



Grade
6

Science Teacher's Guide

To be Implimented from 2015



Department of Science
National Institute of Education
Maharagama
Sri Lanka
www.nie.lk

Science

Grade six

Teachers' Guide

First Edition-2015

© National Institute of Education

ISBN.....

Department of Science

Faculty of Science and Technology

National Institute of Education

Sri Lanka

web: www.nie.lk

email: info@nie.lk

Printed by:

Press

National Institute of Education

Message from the Director General

The first phase of the new competency based curriculum, with 8 years curriculum cycle was introduced to secondary education in Sri Lanka in 2007 replacing the existed content based education system with basic objective of developing the national level competencies recommended by the National Education Commission.

The second phase of the curriculum cycle to be introduced to grades 6 and 10 starts from 2015. For this purpose, National Institute of Education has introduced a rationalization process and developed rationalized syllabi for these grades using research based outcomes and various suggestions made by different stakeholders.

In the rationalization process, vertical integration has been used to systematically develop the competency levels in all subjects from fundamentals to advanced levels using the bottom up approach. Horizontal integration is used to minimize the overlapping in the subject content and to reduce the content over loading in the subjects to produce more students friendly and implementable curricular.

A new format has been introduced to the teachers' guide with the aim of providing the teachers with the required guidance in the areas of lesson planning, teaching, carrying out activities and measurement and evaluation. These guidelines will help the teachers to be more productive and effective in the classroom.

The new teachers' guides provide freedom to the teachers in selecting quality inputs and additional activities to develop the competencies of the students. The new teachers' guides are not loaded with subject content that is covered in the recommended textbooks. Therefore, it is essential for the teacher to use the new teachers' guides simultaneously with the relevant textbooks prepared by Education Publication Department as reference guides to be more aware of the syllabi.

The basic objectives of the rationalized syllabi and the new format of teachers' guide and newly developed textbooks are to bring a shift from the teacher centered education system into a student centered and more activity based education system in order to develop the competencies and skills of the school leavers and to enable the system to produce suitable human resource to the world of work.

I would like to take this opportunity to thank the members of Academic Affairs Board and Council of National Institute of Education and all the resource persons who have immensely contributed in developing these new teacher guides.

Director General

National Institute of Education

Message from the Deputy Director General

Education from the past has been constantly changing and forging forward. In recent years, these changes have become quite rapid. Past two decades have witnessed a high surge in teaching methodologies as well as in the use of technological tools and in the field of knowledge creation.

Accordingly, the National Institute of Education is in the process of taking appropriate and timely steps with regard to the education reforms of 2015.

It is with immense pleasure that this Teachers' Guide where the new curriculum has been planned based on a thorough study of the changes that have taken place in the global context adopted in terms of local needs based on a student-centered learning-teaching approach, is presented to you teachers who serve as the pilots of the schools system.

An instructional manual of this nature is provided to you with the confidence that, you will be able to make a greater contribution using this.

There is no doubt whatsoever that this Teachers' Guide will provide substantial support in the classroom teaching-learning process at the same time. Furthermore the teacher will have a better control of the classroom with a constructive approach in selecting modern resource materials and following guide lines given in this book.

I trust that through the careful study of this Teachers Guide provided to you, you will act with commitment in the generation of a greatly creative set of students capable of helping Sri Lanka move socially as well as economically forward.

This Teachers' Guide is the outcome of the expertise and unflagging commitment of a team of subject teachers and academics in the field Education.

While expressing my sincere appreciation of this task performed for the development of the education system, my heartfelt thanks go to all of you who contributed your knowledge and skills in making this document such a landmark in the field.

M.F.S.P. Jayawardhana
Deputy Director General
Faculty of Science and Technology

Guidance: Academic Affairs Board
National Institute of Education

Directions: M.F.S.P. Jayawardhana
Deputy Director General
Faculty of Science and Technology,
National Institute of Education

Subject leader:

Mr. RSJP Uduporuwa, Senior Lecturer, National Institute of Education

Subject Committee:

Mr. R.S.J.P. Uduporuwa, Senior Lecturer, National Institute of Education

Mr. A.D.A. De Silva, Senior Lecturer, National Institute of Education

Mr. P. Malavipathirana, Senior Lecturer, National Institute of Education

Mr. L.K. Waduge, Senior Lecturer, National Institute of Education

Ms. M. Ragavachari, Lecturer, National Institute of Education

Ms. M.M. Mapagunaratne, Lecturer, National Institute of Education

Ms. M. Thirunadarajah, Lecturer, National Institute of Education

Mr. M.L.S. Piyathissa, Assistant Lecturer, National Institute of Education

Mr. P. Achchudan, Assistant Lecturer, National Institute of Education

Ms. D.A.M.U.S. Warushahannadige, Assistant Lecturer, National Institute of Education

External Resource Contribution:

Mr. M.P. Vipulasena, Director of Education (Science) ,Ministry of Education

Mr. W.A.D. Ratnasooriya, Chief Project Office (Retired), NIE

Mr. W.D. Wijesinghe, , Chief Project Office (Retired), NIE

Mr. H.S.K. Wijethilake, SLEAS 1(retired)

Mr. W.D. Vijithapala, In-Service Advisor (Science), Regional Education Office,
Rideegama

Mr. A.M.T. Pigeru, SLEAS 111(retired)

Mr. K.D. Bandulakumara Assistant, Commissioner Department of Education Publication

Mr. E. Joseph In-Service Advisor, Divisional educational Office, Colombo

Instructions for the use of the teachers' guide

The new rationalized syllabus for the subject of Science and Technology is going to be implemented from the year 2025. From there onwards, the teachers will have to use this teachers' guide in place of the teachers' instructional manual. The syllabus is included in the teachers' guide to make the process easy for the students.

This teachers' guide consists of a compilation of instructions given to the teachers in order to make use of in the classroom to achieve specific competency levels. Further, the specific competencies thus highlighted are included in the teachers' guide with the time suggested for each of the competency levels.

Learning outcomes to be achieved at the end of each lesson are mentioned clearly in the teachers' guide and it is expected that the teachers will be guided to arrive at a comprehensive conclusion on the behavioral changes expected of the children based on the three domains, knowledge, attitudes and skills. Further, the learning outcomes will help the teachers to determine the depth and width and the limits of the subject content to be considered.

The section on "Instructions for lesson planning" consists of a set of suggestions for the teachers to organize and manage the learning teaching process within the allocated number of periods. The teacher is at liberty to make necessary changes to suit the learning teaching environment they encounter and it is the teacher's sole responsibility to make such changes in order to ensure that students reach the learning outcomes.

The teachers' guide also includes the basic concepts and essential technical terms the students are expected to acquire gradually when the competency levels are developed. Whether the students have achieved expected mastery levels has to be determined by way of assessment and evaluation.

Compared to the other subjects, teaching of science subject involves the use of a wide range of equipment and tools since it should happen in a very much practical context with an analytical approach. Minimum requirement of resources thus necessary for the lesson planning strategies is mentioned here as quality input. If teacher intends to introduce lesson planning strategies different from the suggested ones here, they are expected to make necessary changes in quality inputs accordingly.

