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FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
MINISTRY OF EDUCATION

General Education Curriculum

General Sciences (Flow Chart, MLC & Syllabus)

7-8

March, 2021

Addis Ababa

Curriculum Developers Team

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Introduction

Over the past few years, Ethiopia has embarked on an ambitious reform process to ensure the sustainability of its economic growth and development. Among these reforms, education has been a foremost priority for the Government. Accordingly, the country has recently developed a Roadmap, a national policy that guides the country's Education sector from 2018 to 2030. Following the adoption of the Roadmap, Ministry of Education has engaged in developing various curriculum related materials including position papers and general education framework. The curriculum framework identifies a number of values and principles that need to be integrated into the new curriculum development. It also identifies core skills or competencies that the learners should acquire in twenty first century.

The General Science curriculum has been developed to replace the existing specific science disciplines, for Grades 7 and 8, in order to align the Science contents and presentation with the developmental stage and understanding level of the learners.Its contents are designed in a manner that the vertical alignment or progression of science learning is maintained, and thus science learningat this level would serve as a transition from an elementary level (integrated approach)to higher level learning (linear approach)and scientific literacy. The core skills of the twenty first century such aslearner-centered learning, diverse skills, use of indigenous knowledge and values, citizenship and cultural identity, learning to learn,critical thinking and problem solving, have been adequately addressed in all components of the General Science curriculum i.e. Content flow chart, Minimum learning competencies and Syllabus.

In the curriculum development process, a maximum effort has been made to ensure that the syllabus is detailed enough to guide text book and/or teacher guide writers so that they could develop the materials with a maximum precision. The learning strategies and assessment methods are also detailed enough to guide a teacher with his/her teaching and assessment of the lessons. The curriculum developers team would like to extend its utmost gratitude to a panel of anonymous national and international experts whose contributions have been instrumental in improving the draft curriculum and get it to the final stage. The curriculum has also been validated by various stakeholders. However, due to the dynamic nature of a curriculum, the curriculum developers believe that any limitation of thiscurriculum that might be identified after its implementation could be used as more input to further refine and improve it.

March, 2021

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Content Flow Chart (Grades 7-8)
Subject: General Science

Content Flow Chart

Subject: General Science

Grades: 7-8

Thematic Area	Grade 7	Grade 8
Science and its Basics	**Unit-1**: **Basic Concepts of Science** 1.1 The Nature of Science and its Branches • Definition of science (Conventional Science and Indigenous Science) • Branches of science • Science and technology • Famous Scientists of the World and Ethiopia	**Unit-1**: **Basicsof Scientific Investigation** 1.1. Scientific Measurements • Indigenous methods of measurements (length, mass, time, volume) • Physical quantities and modern methods of measurement - Basic physical quantities and their units (length, mass, time and temperature) - Derived physical quantities and their units (Area, Density, Volume and Force) • Prefixes and Conversion of basic units • Accuracy and Precision in measurements

	1.2. Common Laboratory Equipment, Uses, Safety Rules and Procedures in Science Laboratories • List and use of common scientific equipment (Balance, Beaker, Measuring cylinder, Tongs, Bunsen burner, Test tubes, Petridishes, etc.) • Making laboratory equipment/tools from locally available materials • Laboratory safety rules and procedures, personal protective and hazard sings (symbols)	1.2. Doing Scientific Investigation • Introduction to scientific investigation • Scientific methods and Ethical Discipline • Semi-guided investigations (e.g. (a) Does a coiled nail act like a magnet? (b) Is air necessary for burning? (c) How do plants store their food in their leaf?) • Indigenous action: Using local materials and methods (procedures) to conduct investigation
Structure and Properties of Matter	**Unit 2: Matter in Our Surroundings** 2.1. Characteristics and nature of matter • Meaning and Properties of matter • Particulate nature of matter – Characteristics of the particles of matter – Particle theory of matter (Particle model of matter) • Illustrations for the support of the statements of the particle theory – Diffusion • Explaining, observations using the Particle Theory of matter including – Diffusion and every day effects of diffusion, – Properties of solids, liquids and gases • Particles in solids, liquids and gases • Compression • Changes in state - Explaining change of state processes using a simple particle model of matter. 2.2 Physical and chemical properties of matter • Physical properties • Identify substances based on their physical properties • Observing physical properties • Chemical properties 2.3 Classification of substances (in terms of composition and observable properties • Pure substances and mixtures	**Unit 2: Composition of Matter** 2.1 Early thinking about the composition of matter 2.2 Inside of an atom • Parts of an atom (nucleus and electron Shells) • The Subatomic Particles of the atom – Relative mass, the charge and location of sub-atomic particles • Atomic number and mass number • Determination of the electrons, protons and neutrons 2.3 Molecules • Molecules of elements • Molecules of Compounds

	• Elements and Compounds - Classification of elements • Mixtures – Homogeneous mixtures – Heterogeneous mixture 2.4. Physical and Chemical Changes of Substances • Changes Around Us: Physical and chemical changes - Physical and chemical Change – physical chemical changes that are important in everyday life - Useful and Harmful Changes Investigating Importance of physical and chemical changes in our life - Useful and Harmful Changes 2.5 Separation of mixtures and its application • Methods of separation of mixtures • Applications - Separating of mixtures using local materials	
Properties and Interaction of Matter	**Unit 3: Elements, Compound and Chemical Reaction** 3.1. Elements and their representation • Common elements • Chemical symbols • Writing symbols 3.2. Compounds and their representation • Compounds • Meaning of formula • Valence number • Formulas of Binary compounds • Naming binary compounds • Poly atomic ions – Writing chemical formulas – Naming simple chemical compounds • Interpreting formula 3.3 Simple Chemical reactions and chemical equations • Simple chemical Reactions	**Unit 3: Classification of Compounds** 3.1. Introduction • Organic Compounds • Inorganic compounds 3.2. Organic Compounds • Hydrocarbons – Alkanes, Alkenes and Alkynes • Formula • Nomenclature – Uses of some common organic compounds 3.3. Inorganic Compounds • Oxides – Types of oxides – Properties of oxides • Acids and base – Naming and writing formula of acids and bases – Acid- base indicators

	– Evidences that show chemical reaction has occurred – Low of Conservation of mass Writing Chemical Equations – Investigating chemical reaction – Writing and Balancing simple chemical equation – Writing Chemical equation – Balancing Chemical equation 3.4 Uses of Chemical reactions in every day situation	– Investigating properties of acids and bases • Investigation using local indicators • Precautions in working with acids and bases 3. 4 .Neutralization Reaction and Salts • Neutralization • Salt • Naming and Writing Formula of Salts
Life structure and Function	**Unit 4:Cell as the Basis of Life** • Purpose and invention of Microscope • Types of microscope • Basic parts of light microscope • The discovery and definition of a Cell • Structure of a cell • Cell shape and size • Unicellular organisms • Multicellular organisms • Cell, Tissue, Organ, and Organ system • Respiration and Mitochondria • Photosynthesis and Chloroplast	**Unit 4: Human Body Systems and Health** • Integumentary system • Muscular system • Skeletal System • Digestive system • Respiratory system • Circulatory system • Reproductive system
Life Diversity and Interaction	**Unit 5: Living Things and their Diversity** • Characteristics of living things • Classification and Scientific names of organisms • Hierarchy in the classification of organisms (Kingdom to species) • Kingdoms of life - Kingdom Animalia - Kingdom Planate - Kingdom Protista - Kingdom Monera - Kingdom Fungi	**Unit 5: Ecosystem and Conservation of Natural Resources** **5.1. Ecosystem and Interactions** • Definition and Components of ecosystem (biological and physical) • Types of biological interactions • Trophic (feeding) relationships - Food chain and food web - Components of food chain (producers, consumers, decomposers) - Trophic pyramids • Nutrient cycles and energy flow

		5.2. Conservation of Natural Resources • Soil • Water • Air • Forests • Biodiversity • Indigenous knowledge and conservation of natural resources
Earth in Space	**Unit 6: The Earth** 6.1. Shape & dimensions 6.2. Parts of the Earth (Body & Atmosphere) 6.3. Movements of the Earth 6.4. Atmospheric and lithospheric Systems & Cycles, (effects, measurement ideas/estimation)	**Unit 6: The Solar System** 6.1 Family of the Solar System 6.2 Formation of the Solar System (Planets & Satellites, Other objects) 6.3 Earth in comparison with Solar system Our planet's suitability for life (uniqueness)
Energy and the Environment	**Unit 7: Motion, Force, Energy and energy resources** 7.1. Definition and types of motion 7.2. Definition of force and gravitational force 7.3. Effects of force 7.4. Measuring forces 7.5. Definition of Energy (Property of matter can be converted) 7.6. Forms and Conversion of Energy 7.7. Sources (sun, fuel, hydroelectric, wind, nuclear), 7.8. Wise use & Conservation 7.9. Resource depletion & environmental degradation	**Unit 7: Physical Phenomena in the Surrounding** 7.1 Phenomena of Light (source & properties) 7.2 Vision and Imaging (transparent, opaque) 7.3 Sound (Sources, medium Hearing, Echoes, sound pollution) 7.4 Heat (Definition, mechanisms of transfer, insulation) 7.5 Simple circuit 7.6 Magnetism (lines of force, use)

Minimum Learning Competencies

(Grades 7-8)

Subject: General Science

Minimum Learning Competencies

Subject - General Science

Grades 7-8

Thematic Area	Grade 7	Grade 8
Science and its Basics	**Unit-1**: **Basic Concepts of Science** **1.1. The Nature of Science and its Branches** • Define science • Distinguish between the Indigenous Science and Conventional Science; Indigenous Science incorporatinglocal people's knowledge and Indigenous perspectives, while conventional scientific approaches are commonly recognized as Western science.	**Unit-1**: **Basics of Scientific Investigation** **1.1. Scientific Measurements** • Explain the concept of measuring physical quantities • Describe the various indigenousmethods of measurement • Distinguish between the basic and derived physical quantities • Categorize the basic and derived units of

	• Describe the main branches of science and explain their relationship • Relate how science and technology affect one's beliefs, practices, and ways of thinking. • Appreciate the contributions of outstanding Ethiopianscientists to science and technology. • Discuss the importance of ethical disciplines in scientific investigations. • Solve the issue of environmental problems in their school compound and its surroundings **1.2. Common Laboratory Equipment, Uses, Safety Rules and Procedures in Science Laboratories** • Identify different laboratory tools (such as Balance, Beaker, Tongs, Bunsen burner, Test tubes, Petridishes, etc.), and describe their uses • Prepare some laboratory equipment/tools from locally available materials • Demonstrate knowledge of lab safety rules and procedures. • Practice precautionary measures in the laboratory • Identify potential hazards when working in the laboratory • Implement appropriate safety procedures when working in the laboratory • Demonstrate the appropriate use of personal protective equipment for a given laboratory activity	measurements(length, mass, time, temperature, volume, area, density, force) • Identify prefixes and perform conversions among units of measurements • Distinguish between accuracy and precision in measurements **1.2. Doing Scientific Investigation** • State the importance of scientific investigation • Describe the basic procedures of a scientific investigation • Explain the ethical issues that need to be respected in scientific investigations. • Conduct, with guidance, simple investigations using the inquiry approach • Demonstrate the ability to work effectively and respectfully with others in performing scientific investigation. • Conduct, with guidance, simple investigations (activities) using local materials and procedures
Structure and Properties of Matter	**Unit 2: Matter in Our Surroundings** **2.1. Characteristics and Nature of Matter** • Define matter with examples from day today life. • Demonstrate that matter is made up of tiny particles. • State the postulates of the particle theory of matter. • Infer the particulate nature of matter from demonstration. • Apply particle nature of matter in explaining diffusion and every day effect of diffusion. • Describe and/or make a representation of the arrangement, relative spacing, and relative motion of the particles in each of the three states of matter. • Explain compression in terms of distance between particles.	**Unit 2: Composition of Matter** **2.1 Early thinking about the composition of matter** • Give a short history of the concept of the atom. • Compare and contrast the continuity and discreteness (discontinuity) theory of matter. • Compare earlier conceptions of the structure of matter with their conceptions. **2.2 Inside the Atom** • Describe the structure of an atom as a nucleus containing protons and neutrons, surrounded by electrons in shells (energy levels). • State the relative charge and approximate relative mass of a

	• Use the terms melting, evaporating, condensing, and solidification to describe changes of state. • Use the particulate nature of matter to explain: Melting, Solidification, Evaporation, Condensation. **2.2. Physical and Chemical Properties of Matter** • Identify and describe physical Properties. • Use physical properties of matter to identify substance. • Conduct experiments to identify properties of substances and make group report. • Distinguish between physical and chemical properties and give examples. • Identify chemical properties **2.3. Classification of Substances (in terms of composition and observable properties)** • Differentiate between elements and compounds. • Classify common elements into metals and non-metals. • Investigate the properties of metals and non-metals and compile a list of general properties. • Investigate the properties of non-metals and compile a list of general properties. • Describe and classify mixtures as homogeneous and heterogeneous mixtures with examples from daily lives. . • Use models/ particles model diagrams to show differences between homogenous and heterogeneous. • Describe the relationship among elements, compounds, mixtures, homogenous mixture and heterogeneous mixture. **2.4.Changes around Us: Physical and Chemical Changes** • Physical Change and Chemical Change • Distinguish the physical and chemical changes using their characteristic • Conduct some simple activities to show physical and chemical changes and write group report. • Observe and describe physical chemical changes that are important in everyday life. • Identify useful and harmful changes. **2.5. Separation of Mixtures and its Application**	proton, a neutron and an electron • Draw hydrogen atoms, including the location of the protons and electrons, with respect to the nucleus • Differentiate between mass number and atomic number • Determine the number of protons, neutrons, and electrons in an atom. **2.3. Molecules** • Define molecules. • Give examples of monatomic, diatomic and polyatomic molecules. • Use models to represent molecules of elements and compounds.

