEVANCE, CLARITY, TIMELINESS	Graph, data, pictures are all clear and relevant and very well supported by content and submitted on time	Graph, data, pictures are somewhat clear and relevant and supports the content. Submitted on time	Graph, data and pictures are not clear and relevant. Very little supports the content. Submitted little late	Graph, data, pictures are not at all clear and relevant. It does not support content. Submitted late.

GRADE: 9 SCHEME OF ASSESSMENT FIRST SEMESTER

EXTERNAL(THEORY)	INTERNAL			
	ASSIGNMENTS	LAB ACTIVITIES	PRACTICAL	TOTAL
70 MARKS	10 MARKS	10 MARKS	20/2=10 MARKS	100 MARKS

FIRST SEMESTER

MODEL QUESTION PAPER YEAR 2026 - 27

GRADE: 9 TIME: 3 HRS. MARKS: 70 SUBJECT: SCIENCE

GENERAL INSTRUCTIONS:

1. There are 39 questions in the question paper. All questions are compulsory.
2. Question No. 1 to 18 are multiple choice questions carrying 1 mark each.
3. Question No. 19 to 32 are short answer type (i) question, carrying 2 marks each.
4. Question No. 33 to 36 are short answer type (ii) questions, carrying 3 marks each.
5. Question No. 37. to 39 are long answer type questions, carrying 4 marks each.
6. There is no overall choice in the question paper.
   However, an internal choice has been provided for 3 questions of 2 marks each, 2 questions of 3 marks each and one question of 4 marks.

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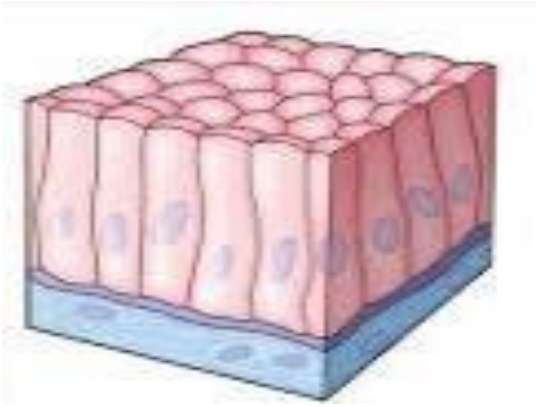
SECTION A

Select the most correct alternative from those given below each statement.

1. One of the substances which can readily sublime on heating is _____
   A. sodium chloride
   B. calcium chloride
   C. ammonium chloride
   D. magnesium chloride
2. Rate of evaporation of water increases with decrease in _____
   A. humidity
   B. temperature
   C. wind speed
   D. surface area
3. A solid melts at 52 ºC. This temperature on Kelvin scale is _____
   A. 52 K
   B. 325 K
   C. 352 K
   D. 425 K

04. The cell organelle responsible for digesting damaged cells is _____
   A. plastids
   B. lysosomes
   C. mitochondria
   D. Golgi apparatus

05. Identify the given epithelial tissue



.

A. squamous
B. cuboidal
C. columnar
D. stratified

06. The features that best describe the cells of parenchyma are _____
A. dead cells, thick walled, tightly packed
B. living cells, thin walled, loosely packed
C. dead cells, thin walled, tightly packed
D. living cells, thick walled, loosely packed

07. The Units of ---------- quantities are same.

- speed and velocity
- displacement and speed
- velocity and acceleration
- acceleration and speed

08. In the graph shown below, the body is _____

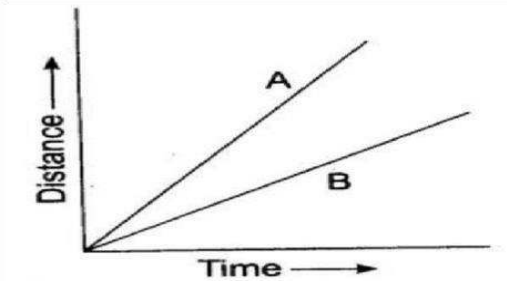


A. moving with increasing velocity per unit time x
B. moving at a constant velocity
C. moving with decreasing velocity per unit time
D. not moving

09. Amoeba acquires its food through a process termed ----------
A. exocytosis

B. Endocytosis
C. Plasmolysis
D. Biogenesis

10 From the distance- time graph shown below, which of the following option is correct?



A. Speed of A = speed of B
B. Speed of A > speed of B
C. Speed of A < Speed of B
D. Speed cannot be predicted from the above graph

11. When the net force acting on a body is zero, the forces acting on it are called _____
A. balanced forces
B. unbalanced forces
C. centripetal forces
D. centrifugal forces

12. An object of mass 2 kg moves with constant velocity of 20 ms^{-1}, then, the unbalanced force acting on the body is _____
A. 0 N
B. 10 N
C. 20 N
D. 40 N

13. The value of 'G' in the universal law of gravitation depends on _____
A. mass and density of the earth
B. density and radius of the earth
C. mass and radius of the earth
D. mass, density and radius of the earth

14. A scientist observes that a cell is unable to digest worn-out cell parts and invading microbes. The organelle most likely malfunctioning in this case is ----------

A. Mitochondria
B. Lysosomes
C. Golgi apparatus
D. Endoplasmic reticulum

15 Voluntary muscles are found in ----------

A. alimentary canal
B. limbs
C. bronchi of lungs
D. iris of the eye

16. You're designing shoes for people who walk on snow. Based on based on your knowledge of pressure the best design would be ----------

A. Shoes with small, narrow soles
B. Shoes with large, flat soles
C. Shoes with metal heels
D. Shoes with pointed studs

Directions: Question numbers 17 and 18 are Assertion – Reasoning based questions: These consists of of two statements – Assertion (A) and Reason (R) Answer these questions selecting the appropriate options given below:

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

17. **Assertion (A)**: A sheet of paper falls slower than one that is crumbled into a ball.
Reason (R) :. The crumbled paper has less surface area

18. **Assertion (A)** : A person travelling along a straight road will always have a displacement equal to the distance travelled .
Reason (R) : Displacement considers both magnitude and direction

SECTION B

19. Draw a diagram to show the separation of ammonium chloride and salt by sublimation and label the cotton plug and solidified ammonium chloride.

20. A ball is thrown vertically upward and returns to the thrower after 6 seconds .Analyse the motion of the ball to determine**:**
a) The initial velocity with which it was thrown,
b) The maximum height it reaches. *(gravity g = 10 m/s²)*

21.. Draw a scientifically correct diagram of a plant cell and label the vacuole and cell membrane.

22. Give reasons for the following (i) Gas completely fills the vessels in which it is kept.
(ii) Solids are incompressible

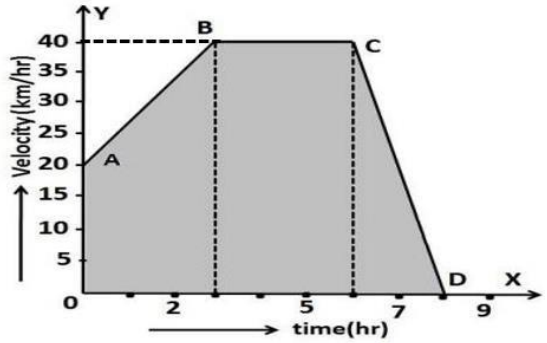
23. What are the consequences of the following conditions? (i) A cell having higher water concentration than the surrounding medium (ii) A cell having equal water concentration to its surrounding medium

OR

23. What would happen when raisins are placed in hypotonic solution and subsequently transferred into a hypertonic solution? How do substances like CO_2 and water move in and out of the cell?

24. . How does the water change to water vapour at temperature below its boiling point? Write two examples of daily life situations where evaporation causes cooling.

25. Study the graph and answer the questions given below.



(1) Find the distance travelled during the duration when the body travels with constant velocity of 40 km/hr

(2) Find the acceleration acting on the body between A and B.

26. Some students claim that all types of epithelial tissues perform the same function**.** Do you agree or disagree with this statement? Use at least two examples to justify your opinion.

27. State why newton's first law of motion is called law of Inertia. A rubber ball and a stone of the same size which one will have more inertia?