Measuring of whether the learning and teaching process was successful within a particular learning environment paves way to achieve feedback and at the same time to use remedial methods accordingly. At the end of each unit there are suggested evaluation and assessment procedures suitable for the said purpose. Here it is expected to examine whether the students have achieved expected mastery in a particular competency level. Assessment process may happen during the lesson or at the end of the lesson and the teacher is free to obtain the assistance of their students too in this regard. Here, it is essential to pay special attention to the National Goals, Basic Competencies and the objectives of the science curriculum, given at the beginning of the teachers' guide.

Table of Content

	Page
Message from the Director General	i
Message from the Deputy Director General	ii
Resource Contribution	iii
Instructions to use the Teachers 'Guide	v
Syllabus	viii
Guidance for the Learning-Teaching Process	1
Exemplar Tools for School Based Assessment	21

Science
Grade 6
Syllabus

INTRODUCTION

The major aim of the subject Science subject is the personal development of the student through a scientific lifestyle, thereby paving way for national development, thus building a unique and prosperous Sri Lanka that is a wonder.

A series of objectives specific to the subject Science has been established as a foundation for the progressive achievement of this admirable goal. To reach this target, the student who enters the 6th grade after primary education must learn Science with zeal and enthusiasm. We proudly present you the duly equipped Science syllabus.

Sri Lanka claims a significant level of literacy and upholds a level of education on par with the countries reputed for the highest standard of education in the world. This standard is sustained through regular syllabus revision, and improving, developing and updating it every eight years.

Therefore, the syllabus presented in 2015 is merely a further improvement of the existing competency based curriculum. These changes have been made, based on the data and suggestions provided by the erudite community of the educational sphere and the research done by both the National Institute of Education and other educational institutions on the syllabus introduced to the education system in 2007.

Now, more time is provided for the teacher to orchestrate the learning-teaching process in the classroom more effectively. In the construction of the new syllabus, the excessive weight of the previous syllabus has been lessened by reducing the subject content and essential information has been added. Thus the teacher has more freedom to engage in the learning-teaching process in the classroom utilizing his/her own creativity to the maximum effect.

0.1 National goals

1. Based on the concept of respecting human values and understanding the differences between the Sri Lankan multi-cultural society, building up the nation and confirming the identity of Sri Lanka by promoting national integrity, national unity, national coherence and peace
2. While responding to the challenges of the dynamic world, identifying and conserving the National heritage.
3. Creating an environment which comprises the conventions of social justice and the democratic life to promote the characteristics of respecting the human rights, being aware of the responsibilities, concerning each other with affectionate relationships.
4. Promoting a sustainable life style based on the people's mental and physical wellbeing and the concept of human values
5. Promoting the positive feelings needed for balanced personality with the qualities of creative skills, initiative, critical thinking and being responsible
6. Through education, developing the human resources, needed for the progress of the wellbeing of an individual, the nation as well as the economic growth of Sri Lanka.
7. Preparing the people for the changes that occur in a rapidly changing world by adapting to it and controlling them; developing abilities and potentialities of people to face the complex and unexpected occasions.
8. Sustaining the skills and attitudes based on justice, equality, mutual respect which are essential to achieve a respectable place in the international community.

National Education Commission Report (2003).

0.2 Basic Competencies

The competencies promoted through the education mentioned below might help to achieve the above mentioned National Goals.

(i.) Competencies in Communication

This first set of competencies is made up of four subsets - Literacy, Numeracy, Graphics and information communication skills :

Literacy : Carefully listening, speaking clearly, reading for comprehension, writing clearly and accurately.

Numeracy: Using numbers to count, calculate, code and to measure, matter, space and time.
Graphics : Making sense of line and form, expressing and recording essential data, instructions and ideas with line, form, colour, two and three-dimensional configurations, graphic symbols and icons
ICT Competencies: Knowledge on computers, and the ability to use the information communication skills at learning or work as well as in the private life

(ii.) Competencies relating to the Personality Development

- Generic skills such as creativity, divergent thinking, initiative, decision making, problem-solving, critical and analytical thinking, team work, inter-personal relationships, discovering and exploring
- Values such as integrity, tolerance and respect for human dignity.
- Cognition

(iii.) Competencies relating to the Environment

This is the second set of competencies related to the Social, Biological and Physical environments.

Social Environment: Awareness, sensitivity and skills linked to being a member of society, social relationship, personal conduct, general and legal conventions, rights, responsibilities, duties and obligations.

Biological Environment: Awareness, sensitivity and skills linked to the living world, man and the ecosystem, the trees, forests, seas, water, air and life - plant, animal and human life.

Physical Environment: Awareness, sensitivity and skills relating to space, energy, fuels, matter, materials and their links with human living, food, clothing, shelter, health, comfort, respiration, sleep, relaxation, rest, wastes and excretion, media of communication and transport.
Included here are the skills in using tools to shape and for materials for living and learning.

(iv.) Competencies relating to preparation for the world of work

Employment related skills to maximize their potential and to enhance their capacity to contribute to economic development; to discover their vocational interests and aptitudes; to choose a job that suits their abilities and; to engage in a rewarding and sustainable livelihood

(v.) Competencies relating to religion and ethics

This fourth set of competencies laden with values and attitudes. It is essential for individuals to assimilate values, so that they may function in a manner consistent with the ethical, moral and religious modes of conduct, rituals, practices in everyday living, selecting the most appropriate.

(vi.) Competencies in play and use of leisure

Competencies that link up with pleasure, joy, emotions and such human motivations. These find expression in play, sports, athletics and leisure pursuit of many types. These also link up with such values as cooperation, team work, healthy competition in life and work. Here are included such activities as are involved in aesthetics, arts, drama, literature, exploratory research and other creative modes in human living

(vii.) Competencies relating to ‘learning to learn’.

These competencies flow directly from the nature of a rapidly changing, complex and interdependent and crowded world. Whatever one learns, that learning will need updating and review. This requires that one should be aware of, sensitive and skilful in sustained attention, and be willing to persevere and attend to details that matter in a given situation.

Course objectives - Grades 6 - 11 science

- Develop scientific concepts and principles systematically through a joyful learning environment.
- Develop competencies related to problem solving by using processes in science and scientific method appropriately.
- Develop competencies pertaining to managing environmental resources intelligently by understanding the potential of such resources.
- Develop competencies related to the usage of scientific knowledge to lead a physically and mentally healthy life.
- Develop competencies pertaining to becoming a successful individual who will contribute to the development of the nation in collaboration, engage in further studies and undertaking challenging job prospects in the future.
- Develop competencies related to understanding the scientific basis of the natural phenomena and the universe
- Use appropriate technology to maintain efficiency and effectiveness at an optimum level in utilizing energy and force.
- Develop competencies related to evaluation of day to day life experiences and information acquired through media by employing scientific criteria with the background of limitations and dynamic nature of science.