	• List methods of separation of mixtures • Give some specific examples of mixtures that can be separated by filtration, decantation, simple distillation, magnetic separation and using separator funnel • Name apparatuses used in decantation, filtration, simple distillation, using separator funnel. • Assemble apparatuses used in decantation, filtration, simple distillation, separator funnel • Conduct and report on an investigation that uses physical means such as particle size, density, boiling point, solubility and magnetism to separation. • Perform simple activities in group, to carry out the separation of mixtures using local materials and write a group report. Compare and evaluate the different ways of separating mixtures from products in community.	
Properties and Interaction of Matter	**Unit 3: Elements, Compound and Chemical Reaction** **3.1. Elements and their Representation** • Define element. • Identify symbols of some common elements. • Write chemical symbols for common elements symbols. **3.2. Compounds and their Representation Compounds** • Define compound as a substance formed when two or more elements chemically combined together. • Define valence numbers as the combining power of an atom. • Write the formulae of simple binary compounds .using symbols and valences. • Name binary compounds. • Describe poly atomic Ion. • Write the chemical formulas of common compounds that contain polyatomic ions. • Name compounds containing polyatomic ions. • Define chemical reaction and give examples. • Describe evidences that show chemical reaction has occurred. • State the law of conservation of mass.	**Unit 3** : **Classification of Compounds** **3.1. Introduction** • Define organic compounds as carbon containing compounds. • Define inorganic compounds as compounds of elements other than carbon. **3.2. Organic Compounds** • Define hydrocarbons and mention at least one source of hydrocarbons. • Write the general formula of alkanes, alkenes and alkynes. • Write the specific chemical formulas of the first eight members of alkanes, alkenes and alkynes. • Describe a homologous series and its general characteristics. • Identify some common uses of organic compounds **3.3. Inorganic Compounds** • Classify oxides into metallic and nonmetallic. • Describe the properties of acidic oxides and basic oxides. • Predict the nature of common oxides. • Prepare sulphur dioxide in the laboratory by burning sulphur in air and use moist blue litmus paper to test its

	• identify the elements and number of atoms, given a chemical formula • Deduce the formula of a simple compound from a model or a diagrammatic representation. • Interpret chemical formulae of compounds in terms of the elements present and the ratios of their atoms. • Name compounds given their formula and write formula given the name of the compound. • Identify the elements and compounds in common household products (e.g., hydrogen peroxide, lye, sodium chloride). **3.3 Simple Chemical Reactions and Chemical Equations** • Define chemical reaction and give examples. • Describe evidences that show chemical reaction has occurred. • State the law of conservation of mass. • Conduct an experiment in group to show simple chemical reaction • Write a chemical equation. • Balance simple chemical equation byinspection. • Describe the uses of chemical reactions in everyday situations. • Create and use models of particles to demonstrate balanced equations. • Define chemical reaction. • Conduct an experiment in group to show simple chemical reaction. • Describe evidences that show chemical reaction has occurred. • Convert word chemical equation in to formula equation. • Balance simple chemical equation by inspection • Describe the law of conversation of mass • Interpret the meaning of a balanced chemical reaction in terms of the law of conservation of mass. • Describe the uses of chemical reactions in everyday situations. • Observe and identify chemical reactions that occurs in in daily live.	acidic nature. • Prepare magnesium oxide in the laboratory by burning magnesium ribbon in air and use red litmus paper to test its basicity in water solution. • Define acid and base • Describe properties a of acids and bases • Relate acidic properties to the presence of hydrogen ions and basic properties to the presence of hydroxide ions. • Name and write formulas for some common acids (HCl, HNO_3, H_2SO_4) and bases (NaOH, KOH, NH_4OH), using the periodic table, a list of ions, and rules for naming acids. • Describe how indicators can be used to classify solutions as acidic or basic • Investigate properties of bases/alkalis experimentally • In group, with guidance, prepare their own indicator by extracting the colour from a vegetable, such as beetroot, or flowers and evaluate the indicator. • Investigate household chemicals using locally prepared indicators. • Explain the safety precautions while working with acids and bases. • Create a safety booklet dealing with the handling of acids and alkali. • Identify some everyday uses of neutralization • Define and give examples of salts

	Describe the effect of chemical reaction in daily life and on the environment.	
Life Structure and Function	**Unit 4:Cells as the Basis of Life** **4.1 Microscope** • Identify the major parts and functions of a basic microscope • Use a microscope to view objects • Discuss the role of a microscope • Differentiate between simple and light microscope • Draw diagram of a microscope and label the major parts • Build microscope from locally available materials **4.2 Cell** • Explain how cell was discovered • Draw a cell • Label the basic structures and functions of a cell (cell membrane, cell wall, cytoplasm, nucleus, mitochondria, chloroplast, vacuole, and endoplasmic reticulum) • Explain why cell shape and structure vary • Distinguish between unicellular and multicellular organisms • Differentiate among cell, tissue, organ and organ system with examples • Examine the importance of cellular respiration and photosynthesis	**Unit 4: Human Body Systems and Health** **4.1. Integumentary System** • Distinguish the major structural components of human integumentary system • Describe the main functions of human integumentary system • Explain, by giving examples, how structure and function are related • Identify and discuss the main diseases or disorders associated with human integumentary system(Acne, Cold sore, Blister, Hives, Actinic keratosis, Rosacea, Carbuncle, Latex allergy, Eczema, Wart, Chickenpox) **4.2. Muscular System** • Distinguish the major structural components of human muscular system • Describe the main functions of human muscular system • Identify and discuss the main diseases or disorders associated with human muscular system **4.3. Skeletal System** • Distinguish the major structural components of human skeletal system • Describe the main functions of human skeletal system • Identify and discuss the main diseases or disorders associated with human skeletal system

		4.4. Digestive System • Distinguish the major structural components of human digestive system • Describe the main functions of human digestive system • Identify and discuss the main diseases or disorders associated with human digestive system **4.5. Respiratory System** • Distinguish the major structural components of human respiratory system • Describe the main functions of human respiratory system • Identify and discuss the main diseases or disorders associated with human respiratory system **4.6. Circulatory System** • Distinguish the major structural components of human circulatory system • Describe the main functions of human circulatory system Identify and discuss the main diseases or disorders associated with human circulatory system **4.7. Reproductive System** • Distinguish the major structural components of human reproductive system • Distinguish between the primary and secondary sexual characteristics • Describe the main functions of human reproductive system • Identify secondary sexual characteristics of males and females • Explain the concept of menstruation and menstrual cycle • Identify and discuss the main diseases or disorders associated with human reproductive system
Life Diversity and Interaction	**Unit 5: Living Things and their Diversity** **5.1. Living Things** • Differentiate between living and non-living things • Organize and describe characteristics of living things • Justify why movement or locomotion from one place to another cannot be a defining characteristic of all organisms	**Unit 5: Ecosystem and Conservation of Natural Resources** **5.1. Ecosystem and Interactions** • Define ecosystem and components of ecosystem • Identify and describe the types of biological interactions of organisms in an ecosystem • Construct simple food chain and explain its components

	• Relate diversity with classification of organisms • Justify why scientific names of organisms should be used in science than the local names • Analyze and describe the relationships of the hierarchical levels (Kingdom to Species) in the classification of organisms **5.2. Kingdoms of Life** • Compare the five Kingdoms of living things by describing their distinguishing characteristics • Summarize the commonest examples of organisms belonging to each Kingdom • Describe the body plans of insects such as butterfly, amphibians such as frogs, mosses, liverworts, ferns, conifers such as junipers, flowering plants, Paramecium, Algae, and Mushroom • Relate each Kingdom of organisms to their major habitat types as aquatic, terrestrial or moist	• Differentiate between food chain and food web • Distinguish between the different components of food chain • Describe the role of nutrient recycling in nature • Explain how energy flows from producers to consumers • Explain why nutrients are said to recycle while energy flows (does not recycle) **5.2. Conservation of Natural Resources** • Summarize the characteristics of soil • Describe the various types of soils • Explain the various uses of soil in nature and to human being • List down and describe the various soil conservation strategies • Engage in the Environment Club of School and participate in awareness creation campaigns. • Explain the various uses of soil in nature and to human being • List down and describe the various water conservation strategies • Describe the various components of atmospheric air • Identify and discuss the various human activities that cause air pollution • Discuss the impacts of air pollution with examples • Explain the various uses of air in nature and to human being • Explain the cause and impacts of global warming • List down and describe the various actions that can be taken to reduce the emission of carbon dioxide to atmosphere • Define forest and give examples of natural forests in Ethiopia • Explain the various uses of forest in nature and to human being • Identify and discuss the various human activities that cause deforestation • Discuss the impacts of air pollution with examples • List down and describe the various actions that can be taken to conserve forests • List and describe the values of biodiversity • List down and describe the various in-situ and ex-

		situconservation strategies in biodiversity conservation • Give examples of the various indigenous knowledge and practices that are used in the conservation of various natural resources such as soil, forest, etc.
Earth in Space	**Unit 6: The Earth** **6.1. Shape & dimensions** • Describe the shape of the earth • Identify evidences supporting the shape of the earth • List local and global ideas about the shape of the earth • Name dimensions (circumferences, diameters, and angular distances) of the earth **6.2. Parts of the Earth (Body & Atmosphere)** • Recognize all parts of the earth • Describe the organization and contents of the different parts of the earth • Explain different observations about the earth in terms of the nature and behaviors of the different parts of the earth. **6.3. Movements of the Earth** • Demonstrate movements of the earth (revolution and rotation) • Explain the effects of motions of the earth. • Construct the model of earth and use it to explain phenomena related to its motion **6.4. Systems & Cycles** (effects, measurement ideas/estimation) • Identify atmospheric and lithospheric systems • Explain their cycle effects of the earth Describe the measuring techniques for too big (Earth) and to small (continental drift) quantities measurement and estimation.	**Unit 6: The Solar System** **6.1 Family of the Solar System** • Explain family of the solar system. • Name all planets in the solar system. • Show the position of each planet in the solar system • Develop the model of solar system. **6.2 Formation of the Solar System** (Planets & Satellites, Other objects) • Describe how satellites move around the earth. • Explain the motion of large bodies in the solar system • Differentiate the motion of satellites and planets in the solar system **6.3 Earth in comparison with Solar system** • Compare the distance, size, position and behavior of each planate from the sun **6.4 Our planet's suitability for life** (uniqueness) • Explain the unique characteristics of the earth. • Describe the suitability of earth for life.
Energy and the Environment	**Unit 7: Motion, Force, Energy and energy resources** **7.1 Definition and types of motion** • Describe the term motion • Identify types of motion. (motion on straight line, circular	**Unit 7: Physical Phenomena in the Surrounding** **7.1 Phenomena of Light** (source & properties) • List some sources of light • Describe reflection and refraction

	motion, rotary motion and curvilinear motion) • Show those types of motion in the class. **7.2 Definition of force and gravitational force** • Explain the term force. • Demonstrate the pulling/pushing activity of force. • Explain gravitational force. **7.3 Effects of force** • List all effects of force • Demonstrate some effects of force. • Relate effects of force with their daily life experience **7.4 Measuring forces** • Name measuring device of force • Identify different measuring scales on measuring device of force • Explain parts of measuring device of force **7.5** Definition of Energy (Property of matter can be converted) • Define energy as a property of matter that can be converted **7.6 Forms and Conversion of Energy** • List all forms of energy • Explain which energy converted to other forms of energy **7.7 Sources** (sun, fuel, hydroelectric, wind, nuclear) • List sources of energy • Distinguish between renewable and non-renewable forms of energy	• Explain dispersion of light • Show colors formed on the other side of the prism. **7.2 Vision and Imaging** (transparent, opaque) • Determine the purpose of light • Classify materials as transparent, translucent and opaque. • Demonstrate how image is formed **7.3 Sound** (Sources, medium, Hearing, Echoes, sound pollution) • Define sound as a form of energy • Explain how sound is formed • Demonstrate the formation of sound • Identify material medium for sound propagation. • Prioritize sound propagation in solid, liquid and gases • Explain the cause of sound pollution • Identify hearing level for different sound • List strategies of sound pollution • Define echo and demonstrate its application **7.4 Heat** (Definition, mechanisms of transfer, insulation) • Define the term heat • Explain mechanism of heat transfer • Classify materials as good conductors of heat and poor conductors of heat (insulators) **7.5. Simple circuit** • List all material used to construct simple circuit Construct simple circuit **7.6.Magnetism (Magnetic lines of force, Use)** • Define magnetism • Do simple experiment and construct magnetic lines of force • Explain the use of magnet