28. People in the villages use earthen pots to get cool water in summers. Explain the reason why water remains cool in earthen pots

OR

28. Why do clothes dry faster on a windy day? How does applying pressure and reducing temperature help in liquefying a gas?

29. Write two differences between nuclear region of bacterial cell and nuclear region of an animal cell.

30. Using Newton's third law of motion, explain the below mentioned situations,

a. rocket propulsion
b. it is difficult for a fireman to hold a hose, which ejects large amounts of water at high velocity

31. Create a **poster or advertisement** that encourages people to wear seatbelts, explaining the science behind it using Newton's laws.Make sure your message is both scientific and creative.

OR

31. Create a fun classroom game or activity that helps students experience Newton's First Law (inertia) in real life. Describe the rules and how the law is demonstrated through the game.

32. Is it scientifically accurate to say 'heavy objects fall faster than light ones'? Evaluate this statement with reasoning and examples."

SECTION C

33. A car falls off a ledge and drops to the ground in 0.5 s. Let g=10 $m/s^{2.}$ (i) What is its speed on striking the ground? (ii) What is its average speed during 0.5 s/ (iii) How high is the ledge from the ground?

OR

33. An object falls freely from a height of 45 m. Find the time taken to reach the ground (g= 9.8 $m/s^{2)}$ ·Now evaluate how the result would differ on the Moon, where g=1.63 m/s^2

34. Write two characteristic features of collenchyma tissues. Where are sclerenchyma tissues present and what are there functions

OR

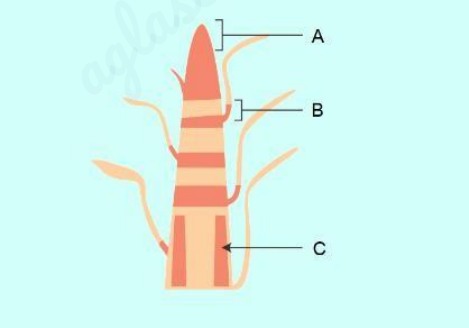
34. State the differences between tendon and ligament. Give the functions of adipose tissue

35. Draw a diagram of a plant cell and label the cytoplasm and nucleus. Make a comparison and write two ways in which plant cells are different from animal cells

36. What is the relation between the mass **m** and the weight **W** of a body .How much would a 70 kg astronaut weigh on moon? What would be his mass on earth and moon?

SECTION D

37. Given below is the diagram of the meristemtic tissues. Identify the labelled parts (A, B, C) and write one function for each part. How are simple tissues different from complex tissues?



38 A constant force acts on an object of mass 5 kg for a duration of 2 s. It increases the velocity of the object from 3 ms^{-1} to 7 ms^{-1}. Find the magnitude of the force applied. Now if the force was applied for a duration 5 s, what would be the final velocity.

39. (i) A motor cyclist moving initially with a speed of 6 ms^{-1} accelerates by 2 ms^{-2} for 5 s. Calculate the final speed and distance travelled by the motor cyclist.
(ii) Write a point of difference between speed and velocity.

OR

39. (i) From a station 'X' a train starts from rest and attains a speed of 15 ms^{-1} in 10 s. Then by applying brakes, a negative acceleration of 3 m s^{-2} is produced and it stops at station 'Y' in 6 s. Find the distance between 'X' and 'Y'.
(ii) Write a point of difference between distance and displacement.

SECOND SEMESTER
MODEL QUESTION PAPER YEAR 2026-27

GRADE : 9 TIME: 3 HRS. MARKS: 70 SUB: SCIENCE

GENERAL INSTRUCTIONS: Read the following instructions carefully and strictly follow them:

1. There are 39 questions in the question paper. All questions are compulsory.
2. Questionn No. 1 to 18 are multiple choice questions carrying one mark each.
3. Question No. 19 to 32 are short answer type (i) question, carrying two mark each.
4. Question No.33 to 36 are short answer type (ii) questions, carrying 3 marks each.
5. Question No. 37 to 39 are long answer type questions, carrying 4 Marks each.
6. There is no overall choice in the question paper. However, an internal choice has been provided for 3 questions of 2 marks, 2 questions of 3 marks and one question of 4 marks. .

PART – I (MULTIPLE CHOICE QUESTIONS)

Select the most correct alternative from those given below each statement.

1 . Tincture of iodine has antiseptic property. This solution is made by dissolving ____

A. iodine in water
B. iodine in acetone
C. iodine in glycerine
D. iodine in alcohol

2. According to the atomicity of the element chlorine is diatomic. What would be the atomicity of phosphorous :

A. monoatomic
B. diatomic
C. tetra-atomic
D. Poly –atomic

3. Time taken by the wave to complete one oscillation is called ----------

A. frequency
B. time period
C. wavelength
D. velocity

4. A technique that is used to separate cream from milk is _____

A. distillation
B. decantation
C. centrifugation
D. chromatography

5. 5 g of sugar is dissolved in 45 g of water. Concentration in terms of mass by mass percentage of the solution is _____

A. 5%
B. 10 %
C. 15 %
D. 20 %

. . 6 The particles that determine the mass of an atom is:
A. Electrons and protons
B. Protons and neutrons
C. Neutrons and electrons
D. Protons, neutrons and electrons

7 .Which of the following has a fixed volume but not a fixed shape?
E. gas
F. solid
G. liquid
H. Plasma

. 8. The growing of different crops in pre- planned succession is called _____

A. mixed cropping
B. inter cropping
C. inter breeding
D. crop rotation

9. The unit of work is joule. The other physical quantity that has same unit as joule is :
A. power
B. velocity
C. energy
D. force

10. Identify two correct statements from those given below.
(i) hybridization means crossing between genetically dissimilar plants.

(ii) cross between two varieties is called as inter-specific hybridization.

(iii) introducing genes of desired characters into a plant gives genetically modified crop.

(iv) cross between plants of two species is called as inter varietal hybridization.

A. (i) and (iii)
B. (ii) and (iv)
C. (ii) and (iii)
D. (iii) and (iv)

11. Which of the following are homogenous in nature

(i) ice (ii) wood

(iii) soil (iv) air

A. I and iii
B. ii and iv
C. I and iv
D. Iii and iv

12. If you had to develop a new variety of wheat for a drought-prone region, which trait would you prioritize first?

A. high water requirement for better yield
B. resistance to pests but low drought tolerance
C. ability to grow with minimal water while maintaining good yield
D. longer maturation time to increase grain size

13. Rusting of an article made up of iron is called ----------

A. corrosion and it is a physical change as well as chemical change

B. dissolution and it's a physical change

C. corrosion and it's a chemical change

D. dissolution and its chemical change

14. If you lift a block of mass 1 kg through a distance of 1 m in 2 seconds, what is the work done? (g=9.8 m/s^2)

A. 19.6 J
B. 9.8 J
C. 4. 9 J
D. 2.6 J

15. A farmer wants to increase milk production in his cows. Which of the following approaches would work best?

A. increasing water supply only
B. providing balanced feed and proper healthcare
C. letting cows graze freely without any supplements
D. reducing milking frequency

16. If the atomic mass of Hydrogen is 1u, nitrogen is 14 u, and that of oxygen is 16 u then the Molecular mass of HNO_3 will be:

A.69 u
B.68 u
C.65u
D.63 u

These consists of of two statements – Assertion (A) and Reason (R) Answer these questions selecting the appropriate options given below:

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

17. **Assertion (A)**: In an atom, first orbit can occupy maximum of 2 electrons.

Reason (R) : The maximum number of electrons present in an orbit is given by the formula $4n^2$ where n is the orbit number

18. **Assertion (A)** : A person travelling along a straight road will always have a displacement equal to the distance travelled .Ammonia obtained from different sources contains nitrogen and hydrogen combined in the ratio of 14 : 3 by mass

Reason (R) : A chemical compound always contains same elements combined in same fixed proportion by mass

PART B (SUBJECTIVE)

19. Give two real life examples of tyndal effect

OR

19. Why does colloidal solution appear homogenous? Give examples of colloidal solutions

20. What are binary compounds? Write the molecular formulae of calcium chloride and ammonium sulphate

21. How is atomic mass related to the number of protons and neutrons? What are valence electrons?

22. Write an expression for the work done when a force is acting on an object in the direction of its displacement. When do we say one joule of work is done?