Competency: 1.0. Explores life and life processes in order to improve productivity of biological systems

Competency	Competency level	Contents	Outcomes	Time (Periods)
1.0	1.1. Explores living organisms around us. 1.2 Suggests some criteria to classify organisms.	<p>Wonders of the living world</p> <ul style="list-style-type: none"> • Organisms living around us • Characteristics of organisms <ul style="list-style-type: none"> • Growth • Reproduction • Movements • Respiration • Nutrition • Organisms <ul style="list-style-type: none"> • Plants • Animals • Microorganisms • Differences between plants and animals <ul style="list-style-type: none"> • Locomotion • Mode of nutrition <p>Growth limitations</p>	Students will be able to; <ul style="list-style-type: none"> • differentiate living from non-living • give examples for living and non-living things • describe the basic features of organisms • classify organisms into three major groups as plants, animals and microorganisms • explain the fundamental differences between plants and animals • design and conduct simple activities to show some characteristics of living organisms • use dichotomous keys to classify organisms • interpret and display collected data • accept that all organisms are part and parcel of the environment • show responsibility to have care and conservation for living organisms • appreciate the diversity of living world • enjoy observing behaviours of organisms • build up a habit of inquiring the environment 	15

Competency: 2.0. Investigates matter, properties of matter and their interaction to enhance the quality of life

Competency	Competency level	Contents	Outcomes	Time (Periods)
2.0.	2.1 Identifies the diversity of things around us. 2.2 Classifies matter based on their properties. 2.3 Examines properties of matter using simple activities.	<p>Things around us</p> <ul style="list-style-type: none"> • Matter and energy • States of matter with relevant examples <ul style="list-style-type: none"> • Solid • Liquid • Gas • Characteristics of three states of matter (qualitative comparison only) <ul style="list-style-type: none"> • Shape • Volume • Hardness • Malleability • Ductility • Elastic nature • Brittleness • Texture • Applications of matter based on properties 	<p>Students will be able to;</p> <ul style="list-style-type: none"> • identify matter and energy giving suitable examples • name solids, liquids and gases as forms of matter • distinguish three states of matter with respect to shape and volume • identify the given properties of matter • identify matter and energy giving suitable examples • classify things in the environment as solids, liquids and gases • test and report hardness, malleability, ductility, elasticity, brittleness and texture of solids • conduct simple activities to show applications of properties of matter • value the usage of matter 	12

	<p>2.4 Classifies water based on different criteria.</p> <p>2.5 Examines properties of water by simple activities.</p> <p>2.6 Accepts water as a valuable and limited resource.</p>	<p>Water as a natural resource</p> <ul style="list-style-type: none"> • States of water <ul style="list-style-type: none"> • Ice, water and water vapor • Types of water based on salinity <ul style="list-style-type: none"> • Fresh water • Sea water • Brackish water • Types of water based on availability <ul style="list-style-type: none"> • Ground water • Rain/precipitation • Surface water <p>Importance of water as a natural resource</p>	<p>Students will be able to;</p> <ul style="list-style-type: none"> • name three physical states of water • describe ground water, precipitation and surface water as sources of water • give examples for ground water, precipitation and surface water • describe importance of water for the existence of life • insist importance of water for human activities • classify water based on salinity and modes of precipitation • compare amount of salt dissolved in fresh water, sea water and brackish water experimentally • present information about water indicating it as a limited resource • accept water as a limited natural resource • appreciate water as a valuable resource 	<p>15</p>
--	---	---	--	-----------

Competency: 3.0. Utilizes various forms of energy, their interaction with matter and energy transformations by maintaining efficiency and effectiveness at an optimum level

Competency	Competency level	Contents	Outcomes	Time (Periods)
3.0	3.1 Develops awareness about energy sources and their uses. 3.2 Performs activities to illustrate the uses of certain energy sources. 3.3 Accepts the importance of sustainable utilization of energy sources.	Energy in day-to-day life <ul style="list-style-type: none"> • Energy does work • Energy sources and their uses <ul style="list-style-type: none"> • Sun • Biomass • Fossil fuels • Wind • Hydropower • Sea waves • Tidal waves • Geothermal • Nuclear 	Students will be able to; <ul style="list-style-type: none"> • state energy as ability of doing work • identify sun as the main source of energy • give a brief introduction to other sources of energy • describe the uses of energy sources with examples • conduct simple activities to demonstrate how energy works • present information on sources of energy • demonstrate several applications of selected energy sources by simple activities • realize the exhaustibility of energy sources • value the sustainable usage of energy 	10

	<p>3.4 Illustrates the uses of light by simple activities.</p> <p>3.5 Explains the nature and functions of light using rays and beams.</p> <p>3.6 Explores various sources of light and the uses of light.</p> <p>3.7 Suggests possible explanations to show properties of light.</p>	<p>Light and vision</p> <ul style="list-style-type: none"> • How we see <ul style="list-style-type: none"> • Need of light • From where the light comes • Luminous objects • Non-luminous objects • Transparent, translucent and opaque media • Properties of light <ul style="list-style-type: none"> • Beam of light • Ray of light • Rectilinear propagation of light • Uses of light <ul style="list-style-type: none"> • Sight • Illumination • Signaling • Communication • Medical purposes • Entertainment • Food production in plants 	<p>Students will be able to;</p> <ul style="list-style-type: none"> • explain the factors necessary for vision • distinguish luminous and non luminous objects giving examples • identify transparent, translucent and opaque media according to the transmission of light • express that the ray as an idealized narrow beam of light • compile a report on uses of light • distinguish the beam of light and a ray of light diagrammatically • conduct simple activities to demonstrate the need of light for vision • build up small set-ups to illustrate certain uses of light • demonstrate a beam of light by simple activities • demonstrate rectilinear propagation of light by simple activities • appreciate the importance of light • accept that light should be used without disturbing others 	<p>15</p>
--	---	---	---	-----------

	<p>3.8 Develops the concept 'sound' with the help of different sounds in the environment.</p> <p>3.9 Describes the principal differences between various types of sound.</p>	<p>Sound and hearing</p> <ul style="list-style-type: none"> • Sound as the sensation received by hearing organs/ear • Sounds in environment <ul style="list-style-type: none"> • Natural sounds • Artificial sounds • Noise and music 	<p>Students will be able to;</p> <ul style="list-style-type: none"> • identify sound as the sensation received by hearing organs/ear • give examples for different sounds existing in the environment • perform simple activities to experience the varieties of sound • distinguish sound in environment as natural and artificial • differentiate noise and music by experiencing various sounds • construct simple instruments to produce sound • enjoy music and natural sounds • accept that sound should be used without disturbing others 	<p>08</p>
	<p>3.10 Argues a case for a magnetic effect.</p> <p>3.11 Formulates appropriate methods to show the behaviour of magnets.</p>	<p>Magnets</p> <ul style="list-style-type: none"> • Magnetic effect • Magnetic poles <ul style="list-style-type: none"> • Attraction/ repulsion 	<p>Students will be able to;</p> <ul style="list-style-type: none"> • understand that magnets exert a force on certain substances • identify magnets and their poles • state that like poles repel and unlike poles attract • conducts simple activities to experience the magnetic effect • prepare workable devices to show magnetic effect • test the strength of magnets collected from the surrounding • perform activities to demonstrate attraction and repulsion of magnets • use repulsion to differentiate a magnet 	<p>08</p>