	7.8 Wise use and Conservation • Describe how energy is used wisely • List the strategies of conservation of energy **7.9 Resource depletion and environmental degradation** • Explain resource depletion and environmental degradation	

Syllabus (Grades 7-8)

Subject: General Science

Grade: 7

Unit One: Basic Concepts of Science (12 periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Define science as a body of knowledge and the processes and practices used to add to that body of knowledge
- Describe the main branches of science and explain their relationship
- Relate how science and technology affect one's beliefs, practices, and ways of thinking.
- Appreciate the contributions of outstanding scientists to science and technology.
- Discuss the importance of scientific values in decision making and problem solving.
- Relate how science and technology affect one's beliefs, practices, and ways of thinking.
- Identify the significant contributions of Ethiopian Scientists in science and technology.
- Identify different laboratory tools
- Demonstrate safe ways of using apparatus in the laboratory.
- Practice precautionary measures in the laboratory
- Exhibit knowledge of lab safety rules and procedures.
- Identify potential hazards and implement appropriate safety procedures when working in the laboratory

Competencies	Contents	Learning Strategies	Assessment
• Define science as a body of knowledge and the processes and practices used to add to that body of knowledge • Describe the main branches of science and explain their relationship • Relate how science and technology affect one's beliefs, practices, and ways of thinking. • Appreciate the contributions of outstanding scientists to science and technology. • Discuss the importance of scientific values in decision making and problem solving. • Relate how science and technology affect one's beliefs, practices, and ways of thinking. • Identify the significant contributions of Ethiopian Scientists in science and technology.	**1.1. The Nature of Science and its Branches (10 periods)** • Definition of science • Branches of science • Science and technology • Scientists and Ethical Discipline	• Students could be asked what they think science is. • Write their ideas on the blackboard. They are likely to suggest things like: - Way of knowing Body of knowledge - Natural world - Our environment • Use the students' ideas to filter a simple definition of science as: • Science is a study of the physical and natural world. Science provides an ordered way of learning about the nature of things, based on observation and evidence. Through science, we explore our environment, gather knowledge and develop ideas that help us interpret and explain what we see. • Students could be asked to write one sentence about the branches natural sciences by searching from Internet or other sources such as libraryFor example, - **Biology -** study of living things - **Chemistry -** study of the chemical properties of materials	Pre-assessment Anticipatory set with questions Remedial or enrichment activities Teacher's observation Quiz

		- **Physics -** study of matter, motion, force and energy. • Students should appreciate that there are regions of overlap between the disciplines. Example, • Chemical reactions that take place in living things combine chemistry and biology. • The effects of forcesresult in the formation of mountains • Students could be asked to identify other topics where the different scientific areas overlap. • Students should appreciate the role and contribution of science and technology in their understanding of the world. • Students could choose one of the scientists and create a role-play for the press release following the news of his/her discovery. Various roles to consider would include: the scientist; media; fellow scientists; and the general public. Alternatively, they could choose an Ethiopian scientist and create a cartoon strip showing their discovery.Values on focus: Imbibe good character traits of scientists. • Students could discuss the uses and benefits of science and technology to society and relate applications of science to some social and ethical issues. • Students could research on the contribution of Ethiopian scientist in science and	Performance assessment- report, presentation Ensure all students participate and contribute to class discussions

• Identify different laboratory tools • Demonstrate safe ways of using apparatus in the laboratory. • Practice precautionary measures in the laboratory • Exhibit knowledge of lab safety rules and procedures. • Identify potential hazards and implement appropriate safety procedures when conducting laboratory	**1.2. Common laboratory equipment, uses, safety rules and procedures in science laboratories** • List and use of common scientific equipment • Making laboratory equipment/tools from locally available materials • Lab safety rules and procedures. • Personal protective • Hazard Sings (Symbols)	technology • Students could be shown some common pieces of apparatuses such as Balance, Beaker, Measuring cylinder, Tongs, Bunsen burner, Test tubes, Petridishes, etc.) • Students should practice the correct handling and use of these laboratory equipment and materials. • Allow groups of students to produce laboratory tools such as beaker, measuring cylinder, balance, tongs, etc. from locally available materials • The learner may be provided opportunities in pairs/groups/ and encouraged to: - Discuss rules and regulations that should be followed in the science laboratory - Discuss hazard symbols on chemical bottles, electrical gadgets and other materials found in the laboratory and demonstrate how to handle those materials safely.	Performance assessment-Report/Presentation Questions Students work in pairs during the practical component Ensure all students participate and contribute to class discussions. Questions

Unit Two: Matter in Our Surroundings (40 Periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Use particles theory's postulates to explain properties and behaviour of materials.
- Classify matter as an element, compound, homogeneous mixture, or heterogeneous mixture with regard to its physical properties.
- Describe the structure of solids, liquids and gases in terms of particle separation, arrangement and types of motion.
- Differentiate between physical and chemical properties and changes of matter.
- Appreciate that matter can be classified based on physical or chemical properties.
- Use properties of matter to identify substances and to separate them.
- Demonstrate scientific inquiry skills along this unit: observing, classifying, comparing and contrasting, making mode, inferring, communicating, asking questions, designing experiments, drawing conclusions, applying concepts.

Competencies	Contents	Learning Strategies	Assessment
• Define matter with examples from day today life.	**2.1 Characteristics and nature of matter** • Meaning and Properties of matter	• Students should review the topic on matter learned in earlier classes using a KWL or mind map strategy. • Students should define matter and give examples of both matter and non-matter. • Students may believe that everything on Earth is matter. Teachers should probe students for examples that are not matter, such as all types of energy, including light, heat, and sound. Definition of matter.	• Observe students during discussion -Mind Map • Oral and written question • Journal (students could write examples of the different types of matter they encounter at school and at home)
• Demonstrate that matteris made up of tiny particles.	• Particulate nature of matter – characteristics of the particles of matter	• Students could develop and use models to communicate the concept that matter is made of particles too small to be seen that move freely around in space (e.g., inflation and shape of a balloon, wind blowing leaves, or dust). Once students have come up with individual models, have them share their ideas with their group and record the group consensus on large poster paper which they will share with the class.	• Models • Observe students during activities • Performance assessment-poster paper, activities on diffusion (using the quality criteria example: rubric, checklist in describing students' achievement).

• State the postulates of the particle theory of matter.	• Particle theory of matter (Particle model of matter)	• Students should outline the postulates of particle theory of matter as: - matter consists of particles, - there are spaces between the particles, - the particles move continuously, - there are forces between the particles, - particles of one substance differ from the particles of other substance.	• Written assessment • Oral questions
• Infer the particulate nature of matter from demonstration/investigation.	•Illustrations for the support of the statements of the particle theory – Diffusion	• Students could carry out experiments, such as the diffusion of a chemical with a distinctive odour, to show that even a small amount, such as one drop, spreads within a large room so it can be smelt in all places – therefore the particles responsible for the smell must be very small and there must be many of them in a single drop.	• Performance assessment- Observe students during activity (using the quality criteria examples: rubric, checklist in describing students' achievement). • Report/presentation • Oral question
• Apply particle nature of matter in explaining diffusion and every day effect of diffusion. • Describe and/or make a representation of the arrangement, relative spacing, and relative motion of the particles in each of the three states of matter. • Describe and explain compression in terms of distance between particles.	• Explaining Observations Using the Particulate nature of matter – Diffusion and every day effects of diffusion, – Properties of solids, liquids and gases • Particles in solids, liquids and gases • Compression	• Students could apply particle nature of matter in explaining diffusion and every day effect of diffusion (, e.g. the spread of perfumes and cooking aromas; tea and coffee grains in water). • Students could use particles model diagram to describe the differences in behaviour among particles in solids, liquids and gases. • Challenge a few students to role-play particles in different states of matter by acting out their properties. • Students should use model or particle model diagram to describe the structure of solids, liquids and gases in terms of particle separation, arrangement and types of motion of the particles using 'particles in boxes' and use this diagram to describe the compressibility of gaseous.	• Observe students during the activity • Observation – collaborative and independent work • Performance Assessment – Model or particle model diagram • Presentation/ reflection • Performance assessment- role play • Observe students during activities

• Use the terms melting, condensing, and freezing/solidification to describe changes of state. • Use the particulate nature of matter to explain: Melting, Freezing/ solidification, Evaporation, Condensation.	• Changes in state • Explaining change of state processes using a simple particle model of matter.	• Students should define melting, evaporating, condensing, and freezing/solidification and use them to describe the process of changes of state. • Students could use particles model diagrams to explain changes of states in terms melting, evaporating, condensing, and freezing/ solidification. Here Students should be helped to visualize how much small the particles (atoms or molecules) are, and what actually happens when substances melt, dissolve or evaporate.	• Interactive Discussion • Observe students during activities • Oral questions
• Describe physical Properties	**2.2Physical and chemical properties of matter** • Physical properties	• Students should be asked to brainstorm information that they need to know in order to identify an object/substance. As a class, students develop a list of properties that can help identify an object/a substance. A class T-chart can be developed listing physical and chemical properties and ones that can be tested for in class. They are likely to suggest things like: - Colour - Mass - Volume - State at room temperature - Melting/Boiling point. • Students should understand that physical properties are those that can be observed or measured without attempting to change the substance into a different substance. Students should realize that some physical properties, such as mass and volume, depend on the amount of matter being measured while	• Diagnostic assessment • Observe students during discussion • Written assessment

		properties, such as melting, and colour, do not depend on the amount of the substance present.	
• Use physical properties of matter to identify substances.	• Identification of substances based on their physical properties	• Students should realize that each pure substance has characteristic physical properties (for any bulk quantity under given conditions) that can be used to identify it. They should also know that melting point, boiling point, solubility, and odor are characteristic physical properties that can be used to identify a pure substance. • Students could be given an unknown substance and asked to identify it by comparing its properties with those given in data tables	• Quiz • Remedial or enrichment activities • Observes and records as students demonstrate their understanding of the concepts

• Conduct experiments to identify properties of substances and make group report.	• Observing physical properties	• Students could be given a substance and asked to find some of its physical properties by observation e.g. , for a metal block the student could observe:
		- State and the colour
		- Conductivity
		- Density
		• The observation of conductivity and density should be done only qualitatively and descriptively
		• Students could identify metals by observing their physical properties e.g.
		  • Copper – brown colour
		  • Iron and steel – magnetic
		  • Aluminum- low density
		  • Lead- high density
			• Performance assessment-presentation, report (using the quality criteria (example rubric, checklist) in describing students' achievement
			• Report

• Identify chemical properties.	• Chemical properties	• Students should know that chemical properties can only be studied while trying to change the substance into another substance e.g. flammability.	• Questions

