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Prerequisite of Using the Assessment Framework

This Assessment Framework (AF) provides theory and structured conceptual map of how the learning outcomes of a programme of study should be assessed at the middle school level. It contains guidelines and principles of assessment as well as several practical examples to illustrate the application in the classroom.

The framework can be considered a blueprint of an assessment programme at the middle school level. As with all assessment frameworks, its enactment in schools and classrooms will require professional judgement guided by the following prerequisites.

Teacher and Head Teacher Development – Where needed, teachers and head teachers would require short courses on a. formative assessment, b. the progressive notions of cyclic purposeful assessment and their need in Pakistani context, and, c. the importance and conduct of formative feedback, which facilitates learners’ progression from lower-order thinking skills to higher-order thinking abilities. They may also need to learn how to read the curriculum maps and tables of specification to plan for authentic and valid assessment.

School Based Assessment Planning – School based yearly assessment programmes and monthly assessment schemes must be developed. In addition, to providing principles and guidelines for assessment, the AF also includes illustrative samples to help clarify how the former can be translated into practice. The framework also contains schedules of assessment and assessment weightage. These need to be considered for school level planning.

School Based Mentoring – There is a need to develop mentors who can work with teachers and head teachers in the selected schools to help them translate the AF into various schools’ realities. Pakistan has schools of varying systems – from public to private to madrasah; varying contexts - from rural to urban to semi-urban; varying socio-economic background – from schools for high-income group to low-income groups to middle-income groups. Therefore, mentors will be required for at least the first year of the implementation of the AF.

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CHAPTER ONE
INTRODUCTION

Chapter One

Introduction

This chapter introduces the National Assessment Framework (NAF), developed as an integral component of the National Curriculum Framework (NCF). By drawing on essential information from different national policy documents and from the relevant international literature, the chapter discusses the philosophical positioning of the assessment framework. It presents a brief overview of the quality of education and the need for developing a uniform national assessment framework. It further outlines the basic structure and the principles of various forms of assessment for General Science grades VI to VIII.

Quality of Education

Quality as a complex and contested notion does not have a single definition; the understanding and the provisions of inputs into quality in education vary from society to society and context to context. National Curriculum Framework (NCF) (Government of Pakistan, 2018b) refers to quality of education as a set of elements containing input, process, and output of the education system. Quality also entails all the desirable characteristics of learners, processes, learning materials, content, governance and management, and learning outcomes. Elaborating on the definition, NCF (2018b, p.1) further argues, “Quality education satisfies basic learning needs and enriches the lives of learners and their overall experience of living.” Policy document on Minimum Standards for Quality of Education in Pakistan (Government of Pakistan, 2018a) refers to the definition used in Education for All (EFA) Global Monitoring Report 2005, which draws on two principles. The first principle identifies learners' cognitive development as the major explicit objective of all education systems, and the second emphasizes education's role in nurturing creative and emotional development for promoting the values and attitudes of responsible citizenship. The document on Minimum Standards for Quality of Education (2018) explains the concept of quality in terms of education that is “meaningful, relevant and responsive to the needs of individuals and the society as a whole.” (Government of Pakistan, 2018c, p.5). Similarly, the National Educational Policy (NEP), 2009 recognizes six pillars of quality, which include curriculum, textbooks, assessment, teachers, learning environment and relevance of education to practical life.

The Need for an Assessment Framework

Assessment is an integral part of the quality of education offered to the students. It serves as a tool to measure outputs and outcomes of processes and practices. As such, assessment plays a central role in translating the key ideas in the quality definition into practice.

Erwin (1991(cited in NCF (Government of Pakistan, 2018b) defines assessment as:

...the process of defining, selecting, designing, collecting, analysing, interpreting, and using information to continuously increase students' learning and development. It is the systematic collection, review, and use of information about educational programmes to improve student learning. Assessment focuses on what students know, what they are able to do, and what values they have when they receive their education... Assessment is concerned with the collective impact of a series of lessons on student learning. (p.69)

The above definition of assessment implies that on the one hand assessment provides evidence of students' learning of academic content (academic domain) and development in other domains (psychosocial/psycho-emotional, language and affective domains). On the other hand, it supports the collection of relevant information for various purposes such as informing teaching and learning, determining students' progress on an ongoing basis, measuring achievement, and providing information needed for monitoring individual and institutional accountability. These all lead to informed decision-making about improving students' learning outcomes and enhance the overall quality of education focusing on efforts at classroom, school, and system levels.

NCF (Government of Pakistan, 2018b), emphasises the need to develop a variety of assessment mechanisms to assess students' competence as per curricula and the SLOs. A robust and coherent national assessment system can help in the realization of the aims, goals and purposes of education articulated in NCF and other policy documents. This can be achievable with the help of a comprehensive and coherent national assessment framework to guide and support education systems, schools and teachers in bringing about improvement in student assessment on a sustainable basis.

The Purpose of Developing Assessment Framework

The purpose of developing an assessment framework is to ensure the standardized implementation of different forms of assessment that includes formative and summative school-based classroom assessments and large-scale assessment. It encompasses a paradigm shift from the traditional ways of assessing to a competency-based assessment considering the implication for its utility, reliability and practicality in different contexts. Underpinning different purposes of assessments, the framework serves as guidance for all the stakeholders in the learning system in developing, implementing and using assessments methodically to instate stronger teaching and learning practices.

The above discussion signifies that the assessment needs to be purposeful. It is a broad process of collecting, synthesising and interpreting information to support student learning and to report on the amount learned. The supporting function is known as formative assessment and the reporting function is known as summative assessment (as shown below).

Assessment Type	Formative	Summative
	Looking back and preparing forward. Feeding back and feeding forward.	Feeding back. Providing a snapshot.
Assessment Objectives & Outcomes	Assessment <i>as and for</i> Learning	Assessment <i>of</i> Learning
	Focusing on constructive feedback from the teacher and on developing students' capacity to self-assess and to reflect on their learning to improve their future learning and understanding.	Making judgments about what the student has learned in relation to the teaching and learning goals; should be comprehensive and reflect the learning growth over the time period being assessed.

Source: (Chappuis & Stiggins, 2017)

The Purpose of Developing General Science Assessment Framework

The General Science curriculum is designed to help students become scientifically literate and to encourage them to develop a critical sense of wonder and curiosity about scientific and technological endeavours through inquiry to critically address social, economic, ethical, and environmental issues related to science and technology. Furthermore, the curriculum enables students to use science and technology to acquire new knowledge and to create opportunities to solve problems, so that they may improve the quality of their own lives and the lives of others.

Aligned with the General Science curriculum, General Science Assessment Framework is developed to provide different forms of formative and summative assessment along with the purpose with which each assessment is being introduced.

General Science Assessment Framework is constructed in the form of tasks that involve taking into account the developmental levels of students. The General Science Assessment Framework is a multi-dimensional framework, and it provides a variety of assessment tools to gather information from multiple sources to make sense of what students understand and what scientific ideas are still developing in three different strands, that is, life science, physical science, earth, and space sciences. It will also present a table of specification along with the structure of formative and summative assessment, schedule of assessment and guidelines for

providing feedback for improving performance. The framework also provides samples/examples of selected and constructed items for summative and formative tests including marking guidelines, examples of authentic tasks and rubrics as well as examples of effective feedback.

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The Cyclic Assessment

Purposeful assessment is cyclic. There are many versions of cyclic assessment. The one presented here is adapted from Margaret Heritage's model cited in Greenstein (2016).

The cyclic model illustrates how purposeful assessment systematically supports learning by tracking and enhancing student growth towards standards following the seven steps. The seven-step model will be unpacked in the subsequent sections of the framework.

CHAPTER TWO

PRE-ASSESSMENT

Pre-Assessment

Curriculum Mapping: A Pre-Assessment Strategy

An important consideration in assessment is how well students have mastered the SLOs, what knowledge, skills, and attitudes they have acquired in a particular learning area during an academic year and where they are expected to be at the end of teaching and learning (Greenstein, 2016). The first stage in planning for assessment is, therefore, to develop curriculum maps illustrating the alignment between the SLOs for science concepts understanding for grades VI-VIII with the various domains of knowledge, skills and attitudes using pre-specified criteria based on Bloom's taxonomy (see Appendices A, B & C).

The detailed curriculum maps have been developed for General Science grades VI-VIII and are attached as appendices D, E and F. Curriculum mapping is based on Bloom's Affective and Psychomotor Domains. The following levels were used in each of the three domains:

The Cognitive Domain comprises six (06) cognitive dimensions, namely remember, understand, apply, analyse, evaluate, create and four (04) knowledge dimensions namely factual, conceptual, procedural, and metacognitive. **The Affective Domain** comprises five (05) dimensions comprising receiving, responding, valuing, organising and characterising. **The Psychomotor Domain** comprises seven (07) dimensions namely, perception, set, guided response, mechanism, complex overt response, adaptation, and origination.

The description, key words and sample assessment in each dimension are given in Appendices A, B and C. The sources from where the description and examples have been taken are also given underneath the tables in the different appendices.

Curriculum maps were used for the following four purposes:

- Develop topic wise or competency wise weightage
- Develop tables of specifications based on the weightage
- Group SLOs in terms of knowing, applying and reasoning they are trying to develop
- Develop assessment codes

The following section presents tables of specifications followed by list of assessment codes, SLOs and assessment strategies.

Tables of Specification

Tables of specifications were prepared for each grade levels to align student-learning outcomes with key competencies or instruction units and calculate the number of assessed items.

Grade VI

Total Percentage Share of the Three Domains for Science

Domains	Share in Percentage
Cognitive	86%
Affective	2%
Psychomotor	12%

Weightage of Each Domain

No	Domain	Cognitive	Affective	Psychomotor	Weightage
1	Domain A: Life Sciences	21%	2%	-	23%
2	Domain B: Physical Sciences	59%	-	12%	71%
3	Domain C: Earth and Space Science	6%	-	-	6%
	Total (100%)	86%	2%	12%	100

Table of Specification

Competency Learning Domains	Domain A: life Science (23%)	Physical Science B- (71%)	Domain C: Earth and Space (6%)	Total 100%
<i>Cognitive Domain</i>				
Remember (17%)	4	12	1	17
Understand (20%)	5	14	1	20
Apply (17%)	4	12	1	17
Analyze (18%)	4	13	1	18
Evaluate (6%)	2	3	1	06
Create (8%)	2	5	1	8
<i>Affective Domain</i>				
Receiving (1%)	1	-	-	1
Valuing 1	1	-	-	1
<i>Psychomotor Domain</i>				
Guided Response (3%)	-	3	-	3
Mechanism (3%)	-	3	-	3
Complex Overt (3%)	-	3	-	3
Origination 3	-	3	-	3
Total (100%)	23	71	6	100

Grade VII

Total Percentage Share of the Three Domains for Science

Domains	Share in Percentage
Cognitive	90%
Affective	1%
Psychomotor	9%

Weightage of Each Domain

No	Domain	Cognitive	Affective	Psychomotor	Weightage
1	Domain A: Life Sciences	28%	1%	2%	31%
2	Domain B: Physical Sciences	57%	-	7%	64%
3	Domain C: Earth and Space Science	5%	-	-	5%
	Total (100%)	90%	1%	9%	100

Table of Specification

Competency Learning Domains	Domain A: life Science (31%)	Physical Science B- (64%)	Domain C: Earth and Space (5%)	Total 100%
<i>Cognitive Domain</i>				
Remember (28%)	9	17	2	28
Understand (26%)	8	17	1	26
Apply (12%)	4	8	-	12
Analyze (9%)	3	6	-	9
Evaluate (9%)	3	5	1	9
Create (6%)	1	4	1	6
<i>Affective Domain</i>				
Organizing (1%)	1	-	-	1
<i>Psychomotor Domain</i>				
Set (2%)	-	2	-	2
Guided Response (3%)	-	3	-	3
Mechanism (2%)	1	1	-	2
Complex Overt (2%)	1	1	-	2
Total (100%)	31	64	5	100

Grade VIII

Total Percentage Share of the Three Domains for Science

Domains	Share in Percentage
Cognitive	88%
Affective	2%
Psychomotor	10%

Weightage of Each Domain

No	Domain	Cognitive	Affective	Psychomotor	Weightage
1	Domain A: Life Sciences	33%	2%	2%	37%
2	Domain B: Physical Sciences	50%	-	7%	57%
3	Domain C: Earth and Space Science	5%	-	1%	6%
	Total (100%)	88%	2%	10%	100

Table of Specification

Competency Learning Domains	Domain A: life Science (37%)	Physical Science B- (57%)	Domain C: Earth and Space (6%)	Total 100 %
<i>Cognitive Domain</i>				
Remember (35%)	13	20	2	35
Understand (18%)	7	10	1	18
Apply (14%)	5	8	1	14
Analyse (7%)	3	4	-	7
Evaluate (6%)	2	3	1	6
Create (8%)	3	5	-	8
<i>Affective Domain</i>				
Valuing (2%)	2	-	-	2
<i>Psychomotor Domain</i>				
Set (1%)	-	-	1	1
Guided Response (4%)	2	2	-	4
Mechanism (2%)	-	2	-	2
Complex Overt (3%)	-	3	-	3
Total (100%)	37%	57%	6%	100%

List of Assessment Codes, SLOs and Assessment Strategies

The following processes were used to develop codes.

- The first letters of **C**ognitive Domain “C”, **R**emember Cognitive Dimension “R” and **F**actual Knowledge Dimension “F” to form the overall domain code as “**CRF**”. Similarly, the first letters of the Cognitive Domain “C”, **U**nderstand Cognitive Dimension “U” and **C**onceptual Knowledge Dimension “C” were combined to form the overall domain code as “**CUC**”. In this way all the overall domain codes were generated for the cognitive Domain. The same strategy was used for Affective and Psychomotor Domains.
- The overall domain codes were combined with NC Reference to form specific codes for each SLO. For example, for the first SLO, “Understand that living things grow, take in nutrients, breathe, reproduce eliminate waste and die.” falling in Domain A: Life sciences in CUC overall code, the specific code of CUCA-01 was developed. The same procedure was used for developing codes for all the SLOs falling in cognitive, affective, and psychomotor domains.
- Specific assessment strategies for each of the overall domain codes suited for assessing the specific SLO were also identified.

This exercise was important to identify the specific domain code in which the SLO was falling so that a valid assessment strategy could be used for assessing each SLO. The table below presents the overall domain code, NC reference, list of SLOs and assessment strategies for each grade level. The codes can also be used as a reference point in different types of assessments.

List of Codes, SLOs and Assessment Strategies

Grade VI

Cognitive Domain				
Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
CRC Cognitive Remember Conceptual	SLO: [S-06-A-01]	Recognize cells as the basic unit of life that are organised into tissues, organs, systems, and organisms.	CRCA-01	Identify names, parts, and characteristics; Matching; Quiz, MCQs, SEQs, Labelling & Drawing of diagram, Teachers Observations
	SLO: [S-06-A-07]	Describe the different types of reproduction of plants.	CRCA-7	
	SLO: [S-06-A-20]	Briefly describe some 09 major digestive disorders.	CRCA-20	
	SLO: [S-06-B-03]	Recognize the names and symbols for some common elements (first 10 elements of the Periodic Table) and recognize their physical properties.	CRCB-03	SLO: [S-06-B-49] - Performing or demonstrating experiment.
	SLO: [S-06-B-18]	Identify different types of mixtures.	CRCB-18	
	SLO: [S-06-B-22]	Identify and explain examples of common mixtures from daily life.	CRCB-22	SLO: [S-06-B-51] - Performing or demonstrating experiment.
	SLO: [S-06-B-31]	Identify the advantages of using renewable energy resources.	CRCB-31	
	SLO: [S-06-B-35]	Recognize electric current as a flow of charges.	CRCB-35	
	SLO: [S-06-B-41]	Identify the use of series and parallel electric circuits in daily life.	CRCB-41	
	SLO: [S-06-B-44]	Recognize that electric current has a magnetic field around it using a magnetic compass.	CRCB-44	
	SLO: [S-06-B-45]	Recognize that a freely moving magnet comes to rest pointing in a North-South direction.	CRCB-45	

	SLO: [S-06-B-49]	Recognize that there is a space around a magnet where effect of magnetic force can be observed.	CRCB-49	
	SLO: [S-06-B-51]	Recognize Earth’s magnetic field which attracts a freely pivoted magnet to line up with it.	CRCB-51	
CRP Cognitive Remember Procedural	SLO: [S-06-A-18]	Recognize that a healthy diet contains a balance of foodstuffs.	CRPA-18	Draw diagrams / tables and label them; concept maps; short answers; performing experiments; hands on activities
CRM Cognitive Remember Metacognitive	SLO: [S-06-A-04]	Identify the structures present in an animal cell and plant cell as seen under a simple microscope and relate them to their functions (only) cell membrane, cytoplasm, nucleus, cell wall, chloroplast, mitochondria, and sap vacuole).	CRMA-04	Recall lab procedures; Experiment; Application of ideas, Group Work/ Cooperative Learning
	SLO: [S-06-A-15]	Identify the constituents of a balanced diet for humans as including protein, carbohydrates, fats and oils, water, minerals (limited to calcium and iron) and vitamins (limited to A, C and D), and describe the functions of these nutrients.	CRMA-15	SLO: [S-06-A-15] - structured observations. SLO: [S-06-A-13] - MCQs, SEQs, short answers questions.
CUC Cognitive Understanding Conceptual	SLO: [S-06-A-11]	State the importance of digestion in the human body and describe physical and chemical digestion.	CUCA-11	SLO: [S-06-A-11] - MCQs, SEQs, short answers, and matching activities.
	SLO: [S-06-A-13]	Briefly describe the role of enzymes in digestion.	CUCA-13	SLO: [S-06-B-01] - MCQs, SEQs
	SLO: [S-06-B-01]	Describe the structure of matter in terms of particles (i.e., atoms and molecules).	CUCB-01	SLO: [S-06-B-04] - SEQs and short answers questions

	SLO: [S-06-B-04]	Differentiate that some elements are made of atoms and some elements exist as molecules and have different properties to a single atom of the element.	CUCB-04	SLO: [S-06-B-06] - MCQs, SEQs and missing words.
	SLO: [S-06-B-06]	Illustrate the formation of a compound with the help of a word equation.	CUCB-06	SLO: [S-06-B-10] - MCQs, SEQs
	SLO: [S-06-B-10]	Explain the Particle Theory of Matter.	CUCB-10	SLO: [S-06-B-13] - Observations and Hands-on Activities
	SLO: [S-06-B-13]	Discuss, using the particle theory of matter, why liquids and gases can flow easily but solids cannot.	CUCB-13	SLO: [S-06-B-34] - Observations and Hands-on Activities
	SLO: [S-06-B-26]	Recognize energy as a physical quantity.	CUCB-26	SLO: [S-06-B-36] -A Observations and Diagrams with labelling
		Explain the phenomena of static electricity in everyday life.	CUCB-34	SLO: [S-06-B-37] - Drawing/Labeling of diagrams
	SLO: [S-06-B-36]	Describe a simple circuit as a path for flow of charges.	CUCB-36	SLO: [S-06-B-39] -MCQs, SEQs, and Short Answers
	SLO: [S-06-B-37]	Differentiate between open and closed circuits.	BUCB-37	SLO: [S-06-B-46] - MCQs, SEQs, and Hands-on Activities
	SLO: [S-06-B-39]	Describe the characteristics of series and parallel circuits.	CUCB-39	SLO: [S-06-C-03] - MCQs and SEQs
	SLO: [S-06-B-46]	Describe how to magnetize a magnetic material. Describe how to de-magnetize a magnet.	CUCB-46	
	SLO: [S-06-C-03]	Describe the uses of various satellites in space i.e., geostationary, weather, communication, and Global Positioning System (GPS).	CUCC-03	
CUP	SLO: [S-06-B-12]	Explain why gases and liquids take the shape of their	CUPB-12	Project Work, Developing an

Cognitive Understanding Procedural		containers but solids do not, in terms of the Particle Theory of Matter.		argument; Debating
	SLO: [S-06-B-16]	Explain the changes in states: Melting, freezing, evaporation, condensation, and sublimation, using the particle model of matter.	CUPB-16	SLO: [S-06-B-12] - LEQs and SEQs SLO: [S-06-B-16] - LEQs and SEQs
	SLO: [S-06-B-29]	State the Law of Conservation of Energy and explain how the law applies to different situations.	CUCB-29	SLO: [S-06-B-29] - LEQs and SEQs
	SLO: [S-06-C-02]	Describe the characteristics of asteroids, meteorites, and comets.	CUCC-02	SLO: [S-06-C-02] - LEQs, MCQs, SEQs and short answers
CAC Cognitive Application Conceptual	SLO: [S-06-A-02]	Arrange and rank different levels of cellular organizations – cells to tissues, organs, and organisms.	CACA-02	SLO: [S-06-A-02] - MCQs and SEQs
	SLO: [S-06-A-19]	Correlate diet and fitness.	CACA-19	SLO: [S-06-A-19] - Matching Columns
	SLO: [S-06-B-09]	Categorize elements into metals and non-metals of first 10 elements based on their physical properties.	CACB-09	SLO: [S-06-B-09] - Matching Column
	SLO: [S-06-B-2]	Describe molecules as a combination of atoms (e.g., H ₂ O, O ₂ & CO ₂).	CACB-2	SLO: [S-06-B-2] - LEQs and drawing structured diagrams
	SLO: [S-06-B-15]	Apply the particle theory of matter to explain diffusion.	CACB-15	SLO: [S-06-B-15] - LEQs
	SLO: [S-06-B-17]	Demonstrate that mixtures are formed when two or more substances mix with each other without the formation of a new substance.	CACB-17	SLO: [S-06-B-17] - Observations and Hands-on activities
	SLO: [S-06-B-25]	Demonstrate the process of solution formation (using water as universal solvent).	CACB-25	SLO: [S-06-B-25] - Observations and Hands-on activities
	SLO: [S-06-B-27]	Relate potential energy and kinetic energy.	CACB-27	SLO: [S-06-B-27] - Observations

