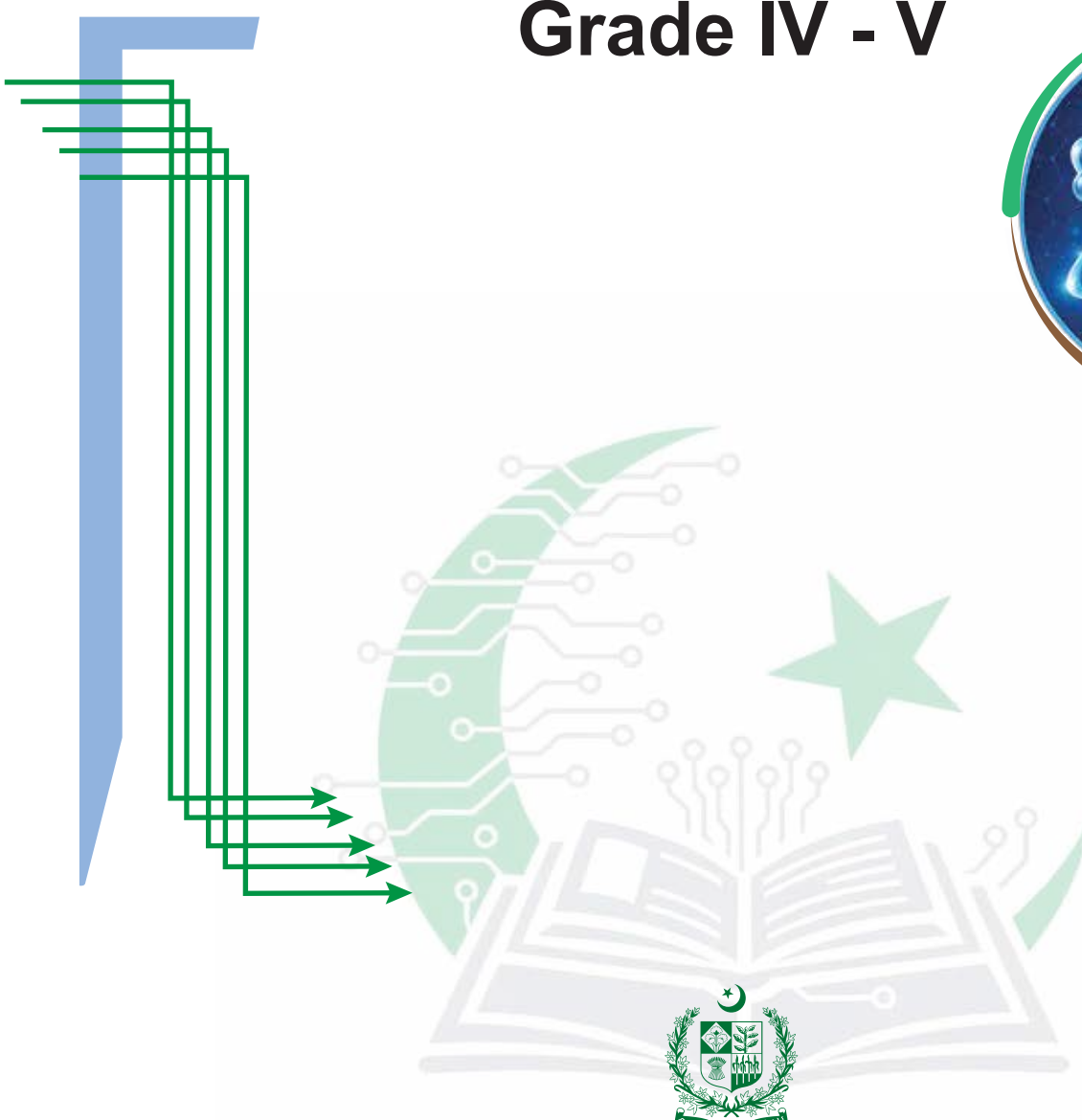


**New National Curriculum of Pakistan 2026
(NNCP)**

SCIENCE

Grade IV - V



**GOVERNMENT OF PAKISTAN
NATIONAL CURRICULUM COUNCIL WING
MINISTRY OF FEDERAL EDUCATION & PROFESSIONAL TRAINING**

New National Curriculum of Pakistan 2026
(NNCP)

SCIENCE

Grade IV - V



NATIONAL CURRICULUM COUNCIL WING
MINISTRY OF FEDERAL EDUCATION AND
PROFESSIONAL TRAINING, ISLAMABAD
GOVERNMENT OF PAKISTAN

Acknowledgement

The National Curriculum Council Wing, Ministry of Federal Education and Professional Training, presents the New National Curriculum of Pakistan (NNCP) 2026 for Science Grades I–V. This significant initiative reflects our collective commitment to enhancing the quality, relevance, and inclusivity of education in Pakistan. It marks a purposeful shift from heavy and complex content towards conceptual understanding, scientific inquiry, critical thinking, problem-solving and the practical application of scientific knowledge. Structured around three interconnected strands—Life Science, Physical Science, and Earth and Space Science—it establishes a progressive learning pathway through clearly defined standards, benchmarks and Student Learning Outcomes (SLOs). Particular emphasis has been placed on observation, experimentation, evidence-based reasoning, hands-on learning, STEAM integration and real-life applications to make science education meaningful, engaging and accessible to all learners.

The successful implementation of this curriculum requires a corresponding transformation in classroom practices, instructional resources, teacher preparation, and assessment approaches. Through sustained institutional coordination and stakeholder engagement, the National Curriculum Council Wing remains committed to facilitating a coherent transition from curriculum development to effective classroom implementation, with the ultimate objective of improving learning outcomes and fostering lifelong learning.

The National Curriculum Council Wing extends its sincere gratitude for the valuable guidance and continued support of the leadership of the Ministry of Federal Education and Professional Training, the Technical Committee, and our collaborating institutions, subject specialists, curriculum developers, provincial and regional representatives, practicing teachers, academic experts, and partner institutions whose expertise, dedication, and constructive feedback have been instrumental in shaping this document. It is hoped that this curriculum will serve as a meaningful foundation for strengthening scientific literacy while nurturing curiosity, confidence, scientific reasoning and analytical abilities, enabling our young learners to become independent thinkers, creative problem-solvers and responsible citizens capable of meeting the challenges of an increasingly complex world, thereby contributing to a more equitable, progressive, and knowledge-driven Pakistan.

Dr. Tabassum Naz

Director

National Curriculum Council Wing

Ministry of Federal Education and Professional Training

Government of Pakistan

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Chapter 1

Introduction and Curriculum Framework

1.1 Vision & Purpose

The New National Curriculum 2026 for science aims to develop scientifically literate, curious, responsible and confident learners who are able to understand the natural and physical world through observation, inquiry, investigation, evidence-based reasoning and application.

Science learning from Grades I-V should establish a coherent developmental pathway from familiar, concrete and directly observable experiences towards increasingly connected explanations of living systems, matter and energy, Earth and space, and their relationship with everyday life. The curriculum therefore places particular emphasis on:

- conceptual progression and continuity;
- scientific inquiry as a core approach to learning science;
- learning through practical experience and investigation;
- evidence-based explanation and communication;
- purposeful STEAM integration;
- problem-solving and design;
- application of science to everyday life;
- local relevance and resourcefulness; and
- health, safety, sustainability and environmental responsibility.

1.2 Objectives

- i) Develop foundational scientific understanding through a coherent progression from concrete experiences towards relationships, systems, patterns and cause-and-effect explanations.
- ii) Develop scientific inquiry progressively through questioning, predicting, observing, investigating, measuring, recording, analysing and interpreting evidence, explaining, evaluating and communicating findings.
- iii) Use evidence obtained from observations and investigations to construct age-appropriate scientific explanations and make informed decisions.
- iv) Apply scientific knowledge and skills to health, safety, daily life, the local environment, conservation and responsible use of natural resources.
- v) Participate in practical, age-appropriate and low-cost investigations using locally available materials.
- vi) Connect science meaningfully with mathematics, technology, engineering/design and creative thinking through STEAM-based investigation, designing, constructing, testing, improving and problem-solving.
- vii) Develop collaboration, communication, creativity, critical thinking, problem-solving and responsible decision-making.

- viii) Build the conceptual knowledge and scientific practices required for successful progression to subsequent stages of science education.

1.3 Guiding Framework

The Science Curriculum for Grades IV–V is based on interlinked components that determine how scientific knowledge, skills, inquiry, attitudes and applications are progressively developed, taught and assessed.

Curriculum Structure

The curriculum is organized into three interconnected domains: Life Science, Physical Science, and Earth & Space Science. Each domain progresses systematically across Grades IV and V through clearly defined Strands, Standards, Benchmarks and Student Learning Outcomes (SLOs). Grade-wise SLOs translate the benchmarks into measurable and classroom-ready learning outcomes, ensuring continuity, progression and appropriate cognitive demand. Connections across the three domains are encouraged so that learners develop an integrated understanding of science rather than viewing scientific concepts in isolation.

Scientific Inquiry and Investigation

Scientific inquiry is a core approach to learning science. Learners progressively develop the ability to ask questions, make predictions, observe, investigate, measure, classify, record data, interpret evidence, draw conclusions, explain findings and communicate results. Inquiry should move from guided investigations toward increasingly independent exploration, using safe, simple and locally available materials wherever possible. Emphasis is placed on evidence-based reasoning and learning science through direct observation and investigation rather than memorization alone.

STEAM Integration

Science learning is connected with Technology, Engineering, Arts and Mathematics (STEAM) through purposeful opportunities for investigation, designing, constructing, testing, improving and problem-solving. Learners should apply scientific concepts to age-appropriate real-life challenges, use measurements and data, develop simple models and designs, and employ appropriate digital tools where available. STEAM activities should remain feasible within the diverse resource contexts of Pakistani schools.

Bloom's Taxonomy

SLOs are aligned with appropriate levels of Bloom's Taxonomy, progressing from remembering and understanding towards applying, analyzing, evaluating and creating. The cognitive demand increases appropriately across Grades IV–V. Teaching and assessment should therefore measure not only recall of scientific facts but also conceptual understanding, application, investigation, interpretation of evidence, reasoning and problem-solving.

Table 1: Bloom's Taxonomy / Guiding Principles

Guiding Principle	Application to Science Education
Developmental progression	Learning progresses from familiar, concrete and observable phenomena towards increasingly abstract relationships, mechanisms, systems and cause-and-effect explanations.
Scientific inquiry as a core approach	Scientific inquiry is embedded across teaching, learning and assessment. Learners progressively ask questions, make predictions, observe, investigate, measure, record, interpret evidence, explain results and communicate findings.
Learning through investigation	Learners construct understanding through direct observation, practical investigation, exploration, modelling and evidence rather than relying primarily on factual recall.
Evidence-based reasoning	Learners support descriptions, conclusions and explanations with observations, measurements, patterns and other relevant evidence.
Vertical coherence	Concepts and scientific practices build systematically on prior learning, with progressively increasing conceptual and cognitive demand across grades.
Learning through doing	Safe, age-appropriate and low-cost practical experiences, models, investigations, demonstrations, designing and construction are integral to science learning.
STEAM integration	Science is purposefully connected with mathematics, technology, engineering/design and creative thinking through investigation, measurement, designing, constructing, testing, improving and problem-solving.
Problem-solving and design	Learners apply scientific understanding to analyse simple problems, generate solutions, construct models or products, test ideas and suggest improvements.
Local relevance and application	Learning begins with the learner's body, home, school, community and local environment and progressively extends towards wider scientific contexts.
Safety, health and environmental responsibility	Healthy habits, hygiene, activity safety, natural-hazard awareness, care for living things and responsible use of resources are integrated throughout the curriculum.
Scientific language and communication	Learners progressively develop scientific vocabulary and communicate observations, procedures, evidence, explanations, diagrams, tables, models and conclusions appropriately.
Equity and resourcefulness	Learning experiences remain achievable in diverse Pakistani contexts through locally available, reusable and low-cost materials and inclusive teaching practices.

1.4 Cross-Cutting Themes

Table 2: Cross-Cutting Themes

Scientific inquiry and evidence	Health, hygiene and wellbeing
Environmental awareness and stewardship	Sustainability and responsible resource use
Safety and risk awareness	Systems and interdependence
Problem-solving and engineering/design	Digital and technological literacy
Creativity and innovation	Collaboration and communication
Values and ethics of care	Socio-emotional development and responsible citizenship

1.5 Summary of International Comparison

Science curriculum of UK, Australia, Malaysia, Turkey, India were consulted for a comparative review of the Pakistani science curriculum with focus on content, methodology and approach (see Annex I). The comparative review was used as an evidence base for strengthening coherence, progression and classroom relevance. It supported decisions about how scientific understanding and practices should develop across grades, how learners should engage with evidence and practical work, and how curriculum expectations can remain rigorous while being achievable within Pakistan's educational context.

- Clearer progression: concepts and scientific practices should develop systematically from grade to grade, with increasing cognitive and conceptual demand.
- Scientific inquiry: questioning, predicting, observing, investigating, measuring, recording, interpreting evidence, explaining and communicating should be visible across teaching, learning and assessment.
- Learning through doing: age-appropriate practical work, investigation, modelling, designing and constructing should support conceptual understanding rather than operate as isolated activities.
- Conceptual depth and application: curriculum emphasis should move beyond recall towards explanation, evidence use, problem-solving, application and reasoned decision-making.
- STEAM and engineering/design opportunities: science may connect purposefully with mathematics, technology, engineering/design and creative thinking where these connections strengthen scientific learning.
- Local relevance and feasibility: learning should be anchored in familiar Pakistani contexts, locally available materials, environmental conditions, resources, safety needs and everyday experiences.
- Assessment alignment: assessment should reflect the intended balance of knowledge, understanding, application, analysis, evaluation and creation, rather than encourage factual recall alone.

1.6 Framework Emphasis

The central priority of primary science education is not simply to expand the number of topics taught. The emphasis is to strengthen the progression, depth and application of carefully selected scientific concepts.

New National Curriculum 2026 - Science Framework

Conceptual Progression + Scientific Inquiry + Evidence + Application + STEAM+
Engineering Design + Problem-Solving + Assessment Alignment + Local Relevance

These elements should operate as interconnected features of the curriculum and should be visible across standards, benchmarks, Student Learning Outcomes (SLOs), pedagogy, assessment, textbooks and teacher support materials.



Chapter 2

Strands, Standards and Benchmarks

Science in Grades IV and V is organized into three interrelated strands: Life Science, Physical Science, and Earth and Space Science. Together, these strands develop scientific understanding, inquiry, problem solving, evidence-based reasoning and responsible decision-making. The content is contextualized for Pakistan's diverse geographic and cultural settings, including homes, schools, farms, canals, plains, deserts, mountains, wetlands and coastal environments. Local foods, materials, energy resources, seasonal weather and natural hazards are used to make learning relevant and achievable with limited resources. Progression moves from identification, description and classification in Grade IV towards interpretation, investigation, analysis, evaluation and design in Grade V. Cross-cutting values include cleanliness, moderation, cooperation, respect for life, safe practices, responsible use of resources and care for shared environments.

2.1 Strands

Strand 1: Life Science

Description:

Life Science develops understanding of health, living organisms, life cycles, ecosystems, adaptation and environmental responsibility. It connects scientific knowledge with the daily lives of learners in Pakistani homes, schools, farms and communities.

Rationale and Contribution:

This strand supports healthy living, respect for life and informed care of local environments. It enables learners to understand how organisms depend on one another and how responsible human actions contribute to personal and community well being.

Major Concepts, Knowledge, Skills and Competencies:

Health, hygiene, safe water, locally available foods, plant and animal life cycles, producers, consumers, decomposers, food chains, food webs, adaptations and conservation.

Relationship with Other Strands:

Life Science connects with Physical Science through energy flow and materials, and with Earth and Space Science through climate, water, habitats, natural resources and environmental change.

Table 3: Strand 1 / Life Science / Sub-Strand

Sub-Strand	Brief Description
Health, Hygiene and Nutrition	Cleanliness, germs, safe drinking water, balanced diets based on locally available foods, moderation and responsible daily habits.
Growth and Life Cycles	Observable stages in the life cycles of familiar local plants and animals.

34Ecosystems and Food Relationships	Producers, consumers, decomposers, food chains, food webs and interdependence in fields, gardens, canals, ponds and other local ecosystems.
Adaptation and Environmental Care	Adaptations of organisms in deserts, plains, mountains, wetlands and coastal areas; protection of living things and shared spaces.

Strand 2: Physical Science

Description:

Physical Science develops understanding of matter, energy, forces, motion, heat, light, sound, magnetism, electricity, mixtures and changes through observation and practical experience.

Rationale and Contribution:

This strand enables learners to explain everyday phenomena, use materials safely and solve simple problems using evidence. Examples are drawn from Pakistani homes, schools, transport, sports, crafts and community life.

Major Concepts, Knowledge, Skills and Competencies:

States and properties of matter, reversible and irreversible changes, conductors and insulators, force and motion, friction, gravity, magnetism, static electricity, simple circuits, mixtures, solutions and separation methods.

Relationship with Other Strands:

Physical Science supports Life Science through energy and material interactions and supports Earth and Space Science through energy resources, heat, water, weather instruments and technology.

Table 4: Strand 2 / Physical Science / Sub-Strand

Sub-Strand	Brief Description
Matter, Properties and Changes	Solids, liquids and gases; material properties; reversible and irreversible changes in familiar household and seasonal contexts.
Energy in Everyday Life	Effects and uses of heat, light and sound in homes, schools and communities.
Forces, Motion and Magnetism	Pushes and pulls, motion, friction, gravity, magnetic effects and simple investigations using familiar objects.
Electricity, Mixtures and Separation	Low-voltage circuits and safety; mixtures, solutions, filtration, sieving and evaporation using accessible materials.

Strand 3: Earth and Space Science

Description:

Earth and Space Science develops understanding of the Solar System, Earth-Sun-Moon relationships, water cycle, soil, weather, climate, energy resources, environmental change and natural hazards.