• Distinguish between physical and chemical properties.		• Students should understand the difference between physical properties and chemical properties.	• Performance assessment-presentation (using the quality criteria (example rubric, checklist) in describing students' achievement
	2.3. Classification of substances (in terms of composition and observable properties		
• Use the particle theory to describe the difference between pure substances and mixtures	• Pure substance and mixture	• Students are likely to have first-hand experience with pure substances and mixtures from their daily life experience. They could be asked to take part in a brainstorming or KWL session to activate their prior knowledge about pure substances and mixture. • Students could make lists of common substances which are pure and those which are mixtures. • Common mixtures could include: - Soil – a mixture of different sized particles and plant material - Cooking oil – a mixture of vegetable oils. - Ink—contains a mixture of dyes, dissolved in alcohol and water. - Milk— contains proteins, carbohydrates, fats, water, minerals. - Air— contain oxygen, nitrogen , carbon dioxide • Common pure substances could include: • Gold Sulphur • Copper Silver • Water Sugar • Students should be informed that: • Pure substances have characteristic properties and are made from a single type	• Diagnostic assessment • Ensure all students participate and contribute to class discussion • Observing • Observe students during activities • Oral questions

		of particle. • A mixture is a combination of two or more particles which have not bond together; each part in the mixture retains its own properties. • Students could be asked to use the particles model diagram to describe the difference between pure substances and mixtures. Paper clips with different size or colours or other local materials can be used to make physical models that can be used for this activity.	• Observe students during activities • Ensure all students participate and contribute to class discussion
• Differentiate between elements and compounds.	• Elements and Compounds	• Students should recognize that there are a number of substances that cannot be decomposed into simpler substances and these are called elements. There are 92 naturally-occurring elements.	• Oral question
• Classify common elements into metals and non-metals	– Classification of Elements	• Students could know that a chemical element is a pure substance that contains only one type of particle (atom), which is the smallest particle of an element. • Students should be asked to suggest how elements might be classified into groups. They may suggest solids, liquids and gases as the states of matter will be familiar to them. Explain to them that elements are classified in terms of metals and non-metals.	• Ensure all students participate and contribute to class discussions
• Investigate the properties of metals and compile a list of		• Provide students with samples of different	• Observe students during

general properties. • Investigate the properties of non-metals and compile a list of general properties.		metals: iron, aluminum, copper and any others which are available. They should examine them and compile a list of general physical properties e.g. solid, hard, flexible, metallic appearance, can be polished. As a result of these activity students should deduce the common properties of metals. • Provide students with samples of different non-metals: carbon, sulphur and iodine. They should examine them and compile a list of general physical properties e.g. solid, rigid, can be crushed into a powder, dull appearance. Show students some examples of gaseous elements such as oxygen, nitrogen and chlorine. Point out that many non-metals are not solids but gases. • Students could also classify the non-metals into solids and gases at room temperature. • This work could be linked back to physical properties by referring students to the tables of melting points and boiling point of the elements to identify one metal and one non-metal which are liquids at room temperature. • Students should appreciate that elements combine chemically to form compounds. Give some examples of binary compounds and ask them from which elements they are formed e.g. - Sodium chloride – sodium and chlorine - calcium oxide (lime) – calcium oxide - Carbon dioxide – carbon and oxygen. • Emphasize that a compound is not a mixture of elements but elements which have undergone a chemical change. The	activities • Make sure students are working together Observe students during activities Report Performance assessment- Report, observing during they perform the investigation, presentation (using the quality criteria (example rubric, checklist) in describing students' achievement Inferring skill

		properties of a compound are completely different from the properties of the elements from which it is formed. • Students could carry out an experiment in which they heat a mixture of iron and sulphur in a soda glass tube and compare the properties of the iron sulphide with the original mixture. This will emphasize the differences between a mixture and a compound. • Students should be informed that: - element is A substance that is made up of only one type of atom. - a compound is a substance that is made up of more than one type of atom bonded together	• Observation • Quiz • Observe students during activities • Lab report • Presentation
• Describe and classify mixtures into homogenous and heterogeneous. •Use models/ particles diagram to show differences between homogenous and heterogeneous. • Describe the relationship among elements, compounds, mixtures, homogenous mixture and heterogeneous mixture.	• Mixture - Homogenous mixture - Heterogeneous mixture	• Students should describe the two types of mixtures, i.e., homogenous and heterogeneous and give examples for each. • They could also be given mixtures of different kinds and be asked to identify them as homogenous or heterogeneous. • Students could use models/ particles diagram to show differences between homogenous and heterogeneous mixtures. • Students could create/make a mind map or concept map of types of matter as they progress through this topic/subunit. One possible arrangement would be to have "matter or substances" at the center. Six branches labelled "properties", "mixture", "elements", "compounds" "homogenous mixtures" and "heterogeneous mixtures"	• Group quiz • Observe students during activities • Make sure students are working together • Concept Map about the classification of Substances

		could form the basis of creating a graphical representation of the main information in this sub-unit.	
• Describe physical and chemical change. • Distinguish the physical and chemical changes using their characteristics. • Conduct some simple activities to show physical and chemical changes and write group report. • Observe and describe physical chemical changes that are important in everyday life. • Identify useful and harmful changes.	**2.4. Changes Around Us: Physical and chemical changes** • Physical Change and Chemical Change • Importance of physical and chemical changes in our life • Physical chemical changes that are important in everyday life • Useful and Harmful Changes	• Students should observe and record typical "changes" in their home and identify whether they are physical or chemical changes .They should give reasons for their choice. These include: - Burning of charcoal - Fermentation - Spoilage of food - Rusting of nail - Melts of ice - Evaporation of water - Dissolving sugar in water etc. • They are asked to generalize – what are the characteristics of different changes – physical and chemical changes? • The difference between these two types of change could include: • Physical change − easily reversed − no new substance formed • Chemical change − not easily reversed − new substance formed • Students could investigate some changes themselves and determine whether they are physical changes or chemical changes by using simple experiment. e.g. - Boiling water - Grinding salt - Tearing paper into small pieces - Melting an ice - Iron nail going rusty	• Asking questions • Presentation • Use a scoring rubric to assess their ability to recognize and provide proof for the variousChanges. • Make sure students are working together

		- Making an iron bar magnetic - Heating magnesium ribbon - Burning candle. • They may then present their findings to the class in the form of an oral presentation, a poster display, or multi-media presentation. • Students could identify n physical changes e. g dissolving etc.) and chemical changes chemical changes (e.g. fermentation, food cooking, etc.) that are important in our live • Students could identify physical changes (e. g oil spills etc.) and chemical changes (rusting of car, souringfood etc.) that are harmful in our live	• Observing during activity • Report • Presentation/ Reflections
• List methods of separation of mixtures	**2.5 Separation of mixtures and its application periods** • Methods of separation of mixtures	• Students should be asked to list the methods of separation with which they are already familiar from their daily life experience. These could include: - Separation by hand - Sieving - Filtering - Decanting • Students should appreciate that separation techniques are a method of obtaining pure substances.	• Diagnostic assessment-group activity, brain storming.

• Give some specific examples of mixtures that can be separated by filtration, decantation, simple distillation, magnetic separation and using separator funnel.		• Students could be asked to give examples of mixtures that can be separated by filtration, decantation, simple distillation, magnetic separation and using separator funnel including the following: • Magnetic separation: – Iron filings and sulfur– illustrates separation of magnetic and non-magnetic substances Iron filings and sand. It is wise to place the magnet in a polyethene before doing this experiment as it can be difficult to remove all of the iron filings from the magnet • Filtration: – A mixture of chalk particles (or some other insoluble solid particles) and water • Evaporation – A mixture of sodium chloride (or any other soluble salt) and water forms a solution which can be separated by evaporation – if the solution is left in an open dish on a window sill the water will evaporate the salt will be left behind. Evaporation is quicker if the solution is placed in a broad dish, such as an evaporating basin, which exposes a large surface area of the solution to the air • Decantation – Pouring boiled coffee from the pot ('Jebena') to the cup – A mixture of cooking oil and water can be separated by decanting - the cooking oil and water form two layers. The top layer, the cooking oil, can be removed by careful pouring. This is best done when the mixture is in a narrow tube	• Written assessment • Oral questions

		such as a measuring cylinder. It can also be separated using separator funnel. • Simple Distillation – A mixture of two miscible liquids boiling points can be separated by simple distillation For example i) Mixture of water (B.P. 1000) and alcohol (ethanol B.P. 780c) ii) Obtaining pure water from salt solution Students should be made familiar with the use and care of the apparatuses used in these techniques. Students could undertake separation using a combination of techniques. For example, a mixture of salt and sand can be separated by first adding water to dissolve the salt, filtering to	
• Name apparatuses used in decantation, filtration, simple distillation, using separator funnel. • Assemble apparatuses used in decantation, filtration, simple distillation, separator funnel. • Conduct and report on an investigation that uses physical means such as particle size, density, boiling point, solubility and magnetism to separation	• Application	• Students should be made familiar with the use and care of the apparatuses used in these techniques. • Students should practice assembling apparatuses used in decantation, filtration, simple distillation, separator funnel. • Students could attempt the separation of different mixtures using a range of techniques including: – A mixture of iron filings and sulphur powder – A mixture of cooking oil and water – A mixture of chalk particles in water – A mixture of alcohol and water – Salt solution • Students could undertake separation using a combination of techniques. For example, a mixture of salt and sand can be separated by	• Oral questions • Performance assessment • Observing during activity • Report

		first adding water to dissolve the salt, filtering to remove the sand and finally evaporation of the filtrate to give the salt.	• Presentation/ Reflections
• Perform simple activities in group to carry out the separation of mixtures using local materials and write a group report.	• Separating of mixtures using local materials	• In group, using local available materials students could plan and investigate how table salt is separated from a mixture of table salt, sulphur powder and iron filings then report their finding. • Students could be asked to separate other mixture locally available using local materials	• Observing during activity • Report • Observation – collaborative and independent work
• Compare and evaluate the different ways of separating mixtures from products in community		• Student could discuss with the parents/guardians /grandparents/elders in the neighborhood on the techniques separation used in daily live. Students should be asked to make/prepare a table of such activities of daily life in which sedimentation, decantation, filtration and evaporation are used/occurs.They may then present their findings to the class in the form of an oral presentation, a poster display, or multi-media presentation. • Alternatively teachers may present examples of separation techniques used by local indigenous peoples. Students should be asked to identify and compare withmodern separation techniques used to accomplish the same tasks. What are the positive and negative effects of using the modern separation techniques as opposed to the traditional indigenous techniques? • Teachers may facilitate a cooperative jigsaw activity to research early historical uses of each separation techniques. Organize students into home groups of six.	• Performance assessment-poster display / multi – media presentation, report (using the qualitycriteria (example rubric, checklist) in describing students' achievement • Report • Performance assessment-poster display / multi – media presentation, report (using the quality criteria (example rubric, checklist) in describing students' achievement • Report

		Assign each member of the home group a separation technique. • Reorganize students according to separation techniques and ask them to research early use of their separation technique and trace how its use has changed over time. Once all research has been completed, students should return to their home group and share what was learned with other members. • Students could create a print or digital display to illustrate how separation techniques devices has changed over time.	• Observation – collaborative and independent work

Unit 3: Elements, Compound and Chemical Reaction (18 Periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Compare elements to compounds and how they are represented by symbols and formulae.
- Identify and write symbols of common elements or compounds.
- Name compounds given their formula and write formula given the name of the compound.
- Use symbols and chemical formulae as a way of communicating information about elements and compounds.
- State and apply the Law of Mass conservation to writing balanced equations.
- Interpret chemical formulae of compounds in terms of the elements present and the ratios of their atoms.

Competency	Contents	Learning Strategies	Assessment
• Define element	**3.1. Elements and their representation** • Common elements	• Students are likely to have first-hand experience with element. Thus they could be asked to take part in a brainstorming session to activate their prior knowledge about element and cite the definition of the term "element".	• Oral questions

• Identify symbols of some common elements. • Write chemical symbols for common elements.	• Chemical symbols • Writing symbols	• Students should define atomic symbols as shorthand way of representing elements or atoms of an element. Illustrate this by writing the names of several elements on the board with their symbols alongside. Students should be aware of that symbols stand for a specific element. No two elements can have the same symbol. • Students should appreciate that: - symbols are much easier and quicker to write - the same symbols are used throughout the world so chemists all over the world can understand them - Symbols stand for a specific element. No two elements can have the same symbol. • Students could be given a periodic table and asked to point out the symbols for some elements they may be familiar with e.g. sulphur, iron, oxygen etc. Do not attempt to explain the Periodic Table at this stage; this will be discussed and explained in detail in Grade 9 • Students should understand that the first letter is always written in upper case and, where there is a second letter, this is written in lower case. For example, the symbol for helium is He, and not HE, hE or he. • Students should know that, in general, the symbol of an element is the first letter of its name. Where there are two elements whose names start with the same letter, an additional letter is added. For example, the symbol for carbon is C, while the symbol for calcium is Ca.	• Quiz • Observation

		• Teachers could ask students to consider why the letter symbols for some of the elements do not correspond to the element's name (e.g. Iron, number 26, has the symbol Fe).Students could research and find out why some common elements have symbols which appear to be are little resemblance to their names e.g. iron, Fe; lead Pb; sodium, Na. • Students should practice writing symbols from names and names from symbols. They should focus on the symbols of the first 20 elements of the Periodic Table together with a small number of commonly encountered elements such as iron (Fe), copper (Cu), zinc (Zn), gold (Au), silver (Ag), bromine (Br) and iodine (I).	• Report/Reflection • Quiz
• Define compound as a substance formed when two or more elements chemically combined together. .	**3.2 Compounds and their representation** • Compounds • Meaning of formula • Valence number	• Students should be reminded from their work in Unit 2 that a compound consists of two or more elements which have been chemically combined. It follows therefore, that in order to represent a compound we combine the symbols of the elements to make a chemical formula. • Students should appreciate that atoms of different elements have different 'combining powers' which we call valence number. • Give students a simple table to show the combining power of some common elements including:	• Oral Questions • Quiz