	SLO: [S-06-B-38]	Draw and interpret simple circuit diagrams (using symbols).	CACB-38	and activities SLO: [S-06-B-38] - Observations and drawing diagrams
CAP Cognitive Application Procedural	SLO: [S-06-A-12]	Sequence the main regions of Alimentary Canal, its associated organs and describe the functions of different parts of the Alimentary Canal.	CAPA-12	Summarizing data in the form of graphs, pictures, tables etc. SLO: [S-06-A-12] - Structured Observations
	SLO: [S-06-B-52]	Grow seasonal plants and vegetables in earthen pots and demonstrate the effect of use of fertilizers on the growth of plants.	CAPB-52	SLO: [S-06-B-52] - Structured Observations
	SLO: [S-06-B-24]	Demonstrate ways of separating different mixtures.	CACB-24	SLO: [S-06-B-24] - Structured Observations and Hands-on activities
	SLO: [S-06-B-28]	Demonstrate an energy transfer such as a bouncing ball by energy transfer diagram, e.g., gravitational potential energy → kinetic → elastic potential energy+ thermal + sound → kinetic → gravitational potential energy, etc.	CACB-28	SLO: [S-06-B-28] - Structured Observations SLO: [S-06-B-40] - Structured Observations
	SLO: [S-06-B-40]	Draw and construct a series and parallel circuits.	CACB-40	SLO: [S-06-B-53] - Structured Observations.
	SLO: [S-06-B-53]	Prepare yogurt and cheese from milk to demonstrate the beneficial microorganisms.	CACB-53	
CANF Cognitive Analysis Factual	SLO: [S-06-B-48]	Compare different types of magnets (permanent, temporary and electromagnets).	CANFB-48	Library Search, Developing an argument; Debating SLO: [S-06-B-48] - Matching the

CANC Cognitive Analysis Conceptual	SLO: [S-06-A-3]	Relate the structures of some common cells (nerve, muscle, epithelium, and blood cells) to their functions.	CANCA-3	Columns, Tables and MCQs
	SLO: [S-06-A-08]	Compare and contrast types of reproduction (sexual and asexual) in plants.	CANCA-8	SLO: [S-06-A-3] - Matching the column, SEQs, MCQs, and tables SLO: [S-06-A-08] - Matching the column, SEQs, MCQs, and tables
	SLO: [S-06-A-10]	Inquire how artificial propagation can lead to better quality yield in agriculture	CANCA-10	SLO: [S-06-A-10] - SEQs
	SLO: [S-06-A-14]	Conclude that blood transports the products of digestion to other parts of the body and the undigested products get egested/defecated.	CANCA-4	SLO: [S-06-A-14] - Oral Questions, SAQs, and ERQs SLO: [S-06-A-16] -Oral Questions, SAQs, and ERQs
	SLO: [S-06-A-16]	Identify the essential nutrients, their chemical composition, and food sources.	CANCA-16	
	SLO: [S-06-B-5]	Explain that compounds are formed by different types of elements joining together chemically forming a new substance.	CANCB-5	
	SLO: [S-06-B-11]	Use particle model of matter to investigate the movement and arrangement of particles in three states. Interpret the evidence for the existence of the particles in matter by observing daily life examples (adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating saltwater).	CANCB-11	SLO: [S-06-B-11] -Observations followed by checklist/rubrics SLO: [S-06-B-19] - Matching the column, SEQs, and tables SLO: [S-06-B-20] - SEQs, and MCQs
	SLO: [S-06-B-19]	Describe the difference between elements, compounds, and mixtures.	CANCB-19	SLO: [S-06-B-21] - SEQs, and

	SLO: [S-06-B-20]	Differentiate between pure substances and mixtures on the basis of their formation and composition.	CANCB-20	short answers SLO: [S-06-B-30] - Matching the column, MCQs, and tables SLO: [S-06-C-01] & SLO: [S-06-C-5] - Matching the column, MCQs, and tables
	SLO: [S-06-B-21]	Describe alloys as mixtures of metals and some other elements.	CANCB-21	
	SLO: [S-06-B-30]	Compare the Renewable Energy Sources (wind, water, Sun, and plants) and Non-Renewable Sources of energy (coal, natural gas, crude oil).	CANCB-30	
	SLO: [S-06-C-01] SLO: [S-06-C-5]	Differentiate between the characteristics of different planets. Differentiate between planets and dwarf planets.	CANCC-10 CANCC-5	
CANP Cognitive Analysis Procedural	SLO: [S-06-A-6]	Compare and contrast an animal cell and plant cell by preparing slides using onion peels and cheek cells.	CANPA-6	Summarizing data in the form of graphs, pictures, tables etc. Observations followed by Checklist/Rubrics SLO: [S-06-B-23] - SEQs, short answers and MCQs
	SLO: [S-06-B-42]	Investigate the factors that affect the brightness of bulbs or speed of motors. <ul style="list-style-type: none"> • Number of batteries • Number of Bulbs • Type of wire • Length of wire • Thickness of wire 	CANPB-42	
	SLO: [S-06-B-08]	Explore the common elements and compounds in our daily life (Carbon, Nitrogen, Hydrogen, Aluminum, Water, Common salt, Sugar).	CECB-08	

	SLO: [S-06-B-23]	Justify why air is considered as a mixture of gases.	CECB-23	
	SLO: [S-06-C-04]	Investigate how artificial satellites have improved our knowledge about space and are used for space research.	CECC-04	
	SLO: [S-06-C-06]	Inquire into the sighting of Halley's Comet; 74 describe what they would feel if they saw it.	CECC-06	
CCC Cognitive Creative Conceptual	SLO: [S-06-B-50]	Draw magnetic field of a bar magnet using iron filings.	CCCB-50	Planning (designing) Observations followed by Checklist/Rubrics
CCP Cognitive Creative Procedural	SLO: [S-06-B-32]	Assemble and demonstrate a solar panel to operate a small fan. (STEAM)	CCPB-32	Producing (construction) Observations followed by Checklist/Rubrics
	SLO: [S-06-B-43]	Assemble and operate a trip wire security alarm system using simple items. (STEAM)	CCPB-43	
	SLO: [S-06-B-55]	Assemble a circuit to demonstrate the working of an electric bell.	CCPB-55	
CCM Cognitive Creative Metacognitive	SLO: [S-06-B-33]	Design and make a solar water heater. (STEAM)	CCMB-33	Generating (hypothesizing) Observations followed by Checklist/Rubrics and construction of model/project
	SLO: [S-06-B-47]	Construct an electromagnet and identify its application in daily life.	CCMB-47	
	SLO: [S-06-B-47]	Design a solar oven to convert solar energy into heat energy.	CCMB-54	

Affective Domain

Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
AR Affective Receiving	SLO: [S-06-C-06]	Inquire into the sighting of Halley's Comet;	ARC-06	Write one muddiest and one mightiest point of the lesson, Structured Essay Questions (SEQs)
AV Affective Valuing	SLO: [S-06-A-19]	Correlate diet and fitness. (C)	AVA-19	Write an opinion piece, explaining one's own stance and reasons supporting that stance. Seeking out information in popular media related to a particular topic. Proposing a plan to improve teamwork while doing STEM challenge. Structured Essay Questions (SEQs)

Psychomotor Domain

Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
PGR Psychomotor Guided Response	SLO: [S-06-B-40]	Draw and construct a series and parallel circuits. Draw and interpret simple circuit diagrams (using symbols). Draw and construct a series and parallel circuits.	PGRB-40	Follow instructions to make a model using different directions. Observations followed by Checklist/Rubrics and construction of model/project
PM Psychomotor Mechanism	SLO: [S-06-B-43]	Assemble and operate a trip wire security alarm system using simple items. (STEAM) Draw magnetic field of a bar magnet using iron filings.	PMB-43	Solving a problem, using pre-set procedures; Constructed response question Observations followed by Checklist/Rubrics and construction of model/project
PCOR Psychomotor Complex Overt Response	SLO: [S-06-B-52]	Grow seasonal plants and vegetables in earthen pots and demonstrate the effect of use of fertilizers on the growth of plants.	PCORB-52	Observations followed by Checklist/Rubrics and construction of model/project

PO Psychomotor Origination	SLO: [S-06-B-33]	Design and make a solar water heater. (STEAM)	POB-33	Project work; Creating different models; Redesign the prototype (solution of any STEM challenge) using the evidence gathered from testing the prototype and research. Observations followed by Checklist/Rubrics and construction of model/project
	SLO: [S-06-B-47]	Construct an electromagnet and identify its application in daily life.	POB-47	
	SLO: [S-06-B-54]	Design a solar oven to convert solar energy into heat energy.	POB-54	

List of Codes, SLOs and Assessment Strategies

Grade VII

Cognitive Domain

Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
CRF Cognitive Remember Factual	SLO: [S-07-B-40]	Define the terms: Wavelength, frequency, and time period of wave.	CRFB-40	Definition; MCQs; Oral questions
	SLO: [S-07-B-49]	State SI (System International) unit of speed.	CRFB-49	
CRC Cognitive Remember Conceptual	SLO: [S-07-A-03]	Define the process of photosynthesis and derive word equation for it.	CRCA-03	Identify names, parts, and characteristics; Matching; Quiz
	SLO: [S-07-A-04]	Know that plants require minerals to maintain healthy growth and life processes (limited to magnesium to make chlorophyll and nitrates to make protein).	CRCA-04	SLO: [S-07-A-04] - MCQs, Diagrams and Labelling SLO: [S-07-A-14] - MCQs,

			Diagrams and Labelling
SLO: [S-07-A-14]	Describe the role and function of major organs in the human respiratory system including trachea, lungs, and alveoli (air sacs).	CRCA-14	SLO: [S-07-A-21] - MCQs
SLO: [S-07-A-16]	Describe the structure and function of the human heart.	CRCA-16	SLO: [S-07-A-23] - Diagram and Labelling SLO: [S-07-B-01] - Diagram and Labelling
SLO: [S-07-A-19]	Describe the composition of blood and the functions of red cells, white cells, platelets, and plasma.	CRCA-19	SLO: [S-07-B-22] -Hand-on activities followed by checklist/Rubrics
SLO: [S-07-A-21]	Describe the three types of immunity in humans – innate, adaptive, and passive.	CRCA-21	SLO: [S-07-B-28] - Hand-on activities followed by checklist/Rubrics
SLO: [S-07-A-22]	Identify the various types of pathogens that cause infectious diseases.	CRCA -22	SLO: [S-07-B-46] - MCQs, Hand-on activities followed by checklist/Rubrics
SLO: [S-07-A-23]	Describe the parts of the immunity system and how they function to produce an immune response.	CRCA-23	SLO: [S-07-B-47] -MCQs
SLO: [S-07-B-01]	Describe and draw the structure of an atom in terms of electrons, protons, and neutrons.	CRCB-01	SLO: [S-07-C-04] - AHand-on activities followed by checklist/Rubrics
SLO: [S-07-B-02]	Describe how an atom is electrically neutral.	CRCB-02	
SLO: [S-07-B-09]	Define valency and explain the formation of ions.	CRCB-09	
SLO: [S-07-B-21]	Define solubility.	CRCB-21	
SLO: [S-07-B-22]	Recognize that the amount of solute which dissolves in a given solvent has an upper limit.	CRCB-22	

	SLO: [S-07-B-28]	Describe the expansion of the three states of matter on heating, and contraction on cooling, in terms of particles.	CRCB-28	
	SLO: [S-07-B-31]	Define the terms heat and temperature on the basis of Kinetic Molecular Theory.	CRCB-31	
	SLO: [S-07-B-36]	Define a wave.	CRCB-36	
	SLO: [S-07-B-46]	Describe the effect of force on changing the speed and direction of motion with time.	CRCB-46	
	SLO: [S-07-B-47]	Define and state the SI unit of force.	CRCB-47	
	SLO: [S-07-C-04]	Describe the effects of the Earth's annual revolution around the Sun, given the tilt of its axis (e.g., different seasons, different constellations visible at different times of the year).	CRCC-04	
CRP Cognitive Remember Procedural	SLO: [S-07-A-12]	Sketch and label the human circulatory system.	CRPA-12	Draw diagrams / tables and label them; Concept maps; short answers; Performing experiments; Hands on activities
	SLO: [S-07-B-08]	Recognize periods and groups in the Periodic Table.	CRPB-08	
	SLO: [S-07-B-11]	Recognize that a chemical bond results from the attraction between atoms in a compound and that the atoms' electrons are involved in this bonding.	CRPB-11	
	SLO: [S-07-B-13]	Recognize that oxygen is needed in combustion, rusting and tarnishing.	CRPB-13	
	SLO: [S-07-C-01]	Recognize that the force of gravity keeps planets and moons in their orbits.	CRPC-01	

	SLO: [S-07-C-03]	Recognize that tides are caused by the gravitational pull of the Moon.	CRPC-03	
CRM Cognitive Remember Metacognitive	SLO: [S-07-B-23]	Identify the factors which affect the solubility of a solute in a solvent and recognize the importance of these factors in homes and industries.	CRMB-23	Recall lab procedures; experiment; Application of ideas
CUF Cognitive Understanding Factual	SLO: [S-07-A-05]	Explain that the structure of leaves is adapted to the process of photosynthesis.	CUFA-05	Explain and describe characteristics of given objects and things, write missing information.
	SLO: [S-07-A-15]	Explain that living organisms have a complex transport system for transfer of various solids, liquids, and gases across the body.	CUFA-15	SLO: [S-07-A-05] - drawing diagrams , Project/ activity followed by checklist/rubrics, and short answers
	SLO: [S-07-A-17]	Explain how blood circulates in the human body through a network of vessels (arteries, veins, and capillaries), and transports gases, nutrients, wastes and heat.	CUFA-17	SLO: [S-07-A-15] - drawing diagrams , Project/ activity followed by checklist/rubrics, and short answers
	SLO: [S-07-A-20]	Explain the various lines of defences that the body has against pathogens.	CUFA-20	SLO: [S-07-A-17] - Drawing diagrams , Project/ activity followed by checklist/rubrics, and short answers
	SLO: [S-07-A-27]	Explain how infectious diseases such as hepatitis, covid-19, typhoid, and dengue are caused /contracted, how they are tested and diagnosed, and how they can be prevented.	CUFA-27	SLO: [S-07-B-24] - Activities followed by checklist/rubrics, and MCQs
	SLO: [S-07-B-24]	Explain what is meant by a concentrated and dilute solution.	CUFB-24	
	SLO: [S-07-B-24]			
CUC	SLO: [S-07-A-23]	Describe the parts of the immunity system and how	CUCA-23	Group Work/Cooperative Learning

Cognitive Understanding Conceptual		they function to produce an immune response.		
	SLO: [S-07-B-07]	Explain that the Periodic Table is a way to organize elements in a systematic order.	CUCB-07	SLO: [S-07-B-32] - Hands-on activities followed by checklist/rubrics
	SLO: [S-07-B-32]	Explain why metals are good thermal conductors and fluids are poor conductors of heat using the particle model.	CUCB-32	SLO: [S-07-B-42] - Activities followed by checklist/rubrics
	SLO: [S-07-B-39]	Identify; a) water wave and Sound wave as mechanical wave, b) light wave as electromagnetic wave	CUCB-39	
	SLO: [S-07-B-42]	Explain the factors affecting pitch and loudness of sound.	CUCB-42	
	SLO: [S-07-B-52]	Give examples of contact forces and non-contact forces.	CUCB-52	
CUP Cognitive Understanding Procedural	SLO: [S-07-A-06]	Describe the process of respiration and write word equations for it. Compare and contrast the processes of photosynthesis and respiration.	CUPA-06	Project Work SLO: [S-07-A-06] - MCQs, SEQs, Tables, Observations followed by Checklist/Rubrics
	SLO: [S-07-A-18]	Compare and contrast arteries, veins, and capillaries.	CUPA-18	SLO: [S-07-A-18] - MCQs, SEQs, Observations followed by Checklist/Rubrics.
	SLO: [S-07-B-10]	Write chemical formulae on the basis of valency of the constituent elements, such as H ₂ O NaCl, NH ₃ , CO ₂ , CO	CUPB-10	SLO: [S-07-B-10] - SEQs, Observations followed by Checklist/Rubrics
	SLO: [S-07-B-14]	Explore methods of preventing rusting.	CUPB-14	SLO: [S-07-B-14] - MCQs, SEQs, Observations followed by Checklist/Rubrics
	SLO: [S-07-B-30]	Compare all three scales of temperature (including inter-conversion of temperature scales).	CUPB-30	SLO: [S-07-B-30] - MCQs, Matching

				Columns and Observations followed
	SLO: [S-07-B-35]	State and explain the practical methods of thermal insulation used for constructing buildings.	CUPB-35	SLO: [S-07-B-35] - MCQs, Short Questions, Matching Columns and Observations followed by Checklist/Rubrics
	SLO: [S-07-B-37]	Compare the types of waves (mechanical and electromagnetic) with daily life examples.	CUPB-37	SLO: [S-07-B-37] - MCQs, Matching Columns and Observations followed by Checklist/Rubrics
	SLO: [S-07-B-43]	Compare and interpret waveforms in terms of pitch and loudness.	CUPB-43	SLO: [S-07-B-43] - MCQs, Matching Columns and Observations followed by Checklist/Rubrics
	SLO: [S-07-B-48]	Formulate the relationship between speed, distance, & time.	CUPB-48	SLO: [S-07-B-48] - MCQs, Matching Columns and Observations followed by Checklist/Rubrics
	SLO: [S-07-B-51]	Interpret a distance-time graph.	CUPB-51	SLO: [S-07-B-51] - SEQs may be added.
CUM Cognitive Understanding Metacognitive	SLO: [S-07-A-02]	Predict the role of xylem and phloem in transport of water and food in plants by observing the cross section of the stem.	CUMA-02	Recall lab procedures; experiment; Application of ideas
	SLO: [S-07-B-25]	Identify ways of accelerating the process of dissolving materials in a given amount of water and provide reasoning (i.e., increasing the temperature, stirring, and breaking the solid into smaller pieces increases the process of dissolving).	CUMB-25	Observations followed by Checklist/Rubrics
	SLO: [S-07-B-29]	Predict the effects of heat gain and heat loss.	CUMB-29	

CAF Cognitive Application Factual	SLO: [S-07-B-05]	Show the arrangement of electrons in K, L and M shells of elements draw the atomic structure of the first eighteen elements of the Periodic Table.	CAFB-05	Responds to questions, making diagrams and structures
	SLO: [S-07-B-06]	Draw atomic structures of elements in the Periodic Table.	CAFB-06	
CAC Cognitive Application Conceptual	SLO: [S-07-B-33]	Construct the concept of heat conduction, convection, and radiation by applying particle theory including daily life examples.	CACB-33	Match, complete sentences SLO: [S-07-B-33] - CRQs, Short Questions, MCQs
	SLO: [S-07-B-41]	Define and relate: 1. Pitch and frequency. 2. Amplitude and frequency.	CACB-41	SLO: [S-07-B-41] - Short Questions, MCQs
	SLO: [S-07-B-44]	Construct the inverse relation between time period and frequency.	CACB-44	SLO: [S-07-B-44] - Short Questions, MCQs
	SLO: [S-07-B-45]	Relate common phenomenon (e.g., echo, hearing thunder after seeing lightning) to the properties of sound.	CACB-45	SLO: [S-07-B-45] - Short Questions, MCQs
CAP Cognitive Application Procedural	SLO: [S-07-A-11]	Trace the path of air in and out of the body and how the oxygen it contains is used during the process of respiration.	CAPA-11	Solves sums; Role play Assessment Strategies of Observations followed by Checklist/Rubric
	SLO: [S-07-B-19]	Demonstrate the process of solution formation (using water as universal solvent).	CAPB-19	SLO: [S-07-C-05] - Structured Essay Questions (SEQs)
	SLO: [S-07-B-34]	Identify the effects of thermal expansion and	CAPB-34	

		contraction with their applications in daily life.		
	SLO: [S-07-B-50]	Calculate average speed.	CAPB-50	
	SLO: [S-07-B-55]	Use different techniques of preserving foods like orange juice, apple jam and pickles.	CAPB-55	
	SLO: [S-07-C-05]	Describe how seasons in Earth's Northern and Southern Hemispheres are related to Earth's annual movement around the Sun.	CAPC-05	
CANC Cognitive Analysis Conceptual	SLO: [S-07-A-09]	Differentiate between the processes of respiration and breathing	CANCA-09	Developing an argument; Debating, Match the Column
	SLO: [S-07-A-10]	Differentiate between aerobic and anaerobic respiration.	CANCA-10	
	SLO: [S-07-B-03]	Differentiate between atomic number and mass number.	CANCB-03	
	SLO: [S-07-B-12]	Differentiate between physical and chemical changes while considering daily life examples.	CANCB-12	
	SLO: [S-07-B-18]	Distinguish between physical and chemical properties of matter.	CANCB-18	
	SLO: [S-07-B-38]	Distinguish between Longitudinal and Transverse waves.	CANCB-38	
	SLO: [S-07-C-02]	Differentiate between mass and weight, using examples of weightlessness experienced by astronauts on the surface of the Moon.	CANCC-02	
CANP Cognitive	SLO: [S-07-B-20]	Distinguish among solute, solvent, and solution; saturated and unsaturated solution.	CANPB-20	Summarizing data in the form of graphs, pictures, tables etc.