			<ul style="list-style-type: none"> from other magnetic substances • identify poles of a magnet using the compass • accept that magnets can be used for joyful activities 	
	<p>3.12 Identifies sources of electricity from various resources.</p> <p>3.13 Illustrates circuit diagrams using standard symbols.</p> <p>3.14 Distinguishes conductors and insulators practically.</p>	<p>Electricity for comfortable life</p> <ul style="list-style-type: none"> • Electricity for day- to-day life • Generating electricity • Introduction of electric circuits, their components and their symbols <ul style="list-style-type: none"> • Wires • Switch • Bulb • Cell/Battery • Ammeter • Conductors and insulators • Simple electronic and electrical components <ul style="list-style-type: none"> • Diodes • LED • Resistors • LDR 	<p>Students will be able to;</p> <ul style="list-style-type: none"> • state, uses of / electricity in day-to-day life • state few electricity generating devices • identify components in an electric circuit by manipulating them correctly • denote components of an electrical circuit by standard symbols • name given simple electronic components • present information on electricity generating devices • conduct simple activities to generate electricity • connect and work out simple electric circuits according to the given circuit diagrams • identify electrical conductors and insulators by performing simple activities • construct simple circuits to demonstrate functions of given electronic components • accept that electrical appliances and electronic components should be handled safely and productively 	20

	<p>3.15 Search for the methods of generating heat.</p> <p>3.16 Demonstrates the effects of heat.</p> <p>3.17 Inquires about the instances where effects of heat are experienced in the environment</p>	<p>Heat and its effects</p> <ul style="list-style-type: none"> • How heat helps life • Effects of heat <ul style="list-style-type: none"> • Raising temperature • Expansion • Change of state • Change of colour • Generation of heat 	<p>Students will be able to;</p> <ul style="list-style-type: none"> • list out uses of heat in day-to-day life • give examples for effects of heat experienced in the environment • perform simple activities to demonstrate the effects of heat • conduct simple activities to demonstrate the ways of generating heat • accept that heat should be handled safely and productively • realize that heat affects the properties of substances and products 	<p>08</p>
--	--	--	---	-----------

Competency: 4.0. Explores nature, properties and processes of earth and space by understanding natural phenomena for intelligent and sustainable utilization

Competency	Competency level	Contents	Outcomes	Time (Periods)
4.0	<p>4.1. Judges interactions among the organisms according to their food habits.</p> <p>4.2. Categorizes organisms according to their mode of nutrition.</p>	<p>Food - related interactions</p> <ul style="list-style-type: none"> • Mode of nutrition <ul style="list-style-type: none"> • Herbivorous • Carnivorous • Omnivorous • Food-related interactions <ul style="list-style-type: none"> • Food chains • Food webs 	<p>Students will be able to;</p> <ul style="list-style-type: none"> • identify herbivores as animals which consume plant materials • identify carnivores as animals which consume animal materials • identify omnivores as animals which consume both plant and animal materials • understand that all animals directly or indirectly depend on plants for food • describe food chains and food webs as an interactions among plants and animals • identify the hierarchy of food related interactions in nature • categorize animals as herbivores, carnivores and omnivores according to their food habits • develop food chains through observations and experiences • build up food webs using the inter-connections between food chains • highlight food chains in a given food web • accept that each and every organism plays a key role in the balanced environment • act responsibly not to disturb the natural balance of the food webs 	15

	<p>4.3. Develops awareness about changes in weather and associated natural disasters.</p> <p>4.4. Observes factors that determine weather.</p>	<p>Climatic changes</p> <ul style="list-style-type: none"> • Weather and climate • Factors determining weather <ul style="list-style-type: none"> • Rain • Wind • Temperature • Humidity • Natural disasters associated with climatic changes <ul style="list-style-type: none"> • Flood • Cyclone • Drought • Landslide 	<p>Students will be able to;</p> <ul style="list-style-type: none"> • differentiate weather and climate • name some factors that determine weather • list out some natural disasters associated with climatic changes • construct simple set ups to observe changes in rainfall, wind direction, wind speed and humidity • use simple set ups and standard instruments to observe and record changes in weather • record observed changes in weather for a given period • realize the importance of awareness of weather conditions 	<p>15</p>
--	--	--	---	-----------

Guidance for Learning-Teaching Process

Competency 1

Explores life and life processes in order to improve productivity of biological systems

Competency levels

- 1.1 Explores living organisms around us
- 1.2 Suggests some criteria to classify organisms

Time 15 periods

Learning outcomes

Students will be able to;

- differentiate living from non-living
- give examples for living and non-living things
- describe the major characteristics of organisms
- classify organisms into three major groups as plants, animals and microorganisms
- explain the fundamental differences between plants and animals
- design and conduct simple activities to show some characteristics of living organisms
- use dichotomous keys to classify organisms
- interpret and display collected data
- accept that all organisms are part and parcel of the environment
- show responsibility to have care and sense of conservation for living organisms
- appreciate the diversity of the living world
- enjoy observing behaviors of organisms
- build up a habit of inquiring the environment

Instructions for lesson planning

- Arrange a field study. Divide students into groups. Prepare a work schedule in order to involve students to observe and record movement, respiratory movements, food habit, growth, reproduction etc.
- Let the groups discuss their findings on observable characteristics and on observable characteristics.
- Guide them to write their findings on board. Conduct a discussion with students on their findings leading to major characteristics of organisms
- Explain why some characteristics of living organism are non observable
- Let students divide the things found in the environment as living and non living

- Discuss and guide students to differentiate plants from animals based on locomotion/ movements, mode of nutrition and growth limitations. Elaborate the above mentioned characteristics.
- Guide groups to present their understanding on characteristics mentioned using suitable methods (short speeches, posters etc.).
- Design a simple experiment to show the growth of a plant.
- Show students microorganisms through simple microscope and then compound microscope using one of the samples from pond water, hey fusion and wet soil. Build the concept of microorganism by pooling their experiences.
- Instruct students to classify the given list of organism as plants, animals and microorganisms.
- Let the students illustrate the things they found in the environment using a tree diagram.
- Build the concept of dichotomous key using beads/ buttons etc. with different colours and sizes.
- Let the students identify given groups of organisms using a dichotomous key.

Key concepts expected to be highlighted

Organism, Microorganism, Non-living, Diversity, Dichotomous key

Quality inputs

Hand lenses, Petri-dishes, photographs and diagrams of relevant organisms, forceps, pair of scissors, microscope, pulley, twine etc.

Assessment and evaluation

- During the field trip assess student based on the following.
 - Active participation
 - Concern for the environment
 - Following instructions
 - Preparation
 - Safety
 - Recording observations
 - Ways of enjoying the environment

- Assess students performances in their presentations(speeches, posters etc.) based on
 - Variety of information
 - Accuracy of information
 - Logical presentation
- Evaluate students' knowledge on the following using a suitable tool.
 - Characteristics of living things
 - Differences between plants and animals
 - Microorganisms
- Assess student skills of using dichotomous key to identify given sets of organisms.

Competency 2

Investigates matter, properties of matter and their interaction to enhance the quality of life

Competency levels

- 2.1. Identifies the diversity of things around us.
- 2.2. Classifies matter based on their properties.
- 2.3. Examines properties of matter using simple activities.