• Define valence numbers as the combining power of an atom • Write the formulae of simple binary compounds using symbols and valences. • Name binary compounds	• Formulas of Binary compounds • Naming binary compounds	- 1 sodium, potassium, copper (I) - 2:magnesium, calcium, iron (II), copper (II) - 3: aluminum, iron (III) - 2: oxygen, sulphur - 1: chlorine, bromine, iodine • Students should practice writing the formulas of compounds in which the metal and non-metal have the same combining power e.g. potassium iodide, KI; copper (II) oxide, CuO. • Ask students to suggest how we write the formulas of a compound in which the combining powers of the atoms are not the same e.g. Calcium chloride. Calcium has a combining power of 2 while chlorine has a combining power of 1 therefore we need two chlorines to go with one calcium. Here the students should understand the use of subscripts and coefficients in a chemical formula and describe using diagrams of molecules. • Students could understand that the name of non-metal that is written at right side in the formula in binary compounds should have an "ide" ending. e.g. NaCl - Sodium chloride • Students should be aware of that a small number of elements have more than one combining powers. For example, in some of its compounds iron shows a combining power of 2 and is written as iron(II) – while in	• Observing students during activities • Oral questions

		others it shows a combining power of 3 and is written as iron (III) • Students should understand that certain groups of atoms are found together in a number of different compounds. They should learn the names, formulas and combining powers of these groups including: - 1 ammonium, NH_4^+ - 1 hydroxide OH^-, nitrate NO_3^- • Students should practice writing the names and formulas of compounds which contain one of these groups and an atom with the same combining power e.g. ammonium chloride, NH_4Cl, potassium hydroxide, KOH	
• Describe polyatomic ion • Write the chemical formulas of common compounds that contain polyatomic ions • Name compounds containing polyatomic ions.	• Polyatomic ions • Writing chemical formulas • Naming simple chemical compounds	• Finally, students should practice writing the names and formulas of compounds which contain one of these groups and an atom with a different combining power e.g. ammonium sulphate, $(NH4)_2SO_4$, iron (II) nitrate, $Fe(NO_3)_2$. • Students should practice writing the chemical formulas of common named chemicals and the names of chemicals from their formula.	• Quiz • Observing during activities • Observing during activities

• Identify the elements and number of atoms, given a chemical formula	• Interpreting formula	• Students should describe the significance of coefficients and subscripts in the formulas of elements and compounds - e.g. Cl_2;the subscript 2 shows qualitatively chlorine is a molecule and quantitatively there are atoms of Cl inchlorine molecule. - $3H_2O$; the coefficient 3 shows that there are 3 molecules of water. • The subscript 2 shows that there are 2 atoms of hydrogen in a water molecule. There is also 1 atom of oxygen in a water molecule though not written as subscript under "O". • Students should interpret some formulas in this way e.g. CaO, calcium and oxygen, one atom of calcium and one atom of oxygen; Ca $(NO_3)_2$, calcium and nitrate, one atom of calcium and two nitrate groups • Students should be asked to search reference materials, such as a Science books and/or the Internet, to try to discover the formulae of common compounds such as baking soda, Vinegar (acetic acid), lime etc. and interpret them in terms of the elements present and theratios of their atoms.	• Observation • Oral question • Report • Presentation
• Define chemical reaction and give examples.	**3.3 Simple chemicalreactions and equations** • Simple chemical Reactions	• Students should understand that a chemical is a process in which some substances change into different/new substances. In chemical reaction one or more substances, called reactants, react alone or with each other to produce one or more new substances, called products. • Students should give different examples of	• Oral questions

• Describe evidences that show chemical reaction has occurred. • State the law of conservation of mass.	• Evidences that show chemical reaction has occurred • Low of Conservation of mass	chemical reactions. The students could also discuss the examples of changes brought about by the chemical reactions. These could include: - Rusting of iron - Fermentation - Digestion of food • Students could record and describe the various chemical changes that occur in their daily lives (e.g. cooking food, etc.) and describe the evidence they use to determine that a chemical reaction occurred. • Students should know that mass is conserved during a chemical reaction i.e. no atoms are lost or gained – they are simply rearranged.	• Quiz • Reflection • Question
• Conduct an experiment in group to show simple chemical reaction.	• Investigating chemical reaction	• Students should conduct an experiment on simple chemical reaction. This could be burning of magnesium in the air to produce magnesium oxide.	• Performance assessment- individual/ group lab report, reflection
• Write a chemical equation. • Balance simple chemical	• Writing and Balancing simple chemical equation • Writing Chemical	• Using the board demonstrate how to write and balance chemical equations. • Describe in words a simple reaction (such as the formation of water from hydrogen and oxygen), and then represent it with a chemical equation. Explain what each part of the equation represents. Be sure to	• Oral questions

equation by inspection. • Create and use models of particles to demonstrate balanced equations.	equation • Balancing Chemical equation • Demonstrating balancing equation	distinguish the uses of coefficients and subscripts. • Also, explain how and why the equation must be balanced. Work with the class to balance two or three of the equations. Then ask students to try to balance some equations. Students should actively participate in brief teacher-led discussion on how to represent chemical reactions with equations. • Students should practice writing balanced chemical equations using the same technique. Initially they should be focused on simple equations. Once they have mastered the technique this should be extended to more difficult examples. • Students should develop the habit of checking for balance each time they write and equation by counting the number of each atom on each side of the equation. • In group, with a guidance, students could prepare a model from local available materials and use to demonstrate balanced equations. Alternatively they can use paper clips of different size or colours and other materials to demonstrate a balanced chemical equation.	• Observation • Quiz
• Describe the uses of chemical reactions in everyday situations.	**3.4 Uses Of Chemical Reactions in Every Day Situation** • Uses of chemical reaction	• Students could discuss in group and give some examples of useful chemical reactions such as fermentation in brewing which produces carbon dioxide and ethanol/ alcohol and other indigenous knowledge.	• Observing during discussion

Unit Four: Cell as the Basis of Life(25 periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Define a microscope
- Explain the use of a microscope
- Distinguish the different types of microscopes
- Describe the basic parts and functions of a microscope
- Use a microscope to view objects
- Define a cell
- Explain how cell was discovered and who discovered it
- Draw a cell and label its major parts
- Describe the functions of the major structural parts of a cell
- Distinguish between unicellular and multicellular organisms
- Give examples of cell shape
- Explain why cell shape and structure vary
- Discuss the differences of cell, tissue, organ and organ system
- Define respiration and write its chemical equation
- Define photosynthesis and write its chemical equation

Competencies	Contents	Learning Strategies	Assessment
• Identify the major parts and functions of a basic microscope • Use a microscope to view objects • Discuss the role of a microscope • Differentiate between simple and light microscope • Draw diagram of a microscope and label the major parts • Build microscope from locally available materials	**4.1. Microscope** (8 Periods) 4.1.1. Purpose and invention of Microscope 4.1.2. Types of microscope 4.1.3. Basic parts of light microscope	• Ask students, in groups, to discuss and tell if they think are organisms around them that they cannot see with their naked eyes; finally, you reflect on their answers. • While students are still in groups, ask them to discuss what they could use to see the organisms that they cannot see with their naked eyes. • Bring a sample of light microscope to a classroom, and	• Observe students activities while they are discussing in groups • Record the results of the students' discussions. • Question and answer on the use, types and parts of a microscope. • Ask students to adjust a microscope to observe small piece of his/her own hair under a microscope and observe it. • Request students to individually draw a microscope on a sheet of paper, label its parts and submit

		ask students if they have known these apparatus before. • Show a very fine fiber to students, and ask them to record its size. • Now, adjust this very fine fiber under a light microscope, and let each student see it through the microscope; ask them to explain what change they have observed. • Now, ask the students to explain the purpose or use of a microscope; finally, you reflect on the students answers. • Ask students, if they know who invented a microscope and when? Finally, you reflect on the students answers. • By providing samples of a simple microscope and a light microscope, ask students to compare and contrast the differences in structure of those two microscopes. • Provide students with a diagram of light microscope labelled with various major parts (such as eyepiece/ ocular, body tube, revolving nosepiece, objectives, stage and stage clips, condenser, course adjustment, fine adjustment knob, arm, lamp and base). • Then, provide a light microscope to students in groups and ask them to discuss and relate the labelled parts from a diagram to the actual parts on the microscope. • Ask students to discuss and tell	• Ask students to list down any questions they have from the chapter. • Ultimately, ask students to construct (build) a light microscope from locally available materials in groups of five students and submit it to the teacher for evaluation. • Provide descriptive feedback on the students' responses to the questions, diagram of the microscope they have submitted, and gaps observed indicating how they shall improve their learning. •

		what component a microscope uses to magnify an object, and in which part(s) a microscope it is located. • Ask students to discuss how what the roles of each part of a microscope are. • Ask students to reflect on how they have felt about a microscope • Ask students to individually draw a microscope on a sheet of paper and label its major parts, and submit for the teacher	
• Explain how cell was discovered • Draw and label the basic structures and functions of a cell • Explain why cell shape and structure vary • Distinguish between unicellular and multicellular organisms • Differentiate among cell, tissue, organ and organ system with examples • Examine and weigh the importance of cellular respiration • Examine and weigh the importance of photosynthesis	**4.2. Cell** (16 Periods) 4.2.1. The discovery and definition of a Cell 4.2.2. Structure of a cell 4.2.3. Cell shape and size 4.2.4. Unicellular organisms 4.2.5. Multicellular organisms 4.2.6. Cell, Tissue, Organ, and Organ system 4.2.7. Respiration and Mitochondria 4.2.8. Photosynthesis and Chloroplast	• Ask students, in groups of five students, to discuss and list down the structural components of a house, which can be a wooden/ mud-walled or brick-walled. • Ask the students to individually think and list down the commonly known external and internal organs of human body • Make the students take a moment and think about how these various body organs are assembled together to form our body, by correlating it with a house structure. • Take a particular human body part, say liver, and ask the students to discuss and in groups if it is made up of further smaller parts or not; finally you reflect on the students answers.	• Observe students activities while they are discussing in groups • Record the results of the students' discussions. • Question and answer on the definition of a cell. • Question and answer on the examples and functions of major cell organelles. • Give students group presentation on the story of cell discovery • Ask students to explain the purpose of respiration and photosynthesis • Request students to individually draw a typical animal cell and plant cell on a sheet of paper, label its parts and submit • Ask students to list down any questions they have from the chapter. • Provide descriptive feedback on the students' responses to the

		• Briefly explain to the students the story of how the cell was discovered by Robert Hooke in 1665 and by A. V. Leeuwenhoek (pronounced as Lay-Van-Hook) in 1674, followed by an explanation that all living things are basically made up of units called cells. • Show charts of typical animal and plant cells to students, and ask students to identify and list down the various labelled structural parts of a cell from a chart ; students should focus on identifying cell membrane, cell wall, cytoplasm, nucleus, mitochondria, chloroplast, vacuole, and endoplasmic reticulum) • Ask students to individually identify and present to a class any differences in structure, shape, etc. they have observed between the animal and plant cells. • Briefly explain to the students the functions of cell wall, cell membrane, nucleus, cytoplasm, mitochondria and chloroplast. • Show a chart of cells with different shape and size, and ask students why cells come with varied shape and size; finally, you reflect on their answers. • Ask students how many cells they think that their body is made of; also ask them if they know of organisms whose body	questions, diagram of the cell they have submitted, and gaps observed indicating how they shall improve their learning.

		is made up of just a single cell (e.g. amoeba, baker's yeast, paramecium, etc.) • Using a chart, show students drawings of unicellular organisms such as paramecium, amoeba, and multicellular organisms such as human, elephant and a tree, and ask them which of these are made up of single cell (i.e. unicellular organisms), and which organisms in the chart are made up of many cells (multicellular organisms). • Ask students if they know the differences among cell, tissue, organ and organ system in their own body • Demonstrate these different levels of biological organization to students using students themselves as follows: ask one student to sit separately from the rest of the students (representing a cell), form two or three groups of five students each (each group representing tissue), then combine each group into one bigger group (representing organ), combine two bigger groups to form much bigger group (Organ system) • Ask students how the energy in the food we eat is released to our body; ask them the role of oxygen we inhale; ask them the relationship between the food we eat and the oxygen we	

		breathe in. • Explain briefly to students how energy in the food can be released in a cell without oxygen (anaerobic respiration) and with the use of oxygen (aerobic respiration), and where each occurs in a cell with the differences in the amount of energy released from the same amount of food during each process. • Tell students that mitochondria of the cell are termed as "power house" of a cell, and ask them to reason out why. • Ask students to write word chemical equation of aerobic respiration (refer to Unit 3 for learning on chemical equation) • Ask students, if respiration is a function of both animals and plants, and why? • Write down the word equation of photosynthesis (refer to Unit 3 for learning on chemical equation) for students, and ask them for any difference with that of respiration; then, ask them what this process maybe termed. • Briefly explain to students what a photosynthesis is and its role. Tell them that it takes place in chloroplast, and then ask them if photosynthesis is a function of animals or plants, and to reason out why. • Use a chart to demonstrate to students that mitochondria and	

		chloroplast are cell structures where aerobic respiration and photosynthesis take place, respectively.	