OR

22. Write an expression for the kinetic energy of an object. What are the energy transformations that occur when you are riding a bicycle?

23 "Two classrooms—one with bare walls and another with curtains and carpets—are used for teaching. Which classroom will have better sound quality? Give reasons for your choice."

24. Draw the schematic atomic structure of magnesium and neon

OR

24. Draw the schematic atomic structure of Beryllium and Nitrogen

25. Under what conditions can work done be zero?. State any two conditions.

26. Write two advantageous of mixed cropping

27. With help a suitable example explain the law of conservation of energy

28 Two isotopes of chlorine have mass numbers 35 and 37. Calculate the average atomic mass of chlorine if their natural abundances are 75% and 25%, respectively."

29 A chemist has 36 g of water. Evaluate whether the number of molecules present will be more, less, or equal compared to 36 g of oxygen gas. Justify your answer."

30. A farmer alternates between growing legumes and cereals on the same land. Analyze how does this practice of growing two different crops affects soil fertility."

31. "If you were asked to design a new musical instrument using everyday household materials, what would it be and how would you produce different pitches of sound with it?"

32. "If 18 g of water contains 6.022×10^{23} molecules, analyze how many molecules will be in 36 g of water."

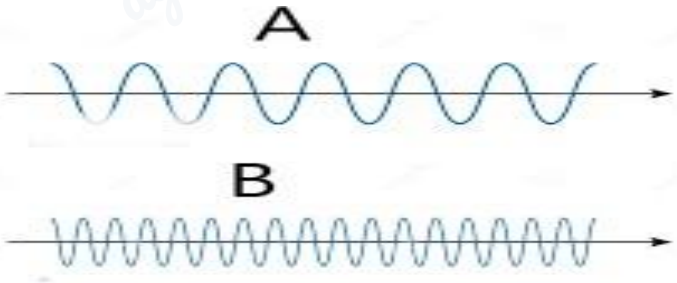
33. Draw a diagram to show the process of obtaining colored component (dye) from Blue/black ink. Name the process of separation of dyes in blue / black ink and write two applications of this process.

OR

33. Draw a diagram to show the separation of two immiscible liquids (oil and Water). Label the water and oil layers. Explain the principle behind this method of separation

34. Write the molecular formulae of all the compounds that can be formed by the combination of following ions. Cu^{2+}, Na^{+}, Fe^{3+}, cl^{-}, SO_4^{2-}, PO_4^{3-}

35. The figure below shows snapshots of two waves (A, B). Both the figures are drawn in the same scale. Distinguish between both waves with respect its frequency, wavelength and pitch



. 36. A poultry farmer desires to expand his poultry business. Devise a method by which he can increase productivity. Discuss any two modern management practices that he can employ.

OR

36 A dairy farmer wants to increase the yield of milk. What should the animal feed include to achieve this? Enlist any two practices that the farmer can employ to maintain the health and hygiene of these animals.

37. . Complete the following table by writing the correct values in places marked as A, . B, C, D, E, and F and also write the electronic configuration of any one pair of isotopes and isobars

Atomic number	Mass number	Number of Neutrons	Number of Electrons	Number of Protons	Name of the Element
A	1	**B**	1	1	Hydrogen
C	24	12	12	**D**	Magnesium
11	23	**E**	11	11	**F**

38. 75 kg missile is dropped downwards from an air, and has a speed of 60m/s at an altitude of 850 m above the ground. Determine

(i) The kinetic energy possessed by the missile at 850 m.

(ii) The potential energy by the missile at 850 m.
(iii) The total mechanical energy possessed by the missile.
(iv) The kinetic energy and velocity with which it strikes the ground.

OR

38. Calculate the electricity bill amount for a month of 30 days, if the following devices are used as specified:
(i) 2 bulbs of 40 W for 6 hours
(ii) 2 tube lights of 50 W for 8 hours
(iii) A TV of 120 W for 6 hours
Given the cost of electricity is three rupees per unit.

39 . Establish the relationship between speed of sound, its wavelength and frequency. If the speed of sound in air is 340 m/s. Calculate;
(i) Wavelength when frequency is 170 Hz
(ii) Frequency when wavelength is 2 m
(iii) Sound is a mechanical wave and needs a material medium like air, water, steel,etc for its propagation. With the help a labelled diagram demonstrate that sound cannot travel through vacuum
.

GENERAL GUIDELINES FOR SUGGESTED LIST OF ASSIGNMENTS AND PROJECTS

GRADE : 9 SUB : SCIENCE

Terminology:

ASSIGNMENT: It is focused on specific, pre-defined tasks.

PROJECT: Involves a variety of inter related tasks to be performed in order to achieve a particular aim.

OBJECTIVES:

1 . Assignment and projects are extended classroom activities.

2. It is a window to bring in outside world of facts, inventions, discoveries, innovation, concepts into the classroom.

3. To make student aware of the latest developments in science and technology.

4. To make students aware of latest outbreak of new diseases, virus or microbes etc.

Note: Such assignments could be made mandatory for a particular class of students in that particular year.

5. Students receive hands on experience in constructing and assembling a working model.

6. Students must be given a fair choice to choose the topic for their assignments and projects as per their interest.

7. Topics given to the students may be related to the syllabus or from outside.

8. If topics are related to the syllabus, then the students must be guided to go in depth beyond the text book.

9. Choice of topics given by the teacher should cover all areas of science and technology.

Example: Sound, light, robotics, biotechnology, optic, electricity, electronics, plant kingdom, animal kingdom, water, agriculture, music, etc.

10. Students must understand concepts, principle, and working of the above assembled projects.

11. Teachers must encourage students to innovate, modify existing known technology. Focus on moving from conventional to non- conventional use of energy.

Example: Solar powered projects like solar car, solar boat, solar wind mill, solar mobile charger, etc.

12. An assignment is an individual activity. ie. Each student presents ONE assignment.
13. PROJECTS are group activity. (Group comprising of 3 to 5 students)
14. Project could be a role play or dramatizing which may require more students. Students may be allowed to expand their group in such cases. 15. Some Assignment / Projects that may require a lot of pictures or short animations. This could be carried out by a PowerPoint presentation, where students must explain the project.
16. In case of projects, the group of students will present the same in the class, assembly, school exhibition, or any school gathering which will promote awareness.
17. Fancy materials and decorations must be avoided.

FIRST SEMESTER

GRADE : 9 ASSIGNMENT (Any one) MARKS:10

1.Students can collect water from tap/well/kitchen of their own house, drains of their locality and find out the difference in terms of colour, odour and components etc.

2. List 10 different situations where you observe an application of force mentioning the effect it produces.
3. To find the density of a wooden rectangular block in water.
4. To find the density of a rectangular piece of stone like marble, granite, Kadappa in water.
5. To measure the speed of any 5 moving objects using a measuring tape and stop watch in cm/s and later converting into m/sec.
6. Frictional force, its pros and cons in our day to day lives.
7. To prepare a coloured chart showing electronic distribution of first 10 elements along with their valencies.
8. Prepare charts to show different methods of classification of organism.

--------OR ANY OTHER SIMILAR ASSIGNMENTS ---------

SECOND SEMESTER

GRADE : 9 PROJECT (Any one) MARKS:10

1.Prepare a chart/poster of disease caused by microbes and their mode of spread.