Time 12 periods

Learning outcomes

Students will be able to;

- identify matter and energy giving suitable examples
- name solids, liquids and gases as forms of matter
- distinguish three states of matter with respect to shape and volume
- identify the given properties of matter
- identify matter and energy giving suitable examples
- classify things in the environment as solids, liquids and gases
- observe and report hardness, malleability, ductility, elasticity, brittleness and texture of solids
- conduct simple activities to show applications of properties of matter
- value the usage of matter

Instructions for lesson planning

- Gather information from the students about the things in their environment and list them on the blackboard (Limit the list to 20 items; ensure the list includes both matter and energy).
- Conduct simple activities to demonstrate the basic characteristics of matter (let them identify matter as everything that has mass and occupies space). Build up the concept of matter. Let the students understand the difference between matter and energy. Introduce different criteria that the matter can be categorized. Explain the three states of matter (solid, liquid, and gas).
- Let the groups discover the differences between three states of matter based on their shape and volume by simple activities. Let students categorise the list of things they mentioned as solids, liquids and gases.
- Guide student groups to discover properties of solid using given materials (hardness, malleability, ductility, elastic nature, brittleness, texture)
- Ask students to bring some materials to the classroom. Divide class into several groups.
- Get the students to observe and report the properties of materials which they have brought. Ask each group to present their findings to the class. Enrich their presentations through discussion and explanations. Discuss the application of properties of solids in day to day life.

Key concepts to be highlighted

Matter, solid, liquid, gas, hardness, malleability, elastic nature, brittleness, texture

Quality inputs and resources

Collection of solid material, hammer, Demy papers, marker pens

Assessment and evaluation

- Assess the students while they are engaged in group work based on following criteria.
 - Accuracy of the information presented
 - Completeness of the information presented
 - Presentation skills
 - Leadership qualities
 - Fellowship qualities
- Ask each student to prepare a booklet on the uses of various properties of solid material in day to day life. Assess it based on following criteria.
 - The accuracy of information
 - The relevance of information
 - The neatness and finishing
 - Effective and logical organization
- Conduct open book test based on the facts in the textbook

Competency 2

Investigates matter, properties of matter and their interaction to enhance the quality of life

Competency levels

- 2.4. Classifies water based on different criteria.
- 2.5. Examines properties of water by simple activities.
- 2.6. Accepts water as a valuable and limited resource.

Time 15 periods

Learning outcomes

Students will be able to;

- name three physical states of water
- describe ground water, precipitation and surface water as sources of water
- give examples for ground water, precipitation and surface water
- describe importance of water for the existence of life
- insist importance of water for human activities
- classify water based on salinity and modes of precipitation
- compare amount of salt dissolved in fresh water, sea water and brackish water experimentally
- present information about water indicating it as a limited resource
- accept water as a limited natural resource
- appreciate water as a valuable resource

Instructions for lesson planning

- Conduct a discussion highlighting the three states of water giving examples (ice, water and water vapour).
- Ask students to describe the sources of water and to list examples for each (ground water, surface water and precipitation).
- Discuss the concept of level of ground water. How the level of water in a well varies (observation in a rainy season and in a drought).
- Assign students to find pictures or draw diagram for the sources of water they mentioned above.
- Explain students the modes of precipitation (rain, snow, hail, sleet, etc.) by showing diagrams, videos, etc.
- Explain students the types of water based on salinity giving examples (fresh water, sea water and brackish water).

- Prepare a guided exploration to compare the salt content dissolved in fresh water and sea water or brackish water (if samples are not available teacher may prepare solutions at the laboratory and must assure the safety of students in the exploration).
- Conduct a discussion highlighting the importance of water for life.
- Assign students to list the uses of water for other human activities such as agriculture, transportation, leisure, etc. giving examples.
- Conduct a discussion emphasizing how we can minimize the wastage of water at home, in school and in the village.
- Ask students to comment on the availability of fresh water and lead a discussion using numerical facts
- Assign students to write an essay on the importance of water.
- Ask students to calculate the amount of water they use for various purposes at home per day and to suggest ways to reduce the wastage of water.

Key concepts expected to be highlighted

Precipitation, surface water, groundwater, salinity

Quality inputs

Samples of fresh water, sea water and brackish water

Assessment and evaluation

- Assess the guided exploration to compare the salt content dissolved in different water types based on
 - following instructions
 - active participation
 - interpretation of the observations.
- Give students an open book test based on the textbook.

Competency 3

Utilizes various forms of energy, their interaction with matter and energy transformations by maintaining efficiency and effectiveness at an optimum level

Competency levels

- 3.1. Develops awareness about energy sources and their uses.
- 3.2. Performs activities to illustrate the uses of certain energy sources.
- 3.3. Accepts the importance of sustainable utilization of energy sources.

Time 10 periods

Learning outcomes

Students will be able to;

- state energy as ability of doing work
- identify sun as the main source of energy
- give a brief introduction to other sources of energy
- describe the uses of energy sources with examples
- conduct simple activities to demonstrate how energy works
- present information on the sources of energy
- demonstrate several applications of selected energy sources by simple activities
- realize the exhaustibility of energy sources
- value the sustainable usage of energy

Instructions for lesson planning

- Direct students to search about various sources of energy. Have a classroom discussion and guide students to identify main source and other sources of energy.
- Ask each student to gather detailed information about other sources of energy using printed media or/and internet. Direct them to share information and make presentation to the class on sources of energy.
- Divide the class into small groups. Give each group materials and tools needed. Guide groups to construct suitable models to demonstrate the application of energy sources such as sun, wind and hydro-power. Have a classroom discussion to highlight the productive applications of energy sources.
- Direct the students to use printed media, electronic media to illustrate the exhaustibility of energy sources. Ask the students to present their findings and to suggest remedial precautions to face the crisis.

Key concepts expected to be highlighted

Work, energy, sources of energy, sustainable use

Quality inputs

Hammer, pair of scissors, tinman's snip, hand saw, hacksaw, styrofoam sheets, gum, small dynamo, small electric motor etc.

Assessment and evaluation

- Have students properly involved in searching sources of energy. Assess how well is their contribution in the discussion.
- Have student complete the assignment on other sources of energy according to the given instructions. Assess them based on;
 - the use of various sources of information
 - identifying relevant information
 - constructive presentation
- Assess students' group work on constructing models to demonstrate application of energy sources based on;
 - use of improvised apparatus
 - linkage of the model with the given energy source
 - attractiveness of demonstration
- Assess them during their illustration on exhaustibility of energy sources based on;
 - accuracy of the information
 - identification of sources
 - suggestions on proper usage of energy as a remedy
 -

Competency 3

Utilizes various forms of energy, their interaction with matter and energy transformations by maintaining efficiency and effectiveness at an optimum level

Competency levels

- 3.4. Illustrates the uses of light by simple activities.
- 3.5. Explains the nature and functions of light using rays and beams.
- 3.6. Explores various sources of light and the uses of light.
- 3.7. Suggests possible explanations to show properties of light.

Time 15 periods

Learning outcomes

Students will be able to;

- explain the factors necessary for vision
- distinguish luminous and non luminous objects giving examples
- identify transparent, translucent and opaque media according to the transmission of light
- express that the ray as an idealized narrow beam of light

- compile a report on uses of light
- distinguish the beam of light and a ray of light diagrammatically
- conduct simple activities to demonstrate the need of light for vision
- build up small set-ups to illustrate certain uses of light
- demonstrate a beam of light by simple activities
- demonstrate rectilinear propagation of light by simple activities
- appreciate the importance of light
- accept that light should be used without disturbing others
-

Instructions for lesson planning

- Conduct a discussion that leads to plan and carry out simple activities to understand the factors necessary for vision.
 - Object be illuminated.
 - Light from the object should reach the eyes.
- Plan and implement simple activities to demonstrate the rectilinear propagation of light.
- Group the students and assign them to categorize the objects they come across in day-to-day life as luminous objects and non-luminous objects. Summarize the results.
- Describe the terms “transparent”, “translucent” and “opaque” to the class. Distribute a collection of suitable items among the students and make them to identify each item as transparent, translucent and opaque.
- Clarify the difference between a beam of light and a ray of light by conducting simple activities and showing diagrams and pictures.
- Group the students and let them carry out simple activities to obtain a series of light rays from a given light beam.
(Hint: Use a comb or parallel narrow slits cut on a card.)
- Guide students to prepare models/devices/presentations to show various uses of light.

i.e.: -Vision

-Illumination

-Signals

-Communication

-Medical purposes

-Recreation and fun

-Food production in green plants

Let the students go through the textbook, other printed media, surf internet and prepare a presentation on the uses of light.