Rationale and Contribution:

This strand helps learners interpret Pakistan's diverse environments and seasonal patterns and make responsible decisions about water, soil, energy, safety and community preparedness.

Major Concepts, Knowledge, Skills and Competencies:

Solar System and planetary order, Earth and Moon movements, seasons and eclipses, water cycle, renewable and non-renewable resources, soil erosion, weather and climate, floods, droughts, heatwaves and earthquakes.

Relationship with Other Strands:

The strand connects with Life Science through habitats and environmental sustainability and with Physical Science through energy, heat, light, water movement and observation technologies.

Table 5: Strand 3 / Earth and Space Science / Sub-Strand

Sub-Strand	Brief Description
Earth in Space	Solar System, planetary order and orbits, Earth's movements, seasons, eclipses, Moon orbit and safe observation.
Water, Soil and Resources	Water cycle, rivers and canals, renewable and non-renewable energy resources, soil erosion and conservation.
Weather and Climate	Local weather observations and climate patterns of plains, coast, deserts and northern mountains.
Natural Hazards and Stewardship	Flood, drought, heatwave and earthquake safety; environmental responsibility, resource conservation and community cooperation.

2.2 Standards

The following standards describe broad learning expectations across Grades IV and V and provide the basis for grade-wise benchmarks and Student Learning Outcomes.

Table 6: Standards describe broad learning expectations across Grades IV and V

Strand	Standard
Life Science	Learners understand health, growth and life cycles of organisms, energy relationships in ecosystems, adaptations and environmental responsibility, and apply this understanding to healthy living and care of Pakistan's local environments.

Physical Science	Learners understand matter, energy, forces, motion, electricity and magnetism through observation and investigation, and apply this knowledge safely to familiar materials, devices and problems.
Earth and Space Science	Learners understand Earth's place in space, natural cycles, resources, weather, climate, environmental change and hazards, and use this understanding to support conservation, safety and responsible community action.

2.3 Benchmarks

Benchmarks indicate the expected learning by the end of each grade and demonstrate progression towards the standards. They consolidate the approved Pakistan-contextualised SLOs and Bloom's cognitive distribution.

Table 7: Standard / Benchmarks Grade IV-V

Strand: Life Science		
STANDARD	GRADE IV BENCHMARKS	GRADE V BENCHMARKS
Learners understand health, growth and life cycles of organisms, energy relationships in ecosystems, adaptations and environmental responsibility, and apply this understanding to healthy living and care of Pakistan's local environments.	<ol style="list-style-type: none"> 1. Explain how hygiene, safe water and balanced local foods support health. 2. Describe and compare life cycles of familiar local plants and animals. 3. Construct a food chain showing producers, consumers and decomposers in a local habitat. 4. Classify common foods and demonstrate healthy and hygienic practices. 5. Evaluate a daily routine using cleanliness, moderation and responsibility as criteria. 	<ol style="list-style-type: none"> 1. Explain adaptations of organisms in Pakistan's deserts, plains, mountains, wetlands or coastal areas. 2. Construct and interpret a simple food web from a local ecosystem. 3. Analyse interdependence and predict the effect of removing an organism. 4. Identify environmental factors that affect local organisms. 5. Develop a practical plan for protecting organisms and caring for shared community spaces.
Strand: Physical Science		
STANDARD	GRADE IV BENCHMARKS	GRADE V BENCHMARKS
Learners understand matter, energy, forces, motion, electricity and magnetism through observation and investigation, and apply this knowledge safely to familiar materials, devices and problems.	<ol style="list-style-type: none"> 1. Explain effects of heat, light, sound and force in everyday Pakistani contexts. 2. Classify local materials as solids, liquids or gases and as likely conductors or insulators. 3. Differentiate reversible and irreversible changes using household examples. 4. Investigate how force changes motion using familiar objects. 5. Evaluate materials and justify safe choices for handling hot objects. 	<ol style="list-style-type: none"> 1. Explain friction, gravity and magnetism through bicycles, cricket, handcarts and household objects. 2. Construct a safe low-voltage circuit using a dry cell, bulb and wires. 3. Differentiate mixtures and solutions and select filtration, sieving or evaporation. 4. Evaluate a simple circuit or separation procedure and justify improvements. 5. Design and test a useful low-cost

device involving magnetism, friction or separation.

Strand: Earth and Space Science

STANDARD	GRADE IV BENCHMARKS	GRADE V BENCHMARKS
Learners understand Earth's place in space, natural cycles, resources, weather, climate, environmental change and hazards, and use this understanding to support conservation, safety and responsible community action.	<ol style="list-style-type: none"> 1. Identify the Sun and planets in correct order and explain planetary orbits. 2. Explain the water cycle and relate it to rain, rivers, canals and farms. 3. Classify energy resources used in Pakistan as renewable or non-renewable. 4. Analyse soil erosion on hill slopes, riverbanks, farms or overgrazed land. 5. Construct a model or community plan for the Solar System, water cycle or soil conservation. 	<ol style="list-style-type: none"> 1. Explain seasons, eclipses and the Moon's orbit using simple models. 2. Differentiate weather and climate using examples from Pakistan's regions. 3. Record, present and analyse local weather observations. 4. Demonstrate safety responses for earthquakes, floods or heatwaves. 5. Evaluate an environmental or hazard scenario and justify a safe, responsible response.

Coding Scheme SCI-G4-S3-SD1-B2-05

Subject	Grade	Strand	Standard	Benchmark	SLO
SCI (General Science)	4	S3	SD1	B2	5
Where a standard or benchmark has subdivision, decimal numbering will be used consistently (e.g., SD 1.1, SD 1.2; B 2.1, B2.2)					

Chapter 3

Content and Student Learning Outcomes

Table 8: Grade 4 / Learning Area / Topics / Unit 15

Learning Area / Topic	Grade 4 General Science: Content Strand Life Sciences	
	Unit 1 Healthy Body, Food and Nutrition	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Concept of germs • Food and nutrition • Daily hygiene habits 	<p>SCI-G4-S1-SD1-B1-01 Define germs (as disease-causing agents); (Remember)</p> <p>SCI-G4-S1-SD1-B1-02 Explain how germs spread through direct contact, contaminated water, or airborne droplets. (Understand)</p> <p>IV-LS-03 Explain the importance of balanced nutrition for growth, tissue repair, immunity, including the contribution of vegetables, fruits, meat, dairy products to a healthy diet. (Understand)</p> <p>SCI-G4-S1-SD1-B1-04 Compare the nutrient content of two given meals and identify which is more balanced and why. (Analyse)</p> <p>SCI-G4-S1-SD1-B1-05 Formulate a daily healthy routine incorporating hygiene, balanced meals and regular physical activity. (Apply)</p> <p>SCI-G4-S1-SD1-B1-06 Evaluate a given daily routine for hygiene and nutrition and recommend at least two specific improvements. (Evaluate)</p>	<p><i>(Remember)</i> Students sort picture/word cards of foods and germ-related items into labelled group charts (food groups; ways germs spread) and record results on a chart paper.</p> <p><i>(Understand)</i> Class discussion and short role-play showing how hand washing before meals prevents illness; students explain the reasoning in their own words.</p> <p><i>(Apply)</i> Using a simple meal-plate worksheet, students plan and draw one day's balanced meals from a list of locally available foods.</p> <p><i>(Analyse)</i> In pairs, students compare two sample meal cards (e.g., a fast-food meal vs a home-cooked meal), noting food groups present/missing, and record their comparison in a table.</p> <p><i>(Evaluate)</i> Students review a sample daily routine (given as a short story/timeline) and write two specific, justified recommendations for improvement.</p> <p><i>(Create)</i> STEAM Challenge: in small groups, students design an illustrated 'Healthy Habits' calendar/poster listing one hygiene or nutrition action per day of the week, and present it to the class.</p>
Key Vocabulary	germs, hygiene, nutrition, balanced diet, carbohydrates, proteins, fats, vitamins, minerals, disease	

Table 9: Grade 4 / Learning Area / Topics / Unit 15

Learning Area / Topic	Grade 4 General Science: Content Strand Life Sciences	
	Unit 2 Life Cycles of Plants and Animals	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Four-stage life cycle of a flowering plant • Four-stage life cycle of a familiar animal 	<p>IV-LS-07 Describe the four stages in the life cycles of a butterfly and a frog. (Understand)</p> <p>SCI-G4-S1-SD1-B2-02 Explain the basic stages in the life cycle of a plant. (Remember and understand)</p> <p>SCI-G4-S1-SD1-B2-03 Illustrate the life cycle of a chosen plant or animal as a labelled diagram. (Apply)</p> <p>SCI-G4-S1-SD1-B2-04 Evaluate how a plant's life cycle would be affected if a stage were missing. (Evaluate)</p> <p>SCI-G4-S1-SD1-B2-05 Create a life-cycle wheel or flip-book model for a plant or animal of choice, showing all stages in correct sequence. (Create)</p>	<p>(Remember) Students sequence picture cards of a plant's or animal's life-cycle stages in the correct order and label them.</p> <p>(Understand) Small groups use provided text/pictures to orally describe what happens at each stage of a chosen organism's life cycle.</p> <p>(Apply) Students draw and label a life-cycle diagram for a plant or animal of their choice.</p> <p>(Analyse) Using a Venn diagram, students compare the life cycle of a plant and an animal.</p> <p>(Evaluate) Students discuss a 'what if' scenario card (e.g., no pollinators visit the flowers) and write a justified prediction of the consequence.</p> <p>(Create) STEAM Challenge: students construct a simple rotating life-cycle wheel (paper plate and brass fastener) or flip-book showing the four stages of a chosen organism.</p>
Key Vocabulary	life cycle, seed, seedling, germination, larva, pupa, pollination, reproduction	

Table 10: Grade 4 / Learning Area / Topics / Unit 16

Learning Area / Topic	Grade 4 General Science: Content Strand Life Sciences	
	Unit 3 Ecosystems and Energy Flow	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Producers, consumers, decomposers • Energy flow in an ecosystem 	<p>IV-LS-12 Define producers, consumers and decomposers, giving an example of each from the local environment. (Remember)</p> <p>SCI-G4-S1-SD1-B3-02 Explain how energy flows from the sun to</p>	<p>(Remember) Students match picture cards of local organisms to the correct term (producer/consumer/decomposer) in a sorting activity.</p> <p>(Understand) Teacher-led demonstration tracing energy from the sun to a plant to an animal; students narrate the flow in their own words.</p>

	<p>producers and then to consumers in an ecosystem. (Understand) SCI-G4-S1-SD1-B3-03 Construct a simple food chain showing a producer, a primary consumer and a secondary consumer from a local habitat. (Apply) SCI-G4-S1-SD1-B3-04 Classify a set of given local organisms as producers, consumers or decomposers, and justify each classification. (Analyse) SCI-G4-S1-SD1-B3-05 Discuss the importance of decomposers in an ecosystem and evaluate what would happen if decomposers were absent. (Evaluate) SCI-G4-S1-SD1-B3-06 Design a poster of a local ecosystem showing producers, consumers, decomposers and the direction of energy flow. (Create)</p>	<p>(Apply) Students build a food-chain sequence using arrow cards for a local habitat (e.g., field, pond). (Analyse) In groups, students sort a mixed set of organism cards into producer/consumer/decomposer categories and explain their reasoning to the class. (Evaluate) Class discussion followed by an individual short written response on the consequence of removing decomposers from an ecosystem. (Create) STEAM Challenge: students design and build a poster of a local ecosystem, labelling energy flow with arrows.</p>
Key Vocabulary	producer, consumer, decomposer, ecosystem, energy flow, food chain, habitat	

Table 11: Grade 5 / Learning Area / Topics / Unit 17

Learning Area / Topic	Grade 5 General Science: Content Strand Life Sciences	
	Unit 1 Ecosystems, Food Webs and Adaptations	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> Local ecosystem and simple food web Adaptations of organisms to their environment 	<p>SCI-G5-S1-SD1-B1-01 Identify the living and non-living components of a local ecosystem with examples. (Remember) SCI-G5-S1-SD1-B1-02 Describe a food web with examples. (Understand) SCI-G5-S1-SD1-B1-03 Construct a simple food web for a local ecosystem, showing at least three interconnected food chains. (Apply) SCI-G5-S1-SD1-B1-04 Analyse the likely effect of removing one</p>	<p>(Remember) Students take a short 'ecosystem walk' (school ground/garden or photos) and list living/non-living components observed; separately, sort adaptation cards. (Understand) Using a diagram, students explain in pairs how a food web connects multiple food chains; teacher-led discussion links specific adaptations to their survival benefit. (Apply) Students build a food-web poster for a local ecosystem using</p>

	<p>organism from a food web. (Analyse)</p> <p>SCI-G5-S1-SD1-B1-05 List examples of structural and behavioural adaptations in local organisms. (Desert, Polar region etc.) (Remember)</p> <p>SCI-G5-S1-SD1-B1-06 Analyse how a given adaptation helps an organism survive in its environment. (Analyse)</p> <p>SCI-G5-S1-SD1-B1-07 Judge how a change in the local environment (e.g., drought, deforestation) might affect the survival of a specific organism, giving reasons. (Evaluate)</p> <p>SCI-G5-S1-SD1-B1-08 Design an imaginary organism adapted to survive in a given environment (e.g., desert, wetland) and justify each adaptation. (Create)</p>	<p>string/arrows to connect at least three food chains.</p> <p>(Analyse) Groups predict and record (using a simple cause-effect chart) what happens to the food web if one organism is removed; separately classify adaptation cards into structural/behavioural columns.</p> <p>(Evaluate) Students respond to a scenario card (e.g., 'a pond dries up') and write a justified prediction about the effect on a named organism.</p> <p>(Create) STEAM Challenge: students design and illustrate an imaginary organism suited to a given environment, labelling and justifying each adaptive feature.</p>
Key Vocabulary	ecosystem, food web, food chain, adaptation, structural adaptation, behavioural adaptation, habitat	

Table 12: Grade 5 / Learning Area / Topics / Unit 18

Learning Area / Topic	Grade 5 General Science: Content Strand Life Sciences	
	Unit 2 Caring for the Local Environment	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> Human impact on the environment Environmental conservation 	<p>SCI-G5-S1-SD1-B2-01 Identify human activities that affect the local environment. (Remember)</p> <p>SCI-G5-S1-SD1-B2-02 Explain the effects of littering, deforestation and pollution on the local ecosystem. (Understand)</p> <p>SCI-G5-S1-SD1-B2-03 Apply simple environmental practices, such as sorting waste or saving water, in the school or neighborhood and explain, why these are important. (Apply)</p>	<p>(Remember) Students sort picture/scenario cards into 'helps the environment' and 'harms the environment' columns and discuss as a class.</p> <p>(Understand) Small-group discussion followed by a short written or oral summary of the effects of littering, deforestation and pollution on a local ecosystem.</p> <p>(Apply) Students conduct a simple audit (checklist/tally) of environmental practices around the school and record their findings.</p>

	SCI-G5-S1-SD1-B2-04 Evaluate the effectiveness of common conservation practices (recycling, tree plantation, reducing waste) used in the community. (Analyse and Evaluate)	(Analyse) Using their audit data, students compare which conservation practices already in place are working well and which are not. (Evaluate) Students write a short justified recommendation identifying the single most effective conservation action the school/community should adopt. (Create) STEAM Challenge: students design and deliver a conservation awareness campaign (poster series, short presentation, or a small event) for their school.
Key Vocabulary	pollution, deforestation, conservation, recycling, sustainability, campaign	

Table 13: Grade 4 / Learning Area / Topics / Unit 19

Learning Area / Topic	Grade 4 General Science: Content Strand Physical Science	
	Unit 4	
	Energy in Everyday Life: Heat, Light and Sound	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Common sources of heat • Uses of heat in daily life • How heat changes temperature • Conductors and insulators 	<p>SCI-G4-S2-SD1-B1-01 Identify common sources and uses of heat in daily life. (Remember)</p> <p>SCI-G4-S2-SD1-B1-02 Describe how adding or removing heat can change the temperature of an object and demonstrate this through everyday examples. (Understand)</p> <p>SCI-G4-S2-SD1-B1-03 Classify materials that allow heat to pass through (conductor) and that do not allow heat to pass through (insulator). (Apply)</p> <p>SCI-G4-S2-SD1-B1-04 Select a suitable material for keeping an object warm or cool. (Evaluate)</p>	<p>(Remember) sort pictures of sources of heat discuss everyday uses of the sources.</p> <p>STEAM: design a simple solar heat collector.</p> <p>(Remember) List and classify uses of heat. STEAM: make a poster depicting uses of heat.</p> <p>(Understand) Warm/cool water investigation and recording. STEAM: design a simple insulating container.</p> <p>(Apply) Test everyday materials with a safe warm-water investigation. STEAM: compare material samples.</p> <p>(Apply) Compare materials used to keep things warm/cool. STEAM: build an insulated container.</p> <p>(Evaluate) Compare materials and justify a choice.</p>
Key Vocabulary	heat, source, temperature, warm, cool, insulation, material.	