(a) Bacterial disease

(b) Viral disease

(c) Protozoan disease

2. Make a model of various water harvesting techniques.
3. Make some devices on solar energy. (Students may use "Do it yourself" kits available in the market or online)
4. Visit a weed infected field in the month of July or August and make a list of the weeds, insects, pests and diseases noticed in crops observed in fields.
5. Find out the facts about the electron microscope from resources in a school library or through internet.
6. Information on importance of diffusion in plants and animals.
7. To list the names of local variety and hybrid variety of plants/crops grown in Goa in the past and present. Also collect the names of local variety of crops/vegetables which are not available now and find out the positive aspects of them and the reason of their unavailability.
8. To prepare a poster showing ill effects of fertilizers and pesticides in plants, animals and human beings by collecting information from different sources.
9. To prepare a list of 20 local fishes found in Goa and write its local name, English name and scientific name if any. Also note down habitat to which they belongs. (pictures, or posters/PowerPoint presentation)
10. Prepare a model of Human ear and label the parts. Also find out causes of deafness.
11. To investigate the outbreak of new diseases like Ebola, Zika etc. Note down its causes, symptoms and treatment.
12. To demonstrate production of high frequency and low frequency sound using different objects.
13. Making musical tunes by producing sounds using different utensils, glasses, metal containers.
14. To prepare a working model of longitudinal waves and transverse waves and note down its differences.
15. To make a study of olive Ridley turtles nesting on Morjim beach, Galgibag beach and its life cycle.
16. Write a skit and dramatize at least 5-6 diseases its symptoms, causes and cares.

Hint: Doctor, nurse, patients (a scene at a clinic) Students will act out the skit and submit the script.

17. To demonstrate or dramatize Newton 3rd law of motion by performing at least 10 activities. List of activities with drawing.
18. To visit a public Health centre and prepare a table showing different vaccines administered to a child from birth (Age wise). Also write the importance of Polio and Tetanus Vaccine.

19. To find out the causes, symptoms, prevention and cure of Rabies. Importance of taking an anti- rabies injection and its dosage after a dog bite. To list names of other animals other than dogs that causes rabies.
20. To make a study of the causes of Malaria, Filaria, Dengue fever and monkey fever (reported in Goa) its symptoms, prevention and cure.
21. A visit to a poultry farm / dairy farm and to study the following.
    a. Breeds (their names).
    b. Feed (their brands).
    c. Care/shelter / cleanliness / water.
    d. Vaccination administered at various stages.
    e. Production of eggs / milk versus our local breeds.

--------OR ANY OTHER PROJECTS ON SIMILAR LINES----------

NOTE:

1. Direct print out of the information about assignments should not be allowed however small printed matter highlighting certain points on chart paper/poster is allowed.
2. Readymade projects should not be accepted.
3. Only Environment friendly materials should be used for projects as far as possible.
4. PowerPoint presentation may be accepted in certain cases as per the needs of the project/Assignment.
5. Fancy Material/decoration/colourful paper must be avoided.

IMPORTANT NOTE:

In the blueprint, diagrams are categorised under the 'REMEMBERING' section.

SEMESTER FIRST -----LAB ACTIVITIES –---

	List of Lab activities: (TOTAL 10 mks)	
1.	To prepare Tincture Iodine in the lab.	5mks
2.	To prepare a saturated solution of two different salts in a fixed volume of water and find solubility of the solute in the solvent. Evaluate which is more soluble.	10mks
3.	Measure your walking speed along the corridor of your School. Materials: measuring tape and Stopwatch.	5mks
4.	To check whether seeds are monocots or dicots. To soak seeds of green gram, wheat, peas tamarind. Try to split the seeds.	5mks
5.	To germinate the above seeds and observe the venation of leaf and type of root system.	5mks
6.	To collect the flowers of Hibiscus/Rose/Petunia, and grass/maize/Bamboo/lily/ Pea and count the number of petals, sepals stamens of each type and note the differences. Select a monocot and a dicot	10mks
7.	To determine the speed of a pulse propagated through a stretched string or slinky **Materials**: slinky, meter scale, a fixed hook and stopwatch. Create a pulse by moving the end of the string up and down and calculate the speed of the pulse. d=_____m, t=____secs. Therefore v=d/t = _____m/s	10mks
8.	To purify common salt from bazaar salt using the process of Crystallisation.	5mks
9.	To observe Human cheek cell (Squamous epithelium) under a compound microscope. **Materials**: slide, toothpick, methylene blue solution for stain, filter paper, cover slip, glycerine, Water. Procedure: Scrap gently the inner cheek to get some epithelial cells. Place the scrapped part in a watch glass containing water to clean it. Add a drop of methylene blue stain. Add one or two drops of glycerine and observe under low and high power of the microscope. Draw diagram and label nucleus and cytoplasm	10mks
10.	To conduct Osmosis with an egg. (**Activity 5.3 on text book**)	10mks

11.	Put dry resins in plain water for some time and then place them into a concentrated salt solution. (**Text book activity 5.4**) Observe and note the change. Note down which is hypotonic solution or Hypertonic solution.	5mks
12.	Carry out the following osmosis experiment. Take two peeled potato halves. A is raw potato. B is boiled potato. Take halves of each potato and scoop the inner part to make like a cup. Place the raw half cup potato in a petridish containing tap water. Place the boiled half cup potato in another petridish containing tap water. Water quantity must be equal. Add half teaspoon salt each in both the halves. After two hours observe inside the two cups in which case osmosis has taken place and write your reason.	10mks
13.	To demonstrate Newtons 1st Law 2nd Law and 3rd Law and write the differences.	5mks
	****Any other similar activities by the teacher will be accepted.	
	**** Pls note: **Two students** in a team will conduct the above activities during the course of the semester.	
	For Evaluation: Each team must select **any two** activities **5mks each** OR **one activity** of **10mks each** and present to other students in the lab.	

SEMESTER SECOND --- LAB ACTIVITIES----

	List of Lab activities: (TOTAL 10 mks)	
1.	**To measure the work done in lifting a load by using a spring balance and a pulley system**. {set up a pully system with the spring balance attached to the string. Attach the load to the end of the string. Measure the initial length. Slowly pull the load using a pully system keeping the string intact. Measure and record the force exerted on the spring balance at regular intervals. Measure the final length of string. Calculate the displacement of the load by subtracting initial length from final length, calculate the work done by using formula work =force x displacement}	5mks
2.	**To measure the power consumption of appliances using multi meter** {Set the multimeter to measure voltage (AC) and current (A). Connect the multimeter in series with the appliance, using extension cord. Ensure the multimeter is set to a correct range for the expected voltage and current. Record voltage and current at	10mks

	regular intervals. Calculate power consumption P= V I (in watts). Calculate the energy consumption for one hour using the formulae=P x t (in watts hours) . Ensure appliance is turned off and unplugged before doing the experiment	
3.	**To measure and calculate approximately the energy consumption of a room or a building** . (Collect information regarding the number of type of appliances, determine the energy consumption of each appliance by checking the appliances name plate or manual for its voltage and energy consumption ratings. Estimate energy consumption based on the appliances type and usage patterns. Using simple formulas find energy consumption**.** { This is a simple guide to find energy consumption. Actual energy consumption may require many more details and complex formulas}	10mks
4.	To create models and explain different molecules, demonstrating chemical bonding with play dough or / clay	5mks
5.	To prove the law of conservation of mass by conducting experiment.	10mks
6.	**To measure the speed of sound using stop watch and a meter stick to measure the time taken for sound to travel certain distance** (**Echo method** ; Find an open place with minimum obstacles for example a football field or an empty parking lot. Measure the distance from the starting point to a reflective surface (a wall). Stand at the starting point and clap your hands or make a loud noise. Stop the stop watch when you hear the echo return. Record the time elapsed. Calculate speed of sound using Speed = 2 x distance / time	10mks
7.	**To determine the speed of a pulse propagated through a stretched string or slinky** **Materials**: slinky, meter scale, a fixed hook and stopwatch. Create a pulse by moving the end of the string up and down and calculate the speed of the pulse. d=_____m, t=____secs. Therefore v=d/t = _____m/s	10mks
8.	**To investigate the effects of medium on sound** (Fill three identical containers with air, water and oil and measure the time taken for sound to travel through each medium.)	5mks

9.	**Play a game for writing formulae**. (make placards with symbols and valencies of the elements separately . Each student should hold two placards, one with symbol in the right hand and other with the valency in the left hand. Keeping the symbols in place, students should criss-cross their valencies to form the formula of a compound.	10mks
10.	To compare amount of kinetic energy.**(Text book Activity 11. 6)**	5mks
11.	To study the amount of work done (**Text book activity 11.7**)	5mks
12.	Computing the potential energy and kinetic energy in different cases **(Text book activity 11.15)**	10mks
13	To estimate the electricity consumed / to be consumed by specific appliances by tabulating their known wattages and hours of operation **(Text book activity 11.7)**	10 mks
14.	To measure the angle of incidence and the angle of reflection of sound **(Text book activity 12. 5)**	10 mks
	****Any other similar activities by the teacher will be accepted.	
	**** Pls note: **Two students** in a team will conduct the above activities during the course of the semester.	
	For Evaluation: Each team must select **any two** activities **5mks each** OR **one activity** of **10mks each** and present to other students in the lab.	