Key concepts expected to be highlighted

Luminousness, non-luminousness, transparency, translucency, opaqueness, beam of light, ray of light

Quality inputs

Textbook, cards/bristle board, a pair of scissors, various light sources, collection of transparent, translucent, and opaque items.

Assessment and evaluation

Assess the students while they are engaging in group activities using suitable criteria for their leadership and fellowship qualities.

Assess the presentation of the students on

quality of facts gathered;

variety of sources from which the facts are gathered;

clarity of presentation;

methods used for presentation;

time management.

Evaluate the students using a short test paper with more emphasis on the key concepts of this unit.

Competency 3

Utilizes various forms of energy, their interaction with matter and energy transformations by maintaining efficiency and effectiveness at an optimum level

Competency levels

- 3.8. Develops the concept 'sound' with the help of different sounds in the environment.
- 3.9. Describes the principal differences between various types of sound.

Time 08 periods

Learning outcomes

Students will be able to;

- identify sound as the sensation received by hearing organs/ear
- give examples for different sounds exist that in the environment
- perform simple activities to experience the varieties sound

- distinguish sounds in environment as natural and artificial
- differentiate noise and music by experiencing various sounds
- construct simple instruments to produce sound
- enjoy music and natural sounds
- accept that sound should be used without disturbing others

Instructions for lesson planning

- Let the students listen different sound in the environment for five minutes and identify them. Ask students to write sounds they heard. Guide them to repeat the same activity at least three times. Get students into the classroom
- Find suitable method to list sounds they heard and their sources on the blackboard. Ask them to copy the list.
- Give chance for each student to imitate a sound they heard.
- Provide the class with a list of sounds identified in the above activity. Assign groups to classify sounds in the list as natural sounds, artificial sounds, musical sounds and noises. Let students present their findings. Clarify different sound categories with suitable examples.
- Regroup the class. Assign them to list 10 examples for the following sounds.
 - Natural sounds
 - Artificial sounds
 - Musical sounds
 - Noises
- Let them present their findings.
- Play a set of recorded sounds /exhibit a list of various sounds to the class (It should include the four categories stated in activity 03). Let students tabulate the given sounds. Guide students to construct a colorful table and exhibit it in the classroom.
- Instruct students to collect photographs/ diagrams/ illustrations of animals with ears. Guide them to paste their visuals on boards and exhibit in front of the classroom
- Assign students to make simple instruments to produce sounds (It is important to guide student to produce instruments based on different methods of generating sound such as vibrating strings/ plate/ air column etc.)
- Divide the class into two groups and assign them to organize musical groups with their productions and conduct a competition.

Key concepts expected to be highlighted

Sound, generating sounds, noise, music

Quality inputs

Paper boards, felt pens, metal wires, balloons, tin cans, rubber bands, pieces of wood, paints, paint brushes, gum or glue, nails, hammer, water, glass bottles and any other materials to make toy musical instruments

Assessment and evaluation

- Evaluate student performance in imitating sounds.
- Assess equipment and presentation in musical competition using following criteria.
 - Producing sound
 - Getting the attraction of viewers
 - Good finishing of the instrument

Competency 3

Utilizes various forms of energy, their interaction with matter and energy transformations by maintaining efficiency and effectiveness at an optimum level

Competency levels

- 3.10. Argues a case for a magnetic effect.
- 3.11. Designs appropriate methods to show the behavior of magnets.

Time 08 periods

Learning outcomes

Students will be able to;

- understand that magnets exert a force on certain substances
- identify magnets and their poles
- state that like poles repel and unlike poles attract
- conduct simple activities to experience the magnetic effect
- prepare workable devices to show magnetic effect
- test the strength of magnets collected from the surrounding
- perform activities to demonstrate attraction and repulsion of magnets
- use repulsion to differentiate a magnet from other magnetic substances
- identify poles of a magnet using a compass
- accept that magnets can be used for leisure activities

Instructions for lesson planning

- Conduct a brainstorming session with suitable activities/demonstrations to review prior knowledge on magnetism. Get the students record their prior knowledge. Ask them to bring devices associated with magnets.
- Let the students engage in various activities using magnets they brought/ available in school laboratory. Ask them to record observations and results.
- Guide the students to observe the direction in which it orients when a magnet is allowed to rotate freely. Instruct students to identify two poles of a magnet as north and south. Introduce compass as a device used to identify poles of a magnet.
- Let the students explore the instances where the free rotation of a magnet is disturbed.
- Conduct simple activities to investigate interactions between like poles and unlike poles using attraction and repulsion
- Let students explore the uses of magnets in day-today life. Guide students to construct simple toys using magnets based on the experiences.
- Introduce suitable methods to compare strengths of two magnets.

Expected key concepts to be highlighted

Magnets, pole

Quality inputs

Materials and instruments needed to construct devices

Assessment and evaluation

- Assess the students' performance in the process of constructing devices based on;
 - Importance of the selected device
 - Design
 - Collection of materials
 - Process
 - The cost
 - Working condition

Competency 3

Utilizes various forms of energy, their interaction with matter and energy transformations by maintaining efficiency and effectiveness at an optimum level

Competency levels

- 3.12. Identifies sources of electricity from various resources.
- 3.13. Illustrates circuit diagrams using standard symbols.
- 3.14 Distinguishes conductors and insulators practically.

Learning outcomes

Students will be able to;

- state, uses of electricity in day-to-day life
- state few electricity generating devices
- identify components in an electric circuit by manipulating them correctly
- denote components of an electrical circuit by standard symbols
- name given simple electronic components
- present information on electricity generating devices
- conduct simple activities to generate electricity
- connect and work out simple electric circuits according to the given circuit diagrams
- identify electrical conductors and insulators by performing simple activities
- construct simple circuits to demonstrate functions of given electronic components
- accept that electrical appliances and electronic components should be handled safely and productively

Instructions for lesson planning

- Asks students to list how electricity helps their lives. Develop a discussion "how human activities are made easy by electricity.
- Assign each student to collect and present information about different electric generating devices. Then fill gaps of knowledge through a guided discussion.
- Assign each student a project to develop a simple electricity generating device. Conduct a classroom exhibition and guide them to demonstrate their working model.
- Ask students to connect a switch, a bulb and a cell to complete a circuit. Guide students to connect an ammeter.
- Introduce the simple electric circuit diagram with standard symbols of the given devices
- Develop a discussion on the standard electric symbols and its uses.
- Conduct simple activities to introduce electrical conductors and insulators.
- Introduce students the electronic components such as diodes, LEDs, resistors, LDRs with circuit symbols.
- Guide them to construct simple circuits to demonstrate the functions of the devices stated.