<p>Energy in Everyday Life: Sound</p> <ul style="list-style-type: none"> • Sources of sound • Sound production by vibration • Loud and soft sounds • Harmful noise • Reducing loud sounds 	<p>SCI-G4-S2-SD1-B1-05 Identify common sources of sound. (Remember)</p> <p>SCI-G4-S2-SD1-B1-06 Explain that sound is produced by vibrating objects. (Understand)</p> <p>SCI-G4-S2-SD1-B1-07 Compare loud and soft sounds. (Analyse)</p> <p>SCI-G4-S2-SD1-B1-08 Analyse the harmful effects of excessive noise. (Analyse)</p> <p>SCI-G4-S2-SD1-B1-09 Suggest ways to reduce unwanted loud sounds. (Evaluate)</p>	<p>(Remember) Movement of sound producing source and its effects on the listener according to the movement of source. STEAM: create a simple sound-making object.</p> <p>(Understand) Use a rubber band/ruler to observe vibration. STEAM: design a simple musical instrument.</p> <p>(Analyse) Produce safe loud/soft sounds and compare. STEAM: design an instrument with two sound levels.</p> <p>(Analyse) Explain harmful noise and its negative effects. STEAM: create a school noise-awareness poster to be used in the school awareness campaign.</p> <p>(Evaluate) Identify noise sources and solutions. STEAM: design a classroom noise-reduction solution.</p>
Key Vocabulary	sound, source, vibration, loud, soft, volume, noise, hearing	
<p>Energy in Everyday Life: Light</p> <ul style="list-style-type: none"> • Sources of light (natural/artificial) • Light and vision • Transparent, translucent, opaque materials • Shadow formation • Changing direction of light 	<p>SCI-G4-S2-SD1-B1-10 Identify natural and artificial sources of light. (Remember)</p> <p>SCI-G4-S2-SD1-B1-11 Describe how light helps us see objects. (Understand)</p> <p>SCI-G4-S2-SD1-B1-12 Identify materials that allow light to pass through and those that block light (transparent, translucent, opaque). (Apply)</p> <p>SCI-G4-S2-SD1-B1-13 Demonstrate by giving examples from everyday life that light travels in a straight line (like sunlight coming through clouds or a flashlight beam) (Understand)</p> <p>SCI-G4-S2-SD1-B1-14 Describe how a shadow is formed. (Understand)</p> <p>SCI-G4-S2-SD1-B1-15 Use a simple arrangement of objects to change the direction of light. (Apply)</p>	<p>(Remember) Classify natural/artificial sources. STEAM: Draw an artificial and natural light-sources on Chart paper.</p> <p>(Understand) Compare the objects which seen in light and darkness. STEAM: make a simple light-and-object demonstration.</p> <p>(Apply) Test transparent/translucent materials with a torch. STEAM: make a light-filtering model.</p> <p>(Apply) Test opaque objects and observe shadows. STEAM: design a shade/screen.</p> <p>(Understand) Describe how shadow is formed with a torch, object and screen. STEAM: create a shadow-puppet theatre.</p> <p>(Apply) Use mirrors/reflective surfaces. STEAM: design a simple light-path model.</p>

Key Vocabulary	light, source, natural, artificial, see, object, reflection, direction transparent, translucent, opaque, block, shadow
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Table 14: Grade 4 / Learning Area / Topics / Unit 20

Learning Area / Topic	Grade 4 General Science: Content Strand Physical Science	
	Unit 5 Magnetism	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Magnetic vs non-magnetic objects • Magnetic attraction and repulsion • Magnetic poles 	<p>SCI-G4-S2-SD1-B2-01 Identify objects that are attracted/not attracted to a magnet. (Remember)</p> <p>SCI-G4-S2-SD1-B2-02 Describe magnetic attraction and repulsion using everyday examples. (Understand)</p>	<p>(Remember) Test classroom objects with a magnet. STEAM: design an activity to sort magnetic and non-magnetic activity.</p> <p>(Remember) Test non-magnetic objects. STEAM: make a magnetic/non-magnetic sorting board.</p> <p>(Understand) Explore how magnets attract selected objects. STEAM: design a simple magnetic pickup tool.</p> <p>(Understand) Place like poles together and observe repulsion. STEAM: build a repulsion demonstration.</p>
Key Vocabulary	magnet, magnetic, attraction repulsion, pole	
<p>Static Electricity</p> <ul style="list-style-type: none"> • Everyday examples of static electricity • Attraction of small/light objects • Electrostatic charge effects 	<p>SCI-G4-S2-SD1-B2-03 Describe static electricity using an everyday example. (Understand)</p> <p>SCI-G4-S2-SD1-B2-04 Demonstrate the attraction of small objects to charged objects. (Apply)</p> <p>SCI-G4-S2-SD1-B2-05 Describe what happens when a charged object is brought near a lightweight object for example paper piece etc. (Understand)</p>	<p>(Understand) Discuss balloon/hair or paper examples. STEAM: make a simple demonstration model.</p> <p>(Apply) Rub balloon/comb safely and test paper pieces. STEAM: design a demonstration.</p> <p>(Understand) Observe attraction and describe results when a charged object is brought near a lightweight object. STEAM: create a labeled display or simple digital diagram.</p>

Table 15: Grade 4 / Learning Area / Topics / Unit 21

Learning Area / Topic	Grade 4 General Science: Content Strand Physical Science	
	Unit 6	
	Force and Motion: Force	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
Force Force as push or pull • Everyday push/pull situations • Effects of force (move, stop, redirect) • Strength of push and distance	SCI-G4-S2-SD1-B3-01 Define force as a push or pull. (Remember) SCI-G4-S2-SD1-B3-02 Identify push and pull in everyday situations. (Remember) SCI-G4-S2-SD1-B3-03 Describe how a force can make an object move, stop a moving object and change its direction. (Understand) SCI-G4-S2-SD1-B3-04 Investigate how the strength of a push affects the movement of an object. (Analyse)	(Remember) Identify pushes and pulls. STEAM: create a push/pull action model/poster. (Remember) Sort picture of push/pull actions. STEAM: design a sorting game. (Understand) Push different objects and observe. STEAM: make a force-and-motion demonstration and record observations digitally. (Understand) Use a ball/toy to demonstrate stopping. STEAM: create a simple braking model. (Understand) Redirect a rolling object. STEAM: design an obstacle/redirecting track. (Analyse) Use different push strengths and compare distance. STEAM: design a fair-test track and record results in a simple digital table.
Key Vocabulary	force, push, pull, movement, distance, movement, stop,	
Force and Motion: • State of rest and motion • Movement over different distances • Recording motion data	SCI-G4-S2-SD1-B3-05 Define motion as a change in the position of an object. (Remember) SCI-G4-S2-SD1-B3-06 Compare different types of motion using familiar examples, such as moving in a straight line, circular motion, and back-and-forth motion. (Analyse) SCI-G4-S2-SD1-B3-07 Record observations on the movement of objects in the classroom, playground, or nearby environment in a simple table or digital table, using an appropriate digital tool. (Apply)	(Remember) Observe and classify examples. STEAM: create a display depicting objects in motion and at rest. (Analyse) Roll objects over measured distances. STEAM: design a mini track. (Apply) Observe a toy's movement and record distance/direction. STEAM: create a data table using a notebook or simple digital tool.

Key Vocabulary	force, push, pull, force, distance, movement, rest and motion
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Table 16: Grade 4 / Learning Area / Topics / Unit 22

Learning Area / Topic	Grade 4 General Science: Content Strand Physical Science	
	Unit 7 Matter and Its States	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
States of Matter <ul style="list-style-type: none"> • Solids, liquids, and gases • Shape of solids • Liquid flow and container shape • Gases filling available space 	SCI-G4-S2-SD1-B4-01 Identify solids, liquids and gases as states of matter from everyday examples. (Remember) SCI-G4-S2-SD1-B4-02 Investigate and classify various classroom materials as solids by testing if their shape remains same when moved or pressed. (Understand) SCI-G4-S2-SD1-B4-03 Predict and experiment with how the same volume of water changes shape when poured into differently shaped containers. (Understand) SCI-G4-S2-SD1-B4-04 Use observations of scent spreading or an inflated balloon to explain that gases fill the available space. (Understand)	(Remember) Sort everyday examples solid, liquid and gases. STEAM: create a model for 3-states of matter. (Understand) Compare shapes of different solids. STEAM: build a solids model. (Understand) Pour liquid into different containers. STEAM: demonstrate how gases and liquids take the shape of containers (Understand) Use balloons/air-filled containers. STEAM: make a simple gas-space model.
Changes of States of matter <ul style="list-style-type: none"> • Melting (solid to liquid) • Freezing (liquid to solid) • Evaporation (liquid to gas) • Condensation (gas to liquid) • Everyday examples of state changes 	SCI-G4-S2-SD1-B4-05 Observe and record what happens to an ice cube when it gets heated/warm. (Analysing) SCI-G4-S2-SD1-B4-06 Investigate how liquid water changes into solid ice when it gets cold. (Apply) SCI-G4-S2-SD1-B4-07 Compare what happens to a puddle of water in the sun versus a puddle in the shade. (Analysing) SCI-G4-S2-SD1-B4-08 Explain where the water droplets on the	(Remember) Observe ice melting. STEAM: design a simple melting investigation and record observations. (Remember) Observe water freezing. STEAM: create a model depicting changes the sequence of the change in matter. (Remember) Observe water drying. STEAM: compare evaporation under safe conditions. (Remember) Observe droplets on a cold surface. STEAM: create a condensation demonstration. (Understand) Match examples to melting/freezing/evaporation/condensation.

	outside of a cold drink come from. (Analysing) SCI-G4-S2-SD1-B4-09 Describe changes of state using everyday examples. (Understand)	STEAM: create a state-change cycle using a poster or simple digital sequence.
Matter and Its States: Reversible and Irreversible Changes • Reversible vs irreversible changes • Everyday examples (melting, folding, cooking, burning) • Classifying changes • Why some changes cannot be reversed	SCI-G4-S2-SD1-B4-10 Identify reversible and irreversible changes from everyday examples. (Remember) SCI-G4-S2-SD1-B4-11 Classify familiar changes as reversible or irreversible. (Apply) SCI-G4-S2-SD1-B4-12 Explain why some changes cannot easily be reversed. (Analyse)	(Remember) Observe examples such as melting ice/folding paper. STEAM: create a demonstration. (Remember) Discuss cooking/burning examples. STEAM: create a display showing examples of cooking/burning. (Apply) Sort cards showing change in the state of matter and justify sorting. STEAM: design a sorting game. (Analyse) Compare reversible and irreversible examples. STEAM: make a before/after explanation model.
Key Vocabulary	reversible, change, irreversible, irreversible, classify.	

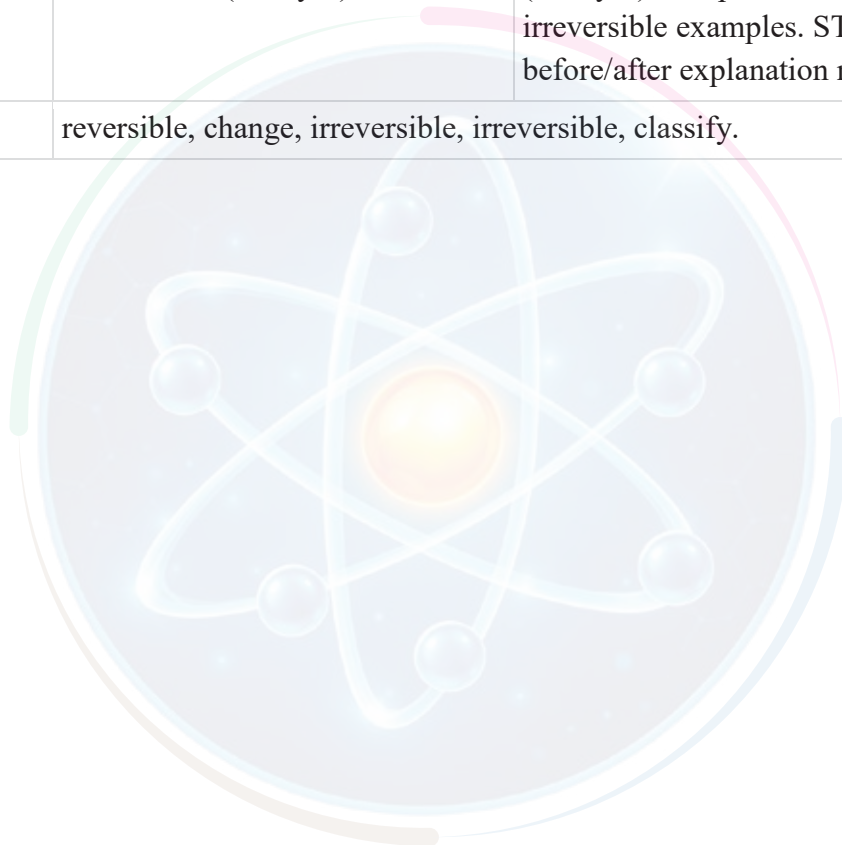


Table 17: Grade 5 / Learning Area / Topics / Unit 25

Learning Area / Topic	Grade 5 General Science: Content Strand Physical Science	
	Unit 3	
	Friction and Gravity	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Friction as a force and daily examples • Effects of friction on movement • Smooth vs rough surfaces • Surface friction and distance • Useful friction vs reducing friction • Increasing/reducing friction methods • Gravity as downward pull of Earth • Effect of gravity on falling objects • Everyday gravity examples 	<p>SCI-G5-S2-SD1-B1-01 Identify friction as a force and provide its examples from everyday life. (Understand)</p> <p>SCI-G5-S2-SD1-B1-02 Describe how friction affects the movement of an object. (Understand)</p> <p>SCI-G5-S2-SD1-B1-03 Compare the movement of an object on smooth and rough surfaces. (Analyse)</p> <p>SCI-G5-S2-SD1-B1-04 Investigate how different surfaces affect the distance travelled by an object. (Analyse)</p> <p>SCI-G5-S2-SD1-B1-05 Identify situations where friction is useful. (Understand)</p> <p>V-PS-06 Identify situations where friction needs to be reduced. (Understand)</p> <p>SCI-G5-S2-SD1-B1-07 Suggest a way to increase or reduce friction for a given purpose. (Evaluate)</p> <p>SCI-G5-S2-SD1-B1-08 Identify gravity as a force that pulls objects towards Earth. (Remember)</p> <p>SCI-G5-S2-SD1-B1-09 Describe the effect of gravity on falling objects. (Understand)</p> <p>SCI-G5-S2-SD1-B1-10 Use concept of gravity to explain everyday situations. (Apply)</p>	<p>(Remember) explain how friction is observed while walking, braking and rubbing hands/smooth and rough objects. STEAM: Make a chart showing how friction changes the movement of objects.</p> <p>(Understand) Compare movement when friction changes. STEAM: build a model showing changes in movement with changes in friction.</p> <p>(Analyse) Roll the same object over different surfaces. STEAM: design a fair-test track.</p> <p>(Analyse) Conduct repeated trials and record distances in a table or simple digital spreadsheet. STEAM: engineer a mini test track.</p> <p>(Understand) Discuss walking, writing, gripping and braking. STEAM: make a chart showing examples of how friction is useful in everyday life.</p> <p>(Understand) Discuss wheels, hinges and machine parts. STEAM: design a model showing reduced friction.</p> <p>(Evaluate) Test the effectiveness of different methods for reducing friction in real-life situations. STEAM: Observe movement of same objects on the surface before and after putting soapy water, oil etc.</p> <p>(Remember) Drop safe objects from the height and observe its movement direction. STEAM: create an Earth-gravity model.</p> <p>(Understand) Observe falling objects after the drop. STEAM: make a chart</p>

		of falling-object depicting the direction movement of falling objects. <i>(Apply)</i> Identify gravity in jumping, falling, throwing and rain. STEAM: make a gravity poster/model.
Key Vocabulary	friction, surface, smooth, rough, distance, trial useful friction, grip, braking, lubricant, movement	



Table 18: Grade 5 / Learning Area / Topics / Unit 26

Learning Area / Topic	Grade 5 General Science: Content Strand Physical Science	
	Unit 4 Electric Circuit	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Main parts of a circuit (cell, wire, switch, bulb) • Component functions • Complete vs incomplete circuits • Constructing a simple circuit • Troubleshooting circuit breaks • Predicting switch positions 	<p>SCI-G5-S2-SD1-B2-01 Identify the main parts of a simple electric circuit. (Remember)</p> <p>SCI-G5-S2-SD1-B2-02 State the function of a battery, wire, switch and bulb in a circuit. (Understand)</p> <p>SCI-G5-S2-SD1-B2-03 Identify a complete and an incomplete circuit. (Apply)</p> <p>SCI-G5-S2-SD1-B2-04 Construct a simple electric circuit that lights a bulb. (Apply)</p> <p>SCI-G5-S2-SD1-B2-05 Explain why a bulb does not light in an incomplete circuit. (Analyse)</p> <p>SCI-G5-S2-SD1-B2-06 Predict what will happen when a switch is opened or closed. (Understand)</p>	<p>(Remember) Identify cell, wires, switch and bulb. STEAM: build a labeled circuit model.</p> <p>(Understand) Match each component to its function. STEAM: build and label a working circuit.</p> <p>(Apply) Open/close a switch and observe. STEAM: build complete and incomplete models.</p> <p>(Apply) Follow a circuit-building procedure.</p> <p>(Evaluate) Test switch positions and record predictions/results in a table.</p>
<p>Electrical Safety</p> <ul style="list-style-type: none"> • Safe and unsafe uses of electricity • Electrical safety rules • Applying safety rules in situations 	<p>SCI-G5-S2-SD1-B2-07 Identify safe and unsafe uses of electricity. (Remember)</p> <p>SCI-G5-S2-SD1-B2-08 State rules for using electricity safely. (Understand)</p> <p>SCI-G5-S2-SD1-B2-09 Apply electrical safety rules in a given situation. (Apply)</p>	<p>(Remember) Sort safe/unsafe situations.</p> <p>(Understand) Discuss classroom/home safety rules. STEAM: create a safety poster/storyboard.</p> <p>(Apply) Analyse short scenarios and choose safe actions.</p>
Key Vocabulary	cell, wire, switch, bulb, circuit, complete circuit, incomplete circuit	