DIAGRAMS FOR EVALUATION (skill)
(ANNEXURE—1)

GRADE: 9 **SUB: SCIENCE** **YEAR : 2026-27**

Ch. No	Name of Chapter	Title of Diagrams	Fig :No
1	Matter in our surroundings	Sublimation of ammonium chloride	1.7
2	Is matter around us pure	Separation of immiscible liquids Separation of ammonium chloride	2.6 2.7
3	Atoms and molecules	----------	----------
4	Structure of atoms	Schematic atomic structure of first 18 elements	4.4
5	The fundamental unit of life	Prokaryotic cell Animal cell Plant cell	5.4 5.5 5.6
6	Tissues	Location of meristamatic tissues Various types of simple permanent tissues Guard cells and epidermal cells Types of complex tissues Neuron unit of nervous tissue	6.2 6.4 6.5 6.7(d) 6.12
8	Motion	Distance- time graph Distance-time graph Velocity –time graph Velocity-time graph Velocity –time graph	8.3 8.4 8.5 8.6 8.8
9	Force and laws of motion	----------	----------
10	Gravitation	----------	----------
11	Work and energy	----------	----------
12.	Sound	Bell jar experiment Auditory parts of human ear	12.6 12.19
15.	Improvement in food resources	----------	----------

DIAGRAMS FOR EVALUATION
(not for drawing)
(ANNEXURE—11)

GRADE: 9 **SUB: SCIENCE** **YEAR: 2026-27**

Ch. No	Name of Chapter	Title of Diagrams	Fig :No
1	Matter in our surroundings	----------	----------
2	Is matter around us pure		2.5 2.8 2.9 2.10
3	Atoms and molecules	----------	----------
4	Structure of atoms		4.3
5	The fundamental unit of life		5.3
6	Tissues		6.9 6.10 6.11
8	Motion		8.7
9	Force and laws of motion	----------	----------
10	Gravitation	----------	----------
11	Work and energy	---------- -	----------
12.	Sound		12.8 12.9 12.10 12.17
15.	Improvement in food resources	----------	----------

Practical Examination in Science
FIRST SEMESTER

GRADE: 9 SUBJECT: SCIENCE MARKS: 20

LIST OF THE EXPERIMENTS YEAR : 2026-27

EXPERIMENT UNDER GROUP "A" (5 MARKS)

Sr. No.	Expt. No.	EXPERIMENTS
1	I - A	To find the temperature of cold water (room temperature) and hot water on a Celsius Thermometer and convert it in to 'Kelvin'.
2	IV -	To find the weights of the given solid objects in

	A	Newtons by using a spring balance.
3	V - A	To study the different parts of a compound microscope with their uses.

EXPERIMENT UNDER GROUP "B" (10 MARKS)

Sr. No.	Expt. No.	EXPERIMENTS
1	I – B (1)	To find boiling Point of water.
2	I – B (2)	To find melting Point of ice.
3	IV - B	To find the loss of weight of an insoluble solid object in water and in kerosene separately.
4	V - B (1)	To mount and observe spirogyra cell under a compound microscope
5	V – B (2)	To mount and observe onion cell under a compound microscope

GRADE:9 SEMESTER 2
LIST OF EXPERIMENTS

EXPERIMENT UNDER GROUP "A" (5 MARKS)

Sr. No.		**Name of the Experiment**	
1	II A	To obtain clear water from muddy water by the method of filtration.	
2	IIIA	To separate common salt from sea water	
3		To separate a mixture of two immiscible liquids water and kerosene using a separating funnel.	Newly added
4		To separate a mixture of ammonium chloride (NH_4Cl) and common salt (NaCl) using the process of sublimation.	Newly added
5		To separate the different dyes present in black ink using the method of paper chromatography.	Newly added
6		To identify the different parts of the human ear and study their functions.	Newly added

EXPERIMENT UNDER GROUP "B" (10 MARKS)

Sr. No.		**Name of the Experiment**	
1	II B	To classify the given mixtures in to solution, suspension	

		and colloid by using the process of filtration and a beam of light	
2	IIIB	To obtain pure water from sea water/salt solution by distillation	
3		To observe and differentiate between physical changes and chemical changes.	Newly added
4		To determine the gravitational potential energy (PE) of stones at different heights and with different masses.	Newly added
5		To determine the frequency of a simple pendulum by measuring its time period.	Newly added
6		To verify laws of reflection of sound	Newly added

NOTE 1: General Instructions
- Duration of practical exam: 1 hour
- Marking scheme for each experiment is provided, but teachers/examiners may adjust it if not convenient.

NOTE 2: General Instructions
- Each student must perform a minimum of 8 experiments in each Semester.

EXPERIMENT UNDER GROUP "A" (5 MARKS)
EXPERIMENT NO. 3

Aim:To separate a mixture of two immiscible liquids—water and kerosene—using a separating funnel.

Materials Required: Separating funnel with stand, Beaker (2), Mixture of water and kerosene, Glass rod, Funnel, Dropper, Measuring cylinder

Procedure:

1.Take a clean, dry separating funnel and fix it to the iron stand.
2.Pour the mixture of water and kerosene into the separating funnel.
3.Allow the mixture to stand undisturbed for a few minutes so that two clear layers are formed.
Lower layer → Water
Upper layer → Kerosene
4.Place a beaker below the funnel.
5.Open the stopcock slowly and allow the lower layer (water) to flow out into the beaker.
6.Close the stopcock immediately when the kerosene layer reaches near the outlet.
7. Place another beaker and now collect the upper layer (kerosene).
8. Label both beakers.

Observation:

a) Two distinct layers are formed in the separating funnel, when the mixture is allowed to stand undisturbed for a few minutes.
b) The lower layer is water, and the upper layer is kerosene.
c) Water is collected first, followed by kerosene.

Inference:

1) Two immiscible liquids (Water and kerosene) are successfully separated

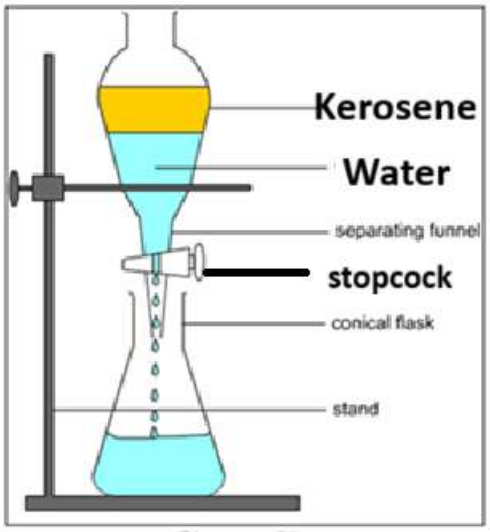
using a separating funnel.
2)The separation is based on the difference in density of the two immiscible liquids.
3)Water, being denser, collects at the bottom and is released first.

EXPERIMENT SLIP (for exam/practical test)

To separate two immiscible liquids, water and kerosene, using a separating funnel.
1.Pour the mixture into separating funnel.
2.Allow layers to form.
3.Release lower layer first.
4.Collect upper layer separately.
5. Record your observations.
6.Write the inference.

MARKING SCHEME:

Expt No.	**Name of the experiment**	**Evaluation points**	**Marks 5**
3	To separate two immiscible liquids, water and kerosene, using a separating funnel.	Writing Aim	1
		Arranging the apparatus	1
		Collecting water	$\frac{1}{2}$
		Collecting Kerosene	$\frac{1}{2}$
		Writing observations	1
		Writing Inference	1



EXPERIMENT UNDER GROUP "A" (5 MARKS)

EXPERIMENT NO: 4

Aim: To separate a mixture of ammonium chloride (NH_4Cl) and common salt (NaCl) using the process of sublimation.