- Conduct a one minute speech competition in the classroom under the theme of "why should we handle electricity safely and productively".

Key concepts expected to be highlighted

Electricity, generation of electricity, circuits, symbols, insulators, conductors, diode, LED, resistor, LDR

Quality inputs

Bulbs, switches, connecting wire, LEDs, resistors, LDRs, ammeters, conductors, insulators

Assessment and evaluation

- Test knowledge by written questions.
- Assess electric generator devices developed by students based on their working and neatness.
- Evaluate presentation skills at the speech competition

Competency 3

Utilizes various forms of energy, their interaction with matter and energy transformations by maintaining efficiency and effectiveness at an optimum level

Competency levels

3.15 Investigates the methods of generating heat.

3.16 Demonstrates the effects of heat.

3.17 Inquires into the instances where effects of heat impact the environment.

Time 08 periods

Learning outcomes

Students will be able to;

- list out uses of heat in day-to-day life
- give examples for effects of heat on the environment
- perform simple activities to demonstrate the effects of heat
- conduct simple activities to demonstrate the ways of generating heat
- accept that heat should be handled safely and productively
- realize that heat affects the properties of substances and products

Instructions for lesson planning

- Differentiate the concepts ‘heat’ and ‘temperature’ using previous experiences and confirm those using suitable activities.
- Ask students to collect information on how ancient people produced fire.
- Conduct simple activities to generate heat from fuel, electricity, radiation of sun, friction.
- Assign students to compile a report on the uses of heat in day-to-day life.
- Guide students to detect temperature rise using a thermometer.
- Conduct simple activities to show the following effects of heat.
 - Increase in temperature
 - Expansion
 - Change of state
 - Change of colour
- Ask students to search about the instances where effect of heat is manifested in the environment emphasizing the following.
 - Evaporation of water
 - Melting of glaciers
 - Warming of the environment
 - Wind
 - Water currents
- Conduct a competition among the students on the theme ‘useful versus harmful effects of heat,

Key concepts expected to be highlighted

Heat, temperature, expansion, heat generation, change of state

Quality inputs

Demy papers, marker pen, pieces of dry wood, stones, Al foil, card boards, wire, nails, hammer

Assessment and evaluation

- Evaluate the students using a written test.
- Assess the competitors using the following criteria.
 - Amount of relevant facts
 - Accuracy of facts
 - Logical presentation

Competency 4

Explores nature, properties and processes of earth and space by understanding natural phenomena for intelligent and sustainable utilization

Competency levels

- 4.1. Examines interactions among the organisms according to their food habits.
- 4.2. Categorizes organisms according to their mode of nutrition.

Time 15 periods

Learning outcomes

Students will be able to;

- identify herbivores as animals which consume plant materials
- identify carnivores as animals which consume animal materials
- identify omnivores as animals which consume both plant and animal materials
- understand that all animals directly or indirectly depend on plants for food
- describe food chains and food webs as an interaction among plants and animals
- identify the hierarchy of food-related interactions in nature
- categorize animals as herbivores, carnivores and omnivores according to their food habits
- develop food chains through observations and experiences
- build up food webs using the inter-connections between food chains
- highlight food chains out of a given food web
- accept that each and every organism plays a key role in the balanced environment
- act responsibly not to disturb the natural balance of the food webs

Instructions for lesson planning

- Display pictures/videos of animals and their feeding habits. Ask students to tabulate categorizing the animals on the material they feed on.
- Involve students in the following activities and discuss about their feedings.
 - Observing and reporting animals found in the environment with their feeding habits
 - Categorizing them based on materials they feed on
- Introduce carnivore, herbivore and omnivore as main groups of animals, based on their feeding habits.
- Organize a field visit to a zoological garden or any other suitable place to observe and record relevant information regarding feeding habits of animals and guide them to construct a portfolio in order to keep records on the feeding habits of animals.
- Display pictures of pond/tank habitats. Engage students in small groups to conduct the following activities and discuss with the students on their findings.
 - Identify plants, animals and microorganisms in the pictures.
 - Name organisms they identified.

- Identify feeding habits of the organisms in the pond.
- Connect the organisms with their feeding habits using arrows.
- By building up the concept of ‘food web’ let students construct a food web of the pond. Guide them to identify food chains in the food web.
- Ask students to construct food chains related to,
 - a forest
 - a sea
 - a grass land
 - a decaying tree log.

Key concepts expected to be highlighted

Herbivore, omnivore, carnivore, food web, food chain

Quality inputs

Videos, pictures of animals illustrating their feeding habits, photographs, and material needed for the field excursion

Assessment and evaluation

- Assess students’ portfolio based on,
 - The variety of the formats presenting their findings
 - the way they arrange the portfolio
 - creativity

Competency 4

Explores nature, properties and processes of earth and space by understanding natural phenomena for intelligent and sustainable utilization

Competency levels

- 4.3. Develops awareness about changes in weather and associated natural disasters.
- 4.4. Observes factors that determine weather.

Time 15 periods

Learning outcomes

Students will be able to;

- differentiate weather and climate
- name some factors that determine weather
- list out some natural disasters associated with climatic changes
- construct simple set ups to observe changes in rainfall, wind direction, wind speed and humidity
- use simple set ups and standard instruments to observe and record changes in weather
- record observed changes in weather for a given period
- realize the importance of awareness of weather conditions

Instructions for lesson planning

- Conduct a discussion to distinguish the terms ‘climate’ and ‘weather’. Assign the students to collect media reports on weather.
- Based on the collected reports make the students analyze information and find the factors affecting weather. Conduct a discussion to fill the gaps of knowledge on the factors affecting weather.
- Get the students to design and construct simple apparatus to measure weather factors and organize a classroom exhibition.
- Guide the students to collect data using the instruments made/ available data and interpret them and display graphically.
- Conduct a discussion on natural disasters related to climate change, using various sources of information.
- Organize a field trip to Meteorological Department/Regional Meteorological Centre and guide students to compile a report.

Key concepts expected to be highlighted

Weather, climate, rainfall, wind, temperature, humidity, natural disaster

Quality inputs

Thermometers, materials needed to construct simple instruments

Assessment and evaluation

- Assess student’s performance in the exhibition based on
 - accuracy of the exhibits
 - neatness of the exhibits
 - workability of the exhibits
 - organizational skills

Exemplar Tools for School Based Assessment

Sample 1

- 1. Evaluation state :** Term 1
- 2. Competency level covered :** 2.3 Examines properties of matter using simple activities
- 3. Content covered :** Properties of solids
- 4. Nature of the tool :** Group activity
- 5. Objectives of the tool:**
 - Observe and report different skills of students such as contribution, cooperation, on task and communication while they are engaging in group activities.
- 6. Instruction to implement the tool :**
 - Use the rubrics given in section 7 to evaluate each student while they are working in groups.
 - Allocate points to each student in a table given in section 7.