Table 19: Grade 5 / Learning Area / Topics / Unit 27

Learning Area / Topic	Grade 5 General Science: Content Strand Physical Science	
	Unit 5	
	Characteristics of Matter	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Properties: hardness, flexibility, texture, absorption • Comparing materials based on properties • Investigating selected properties and tables • Recording test results • Selecting materials for specific purposes • Justifying material selection 	<p>SCI-G5-S2-SD1-B3-01 Describe materials using properties such as hardness, flexibility, texture and water absorption. (Understand)</p> <p>SCI-G5-S2-SD1-B3-02 Compare two materials based on their properties. (Analyse)</p> <p>SCI-G5-S2-SD1-B3-03 Investigate materials for a selected property and record the results of test in a table. (Apply)</p> <p>SCI-G5-S2-SD1-B3-04 Select a suitable material for a particular purpose using observed or digitally recorded test results (e.g. cotton, plastic). (Evaluate)</p> <p>SCI-G5-S2-SD1-B3-05 Give reasons for selecting a material based on its properties and communicate the choice. (Evaluate)</p>	<p>(Understand) Handle and test different materials and describe their properties. STEAM: create a property-testing station.</p> <p>(Analyse) Compare materials for a stated purpose (making a cupboard). STEAM: make a comparison chart/model or simple digital comparison table.</p> <p>(Evaluate) Choose materials based on properties. STEAM: design a product and select its material.</p> <p>(Evaluate) Explain why a chosen material suits a purpose. STEAM: present and defend a material choice.</p>
Key Vocabulary	hard, flexible, texture, absorbent, compare, material, test, property, data, table, result, purpose, reason, selection	

Table 20: Grade 5 / Learning Area / Topics / Unit 27

Learning Area / Topic	Grade 5 General Science: Content Strand Physical Science	
	Unit 6	
	Mixtures and Solutions	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<p>Mixtures</p> <ul style="list-style-type: none"> • Mixture identification from everyday examples • Substances present in a mixture • Substances retain individual properties <p>Solutions</p>	<p>SCI-G5-S2-SD1-B4-01 Identify mixtures from everyday examples (salad, fruit chaat). (Remember)</p> <p>SCI-G5-S2-SD1-B4-02 Identify the different substances present in a mixture. (Apply)</p> <p>SCI-G5-S2-SD1-B4-03 Analyse how the substances in a mixture</p>	<p>(Remember) Identify mixtures in food, soil and other examples. STEAM: create a mixture/non-mixture display.</p> <p>(Apply) Examine familiar mixtures and name components. STEAM: create a labeled mixture model or simple digital diagram.</p>

<ul style="list-style-type: none"> • Solution identification (salt/sugar water) • Dissolving in a liquid • Preparing simple water solutions • Distinguishing solution vs visible mixture 	<p>retain their individual properties. (Analyse)</p> <p>SCI-G5-S2-SD1-B4-04 Identify a solution from everyday examples (salt/sugar water). (Remember)</p> <p>SCI-G5-S2-SD1-B4-05 Describe what happens when a substance dissolves in a liquid. (Understand)</p> <p>SCI-G5-S2-SD1-B4-06 Prepare a simple solution by dissolving a substance in water. (Apply)</p> <p>SCI-G5-S2-SD1-B4-07 Distinguish between a solution and a mixture in which substances remain visibly separate. (Analyse)</p>	<p>(Analyse) Compare components before and after mixing. STEAM: make a before/after model.</p> <p>(Remember) Identify salt/sugar water as solutions. STEAM: make a solution/non-solution display.</p> <p>(Understand) Observe salt/sugar dissolving. STEAM: create a simple dissolving model.</p> <p>(Apply) Prepare a safe salt/sugar solution. STEAM: design a measured solution-making activity.</p> <p>(Analyse) Compare salt water with sand-water. STEAM: create a classification model.</p>
Key Vocabulary	mixture, component, substance, property	

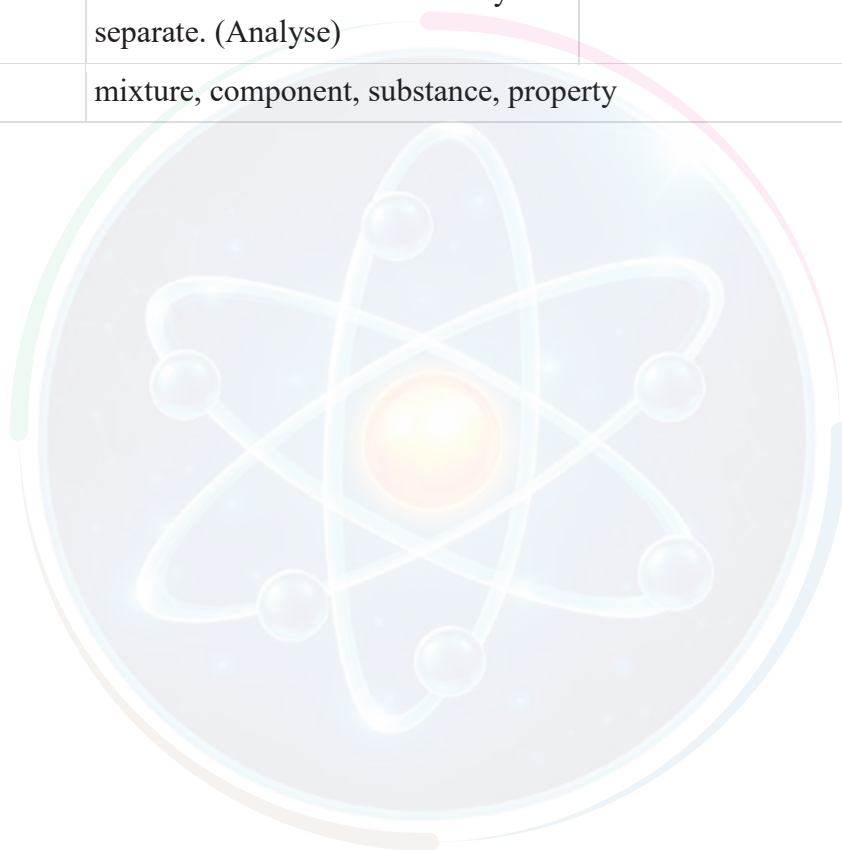


Table 21: Grade 5 / Learning Area / Topics / Unit 29

Learning Area / Topic	Grade 5 General Science: Content Strand Physical Science	
	Unit 6	
	Filtration and Evaporation	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Definition and use of filtration • Filtering sand-water mixture • Explanation and use of evaporation • Demonstrating solid separation from solution • Evaporation procedures and setups • Selecting suitable separation methods • Justifying separation plans and communication 	SCI-G5-S2-SD1-B5-01 Define filtration and its use. (Knowledge) SCI-G5-S2-SD1-B5-02 Filter a safe sand-water mixture. (Apply) SCI-G5-S2-SD1-B5-03 Explain evaporation and its use. (Understand) SCI-G5-S2-SD1-B5-04 Demonstrate evaporation to separate a dissolved solid from a solution (salt water). (Apply) SCI-G5-S2-SD1-B5-05 Select a suitable separation method for a given mixture. (Evaluate) SCI-G5-S2-SD1-B5-06 Explain why a particular separation method is suitable for a given mixture and communicate the separation plan. (Evaluate)	STEAM: design a simple filter using safe materials. <i>(Apply)</i> Filter a safe sand-water mixture. STEAM: design a safe evaporation demonstration to separate salt from water (Teacher guided). <i>(Evaluate)</i> Choose filtration or evaporation to separate different mixtures. STEAM: design a decision tree on paper or using a simple digital tool. <i>(Evaluate)</i> Match mixture properties to a method and justify. STEAM: present a separation plan using a poster, oral presentation, or simple digital presentation.
Key Vocabulary	filtration, filter, mixture, filtration, insoluble, dissolved solid, evaporation, solution, separation	

Table 22: Grade 4 / Learning Area / Topics / Unit 30

Learning Area / Topic	Grade 4 General Science: Content Strand Earth and Space Sciences	
	Unit 8	
	Our Solar System	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • The Sun and planets • Order of the planets • Orbits 	IV-ESS-01 Identify the Sun as the center of the Solar System and name the planets in order of their distance from the Sun. (Remember) SCI-G4-S3-SD1-B1-02 Describe our Solar System as the Sun at the centre with planets revolving around it in fixed orbits. (Understand)	<i>(Remember)</i> Recite the planet order using a mnemonic; match planet name cards to picture cards. <i>(Understand)</i> Teacher-led demonstration using a simple orbit model (string and markers) to show planets revolving around the Sun.

Learning Area / Topic	Grade 4 General Science: Content Strand Earth and Space Sciences	
	Unit 8 Our Solar System	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
	SCI-G4-S3-SD1-B1-03 Arrange model or picture cards of the planets in correct order of distance from the Sun and label their orbits. (Apply) SCI-G4-S3-SD1-B1-04 Analyse the conditions of Mars which is suitable/not suitable for human life and justify the answer using evidence. (Evaluate) SCI-G4-S3-SD1-B1-05 Develop a labelled scale model or diagram of the Solar System showing the order of the planets. (Create)	<i>(Apply)</i> Arrange planet cards in order on a floor number line representing distance from the Sun. <i>(Analyse)</i> Using a simple data table of planet sizes/distances, students rank and compare planets by size and distance. <i>(Evaluate)</i> Groups discuss given data cards (temperature, atmosphere) for two planets and justify which is less suitable for life. <i>(Create)</i> STEAM Challenge: build a labelled scale model of the Solar System using craft materials (balls of different sizes, string, cardboard) and present it to the class.
Key Vocabulary	Solar System, Sun, planet, orbit, order, distance, scale model	

Table 23: Grade 4 / Learning Area / Topics / Unit 31

Learning Area / Topic	Grade 4 General Science: Content Strand Earth and Space Sciences	
	Unit 9 Energy Resources: Renewable and Non-Renewable	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Renewable energy resources • Non-renewable energy resources • Conservation 	SCI-G4-S3-SD1-B2-01 Define renewable and non-renewable energy resources and recall examples such as sunlight, wind, coal, and natural gas. (Remember) SCI-G4-S3-SD1-B2-02 Explain why it is important to conserve non-renewable energy resources. (Understand) SCI-G4-S3-SD1-B2-03 Analyse the advantages and disadvantages of using a given renewable resource for a specific purpose. (Analyse)	<i>(Remember)</i> Sort resource picture cards into renewable/non-renewable columns and define each term as a class. <i>(Understand)</i> Class discussion on what would happen if non-renewable resources ran out; students write one reason conservation matters. <i>(Apply)</i> Complete a classification worksheet sorting given resources into renewable/non-renewable. <i>(Analyse)</i> In pairs, compare a renewable and a non-renewable

	<p>SCI-G4-S3-SD1-B2-04 Analyse the advantages and disadvantages of using a given non-renewable resource for a specific purpose. (Analyse)</p> <p>SCI-G4-S3-SD1-B2-05 Design a simple poster or model demonstrating one way a renewable energy resource could be used at school. (Create)</p>	<p>resource for a given use (e.g., heating a home) and list pros/cons.</p> <p><i>(Evaluate)</i> Students write a short justified recommendation for one renewable-energy practice their school could adopt.</p> <p><i>(Create)</i> STEAM Challenge: design a poster or simple working model (e.g., a small pinwheel to represent wind energy) demonstrating a renewable-energy use at school.</p>
Key Vocabulary	renewable, non-renewable, energy resource, conserve, solar, wind, fossil fuel	

Table 24: Grade 4 / Learning Area / Topics / Unit 32

Learning Area / Topic	Grade 4 General Science: Content Strand Earth and Space Sciences	
	Unit 10 The Water Cycle	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Stages of the water cycle • Water cycle and weather events 	<p>IV-ESS-11 Describe the main stages of the water cycle (evaporation, condensation, precipitation, collection). (Remember and (Understand))</p> <p>SCI-G4-S3-SD1-B3-02 Investigate the process of evaporation and condensation through a simple classroom experiment and record observations. (Analyse)</p> <p>SCI-G4-S3-SD1-B3-03 Analyze how protecting freshwater sources helps maintain the benefits of the water cycle for a community. (Analyse)</p> <p>SCI-G4-S3-SD1-B3-04 Design a simple working model that demonstrates evaporation and condensation. (Create)</p>	<p><i>(Remember)</i> Sequence picture/word cards of the water-cycle stages in the correct order.</p> <p><i>(Understand)</i> Class discussion linking cloud formation, dew and rain to specific water-cycle stages; students explain the importance of the water cycle for freshwater in their own words.</p> <p><i>(Apply)</i> Students draw and label a full water-cycle diagram.</p> <p><i>(Analyse)</i> Conduct a simple evaporation/condensation experiment (e.g., water in a covered cup left in sunlight) and record observations over time.</p> <p><i>(Evaluate)</i> Class discussion followed by a short written evaluation of why protecting local water sources matters.</p> <p><i>(Create)</i> STEAM Challenge: build a mini water-cycle model in a sealed clear bag or jar with water and soil, place it in sunlight, and observe</p>

		evaporation and condensation over several days.
Key Vocabulary	water cycle, evaporation, condensation, precipitation, collection, cloud, dew, rain	

Table 21: Grade 4 / Learning Area / Topics / Unit 11

Learning Area / Topic	Grade 4 General Science: Content Strand Earth and Space Sciences	
	Unit 11	
	Soil Erosion: Cause and Effect	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Causes of soil erosion • Effects of soil erosion • Prevention 	<p>SCI-G4-S3-SD1-B4-01 Define soil erosion and identify its common causes (wind, water, deforestation). (Remember)</p> <p>SCI-G4-S3-SD1-B4-02 Explain the effects of soil erosion on plant growth and the local environment. (Understand)</p> <p>SCI-G4-S3-SD1-B4-03 Suggest practical ways to prevent or reduce soil erosion and justify the recommendation. (Evaluate)</p> <p>SCI-G4-S3-SD1-B4-04 Design and test a simple model that demonstrates how vegetation reduces soil erosion. (Create)</p>	<p>(Remember) Sort cause cards (wind, water, deforestation, farming) related to soil erosion and define the term as a class.</p> <p>(Understand) Discuss/observe images of eroded land and healthy land, and explain effects on plant growth.</p> <p>(Apply) Pour water over a tray of loose soil at an incline and observe/record what happens.</p> <p>(Analyse) Compare erosion in two trays (one bare, one with grass/plant cover) after pouring the same amount of water on each.</p> <p>(Evaluate) Students write a justified recommendation for reducing soil erosion in a given local scenario (e.g., a hillside farm).</p> <p>(Create) STEAM Challenge: design and build a planted vs. Un-planted soil-tray model, test both with water, and use the evidence to explain how vegetation helps prevent erosion.</p>
Key Vocabulary	soil erosion, wind, water, deforestation, vegetation, terracing, prevention	

Table 26: Grade 5 / Learning Area / Topics / Unit 33

Learning Area / Topic	Grade 5 General Science: Content Strand Earth and Space Sciences	
	Unit 7 Earth and Space	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Formation of seasons • Eclipses • Moon's orbit • Space exploration 	<p>SCI-G5-S3-SD1-B1-01 Describe that the Earth's axis is tilted and that the Moon orbits the Earth. (Remember)</p> <p>SCI-G5-S3-SD1-B1-02 Define solar and lunar eclipses. (Remember)</p> <p>SCI-G5-S3-SD1-B1-03 Differentiate how a solar eclipse and a lunar eclipse occur using a diagram or simple model. (Apply and Analyse)</p> <p>SCI-G5-S3-SD1-B1-04 Evaluate the benefits and challenges of space exploration for humankind, using at least one specific example. (Evaluate)</p> <p>SCI-G5-S3-SD1-B1-05 Design a model or presentation demonstrating the relative positions and motion of the Earth, Sun and Moon during a chosen event. (Create)</p>	<p>(Remember) Use a simple Earth-Sun-Moon model to point out the tilt of the Earth's axis and the Moon's orbit.</p> <p>(Understand) Using a torch and a globe, demonstrate and discuss how axial tilt causes seasons; use a Moon-phase chart to relate orbit position to appearance.</p> <p>(Apply) Students build/use a simple ball-and-torch model to show how solar and lunar eclipses occur and draw a labelled diagram.</p> <p>(Analyse) Compare diagrams of a solar eclipse and a lunar eclipse, and separately compare the causes of day/night versus seasons, noting key differences.</p> <p>(Create) STEAM Challenge: design and present a working model (balls, string, torch) demonstrating the Earth-Sun-Moon system during a chosen astronomical event.</p>
Key Vocabulary	axis, tilt, season, solar eclipse, lunar eclipse, orbit, phase, space exploration, satellite	

Table 2722: Grade 5 / Learning Area / Topics / Unit 8

Learning Area / Topic	Grade 5 General Science: Content Strand Earth and Space Sciences	
	Unit 8 Weather, Climate and Environmental Safety	
	Student Learning Outcomes (SLOs)	Suggested Learning Experiences / STEAM Activities
<ul style="list-style-type: none"> • Weather versus climate • Natural hazards • Basic safety measures 	<p>SCI-G5-S3-SD1-B2-01 Identify common weather and climate variables such as temperature, rainfall and wind. (Remember)</p>	<p>(Remember) Discuss and list safety steps for an earthquake or fire drill; practise a 'drop, cover, hold' mock drill.</p> <p>(Understand) Class discussion using pictures/news reports of natural hazards</p>

	<p>SCI-G5-S3-SD1-B2-02 Explain relationships between weather/climate conditions and living things or human activities. (Understand)</p> <p>SCI-G5-S3-SD1-B2-03 Identify basic safety measures to be followed during an earthquake, flood or fire emergency. (Remember)</p> <p>SCI-G5-S3-SD1-B2-04 Interpret a simple weather table or graph. (Apply)</p> <p>SCI-G5-S3-SD1-B2-05 Compare two sets of local environmental observations and identify a pattern. (Analyse)</p> <p>SCI-G5-S3-SD1-B2-06 Describe common natural hazards (earthquakes, floods, cyclones) and their effects on people and the environment. (Understand)</p> <p>SCI-G5-S3-SD1-B2-07 Demonstrate appropriate safety drills for natural hazards through a mock activity. (Apply)</p> <p>SCI-G5-S3-SD1-B2-08 Design a simple family or classroom emergency preparedness plan for a specific natural hazard relevant to the local area. (Create)</p>	<p>to describe their effects on people and the environment.</p> <p>(Apply) Conduct a mock safety drill for a chosen hazard and reflect on what went well and what to improve.</p> <p>(Analyse) Compare local daily weather records over a week with general climate data for the region, and explain the difference between the two concepts.</p> <p>(Evaluate) Groups research a local community safety measure (e.g., an early-warning system) and write a short evaluation of its effectiveness.</p> <p>(Create) STEAM Challenge: design a one-page emergency preparedness plan (checklist/poster) for a chosen natural hazard relevant to the local area, and share it with the class.</p>
Key Vocabulary	weather, climate, natural hazard, earthquake, flood, cyclone, safety drill, preparedness	

Bloom's Taxonomy Cognitive Weightage Framework

Table 28: Bloom's Taxonomy: Cognitive Weightage Framework

Grade Band	Knowledge (Remembering)	Understanding	Applying	Analysing	Evaluating	Creating	Total
Grades 4–5	15%	25%	25%	15%	10%	10%	100%

Application note: The prescribed weightage is applied across the complete Grade 4–5 science programme and assessment design. It is not intended as a rigid quota within every chapter. The overall balance is 40% Knowledge/Understanding and 60% Application/Analysis/Evaluation/Creation.