Analysis Procedural	SLO: [S-07-B-26]	Explore the effectiveness of various cleaning solutions in cleaning tarnished and oxidized coins. (STEAM)	CANPB-26	SLO: [S-07-B-20] - Matching Columns, Hands-on activities and MCQs. SLO: [S-07-B-53] - Observations followed by Checklist/Rubrics
	SLO: [S-07-B-53]	Demonstrate that forces always work in action and reaction pairs (equal in magnitude, opposite in direction).	CANP-53	
CEC Cognitive Evaluation Conceptual	SLO: [S-07-A-01]	Explain the root and shoot system in plants. Label different parts of leaf, stem, and root (external and internal structure).	CECA-01	Survey, SLO: [S-07-A-01] - SEQs, LEQs, diagrams, recalling lab procedures, experiment and application of ideas SLO: [S-07-A-07] - Observations followed by Checklist/Rubrics, developing and argument, responding to questions SLO: [S-07-A-08] - Observations followed by Checklist/Rubrics SLO: [S-07-B-04] - SEQs, drawing diagrams and figures SLO: [S-07-B-16] - SEQs, Oral questions and short answers SLO: [S-07-B-17] - Matching columns, Short questions/answers, Hands-on Activities
	SLO: [S-07-A-07]	Investigate the phenomena of transpiration and its importance in a plant (wind, temperature, light, humidity affecting rate of transpiration in plants).	CECA-07	
	SLO: [S-07-A-08]	Explore and apply natural raise of water based on the principle of transpiration.	CECA-08	
	SLO: [S-07-B-04]	Determine the atomic number and mass number of elements on the basis of the number of protons, electrons, and neutrons.	CECB-04	
	SLO: [S-07-B-16]	Evaluate Impact of combustion reaction on environment.	CECB-16	
	SLO: [S-07-B-17]	Relate uses of materials to their physical properties (e.g., melting point, boiling point, solubility, thermal conductivity).	CECB-17	
CEP	SLO: [S-07-A-13]	Hypothesize how exercises of varying intensity (from	CEPA-13	Interpreting a graph, a picture

Cognitive Evaluation Procedural		rest to high-intensity interval training) would impact their pulse rate, test their hypothesis, calculate their pulse rate, and record their findings.		etc. SLO: [S-07-A-13] - Structured Observations followed by Checklist/Rubrics
	SLO: [S-07-A-26]	Propose some common strategies for strengthening their immune system.	CEPA-26	SLO: [S-07-A-26] - SEQs, LEQs, MCQs, Hands on activities
	SLO: [S-07-B-15]	Relate uses of materials to their chemical properties (e.g., tendency to rust, flammability).	CEPB-15	SLO: [S-07-B-15] - matching columns, short answer-questions
CCP Cognitive Creative Procedural	SLO: [S-07-B-27]	Make a rock candy with sugar using crystal seeding technique. (STEAM).	CCPB-27	Design an efficient project workflow. SLO: [S-07-B-27] - Observations followed by Checklist/Rubrics, short answer-questions
	SLO: [S-07-B-54]	Design a model to demonstrate drip & sprinkler irrigation system for conservation of water.	CCPB-54	SLO: [S-07-B-54] - Observations followed by Checklist/Rubrics
	SLO: [S-07-B-56]	Make a simple Stethoscope.	CCPB-56	SLO: [S-07-B-56] - Observations followed by Checklist/Rubrics
	SLO: [S-07-B-57]	Make a sanitizer using suitable substances.	CCPB-57	SLO: [S-07-B-57] - Observations followed by Checklist/Rubrics
CCM Cognitive Creative Metacognitive	SLO: [S-07-A-25]	Visualize the ways to add additional layers of defence (such as wearing masks, using sanitizers, etc.).	CCMA-25	Create a learning portfolio. SLO: [S-07-A-25] - Observations followed by Checklist/Rubrics
	SLO: [S-07-A-28]	Suggest ways in which communities of people can safeguard against the spread of infectious diseases.	CCMA-28	SLO: [S-07-A-28] - MCQs, SEQs

Affective Domain

Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
AO Affective Organizing	SLO: [S-07-A-13]	Hypothesize how exercises of varying intensity (from rest to high-intensity interval training) would impact their pulse rate, test their hypothesis, calculate their pulse rate, and record their findings.	AOA-13	Read the given data to provide evidence-based reasoning (constructed response), Oral questions/answers followed by checklist/rubrics

Psychomotor Domain

Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
PS Psychomotor Set	SLO: [S-07-B-01]	Describe and draw the structure of an atom in terms of electrons, protons, and neutrons.	PSB-01	Use body moment to follow the given instructions such as (i) to show the eagerness for activity (ii) follow the pattern (jump, jump and walk one step forward; jump, jump, jump, take one step backward) Observations followed by Checklist/Rubrics
	SLO: [S-07-B-25]	Identify ways of accelerating the process of dissolving materials in a given amount of water and provide reasoning (i.e., increasing the temperature, stirring, and breaking the solid into smaller pieces increases the process of dissolving).	PSB-25	
PGR Psychomotor Guided Response	SLO: [S-07-B-27]	Make a rock candy with sugar using crystal seeding technique. (STEAM).	PGRB-27	Observations, projects, recalling lab procedures and experiments followed by Checklist/Rubrics
	SLO: [S-07-B-56]	Make a simple Stethoscope.	PGRB-56	
	SLO: [S-07-B-57]	Make a sanitizer using suitable substances.	PGRB-57	
PM	SLO: [S-07-A-25]	Visualize the ways to add additional layers of defense (such as wearing masks, using sanitizers,	PMA-25	Follow instruction to make a model using

Psychomotor Mechanism		etc.).		different directions. Observations followed by Checklist/Rubrics
	SLO: [S-07-B-26]	Explore the effectiveness of various cleaning solutions in cleaning tarnished and oxidized coins. (STEAM)	PMAB-26	
PCOR Psychomotor Complex Overt Response	SLO: [S-07-A-13]	Hypothesize how exercises of varying intensity (from rest to high-intensity interval training) would impact their pulse rate, test their hypothesis, calculate their pulse rate, and record their findings.	PCORA-13	Calibrate accuracy using the given criteria. (Self- assessment). Observations followed by Checklist/Rubrics
	SLO: [S-07-B-54]	Design a model to demonstrate drip & sprinkler irrigation system for conservation of water.	PCORB-54	

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List of Codes, SLOs and Assessment Strategies

Grade VIII

Cognitive Domain				
Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
CRF Cognitive Remember Factual	SLO: [S-08-A-12]	Sketch and label a diagram of the Human Nervous System.	CRFA-12	Definition; MCQs; Oral questions, Drawing and labelling diagram
	SLO: [S-08-B-14]	Name certain ionic and covalent compounds.	CRFB-14	
	SLO: [S-08-B-24]	State the Laws of Reflection.	CRFB-24	
	SLO: [S-08-B-41]	List precautionary measures to ensure the safe use of electricity.	CRFB-41	
CRC Cognitive Remember Conceptual	SLO: [S-08-A-01]	Describe variation and adaptation in living organisms.	CRCA-01	Identify names, parts, and characteristics; Matching; Quiz, Drawing and labelling diagram
	SLO: [S-08-A-03]	Identify sources of variation from environmental and genetic factors.	CRCA-03	
	SLO: [S-08-A-05]	Recognize Genetics as the study of Heredity and understand and define heredity as the transfer of genetic information that specifies structure, characteristics, and functions, from parents to offspring.	CRCA-05	SLO: [S-08-B-02] & SLO: [S-08-B-03] Making tables
	SLO: [S-08-A-07]	Describe the composition and structure of DNA.	CRCA-07	SLO: [S-08-B-18] - Making table and lab procedures
	SLO: [S-08-A-09]	Describe cell division and its types – mitosis and meiosis and relate them to the passage of genetic information through reproduction.	CRCA-09	SLO: [S-08-B-33] - LEQs
	SLO: [S-08-A-11]	Identify the organs, functions, and processes of the Human Nervous System.	CRCA-11	SLO: [S-08-B-52] - Drawing diagrams and LEQs
	SLO: [S-08-A-14]	Identify the three major parts of the brain – cerebrum, cerebellum, the fore brain, mid brain, and hind brain, &	CRCA-14	SLO: [S-08-C-01] - Short Answer Questions, LEQs

	describe their various functions.	
SLO: [S-08-A-15]	Describe the structure of the cerebrum, its division into two hemispheres (left and right) and the role of each hemisphere in the control of the body. (C)	CRCA-15
SLO: [S-08-A-17]	Describe the type and function of neurons in transmitting messages through the body.	CRCA-17
SLO: [S-08-A-20]	Describe the structure of the cerebrum, its division into two hemispheres (left and right) and the role of each hemisphere in the control of the body.	CRCA-20
SLO: [S-08-A-23]	Describe the role and function of neurons in transmitting messages through the body.	CRCA-23
SLO: [S-08-A-26]	Describe the role of living things in cycling oxygen and carbon through an ecosystem, citing the processes of respiration, Photosynthesis, and combustion.	CRCA-26
SLO: [S-08-A-29]	Describe how energy flows from producers to consumers, and how only part of the energy flows from one level of the pyramid to the next.	CRCA-29
SLO: [S-08-A-35]	Define biotechnology as the use of living cells and organisms in products and processes that can improve the quality of life.	CRCA-35
SLO: [S-08-B-01]	Recognise Periodic Table as a way of classifying the elements in groups and periods.	CRCB-01
SLO: [S-08-B-02]	Identify the names and location of the first 18 elements only.	CRCB-02

SLO: [S-08-B-03]	Identify properties of metals and non-metals.	CRCB-03
SLO: [S-08-B-05]	Identify chemical reactions and give examples.	CRCB-05
SLO: [S-08-B-17]	Identify the physical properties of acids, alkalis, and salts.	CRCB-17
SLO: [S-08-B-18]	Define pH and its ranges with reference to indicators.	CRCB-18
SLO: [S-08-B-22]	Identify basic properties of light (i.e., speed, transmission through different media, absorption, reflection, and dispersion).	CRCB-22
SLO: [S-08-B-25]	Describe different optical instruments which use curved mirrors.	CRCB-25
SLO: [S-08-B-32]	Identify spherical mirror Describe the characteristics of image(s) formed by concave mirrors and convex mirrors.	CRCB-32
SLO: [S-08-B-33]	Describe use of different optical instruments with plane in which spherical mirrors are used.	CRCB-33
SLO: [S-08-B-34]	Define resistance and its SI unit.	CRCB-34
SLO: [S-08-B-35]	Define voltage & current state their SI units.	CRCB-35
SLO: [S-08-B-37]	Define electric power and state its unit.	CRCB-37
SLO: [S-08-B-45]	Define 'pressure' with examples and its unit.	CRCB-45
SLO: [S-08-B-51]	Describe the properties that are unique to electromagnets (i.e., the strength varies with current, number of coils, and type of metal in the core; the magnetic attraction can be turned on and off; and the	CRCB-51

		poles can switch).		
	SLO: [S-08-B-52]	Briefly describe the working principles of electromagnetic devices such as speaker, doorbell.	CRCB-52	
	SLO: [S-08-C-01]	Explore and understand the terms star, galaxy, Milky Way, and the black holes.	CRCC-01	
CRP Cognitive Remember Procedural	SLO: [S-08-A-19]	Match various body functions with the relevant part of the brain that controls or regulates them (For instance, associating breathing with the brain stem).	CRPA-19	Draw diagrams / tables and label them; concept maps; short answers; Performing experiments; Hands on activities, match the column, SLO: [S-08-B-10] - Procedural experiments activities
	SLO: [S-08-A-25]	Match various body functions with the relevant part of the brain that controls or regulates them (for instance, associating breathing with the brain stem).	CRPA-25	
	SLO: [S-08-B-10]	Recognize the importance of exothermic and endothermic reactions in daily life.	CRPB-10	
	SLO: [S-08-B-39]	Recognize the terms earth wire, fuse, circuit breaker.	CRPB-39	
	SLO: [S-08-C-04]	Discuss the birth and eventual death of our sun.	CRPC-04	
CUF Cognitive Understanding Factual	SLO: [S-08-A-10]	Explain the process of mitosis and meiosis and identify their key phases.	CUFA-10	Explain and describe characteristics of given objects and things, write missing information, LEQs, RRQs MCQs, Match and draw/labelling diagrams
	SLO: [S-08-A-13]	Explain how the brain works as the control station of the human body.	CUFA-13	
	SLO: [S-08-A-28]	Describe global warming and explain how threats to the carbon-oxygen balance such as overpopulation, reliance on fossil fuels, and deforestation are contributing to global warming and climate change.	CUFA-28	

	SLO: [S-08-B-27]	Explain that light is refracted at the boundary between air and any transparent material.	CUFB-27	
CUC Cognitive Understanding Conceptual	SLO: [S-08-A-02]	Explain and illustrate the differences between variation and adaptation.	CUCA-02	Group Work/Cooperative Learning, MCQs, LEQs, drawing and labelling diagram, Observation followed by checklist/Rubrics, Short answer questions, SLO: [S-08-B-06]: Definitions and oral questions followed by checklist/rubrics SLO: [S-08-B-13] - Assessment Strategies of LEQs, making diagram and structures, Observation followed by checklist/Rubrics may be added. SLO: [S-08-B-30]: LEQs, Explaining and describing characteristics
	SLO: [S-08-A-04]	Explain how different adaptations affects the chances of survivals of different species of organism.	CUCA-04	
	SLO: [S-08-A-16]	Map the various steps in the transmission of messages through the body and to the brain via a reflex arch.	CUCA-16	
	SLO: [S-08-A-30]	Draw a food web diagram to illustrate the food relationships between organisms.	CUCA-30	
	SLO: [S-08-A-31]	Describe and illustrate through examples key ecological relationships between organisms, including competition, predation and symbiosis.	CUCA-31	
	SLO: [S-08-A-36]	Illustrate how biotechnology is a discipline/field that has the potential to transform how we live.	CUCA-36	
	SLO: [S-08-B-06]	Define the Law of Conservation of Mass and demonstrate the law with an experiment.	CUCB-06	
	SLO: [S-08-B-12]	Discuss formation of ionic bonds as a result of electrostatic forces between atoms (e. g., NaCl).	CUCB-12	
	SLO: [S-08-B-13]	Discuss types and formation of covalent bond as a result of mutual sharing of electrons between atoms (e. g., H ₂ , O ₂ , N ₂).	CUCB-13	
	SLO: [S-08-B-16]	Classify acids, alkalis, and salts and give examples of each.	CUCB-16	
	SLO: [S-08-B-20]	Describe neutralization reaction with real life	CUCB-20	

		examples.		
	SLO: [S-08-B-30]	Illustrate the characteristics of image formed by plane mirror.	CUCB-30	
CUP Cognitive Understanding Procedural	SLO: [S-08-A-21]	Explain and represent how messages flow through the body from and to the brain, and how the brain collaborates with the sensory organs to regulate this process.	CUPA-21	Project Work, Observation followed by checklist/Rubrics
	SLO: [S-08-A-22]	Map the various steps in the transmission of messages through the body and to the brain.	CUPA-22	
	SLO: [S-08-B-19]	Interpret the pH scale and identify acids, alkalis, and salts.	CUPB-19	
	SLO: [S-08-C-02]	Compare the types of galaxies.	CUPC-02	
CAF Cognitive Application Factual	SLO: [S-08-B-15]	Draw cross and dot structures showing formation of ionic compounds and covalent compounds.	CAFB-15	Responds to questions, drawing diagram, structures and tables
CAC Cognitive Application Conceptual	SLO: [S-08-B-04]	Relate the properties to the uses of metals.	CACB-04	Match, complete sentences, CRQs, short answer questions, discussion with examples followed by checklist/Rubrics
	SLO: [S-08-B-26]	Relate the apparent colour of objects to reflected or absorbed light.	CACB-26	
	SLO: [S-08-B-36]	Formulate that resistance is the ratio of voltage to current.	CACB-36	
	SLO: [S-08-B-46]	Relate pressure with force and area.	CACB-46	
	SLO: [S-08-C-03]	Relate the life of a star with the formation of black hole, neutron star. Pulsar White Dwarf, Red Giant.	CACC-03	

CAP Cognitive Application Procedural	SLO: [S-08-B-07]	Write and balance chemical equations.	CAPB-07	Solve sums; role play, Project activity with procedure/activity and Observation followed by checklist/Rubrics
	SLO: [S-08-B-21]	Observe and write the uses of acids, bases, and salts in daily life.	CAPB-21	
	SLO: [S-08-B-23]	Describe and show how an image is formed by the plane mirror.	CAPB-23	
	SLO: [S-08-B-43]	Examine the effect of an unbalanced force on an object.	CAPB-43	
	SLO: [S-08-B-48]	Examine the effect of force in the presence of air pressure.	CAPB-48	
	SLO: [S-08-B-53]	Make bioplastic from milk and vinegar as an application of biotechnology.	CAPB-53	
	SLO: [S-08-B-54]	Make toothpaste, soap, and detergent as an application of acids and bases in daily life.	CAPB-54	
CAM Cognitive Application Metacognitive	SLO: [S-08-A-24]	Predict what would happen if a nerve connection broke.	CAMA-24	Create a blog, labelling diagram, Project activity/observation followed by checklist/Rubrics
	SLO: [S-08-B-57]	Demonstrate the working of UPS and use it to operate a fan or energy saver bulb.	CAMB-57	
	SLO: [S-08-C-05]	Show how information is collected from space by using telescopes (e.g., Hubble Space Telescope) and space probes (e.g., Galileo).	CAMC-05	
CANF Cognitive Analysis Factual	SLO: [S-08-C-06]	Describe advancements in space technology and analyze the benefits generated by the technology of space exploration.	CANFC-06	Library search
CANC Cognitive	SLO: [S-08-A-06]	Differentiate between the concept of genes and chromosomes and relate them to how genetic characteristics are inherited.	CANCA-06	Developing an argument; debating. Adding diagram, project activity with

Analysis Conceptual	SLO: [S-08-B-08]	Distinguish between different types of reactions (combination, displacement, double displacement, combustion).	CANCB-08	procedure/activity and observation followed by checklist/rubrics, making tables
	SLO: [S-08-B-09]	Distinguish between endothermic and exothermic reactions.	CANCB-09	
	SLO: [S-08-B-28]	Distinguish between reflection and refraction of light with daily life examples.	CANCB-28	
	SLO: [S-08-B-42]	Recognize that several forces may act on an object and that they may or may not balance each other.	CANCB-42	
CANP Cognitive Analysis Procedural	SLO: [S-08-B-40]	Analyse the danger of overloading and short circuit and identify the importance of earth wire, fuses, and circuit breakers.	CANPB-40	Summarizing data in the form of graphs, pictures, tables etc.
	SLO: [S-08-B-44]	Differentiate between floating and sinking objects in terms of density.	CANPB-44	Demonstrations, hands-on activities, observation, experimental and procedural activities followed by checklist/Rubrics
CEF Cognitive Evaluation Factual	SLO: [S-08-A-34]	Explain ways in which human behaviour (e.g., replanting forests, reducing air and water pollution, protecting endangered species) can have positive effects on the local environment.	CEFA-34	Group discussion, making diagrams, structured observation followed by checklist/rubrics
CEC Cognitive Evaluation Conceptual	SLO: [S-08-A-37]	Discuss the applications of biotechnology in the Pakistani context and their effects on the people and the environment of Pakistan over time. Illustrative examples: bread-making, making of yogurt and cheese, vaccines for immunization, insulin production, dyes, etc.	CECA-37	Survey, structured observation followed by checklist/rubrics.
	SLO: [S-08-B-31]	Investigate that light is made up of many colours. Relate the apparent colour of objects to reflected or absorbed light.	CECB-31	SLO: [S-08-B-31] & SLO: [S-08-B-38] - experimental and procedural activities, structured observation followed by checklist/Rubrics

	SLO: [S-08-B-38]	Recognize the electric power of various electrical appliances.	CECB-38	
	SLO: [S-08-B-47]	Investigate effects related to pressure (e.g., water pressure increasing with depth, a balloon expanding when inflated, etc.)	CECB-47	
	SLO: [S-08-B-50]	Investigate the factors that affect the strength of an electromagnet.	CECB-50	
CEP Cognitive Evaluation Procedural	SLO: [S-08-A-27]	Relate how oxygen and carbon cycles are complementary processes that bring balance and symmetry to life on Earth.	CEPA-27	Interpreting a graph, a picture etc. Structured observation, developing arguments followed by checklist/Rubrics
CCC Cognitive Creative Conceptual	SLO: [S-08-A-18]	Create a plan of activities and exercises they can do to maintain a healthy brain.	CCCA-18	Planning (designing)
CCP Cognitive Creative Procedural	SLO: [S-08-A-08]	Design a model of DNA to demonstrate its structure, functions, and various components.	CCPA-08	Producing (construct)
	SLO: [S-08-A-38]	Relate the use of biotechnology in food sciences in producing foods with higher nutritional value and improved taste and quality (how fermentation has been improved by genetically modified organisms or the introduction of certain genes to raise iron content in rice, can be taken as examples).	CCPA-38	
	SLO: [S-08-B-11]	Design a car that is powered solely by a chemical reaction and can travel. (STEAM).	CCPB-11	
	SLO: [S-08-B-48]	Build a two-stage rocket model. (STEAM)	CCPB-48	
	SLO: [S-08-B-49]	Make a hydraulic elevator. (STEAM)	CCPB-49	

	SLO: [S-08-B-55]	Assemble a concave mirror type solar cooker to convert solar energy into heat energy.	CCPB-55	
	SLO: [S-08-B-56]	Assemble and operate a simple wind turbine to produce electricity.	CCPB-56	
CCM Cognitive Creative Metacognitive	SLO: [S-08-A-32]	Predict how changes in an ecosystem (e.g., changes in the water supply, the introduction of a new population, hunting, migration) can affect available resources, and thus the balance among populations.	CCMA-32	Generating (hypothesizing)
	SLO: [S-08-A-33]	Hypothesize what would happen in the ecosystem if the population of one of the participants in different ecological relationships is affected.	CCMA-33	

Affective Domain

Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
AV Affective Valuing	SLO: [S-08-A-33]	Hypothesize what would happen in the ecosystem if the population of one of the participants in different ecological relationships is affected.	AVA-33	Assessment strategy may include structured observation, developing arguments followed by checklist/Rubrics.
	SLO: [S-08-A-37]	Discuss the applications of biotechnology in the Pakistani context and their effects on the people and the environment of Pakistan over time. Illustrative examples: bread-making, making of yogurt and cheese, vaccines for immunization, insulin production, dyes, etc.	AVA-37	Write an opinion piece, explaining one's own stance and reasons supporting that stance. Seeking out information in popular media related to a particular topic. Proposing a plan to improve teamwork while doing STEM challenge. Assessment strategy may include structured observation, developing arguments followed by checklist/Rubrics.