Unit Five: Living things and their diversity (25 periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Distinguish between living and non-living things by describing the features that characterize living organisms
- Discuss if movement i.e. locomotion can characterize all living things or not
- Define classification and its purpose
- Explain the purpose of scientific name
- List down the hierarchical levels in the classification of organisms
- Describe the distinguishing characteristics of kingdom Animalia, Plantae, Protista, Monera and Fungi.
- List common examples of animals, Plantae, Protista, Monera and Fungi
- Describe the body plan of a common animals, Plantae, Protista, Monera and Fungi
- Describe habitats of animals, Plantae, Protista, Monera and Fungi

Competencies	Contents	Learning Strategies	Assessment
• Differentiate between living and non-living things • Organize and describe characteristics of living things • Justify why movement or locomotion from one place to another cannot be a defining characteristic of all organisms • Relate diversity with classification of organisms • Justify why scientific names of organisms should be used in science than the local names • Analyze and describe the	**5.1. Living Things** (9 periods) 5.1.1. Characteristics of living things 5.1.2. Classification and scientific names of organisms 5.1.3. Hierarchy in the classification of organisms (Kingdom to species)	• Organize students into groups and ask them to discuss the differences between living things (e.g. butterfly) and non-living things (e.g. stone). • Invite the students to make a presentation of their discussions turn by turn. • Give brief summary of characteristics of living things such as growth, reproduction, respiration, and adaptation to changes in the environment. • Now, ask students to tell if a	• Observe students while they are discussing about the living and non-living things and make sure that all students are participating in the group discussion and activities • Record the results of the students presentations on the differences between the living and non-living things • Provide constructive comments on the gaps observed in the students' presentations. • Ask students to explain why classification is important in biology

relationships of the hierarchical levels (Kingdom to Species) in the classification of organisms		plants are categorized as living things or non-living things, and justify why. • Ask students to discuss and explain in groups if "movement or locomotion from one place another" can be taken as a defining characteristic of all living things, and why. • Tell students in a very simple term that "classification" means "sorting" things based on defined characteristics or criteria. • Now, invite students to come forward turn by turn and classify their classmates into some groups based on their own criteria. • Write down the structural hierarchy of Ethiopia: Country, Region, Zone, Wereda and Kebele. • Organize the students into groups give them a chance to discuss in groups the relationships among these different structural levels. • Invite the students to make presentations of their discussions turn by turn. • Now, briefly introduce to students that classification of organisms (biological classification) is conducted in hierarchy from largest levels to lower levels in the same fashion as the above mentioned administrative levels.	• Record the results of the students' presentations on the relationships of the administrative structures: Country, Region, Zone, Wereda and Kebele. • Provide constructive comments on the gaps observed in the students' presentations. • Ask students to correlate the biological levels of classification with the administrative structural levels of Ethiopia (Country to Kebele) • Ask if each student can repeat the mnemonic of biological levels of classification at the start of every class until this chapter is completed • Observe students while they are discussing about the grouping of organisms from the provided charts and make sure that all students are participating in the group discussion and activities • Encourage students to make presentations of their discussions on classifying organisms into some groups from the provided charts; provide constructive comments on the gaps observed in the students' presentations. • Ask students to justify why scientific name should be used over the local name in science • Provide descriptive feedback on all the students' activities, indicating how they shall improve their learning.

		• List down the hierarchical levels in the biological classification as: Kingdom (highest level), Phylum (Division in plants), Class, Order, Family, Genus and Species (the lowest level). • Ask students if they can coin mnemonics using first letters of the levels such as "K" for Kingdom, "P" for Phylum, etc. for easy and frequent memorization of the levels • Give the students an example of such mnemonic as: **K**ing **P**hilip **Ca**me **O**ver **F**or **G**ood **S**paghetti (KPCOFGS) • Allow students to always rehearse this mnemonic at the beginning of your class until this Unit is completed. • Provide the students with samples of plants found in the school compound, and ask them to name each with the locally known names. • Give students a chance to discuss and explain why name is important. • Explain to students that organisms can be known by their local names or scientific names, and the differences of the two names • Give example of scientific names (e.g. *Homo sapiens* for Human species), and explain to them that it is known as Binomial naming.	

		• Ask students to explain what each word may stand for, why the first name should be always written in capital initial letter and the second name in lower case. • Ask students to search for the local and scientific names of a wide variety of living things (e.g. plants, animals, fungi, bacteria) from Internet and other sources, and submit it for assessment.	
• Compare the five Kingdoms of living things by describing their distinguishing characteristics • Summarize the commonest examples of organisms belonging to each Kingdom • Describe the body plans of insects such as butterfly, amphibians such as frogs, mosses, liverworts, ferns, conifers such as junipers, flowering plants, Paramecium, Algae, and Mushroom • Relate each Kingdom of organisms to their major habitat types as aquatic, terrestrial or moist	**5.2. Kingdoms of Life** (15 periods) 5.2.1. Kingdom Animalia • Major characteristics of animals • Major groups of animal and their habitats: Invertebrates (worms, insects), Vertebrates (fish, amphibians, reptiles, birds & mammals) 5.2.2. Kingdom Plantae • Major characteristics of plants • Major groups of plants and their habitats: seedless plants (bryophytes, pteridophytes, gymnosperms), seed plants (flowering plants) 5.2.3. Kingdom Protista • Major characteristics of Protista • Major groups of Protista and their habitats (protozoasuch as amoeba, plasmodium and trypanosome, and algae)	• Introduce the topic by brainstorming students on the multitude diversity of living things on the planet Earth; • Provide students with various charts consisting of worms, insects, fish, amphibians (frogs), reptiles (snake, crocodile, etc.), birds mammals (human, lion, etc.), plants, mushroom, Paramecium, Amoeba, and Bacteria) • Then, organize students into groups of five, and ask them to categorize the organisms into some named groups. • Allow students to make presentations of their discussions • Challenge students with a question that there are organisms in the provided charts that are neither	• Observe students while they are discussing about classifying organisms from the provided charts and make sure that all students are engaged in the group discussion and activities • Record the results of the students' presentations on classifying the organisms provided in the charts. • Provide constructive comments on the gaps observed in the students' presentations. • Ask students to differentiate among the five Kingdoms of living things by describing their distinguishing characteristics • Students should give examples of organisms that belong to each Kingdom. • Supervise and guide the students in all of the suggested practical activities; make sure active participation of each student. • Ask students to discuss among themselves and reflect on why it is

	5.2.4. Kingdom Monera • Major characteristics of Monera • Major groups of Monera and their habitats (Blue Green algae & Bacteria) 5.2.5. Kingdom Fungi • Major characteristics of Fungi • Major groups of Fungi and their habitats	animals nor plants. • Now, introduce to the students the concept that living things can be classified into five broad categories at Kingdom level as Animalia, Plantae, Protista, Monera and Fungi • Again ask the students to re-work on the already provided charts and categorize the organisms under any of these five groups; ask students for their reasons to assign the organisms to any one of the Kingdoms, and explain why. • Now, briefly summarize the major distinguishing characteristics of each kingdom including their habitats (as aquatic, terrestrial, moist, etc.); give examples of each, and ask the students to accordingly verify their group work on classification against the conceptual explanation you provided. • Organize a schedule for students to make collection of flatworms and insects (butterfly) from the school compound and the surrounding environment and identify their parts; guide students with provision of the necessary materials as well as with orienting students on careful (humane) handling of the	important to handle animals with maximum humanity (care) when collecting and working on them for scientific studies. • Provide descriptive feedback on all the students' activities, indicating how they shall improve their learning.

		animals during collection, killing (when necessary), and using them to identify major structural parts. Where collection of these organisms from the school compound or its environs is not possible, the teacher should look for options of visiting pedagogical center in the school that may have collection of these organisms. • Organize a schedule for students to make collections of amphibians (frogs) from the school environment and identify their body parts; guide students with provision of the necessary materials. • Organize a schedule for students to make collection of mosses, liverworts, ferns, Junipers, flowering plants from the environment and identify their major parts; guide students with provision of the necessary materials; guide students with provision of the necessary materials. • Make arrangements for the students to grow (culture) paramecium (a protozoan) in the lab using hay infusion, and observe its parts under a microscope. • Place hay in a plastic beaker of reasonable size and cover it with water, and leave it as side in the lab at least for one week before you return to check for the growth of a paramecium.	

		• Organize a schedule for students to make collection of algae from moist areas and describe their major parts; guide students with provision of the necessary materials. • Organize a schedule for students to make collection of Mushroom from the environment and describe their major parts; guide students with provision of the necessary materials.	

Unit Six: Earth in Space (24 periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Describe the shape of the earth
- Identify evidences supporting the shape of the earth
- List local and global ideas about the shape of the earth
- Name dimensions (circumferences, diameters, and angular distances) of the earth
- Recognize all parts of the earth
- Describe the organization and contents of the different parts of the earth
- Explain different observations about the earth in terms of the nature and behaviors of the different parts of the earth.
- Demonstrate movements of the earth (revolution and rotation)
- Explain the effects of motions of the earth
- Construct the model of earth and use it to explain phenomena related to its motion
- Identify atmospheric and lithospheric systems
- Explain their cycle effects of the earth
- Describe the measuring techniques for too big (Earth) and to small (continental drift) quantities measurement and estimation.

Competencies	Contents	Learning Strategies	Assessment
• Describe the shape of the earth • Identify evidences supporting the shape of the earth • List local and global ideas about the shape of the earth • Name dimensions (circumferences, diameters, and angular distances) of the earth	**6.1Shape & dimensions**	• Allow students to build model of the earth. Make to discuss about the shape, body parts, movement and dimension of the earth. • Make a group of 4 students to make a discussion about circumferences, diameters, and angular distances and parts of the earth. • Give individual exercise on what will happen when the earth moves on itself and about the sun. • Allow students to find evidences supporting the shape of the earth from intermediate and other references.	• Assist the discussion and give feedback. • Monitor Presentation • Follow the exact representation of model. • Follow what they search about shape of the earth.
• Recognize all parts of the earth • Describe the organization and contents of the different parts of the earth • Explain different observations about the earth in terms of the nature and behaviors of the different parts of the earth.	**6.2 Parts of the Earth (Body & Atmosphere)**	• Allow each student to name all parts of the earth • Make a group and discuss on organization and contents parts of the earth • Using intermediate connection (references) explain about the earth in terms of the nature and behaviors of the different parts of the earth.	• Assist the discussion and give feedback. • Observe what they search from different sources
• Demonstrate movements of the earth (revolution and rotation) • Explain the effects of motions of the earth • Construct the model of earth and use it to explain phenomena related to its motion	**6.3 Movements of the Earth**	• Using torch (light) lighting on prepared model of the earth - Show movement of the earth - Explain effects of motions of the earth	• Strictly follow whether the give clear movement and effects of the earth.

• Identify atmospheric and lithospheric systems • Explain their cycle effects of the earth • Describe the measuring techniques for too big (Earth) and to small (continental drift) quantities measurement and estimation.	**6.4 Systems & Cycles** (effects, measurement ideas/estimation)	• Allow students so find atmospheric and lithospheric systems of the earth from different sources • Make a group and discuss on cycle effects of the earth and measuring techniques for too big (Earth) and to small (continental drift) quantities measurement and estimation.	• Assist the discussion and give feedback. • Provide constructive feedback to improve their learning.

Unit Seven: Motion, Force, Energy and energy resources (24 Periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Describe the term motion
- Identify types of motion (motion on straight line, circular motion, rotary motion and curvilinear motion)
- Show those types of motion in the class.
- Explain the term force.
- Demonstrate the pulling/pushing activity of force.
- Explain gravitational force.
- List all effects of force
- Demonstrate some effects of force.
- Relate effects of force with their daily life experience
- Name measuring device of force
- Identify different measuring scales on measuring device of force
- Explain parts of measuring device of force
- Define energy as a property of matter that can be converted
- List all forms of energy
- Explain which energy converted to other forms of energy.
- List sources of energy.
- Distinguish between renewable and non-renewable forms of energy.

- Describe how energy is used wisely.
- List the strategies of conservation of energy
- Explain resource depletion and environmental degradation.