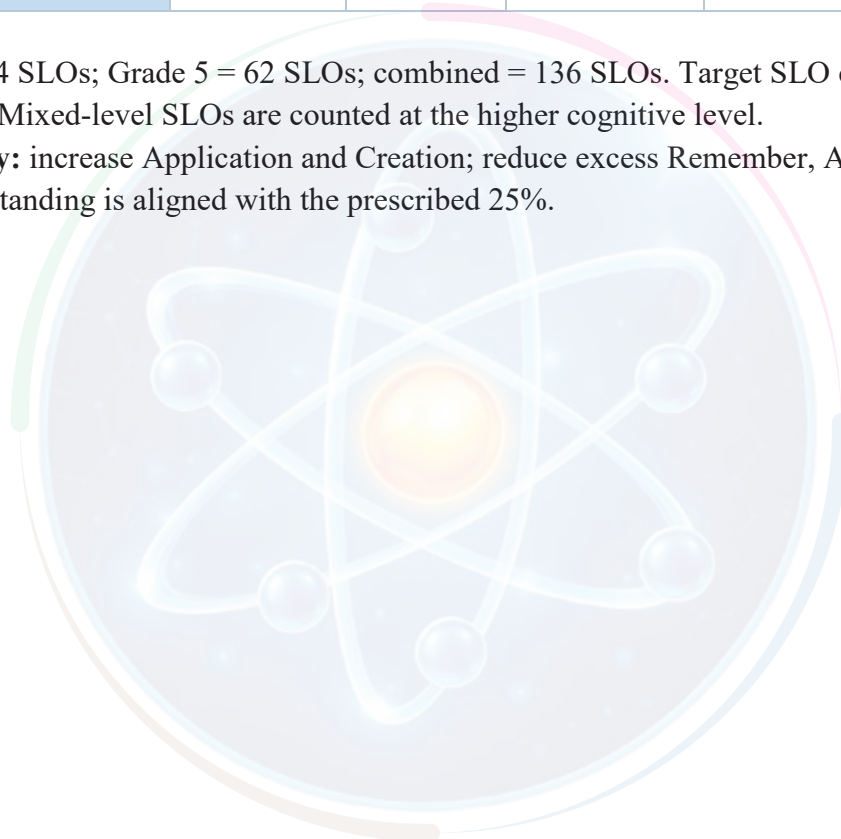
Bloom's Weightage Alignment Summary

Table 29: Bloom's Weightage Alignment Summary

Cognitive Level	Prescribed	Current SLOs	Actual	Target SLOs	Adjustment
Remembering / Knowledge	15%	28	20.59%	20	-8
Understanding	25%	34	25.00%	34	0
Applying	25%	25	18.38%	34	+9
Analyzing	15%	23	16.91%	20	-3
Evaluating	10%	17	12.50%	14	-3
Creating	10%	9	6.62%	14	+5
Total	100%	136	100.00%	136	-

Basis: Grade 4 = 74 SLOs; Grade 5 = 62 SLOs; combined = 136 SLOs. Target SLO counts are rounded to whole numbers. Mixed-level SLOs are counted at the higher cognitive level.

Alignment priority: increase Application and Creation; reduce excess Remember, Analysis and Evaluation; Understanding is aligned with the prescribed 25%.



Chapter 4

Guidelines for General Science Pedagogy

4.1 Purpose and Scope

This chapter translates the Grades IV-V science curriculum into practical classroom guidance. It emphasizes inquiry-driven, experiential and contextually relevant learning across Life Sciences, Physical Sciences, and Earth & Space Sciences. The purpose is to reduce reliance on rote recall and strengthen observation, investigation, reasoning, communication and application.

4.2 Principles of Teaching and Learning Science

Table 30: Principles of Teaching and Learning Science

Principle	Classroom Emphasis
Inquiry-based and experiential learning	Use questions, predictions, observation, simple investigations, measurement, recording and evidence-based conclusions as central learning processes.
Systems thinking and causal reasoning	Help learners connect parts of biological, physical and Earth systems and explain simple cause-and-effect relationships.
Local relevance	Anchor learning in familiar Pakistani contexts such as local crops, household materials, rivers, weather, natural resources and community environments.
Developmental progression	Move from concrete and guided experiences toward models, comparison, basic quantitative representation and increasingly independent reasoning.
Stewardship and practical application	Connect science learning with health, hygiene, biodiversity, resource conservation, safety and responsible action.

4.3 Recommended Pedagogical Approaches

The same core approaches should be used across the three science domains, with the level of teacher guidance adjusted to learners' readiness and the nature of the content.

Table 31: Recommended Pedagogical Approaches

Approach	Application
Inquiry-Based Learning	Learners ask or respond to investigable questions, identify variables where appropriate, observe or measure, record findings and use evidence to explain results.

Approach	Application
Experiential Learning	Learners encounter scientific ideas through direct, safe experiences using familiar materials, demonstrations, school grounds and everyday situations.
Project-Based Learning	Short, purposeful projects allow learners to apply science to a defined local problem, produce a model, plan or solution, and communicate their work.
Collaborative Learning and Modeling	Pairs or groups use physical models, role-play, diagrams and shared data to represent relationships and explain systems.
STEAM and Digital Integration	Technology, engineering/design, mathematics and creative communication are integrated when they strengthen the science concept; they should not create additional syllabus load.

4.4 Domain-Specific Classroom Applications

Table 32: Domain-Specific Classroom Applications

Domain	Illustrative Applications
Life Sciences	Seed germination under varied light/water conditions; hygiene transmission demonstration; schoolyard biodiversity observation; food-web modeling using local organisms; simple recycled-material biological models and brief digital presentation.
Physical Sciences	Movement on ramp, Different surface friction investigation; low-voltage circuit and conductor/insulator testing; thermal insulation design challenge; light and shadow modeling; simple digital recording or light-intensity measurement where devices are available.
Earth & Space Sciences	Soil-erosion comparison using planted and bare soil; local weather recording; Earth-Sun-Moon role-play or model; water-cycle terrarium; school hazard audit and preparedness plan; simple Indus watershed model and suitable digital planetarium/land-use exploration.

4.5 Developmental Progression in Pedagogy

Pedagogy should reflect learners' developmental progression. Grade III provides a concrete baseline; Grades IV and V increasingly require guided investigation, comparison, modeling, data use and connected scientific explanation.

Table 33: Developmental Progression in Pedagogy

Life Sciences		
Grade	III	Recognize habitats, animals, simple life cycles and food chains.
Concrete Baseline		

Grade Guided Investigation	IV	Explain health and hygiene, four-stage life cycles, and energy flow through producers, consumers and decomposers.
Grade Systemic Analysis	V	Construct and interpret food webs, explain adaptations and apply learning to local environmental care.
Physical Sciences		
Grade Concrete Baseline	III	Observe heating/cooling, sound and light; assemble a simple circuit; identify simple machines.
Grade Guided Investigation	IV	Investigate heat, sound, light, conductors/insulators, magnetism, static electricity, force, motion and changes of matter.
Grade Systemic Analysis	V	Investigate friction, gravity, magnetic effects, safe circuits, mixtures, solutions, separation and characteristics of matter.
Earth & Space Sciences		
Grade Concrete Baseline	III	Relate environments to living conditions; explore conservation; model the solar system and day/night.
Grade Guided Investigation	IV	Describe the solar system, energy resources and water cycle; investigate soil erosion.
Grade Systemic Analysis	V	Explain seasons, eclipses and Moon orbit; distinguish weather and climate; address hazards, safety and environmental maintenance.

4.6 Implications for Teacher Professional Development

Teacher capacity building should focus on practical facilitation, resource management, safe fieldwork and assessment of inquiry processes.

- Mastery of inquiry facilitation: use open and scaffolded questions that prompt observation, prediction, evidence and explanation.
- Low-cost resource management: construct, organize and maintain simple science materials using locally available and recycled resources.
- Outdoor learning and safety: conduct controlled observations in school grounds or nearby settings using clear safety procedures.
- Formative assessment integration: assess process skills such as observing, measuring, predicting, recording, graphing and explaining alongside conceptual understanding.

4.7 Implementation Guidance

- Begin units with simple prompts or observations that reveal learners' prior ideas before introducing new explanations.
- Move from observation and guided inquiry toward explanation, application and evidence-based communication.

- Integrate practical and inquiry work within normal instructional time rather than treating it as an optional add-on.
- Use Pakistani organisms, materials, weather, hazards and community examples without extending beyond the prescribed concepts.
- Use low-cost, safe materials and low-voltage electrical components; establish clear procedures for outdoor and practical work.
- Use formative evidence to identify misconceptions and provide targeted reinforcement or remediation.



Chapter 5

Guidelines for Assessment

5.1 Introduction

Assessment across the three primary science domains is designed as a continuous diagnostic, formative and summative process that measures conceptual understanding, scientific inquiry, practical skills, evidence-based reasoning, communication, safety, environmental responsibility and the ability to apply learning in familiar contexts. The emphasis is on what learners can explain, investigate, construct, compare, interpret and improve; not on isolated recall alone. The assessment framework focuses on evaluating:

- **Conceptual Depth:** the transition from rote memory of facts to understanding functional systems, relationships, and cause-and-effect mechanisms.
- **Scientific Inquiry Skills:** the ability to observe, measure, record data, formulate explanations based on evidence, and solve simple problems.
- **Values and Dispositions:** the development of positive, daily habits regarding health, hygiene, resource conservation, safety, and care for living things and shared environments.

Cognitive Level	Weight	Cross-Domain Assessment Task Examples
Remembering / Knowledge	15%	1) identify hygiene steps; 2) recognize circuit parts or states of matter; 3) enlist names of planets.
Understanding	25%	1) explain germ spread or adaptation; 2) elaborate vibration, insulation or friction; 3) describe erosion, water cycle or seasons.
Applying	25%	1) use and maintain a seed growth journal; 2) Develop a circuit or separate a mixture; 3) demonstrate a water cycle or eclipse model.
Analyzing	15%	1) interpret food-web disruption; 2) compare heating and cooling or friction data; 3) investigate soil erosion, weather records and climate trends.
Evaluating	10%	1) assess a biodiversity action; 2) select the best insulator/separation sequence; 3) justify a conservation or hazard-safety strategy.
Creating	10%	1) design a school biodiversity restoration plan; 2) improve the efficiency of ramp by changing surface/circuit solution; 3) create a hazard plan or model-based explanation.

5.2 Purpose of Assessment and Cognitive Balance

Assessment is a continuous process used to determine what learners know, understand and can do in science. It should measure conceptual understanding, scientific inquiry, practical skills, evidence-based reasoning, communication, safety, environmental responsibility and application in familiar contexts. Recall is included, but it should not dominate assessment.

Assessment evidence should address three dimensions:

- Conceptual understanding - explaining scientific ideas, relationships, systems and cause-and-effect.
- Scientific inquiry and practical skills - observing, measuring, recording, interpreting evidence and solving simple problems.
- Values and dispositions - safe practice, health and hygiene, responsibility, cooperation and care for living things and shared environments.

Cognitive Level	Weight	Illustrative Assessment Evidence
Remembering / Knowledge	15%	Identify hygiene steps, circuit parts, states of matter or planets.
Understanding	25%	Explain germ spread, adaptation, vibration, insulation, erosion, the water cycle or seasons.
Applying	25%	Maintain a growth journal, construct a safe circuit, separate a mixture or demonstrate a model.
Analysing	15%	Interpret food-web change; compare investigation data; analyse weather or erosion evidence.
Evaluating	10%	Justify a material choice, conservation action, separation method or hazard-safety response.
Creating	10%	Design a model, investigation improvement, biodiversity action or hazard-preparedness plan.

5.3 Principles of Assessment

Principle	Application
Authentic and local	Use familiar Pakistani contexts such as hygiene, local organisms, household energy, transport, monsoon weather, soil erosion and natural hazards.
Performance and evidence	Require learners to observe, measure, classify, construct, record, interpret, explain and justify; assess both process and product.
Progression	Provide stronger scaffolding in Grade IV; in Grade V, increase interpretation, comparison, variable control, reasoning and design choices.

Principle	Application
Fairness and inclusion	Allow equivalent evidence through oral explanation, models, diagrams, structured writing or accessible digital tools without reducing the intended scientific demand.
Safety and ethics	Use safe household materials, supervised heating, low-voltage dry cells, hygienic biological materials and appropriate outdoor/disaster-drill procedures.
Actionable feedback	Identify the specific concept, process skill or evidence gap and state what the learner should improve next.

5.4 Types of Assessment

- **Diagnostic Assessment (Before Learning):**

Diagnostic assessment is conducted at the beginning of a unit, topic or learning sequence. It helps teachers determine learners' starting points and plan appropriate instruction, differentiation, and support. Elicit prior conceptions for example, how germs spread, whether heavier objects always move faster, why shadows change size, or why seasons occur. Use quick drawings, sorting cards, prediction prompts or oral questioning.

- **Life Sciences Misconception Probe:** Teacher presents images of a Cholistan desert camel and a northern snow leopard, asking: 'Can a camel instantly grow thick fur if moved to the mountains?' Target: Elicit whether students hold the misconception that organisms consciously adapt physical traits instantly.
- **Physical Sciences Misconception Probe:** Teacher asks: 'Does a woolen blanket generate heat by itself, or does it prevent body heat from escaping?' Target: Address the common misconception that insulating materials are active heat sources.
- **Earth & Space Sciences Misconception Probe:** Teacher asks: 'Why is summer hotter than winter, is Earth closer to the Sun in summer?' Target: Uncover misconceptions regarding orbital distance vs. Earth's axial tilt.

- **Formative Assessment (During Learning):** Formative assessment is an ongoing process embedded within classroom activities. It enables teachers to identify misconceptions and learning gaps while learning is taking place and allows learners to understand how they can improve. Embed checklists, science journals, data tables, exit tickets, peer explanation, model checkpoints and teacher questioning during the germ simulation, seed growth journal, insulation test, ramp investigation, water-cycle jar and eclipse model.

- **Life Sciences Formative Exit Ticket:** Students sketch a 3-organism canal food chain (Algae -> Fish -> Crane) and label producers, consumers, and decomposers, verifying arrow directionality.
- **Physical Sciences Formative Check:** Students draw a 3V circuit schematic with an open switch and list one household electricity-saving rule.
- **Earth & Space Sciences Formative Log:** Students log daily temperature and rain gauge depth over 14 days, constructing simple bar charts.

- **Summative Assessment (End of Unit):** Summative assessment provides a structured judgement of learners' achievement after a period of learning. It should assess not only scientific knowledge but

also the appropriate application of scientific skills, reasoning and understanding. Use a balanced combination of selected-response and constructed-response items together with one or more practical/performance tasks aligned to the cognitive distribution.

- **Performance-Based Assessment:** Assess authentic execution classification, experimental control, measurement, circuit construction, mixture separation, model alignment, graph interpretation, biodiversity restoration and emergency-drill performance.
- **Self and Peer Assessment:** Use age-appropriate success criteria so learners can check accuracy, safe practice, collaboration, clarity of scientific vocabulary and whether conclusions are supported by evidence.

Type	Purpose and Use
Diagnostic - before learning	Establish prior conceptions and identify misconceptions using short questions, drawings, sorting tasks or prediction prompts. Examples: adaptation, insulation and season formation.
Formative - during learning	Gather evidence continuously through observation, science journals, data tables, exit tickets, questioning, peer explanation and model checkpoints; use findings to adjust teaching.
Summative - end of unit/term	Judge achievement through a balanced combination of selected-response, constructed-response and practical/performance tasks aligned to SLOs and cognitive demand.
Performance-based	Assess authentic execution such as classification, measurement, circuit construction, mixture separation, model use, graph interpretation and safe practical procedures.
Self and peer assessment	Use age-appropriate success criteria to review scientific accuracy, safe practice, collaboration, vocabulary, clarity and evidence-based conclusions.

5.5 Assessment Methods and Domain Application

Assessment across Grades 4 and 5 uses complementary methods to gather evidence of learners' scientific knowledge, inquiry skills, and scientific attitudes. Evaluation is treated as an integral part of the scientific inquiry process, helping teachers adapt instruction and enabling students to monitor their own cognitive growth.

Assessment Method	Purpose	Appropriate Use	Examples from Science
Written Assessments	Assess scientific knowledge, reasoning, and application.	Individual understanding before, during, or after a sequence.	MCQs, short-answer, diagram labeling, scenario problem-solving.

Teacher Observation	Assess practices, safety, collaboration, and attitudes.	Continuously during classroom, lab, and group tasks.	Rubrics/checklists for tool handling, hygiene, and participation.
Performance-Based	Assess application of knowledge and practical skills.	When learners construct, demonstrate, or execute tasks.	Building circuits, testing magnetic materials, filtration setups.
Inquiry-Based	Assess predicting, investigating, and drawing conclusions.	Guided and independent scientific investigations.	Testing thermal conductivity, plant growth factors, evaporation.
Projects & Extended Work	Develop inquiry, collaboration, and real-world STEM skills.	Extended, multi-day, or schoolwide projects.	Designing water filters, seed germination tracking, garden projects.
Portfolio Assessment	Track growth, self-reflection, and evidence over time.	Periodically across terms.	Lab reports, dated drawings, habit charts, reflection sheets.
Self & Peer Assessment	Build self-monitoring, feedback, and ownership.	Post-investigation and group presentations.	Checklist reviews of peer models, identifying personal learning gaps.
Questioning & Discussion	Formatively assess reasoning and clear misconceptions.	Ongoing throughout lessons.	Socratic prompts: "What evidence supports your conclusion?"