Materials Required: Mixture of ammonium chloride and common salt, China dish, Inverted funnel
Cotton plug, Tripod stand, Wire gauze, Burner (spirit lamp/Bunsen burner), Tongs

Procedure:

1.Take the mixture of NH_4Cl and NaCl in a clean china dish.
2.Cover the china dish with an inverted funnel.
3.Plug the stem of the funnel using cotton to prevent loss of vapours.
4.Keep the china dish on a wire gauze placed over a tripod stand.
5.Heat the dish gently using a burner.
6.After some time, observe white vapours of ammonium chloride rising and depositing as white crystalline solid on the inner surface of the funnel.
7.Stop heating when no more vapours are seen.
8.Carefully remove the funnel and collect the sublimed NH_4Cl crystals by scratching gently.
9. The residue in the china dish is common salt.

Observation:
On heating, white vapours of ammonium chloride are seen.
Ammonium chloride is deposited as white crystals on the inner wall of the funnel.
Common salt remains unchanged in the china dish.

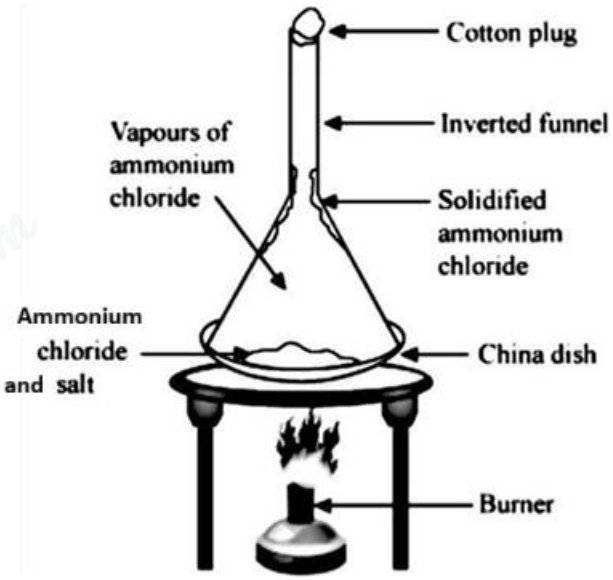
Inference:
The mixture is successfully separated by sublimation.
Ammonium chloride, being a sublimable solid, forms vapours and deposits on the inner wall of the funnel.
Common salt, being a non-sublimable solid, remains in the china dish.

EXPERIMENT SLIP (for exam/practical test)
To separate a mixture of ammonium chloride and common salt using sublimation.

Heat mixture NH_4Cl and NaCl in china dish covered with inverted funnel.
Collect both separately.
Record your Observation:
Write the inference

MARKING SCHEME:

Expt No.	**Name of the experiment**	**Evaluation points**	**Marks 5**
4	To separate a mixture of ammonium chloride and common salt using sublimation	Writing Aim	1
		Arranging and heating the apparatus	1
		Collecting Ammonium chloride	$\frac{1}{2}$
		Collecting common salt	$\frac{1}{2}$
		Writing observations	1
		Writing inference	1



EXPERIMENT UNDER GROUP "A" (5 MARKS)
Expt. No. 5
Aim: To separate the different dyes present in black ink using the method of paper chromatography.
Materials Required: Chromatography paper / filter paper, Black ink (preferably water-soluble), Glass jar or beaker, Pencil, Scale, Thread or glass rod, Water (as solvent), Dropper,

Clip/tape.

Procedure:

1.Take a strip of filter paper about 15–20 cm long.
2. Draw a pencil line about 2 cm above the bottom end of the paper.
3. Put a small drop of black ink on the pencil line and let it dry.
4. Pour a small amount of water into a beaker (about 1–2 cm deep).
5. Suspend the filter paper in the beaker so that the bottom of the paper just touches the water but the ink spot does not dip into the water directly.
6. Ensure the paper is hanging vertically and is not touching the walls of the beaker.
7. Allow the water (solvent) to rise slowly by capillary action.
8. Observe the ink separating into different coloured bands as the water rises.
9. Remove the paper when the solvent has risen sufficiently.
10. Let the paper dry.

Observation:

1. The water rises up the filter paper by capillary action.
2. The black ink separates into two or more distinct coloured bands such as blue, red, green, Yellow, etc.
3. Different dyes move at different speeds depending on its solubility in water and thus separate along the paper.

Inference:

1. Black ink is a mixture of different coloured dyes.
2. In chromatography, the more soluble dye travels farther, while the less soluble dye travels shorter distance.
3. Hence, chromatography helps to separate mixtures of substances that are soluble in the same solvent.

Experiment Slip (For Test/Exam)

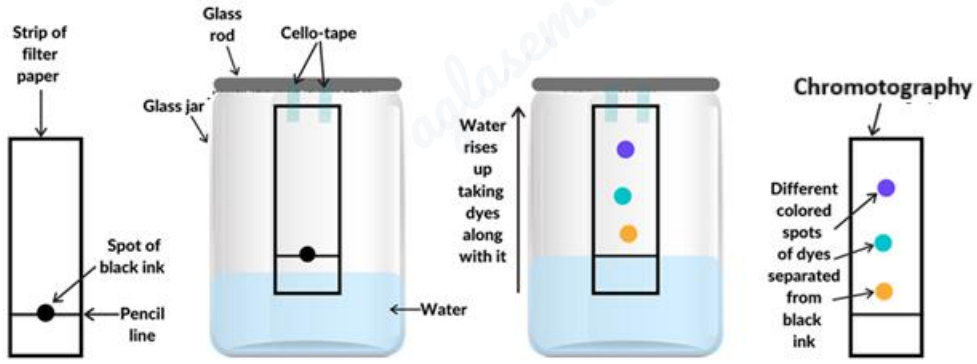
Experiment: Separation of dyes in black ink using paper chromatography.

1.Take a strip of filter paper about 15–20 cm long.
2. Draw a pencil line about 2 cm above the bottom end of the paper.
3. Put a small drop of black ink on the pencil line and let it dry.
4. Pour a small amount of water into a beaker (about 1–2 cm deep).
5. Suspend the filter paper in the beaker so that the bottom of the paper just touches the water but the ink spot does not dip into the water directly.
6. Ensure the paper is hanging vertically and is not touching the walls of the beaker.
7. Allow the water to rise slowly.
8. Remove the paper when the solvent has risen sufficiently.
9. Let the paper dry.
10. Write your observation and conclusion.

MARKING SCHEME:

EXPT No	Name of the experiment	Evaluation points	Marks 5
5	Separation of dyes in black ink using paper chromatography	Writing Aim	1

		a)Putting a small drop of black ink on the pencil line and let it dry. b) b) Suspending the filter paper in the beaker so that the bottom of the paper just touches the water	1
		Showing the ink separating into different coloured bands as the water rises	1
		Writing observations	1
		Writing inference	1



EXPERIMENT UNDER GROUP "A" (5 MARKS)

Expt. No.: 6

Aim: To identify the different parts of the human ear and study their functions.

Material required:- Model of the human ear

Procedure:

1. Observe the Model of the human ear.
2. Identify the different parts of the human ear marked as A, B, C, D, and E.
3. Study the functions of each part and note them down.