Psychomotor Domain

Overall, Domain Code	SNC Reference	SLOs	Codes	Assessment Strategies
PS Psychomotor Set	SLO: [S-08-C-05]	Show how information- is collected from space by using telescopes (e.g., Hubble Space Telescope) and space probes (e.g., Galileo).	PSC-05	Use body moment to follow the given instructions such as (i) to show the eagerness for activity (ii) follow the pattern (jump, jump and walk one step forward; jump, jump, jump, take one step backward), Demonstration of project activity followed by checklist/rubric
PGR Psychomotor Guided Response	SLO: [S-08-A-08]	Design a model of DNA to demonstrate its structure, functions, and various components.	PGRA-08	Follow instruction to make a model using different directions.
	SLO: [S-08-A-12]	Sketch and label a diagram of the Human Nervous System.	PGRA-12	SLO: [S-08-A-08]: Demonstration of project activity followed by checklist/rubrics
	SLO: [S-08-B-53]	Make bioplastic from milk and vinegar as an application of biotechnology.	PGRB-53	
	SLO: [S-08-B-54]	Make toothpaste, soap, and detergent as an application of acids and bases in daily life.	PGRB-54	
PM Psychomotor Mechanism	SLO: [S-08-B-55]	Assemble a concave mirror type solar cooker to convert solar energy into heat energy.	PMB-55	Performance in a game (football, hockey). Solving a problem, using pre-set procedures; Constructed response question. SLO: [S-08-B-56] - Demonstration of project activity followed by checklist/rubrics
	SLO: [S-08-B-56]	Assemble and operate a simple wind turbine to produce electricity	PMB-56	
PCOR Psychomotor Complex	SLO: [S-08-B-11]	Design a car that is powered solely by a chemical reaction and can travel. (STEAM)	PCORB-11	Calibrate accuracy using the given criteria. (Self- assessment).
	SLO: [S-08-B-49]	Make a hydraulic elevator. (STEAM)	PCORB-49	

Overt Response	SLO: [S-08-B-48]	Build a two-stage rocket model. (STEAM)	PCORB-48	Demonstration of project activity followed by checklist/rubrics
	SLO: [S-08-B-57]	Demonstrate the working of UPS and use it to operate a fan or energy saver bulb.	PCORB-57	

DRAFT

CHAPTER THREE

ASSESSMENT DURING INSTRUCTION

Chapter Three

Assessment during Instruction

Designing Classroom Assessment

The design of classroom assessment depends on how classroom learning is approached. The three commonly understood approaches to learning are surface learning, strategic learning, and deep learning (Entwistle, 2000). Differences between deep, surface, and strategic learners are summarised below.

Surface Approach	Strategic Approach	Deep Approach
<p>Reproducing Intention – merely to cope with course requirements by:</p> <ul style="list-style-type: none">- Treating the course as unrelated bits of knowledge- Memorizing facts and carrying out procedures routinely- Finding difficulty in making sense of new ideas presented- Seeing little value or meaning in either courses or tasks set- Feeling undue pressure and worry about work	<p>Reflective Organizing Intention - to achieve the highest possible grades by:</p> <ul style="list-style-type: none">- Putting consistent effort into studying- Managing time and effort effectively- Finding the right conditions and materials for studying- Monitoring the effectiveness of ways of studying- Being alert to assessment requirements and criteria- Using previous exam papers and assessments to predict questions	<p>Seeking Meaning Intention - to understand ideas by:</p> <ul style="list-style-type: none">- Relating ideas to previous knowledge and experience- Looking for patterns and underlying principles- Examining logic and argument cautiously and critically- Actively interacting with the course content- Reading and studying beyond the course requirements- Taking interest

Note: Adapted from Entwistle, 1988; Entwistle and Ramsden, 2015

It is the teachers' responsibility to foster deep and/or strategic learning so that students can engage with the subject with the help of purposeful assessment strategies.

Assessment Strategies

Literature abounds with the different types of assessment strategies. The important question that perplexes teachers is which strategy to use and for what purposes. The simple response is that teachers must align their assessment with the SLOs. However, this alignment is not easy. Chapter Two presents a list of codes aligned with the SLOs and sample assessment strategies.

This chapter presents an explanation and examples of selected formative and summative assessment strategies.

Formative Assessment for Deep Learning Approach – Meaningful Examples

This framework further elaborates the following four strategies for assessing students' knowledge, skills, and dispositions at the primary school level with examples. This framework provides examples for the formative purposes of the first two strategies and summative purposes of the last two strategies.

1. Portfolio Assessment
2. Group Project Assessment
3. Selected Response (Multiple Choice)
4. Constructed Response (Short and long essay questions)

Portfolio Assessment: Practical work in Science-Lab

A portfolio is a record of the development in learners' thinking and ideas. A portfolio enables learners to assemble examples of their work to tell stories of their learning over a period of time. It enables teachers to assess learners' progress in ideas and understanding that cannot be adequately measured in any other way (Chappuis & Stiggins, 2017; Crockett & Churches, 2017). A portfolio can include the following:

- Examples of students' work with feedback about quality – multiple drafts with revisions
- Students' self-assessment
- Student' reflections on their growth as learners

Portfolio Assessment in the Science Classroom – Example

Teachers can use portfolio to assess learners' growth and achievement in concept exploration as well as practical work done in science-lab. The following are the uses of portfolios to learners and teachers.

Benefits of Portfolios to the Learners

Portfolios offer opportunities for reflection and the development of self-awareness.

Learners develop a sense of ownership of their work through selection of portfolio contents, which leads to a sense of responsibility.

Learners can self-assess their performance with the help clear criteria and opportunity to revise their work.

Benefits of Portfolios to Teachers

Portfolio assessment becomes an integral part of the instructional process rather than a separate activity.

Portfolios give teachers more information about the learners' process than do scores or grades on final product/tests. The variety of texts within a portfolio can give teachers insights into learners' strengths and weaknesses (Murphy & Camp, 1996).

Essential Elements of a Portfolio

- Cover page
- Introduction to the portfolio
- Table of contents
- Entries with dates
- Drafts of your work (writing sample, essays, projects and assignments, science experiments/lab reports [Science-Lab work, problem-solving tasks], tests and quizzes
- Artefacts (awards and certificates, photos, images, concept maps etc.)
- Reflections

Adapted from: <https://www.slideshare.net/ilovelagrosal/portfolio-assessment-42422639>

A Sample of Introduction to the Portfolio

An Introduction to My Portfolio

Date: _____ **I am in Class** _____ **at** _____ **School**

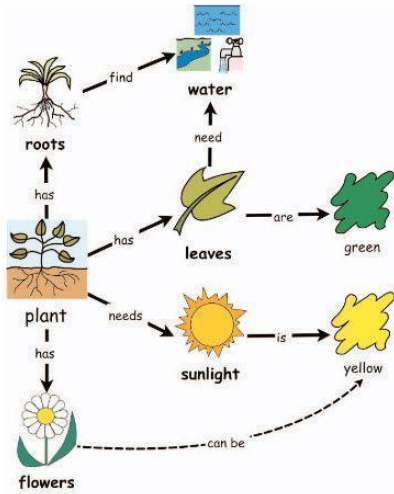
My name is _____ **My teacher's name is** _____

- You will find different things in my portfolio. These are _____

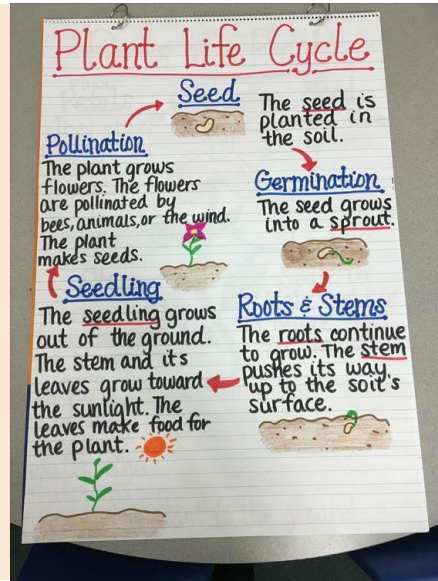
- I am making this project work because I want to (focus on learning target and the portfolio type)

Student's signature: _____

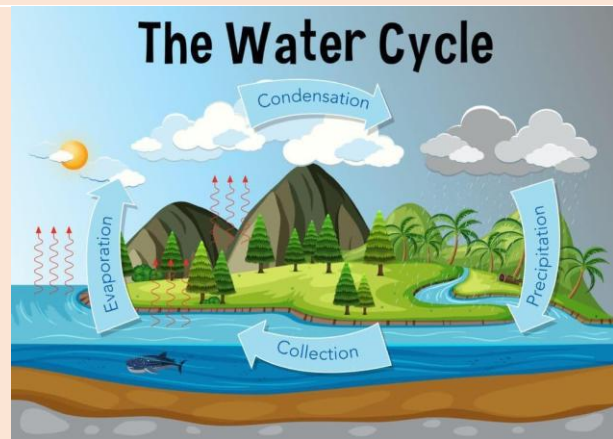
A Sample of Concept Exploration and practical Work in Science Lab, NC p. 34



<https://www.pinterest.com/pin/508484614154945328/>



<https://www.pinterest.com/pin/100275529187209082/>



<https://www.science-sparks.com/make-a-mini-water-cycle/>

<https://www.quora.com/What-are-some-project-topics-relating-to-electrical-and-electronics-engineering-and-chemical-engineering-fields>

Learners can be encouraged to record the steps and process that they use to explore scientific concepts. These can be collected in their portfolio.

A Sample of Design Ideas for the STEM Challenge- Plan of the Team

Prototype Planning Worksheet

Name of Solar Water Still: _____ **Prototype #** _____

Name of the Engineering Firm:	Team Members:
--------------------------------------	----------------------

Engineering Design Challenge: Pakistan Council of Research in Water Resources (PCRWR) has challenged your team to design and construct a prototype for an efficient solar water still. You will calculate the efficiency of the water still as: water collected (l) per surface area of water in still (m^2) per day or $l/m^2/day$. (Assume the average day has 10 hours of sunshine.)

Plan of Solar Water Still: Draw a labelled plan of your solar water still in the space below:

Remember to think about:

1. Maximizing the heat from the sun

3. Maximizing condensation

2. Maximizing Evaporation

4. How the pure water will be collected.

How do you plan to use the brine?

A Sample of Periodic Student Self-Reflection

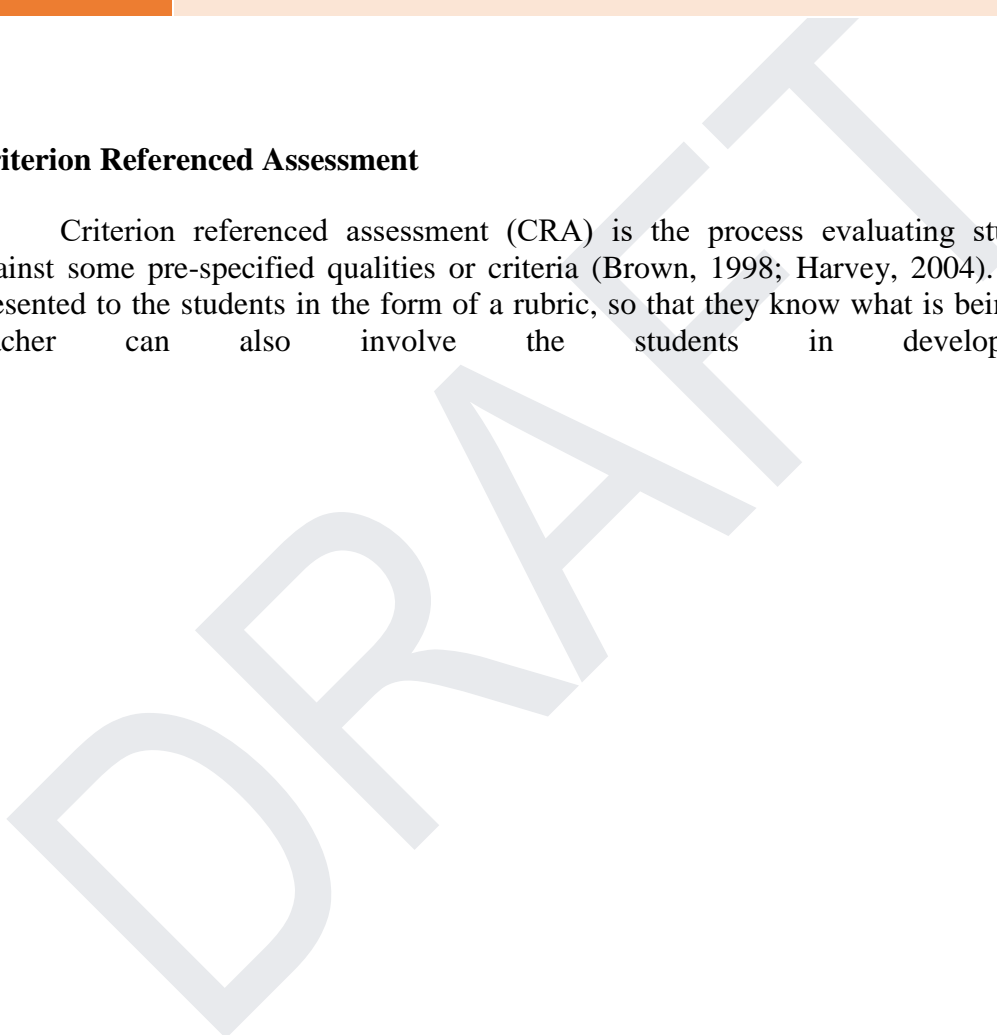
Prompts to activate Self-Reflection

Portfolio Type	Starters
Celebration	I am happiest/proudest of _____ because _____ . I really liked doing _____ because _____ . What this portfolio says about me... I have learnt that _____ . I now understand _____ . I can now do _____ . I now feel _____ .
Growth	I have become better at _____, I used to _____, but now I _____ . Here is what has helped me improve: _____ . Here is what has helped me as a learner: _____ . Here is what I learned about myself as a learner : _____ . Here is what gets in my way as a learner: _____ . Here is what is difficult for me: _____ . This used to be hard, but now it is easy: _____ Here is what made it easier: _____ . Here are “before” and “after” pictures of my learning. The first one shows _____ . The second shows _____ .
Project	Here is what I learnt about myself as a learner while doing this project: _____ . I developed the following skills while doing this project: _____ Here is what I liked least/most about doing this project _____ . Here’s why: _____ Here is how my thinking changed about _____ because of doing this project: _____

	This project has affected my interest in _____. It has caused me to _____.
Achievement	<p>My selections have shown I have mastered _____. Here is how they show that _____.</p> <p>My strength in (subjects or learning target) are _____.</p> <p>I still need to work on _____.</p> <p>Here is how I achieved mastery of _____(learning target):_____.</p> <p>Here how I would change what I did if I had it to do over:_____.</p> <p>Here is what doing _____ has taught me about myself as a learner: _____.</p>

Criterion Referenced Assessment

Criterion referenced assessment (CRA) is the process evaluating students' learning against some pre-specified qualities or criteria (Brown, 1998; Harvey, 2004). The criteria are presented to the students in the form of a rubric, so that they know what is being assessed. The teacher can also involve the students in developing rubrics.



Course Number(s): _____ Date Submitted: _____

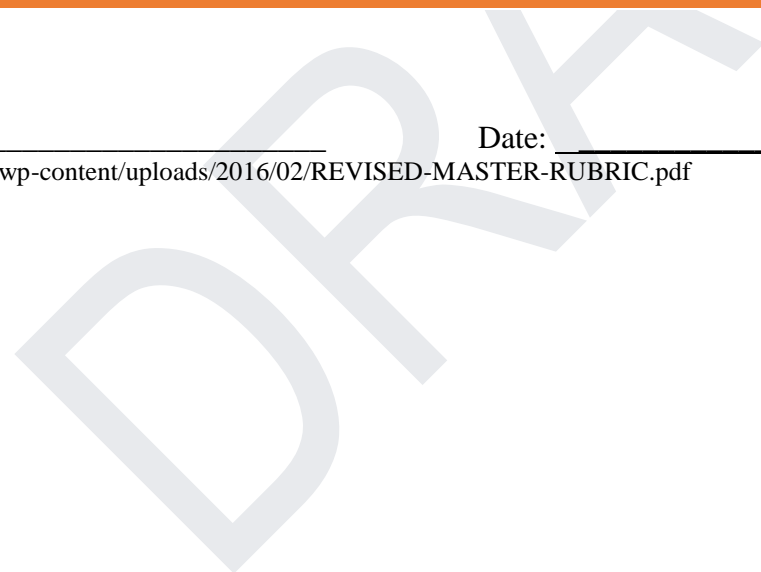
RUBRIC FOR PORTFOLIO-BASED ASSESSMENT

Assessment Ratings	1	2	3	4	Score
	Does not meet expectations (6 points)	Partially meets expectations (12 points)	Meets expectations (18 points)	Exceeds expectations (24 points)	
Sources of Learning <i>Experiences relevant to learning outcomes</i>	Documentation and description of learning experiences related to course learning outcomes are <i>lacking or substantially inadequate</i>	Documentation and description of learning experiences related to course learning outcomes are <i>not effectively or completely presented</i>	Documentation and description of learning experiences related to course learning outcomes are <i>appropriate and effectively presented</i>	Documentation and description of learning experiences related to course learning outcomes <i>exceed expectations</i>	
Demonstration of Learning <i>Artifacts</i>	The portfolio's materials and artifacts are <i>not appropriate and/or adequate</i> , and are not supported by the presentation	The portfolio materials and artifacts are <i>not fully supported</i> by or connected to the course's learning outcomes	The portfolio includes <i>appropriate</i> artifacts that support the demonstration of learning outcomes	The presentation of artifacts is <i>convincing</i> , with <i>strong support</i> for the course's learning outcomes	
Evidence of Learning <i>Competencies</i>	The portfolio shows <i>little, or no evidence</i> of learning tied to sound educational theory	The portfolio documents some, but <i>not sufficient</i> , learning tied to sound educational theory (Or grounded in appropriate academic frameworks)	The portfolio <i>adequately</i> documents learning tied to sound educational theory (or grounded in appropriate academic frameworks)	The portfolio provides <i>clear evidence</i> of learning tied to sound educational theory (or grounded in appropriate academic frameworks)	
Mastering Knowledge & Skills <i>Application of Learning</i>	The portfolio provides <i>little evidence</i> of the student's ability to use knowledge and skills for the course's learning outcomes in practice	The portfolio demonstrates the student's ability to use the knowledge and skills for the course learning outcomes in practice is <i>limited</i>	The portfolio documents the <i>acquisition</i> of knowledge and skills for the course learning outcomes, with <i>some ability</i> to apply them in practice	The portfolio demonstrates the student has <i>mastered</i> the knowledge and skills for the course learning outcomes and can <i>apply them in practice</i>	
Reflection on Learning	The portfolio provides <i>little or no evidence of reflection</i> to increase	The portfolio provides <i>inadequate evidence of reflection</i> to increase	The portfolio provides <i>evidence of reflection</i> to increase learning aligned	The portfolio shows that the student has reflected with <i>substantial depth</i>	

<i>Aligned with course learning outcomes</i>	learning aligned with the course learning outcomes for which credit is being sought	learning aligned with the course learning outcomes for which credit is being sought	with the course learning outcomes for which credit is being sought	upon how the prior learning experience is aligned to the course learning outcomes for which credit is being sought	
Presentation <i>Completeness and quality of the portfolio presentation</i>	Assembly instructions have not been followed with critical portfolio elements not included; the quality of written, visual and/or digital presentation does not meet postsecondary standards	Most of the expected elements are included; the quality of written, visual and/or digital presentation does not meet postsecondary standards with too many errors in spelling, grammar, and punctuation	The portfolio is well organized with all critical elements included; the quality of written, visual and/or digital the presentation is competent with minor errors in spelling, grammar and punctuation	The portfolio is well organized with all critical elements included; learning is well-documented with writing and production skills that exceed those of most students	
Overall Assessment	The recommended cut score for a successful (i.e., passing) portfolio is <u>12</u> with a score of <u>at least 02 in each of the six assessment criteria</u> .				TO TA L

Name of Assessor (print): _____ Date: _____

Source: <https://www.starkstate.edu/wp-content/uploads/2016/02/REVISED-MASTER-RUBRIC.pdf>



Sample of Rubric for Communication Using Evidence Based Reasoning in STEM unit

Communication should have	3	2	1	0
Description of your design and how your prototype meets client’s criteria.	Describes and draws a picture/plan of the design labelling all parts. Explanation of all materials used.	Describes and draws a picture/plan of the design labelling some parts. Explanation of some materials used.	Describes and draws a picture/plan of the design labelling one part. Weak explanation of some materials used.	If any of the following are true: <ul style="list-style-type: none"> • No picture/plan • No labels • No materials
Explanation of prototype using disciplinary connections	Fully explains how science and math has enriched the prototype. Also, explains the technology & engineering connections	Partially explains how science and math has enriched the prototype.	Insufficiently explains some disciplinary connections.	Explanation totally lacks disciplinary connections.
Clear use of evidence	Uses three or more pieces of evidence.	Uses two pieces of evidence.	Uses one piece of evidence only.	No use of evidence.
Vocabulary from science, and mathematics content	Appropriate Vocabulary from science and mathematics content is fully included throughout the communication	Appropriate Vocabulary from science and mathematics content is mostly included in the communication	Appropriate Vocabulary from science or is mathematics is rarely included in the communication	No use of appropriate vocabulary from science and mathematics content in the communication.