Domain-Wise Assessment Methods & Skills Evaluation Matrix)

The table below replaces generic assessment descriptions with a fully standardized, domain-wise assessment matrix. It explicitly details how each core assessment method is operationally executed across Life Sciences, Physical Sciences, and Earth & Space Sciences in Grades IV and V.

Assessment Method	Core Scientific Purpose & Inquiry Focus	Life Sciences Assessment Exemplars (Grades IV–V)	Physical Sciences Assessment Exemplars (Grades IV–V)	Earth & Space Sciences Assessment Exemplars (Grades IV–V)
Written Assessments (Diagnostic & Summative)	Evaluate conceptual depth, structured scientific reasoning, terminology, and quantitative problem-solving.	Grade IV: Scenario questions on germ transmission steps. Grade V: Multi-trophic level disruption analysis in food webs.	Grade IV: Conductor/insulator sorting questions. Grade V: Household energy audit calculations comparing LED vs. filament bulbs.	Grade IV: Labeling 4 stages of the water cycle. Grade V: Comparative analysis of climate of two different cities.
Teacher Observation (Formative Checklists)	Assess lab safety compliance, tool handling precision, peer collaboration, and procedural ethics.	Grade IV: Observation checklist during glitter-germ hygiene activity.	Grade IV: Monitoring circuit safety rules (no mains power). Grade V: Observation of team roles during ramp friction trials.	Grade IV: Checklist for rain gauge and soil tray setup. Grade V: Evaluating team performance during 3D torch eclipse simulations.
Performance-Based Tasks	Evaluate physical execution of practical setups, structural modeling, and schematic accuracy.	Grade IV: Constructing 4-stage seed germination growth trays. Grade V: Assembling functional insect nesting boxes for plot restoration.	Grade IV: Building a 3V series circuit. Grade V: Assembling a 3-layer water filtration column (gravel/sand/charcoal).	Grade IV: Constructing shoebox solar heat collectors. Grade V: Demonstrating shadow for eclipses.

Assessment Method	Core Scientific Purpose & Inquiry Focus	Life Sciences Assessment Exemplars (Grades IV–V)	Physical Sciences Assessment Exemplars (Grades IV–V)	Earth & Space Sciences Assessment Exemplars (Grades IV–V)
Inquiry-Based Investigations	Assess variable isolation, hypothesis formulation, quantitative data logging, and fair testing.	Grade IV: 14-day seed germination variable audit (light/water).	Grade IV: Ramp surface friction distance measurements. Grade V: Thermal conductivity melting time tests on spoon materials.	Grade IV: Monsoon soil erosion incline tray sediment activity. Grade V: Tracking shadow length variations against solar elevation.
Projects & Extended STEM Tasks	Evaluate multi-day inquiry, engineering design loops, community problem-solving, and synthesis.	Grade IV: Classifying local garden flora & building growth logs. Grade V: Schoolyard micro-habitat & biodiversity restoration plan.	Grade IV: Recycled rubber-band acoustic instrument challenge. Grade V: Designing thermal food insulators to prevent ice melting.	Grade IV: School rainwater collection design. Grade V: Drafting family natural hazard emergency plans & evacuation maps.
Portfolios & Science Journals	Track longitudinal skill progression, dated observational sketches, and reflective growth.	Grade IV: Dated germination drawings & growth tables. Grade V: Multi-week ecological stewardship & biodiversity reflection logs.	Grade IV: Circuit schematic practice & material test logs. Grade V: Mixture separation flowcharts & household energy saving activity.	Grade IV: 30-day weather logging charts Grade V: Natural hazard vulnerability maps & emergency kit checklists.

Assessment Method	Core Scientific Purpose & Inquiry Focus	Life Sciences Assessment Exemplars (Grades IV–V)	Physical Sciences Assessment Exemplars (Grades IV–V)	Earth & Space Sciences Assessment Exemplars (Grades IV–V)
Self & Peer Assessment	Promote self-reflective practices, peer review of scientific models, and rubric-based self-correction.	Grade IV: Peer review of 3-stage food chain arrow directions. Grade V: Checking how well each group's biodiversity plan protects nature	Grade IV: Peer troubleshooting of unlit 3V electric circuits. Grade V: Self-assessment checklist on water filter clarity performance.	Grade IV: Peer checklist verifying solar system planetary order. Grade V: Peer evaluation of Drop-Cover-Hold emergency drill execution.
Socratic Questioning & Oral Defense	Evaluate oral scientific communication, spontaneous evidence justification, and vocabulary precision.	Grade IV: 'Why do roots absorb water?' Grade V: 'What evidence proves decomposers prevent forest waste accumulation?'	Grade IV: 'Why does a blanket keep us warm?' Grade V: 'How does oil lubrication reduce friction and lower fuel costs?'	Grade IV: 'Why does topsoil wash away on deforested slopes?' Grade V: 'Why do lunar eclipses only occur during full moons?'

5.6 Assessing Different Types of Learning

Learning Dimension	Assessment Focus
Knowledge and conceptual understanding	Assess description, explanation, classification, comparison, prediction and transfer of knowledge. Prefer scenario-based questions, concept maps and structured explanation over isolated fact recall.
Skills and performance	Observe learners carrying out investigations, using tools, measuring, recording data, constructing models/circuits and communicating findings. Evidence should show safe and accurate procedure.
Attitudes and values	Use observation over time to assess curiosity, cooperation, persistence, honest data reporting, safety, cleanliness, responsibility and care for living organisms and the environment.

5.7 Inquiry Progression Across Grades IV-V

Inquiry assessment should become progressively less scaffolded. The key progression is:

Grade	Inquiry Expectation	Typical Evidence
Grade IV - Guided Inquiry	Teacher provides the question, materials and main procedure; learners observe, predict, measure and record.	Accurate observations, simple measurements, tables, labelled diagrams and basic conclusions.
Grade V - Structured / Increasingly Independent Inquiry	Learners refine questions, identify variables, plan fair tests, interpret data, justify conclusions and suggest improvements.	Variable control, quantitative data, graphs/tables, evidence-based conclusions and design improvements.

5.8 Assessing Cross-Cutting Competencies & Themes

Assessment in primary science evaluates transferable life competencies embedded directly within authentic science tasks rather than isolated tests.

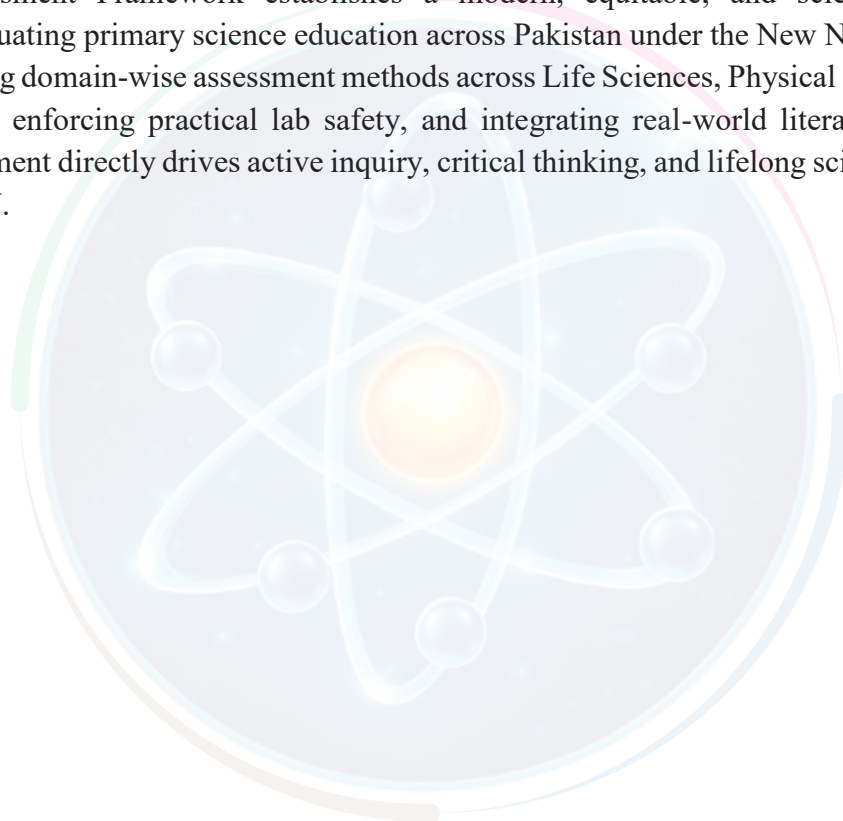
Competency / Theme	Assessment Method	Domain Authentic Science Task
Critical Thinking	Problem-solving scenarios, data analysis	Evaluating why water boiling/filtration is safer and cheaper than unverified well water.
Creativity & Innovation	STEM design tasks, physical modeling	Constructing low-cost sound instruments using tissue boxes and rubber bands.
Communication	Presentations, labelled diagrams, logs	Presenting illustrated shadow geometry diagrams or weather log trends to the class.
Collaboration	Teacher observation checklists, peer reviews	Working in 4-member teams to set up soil erosion incline trays and share roles.
Inquiry & Scientific Thinking	Performance tasks, variable isolation	Designing a fair test to measure how ramp surface texture impacts toy car travel distance.
Environmental Responsibility	Project rubrics, stewardship checklists	Conducting a schoolyard biodiversity review and building insect nesting boxes.
Health, Safety & Well-being	Safety observation checklists	Demonstrating strict low-voltage circuit rules and hand hygiene washing routines.
Citizenship & Social Responsibility	Community plans, energy conservation	Executing a household energy review and drafting family monsoon flood safety plans.

5.9 Implications for Teacher Professional Development (TPD)

To successfully execute this unified assessment framework, primary science educators require continuous capacity building in six core assessment literacy domains:

- **Assessment Literacy & Item Design:** Training educators to write test items targeting higher-order cognitive levels (Apply, Analyse, Evaluate, Create) rather than pure factual recall.
- **Formative Assessment Integration:** Equipping teachers with techniques for exit tickets, misconception probes, questioning strategies, and adjusting instructional pace based on daily evidence.
- **Objective Rubric Design & Moderation:** Standardizing rubric application to student models, group investigations, and STEM projects to eliminate subjective grading bias.
- **Constructive Actionable Feedback:** Transitioning teacher comments from generic praise ('Good job') to actionable guidance ('Your food chain items are correct, but check arrow direction from prey to predator').
- **Assessing Non-Cognitive Dispositions:** Guiding teachers to use observation checklists that capture student habits regarding cleanliness, energy conservation, safety, and respect for life.
- **Inclusive & Differentiated Assessment:** Training teachers to adapt task formats, visual aids, and oral presentation channels for learners with physical, sensory, or linguistic challenges.

This Assessment Framework establishes a modern, equitable, and scientifically rigorous foundation for evaluating primary science education across Pakistan under the New National Curriculum 2026. By embedding domain-wise assessment methods across Life Sciences, Physical Sciences, and Earth & Space Sciences, enforcing practical lab safety, and integrating real-world literacy, the framework ensures that assessment directly drives active inquiry, critical thinking, and lifelong scientific competence in Grades IV and V.



Chapter 6

Teaching and Learning Materials Development

6.1 Introduction

Primary Science textbooks and supplementary learning materials translate curriculum standards, benchmarks, and Student Learning Outcomes into meaningful classroom experiences. For Grades IV–V, materials should connect Life Sciences, Physical Sciences, and Earth & Space Sciences with learners' everyday experiences in Pakistani homes, schools, farms, markets, neighborhoods, mountains, plains, deserts, wetlands, and coastal areas. They should move learning beyond factual recall toward observation, inquiry, evidence, safe practical work, problem-solving, environmental responsibility, and application of science in real-life Pakistani settings, while remaining developmentally appropriate and strictly within the prescribed progression.

6.2 Types of Learning Materials

Science content should be organized SLO-by-SLO, with each SLO linked to a clear learning target, an age-appropriate learning experience, relevant Pakistani context, feasible practical work, assessment evidence, and suitable resources. Materials should support competency-based and inquiry-oriented science while remaining practical for public and private schools across urban, rural, mountainous, desert, agricultural, and coastal settings in Pakistan. For each SLO, learning materials should specify:

- **Learning Target:** The knowledge, skill, or competency students are expected to demonstrate.
- **Learning Experience:** A sequence of age-appropriate activities involving exploration, inquiry, practice, and application.
- **Local Context:** Relevant examples from students' everyday lives and Pakistani environmental, social, and community settings.
- **Practical and Inquiry Activities:** Opportunities for observation, questioning, investigation, experimentation, measurement, and evidence-based conclusions using available resources.
- **Assessment:** Clearly aligned formative and performance-based assessment activities to measure achievement of the SLO.
- **Resources:** Required textbook content, activity sheets, teacher guidance, low-cost materials, and digital resources where appropriate.
- **Differentiation:** Simple adaptations or extension activities to address varied learner needs and school resources.

To support the diverse range of classroom settings across Pakistan, developers should design a cohesive, multi-format suite of resources. For each type, the purpose and contribution to learning is set out below.

- **Student Textbooks:** The core narrative and visual resource, featuring structured conceptual progression and clear concept boundaries across all three science domains, localized Pakistani contexts and examples, scientifically accurate and vivid visuals, balanced text-to-visual layouts

(approximately 50/50), and step-by-step active-inquiry guides embedded within the conceptual flow rather than presented as optional activities.

- **Workbooks & Activity Journals:** Practical student resources containing standardized observation and data-recording tables, weather-tracking logs, water-cycle observation journals, force/ramp measurement sheets, incline-tray data sheets, seed-germination drawing logs, circuit schematic sheets, household energy and water audit templates, structured inquiry templates, self-assessment habit and safety checklists, and activity records.
- **Teacher Facilitation Guides:** Comprehensive operational manuals providing step-by-step experiment and activity setup, facilitation pathways, safety enforcement rules and outdoor field-safety protocols, strategies for managing outdoor field trips, experiment troubleshooting tips, low-cost material sourcing and classroom kit-assembly ideas, and objective guidance for assessing practical work through rubrics, observation checklists, and performance criteria.
- **Low-Cost Classroom Science Kits (Manipulatives):** Practical guides and materials for assembling classroom science kits using accessible household recyclables and inexpensive items, including dry cells, 3V LEDs, copper wires, paper clips, magnets, plastic bottles, jars and cups, magnifying lenses, seeds, cotton, thermometers, torches, plastic globes, incline trays, and floor tape.
- **Digital & QR-Enhanced Resources:** Textbook-embedded QR codes linking to short, open-access videos, 3D animations, and interactive resources that illustrate processes that may be difficult to observe directly, including germ multiplication, seed germination, eclipse geometries, and water-cycle dynamics. Resources also include interactive digital quizzes and access to live satellite weather information from SUPARCO and the Pakistan Meteorological Department (PMD).
- **Reading & Supplementary Resources:** Age-appropriate supplementary readers, science fact cards, and extension materials designed to encourage independent exploration, curiosity, and further learning beyond the core textbook.
- **Assessment Resources:** Embedded learning checkpoints, success-criteria checklists, simple rubrics, observation checklists, and performance-task templates that support continuous assessment for learning and provide structured evidence of students' conceptual understanding, inquiry skills, practical work, and application of scientific knowledge.

Recommended resources

Table : 34 Recommended Resources

Resource	Required function
Student textbook	Core narrative, concept explanations, accurate visuals, local examples and inquiry tasks integrated into the conceptual flow.
Workbook / activity journal	Observation tables, data logs, diagrams, investigation records, safety checks and self-assessment.

Resource	Required function
Teacher facilitation guide	Activity setup, facilitation steps, safety guidance, troubleshooting, low-cost alternatives and practical assessment criteria.
Low-cost science kit	Accessible materials such as dry cells, LEDs, wires, magnets, bottles, cups, seeds, cotton, torches, trays and measuring tools.
Digital / QR resources	Short open-access videos, animations, simulations, weather information and digital quizzes, always with a non-digital alternative.
Supplementary reading	Age-appropriate science fact cards and extension readers that build curiosity without expanding the mandated curriculum.
Assessment resources	Learning checkpoints, success criteria, rubrics, observation checklists and performance-task templates.

6.3 Content Organization, Progression and Boundaries

Content should be organized by strand and grade progression, with unnecessary duplication removed. Grade IV emphasizes concrete observation and guided inquiry; Grade V increases explanation, investigation, interpretation, justification and independent application without introducing high-level/complicated theories.

Table : 35 Grade IV-V / Strand / Prescribed Progression

Strand	Grade IV - Prescribed Progression	Grade V - Prescribed Progression
Life Science	Healthy body, germs, food and nutrition; four-stage life cycles; producers, consumers and decomposers.	Local ecosystems and food webs; adaptations; care for the local environment.
Physical Science	Effects of heat, sound and light; conductors/insulators; basic magnetism; static electricity; force and motion; states and changes of matter; reversible/irreversible change.	Friction and gravity; magnetic effect; safe electric circuits; mixtures and solutions; filtration/evaporation; characteristics of matter.
Earth & Space Science	Solar System and planet order/orbits; renewable/non-renewable energy; water cycle; soil erosion.	Seasons, eclipses, Moon orbit and space exploration; weather and climate; environmental maintenance; natural hazards and safety.

- Use concrete, observable primary-level science and clear age-appropriate language; avoid unnecessary terminology and encyclopedic detail.
- Nutrition should remain at the level of balanced local food choices and healthy habits; avoid pathogen taxonomy, diagnosis, nutrient biochemistry and calorie calculations.
- Electricity should use observable properties and safe dry-cell investigations only; exclude main wiring, electron-flow theory, Ohm's law and resistance calculations.

- Weather and hazards should focus on observable variables, patterns and practical family/school safety; exclude advanced meteorology, climate-model mathematics and technical seismology.