Competencies	Contents	Learning Strategies	Assessment
• Describe the term motion • Identify types of motion (motion on straight line, circular motion, rotary motion and curvilinear motion) • Show those types of motion in the class.	**7.1 Definition and types of motion**	• Equipping students in categorizing types of energy existing in their surroundings. • Make a group and discuss on identifying different forms of energy and its source. • Make every student to practice how to use and conserve energy in their daily life experience.	• Assist the group and provide constructive feedback to improve their learning. • Asking student how they are using and conserve energy
• Explain the term force. • Demonstrate the pulling/pushing activity of force. • Explain gravitational force.	**7.2 Definition of force and gravitational force**	• Ask each student to explain force • Take two students in front of the class and allow to show the pulling/pushing activities to define a force • Ask the student why every thrown object failed to the ground? And make to explain gravity.	• Follow what they do in the activity and give constructive feedback

• List all effects of force • Demonstrate some effects of force. • Relate effects of force with their daily life experience	**7.3 Effects of force**	• Ask student to write all effects of force • Enable students to demonstrate all effects of force in the class in front of the student • Retrieve from the students all effects of force face them in their daily life experience.	• Ask student to reflect what they know about effects of force
• Name measuring device of force • Identify different measuring scales on measuring device of force • Explain parts of measuring device of force	**7.4 Measuring forces**	• Make a group and allow to name measuring device of force • Take a sample of force measuring device allow student to show the scale of division. • Enable students to show all parts of the measuring device of force	• Assist the group and follow showing exact scale of measuring device
• Define energy as a property of matter that can be converted	**7.5 Definition of Energy** (Property of matter can be converted)	• From different sources make a student to bring definition of energy.	• Observe what they bring from different sources
• List all forms of energy • Explain which energy converted to other forms of energy.	**7.6 Forms and Conversion of Energy**	• Make a group allow to list all forms of energy and identify forms and to which this energy is converted.	• Assist the group and give constructive feedback
• List sources of energy. • Distinguish between renewable and non-renewable forms of energy.	**7.7 Energy Sources** (sun, fuel, hydroelectric, wind, nuclear)	• Make a group and allow to list all forms of energy and differentiate renewable and non-renewable forms of energy	• Strict follow the group and give constructive

			feedback
• Describe how energy is used wisely. • List the strategies of conservation of energy	**7.8 Wise use & Conservation**	• Give reading assignment and make to present wise used energy and strategies of conservation of energy	• See strictly their assignment
• Explain resource depletion and environmental degradation.	**7.9 Resource depletion & environmental degradation**	• Make a group and discuss on resource depletion and environmental degradation.	• Assist the group and give constructive learning

Grade: 8

Unit One: Basics of Scientific Investigation(18 periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Identify the basic and derived units of measurements
- Explain the concept of measuring how physical quantities
- Describe the components of a scientific investigation
- Demonstrate ability to work effectively and respectfully with others in performing fair testing

Competencies	Contents	Learning Strategies	Assessment
• Identify the basic and derived units of measurements	**1.1. Scientific Measurements (8 periods)** • Base and Derived Unit of	• Students should appreciate that,	Observation – collaborative and

• Explain the concept of measuring how physical quantities	Measurement • Measurement of Physical Quantities	science is about taking measurements and making observations, and using them to come to conclusions. • Science is about looking for patterns in the way materials behave. • The learner may be provided opportunities in pairs/groups/ individually and encouraged to: - Discuss the importance of scientific measurements to the study of science - Compare base and derived units of measurement using specific physical quantities - Demonstrate how to measure mass, length, time, temperature and volume. - A circus of experiments may be used to introduce this by measuring the temperature, mass, and volumes of different colored liquids (water/food dye)	independent work Observe students during activities Performance assessment-presentation Report
• Describe the components of a scientific investigation • Demonstrate ability to work effectively and respectfully with others in performing fair testing. • Practice scientific investigation procedures using appropriate contents to their age levels	**1.2. Doing Scientific Investigation (16 periods)** • Scientific methods • Semi-guided investigations	• Students should be aware that, a scientific investigation generally involves some or all of the following steps: ask a question, form a hypothesis, gather and analyze evidence, decide whether the evidence supports the hypothesis, draw conclusions, and communicate results. • Students should know that scientific investigations must be guided by ethical rules.	Research Output Performance assessment: Tasks: Role play, reflection etc. Activity: Application of Scientific

		Opportunity to reinforce ethical values. • The learner may be provided opportunities in pairs/groups/ individually and encouraged to: • Organize students into groups and guide them to conduct investigations on activities such as (a) Does a coiled nail act like a magnet? (b) Is air necessary for burning? (c) How do plants store their food in their leaf? • Record the observations during the activity, experiments, surveys, field trips, etc. • Analyze recorded data, interpret results and draw inference/ make generalizations and share findings with peers and adults formulate, with guidance, specific questions that lead to investigations.	Method Performance assessment; Role play write a report in groups or independently

Unit Two: The composition of Matter (12 Periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Narrate the historical development of the atomic nature of substances
- Appreciate that atoms are the building blocks which make up all substances
- Demonstrate understanding of the idea that the identity of a substance is determined by its atomic structure
- Differentiate molecules of elements from molecules of compounds.
- Demonstrate scientific inquiry skills along this unit: communicating, asking questions, drawing conclusions, applying concepts

Competency	Content	Learning Strategies	Assessment
• Give a short history of the concept of the atom. • Compare and contrast the continuity and discreteness (discontinuity) theory of matter. • Compare earlier conceptions of the structure of matter with their conceptions.	**2.1 Early thinking about the composition of matter**	• This unit can begin with a What I Know-Want to Know-Learned (KW-L) or brainstorming activity centered on the topic of matter. Questions such as "What is matter?" "What do you think matter is made up of will allow for an assessment of students' prior understanding and knowledge of matter. • Students should give a short history of the concept of matter and appreciate that the particulate nature of matter was discussed by the ancient Greeks. They argued that if a substance was divided in half enough times, there would come a time when only a single particle remained. This was not supported by any practical work. • In group, students could research	• Oral questions • Performance assessment-Report

		the idea of a fundamental building block proposed by the ancient Greeks and the meaning of the word ‘atom”. • Demonstrate to students the thinking behind Democritus’s idea of the atom. As students watch, cut an aluminum foil in half. Then cut one of the halves in half. Continue cutting the pieces in half until they are too small to cut into smaller pieces. Relate the demonstration to Democritus’s idea of “uncuttable” pieces, or “atomos.” • He proposed that matter is made up of tiny particles that cannot be reduced to smaller pieces • A box of paper clips can also be used to illustrate the concept of an atom. The paper clips can be spread out and their number divided in half a number of times. Eventually we arrive at one paper clip which is the equivalent of an atom. What we have is still recognizable as a paper clip and still does the job of a paper clip. If we try to divide this further what we end up with is two pieces of wire which no longer resemble a paper clip and are no longer able to do the job of a paper clip. In terms of atoms, once we break up an atom it no longer has the properties of the substance. • Have students perform a debate involving the Aristotle continuum	/presentation • Observation – collaborative and independent work

		idea of matter and Democritus discrete idea of matter. One student would defend the Aristotle continuum idea, while the other would defend the Democritus idea. • From the discussion in this lesson Students should recognize that science-based ideas are continually being tested, modified and improved as new knowledge and explanations supersede existing knowledge and explanations.	• Performance assessment- Debate
• Describe the structure of an atom as a nucleus containing protons and neutrons, surrounded by electrons in shells (energy levels)	**2.2 Inside of an atom** • Parts of an atom	• Students should know the two parts of atom – Nucleolus and Electron Shell	• Oral questions

• State the relative charge and approximate relative mass of a proton, a neutron and an electron. • Draw hydrogen atoms, including the location of the protons and electrons, with respect to the nucleus.	• The Subatomic Particles – Relative mass, the charge and location of subatomic particles .	• Students should be aware of the relative mass, charge and location of sub-atomic particles within an atom. This could be given as a table. • Start a simple sketch of a hydrogen atom on the board by drawing a small circle labelled "nucleus." Add a smaller circle labelled "proton" inside the nucleus. Call on a student to come to the board and add the electron and its orbit to the sketch. (The student is likely to draw a circle around the nucleus and add a symbol such as a dot for the electron.) • Point out that this is how electrons are usually represented but it's misleading. Explain that if the nucleus were the size of the nucleus in the sketch, then the electron orbit would actually be about 800 meters away with nothing but empty space in between. • Stress the importance of using models to study atoms because they are so small. Then have students create model of hydrogen using local materials.	• Observe students during activities • Observation – collaborative and independent work • Observe students during activities • Oral questions • Quiz • Model
• Differentiate between mass number and atomic number.	• Atomic Number and Mass Number	• Students could use a Periodic Table to look up the atomic numbers and mass numbers (approximately equal to atomic mass) of common elements from both their names and their	• Observe students during activities • Written assessment

		atomicsymbols. This will provide a useful way of revising work done in Grade 7 Unit 3. Do not attempt to explain the structure of Periodic Table at this stage	
• Determine the number of protons, neutrons, and electrons in an atom	• Determination of the electrons, protons and neutrons	• Students should be aware that in an atom the number of : - Protons is equal to its atomic number. - Electrons is equal to the number of protons. - Neutrons is the difference between the mass number and the atomic number. • Students should deduce the numbers of particles in atoms of different elements from the atomic number and mass number. Students can use charts to arrange the atomic number, mass number, number of protons, neutrons, and electrons of the first 10 elements. • Students should recognize that an element is identified by the number of protons in the nucleus/atomic number.	• Written assessment • Oral Questions
	2.3 Molecules		
• Define molecules • Give examples of monatomic, diatomic and polyatomic molecules. • Use models or particles model diagram to represent moleculesof elements and compounds.	• Molecules of elements • Molecules of Compounds	• Students should be familiar with the term molecule as two or more atoms of the same element or different elements combined together. chemically from their work in grade 7 unit 3 • Students could be asked to give examples of molecule of elements. - Monoatomic - He, Ne, Ar	• Written assessments • Oral Questions • Models

		- Diatomic - H2 , O_2, F_2 , Cl_2 , Br_2, I_2 - Polyatomic - O_3, P_4, S_8	

Unit Three: Classification of Compounds (23 Periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Explain the classification of compounds into organic and inorganic
- Write the formulas and names the first ten alkanes, alkenes alkynes and list the uses some important common organic compounds
- classify oxides into different groups and give examples of each group
- Develop skills in identifying acidic, basic and neutral solutions
- Define, and apply the concept of neutralization
- Explain the safety precautions while working with acids and bases
- Demonstrate scientific inquiry skills along this unit: Observing, classifying, comparing and contrasting, communicating, asking questions, designing experiment, drawing conclusion, applying concepts and problem solving

Competencies Contents	Contents	Learning Strategies	Assessment
	3.1 Introduction		
• Define organic compounds as carbon containing compounds and give examples	• Organic compounds	• Students should be aware that chemical compounds can be broadly divided into two groups called organic compounds and inorganic compounds and define inorganic compounds and inorganic compounds • Students could research and present to the class the historic origins of the terms organic and inorganic and in particular the relationship between organic chemicals and living things. • Students should be made aware that all organic compounds contain carbon and hydrogen, along with other possible elements such as oxygen, but some compounds containing carbon (for example, $CaCO_3$, CO_2) are classed as inorganic. • Students should be aware of the modern definition of organic compounds as compounds containing carbon in	• Oral Questions • Performance assessment Presentation • Written and oral Questions

• Define inorganic compounds as compounds of elements other than carbon.	• Inorganic compounds periods	their molecules excluding carbonates, hydrogen carbonates, carbon monoxide and carbon dioxide which are inorganic. • Students should be aware of the modern definition of inorganic compounds as compounds of elements other than carbon • Students could be given the formula of some common compounds and asked to identify which group they belong to. Some examples are: - $C_{12}H_{22}O_{11}$ - NaCl - CaO - C_2H_6O	• Quiz

• Define hydrocarbons and mention at least one source of hydrocarbons	**3. 2 Organic Compounds** • Hydrocarbons and its sources)	• Students should understand that the term hydrocarbon is used to describe organic chemicals that contain hydrogen and carbon only. • Students should research source of hydrocarbons thatis found in Ethiopia and report to the class. • Students should be made aware of the three groups of hydrocarbons: alkanes, alkenes and alkynes. They should recognize that all members of a group can be represented by a general formula. (Do not attempt to explain the structure formula at this stage)	
• Write the general formula of alkanes, alkenes and alkynes. • Write the specific chemical formulas of the first eight members of alkanes, alkenes and alkynes. • Describe a homologous series and its general characteristics. .	• Alkanes, Alkenes and Alkynes - Formula	• Alkanes—can be expressed by the general formula C_nH_{2n+2},where n is the number of carbon atoms. • Alkenes—have the general formula C_nH_{2n}. • Alkynes—have the general formula CnH_{2n-2}. • Students could use the general formula to generate the chemical formulas of the first eight alkanes in the series. For example: n=1, CH_4, n=2, C_2H_6 etc. • Students should use the general formula to write the actual formulas of alkanes, alkenes and alkynes for different values of n. • Students should be made aware of that organic compounds are classified into groups – called homologous series which can be represented by general formula. They should be asked to find the difference in the number of carbon and hydrogen atoms in the formulas of consecutive members of alkane series. This activity could be extended to alkanes and alkenes series. From these activities students should be able to infer that the difference inthe number carbon and a hydrogen atoms between the successive members of any homologous series is the same (i.e. – CH_2 -).	
• Name the first eight members of alkanes, alkenes and alkynes	• Nomenclature	• Students should understand that the name of a hydrocarbon is derived from the number of carbon atoms present (prefix) and the ending it contains (suffix). • Students should be given the prefixes used for	