Group Project Assessment

Group projects are based on cooperative learning goals, which are reflected in the illustration below.

In cooperative learning structures, a student can obtain his or her goal only when other students in the group obtain theirs (Arends, 2007). Project work is a very good example of group work.

According to the Buck Institute of Education (BIK, 2021), students' work on a project over an extended period of time – from a week up to a semester – that engages them in solving a real-world problem or answering a complex question. They demonstrate their knowledge and skills by developing a public product or presentation for a real audience. As a result, students develop deep content knowledge as well as critical thinking, creativity, and communication skills in the context of doing an authentic, meaningful project.

The assessment in the group project can be done at two levels – the whole group presentation and an individual student performance within the project. Rubrics for both levels are given below.

Multimedia Project and Performance Rubrics (Group Performance)

Criteria	Exceeds Expectations (24 points, 4 for each criterion)	Meets Expectations (18 points, 3 for each criteria)	Almost Meets Expectations (12 points, 2 for each criteria)	Does Not Meet Expectation (6 points 1 for each criteria)
Organization	Students present information in a logical and creative sequence that the audience can follow.	Students present information in a logical sequence that the audience can follow.	Audience has difficulty following presentation because student does not consistently use a logical sequence.	Audience cannot understand presentation because there is no sequence of information.
Subject Knowledge	Students demonstrate complete knowledge by answering all questions with explanations and elaborations.	Students are at ease and provide expected answers to all questions but do not provide elaborations.	Students are uncomfortable with information and are able to answer only rudimentary questions.	Students do not have grasp of information and are not able to answer many questions.
Graphics	Students' graphics explain and reinforce screen text and presentation.	Students' graphics relate to text and presentations.	Students occasionally use graphics that rarely support text and presentation.	Student uses superficial graphics or no graphics.
Mechanics	Presentation has no misspellings or grammatical errors.	Presentation has no more than two misspellings or grammatical errors.	Presentation has three misspellings or grammatical errors.	Presentation has four misspellings or grammatical errors.
Eye Contact	Students maintain eye contact with audience, seldom returning to notes.	Students maintain eye contact most of the times, but frequently return to notes.	Students occasionally use eye contact but still read most of report.	Students read all of the report with no eye contact.
Elocution	Student uses a clear voice and correct, precise pronunciation of words.	Students' voice is clear and most of the words are pronounced correctly.	Students' voice is not very clear and they incorrectly pronounce most of the words.	Students mumble, incorrectly pronounce words and speak in a low tone.

From: Fisher and Frey (2007)

Rubric for Assessing Collaboration Fluency (Individual - Affective)

Criteria	Phase 1 (Awareness, connection, remembering) (4 points)	Phase 2 (Understanding, applying) (8 points)	Phase 3 (Analysing, evaluating) (12 points)	Phase 4 (Evaluating, creating) (16 points)
Interacts with others to generate ideas and develop products	Listens to others' input and occasionally combines his or her own and peers' concepts to produce an understanding of the task, problem, or issue.	Frequently, listens to others' input and occasionally combines his or her own and peers' concepts to produce an understanding of the task, problem, or issue. Attempts to make sure team members contribute.	Listens to others' input and combines his or her own and peers' concepts to produce an understanding of the task, problem, or issue. Uses techniques to make sure team members contribute. Explains the task to the team members.	Listens to others' input and effectively combines his or her own and peers' concepts to produce an understanding of the task, problem, or issue. Uses suitable techniques to make sure all team members contribute. Uses effective probing questioning to develop a realistic understanding of the task.
Develops and implements effective plans	Shows an awareness of the process and the current stage of development.	Uses checkpoints to measure progress in the project. Describes problems and develops some solutions.	Uses regular checkpoints to measure progress in the project. Defines each person's tasks within the process.	Manages progress on the assigned task using regular checkpoints. Clearly defines each person's roles and responsibilities within each element of the process. Discusses problems and develops suitable solutions.
Works collaboratively toward a common, shared goal or objective	Sometimes works with peers. Is sometimes on tasks when working collaboratively.	Works with peers collaboratively or individually to achieve the group's goal.	Works with peers collaboratively or individually to achieve the group's goal. Analyses individual or group progress against the goals and objectives and sometimes offers appropriate critique.	Works with peers collaboratively and economically or individually to achieve the group's goal. Analyses individual or group progress against the goals and objectives and offers appropriate critique or undertakes suitable actions as required.
Revisits, reflects, and revises group process	Sometimes reflects on overall progress. Struggles to accept feedback.	Reflects on overall progress. Often accept feedback. Sometimes offer useful reflection.	Reflects on overall progress and analyses his or her performance. Accept feedback, sometimes modifies behaviour. Sometimes offer useful reflection.	Reflects on overall progress evaluating his or her contribution and that of peers fairly. Accept feedback, modifying tasks, action and behaviours based on this. Offers critical reflection that are task focussed and appropriate, enabling growth and development.

Source: Adapted from Crockett and Churches (2017)

Summative Assessment for Measurement and Evaluation – Frequently Use Examples

This framework is proposing two teaching terms of four months in a year (see section on Balanced Assessment Schedule for details). There will be a school wide summative assessment at the end of each semester. The key purpose of these summative assessments is to obtain valid and accurate information for evaluating each student’s performance. This evaluation is the basis of a student’s academic progression.

Measurement accuracy is determined by *what* is being measured and the *instrument* used to make the measurements. For example, a teacher can obtain a more precise measurement of a students’ knowledge of parts of speech rather than his or her creative ability.

In addition, the instrument used to make the measurements also determines measurement accuracy. Teacher made tests are the most common form of measurement instruments used at the school level. In the subsequent sections, the framework provides examples of the two most common types of test questions - Multiple Choice Questions (MCQs) from selected response and word problems from the constructed response category.

Selected Response - Multiple Choice (Objective Test Item)

Multiple Choice is the most common type of objective test question (Linn & Miller, 2005). They are easy to administer and analyse. Multiple choice questions consist of a stem (question or statement) with several answer choices (distractors). In science, distractors are thoughtfully designed to know student’s misconceptions

The table below gives four guidelines of developing multiple choice items with an example and a non-example. These have been borrowed from Classroom Assessment course (2018) at <https://fcit.usf.edu/assessment/selected/response.html>

Guideline One - All answer choices should be plausible and homogeneous.	
Example	Non-Example
Bees must collect nectar from approximately how many flowers to make 1 pound of honeycomb? A. 10 thousand B. 2 million C. 20 million D. 50 million	Bees must collect nectar from approximately how many flowers to make 1 pound of honeycomb? A. 10 thousand B. 2 million C. 20 million D. Many flowers
Guideline Two - Answer choices should be similar in length and grammatical form.	
Example	Non-Example
Which unit is used to measure how warm or cool the air is? A. Grams B. Kilometres	Which unit is used to measure how warm or cool the air is? A. Kilograms B. Kilo meters

- C. Degree Celsius
- D. Cubic Centimetre

- C. Degree Celsius
- D. Thermometer

Guideline Three – List answer choices in logical (alphabetical or numerical) order

Example

The chart below shows how long it took a seed to sprout at three different temperatures.

Temperature	Days needed to sprout
60° F	15
65° F	13
70° F	11

Based on the chart, how long will it take for the same kind of seed to sprout at 75° F?

- A. 7 days
- B. less than 11 days
- C. 11 days
- D. More than 11 days

Non-Example

The chart below shows how long it took a seed to sprout at three different temperatures.

Temperature	Days needed to sprout
60° F	15
65° F	13
70° F	11

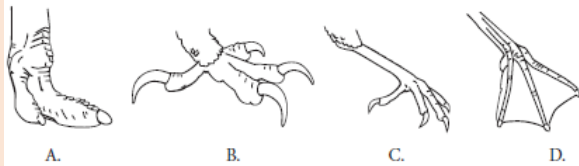
Based on the chart, how long will it take for the same kind of seed to sprout at 75° F?

- A. 7 days
- B. More than 11 days
- C. less than 11 days
- D. 11 days

Guideline Four – Avoid using “All of the Above” options

Example

A bird that lives on a pond is most likely to have which of these foot structures?

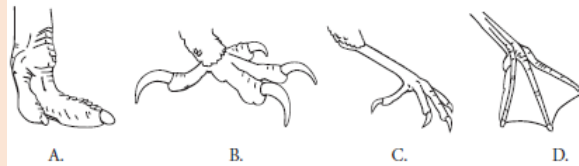


Ref: TIMSS 2011 release items

- i. A
- ii. B
- iii. C
- iv. D

Non-Example

A bird that lives on a pond is most likely to have which of these foot structures?



- i. A
- ii. B
- iii. D
- iv. All of the above

Bottom of Form

In addition, a checklist for reviewing one-best MCQ is also given.

One-Best MCQ Review Checklist

#	Overall	Yes *	No *
1	Is appropriate for the level of the learner		
2	Is aligned to the Student Learning Outcome and its number is referenced		
3	Exam specification number is referenced		
4	Concept to be tested is stated appropriately/ Item is aligned with the concept being assessed		
5	The item is conceptually correct		
6	The cognitive level of the item is identified appropriately		
7	The difficulty level of the item is identified appropriately		
8	Assesses an essential (Must Know) or an important (Good to Know) item		
9	Can be answered with the options covered (Cover Test)		
10	Cannot be answered with the stem/ case covered (Test for Cognitive Level)		
11	Item author's name is mentioned		
12	An authentic reference is mentioned		
13	There are no spelling or grammar mistakes		
14	Task can be completed by the students in the assigned time		
	Stem/ Case		
1	Clearly defined with no ambiguities		
2	Is contextual and relevant		
3	Contains all essential information; however, avoids irrelevant information		
4	Avoids abbreviations, uncommon terminologies, and brand names		
	Lead-in		
1	Focuses on one feature or concept		
2	Avoids negative phrases such as 'Except' and 'Not'		
3	Is clearly understandable at the level of the students		
	Options		
1	Congruent with the lead-in		
2	Aligned with the lead-in in grammar		
3	Are of similar length		
4	Homogenous in content		

5	Distractors are plausible		
6	Listed in an alphabetical order		
7	Use generic and common terms		
8	Mutually exclusive (non-overlapping)		
9	Avoid phrases like ‘all of the above’ and ‘none of the above’		
1 0	Avoid vague terms such as ‘usually’ and ‘frequently’		
1 1	Avoids key terms from the stem or lead-in		
1 2	The key is clearly the best/ correct option for the level of the learners		
1 3	The key/ correct answer is identified		

Source: Aga Khan University Examination Board.

Constructed Response

Constructed response is a very useful way of testing students’ higher order thinking skills. It requires students to organise the ideas they have learnt and respond accordingly. Test items can present a problem or a situation and ask students to construct their own response. In this way, students are expected to analyse, evaluate and synthesise.

Sample 1



Monkey



Crocodile



Grasshopper



Octopus

Answer the following questions using the animals shown above. Write the name for the correct animal in the spaces below.

A. Which animal has an internal skeleton and produces milk for its young?

B. Which animal has an external skeleton and three pairs of legs?

C. Which animal has a soft body and no skeleton?

Ref: TIMSS 2013 release items

Sample 2



The pictures above show two ways of traveling around town.

A. Which way of traveling is better for the environment?

(Check one box.)

- Bicycle
- Motorbike

B. Explain your answer.

Ref: TIMSS released items 2013

Sample 3

Write what happens to plants and fish in a river when a factory pours large amounts of hot water into the river.

Ref: TIMSS 2013 released items

Sample 4 (From STEM Unit on Pedestrian Bridge Design Challenge for Assessing Cognitive Domain of Reasoning and Analysis)

Read the table below showing data on the facilities at four Signal Free Corridors (SFCs) in Karachi.

SFCs	Road Length in Km	Underpass	U-Turn	Pedestrian Bridge	Flyovers
Corridor I	11	3	4	8	6
Corridor II	19	1	45	15	3
Corridor III	28	-	44	19	7
Corridor IV	28	-	39	15	9

(Source: Zubair, S., Kazmi, J., Jooma, R., Ali, S., Akhtar, Z. (2015). Impacts of signal free corridors on the incidence of road traffic accidents in Karachi. Journal of Basic & Applied Sciences, 11(1), 244-254.)

Use evidence-based reasoning to respond to the questions below:

A. Which Signal Free Corridor provides the most facilities?

B. Justify the statement: *Signal Free Corridor-IV has the greatest number of pedestrian bridges in relation to the length of the road.*

Rubric for Assessing Constructed Response Question

Criteria	Exceeds Expectations	Meets Expectations	Almost Meets Expectations	Does Not Meets
----------	----------------------	--------------------	---------------------------	----------------

Expectation				
Explanation	A complete response with a detailed explanation. Student can explain how to solve and WHY the chosen response/methods work.	Good solid response with clear explanation. Student can explain how to solve but not why the method works.	Explanation is unclear. Student can explain only a small part of the work.	Misses key points. Student does not explain the majority of the work.
Use Of Visuals	Clear diagram or sketch with some detail.	Clear diagram or sketch.	Inappropriate or unclear diagram.	No diagram or sketch.
Accuracy	No scientific errors.	No major scientific errors or serious flaws in reasoning.	May be some serious scientific errors or flaws in reasoning.	Major scientific errors or serious flaws in reasoning.
Plan	Student understands the problem, identifies key information for solving the problem, and develops a plan to solve.	Student understands the problem but can only identify some key information needed to solve or develops an inaccurate plan to solve.	Student understands the problem but cannot identify necessary information needed to solve or create a plan to solve.	Student does not understand the problem, does not create a plan to solve.
Process	Student's process is completely shown. Another student can easily follow the student's work.	Student's process is mostly shown, with a few steps combined. A teacher could easily follow the student's work.	Student's process is missing many steps. It would be difficult for another person to follow the student's work.	Little to no work is shown.
Check	Student self-checked their answer and reworked the problem if necessary.			Student failed to self-check his or her answer.

Ref: <https://paizymath.files.wordpress.com/2013/07/math-portfolio-rubric.docx>

Sample General Science Test Paper

Grade VI

Max Marks: 30

Max Time: 2 Hours

Name: _____ Section: _____ Roll no: _____ Date: _____

Instructions:

- Read the paper carefully
- Attempt all the questions

Q.1 Choose the correct answer by circling the appropriate alphabet. [7 Marks]

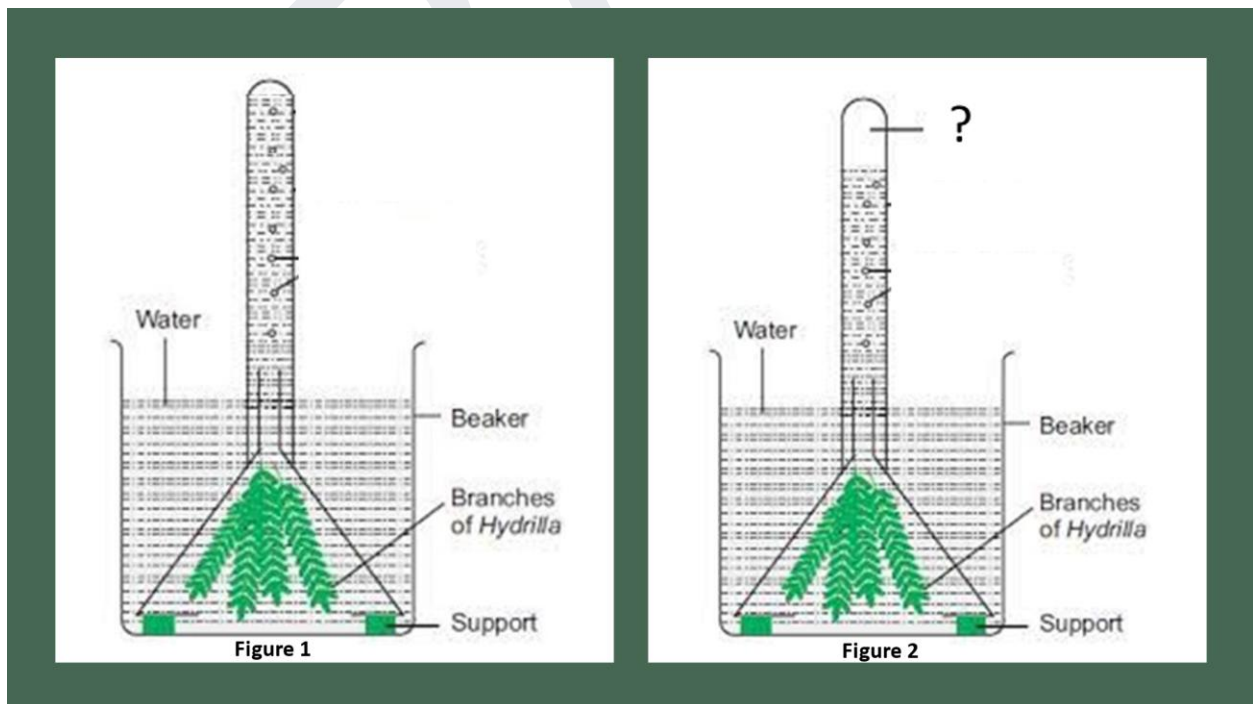
- I. Which of these daily activities can most directly help reduce air pollution in a city?
- A. Turning down the volume on the television
 - B. Using biodegradable materials
 - C. Using public transportation instead of driving
 - D. Recycling paper
- II. How many bones are there in human body?
- A. 206
 - B. 216
 - C. 226
 - D. 260
- III. Which of the following is not a type of teeth?
- A. Canines
 - B. Molar
 - C. Incisors
 - D. Cavity
- IV. Identify this body part?



- A. Brain
- B. Heart
- C. Kidney
- D. Stomach

- V. Which group of energy sources are all renewable?
- A. Coal, oil, and natural gas
 - B. Solar, oil and geothermal
 - C. Wind, solar, and tidal
 - D. Natural gas, solar, and tidal
- VI. Which is an example of a chemical process that releases energy?
- A. Water boiling
 - B. Raw egg cooking
 - C. Oil lamp glowing
 - D. White sugar dissolving
- VII. Animals which eat other animals are called
- A. Carnivores
 - B. Omnivore
 - C. Herbivores
 - D. None of the above

Q.2 The picture shows how a student set up some apparatus in a laboratory for an investigation. The inverted test tube was filled with water at the beginning of the investigation as shown in the Figure 1. After several hours, the level of water in the test tube had gone down as shown in Figure 2.



What is contained in the top part of the test tube labelled X in Figure 2? Explain your answer.

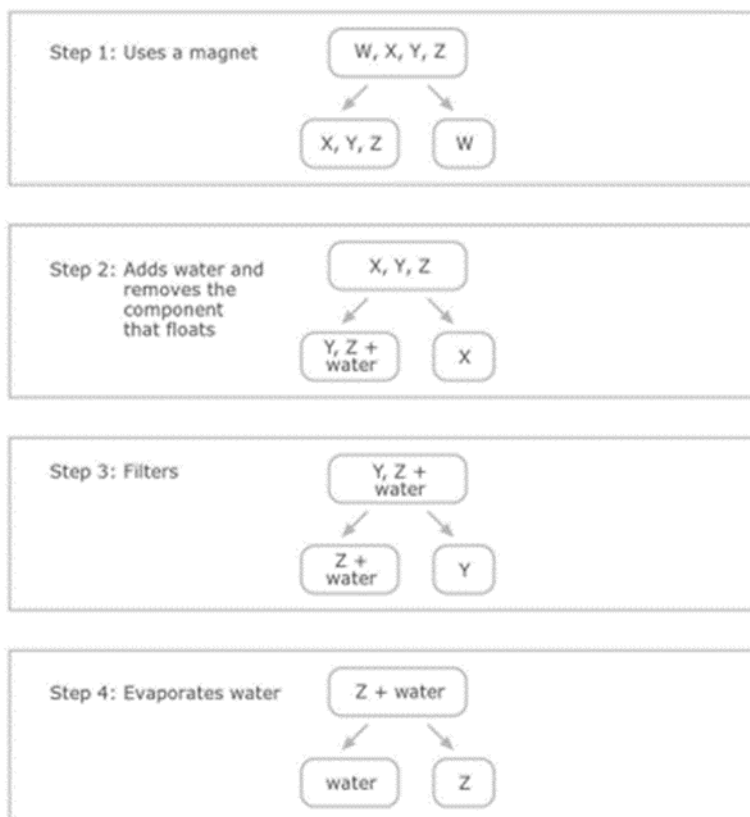
[4 Marks]

Q. 3 The diagram shows a ray of sunlight entering a glass prism. Describe what will be seen on the screen? First draw on the diagram to later explain your answer.

[5 Marks]

Q. 4 Tahira is given a mixture of salt, sand, iron fillings, and small pieces of cork. She separates the mixture using a 4-step procedure as shown in the diagram. The letters W, X, Y and Z are used for the four components but do not indicate which letters stand for which component.

[6 Marks]



Identify what each component is by writing salt, iron, or cork in the correct spaces followed by the justification of your answer. [1 mark for correct identification and 0.5 for justification/component]

Component W is: _____
Because _____

Component X is: _____
Because _____

Component Y is: _____
Because _____

Component Z is: _____
Because _____

Q. 5 Describe two examples of biotechnology in the Pakistani context (share one example from food industry and the other from health sector) and justify how has these two examples supported or hindered the Pakistani society over time. **[8 Marks]**

DRAFT

Assessment Validity

The assessment must be valid, that is, it should actually measure what it is supposed to measure. There are three kinds of validity evidence considered during assessment. These are:

- Criterion
- Construct
- Content

Criterion and construct validity measures are beyond the scope of a class teacher's work. They should best be done by assessment experts. For purposeful assessment, content validity is extremely important and can be controlled by teachers.