Observations:

The different parts of the human ear and their functions are:

Part	Name of the Part	Function
A	Pinna	Collects sound

B	Auditory canal	Allows the sound waves to pass through and reach the eardrum.
C	Eardrum	produces vibrations when sound waves hit it
D	Cochlea	converts vibrations into electrical nerve impulses.
E	Auditory Nerve –	carries electrical signals to the brain for interpretations

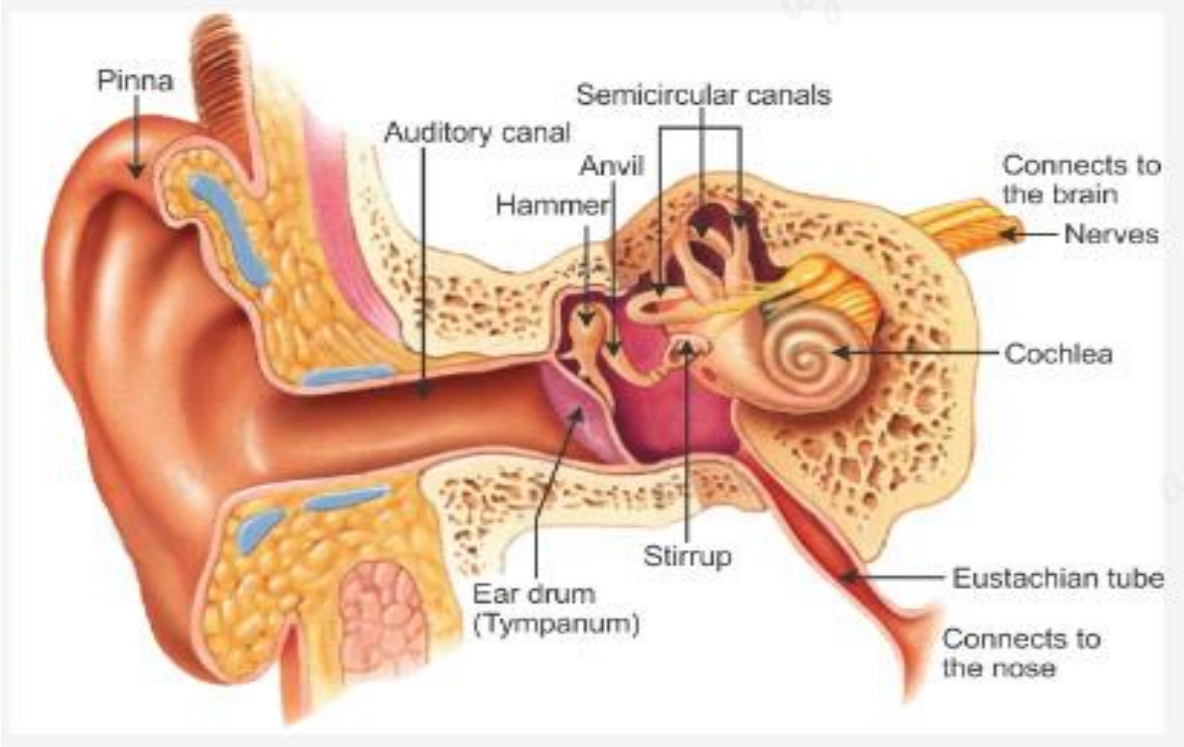
EXPERIMENT SLIP(for exam/practical test)

- Observe the Model of the human ear.
- Identify the different parts of the human ear as A, B, C, D, and E. (Write ANY TWO)
- Write the functions of each part.
- Draw a neat labelled diagram.

Part	Name of the Part	Function
A		
B		

MARKING SCHEME:

Expt. No.	Name of the experiment	Evaluation points	Marks 5
6	Human Ear	Writing Aim	1
		Naming Any Two parts	1
		Writing function of the identified parts	1
		Drawing and labelling human ear	2



EXPERIMENT UNDER GROUP "B" (10 MARKS)
EXPT. No.: 3
AIM: To observe and differentiate between physical changes and chemical changes.
Materials Required: Ice cubes, Beaker, Salt, Water, Glass tumbler, Zinc granules, Dilute sulphuric acid (H_2SO_4), Test tube, Delivery tube (optional), Burning splint (optional for hydrogen test), Magnesium ribbon, Sandpaper, Burner or matchbox, Tongs, etc.
Procedure:
A. 1. Take ice cubes in a beaker.
2. Allow it to stand at room temperature.
3. Observe the conversion .
B. 1. Take a glass of water.
2. Add a spoon of salt.
3. Stir the solution until the salt dissolves completely.
4. observe the salt.
C. 1. Take a few zinc granules in a test tube.
2. Add dilute sulphuric acid to it.
3. Observe the formation of bubbles and effervescence.
4. Bring a burning splint near the mouth of the test tube and observe.
D. 1. Clean the magnesium ribbon with sandpaper.
2. Hold it with tongs and ignite it.
3. Observe the reaction.

Observation:

S.No	Activity	Type of Change	Observation	New Substance Formed?	Reversible?
1	Melting of ice	Physical	Ice → water	No	Yes
2	Dissolving salt	Physical	Salt disappears	No	Yes

	in water		in water		
3	Zinc + dilute sulphuric acid	Chemical	Effervescence, hydrogen gas released	Yes	No
4	Burning of magnesium ribbon	Chemical	Bright flame, white ash formed	Yes	No

Inference:

1.Physical changes are temporary changes in which no new substance is formed and the changes are usually reversible.

2.Chemical changes result in the formation of new substances and are usually irreversible.

3.Therefore, melting of ice and dissolving salt in water are physical changes; zinc reacting with dilute sulphuric acid and burning of magnesium ribbon are chemical changes.

NOTE: Alternative chemicals may be used such as:

- Copper Suphate and Iron
- Sodium Sulphate and Barium Chloride
- Zinc and Copper Sulphate
- Copper Sulphate and Sodium Hydroxide

Experiment Slip (For Test/Exam)

Experiment: To observe and differentiate between physical and chemical changes.

A. 1. Take ice cubes in a beaker.
   2. Allow it to stand at room temperature.
   3. Observe the conversion .

B. 1. Take a glass of water.
   2. Add a spoon of salt.
   3. Stir the solution until the salt dissolves completely.
   4. observe the salt.

C. 1. Take a few zinc granules in a test tube.
   2. Add dilute sulphuric acid to it.
   3. Observe the formation of bubbles and effervescence.
   4. Bring a burning splint near the mouth of the test tube and observe.

D. 1. Clean the magnesium ribbon with sandpaper.
   2. Hold it with tongs and ignite it.
   3. Observe the reaction.

Write your observations and Inference

Observation:

S.No	Activity	Type of Change	Observation	New Substance Formed?	Reversible?
1	Melting of ice				
2	Dissolving salt in water				
3	Zinc + dilute sulphuric acid				
4	Burning of				

	magnesium ribbon				

MARKING SCHEME

Expt No.	Name of the experiment	Evaluation points	Marks (10)
3	To observe and differentiate between physical and chemical changes.	Writing Aim	1
		Performing four tests	4
		Writing observations	4
		Writing inference	1

EXPERIMENT UNDER GROUP "B" (10 MARKS)
EXPT NO.: 4
AIM: To determine the gravitational potential energy (PE) of stones at different heights and with different masses.
MATERIALS REQUIRED: Three stones of different masses (Stone A, Stone B, Stone C), Measuring scale or meter ruler, Spring balance / electronic balance (to measure mass), A table or stand for height measurements, Notebook and pen, etc.
PROCEDURE:
Part A: For the same stone at three different heights

1. Measure and record the mass of the stone.
2. Select three heights, for example: H_1=2m, H_2= 4m, and H_3= 6m.
3. Place Stone A at height $H_1$and calculate PE using $PE = mgh$.(g=10 m/s^2)
4. Repeat the same for heights H_2 and H_3.
5. Record all observations in the table.

Part B: For three stones of different masses at the same height

1. Select a fixed height, for example: Height = 2m
2. Measure the masses of stones: A, B, and C.
3. Place each stone at height 2.0 m and calculate PE using $PE = mgh$. (g=10 m/s^2)
4. Record all observations in the table.

Observation Table (PART A): For the same stone at three different heights.
Mass of the stone = _____Kg (grams to be converted in to Kg)
The value of 'g'=10 m/s^2

Sr. No.	Height in (m)	PE = mgh Joules
1		
2		
3		

Observation Table (PART B): For three stones of different masses at the same height.
Height = 2 m.
The value of 'g'=10 m/s^2

Sr. No.	Mass in Kg (grams to be converted in to Kg)	PE = mgh Joules
1		
2		
3		

Observation:
1.For the same stone, PE increases as height increases.
2. For the same height, stones with greater mass have greater PE.
3.Thus, gravitational potential energy depends directly on both mass and height,

INFERENCE:
1. PE ∝ mass of the object
2. PE ∝ height above the ground

Experiment Slip (For Test/Exam)
Experiment: To determine the gravitational potential energy (PE) of stones at different heights and with different masses.
Part A: For the same stone at three different heights

6. Measure and record the mass of the stone.
7. Select three heights, for example: H_1=2m, H_2= 4m, and H_3= 6m.
8. Place Stone A at height $H_1$and calculate PE using $PE = mgh$.(g=10 m/s^2)
9. Repeat the same for heights H_2 and H_3.
10. Write your observation and the inference.