6.4 Learning Experiences, Inquiry and Pedagogy

Active scientific inquiry should be embedded in the main chapter flow, not treated as an optional end-of-unit activity. Every chapter should include an observable starting point, guided or increasingly independent investigation, evidence recording, discussion, and an application task.

- Inquiry-based learning: Open with a Big Question or observable phenomenon before formal explanation.
- Experiential learning: Use step-by-step investigations with locally available and reusable materials.
- Collaborative learning: Use structured pair/group prompts for scientific dialogue, data sharing and joint problem-solving.
- STEAM and design: Include purposeful design-and-test challenges where they strengthen the science concept.
- Place-based learning: Use diverse Pakistani settings such as homes, farms, canals, markets, mountains, deserts, wetlands and coastal areas.
- Digital support: Use videos, simulations, weather charts or QR resources only when they add value; provide equivalent offline options.
- Safety: Place safety instructions beside the relevant activity. Electrical work must use dry cells only; hazard learning must remain age-appropriate and calm.

Illustrative practical emphasis by strand

Table : 36 Illustrative Practical Emphasis by Strand

Strand	Practical emphasis
Life Science	Model germ transmission, observe life cycles, construct food chains/webs, compare adaptations and plan environmental-care actions.
Physical Science	Investigate heat/sound/light, conductors/insulators, magnetism, static electricity, force/motion, friction/gravity, matter changes, safe dry-cell circuits and mixture separation.
Earth & Space Science	Model planet order/orbits, water cycle, erosion, seasons/eclipses/Moon orbit; compare weather/climate and practice basic hazard safety.

Authoring Handbook

1. Standard / Benchmark Intent

Generic Description: This section defines the core learning expectations, student learning outcomes (SLOs), and conceptual benchmarks for a specific unit. It establishes what learners should know, understand, and be able to demonstrate by the end of the instructional sequence, aligning content with national curriculum standards.

Life Sciences

Focus Area: Grade IV: Healthy Body, Daily Habits, Germs, Food & Nutrition
Explain how hygiene, safe water, balanced food choices, rest, and responsible daily

	habits support health; recognize that germs can spread through contact and contaminated food/water.
Physical Sciences	Focus Area: Grade IV: Conductors, Insulators & Static Electricity Classify familiar materials as electrical conductors or insulators using a safe low-voltage tester, and observe simple static-electric effects.
Earth & Space Sciences	Focus Area: Grade V: Weather, Climate, Environmental Maintenance & Hazard Safety Differentiate short-term weather from longer-term climate patterns, interpret simple weather information, identify locally relevant hazards, and demonstrate basic preparedness and environmental-maintenance actions.

2. Concept Boundary & Cognitive Limits

Generic Description: This section sets strict age-appropriate scope limits and cognitive guardrails for authors. It explicitly details which advanced theories, complex mathematics, or technical depth must be excluded to prevent cognitive overload and maintain focus on observable primary-level science.

Life Sciences	Focus Area: Grade IV: Healthy Body, Daily Habits, Germs, Food & Nutrition Treat germs as a simple health concept linked to transmission and prevention. Keep nutrition at the level of balanced local food choices and healthy habits; avoid pathogen taxonomy, disease diagnosis, nutrient biochemistry, calorie calculations, or body-system detail.
Physical Sciences	Focus Area: Grade IV: Conductors, Insulators & Static Electricity Use observable properties and dry-cell testing only. Avoid electron-flow theory, resistance calculations, Ohm's law, electric-field equations, or household mains wiring.
Earth & Space Sciences	Focus Area: Grade V: Weather, Climate, Environmental Maintenance & Hazard Safety Focus on observable weather variables, patterns, and practical safety. Avoid advanced meteorology equations, global climate-model mathematics, technical seismology, or emergency procedures beyond school/family level.

3. Narrative Tone & Writing Strategy

Generic Description: This section specifies the pedagogical voice, framing techniques, and storytelling approach for textbook authors. It guides how to open lessons with familiar real-world scenarios, framing concepts around relatable questions that stimulate curiosity, active inquiry, and logical reasoning.

Life Sciences	Focus Area: Grade IV: Healthy Body, Daily Habits, Germs, Food & Nutrition Begin with a familiar Pakistani school/home situation such as sharing a water bottle, eating without washing hands, or choosing a balanced lunch. Use short questions that connect cleanliness and food choices with everyday wellbeing.
Physical Sciences	Focus Area: Grade V: Friction & Gravity through Observation Connect friction directly with safe footwear, tyre grip, bicycle brakes, and

maintenance; explain in an engaging, comparative tone that appropriate friction improves safety while excessive friction increases wear.

**Earth &
Space
Sciences**

Focus Area: Grade V: Weather, Climate, Environmental Maintenance & Hazard Safety

Use “What is the weather today, what is our region usually like, and how do we stay safe?” to connect observation, climate patterns, environmental care, and preparedness.

4. Active Inquiry & Low-Cost Activities

Generic Description: This section outlines hands-on, student-centered investigations that rely on readily available, low-cost materials. It ensures that classroom learning is experiential, safe, and actionable without requiring expensive lab infrastructure.

**Life
Sciences**

Focus Area: Grade IV: Healthy Body, Daily Habits, Germs, Food & Nutrition

1) Conduct a flour/glitter transfer simulation to show how contamination spreads through touch, followed by correct hand washing. 2) Maintain a 5–7 day “Healthy Habits” checklist covering hand washing, safe drinking water, clean food, sleep, and physical activity.

**Physical
Sciences**

Focus Area: Grade V: Magnetic Effect, Electric Circuit & Safety

Build a simple dry-cell circuit using a dry cell, bulb/LED, wires, and switch to test open/closed switch conditions; observe attraction/repulsion with magnets and test magnetic transmission through paper or plastic.

**Earth &
Space
Sciences**

Focus Area: Grade V: Weather, Climate, Environmental Maintenance & Hazard Safety

Maintain a 1–2 week classroom weather log; compare with teacher-provided longer-term regional information; conduct a simple school safety audit and practice age-appropriate Drop–Cover–Hold and flood/heatwave safety discussions.

5. Local Pakistani Contexts & Species

Generic Description: This section anchors scientific concepts in the immediate environment of Pakistani students. It provides regional geography, native species, cultural habits, and local infrastructure examples to make learning culturally authentic and contextualized.

**Life
Sciences**

Focus Area: Grade V: Adaptations of Organisms to Surrounding Environment

Use native Pakistani species and regional habitats: camel/cactus in Thar or Cholistan deserts, snow leopard/ibex in northern mountains, mangroves/coastal organisms, and Indus River dolphin/wetland species.

**Physical
Sciences**

Focus Area: Grade IV: Conductors, Insulators & Everyday Applications

Relate material choices to safe and durable everyday products in local homes: metal conducting parts and plastic/rubber insulating covers on wires, plugs, tools, and appliance handles.

**Earth &
Space
Sciences**

Focus Area: Grade V: Weather, Climate, Environmental Maintenance & Hazard Safety

Use monsoon rainfall/flood risk in plains, heatwaves in hot urban/desert areas, winter

cold/snow in northern regions, earthquakes in relevant zones, dust/wind in dry areas, and locally appropriate environmental maintenance.

6. Visual Design Brief for Artists

Generic Description: This section provides explicit visual instructions for textbook illustrators and graphic designers. It defines layout requirements, diagram standards, cultural diversity in character depictions, and safety warnings to ensure illustrations are accurate, clear, and non-frightening.

Life Sciences

Focus Area: Grade IV: Healthy Body, Daily Habits, Germs, Food & Nutrition

Show a clear hand washing sequence and a balanced Pakistani meal plate using familiar foods. Illustrations should include girls and boys from diverse urban/rural settings and avoid portraying germs as scientifically literal cartoon “monsters”.

Physical Sciences

Focus Area: Grade V: Magnetic Effect, Electric Circuit & Safety

Show pictorial and standard-symbol versions of the same simple circuit. Every circuit page must display a prominent safety box: “Use dry cells only. Never experiment with wall sockets or mains electricity.”

Earth & Space Sciences

Focus Area: Grade V: Weather, Climate, Environmental Maintenance & Hazard Safety

Use weather-vs-climate comparison panels, simple temperature/rainfall graphs, and calm step-by-step hazard-safety illustrations. Avoid frightening disaster imagery.

7. Embedded Assessment Opportunity

Generic Description: This section presents practical formative assessment tasks embedded directly into textbook lessons. It provides scenarios, data interpretation tasks, or decision-making challenges that allow teachers to evaluate student conceptual understanding, critical thinking, and application skills.

Life Sciences

Focus Area: Grade V: Adaptations of Organisms to Surrounding Environment

Present an unfamiliar habitat scenario and ask learners to choose or design two suitable adaptations, classifying each as structural or behavioral and explaining why it would help survival.

Physical Sciences

Focus Area: Grade IV: Matter, State Changes & Reversible/Irreversible Processes

Provide six everyday changes (e.g., ice melting, cooking an egg, drying wet cloth, burning paper) and ask learners to classify each as reversible or irreversible, giving one observable reason for two selected cases.

Earth & Space Sciences

Focus Area: Grade V: Weather, Climate, Environmental Maintenance & Hazard Safety

Give a short weather datasets plus a local hazard scenario; learners distinguish weather from climate and design a concise family/school safety and environmental-care response.

6.5 Alignment with Pedagogical Approaches

Textbook authors across all three domains must embed active pedagogical approaches directly into chapter structures rather than treating them as optional end-of-unit add-ons:

- Inquiry-Based Learning (IBL): Every chapter opens with a 'Big Question' or observable phenomenon leading to student-led exploration before defining formal concepts.
- Experiential & Hands-On Learning: Provide step-by-step procedures in the main text for practical tasks using household recyclables (jars, cotton, seeds, dry cells, rubber bands).
- Collaborative & Peer Learning: Integrate structured 'Let's Talk' or 'Work in Teams' prompts to foster scientific dialogue, data sharing, and collective problem-solving.
- Problem-Solving & STEAM Integration: Position engineering design challenges (building water filters, pinwheels, recycled instruments, emergency plans) as core assessable components.
- Contextualized & Place-Based Learning: Ground concepts in diverse Pakistani settings—urban and rural schools, farms, markets, canals, mountains, deserts, wetlands, coastal communities, local foods/materials, household energy/water use, regional weather, and familiar plants/animals—without treating any one region or lifestyle as the national norm.

6.6 Inclusion, Diversity and Representation

Science materials should present participation in science as accessible to all learners. Inclusion should be visible in examples, illustrations, practical work, group roles and safety guidance, not confined to a separate diversity box.

- Gender: Represent girls and boys meaningfully and equally as investigators, builders, presenters and users of technology.
- Language and culture: Use clear language, glossaries or labelled diagrams where helpful, and draw examples from varied cultural and linguistic contexts.
- Geography and resources: Reflect urban, rural, mountainous, agricultural, desert and coastal settings; do not assume access to expensive laboratories or digital devices.
- Disability inclusion: Show learners with disabilities as active contributors and provide reasonable alternatives such as enlarged visuals, tactile materials, verbal descriptions or simplified procedural steps.
- Bias avoidance: Avoid stereotypes related to gender, community, religion, language, occupation, social class, location or scientific ability.
- Community relevance: Present farmers, electricians, mechanics, builders, cooks, technicians and other occupations with equal dignity, emphasizing the science involved.
- Group work: Rotate roles such as investigator, recorder, materials manager, presenter and safety monitor so participation is equitable.
- Visual representation: Use diverse learners and communities in photographs and illustrations and avoid repeatedly placing any group in passive roles.

6.7 Assessment within Learning Materials

Assessment should be continuous and directly aligned: Curriculum Standard → Benchmark → SLO → Learning Activity → Assessment Task → Evidence of Learning.

- Use mid-chapter 'Stop and Think' checks after major concepts.
- End chapters with a balanced mix of selected-response, short-answer, structured-response, diagram/data-based and application questions.
- Include practice exercises, reflection prompts and student-friendly 'I can' self-assessment/habit checklists.

- Use performance tasks for practical demonstration (e.g., classification, filtration, heat transfer, vibration, shadows, friction, magnetism and low-voltage circuits) with clear success criteria or simple rubrics.
- Include short project-based tasks assessing planning, investigation, scientific application, testing/modification, teamwork and presentation.
- Assess scientific skills and attitudes as well as knowledge: observation, classification, measurement, prediction, questioning, investigation, data recording, evidence interpretation, conclusions, communication, problem-solving, curiosity, cooperation, responsibility, perseverance and safe practice.



Chapter 7

Weightage and Time Allocation

General Science Curriculum Framework — Grades IV and V

Framework Overview & Purpose

Chapter 7 specifies the official time allocation, subject weightage, strand-wise distribution, and Bloom's Taxonomy cognitive demand framework for General Science across Grades IV and V under the New National Curriculum of Pakistan (NNCP 2026). Designed in structural alignment with Chapter 7 of the Mathematics Curriculum, this framework integrates parameters from the official Scheme of Studies 2026 (36 school weeks, 3 periods per week, 40 minutes per period) and provides an 84-period (28-week) core instructional planning model for textbook authors, curriculum developers, and classroom teachers.

7.1 Allocation Basis and Scheme of Studies Parameters

The distribution of instructional time, subject weightage, and Student Learning Outcomes (SLOs) for General Science is established on the basis of conceptual depth, prerequisite value, inquiry and practical demands, real-world application, and cognitive progression across primary grades, rather than numerical SLO counts alone. The Tentative Official Draft Scheme of Studies (15 August 2026) sets the structural baseline for primary education across Pakistan, establishing an academic year of 180 school days spread across 36 school weeks.

Under the 2026 Scheme of Studies, General Science is formally introduced as a distinct core subject at Grade IV and Grade V. The mandated time allocation for General Science is 3 instructional periods per week in both Grade IV and Grade V, with each period lasting exactly 40 minutes. This provides an annual baseline of 108 periods per grade (4,320 study minutes per year). General Science carries an official subject weightage of 8% within the overall primary school time distribution and an assessment allocation of 50 marks.

7.1.1 The 28-Week Core Instructional Pacing Model

To parallel the curriculum pacing model established in Chapter 7 of the NNCP 2026 Mathematics Curriculum, a 28-week core instructional window (84 periods per grade) is adopted for syllabus design and textbook authoring. The remaining 8 school weeks (24 periods per grade) of the 36-week academic year are explicitly reserved for diagnostic and formative assessment, term-end reviews, remedial instruction, school-based STEAM project challenges, and local environmental field activities.

- **Official Annual Entitlement:** 36 school weeks $\times$ 3 periods/week = 108 annual periods (40 minutes duration; 50 total assessment marks).
- **Core Instructional Pacing Subset:** 28 instructional weeks $\times$ 3 periods/week = 84 core periods per grade (140 instructional days).
- **Flexible Margin:** 8 academic weeks (24 periods) dedicated to formative feedback, practical investigations, disaster-drill practice, and remediation.

7.2 Total Academic Time and Instructional Pacing Summary

Tables 37 and 38 summarize the macro time allocation and instructional pacing subsets for General Science in Grades IV and V, reflecting both the Scheme of Studies parameters and the 28-week planning convention.

Table 37: General Science: Total Academic Time Allocation

Grade	Academic Days/Year	School Weeks/Year	School Days/Week	Science Periods/Week	Science Periods/Year	Duration per Period
Grade IV	180	36	5	3	108	40 minutes
Grade V	180	36	5	3	108	40 minutes

Table 38: General Science Core Instructional Planning Model (28-Week Window)

Grade	NNCP 2026 SLOs	Curriculum Units	Instructional Weeks	Instructional Days	Periods per Week	Core Periods Allocated
Grade IV	74	11 Units	28	140	3	84 Core Periods
Grade V	62	8 Units	28	140	3	84 Core Periods

7.3 Strand and Unit-Wise Content Weightage Allocation

General Science across Grades IV and V is organized into three interconnected content strands: Life Science, Physical Science, and Earth and Space Science. A key achievement of the NNCP 2026 revision is the systematic rationalization of content scope from the earlier National Curriculum (NCP 2022–23). Fact-heavy clusters and overlapping biology topics were streamlined, while Physical Science expectations were made explicit through guided testing, hands-on circuit building, and mixture separation.

Table 39: Consolidated Strand-Wise Summary and Comparison with NCP 2022-23

Grade	Content Strand	NNCP 2026 SLOs	NCP 2022-23 SLOs	Net Change	Percentage Change
Grade IV	Life Sciences	17	27	-10	-37.0%
Grade IV	Physical Sciences	39	28	+11	+39.3%
Grade IV	Earth & Space Sciences	18	10	+8	+80.0%
Grade IV Total	Grade IV Consolidated	74	65	+9	+13.8%

Grade	Content Strand	NNCP 2026 SLOs	NCP 2022-23 SLOs	Net Change	Percentage Change
Grade V	Life Sciences	12	23	-11	-47.8%
Grade V	Physical Sciences	37	23	+14	+60.9%
Grade V	Earth & Space Sciences	13	15	-2	-13.3%
Grade V Total	Grade V Consolidated	62	61	+1	+1.6%
Grades IV–V Grand Total	All Strands Combined	136	126	+10	+7.9%

7.3.1 Detailed Unit-Wise Topic Allocation and Instructional Pacing

Details the unit-by-unit allocation of the 136 SLOs across Grade IV (11 units, 74 SLOs) and Grade V (8 units, 62 SLOs), along with the recommended period pacing within the 84-period core instructional model.