Content Validity

As the name suggests, a valid assessment covers the content completed in the class. This means that a valid assessment covers all relevant parts of a subject. If any part, covered in the subject, is left out or if any irrelevant part, not covered, in the subject is included then it is not a valid assessment. The entire purpose of developing a list of codes and tables of specification and aligning them with the assessment strategies was to ensure content validity of the assessment. The assessment should be written at the level of difficulty required by the standards and student learning outcomes covered in the term. The assessment must also be in a format that allows students to demonstrate the particular ability being assessed. For example, if a teacher wishes to assess how a student has improved her writing abilities, then MCQ is not the best option.

Ways to Improve Content Validity

Clearly defined objectives. Student learning outcomes should be clearly defined and operationalised.

Alignment. Assessment measures must be matched with student learning outcomes.

Review by Subject Matter Experts (SMEs). Subject experts may be asked to rate each question on a scale from very relevant/very essential to not relevant/not essential at all. The more SMEs agree that items are essential, the higher the content validity.

Objective Review. The test/assessment question/instrument can be reviewed by faculty at other schools to obtain feedback from an outside party who has not been involved in the instrument development.

Item Analysis. Item analysis is helpful in analysing student responses to individual test/exam questions with the intention of evaluating test/exam quality.

Review and update tests frequently. Many tests that were valid two years ago, are not valid today. It is important to review and update or retire questions that are no longer relevant.

Item Bank. An item bank facility is important to manage and update questions.

CHAPTER FOUR

SUPPORTING RESPONSIVE TEACHING AND LEARNING THROUGH FEEDBACK

DRAFT

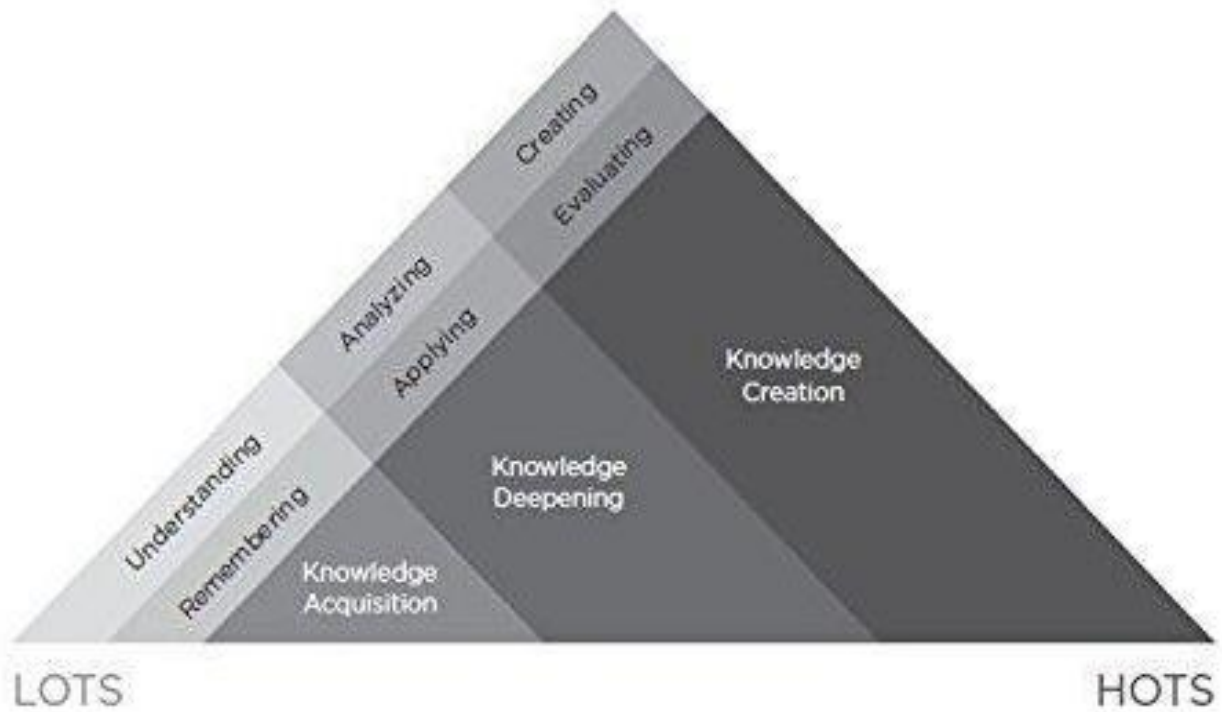
Chapter Four

Supporting Responsive Teaching and Learning through Feedback

Feedback

In order to help students, succeed in the 21st century world, teachers must see their teaching as a response to learning, rather than seeing learning as an outcome of teaching (Crockett & Churches, 2017). This calls for the integration of classroom assessment processes into teaching in ways that enhances students' achievement and their motivation to learn.

The formative feedback cycle helps learners to know where they are now in terms of high-quality work and where they ought to be. This gap analysis facilitates learners' progression from Bloom's lower-order thinking skills (LOTS) which focuses on knowledge acquisition to higher-order thinking skills (HOTS) where the learners are able to create knowledge.



Source: Crockett & Churches (2017)

Hattie's (2012) findings from his meta-analysis of hundreds of education papers indicate that providing formative evaluation and feedback has some of the largest effects on student learning. For an assessment to be formative, student must be receptive to the feedback and use it to adjust their learning. "Without feedback, assessment is not a learning activity; it is a compliance task." (Crockett & Churches, 2017, p. 21)

Churches (n.d.) outlines five characteristics of high-quality feedback. These are:

Timely: The end of the task is too late. Feedback must be provided often and in detail during the process.

Appropriate and reflective: Feedback must reflect the students' ability, maturity, and age. It must be understandable.

Honest and supportive: Receiving a critique that identifies weaknesses of one's work can be very disheartening. The feedback must provide encouragement to continue and guidance on how to achieve the desired goals.

Focused on learning: The feedback should provide information which allows the learner to close the gap between the current and desired performance. The clarity and descriptive nature of the feedback the teacher presents are major influences on students' achievement (Hattie, 2012).

Enabling: Receiving feedback without the opportunity to act on it is frustrating, limiting, and counterproductive. Students must be able to learn from the formative assessments and apply the feedback and corrections.

One of the best models of feedback is developed by Dr Jodie Nyquist (Crocket & Churches, 2017). This model of effective feedback has five stages going from weakest to strongest.

The teacher who provides feedback at the KCR+e and a specific action or ideally KCR+e and an immediate activity gives the learners opportunity to maximise their learning. Based on the above model, three specific criteria for good and bad feedback can be developed.

Criteria for Good and Bad Feedback

Good Feedback	Bad Feedback
<ul style="list-style-type: none">• Being positive• Even when criticizing, being constructive• Making suggestions (not prescriptions or pronouncements)	<ul style="list-style-type: none">• Finding fault• Describing what is wrong and offering no suggestions about what to do.• Punishing or denigrating students for poor work

Examples of Good and Bad Feedback

Feedback	Good or Bad?
Your answer is the best one in the class.	This is an example of bad feedback. It does not tell the student what is good about the answer.
Your details strongly support your claim that it is not necessary that the objects that have large volume also have high weight. That's great. How have you figured this out?	This is an example of good feedback. It confirms for the students that the work meets one of the targets (strong supporting details) and connects the success to students' effort (the student has find out the relationship, and the teacher noticed).
You are the last one in the class to answer and yet incorrect. You didn't put enough in it.	This is an example of bad feedback. It implies that the student is competing with others (as opposed to aiming for a learning target) and the reason the work is poor is that the student "did something bad." The student ends up feeling judged and not motivated to improve.
How did you arrive at this hypothesis? I would want to know more about the process that helped you to get the right answer.	This is an example of good feedback for a student who the teacher believes that process is more important than only knowing that student arrived at the right answer.
Your report is late. What is the matter with you?	This is an example of bad feedback. It may not inspire the student to complete his or her work and turn it in for assessment.
[Name], I do not have your answer sheet. Can you tell me what happened?	This is a better example than the previous one of feedback to deliver the message that the work is late.

Feedback to Parents

The most common form of communicating grades to parents is the report card. Education in the 21st Century focuses on not just academic learning but holistic development (Hare, 2006; Miller, 2019). Therefore, report cards at the elementary/middle school level should also provide information on satisfactory or unsatisfactory performance in other dimensions.

A report card is only one way of sharing feedback to parents about their students' performance. A written report is another way of communicating with students. The reports should be visually accessible and comprehensible and written in a positive, direct, and easy to understand manner.

The most effective way of communicating with parents is through a conference, generally known as parent-teacher meeting, which allows the parent to ask questions and the teachers to provide explanations. Conferences provide avenues to teachers to learn about students' home environment and to parents to be more involved in their children's learning.

(Front Page)

School's Name

School's Logo

Annual Report Card

[Month] 2023 – [Month] 2023

(First inside Leaflet)

Name: ABC_____

Term One: _[Date]_____

Class:_____



Rarely







Sometimes







Most of the times



Always

Your child as a learner				
				
Interested in learning				
Listens carefully				
Works well independently				
Keeps trying even when tasks are difficult				
Teacher's Comment:				

Your child's social and personal development

				
Happy at school				
Behaves well in the class				
Mixes well with other children				
Behaves well in the playground				
Manages and expresses own feelings well				
Teacher's Comments:				

(Second inside Leaflet – Sample for Grades VI, VII & VIII)

	Key Themes	Child's Performance					
		Term I Marks			Term II Marks		
		Formative	Summative	Total	Formative	Summative	Total
1	Life Science	12	18	30	12	18	30

2	Physical Science	24	36	60	24	36	60
3	Earth And Space	4	6	10	4	6	10
Total Marks Obtained							
Out of Total Marks		40 Marks	60 Marks	100 Marks	40 Marks	60 Marks	100 Marks

Teacher's Comments (Term I):

Teacher's Comments (Term II):

[Same type of tables will be prepared for all the subjects)

(Last inside Leaflet)

Students Comment (My Learning in School)

Blank space for student comment.

Parents' Comments (How can you further support your child's learning)

Blank space for parents' comments.

Teacher's Overall Comment:

Blank space for teacher's overall comment.

Attendance	Punctuality
------------	-------------

Teachers' Signature: _____

Date: _____

Principal's Signature: _____

Date: _____

Parent's Signature: _____

Date: _____

CHAPTER FIVE

**POST ASSESSMENT: REDEFINED
GOALS/CURRICULUM**

DRAFT

Chapter Five

Post Assessment: Redefined Goals/Curriculum

Completing the Assessment Loop

This framework brings forth the philosophy, the principles, the policy, and the practice of purposeful assessment for evaluating teaching and learning targets at the classroom level, the school and national level. However, unless the evaluation is constructively utilised to inform changes to curriculum, learning targets and teaching methodology in a balanced manner, its real purpose will not be achieved.

Balanced Assessment System

The success of any assessment system will depend on how formative and summative assessments are balanced to meet the needs of all stakeholders. The tables below summarize the use of the two types of assessments across three levels – the classroom, school, and district/province.

Elements of a Balanced Assessment System

Level of Assessment	Purpose of Assessment	User of Information	Type of Assessment
Classroom assessment	To measure level of student achievement on learning targets taught.	Teacher	Summative: To determine grades for reporting purposes Formative: To revise teaching plans for next year/semester.
	To diagnose student strengths and areas needing further work.	Teacher student	Formative: To plan further instruction Formative: To provide feedback to students. Formative: To self-assess and to set goals for next steps.
School based exam	To measure level of student achievement on pre-set content standard.	Teacher School Leadership District Education Office	Summative: To evaluate achievement level of each student and summarise across students Summative: To determine programme or curriculum effectiveness Formative: To identify programme or curriculum needs.
District, provincial or national large-scale assessments	To measure level of student achievement toward content standards and/or international standards. To identify students and/or portions of the curriculum needing additional/ different instruction.	Teacher School Leadership District Education Office	Summative: To evaluate programme effectiveness. Formative: to identify standards in need of more effective programmes. Formative: To plan interventions for groups or individuals.

Source: Chappuis and Stiggins, 2017

Implicit within this balanced assessment system is the cyclic approach to assessment, which emerges as a response to teaching and learning and further informs teaching and learning.

The following section presents schedules of assessment for grades VI to VII to illustrate how the three streams or levels of assessment can be employed in a balanced manner during an academic year. The schedule is also aligned with the SLOs.

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Balanced Assessment Schedule for Grades Science VI to VIII

Overall Assessment Schedule							
Domain Code*	One Month	Term I (4 Months)	One Month	Term II (4 Months)	One Month	One Month	
CRF	Pre - Assessment	Formative Assessment (40% Marks based on Ongoing)	School based Summative Assessment (60% Marks)			Post Assessment - One Month After Term II	
CRC							
CRP							
CRM							
CUF							
CUC							
CUP							
CUM							
CEF							
AR							
PP							
PS							
CAF							
CAC							
CAP							
CAM							
CANP							
CANF							
CANC							
CEC							
CCC							
CEP							
CCP							
CCM							
AV							
AO							
PGR							
PM	Pre-Assessment						
PCOR							

	Pre- Ass ess me nt					Pos t Ass ess me nt
						Pos t Ass ess me nt

	Pre- Ass ess me nt								Pos t Ass ess me nt
	Pre- Ass ess me nt - One Mo								

	<p>nth Prio r to Ter m I</p> <p>Pre- Ass ess me nt</p> <p>Pre-</p>					<p>Pos t Ass ess me nt</p>
--	--	--	--	--	--	--

	Assessment						Post Assessment
	Pre-Assessment						Post Assessment

	Pre- Ass ess me nt							Pos t Ass ess me nt
--	--------------------------------	--	--	--	--	--	--	------------------------------------

	Pre- Ass ess me nt							Pos t Ass ess me nt
	Pre- Ass ess me nt							

							Post Assessment
PO							

* This includes all the SLOs contained within the Domain Code

Concluding Remarks – Exit to the Next Cycle

The framework can be considered a blueprint of an assessment programme at the primary school level. It provides the broad overview of policy guidelines for assessment framework 2021 while guiding the alignment of student learning outcomes with assessment strategies. It identifies the learning targets, the deep learning approaches, and the strategies for assessing the same. In doing this, it ensures that the assessments are interconnected and purposeful.

While the blueprint is necessary as an overarching guide, its enactment will require professional judgement. Its real purpose will be realised when teachers use it at the classroom level to modify their teaching to match students’ learning needs, when school leaders use it to accomplish their

goals more effectively by replacing some programmes or practices with better ones (Fullan, 2001) and when the public education departments use it to invest in practices that yield positive results. The education practices, redefined in this manner, are again put to the test and the process of ongoing purposeful assessment continues.

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Appendices

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Bloom's Revised Taxonomy Model – Cognitive Domain

Cognitive Dimension	The Knowledge Dimension			
	Factual The basic elements a student must know to be acquainted with a discipline or solve problems in it.	Conceptual The interrelationships among the basic elements within a larger structure that enable them to function together.	Procedural How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.	Metacognitive Knowledge of cognition in general as well as awareness and knowledge of one's own cognition
Remember Recall or retrieve previous learned information from long-term memory	List primary and secondary colours.	Recognize action words.	Recall how to perform a sum based on four operations.	Identify strategies for retaining information
Key Words (Verbs)	labels, lists, names, outlines, states	Defines, describes, identifies, knows,	Recalls, recognizes, matches,	reproduces, selects,
Sample Assessment	Definition; MCQs; oral questions	Identify names, parts, and characteristics, Matching; quiz	draw diagrams / tables and label them, concept maps, short answers. performing experiments, hands on activities	Recall lab procedures; experiment; application of ideas
Understand Construct meaning from instructional messages, including oral, written, and graphic communication.	Summarize features of a new product.	Explain the main ideas of a play or piece of literature.	Explain in one's own words the steps for performing a complex task.	Predict one's response to a performance.
Key Words (Verbs)	Summarizing (Abstracting, generalizing) Explaining (constructing models)	Classifying (Categorizing, subsuming) Exemplifying (Illustrating, instantiating)	Interpreting (clarifying, paraphrasing, representing, translating) Comparing (contrasting, mapping, matching)	Inferring (concluding, extrapolating, interpolating, predicting)

Sample Assessment	Explain and describe characteristics of given objects and things, write missing information	Group Work/Cooperative Learning	Project Work	Recall lab procedures; experiment; application of ideas
Apply Carry out or use a procedure in a given situation.	Respond to frequently asked questions.	Provide advice to juniors.	Divide one whole number by another whole number, both with multiple digits	Use techniques that match one's strengths. Use class rules in situations in which it is appropriate.
Key Words (Verbs)	Demonstrates, discovers,	Constructs, relates,	Computes, demonstrates, manipulates, operates, prepares, produces, solves	Changes, discovers, modifies, predicts, uses
Samples Assessment	Responds to questions	Match, complete sentences	Solves sums; role play	Create a blog
Analyze Break material into its constituent parts & determine how the parts relate to-one another and to an overall structure or purpose.	Select the most complete list of activities.	Distinguish between relevant and irrelevant numbers in a mathematical word problem	Compare and contrast four ways of serving foods made with apples and examine which ones have the highest health benefits.	Determine the point of view of the author of an essay.
Key Words (Verbs)	Focusing, selecting	Differentiating (discriminating , distinguishing)	Organizing (finding, coherence, integrating, outlining, structuring)	Attributing (deconstructing)
Samples Assessment	Library search	Developing an argument; debating	Summarizing data in the form of graphs, pictures, tables etc.	Review of a written piece of work, oral discourse, video etc.
Evaluate Make judgments based on criteria and standards.	Select the most complete list of activities.	Determine which kinds of apples are best for baking a pie, and why	Judge which of two methods is the best way to solve a given problem	Reflect on one's progress.
Key Words (Verbs)	Describes, explains	Checking (coordinating, detecting, monitoring, testing)	Interprets, justifies, relates, summarizes, supports	critiquing (judging)
Sample Assessment	Group discussion	Survey	Interpreting a graph, a picture etc.	Blogs; self-evaluation
Create Put elements together	Generate a log of daily activities.	Compose a story	Design an efficient project workflow.	Inventing a product

to form a coherent or functional whole; reorganize elements into a new pattern or structure				
Key Words (Verbs)	Compiles, explains, reorganizes, summarizes,	planning (designing)	producing (construct)	generating (hypothesizing)
Sample Assessment	Game; network with others	Make predictions and hypotheses and deduce relationships	CCP	Create a learning portfolio.

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Bloom's Revised Taxonomy Model – Affective Domain

Affective Domain			
Dimension	Examples	Key words/Verbs	Sample Assessment
Receiving The lowest level. Awareness of feelings, emotions, ideas, material, and phenomenon etc. Passively paying attention.	Demonstrates a willingness to participate in a hands-on activity.	Asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, replies, uses, acknowledge, attentive, courteous, dutiful, follows, listens, understands	Write one muddiest and one mightiest point of the lesson.
Responding The student actively participates in the learning process, not only attends to a stimulus; the student also reacts in some way.	Shows interest in the objects, phenomena, or activity by seeking it out or pursuing it for pleasure.	answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, tells, practices, presents, reads, recites, reports, selects, writes.	Completion of class tasks/homework; participation in class/group discussion; presentation; response to questions; compliance with class rules and certain procedures. Reflect on your learning from the hands-on activity on 'Forms of Energy' (Portfolio Assessment)
Valuing The worth or value a person attaches to a particular object, phenomenon, or behaviour. This ranges from simple acceptance to the more complex state of commitment.	Simpler acceptance could be being part of the team; while more complex level of commitment may include being responsible for the overall improvement of the team.	appreciates, cherish, treasure, demonstrates, initiates, invites, joins, justifies, proposes, respect, shares Completes, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, studies, works.	Write an opinion piece on 'Global Warming', explaining one's own stance and reasons supporting that stance. Seeking out information in popular media related to a particular topic. Proposing a plan to improve teamwork while doing STEM challenge.
Organizing Organizes values into priorities by contrasting different values, resolving conflicts between them, and creating an unique value system. The emphasis is on	The student can put together different values, information, and ideas, and can accommodate them within his/her own schema; the student is comparing, relating	compares, relates, synthesizes, adheres, alters, arranges, combines, completes, defends, explains, formulates, generalizes, identifies, integrates, modifies,	Read the given data to provide evidence-based reasoning (constructed response)

comparing, relating, and synthesizing values.	and elaborating on what has been learned.	orders, organizes, prepares,	
Characterizing Highest level. Internalizing values. Student has a value system that controls their behaviour. The behaviour is pervasive, consistent, predictable.	Shows self-reliance when working independently; cooperates in group activities (displays teamwork); uses an objective approach in problem solving; follows rules and regulations on daily basis.	acts, discriminates, displays, influences, modifies, performs, qualifies, questions, revises, serves, solves, verifies	Provide evidence of individual input in group work and group project. (Self-assessment tasks)

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Bloom's Revised Taxonomy Model – Psychomotor Domain

Psychomotor Domain			
Dimension	Examples	Key words/Verbs	Sample Assessment
Perception (awareness) The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation.	Detects non-verbal communication cues. Estimate where a ball will land after it is thrown and then moving to the correct location to catch the ball.	chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects.	Participation science activities.
Set Readiness to act. Mental, physical, and emotional dispositions that make one respond in a certain way to a situation.	Knows and acts upon a sequence of steps in a process. Shows desire to learn a new process Attend project exhibition. Observe demonstrations through audio, videos, visuals. Set-up lab equipment for experiments.	Begins, displays, explains, moves, proceeds, reacts, shows, states, volunteers.	Use body moment to follow the given instructions such as (i) to show the eagerness for activity (ii) follow the pattern (jump, jump and walk one step forward; jump, jump, jump, take one step backward)
Guided Response The early stages in learning a complex skill that includes imitation and trial and error. Adequacy of performance is achieved by practicing.	Performs a mathematical equation as demonstrated. Follows instructions to build a model.	Copies, traces, follows, react, reproduce, responds.	Follow instruction to make a model using different directions.
Mechanism (basic proficiency) This is the intermediate stage in learning a complex skill. Learned responses have become habitual	Use a personal computer. Repair a toy. Drive a bicycle. Holding a pencil	Assembles, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes,	Performance in a game (football, hockey). Solving a problem, using pre-set procedures

and the movements can be performed with some confidence & proficiency.		organizes, sketches.	Constructed response question.
Complex Overt Response Performs task or objective in a confident, proficient, and habitual manner	Control and use correct movements when playing instruments, drawing with pencil, and painting proficiently. Operate and run machines (e.g., computer) efficiently. <input type="checkbox"/> Use equipment with confidence.	Assembles, builds, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches. NOTE: The Key Words are the same as Mechanism, but will have adverbs or adjectives that indicate that the performance is quicker, better, more accurate, etc.	Calibrate accuracy using the given criteria. (Self- assessment). Determine the density of a group of sample metals with regular and irregular shapes.
Adaptation Skills are well developed, and the individual can modify movement patterns to fit special requirements.	Use tools for situations outside typical discipline. Responds effectively to unexpected experiences. Modifies instruction to meet the needs of the learners.	Adapts, alters, changes, rearranges, reorganizes, revises, varies.	Field based tasks. Revise and improve procedures of movements, written responses. Portfolio; Communicate the solution to a STEM challenge using evidence- based reasoning.
Origination Creating new movement patterns to fit a particular situation or specific problem. Learning outcomes emphasize creativity based upon highly developed skills.	Constructs a new theory/story. Develops a new teamwork approach. Creates a new project; a new programme	Arranges, builds, combines, composes, constructs, creates, designs, initiate, makes, originates.	Project work; Creating different models; Redesign the prototype (solution of any STEM challenge) using the evidence gathered from testing the prototype and research.