7. Evaluation / assessment criteria

Rubric for Group Activity

	Beginning 1 point	Developing 2 points	Accomplished 3 points	Exemplary 4 points
Contribution	One or more members do not contribute.	All members contribute, but some contribute more than others.	All members contribute equally.	All members contribute equally, and some even contribute more than was required.
Cooperation	Teacher intervention needed often to help group cooperate.	Members work well together some of the time. Some teacher intervention needed.	Members work well together most of the time.	All members work well together all the time; assist others when needed.
On task	Team needs frequent teacher reminders to get on task.	Team is on task some of the time. Needs teacher reminders.	Team is on task most of the time. Does not need any teacher reminders.	Team is on task all the time. Does not need any teacher reminders.
Communication	Members need frequent teacher intervention to listen to each other and speak to each other appropriately.	Members need some teacher intervention make them listen to each other and speak to each other appropriately.	All members listen to each other and speak to each other equally.	Each member listens well to other members. Each member speaks in an friendly and encouraging tone.

Point allocation table

Criteria	Point allocation							
	Name of the student							
	B	C	D	E	F	G	H	
Contribution								
Cooperation								
On task								
Communication								
Total points								

Sample 2

1. **Evaluation state** : Term 2

2. **Competency level covered** :

3.8 Describe the principal differences between various types of sounds

3. **Content covered** : Artificial sounds

4. **Nature of the tool** : made instrument

5. Objectives of the tool:

- Evaluate student's performance and creativity

6. Instruction to implement the tool :

- Assign students to make simple instruments to produce sounds. (it is important to guide students to produce instruments based on different methods of origin of sounds such as vibrating strings/ plate/ air column etc.)
- Guide them to exhibit their instruments and explain how they work.
- Assess their product and explanation.

7. Evaluation / assessment criteria

Criteria	Name of the student							
	A	B	C	D	E	F	G	H
Material used								
Being their own work								
Creativity								
Workability								
Logical explanation								
Total								

Indicate proficiency levels as A, B, C, D.

- A - Very good
- B - Good
- C - Ordinary
- D - Should be developed

Sample 3

1. **Evaluation state** : Term 3
2. **Competency levels covered** :
 - 4.3. Examines interactions among the organisms according to their food habits.
 - 4.4. Categorizes organisms according to their mode of nutrition
3. **Content covered** :
 - Mode of nutrition
 - Herbivorous
 - Carnivorous
 - Omnivorous
 - Food related interactions
 - Food chains
 - Food webs
4. **Nature of the tool:** • field trip
5. **Objectives of the tool** :
 - To observe students' ability to focus on the particular objective.
 - To guide students to work according to the given instructions.
 - To let students collect appropriate information.
 - To assess students presentation skills.
 - To assess students' skills of analyzing data, information and their findings.
6. **Instruction to implement the tool** :
 - Arrange a field trip to zoological gardens.
 - Decide a date for the field trip.
 - Prepare a schedule for the students to record their observations.
 - Discuss the things that the students have to do before, during and after the field trip.
 - Guide the students to record their observations during the field trip.
 - Give opportunities to present their observations and findings in the classroom after the field trip.
 - Lead a discussion to confirm the students' findings.
 - Evaluate student while they are engaging in the field trip and their presentations using criteria tabulated in section 7 .

7. Evaluation / assessment criteria

	Criteria	Name of student							
		A	B	C	D	E	F	G	H
1	Concern on the particular objective.								
2	Working according to the given instructions.								
3	Collecting appropriate information.								
4	Presenting their findings using different methods.								
5	Analyzing data, information and findings.								

Indicate proficiency levels as A, B, C, D.

- A - Very good
- B - Good
- C - Ordinary
- D - Should be developed

Science – Grade six

Recommended list of practicals and activities

01. A field study to observe and record movement, respiratory movements, food habit, growth, reproduction etc.
02. Design a simple experiment to show the growth of a plant.
03. Observe microorganisms through simple microscope and then compound microscope using one of the samples from pond water, hey fusion and wet soil.
04. Conduct simple activities to demonstrate the basic characteristics of matter (identify matter as everything that has mass and occupies space).
05. Discover properties of solid using given materials (hardness, malleability, ductility, elastic nature, brittleness, texture)
06. Compare the salt content dissolved in fresh water and sea water or brackish water
07. Construct suitable models to demonstrate the application of energy sources such as sun, wind and hydro-power.
08. Carry out simple activities to understand the factors necessary for vision.
09. Plan and implement simple activities to demonstrate the rectilinear propagation of light.
10. Carry out simple activities to obtain a series of light rays from a given light beam. (Hint: Use a comb or parallel narrow slits cut on a card.)
11. Prepare models/devices/presentations to show various uses of light.
12. Make simple instruments to produce sounds (It is important to guide student to produce instruments based on different methods of generating sound such as vibrating strings/ plate/ air column etc.)
13. Activities using magnets and record observations and results.

14. Conduct simple activities to investigate interactions between like poles and unlike poles using attraction and repulsion
15. Project to develop a simple electricity generating device. Conduct a classroom exhibition and to demonstrate working models.
16. Connect a switch, a bulb and a cell to complete a circuit and then connect an ammeter.
17. Conduct simple activities to introduce electrical conductors and insulators
18. Construct simple circuits to demonstrate the functions of the devices such as diodes, LEDs, resistors, LDRs
19. Conduct simple activities to generate heat from fuel, electricity, radiation of sun, friction.
20. Use thermometer correctly to measure temperature.
21. Conduct simple activities to show the following effects of heat.
 - a. Increase in temperature
 - b. Expansion
 - c. Change of state
 - d. Change of colour
 - e. Nature of products
22. Observe and report animals found in the environment with their feeding habits and categorize them based on materials they feed on
23. A field visit to a zoological garden or any other suitable place to observe and record relevant information regarding feeding habits of animals and construct a portfolio in order to keep records on the feeding habits of animals.
24. Design and construct simple apparatus to measure weather factors and organize a classroom exhibition.
25. A field trip to Meteorological Department/Regional Meteorological Centre and compile a report.

Teaching Sequence

School term	Competency level	Time (periods)
1 st term	1.1. Explores living organisms around us. 1.2 Suggests some criteria to classify organisms.	15
	2.1 Identifies the diversity of things around us. 2.2 Classifies matter based on their properties. 2.3 Examines properties of matter using simple activities.	12
	2.4 Classifies water based on different criteria. 2.5 Examines properties of water by simple activities. 2.6 Accepts water as a valuable and limited resource.	15
2 nd term	3.1 Develops awareness about energy sources and their uses. 3.2 Performs activities to illustrate the uses of certain energy sources. 3.3 Accepts the importance of sustainable utilization of energy sources.	10
	3.4 Illustrates the uses of light by simple activities. 3.5 Explains the nature and functions of light using rays and beams. 3.6 Explores various sources of light and the uses of light. 3.7 Suggests possible explanations to show properties of light.	15
	3.8 Develops the concept 'sound' with the help of different sounds in the environment. 3.9 Describes the principal differences between various types of sound.	08
	3.10 Argues a case for a magnetic effect. 3.11 Formulates appropriate methods to show the behaviour of magnets.	08
3 rd term	3.12 Identifies sources of electricity from various resources. 3.13 Illustrates circuit diagrams using standard symbols. Distinguishes conductors and insulators practically.	20
	3.14 Search for the methods of generating heat. 3.15 Demonstrates the effects of heat. 3.16 Inquires about the instances where effects of heat are experienced in the environment	08
	4.1. Judges interactions among the organisms according to their food habits. 4.2. Categorizes organisms according to their mode of nutrition.	15
	4.3. Develops awareness about changes in weather and associated natural disasters. 4.4. Observes factors that determine weather.	15