Table 40: Grade 4 and Grade 5 / Unit-Wise Content Allocation and Period Pacing

Grade	Content Strand	Unit / Learning Area Title	SLO Count	Pacing (Periods)
Grade IV	Life Sciences	Unit 1: Healthy Body, Food and Nutrition	6	7 Periods
Grade IV	Life Sciences	Unit 2: Life Cycles of Plants and Animals	5	6 Periods
Grade IV	Life Sciences	Unit 3: Ecosystems and Energy Flow	6	7 Periods
Grade IV	Physical Science	Unit 4: Energy in Everyday Life — Heat, Sound and Light	15	17 Periods
Grade IV	Physical Science	Unit 5: Magnetism and Static Electricity	5	6 Periods
Grade IV	Physical Science	Unit 6: Force and Motion	7	8 Periods
Grade IV	Physical Science	Unit 7: Matter, States and Changes	12	13 Periods
Grade IV	Earth & Space	Unit 8: Solar System	5	6 Periods
Grade IV	Earth & Space	Unit 9: Energy Resources: Renewable and Non-Renewable	5	5 Periods
Grade IV	Earth & Space	Unit 10: Water Cycle	4	4 Periods
Grade IV	Earth & Space	Unit 11: Soil Erosion: Cause and Effect	4	5 Periods

Grade	Content Strand	Unit / Learning Area Title	SLO Count	Pacing (Periods)
Grade IV Subtotal	Grade IV (11 Units)	Consolidated Grade IV Pacing Model	74	84 Periods
Grade V	Life Sciences	Unit 1: Ecosystems, Food Webs and Adaptations	8	11 Periods
Grade V	Life Sciences	Unit 2: Caring for the Local Environment	4	5 Periods
Grade V	Physical Science	Unit 3: Friction and Gravity	10	13 Periods
Grade V	Physical Science	Unit 4: Electric Circuit and Electrical Safety	9	12 Periods
Grade V	Physical Science	Unit 5: Characteristics of Matter	5	7 Periods
Grade V	Physical Science	Unit 6: Mixtures, Solutions and Separation	13	18 Periods
Grade V	Earth & Space	Unit 7: Earth and Space (Seasons, Eclipses, Moon Orbit)	5	7 Periods
Grade V	Earth & Space	Unit 8: Weather, Climate and Environmental Safety	8	11 Periods
Grade V Subtotal	Grade V (8 Units)	Consolidated Grade V Pacing Model	62	84 Periods

7.4 Cognitive Demand Framework (Bloom's Taxonomy Alignment)

A central pillar of the NNCP 2026 science reform is a decisive shift away from rote memory toward higher-order thinking and practical application. The prescribed cognitive demand across the complete Grades IV–V programme establishes a 40% Knowledge/Understanding and 60% Application/Analysis/Evaluation/Creation balance. This framework ensures that classroom teaching and national assessments prioritize inquiry skills, evidence-based reasoning, and STEAM problem-solving.

Table 41: Grade IV-V / Bloom's Taxonomy Cognitive Weightage and Adjustment Targets

Cognitive Level (Bloom's)	Prescribed Weight	Current SLO Count	Current Share (%)	Target SLO Count	Strategic Adjustment
Remembering / Knowledge	15%	28	20.59%	20	-8 (Reduce definitions)
Understanding	25%	34	25.00%	34	0 (Maintain mechanisms)

Cognitive Level (Bloom's)	Prescribed Weight	Current SLO Count	Current Share (%)	Target SLO Count	Strategic Adjustment
Applying	25%	25	18.38%	34	+9 (Expand tool testing)
Analyzing	15%	23	16.91%	20	-3 (Focus on data trends)
Evaluating	10%	17	12.50%	14	-3 (Focus on justification)
Creating (STEAM)	10%	9	6.62%	14	+5 (Expand design loops)
Total Primary SLOs	100%	136	100.00%	136	Re-balanced to 60% HOTS

7.5 Strategic Shift and Curriculum Rationalization Summary

Provides a qualitative summary of the strategic curriculum shifts between the NCP 2022–23 pattern and the NNCP 2026 framework, highlighting how content load has been rationalized to make learning experiential, relevant, and manageable.

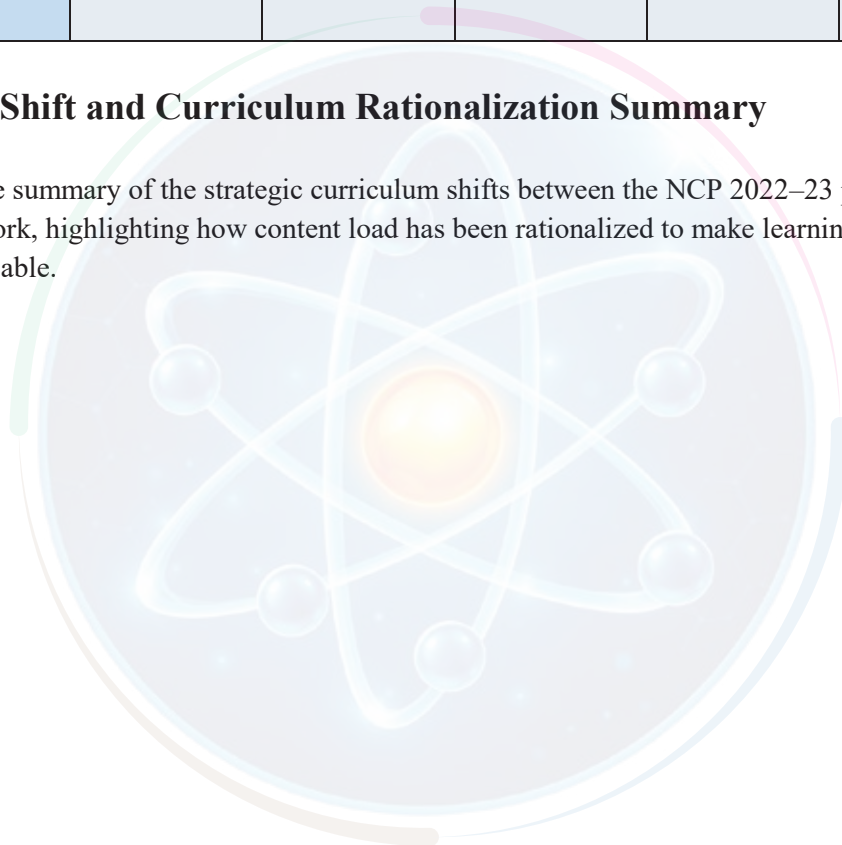


Table 42: Curriculum Rationalisation and Strategic Pedagogy Summary

Dimension	NCP 2022–23 / Earlier Pattern	NNCP 2026 Direction & Strategic Purpose
Conceptual Breadth	Broader entitlement with several fact-heavy clusters and overlapping biological topics across primary years.	Clear grade-to-grade progression; merge, simplify, resequencing and establish explicit concept boundaries without technical overload.
Life Sciences	Detailed plant/animal taxonomy, human organ system details, microorganisms, and theoretical ecology.	Refocused on health, hygiene, germ transmission pathways, balanced local diets, observable life cycles, local food webs, adaptations, and environmental care.
Physical Sciences	Fragmented definitions of matter, simple machines, reflection rules, and isolated physics facts.	Everyday energy (heat, light, sound) and qualitative electrical/magnetic foundations in Grade IV; friction/gravity, safe dry-cell circuits, characteristics of matter, and mixture separation in Grade V.
Earth & Space Sciences	Earth resources, soil layers, solar system, eclipses, and weather distributed with potential repetition.	Connected progression through solar system order, energy resources, water cycle, and soil erosion in Grade IV; Earth-space relationships (seasons, eclipses), weather vs. climate, and disaster preparedness in Grade V.
Pedagogy & STEAM	Textbook-centric delivery dominated by definitions, diagram copying, and recall tests.	Inquiry-driven, experiential learning; low-cost/no-cost Pakistani materials; mandatory safety guardrails; explicit STEAM design challenges and local environmental action.

7.6 Implementation Guidelines for Developers and Teachers

To operationalize Chapter 7 effectively in textbook development, classroom instruction, and national assessment design, authors and educators should observe the following implementation directives:

- **Textbook Pacing Alignment:** Authors must structure student textbooks and teacher guides around the 84-period core instructional pacing model (Table 35). Each unit should specify clear period allocations and lesson breakdowns.
- **Integration of Practical Inquiry:** Practical investigations, kit-based activities, and STEAM challenges must be embedded directly within normal instructional periods rather than treated as

optional afterthoughts. Activities must utilize safe, low-cost, locally available household recyclables.

- **Safety & Cognitive Limits:** Electrical experiments must strictly enforce dry-cell usage (maximum 3V) and prominently display safety warnings against wall sockets. Advanced theories (Ohm's law, electron flow, pathogen taxonomy, meteorology equations) are strictly excluded.
- **Formative & Summative Balance:** Of the 108 total annual periods, 24 periods (8 weeks) must remain unallocated in textbook narrative to allow teachers flexibility for continuous formative assessment, diagnostic feedback, revision, and disaster mock drills.



Annex I

COMPARATIVE ANALYSIS OF INTERNATIONAL CURRICULA WITH PAKISTAN'S NATIONAL CURRICULUM

2. INTERNATIONAL COMPARATIVE ANALYSIS

Concise curriculum-level synthesis; detailed comparative evidence placed in annexure

Comparative Analysis

Life science	
UK	Plants, animals, habitats, food chains, human body, evolution/inheritance (upper primary).
Australia	Biological sciences: needs, life cycles, adaptations, ecosystems and interdependence.
Singapore	Cycles, systems and interactions in plants, animals, humans and environments.
Malaysia	Life Science: living processes, reproduction, microorganisms and ecosystems.
India	Family, food, plants, animals, habitats and environment through integrated EVS.
Sri Lanka	Living world, food, health, environment and relationships with local ecosystems.
Türkiye	Living things, human body, ecosystems, biodiversity and environment.
Physical science: matter, force & energy	
UK	Materials, states, light, sound, electricity, forces and magnets.
Australia	Chemical and physical sciences: materials, motion, heat, light, sound and energy.
Singapore	Diversity, cycles and systems through matter, forces, heat, light and electricity.
Malaysia	Physical and Material Science are separate, sequenced learning fields.
India	Water, materials, motion, work, energy and everyday technologies through experience.
Sri Lanka	Materials, energy, force and everyday applications in activity-oriented units.
Türkiye	Matter, force, motion, light, sound, electricity and daily-life applications.
Earth & space science	
UK	Seasonal change, rocks, soils, water cycle, Earth, Sun, Moon and solar system.
Australia	Earth and space sciences: observable sky, resources, weathering and Earth systems.

Singapore	Earth and space themes through cycles, systems, weather and interactions.
Malaysia	Earth and Space is an explicit learning field across primary years.
India	Weather, water, shelter and environment; formal astronomy develops later.
Sri Lanka	Weather, water, land and environment; contextual observation is emphasized.
Türkiye	Earth, Sun and Moon, weather, natural events and environmental processes.

Comparative Analysis of Pakistan's Primary Science Curriculum:

National Curriculum 2022-23 vs. New National Curriculum 2026 (Grades IV–V)

1. Paradigm Evolution

Pakistan's educational landscape has entered a transformative phase with the transition from the National Curriculum 2022–23 (formerly developed under the Single National Curriculum framework) to the New National Curriculum of Pakistan (NNCP) 2026 for Primary Science (Grades IV–V). While the 2023 curriculum laid essential groundwork for national standardization and concept-based learning across provinces, the 2026 draft curriculum introduces a fundamental shift toward inquiry-driven instruction, evidence-based reasoning, purposeful STEAM (Science, Technology, Engineering, Arts, and Mathematics) integration, and locally grounded experiential learning.

The 2026 curriculum preserves the foundational content domains Life Sciences, Physical Sciences, and Earth & Space Sciences while radically reshaping cognitive expectations. Rather than measuring success by recall of factual knowledge, the 2026 framework rebalances Student Learning Outcomes (SLOs) under Bloom's Taxonomy, lowering lower-order rote memory requirements and elevating application, evaluation, and creative problem-solving.

2. Vision & Strategic Alignment Comparison

Pillar / Dimension	National Curriculum 2022–23 (NCP)	New National Curriculum 2026 (NNCP)
Curriculum Philosophy	Standardized national baseline; transition from traditional rote learning toward concept recognition.	Experiential, inquiry-led discovery; deep conceptual progression and real-world problem-solving.
Cognitive Orientation	Predominantly Knowledge (Remember) & Understanding (~60-70% lower-order cognitive demand).	Rebalanced Bloom's Taxonomy with heavy emphasis on Higher-Order Thinking Skills (HOTS: Apply, Analyze, Evaluate, Create).
STEAM Integration	Disciplinary science taught alongside basic math links; limited cross-curricular synthesis.	Explicit, purposeful STEAM integration embedding Engineering design loops, Arts/visual representation, and Tech/Math.
Resource Requirement	Textbook-centric with reliance on standard laboratory kits or school infrastructure.	Low-cost, no-cost locally accessible materials, enabling hands-on

		experiments across diverse socio-economic contexts.
Environmental & Civic Scope	Basic coverage of ecosystems, pollution, and natural resources.	Deep environmental stewardship, climate literacy, sustainable resource management, and local ecological responsibility.

Key Strategic Insight: While NCP 2023 succeeded in establishing a unified nationwide curriculum across public, private, and religious education sectors, NNCP 2026 upgrades the pedagogical mechanism ensuring that learning occurs through direct experimentation rather than passive reading.

3. Cognitive Redistribution & Bloom's Taxonomy Alignment

A central critique of the 2020–2023 curriculum implementation (as noted in empirical curriculum audits) was the high concentration of lower-order assessment questions in textbooks and examinations. The 2026 framework directly addresses this imbalance through deliberate cognitive weightage distribution across Student Learning Outcomes (SLOs).

Bloom's Cognitive Level	NCP 2022–23 Share	NNCP 2026 Target Share	Pedagogical Shift & Focus
Remembering (Knowledge)	~50% – 60%	~20% – 25%	Drastic reduction in simple definitions and memorized facts; terms introduced in active context.
Understanding (Comprehension)	~25% – 30%	~35% – 40%	Focus on explaining mechanisms, comparing biological and physical phenomena, and conceptual maps.
Applying & Analyzing	~10% – 15%	~25% – 30%	Using models to solve problems, analyzing experimental data, identifying patterns and cause-effect relationships.
Evaluating & Creating (STEAM)	< 5%	~10% – 15%	Designing simple solutions, constructing low-cost models, formulating hypotheses, and evaluating evidence.

4. Strand-Wise Content Domain Comparison

4.1 Life Sciences Strand (Grades IV & V)

In the Life Sciences domain, both curricula cover human organ systems, plant/animal classification, and ecosystems. However, NNCP 2026 shifts the pedagogical depth significantly:

Grade IV Diversity & Characteristics of Living Things: NCP 2023 focuses on listing vertebrates/invertebrates and plant groups. NNCP 2026 requires students to conduct field observations

of local flora and fauna, construct visual classification keys, and examine adaptations to local micro-habitats.

Grade V Human Body Systems: NCP 2023 presents digestive and respiratory organ identification. NNCP 2026 links organ system function with lifestyle choices, nutrition, disease prevention, and simple modeling of physiological mechanics (e.g. constructing working lung models).

Ecology & Conservation: NNCP 2026 introduces local biodiversity threats specific to Pakistani regions (monsoon impact, deforestation, urban expansion) and challenges students to propose actionable community conservation steps.

4.2 Physical Sciences Strand (Grades IV & V)

Matter & Materials: Transition from memorizing three states of matter to investigating physical state changes, solubility, mixtures, and solutions through hands-on experiments using household materials.

Forces, Motion & Simple Machines: NNCP 2026 moves beyond defining lever, pulley, and inclined plane types toward engineering challenges—students design and build functional toy levers or inclined ramps to test friction and load efficiency.

Energy, Sound & Light: NCP 2023 focuses on sources of light and sound reflection rules. NNCP 2026 incorporates circuit-building, investigations into thermal insulators/conductors, and light ray pathway modeling.

4.3 Earth and Space Sciences Strand

Solar System & Celestial Bodies: NNCP 2026 emphasizes physical scale models, moon phase observation logs, and understanding seasonal rotation/revolution dynamics.

Weather, Climate & Earth Resources: Elevates climate awareness by analyzing local weather data, water conservation, and soil degradation issues facing Pakistan's provinces.

5. Pedagogical Methods, Materials & Assessment Transformation

The success of curriculum reform relies on classroom implementation, textbook quality, and evaluation methods. The 2026 framework establishes explicit instructions for textbook authors, teacher training institutions, and examination boards:

Textbook Development Guidelines: Replaces wall-of-text explanations with inquiry prompts, 'Try This' hands-on activities, safety icons, and locally context-rich illustrations reflecting Pakistani environments.

Formative-First Assessment: De-emphasizes high-stakes end-of-term rote tests in favor of continuous formative assessment, teacher observation rubrics, practical investigation logs, and student peer reviews.

Inclusivity & Classroom Equity: Mandates accessible design for diverse learners, gender-balanced science representation, and adaptable low-cost experiments for remote and under-resourced schools.

6. Policy & Implementation Recommendations

Teacher Capacity Building: Launch nationwide teacher professional development programs focused on facilitating inquiry-based learning and low-cost STEAM experiments rather than traditional lecturing.

Textbook & Assessment Alignment: Ensure provincial textbook boards and private publishers strictly adhere to the updated Bloom's cognitive weightage (capping pure recall questions at 25%).

Provision of Low-Cost Science Kits: Distribute standardized low-cost inquiry toolkits (magnifying glasses, basic electrical wires, spring balances, measuring cylinders) to primary schools across all federating units.

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NOTIFICATION

F.No.1-1/2025/NCC(Acad): In exercise of the powers conferred under Section 3(2)(a) of the Federal Supervision of Curricula, Textbooks and Maintenance of Standards of Education Act, 1976, the competent authority i.e. the Director, NCC Wing, Ministry of Federal Education and Professional Training (M/o FE&PT) has approved *New National Curriculum of Pakistan (NNCP-2026)* for the subjects of Early Childhood Care and Education (ECCE), English, Urdu, Mathematics, Health & Physical Education, Arts & Crafts, Information and Communication Technology (Grade 1-5), The World Around Us (Grade 1-3) and Social Studies and Science (Grade 4-5).

2. This curriculum shall be implemented in all public and private educational institutions within the Islamabad Capital Territory (ICT) and in educational institutions under the Federal Government across the country w.e.f. academic year 2027-28. These curricula can be downloaded from official website of NCCW at ncc.gov.pk


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