Curriculum Mapping

Grade VI

COGNITIVE DOMAIN

Low Order Taxonomies (Cognitive)						High Order Taxonomies (Cognitive)						
Remember	No	Understand	No	Apply	No	Analyse	No	Evaluate	No	Create	No	Total
Domain A: Life Sciences												
Organisms - Characteristics and Life Processes of Living Things												
[SLO: S-06-A-01] Recognize cells as the basic unit of life that are organized into tissues, organs, systems and organisms. (C)	01			[SLO: S-06-A-02] Arrange and rank different levels of cellular organizations – cells to tissues, organs, and organisms. (C)	01	[SLO: S-06-A-03] Relate the structures of some common cells (nerve, muscle, epithelium and blood cells) to their functions. (C)	01	[SLO: S-06-A-05] Describe the similarities and differences between the structures of plant and animal cells. Sketch the animal and plant cells and label key organelles in each. (C)	01			04
[SLO: S-06-A-04] Identify the structures present in an	01					[SLO: S-06-A-06] Compare and contrast an animal cell and	01					02

animal cell and plant cell as seen under a simple microscope and relate them to their functions (Only cell membrane, cytoplasm, nucleus, cell wall, chloroplast, mitochondria and sap vacuole). (M)						plant cell by preparing slides using onion peels and cheek cells. (P)							
Total Frequency	02				01		02		01				06
Organism-Structure & Functions (Plants)													

[SLO: S-06-A-07] Describe the different types of reproduction of plants. (C)	01					[SLO: S-06-A-08] Compare and contrast types of reproduction (Sexual and asexual) in plants. (C)	01			SLO: S-06-A-09] Distinguish between artificial and natural asexual reproduction in plants. (Budding, grafting, Bulbs, Tuber, Runners, cutting, and layering). (C)	01	03
						[SLO: S-06-A-10] Inquire how artificial propagation can lead to better quality yield in agriculture. (C)	01					01
Total Frequency	01						02				01	04
Organism-Structure & Function (Animals)												
		[SLO: S-06-A-11] State the	01	[SLO: S-06-A-12]	01	[SLO: S-06-A-14] Conclude that	01					03

		importance of digestion in the human body and describe physical and chemical digestion. (C)		Sequence the main regions of Alimentary Canal, its associated organs and describe the functions of different parts of the Alimentary Canal. (P)		blood transports the products of digestion to other parts of the body and the undigested products get egested/defecated. (C)								
		[SLO: S-06-A-13] Briefly describe the role of enzymes in digestion (C)	01											01

Total Frequency **02** **01** **01** **04**

Human health & disease

[SLO: S-06-A-15] Identify the constituents of a balanced diet for humans as including protein, carbohydrates, fats and oils, water, minerals (limited to	01			[SLO: S-06-A-19] Correlate diet and fitness. (C)	01	[SLO: S-06-A-16] Identify the essential nutrients, their chemical composition, and food sources. (C)	01							03
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calcium and iron) and vitamins (limited to A, C and D), and describe the functions of these nutrients. (M)												
[SLO: S-06-A-18] Recognize that healthy diet contains a balance of foodstuffs. (P)	01					[SLO: S-06-A-17] Identify and describe essential nutrients' deficiency disorders. (C)	01					02
[SLO: S-06-A-20] Briefly describe some major digestive disorders. (C)	01											01
Total Frequency	03				01		02					06
Ecosystems												
Total Frequency										01		
Overall Total Frequency	06		02		04		07		01			20
Domain B: Physical Sciences												
[SLO: S-06-B-03]	01	[SLO: S-06-B-01]	01	[SLO: S-06-B-09]	01	[SLO: S-06-B-05]	01	[SLO: S-06-B-07]	01	[SLO: S-06-B-32]	01	06

Recognize the names and symbols for some common elements (first 10 elements of the Periodic Table) and recognize their physical properties. (C)		Describe the structure of matter in terms of particles (i.e., atoms and molecules). (C)		Categorize elements into metals and non-metals of first 10 elements based on their physical properties. (C)		Explain that compounds are formed by different types of elements joining together chemically forming a new substance. (C)		Distinguish between elements and compounds (C)		Assemble and demonstrate a solar panel to operate a small fan. (STEAM) (P)		
[SLO: S-06-B-18] Identify different types of mixtures. (C)	01	[SLO: S-06-B-02] Describe molecules as a combination of atoms (e.g., H ₂ O, O ₂ & CO ₂). (C)	01	[SLO: S-06-B-11] Use particle model of matter to investigate the movement and arrangement of particles in three states. (C)	01	[SLO: S-06-B-14] Interpret the evidence for the existence of the particles in matter by observing daily life examples (adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and	01	[SLO: S-06-B-08] Explore the common elements and compounds in our daily life (Carbon, Nitrogen, Hydrogen, Aluminum, Water, Common salt, Sugar). (C)	01	SLO: S-06-B-33] Design and make a solar water heater. (STEAM) (M)	01	06

						evaporating salt water). (C)						
[SLO: S-06-B-22] Identify and explain examples of common mixtures from daily life. (C)	01			[SLO: S-06-B-15] Apply the particle theory of matter to explain diffusion. (C)	01					[SLO: S-06-B-43] Assemble and operate a trip wire security alarm system using simple items. (STEAM) (P)	01	03
[SLO: S-06-B-31] Identify the advantages of using renewable energy resources.	01	[SLO: S-06-B-04] Differentiate that some elements are made of atoms and some elements exist as molecules and have different properties to a single atom of the element. (C)	01	[SLO: S-06-B-17] Demonstrate that mixtures are formed when two or more substances mix with each other without the formation of a new substance (C)	01	[SLO: S-06-B-19] Describe the difference between elements, compounds, and mixtures (C)	01	[SLO: S-06-B-23] Justify why air is considered as a mixture of gases. (C)	01	[SLO: S-06-B-47] Construct an electromagnet and identify its application in daily life(M)	01	06

[SLO: S-06-B-35] Recognize electric current as a flow of charges. (C)	01	[SLO: S-06-B-06] Illustrate the formation of a compound with the help of a word equation. (C)	01	[SLO: S-06-B-24] Demonstrate ways of separating different mixtures. (P)	01	[SLO: S-06-B-20] Differentiate between pure substances and mixtures on the basis of their formation and composition(C).	01			[SLO: S-06-B-50] Draw magnetic field of a bar magnet using iron filings. (C)	01	05
[SLO: S-06-B-41] Identify the use of series and parallel electric circuits in daily life. (C)	01	[SLO: S-06-B-10] Explain the Particle Theory of Matter. (C)	01	[SLO: S-06-B-25] Demonstrate the process of solution formation (using water as universal solvent) (C)	01	[SLO: S-06-B-21] Describe alloys as mixtures of metals and some other elements. (C)	01					04

[SLO: S-06-B-44] Recognize that electric current has a magnetic field around it is using a magnetic compass. (C)	01	[SLO: S-06-B-12] Explain why gases and liquids take the shape of their containers but solids do not, in terms of the Particle Theory of Matter. (P)	01	[SLO: S-06-B-27] Relate potential energy and kinetic energy. (C)	01	[SLO: S-06-B-30] Compare the Renewable Energy Sources (wind, water, Sun, and plants) and Non-Renewable Sources of energy (coal, natural gas, crude oil). (C)	01						04
				SLO: S-06-B-28] Demonstrate an energy transfer such as a bouncing ball by energy transfer diagram, e.g., gravitational potential energy → kinetic → elastic	01								01

				potential energy + thermal + sound → kinetic → gravitational potential energy, etc. (P)								
[SLO: S-06-B-45] Recognize that a freely moving magnet comes to rest pointing in a North-South direction. (C)	01	[SLO: S-06-B-13] Discuss, using the particle theory of matter, why liquids and gases can flow easily but solids cannot. (C)	01	[SLO: S-06-B-38] Draw and interpret simple circuit diagrams (using symbols). (C)	01	[SLO: S-06-B-42] Investigate the factors that affect the brightness of bulbs or speed of motors • Number of batteries • Number of Bulbs • Type of wire • Length of wire • Thickness of wire (P)	01					04
[SLO: S-06-B-49] Recognize that there is a space around a magnet where effect of magnetic force can be observed.	01	[SLO: S-06-B-16] Explain the changes in states: Melting, freezing, evaporation, condensation, and sublimation,	01	[SLO: S-06-B-40] Draw and construct a series and parallel circuits (P)	01	[SLO: S-06-B-48] Compare different types of magnets (Permanent, temporary and electromagnets). (F)	01					04

(C)		using the particle model of matter. (C)											
[SLO: S-06-B-51] Recognize Earth's magnetic field which attracts a freely pivoted magnet to line up with it. (C)	01	[SLO: S-06-B-26] Recognize energy as a physical quantity. (C)	01										02
		[SLO: S-06-B-29] State the Law of Conservation of Energy and explain how the law applies to different situations. (P)	01										01
		[SLO: S-06-B-34] Explain the phenomena of static electricity in everyday life. (C)	01										01

		[SLO: S-06-B-36] Describe a simple circuit as a path for flow of charges. (C)	01									01
		[SLO: S-06-B-37] Differentiate between open and closed circuits. (C)	01									01
		[SLO: S-06-B-39] Describe the characteristics of series and parallel circuits. (C)	01									01
		[SLO: S-06-B-46] Describe how to magnetize a magnetic material. Describe how to de-magnetize a magnet. (C)	01									01
Total Frequency												
Technology in Everyday life												

			[SLO: S-06-B-52] Grow seasonal plants and vegetables in earthen pots and demonstrate the effect of use of fertilizers on the growth of plants. (P)	01					[SLO: S-06-B-54] Design a solar oven to convert solar energy into heat energy. (M)	01	02
			[SLO: S-06-B-53] Prepare yogurt and cheese from milk to demonstrate the beneficial microorganisms (P)	01					[SLO: S-06-B-55] Assemble a circuit to demonstrate the working of an electric bell. (P)	01	02
Total Frequency	10	15		12		08		03		07	55

Domain C: Earth and Space Science

	[SLO: S-06-C-02] Describe the characteristics of asteroids, meteorites and comets. (P)	01		[SLO: S-06-C-01] Differentiate between the characteristics of different planets. (C)	01	[SLO: S-06-C-04] Investigate how artificial satellites have	01			03
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								improved our knowledge about space and are used for space research. (C)				
		Describe the uses of various satellites in space i.e., geostationary, weather, communication and Global Positioning System (GPS). (C)	01			[SLO: S-06-C-05] Differentiate between planets and dwarf planets(C)	01	[SLO: S-06-C-06] Inquire into the sighting of Halley's Comet. 74 describe what they would feel if they saw it. (C)	01			03
Total Frequency			02				02		02			06
Overall Total	16		19		16		17		06		07	

AFFECTIVE DOMAIN

From Lower Order Taxonomies to Higher Order Taxonomies										
Receiving	No	Responding	No	Valuing	No	Organizing	No	Characterizing	No	Total
Domain A: Life Sciences										
Organisms - Characteristics and Life Processes of Living Things										

SLO: S-06-C-06] Inquire into the sighting of Halley's Comet.														
Total Frequency	01													01
Total Frequency														
Human health & disease														
				[SLO: S-06-A-19] Correlate diet and fitness. (C)										
Total Frequency	1							1						02
Total overall														02

PSYCHOMOTOR DOMAIN

From Low Order Taxonomies to High Order Taxonomies														
Perception	No	Set	No	Guided Response	No	Mechanism	No	Complex Overt Response	No	Adaptation	No	Origination	No	Total
Domain B: Physical Sciences														
				[SLO: S-06-B-40] Draw and construct a series and parallel circuits	01	[SLO: S-06-B-43] Assemble and operate a trip wire security alarm system	01					[SLO: S-06-B-33] Design and make a solar water heater. (STEAM)	01	03

						using simple items. (STEAM)								
				Draw and interpret simple circuit diagrams (using symbols).	01	Draw magnetic field of a bar magnet using iron filings.	01					Construct an electromagnet and identify its application in daily life	01	03
				Draw and construct a series and parallel circuits	01							Design a solar oven to convert solar energy into heat energy.	01	02
Total Frequency					03		02							05
Technology in everyday life														
								Grow seasonal plants and vegetables in earthen pots and demonstrate the effect of use of fertilizers on the growth of plants.	01					01
								Prepare yogurt and cheese from milk to demonstrate the beneficial microorganisms.	01					01
								[SLO: S-06-B-	01					01

								55] Assemble a circuit to demonstrate the working of an electric bell.						
Total Frequency									03					
Total overall					03		02		03				03	11

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CURRICULUM MAPPING

Grade VII

COGNITIVE DOMAIN

Low Order Taxonomies (Cognitive)						High Order Taxonomies (Cognitive)						
Remember	No	Understand	No	Apply	No	Analyse	No	Evaluate	No	Create	No	Total
Domain A: Life Sciences												
Organism-Structure & Functions (Plants)												
[SLO: S-07-A-03] Define the process of photosynthesis and derive word equation for it. (C)	01	[SLO: S-07-A-02] Predict the role of xylem and phloem in transport of water and food in plants by observing the cross section of the stem. (M)	01					[SLO: S-07-A-01] Explain the root and shoot system in plants. Label different parts of leaf, stem, and root (external and internal structure). (C)	01			03
[SLO: S-07-A-04] Know that plants require minerals to maintain healthy growth and life	01	[SLO: S-07-A-05] Explain that the structure of leaves is adapted to the process of photosynthesis. (F)	01					[SLO: S-07-A-07] Investigate the phenomena of transpiration and its importance in a plant (wind,	01			03

processes (limited to magnesium to make chlorophyll and nitrates to make protein). (C)							temperature, light, humidity affecting rate of transpiration in plants). (C)				
[SLO: S-07-A-14] Describe the role and function of major organs in the human respiratory system including trachea, lungs, and alveoli (air sacs). (C)	01	[SLO: S-07-A-06] Describe the process of respiration and write word equations for it. Compare and contrast the processes of photosynthesis and respiration. (P)	01				[SLO: S-07-A-08] Explore and apply natural raise of water based on the principle of transpiration. (C)	01			03
[SLO: S-07-A-16] Describe the structure and function of the human heart. (C)	01	[SLO: S-07-A-15] Explain that living organisms have a complex transport system for transfer of various solids, liquids, and gases across the body. (F)	01				[SLO: S-07-A-13] Hypothesize how exercises of varying intensity (from rest to high-intensity interval training)	01			03

								would impact their pulse rate, test their hypothesis, calculate their pulse rate, and record their findings. (P)				
		[SLO: S-07-A-17] Explain how blood circulates in the human body through a network of vessels (arteries, veins, and capillaries), and transports gases, nutrients, wastes and heat. (F)	01									01
		[SLO: S-07-A-18] Compare and contrast arteries, veins,	01									01

		and capillaries. (P)										
Total Frequency	04		06					04				14
Organism-Structure & Function (Animals)												
[SLO: S-07-A-19] Describe the composition of blood and the functions of red cells, white cells, platelets, and plasma. (C)	01			[SLO: S-07-A-11] Trace the path of air in and out of the body and how the oxygen it contains is used during the process of respiration. (C)	01	[SLO: S-07-A-09] Differentiate between the processes of respiration and breathing. (C)	01					03
[SLO: S-07-A-12] Sketch and label the human circulatory system. (P)	01					[SLO: S-07-A-10] Differentiate between aerobic and anaerobic respiration. (C)	01					02
Total Frequency	02				01		02					05
Human health & disease												
[SLO: S-07-A-21] Describe the three types of immunity in humans – innate, adaptive, and passive. (C)	01	[SLO: S-07-A-20] Explain the various lines of defenses that the body has against pathogens. (F)	01					[SLO: S-07-A-26] Propose some common strategies for strengthening their immune system. (P)	01	[SLO: S-07-A-25] Visualize the ways to add additional layers of defence (such as wearing masks, using	01	04

									sanitizers, etc.). (M)		
[SLO: S-07-A-22]	01	[SLO: S-07-A-23]	01						[SLO: S-07-A-28]	01	03
Identify the various types of pathogens that cause infectious diseases. (C)		Describe the parts of the immunity system and how they function to produce an immune response. (C)							Suggest ways in which communities of people can safeguard against the spread of infectious diseases. (M)		
[SLO: S-07-A-23]	01	[SLO: S-07-A-27]	01								02
Describe the parts of the immunity system and how they function to produce an immune response. (C)		Explain how infectious diseases such as hepatitis, covid-19, typhoid, and dengue are caused /contracted, how they are tested and diagnosed, and how they can be prevented. (F)									
Total Frequency	03		03					01		02	09
Domain B: Physical Sciences											

[SLO: S-07-B-01]	01	[SLO: S-07-B-07]	01	[SLO: S-07-B-05]	01	[SLO: S-07-B-03]	01	[SLO: S-07-B-04]	01	[SLO: S-07-B-27]	01	06
Describe and draw the structure of an atom in terms of electrons, protons, and neutrons. (C)		Explain that the Periodic Table is a way to organize elements in a systematic order. (C)		Show the arrangement of electrons in K, L and M shells of elements draw the atomic structure of the first eighteen elements of the Periodic Table. (F)		Differentiate between atomic number and mass number. (C)		Determine the atomic number and mass number of elements on the basis of the number of protons, electrons, and neutrons. (C)		Make a rock candy with sugar using crystal seeding technique. (STEAM). (P)		
[SLO: S-07-B-02]	01	[SLO: S-07-B-10]	01	[SLO: S-07-B-06]	01	[SLO: S-07-B-12]	01	[SLO: S-07-B-15]	01			05
Describe how an atom is electrically neutral. (C)		Write chemical formulae on the basis of valency of the constituent elements. such as H ₂ O, NaCl, NH ₃ , CO ₂ , CO, etc. (P)		Draw atomic structures of elements in the Periodic Table. (C)		Differentiate between physical and chemical changes while considering daily life examples. (C)		Relate uses of materials to their chemical properties (e.g., tendency to rust, flammability). (P)				

[SLO: S-07-B-08]	01	[SLO: S-07-B-14]	01	[SLO: S-07-B-19]	01	[SLO: S-07-B-18]	01	[SLO: S-07-B-16]	01			05
Recognize periods and groups in the Periodic Table. (P)		Explore methods of preventing rusting. (P)		Demonstrate the process of solution formation (using water as universal solvent). (P)		Distinguish between physical and chemical properties of matter. (C)		Evaluate Impact of combustion reaction on environment. (C)				
[SLO: S-07-B-09]	01	[SLO: S-07-B-24]	01	[SLO: S-07-B-33]	01	[SLO: S-07-B-20]	01	[SLO: S-07-B-17]	01			05
Define valency and explain the formation of ions. (C)		Explain what is meant by a concentrated and dilute solution. (F)		Construct the concept of heat conduction, convection, and radiation by applying particle theory including daily life examples. (C)		Distinguish among solute, solvent and solution, saturated and unsaturated solution. (P)		Relate uses of materials to their physical properties (e.g., melting point, boiling point, solubility, thermal conductivity) . (C)				
[SLO: S-07-B-11]	01	[SLO: S-07-B-25]	01	[SLO: S-07-B-41]	01	[SLO: S-07-B-26]	01					04
Recognize that a chemical bond results from the attraction between atoms in a compound and that the atoms' electrons are involved in this		Identify ways of accelerating the process of dissolving materials in a given amount of water and provide		Define and relate: 1. Pitch and frequency. 2. Amplitude and frequency. (C)		Explore the effectiveness of various cleaning solutions in cleaning tarnished and oxidized						

bonding. (P)		reasoning (i.e., increasing the temperature, stirring, and breaking the solid into smaller pieces increases the process of dissolving). (M)				coins. (STEAM) (P)						
[SLO: S-07-B-13] Recognize that oxygen is needed in combustion, rusting and tarnishing. (P)	01	[SLO: S-07-B-29] Predict the effects of heat gain and heat loss. (M)	01	[SLO: S-07-B-44] Construct the inverse relation between time period and frequency. (C)	01	[SLO: S-07-B-38] Distinguish between Longitudinal and Transverse waves. (C)	01					04
[SLO: S-07-B-21] Define solubility. (C)	01	[SLO: S-07-B-30] Compare all three scales of temperature (including inter-conversion of temperature scales). (P)	01	[SLO: S-07-B-45] Relate common phenomenon (e.g., echo, hearing thunder after seeing lightning) to the properties of sound. (C)	01							03
[SLO: S-07-B-22] Recognize that the amount of solute which dissolves in a	01	[SLO: S-07-B-32] Explain why metals are good thermal	01	[SLO: S-07-B-50] Calculate average speed. (P)	01							03

given solvent has an upper limit. (C)		conductors and fluids are poor conductors of heat using the particle model. (C)											
[SLO: S-07-B-23] Identify the factors which affect the solubility of a solute in a solvent and recognize the importance of these factors in homes and industries. (M)	01	[SLO: S-07-B-34] Identify the effects of thermal expansion and contraction with their applications in daily life. (P)	01	[SLO: S-07-B-53] Demonstrate that forces always work in action and reaction pairs (equal in magnitude, opposite in direction). (P)	01								03
[SLO: S-07-B-28] Describe the expansion of the three states of matter on heating, and contraction on cooling, in terms of particles. (C)	01	[SLO: S-07-B-35] State and explain the practical methods of thermal insulation used for constructing buildings. (P)	01										02
[SLO: S-07-B-31] Define the terms heat and temperature on the basis of Kinetic Molecular	01	[SLO: S-07-B-37] Compare the types of waves (mechanical and	01										02