Part B: For three stones of different masses at the same height

2. Select a fixed height, for example: Height = 2m
2. Measure the masses of stones: A, B, and C.
3. Place each stone at height 2.0 m and calculate PE using $PE = mgh$. (g=10 m/s^2)
4. Write your observations and the inference.

Observation Table (PART A): For the same stone at three different heights.
Mass of the stone = _____Kg (grams to be converted in to Kg)
The value of 'g'=10 m/s^2

Sr. No.	Height in (m)	PE = mgh Joules
1		
2		
3		

Observation Table (PART B): For three stones of different masses at the same height.
Height = 2 m.
The value of 'g'=10 m/s^2

Sr.	Mass in Kg	PE = mgh Joules

No.	(grams to be converted in to Kg)	
1		
2		
3		

MARKING SCHEME

Expt No.	**Name of the experiment**	**Evaluation points**	**Marks (10)**
4	To determine the gravitational potential energy (PE) of stones at different heights and with different masses.	Writing Aim	1
		Arranging the setup and completing observation table with the right readings (PART A)	3
		Arranging the setup and completing observation table with the right readings (PART B)	3
		Writing observations	2
		Writing Inference	1

EXPERIMENT UNDER GROUP "B" (10 MARKS)

Experiment No.: 5

Aim: To determine the frequency of a simple pendulum by measuring its time period.

Materials Required: A bob (small metallic ball), A strong, light, inextensible thread, Stand with clamp, Stopwatch, Meter scale, Protractor (optional)

Procedure:

1. Fix a small metallic bob to one end of a thread about 60–80 cm long.
2. Tie the other end of the thread to a rigid support so that the bob hangs freely.
3. Measure the **length of the pendulum** from the point of suspension to the centre of the bob.
4. Displace the bob slightly (less than 15°) and release it gently so that it

oscillates freely.
5. Start the stopwatch when the bob crosses the mean position.
6. Count **20 complete oscillations** and stop the stopwatch when it again crosses the mean position the 20th time.
7. Note the time taken (t) for 20 oscillations.
8. Repeat the experiment 2–3 times for accuracy.
9. Calculate the **time period**:

$$T = \frac{t}{20}$$

10. Calculate the **frequency** using:

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

Observation Table:

Sr. No.	Length of Pendulum (L) (cm)	Time for 20 Oscillations (t) in s	Time Period T = t/20 (s)	Frequency f = 1/T (Hz)
1	60 cm	28 s	1.4 s	0.71 Hz
2	60 cm	29 s	1.45 s	0.69 Hz
3	60 cm	28.5 s	1.425 s	0.70 Hz

(Values are sample data—you may replace them with your actual readings.)

Observation:
1. The time period for a pendulum of fixed length remains nearly constant for small amplitudes.
2. The frequency is found by taking the reciprocal of the time period.

Inference :
1.The frequency of the simple pendulum is found to be approximately 0.70 Hz (example value).
2. This means the pendulum makes about 0.70 oscillations per second. (Mean Value)
3. The experiment verifies that frequency is the reciprocal of time period.

Experiment Slip (For Test/Exam)

Experiment: To determine the frequency of a simple pendulum by measuring its time period.
1. Fix a small metallic bob to one end of a thread about 60–80 cm long.
2. Tie the other end of the thread to a rigid support so that the bob hangs freely.
3. Measure the length of the pendulum from the point of suspension to the centre of the bob.
4. Displace the bob slightly (less than 15°) and release it gently so that it oscillates freely.
5. Start the stopwatch when the bob crosses the mean position.
6. Count 20 complete oscillations and stop the stopwatch when it again crosses the mean position the 20th time.
7. Note the time taken (t) for 20 oscillations.
8. Repeat the experiment 2–3 times for accuracy.
9. Calculate the time period.
10. Calculate the frequency.
11. Write your observation and inference

Observation Table:

Sr. No.	Length of Pendulum (L) (cm)	Time for 20 Oscillations (t) in s	Time Period T = t/20 (s)	Frequency f = 1/T (Hz)
1				
2				
3				

MARKING SCHEME

Expt No.	**Name of the experiment**	**Evaluation points**	**Marks (10)**
5	To determine the frequency of a simple pendulum by measuring its time period..	Writing Aim	1
		Arranging the setup and completing observation table with the right readings	6
		Writing observations	1
		Writing Inference	2

EXPERIMENT UNDER GROUP "B" (10 MARKS)

Expt. No. : 6

Aim: To verify laws of reflection of sound.

Materials Required: Two plastic tubes/paper tubes (hollow cylinders), A large smooth hard board or wall, Protractor, Stopwatch/mobile/A friend/helper (one to speak, one to listen)

Procedure:

1. Place a large smooth hard board vertically on the table.
2. Take two hollow tubes of equal length.

Note: In this experiment, very low-amplitude sound waves are heard so peaceful atmosphere is important. Put off fan to hear the sound clearly. Using a pencil, draw a Normal (perpendicular line) on the table, normal to the smooth wall surface. Draw a line OC making an ∠i (say 30°) with the Normal line.)

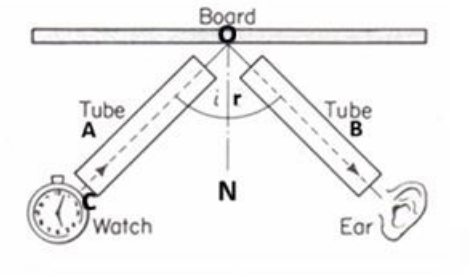
3. Place one tube (Tube A) on one side of the board at an angle. (Say 30º)
4. Place the other tube (Tube B) on the opposite side of the board at the same angle but making a "V" shape so that both tubes face the board.
5. Adjust the angles so the sound from Tube A can reflect from the board and travel into Tube B.
6. Ask a student to speak softly into Tube A/ use stopwatch/mobile.

7. Ask another student to keep an ear near Tube B and listen.
8. If needed, adjust the angles until the sound is heard clearly through Tube B.
9. Record the observation

Observations:
1. When sound is produced in Tube A, it strikes the hard board and gets reflected.
2.The listener at Tube B can clearly hear the sound after adjusting the tubes to equal angles.
3. The clearest sound is heard when the angle of incidence equals the angle of reflection.

Sr. No.	Angle of incidence (in degree)	Angle of Refection (in degree)
1	30º	
2	45º	

Inference :
1. Sound reflects from a smooth surface.
2. It obeys the laws of reflection:
    - The angle of incidence = angle of reflection
    - The incident sound, reflected sound, and the normal lie in the same plane



Experiment Slip (For Test/Exam)
To verify laws of reflection of sound.
1. Place a large hard board vertically on the table.
2. Take two hollow tubes of equal length.
3. Place one tube (Tube A) on one side of the board at an angle.(Say 30º)
4. Place the other tube (Tube B) on the opposite side of the board at the same angle but making a "V" shape so that both tubes face the board.
5. Adjust the angles so the sound from Tube A can reflect from the board and travel into Tube B.
6. Ask a student to speak softly into Tube A/ use stopwatch/mobile.
7. Ask another student to keep an ear near Tube B and listen.
8. If needed, adjust the angles until the sound is heard clearly through Tube B.
9. Record the observation and inference.

Sr. No.	Angle of incidence (in degree)	Angle of Refection (in degree)
1		
2		

MARKING SCHEME:

Expt. No.	Name of the experiment	Evaluation points	Marks 10
6	To verify laws of reflection of sound.	Writing Aim	1
		proper arrangement of pipes	1
		Writing angle of reflection	2
		Writing observations	2
		Writing inference	2
		Draw a labelled diagram to show the reflection of sound from a plane surface. Mark the incident ray, reflected ray, normal, angle of incidence, and angle of reflection.	2