Theory. (C)		electromagnetic) with daily life examples. (P)											
[SLO: S-07-B-36] Define a wave. (C)	01	[SLO: S-07-B-39] Identify. 1. water wave and Sound wave as mechanical wave. light wave as electromagnetic wave. (C)	01										02
[SLO: S-07-B-40] Define the terms: Wavelength, frequency, and time period of wave. (F)	01	[SLO: S-07-B-42] Explain the factors affecting pitch and loudness of sound. (C)	01										02
[SLO: S-07-B-46] Describe the effect of force on changing the speed and direction of motion with time. (C)	01	[SLO: S-07-B-43] Compare and interpret waveforms in terms of pitch and loudness. (P)	01										02
[SLO: S-07-B-47] Define and state the SI unit of	01	[SLO: S-07-B-48] Formulate the	01										02

force. (C)		relationship between speed, distance, and time. (P)										
[SLO: S-07-B-49] State SI (System International) unit of speed. (F)	01	[SLO: S-07-B-51] Interpret a distance-time graph. (P)	01									02
		[SLO: S-07-B-52] Give examples of contact forces and non-contact forces. (C)	01									01
Total Frequency	16		17		10		06		04		01	53
Technology in Everyday life												
			[SLO: S-07-B-55] Use different techniques of preserving foods like orange juice, apple jam and pickles. (P)	01						[SLO: S-07-B-54] Design a model to demonstrate drip & sprinkler irrigation system for conservation of water. (P)	01	02
										[SLO: S-07-B-56] Make a	01	01

									simple Stethoscope. (P)		
									[SLO: S-07-B-57] Make a sanitizer using suitable substances. (P)	01	01
Total Frequency					01					03	04
Domain C: Earth and Space Science											
[SLO: S-07-C-01] Recognize that the force of gravity keeps planets and moons in their orbits. (P)	01			[SLO: S-07-C-05] Describe how seasons in Earth's Northern and Southern Hemispheres are related to Earth's annual movement around the Sun. (P)	01	[SLO: S-07-C-02] Differentiate between mass and weight, using examples of weightlessness experienced by astronauts on the surface of the Moon. (C)	01				03

[SLO: S-07-C-03] Recognize that tides are caused by the gravitational pull of the Moon. (P)	01											01
[SLO: S-07-C-04] Describe the effects of the Earth's annual revolution around the Sun, given the tilt of its axis (e.g., different seasons, different constellations visible at different times of the year). (C)	01											01
<i>Total Frequency</i>	03			01		01						05
<i>Overall Total</i>	28		26	12		09		09			06	90

AFFECTIVE DOMAIN

From Lower Order Taxonomies to Higher Order Taxonomies										
Receiving	No	Responding	No	Valuing	No	Organizing	No	Characterizing	No	Total
Domain A: Life Sciences										
						[SLO: S-07-A-13] Hypothesize how exercises of varying intensity (from rest to high-intensity interval training) would impact their pulse rate, test their hypothesis, calculate their pulse rate, and record their findings.	01			01
<i>Total Frequency</i>							01			01
<i>Total overall</i>							01			

PSYCHOMOTOR DOMAIN

From Low Order Taxonomies to High Order Taxonomies													
Perception	No	Set	No	Guided Response	No	Mechanism	No	Complex Overt Response	No	Adaptation	No	Origination	No
Domain A: Life Sciences													
Organism-Structure & Function (Animals)													
						[SLO: S-07-A-25] Visualize the ways to add additional layers of defense (such as wearing masks, using sanitizers, etc.).	01	[SLO: S-07-A-13] Hypothesize how exercises of varying intensity (from rest to high-intensity interval training) would impact their pulse rate, test their hypothesis, calculate their pulse rate, and record their findings.	01				02
Total Frequency							01		01				02

Domain B: Physical Sciences

	[SLO: S-07-B-01]	01	[SLO: S-07-B-27]	01	[SLO: S-07-B-26]	01							03
	Describe and draw the structure of an atom in terms of electrons, protons, and neutrons.		Make a rock candy with sugar using crystal seeding technique. (STEAM).		Explore the effectiveness of various cleaning solutions in cleaning tarnished and oxidized coins. (STEAM)								
	[SLO: S-07-B-25]	01											01
	Identify ways of accelerating the process of dissolving materials in a given amount of water and provide reasoning (i.e., increasing the temperature, stirring, and breaking the solid												

		into smaller pieces increases the process of dissolving).											
Total Frequency			02		01		01						04
Technology in everyday life													
				[SLO: S-07-B-56] Make a simple Stethoscope .	01			[SLO: S-07-B-54] Design a model to demonstrate drip & sprinkler irrigation system for conservation of water.	01				02
				[SLO: S-07-B-57] Make a sanitizer using suitable substances.	01								01
Total Frequency					02				01				03
Total overall			02		03		02		02				09

CURRICULUM MAPPING

Grade VIII

COGNITIVE DOMAIN

Low Order Taxonomies (Cognitive)						High Order Taxonomies (Cognitive)						Total
Remember	No	Understand	No	Apply	No	Analyse	No	Evaluate	No	Create	No	
Domain A: Life Sciences												
Organisms - Characteristics and Life Processes of Living Things												
[SLO: S-08-A-01] Describe variation and adaptation in living organisms. (C)	01	[SLO: S-08-A-02] Explain and illustrate the differences between variation and adaptation. (C)	01			[SLO: S-08-A-06] Differentiate between the concept of genes and chromosomes and relate them to how genetic characteristics are inherited. (C)	01			[SLO: S-08-A-08] Design a model of DNA to demonstrate its structure, functions, and various components. (P)	01	04
[SLO: S-08-A-03] Identify sources of variation from environmental	01	[SLO: S-08-A-04] Explain how different adaptations	01									02

and genetic factors. (C)		affects the chances of survivals of different species of organism. (C)										
[SLO: S-08-A-05] Recognize Genetics as the study of Heredity and understand and define heredity as the transfer of genetic information that specifies structure, characteristics, and functions, from parents to offspring. (C)	01	[SLO: S-08-A-10] Explain the process of mitosis and meiosis and identify their key phases. (F)	01									02



[SLO: S-08-A-07] Describe the composition and structure of DNA. (C)	01											01	
[SLO: S-08-A-09] Describe cell division and its types – mitosis and meiosis and relate them to the passage of genetic information through reproduction. (C)	01											01	
Total Frequency	05		03				01					01	10
Organism-Structure & Function (Animals)													
[SLO: S-08-A-11] Identify the organs, functions and processes of	01	[SLO: S-08-A-13] Explain how the brain works as the control station	01	[SLO: S-08-A-24] Predict what would happen if a nerve	01						[SLO: S-08-A-18] Create a plan of activities and	01	04

the Human Nervous System. (C)		of the human body. (F)		connection broke. (M)						exercise s they can do to maintai n a healthy brain. (C)		
[SLO: S-08-A-12] Sketch and label a diagram of the Human Nervous System. (F)	01	[SLO: S-08-A-16] Map the various steps in the transmission of messages through the body and to the brain via a reflex arch. (C)	01									02
[SLO: S-08-A-14] Identify the three major parts of the brain – cerebrum, cerebellum, the fore brain, mid brain and hind brain, & describe their various functions. (C)	01	[SLO: S-08-A-21] Explain and represent how messages flow through the body from and to the brain, and how the brain	01									02

		collaborates with the sensory organs to regulate this process. (P)										
[SLO: S-08-A-15] Describe the structure of the cerebrum, its division into two hemispheres (left and right) and the role of each hemisphere in the control of the body. (C)	01	[SLO: S-08-A-22] Map the various steps in the transmission of messages through the body and to the brain. (P)	01									02
[SLO: S-08-A-17] Describe the type and function of neurons in transmitting messages through the body. (C)	01											01
[SLO: S-08-A-19] Match various body functions with the relevant part of the brain	01											01

that controls or regulates them (For instance, associating breathing with the brain stem). (P)												
[SLO: S-08-A-20] Describe the structure of the cerebrum, its division into two hemispheres (left and right) and the role of each hemisphere in the control of the body. (C)	01											01
[SLO: S-08-A-23] Describe the role and function of neurons in transmitting messages through the body. (C)	01											01
[SLO: S-08-A-25] Match various body functions with the relevant part of the brain that controls or regulates them	01											01

(for instance, associating breathing with the brain stem). (P)												
[SLO: S-08-A-26] Describe the role of living things in cycling oxygen and carbon through an ecosystem, citing the processes of respiration, Photosynthesis, and combustion. (C)	01											01
Total Frequency	10		04		01						01	16
Ecosystems												
[SLO: S-08-A-29] Describe how energy flows from producers to consumers, and how only part of the energy flows from one level of the pyramid to the next. (C)	01	[SLO: S-08-A-28] Describe global warming and explain how threats to the carbon-oxygen balance such as overpopulation, reliance on	01					[SLO: S-08-A-27] Relate how oxygen and carbon cycles are complementary processes that bring balance and symmetry to life on Earth. (P)	01			03

		fossil fuels, and deforestation are contributing to global warming and climate change. (F)										
		[SLO: S-08-A-30] Draw a food web diagram to illustrate the food relationships between organisms. (C)	01					[SLO: S-08-A-34] Explain ways in which human behaviour (e.g., replanting forests, reducing air and water pollution, protecting endangered species) can have positive effects on the local environment. (F)	01			02
		[SLO: S-08-A-31] Describe and illustrate through examples key ecological	01									01

		relationships between organisms, including competition, predation, and symbiosis. (C)										
Total Frequency	01		03					02			06	
Biotechnology												
[SLO: S-08-A-35] Define biotechnology as the use of living cells and organisms in products and processes that can improve the quality of life. (C)	01	[SLO: S-08-A-36] Illustrate how biotechnology is a discipline/field that has the potential to transform how we live. (C)	01					[SLO: S-08-A-37] Discuss the applications of biotechnology in the Pakistani context and their effects on the people and the environment of Pakistan over time. Illustrative examples: bread-making, making of yogurt and cheese, vaccines for immunization, insulin production, dyes, etc. (C)	01	[SLO: S-08-A-32] Predict how changes in an ecosystem (e.g., changes in the water supply, the introduction of a new population, hunting, migration) can affect available resources, and thus the balance among populations. (M)	01	04

										[SLO: S-08-A-33] Hypothesize what would happen in the ecosystem if the population of one of the participants in different ecological relationships is affected. (M)	01	01
										[SLO: S-08-A-38] Relate the use of biotechnology in food sciences in producing foods with higher nutritional value and improved	01	1

									taste and quality (how fermentation has been improved by genetically modified organisms or the introduction of certain genes to raise iron content in rice, can be taken as examples). (P)			
Total Frequency	01		01						01	03	06	
Domain B: Physical Sciences												
[SLO: S-08-B-01] Recognise Periodic Table as a way of classifying the elements in groups and periods. (C)	01	[SLO: S-08-B-06] Define the Law of Conservation of Mass and demonstrate the law with an experiment. (C)	01	[SLO: S-08-B-04] Relate the properties to the uses of metals. (C)	01	[SLO: S-08-B-08] Distinguish between different types of reactions (combination, displacement, double displacement	01	[SLO: S-08-B-31] Investigate that light is made up of many colours. Relate the apparent color of objects to reflected or	01	[SLO: S-08-B-11] Design a car that is powered solely by a chemical reaction and can travel. (STEAM). (P)	01	06

						, combustion). (C)		absorbed light. (C)				
[SLO: S-08-B-02] Identify the names and location of the first 18 elements only. (C)	01	[SLO: S-08-B-12] Discuss formation of ionic bonds as a result of electrostatic forces between atoms (e. g., NaCl). (C)	01	[SLO: S-08-B-07] Write and balance chemical equations. (P)	01	[SLO: S-08-B-09] Distinguish between endothermic and exothermic reactions. (C)	01	[SLO: S-08-B-38] Recognize the electric power of various electrical appliances. (C)	01	[SLO: S-08-B-49] Make a hydraulic elevator. (STEAM) (P)	01	06
[SLO: S-08-B-03] Identify properties of metals and non-metals. (C)	01	[SLO: S-08-B-13] Discuss types and formation of covalent bond as a result of mutual sharing of electrons between atoms (e. g., H ₂ , O ₂ , N ₂). (C)	01	[SLO: S-08-B-15] Draw cross and dot structures showing formation of ionic compounds and covalent compounds. (F)	01	[SLO: S-08-B-28] Distinguish between reflection and refraction of light with daily life examples. (C)	01	[SLO: S-08-B-47] Investigate effects related to pressure (e.g., water pressure increasing with depth, a balloon expanding when inflated, etc.) (C)	01	[SLO: S-08-B-48] Build a two-stage rocket model. (STEAM) (P)	01	06
[SLO: S-08-B-05] Identify chemical reactions and give examples. (C)	01	[SLO: S-08-B-16] Classify acids, alkalis, and salts and give examples of each. (C)	01	[SLO: S-08-B-21] Observe and write the uses of acids, bases, and salts in daily	01	[SLO: S-08-B-40] Analyse the danger of overloading and short circuit and	01	[SLO: S-08-B-50] Investigate the factors that affect the strength of an electromagne	01			05

				life. (P)		identify the importance of earth wire, fuses, and circuit breakers. (P)		t. (C)				
[SLO: S-08-B-10] Recognize the importance of exothermic and endothermic reactions in daily life. (P)	01	[SLO: S-08-B-19] Interpret the pH scale and identify acids, alkalis, and salts. (P)	01	[SLO: S-08-B-23] Describe and show how an image is formed by the plane mirror. (P)	01	[SLO: S-08-B-42] Recognize that several forces may act on an object and that they may or may not balance each other. (C)	01					04
[SLO: S-08-B-14] Name certain ionic and covalent compounds. (F)	01	[SLO: S-08-B-20] Describe neutralization reaction with real life examples. (C)	01	[SLO: S-08-B-26] Relate the apparent color of objects to reflected or absorbed light. (C)	01	[SLO: S-08-B-44] Differentiate between floating and sinking objects in terms of density. (P)	01					04
[SLO: S-08-B-17] Identify the physical properties of acids, alkalis, and salts. (C)	01	[SLO: S-08-B-27] Explain that light is refracted at the boundary between air	01	[SLO: S-08-B-36] Formulate that resistance is the ratio of voltage to current. (C)	01							03

		and any transparent material. (F)										
[SLO: S-08-B-18] Define pH and its ranges with reference to indicators. (C)	01	[SLO: S-08-B-30] Illustrate the characteristics of image formed by plane mirror. (C)	01	[SLO: S-08-B-43] Examine the effect of an unbalanced force on an object. (P)	01							03
[SLO: S-08-B-22] Identify basic properties of light (i.e., speed, transmission through different media, absorption, reflection, and dispersion). (C)	01			[SLO: S-08-B-46] Relate pressure with force and area. (C)	01							02
[SLO: S-08-B-24] State the Laws of Reflection. (F)	01			[SLO: S-08-B-48] Examine the effect of force in the presence of air pressure. (P)	01							02
[SLO: S-08-B-25] Describe	01											01

different optical instruments which use curved mirrors. (C)													
[SLO: S-08-B-32] Identify spherical mirror Describe the characteristics of image(s) formed by concave mirrors and convex mirrors. (C)	01												01
[SLO: S-08-B-33] Describe use of different optical instruments with plane in which spherical mirrors are used. (C)	01												01
[SLO: S-08-B-34] Define resistance and its SI unit. (C)	01												01
[SLO: S-08-B-35] Define voltage	01												01

& current state their SI units. (C)													
[SLO: S-08-B-37] Define electric power and state its unit. (C)	01												01
[SLO: S-08-B-39] Recognize the terms earth wire, fuse, circuit breaker. (P)	01												01
[SLO: S-08-B-41] List precautionary measures to ensure the safe use of electricity. (F)	01												01
[SLO: S-08-B-45] Define 'pressure' with examples and its unit. (F)	01												01
[SLO: S-08-B-51] Describe the properties that are unique to electromagnets (i.e., the strength	01												01

varies with current, number of coils, and type of metal in the core; the magnetic attraction can be turned on and off; and the poles can switch). (C)												
[SLO: S-08-B-52] Describe briefly the working principles of electromagnetic devices such as speaker, doorbell. (C)	01											01
Total Frequency	21		08		10		06		04		03	52
Technology in Everyday life												
				[SLO: S-08-B-53] Make bioplastic from milk and vinegar as an application of biotechnology. (P)	01					[SLO: S-08-B-55] Assemble a concave mirror type solar cooker to convert solar energy into heat energy. (P)	01	02

				[SLO: S-08-B-54] Make toothpaste, soap, and detergent as an application of acids and bases in daily life. (P)	01					[SLO: S-08-B-56] Assemble and operate a simple wind turbine to produce electricity. (P)	01	02
				[SLO: S-08-B-57] Demonstrate the working of UPS and use it to operate a fan or energy saver bulb. (M)	01							01
Total Frequency					03						02	05
Domain C: Earth and Space Science												
[SLO: S-08-C-01] Explore and understand the terms star, galaxy, Milky Way and the black holes. (C)	01	[SLO: S-08-C-02] Compare the types of galaxies. (P)	01	[SLO: S-08-C-03] Relate the life of a star with the formation of black hole, neutron star. Pulsar White Dwarf, Red Giant. (C)	01	[SLO: S-08-C-06] Describe advancements in space technology and analyse the benefits generated by the technology of space	01					04

						exploration. (F)								
[SLO: S-08-C-04] Discuss the birth and eventual death of our sun. (P)	01			[SLO: S-08-C-05] Show how information is collected from space by using telescopes (e.g., Hubble Space Telescope) and space probes (e.g., Galileo). (M)	01									02
<i>Total Frequency</i>	02		01		02		01							06
<i>Overall Total</i>	40		20		16		08		07			10		101

PSYCHOMOTOR DOMAIN

From Low Order Taxonomies to High Order Taxonomies													
Perception	No	Set	No	Guided Response	No	Mechanism	No	Complex Overt Response	No	Adaptation	No	Origination	No
Domain A: Life Sciences													
Organisms - Characteristics and Life Processes of Living Things													
				[SLO: S-08-A-08] Design a model of DNA to demonstrate	01								

				te its structure, functions, and various components.										
Total					01									
Organism-Structure & Function (Animals)														
				[SLO: S-08-A-12] Sketch and label a diagram of the Human Nervous System.	01									
Total					01									
Domain B: Physical Sciences														
									[SLO: S-08-B-11] Design a car that is powered solely by a chemical reaction and can travel.(STEAM)	01				
									[SLO: S-08-B-49] Make a hydraulic	01				

								elevator. (STEAM)						
								[SLO: S-08-B-48] Build a two stage rocket model. (STEAM)	01					
Total									03					
Technology in everyday life														
				[SLO: S-08-B-53] Make bioplastic from milk and vinegar as an application of biotechnology.	01	[SLO: S-08-B-55] Assemble a concave mirror type solar cooker to convert solar energy into heat energy.	01	[SLO: S-08-B-57] Demonstrate the working of UPS and use it to operate a fan or energy saver bulb.	01					
				[SLO: S-08-B-54] Make toothpaste, soap, and detergent as an application of acids and bases	01	[SLO: S-08-B-56] Assemble and operate a simple wind turbine to produce electricity	01							

				in daily life.									
Total					02		02		01				
Domain C: Earth and Space Science													
		[SLO: S-08-C-05] Show how information is collected from space by using telescopes (e.g., Hubble Space Telescope) and space probes (e.g., Galileo).	01										
Total			01										
Total overall			01		04		02		04				

AFFECTIVE DOMAIN

From Lower Order Taxonomies to Higher Order Taxonomies												
Receiving	No	Responding	No	Valuing	No	Organizing	No	Characterizing	No	Characterizing	No	Total
Domain A: Life Sciences												
Ecosystems												

				[SLO: S-08-A-33] Hypothesize what would happen in the ecosystem if the population of one of the participants in different ecological relationships is affected.	01					
Total Frequency					01					
6. Biotechnology										
				[SLO: S-08-A-37] Discuss the applications of biotechnology in the Pakistani context and their effects on the people and the environment of Pakistan over time. Illustrative examples: bread-making, making of yogurt and cheese, vaccines for immunization, insulin production, dyes, etc.	01					
Total Frequency					01					

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