		hydrocarbons containing up to 8 carbon atoms:1 meth, 2 eth, 3 prop, 4 but, 5 pent, 6 hex. 7 hept , oct, • Students should be given the suffixes for the three groups of hydrocarbons: alkanes – ane, alkenes –ene, alkynes – yne. • Students should use the suffix 'ane' to generate the names of the first eight alkanes e.g. meth + ane = methane, eth + ane= ethane, prop + ane propane etc. • Students could be asked to construct the name of a compound from information given e.g. an alkene containing 4 carbon atoms is butene. They could also be asked to deduce the molecular formula of a hydrocarbon from its name e.g. butane is an alkane containing 4 carbon atoms.	
• Identify some common uses of organic compounds	• Uses of common organic compounds	• Students should be able to identify important uses of common organic compounds. These could include: - Methane – fuel gas - Propane and butane – bottled gas (buta gas) - Ethyne – at high temperature for cutting and welding - Ethanol – in alcoholic drinks - Ethanoic acid – in vinegar - Formalin - preservation	
. • State that inorganic compounds are classified into oxides, acids, bases and salts	**3.3 Inorganic Compounds**	• Students should be aware that, just as with organic compounds, inorganic compounds can be classified into groups according to their composition and their properties. These include: − Oxides − Acids − Bases − Salts	• Oral or written questions
• Classify oxides into metallic and non-metallic. • Describe the properties of acidic oxides	• Oxides	• Student could use the concept of compounds to introduce oxides as compounds of an element with oxygen and discuss some common examples of oxides e.g. water (hydrogen oxide), carbon dioxide, rust (iron(III) oxide), lime (calcium oxides)	

and basic oxides.	- Types of oxides	• Students should be made aware that oxides can be classified as follows: - Metallic oxides - binary compounds containing only metals and oxygen. e.g. Na_2O, MgO • Non-metallic oxides - binary compounds containing nonmetals and oxygen. e.g. CO_2, , SO_3, H_2O • Basic oxides react with acids – most oxides of metals - Acidic oxides react with bases – most oxides of non-metals
• Predict the nature of common oxides.	– Properties of oxides	• Students should know thatsome metals form oxides which exhibit basic properties and dissolve in water to give alkaline solutions and most non-metals form oxides which exhibit acidic properties and dissolve in water to give acidic solutions. • Students could be asked to predict the nature of the oxides formed by some metals, such as sodium, potassium and calcium, and some non-metals such as carbon and phosphorus.
• Prepare sulphur dioxide in the laboratory by burning sulphur in air and use moist blue litmus paper to test its acidic nature.		• Students should prepare sulphur dioxide, an acidic oxide, by burning sulphur in air in a gas jar. The resulting gas should be shaken with a small amount of water and litmus solution or blue litmus paper should be added to demonstrate that the resulting solution is acidic.
• Prepare magnesium oxide in the laboratory by burning magnesium ribbon in air and use red litmus paper to test its basicity in water solution.		• Students should prepare magnesium oxide, a basic oxide, by burning magnesium in air in a gas jar. The resulting powder should be shaken with a small amount of water and litmus solution or red litmus paper should be added to demonstrate that the resulting solution is alkaline (basic).
• Relate acidic .properties to the presence of hydrogen ions and basic properties to the presence of hydroxide ions.	• Acids and Bases	• Students should appreciate that acids are a group of substances that all release hydrogen ions, H+, when in aqueous solution and they have sour taste.

		• By contrast, students should understand that bases are a group of substances that all react with acids by neutralizing them to form salts. They should also know that bases which are soluble in water are called alkalis. Alkalis release hydroxide ions, OH^-, when in aqueous solution and have better taste. • Students should give list of some acidic substances in their daily life. These could include lemon juice, vinegar, sour talla and milk etc.	
• Name and write formulas for some common acids (HCl, HNO_3, H_2SO_4) and bases (NaOH, KOH, NH_4OH), using the periodic table, a list of ions, and rules for naming acids.	• Naming and writing formula of acids and Bases	• Students should be able to write the formulas of some common acids (for example, HCl [hydrochloric acid] • H_2SO_4 [sulphuric acid], HNO_3 [nitric acid]), bases (for example, NaOH, $Ca(OH)_2$). They should also be introduced to the rules for writing and naming common acids.	
• Describe how indicators can be used to classify solutions as acidic or basic.	• Acid- base indicators	• Before they explore the properties of acids and bases students should be made familiar with acid-base indicators. These could include: - litmus - phenolphthalein - methyl orange	
• Investigate properties of bases/alkalis experimentally	• Investigating properties of acids and bases	• Students should investigate the properties of acids by experiment. This could include: - Effect on acid-base indicators - Reaction with metals (e.g. iron, zinc, aluminium, magnesium), - Reaction with carbonates and hydrogen carbonates - Neutralizing effects on bases - As a result of these experiments students should deduce the general properties of acids.	• Lab Report • Presentation • Questions
		• Students should investigate the properties of bases by experiment. This could include: - Effect on acid-base indicators - Neutralizing effects on acids • As a result of these experiments students should deduce	• Lab Report • Presentation • Quiz

		the general properties of alkalis.	
• In group, with guidance, prepare their own indicator by extracting the colour from a vegetable, such as beetroot, or flowers and evaluate the indicator. • Investigate household chemicals using locally prepared indicators.	• Investigation using local indicators	• Students could make their own indicator by extracting the colour from a vegetable, such as beetroot, or flowers. They could discuss the characteristics of a good indicator and evaluate their own indicator. • In group, with guidance students could investigate house old chemicals such as vinegar, baking soda, lemon etc. using locally prepared indicators and report to the class.	• Performance assessment- • Observing while doing actives. • Report
• Describe the safety precautions while working with acids and bases. • Create a safety booklet dealing with the handling of acids and alkali.	• Precautions in working with acids and bases	• Students should be aware of the corrosive nature of both acids and alkalis and take suitable precautions when working with them. In groups, theyshould conduct using internet or/and others sources of information research and develop a safety booklet on the correct ways of handling acids and alkalis.	• Performance assessment- safety booklet
• Identify some everyday uses of neutralization.	**3.4 .Neutralization Reaction and Salts** • Neutralization	• Students could research and identify important uses of neutralization in daily life. These could include • **Neutralization at Home** – Toothpaste contains bases that neutralize the acid produced by bacteria in our mouth. – Baking powder is usually used to help the cakes rise. – Conditioner is used with shampoo to prevent small scales on hair which make you hair unmanageable. • **Neutralization in Health** - Antacids contains bases such as aluminium hydroxide, $Al(OH)_3$ and magnesium hydroxide, $Mg(OH)_2$ to neutralize the excess acid in the stomach. - Vinegar is used to cure wasp stings that are alkaline in nature. - Baking powder is used to cure bee stings and ant bites that are acidic in nature. • **Neutralization in Agriculture** - Acidic soil is treated with powdered lime, CaO,	• Presentation • Report • Interview

		limestone, $CaCO_3$ or ashes of burnt wood. - The acidic gas from the decomposition of compost neutralizes the alkalis in basic soil. • Students should be aware that different crops require different nutrients in different proportions and, as a consequence, each crop grows best in soil within a particular pH range. Students could find the best pH range for growing different crops e.g.: - Potatoes 5.5 – 6.5 - Oats 5.5 – 7.0 - Beans 6.0 – 7.5 • Students should understand that when organic materials, such as dead leaves, animal wastes etc. decay, organic acids are produced and these lower the pH of the soil so, over the years, soil naturally becomes more acidic. • Students could measure the pH of different soil samples taken from different locations. • Students should appreciate that in order to prepare the soil to produce good yields of crops, it is often necessary to raise the pH by spreading lime in the form of limestone, quick lime or slaked lime. • Students should appreciate that different amounts are needed to reduce the pH of different types of soil. • Students could create a print or digital display to exhibit the use of neutralization reactions in daily live. • Students could brainstorm to come out with the meaning of salt.	
Define and give examples of salts	• Salts	• Students could brainstorm to come out with the meaning of salt. • Students should appreciate that in science the term 'salt' applies to a group of compounds. In order to avoid confusion common salt should be referred to as table salt and not just salt. • Students should give some common salts. These could	• Chapter Test • Written Assessment

		include: - Sodium chloride (table salt) - Sodium bicarbonate - Calcium carbonate - Diammonium phosphate - Potassium nitrate	
• Name and write formulas for some common salts using the periodic table, a list of ions, and rules for naming salts	• Naming and Writing Formula of Salts • Uses	• Students could name and write formulas for some common salts using thegiven the periodic table, a list of ions, and rules for naming salts • Students should research the important uses of particular salts. These could include: • Sodium chloride • Sodium bicarbonate • Potassium nitrate • Students could prepare a five -minute presentation on the uses of important salts	• Observing during activity

Unit Four: Human Body Systems and Health (32 periods)

Learning Outcomes: At the end of this unit, learners will able to:

- List down the major organs that constitute the human body systems covered in this unit
- Explain the main functions of the major human body systems covered in this unit
- List down the main diseases or disorders associated with the major human body systems covered in this unit
- Discuss the effects of diseases of the major human body systems covered in this unit

Competencies	Contents	Learning Strategies	Assessment
• Distinguish the major structural components of human integumentary system • Describe the main functions of	**4.1. Integumentary system** (4 periods) 4.1.1. Components of integumentary system 4.1.2. Functions of	• Display a chart of human integumentary system in a class room, tell students that this is a system that covers and protects	• Observe students while they are discussing about identifying organs that form the system from the provided chart and make sure that all

human integumentary system • Identify and discuss the main diseases or disorders and effects of human integumentary system	4.1.3. integumentary system Major skin diseases (Acne, Cold sore, Blister, Hives, Actinic keratosis, Rosacea, Carbuncle, Latex allergy, Eczema, Wart, Chickenpox)	the entire human body. Then, engage students in groups of five to identify and name as many organs as possible that form the system, and allow them to make presentations of their discussions; provide comments on the gaps of their responses • Then, engage students to identify the outer layer (epidermis) and inner layer (endodermis) of a skin, the outer (shaft) and inner (root) part of hair, sweat gland and its duct (a tube connecting the gland to the pore on the skin surface), sebaceous gland and its duct; then, based on the students' responses, give summary of the basic structural parts and functions of each organ constituting the system • Now, ask students to tell the functions of each organ forming the integumentary system; then, give your own conclusion based on the students' responses. • Organize students into groups and ask them to discuss and list as many skin diseases as possible they know from their personal experience (a list of any skin disease is acceptable just to brainstorm students on the topic); allow them to make presentations of their discussions in the class. In case of large class size, the teacher can manage the presentations by letting all students prepare a presentation, but only some randomly selected	students are engaged in the group discussion and activities • Record the results of the students' presentations on identifying the organs of the system provided in the chart. • Provide constructive comments on the gaps observed in the students' presentations. • Ask students to differentiate the different structural parts of each organ forming the system • Question and answer on the functions of each of the organs forming the system and the function of the system as a whole. • Give students an assignment in groups of five to summarize the main diseases or disorders of skin, and submit. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		individuals present on each topic. Finally, give your own conclusion based on the students' responses.	
• Distinguish the major structural components of human muscular system • Describe the main functions of human muscular system • Identify and discuss the main diseases or disorders and effects of human muscular system	**4.2. Muscular system (**4 periods) 4.2.1. Components of muscular system 4.2.2. Functions of muscular system 4.2.3. Major muscle disorders (Muscle dystrophy)	• Display a chart of human muscular system in a class room, tell students that this is a system that allows movement of part of a body, the whole body or fluids such as blood via a blood vessel. • Then, engage students in groups of five to identify and name as many muscles as possible that form the system, and allow them to make presentations of their discussions; provide comments on the gaps of their responses • Help the students to recall their lesson in Grade 7 about the structure and function of cells, and engage them to identify special property of muscle cell that allows movement; then, based on the students' responses, give your conclusion based on the students' responses. • Briefly explain to the students about the three types of muscle tissues in human body (skeletal muscle, smooth muscle and cardiac muscle), with their locations and functions; to this effect you could ask students to feel their own arm and leg muscles as they extend (relax) and flex (contract) them. • Organize students into groups and ask them to discuss and mention any muscle disease they	• Observe students while they are discussing about identifying various muscles types that form the system from the provided chart and make sure that all students are engaged in the group discussion and activities • Record the results of the students' presentations on identifying the muscles. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the types of muscle tissues and their functions. • Give students an assignment in groups of five to compare and summarize the three types of muscle tissues, and submit. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		know from their personal experience (such as muscle strains, muscle dystrophy, etc.); allow them to make presentations of their discussions in the class. Finally, give your own conclusion based on the students' responses.	
• Distinguish the major structural components of human skeletal system • Describe the main functions of human skeletal system • Identify and discuss the main diseases or disorders and effects of human skeletal system	**4.3. Skeletal System**(5 periods) 4.3.1. Structural components of Skeletal system 4.3.2. Functions of Skeletal system 4.3.3. Major diseases of Skeletal system (e.g. Osteoporosis, Osteoarthritis and Fracture)	• Display a chart of human skeletal system or its model in a class room, tell students that this is a system that supports our flesh or soft tissue giving us an erect posture as well as protection of major organs. • Then, engage students in groups of five to observe and record labelled bones of the various major body parts such as head, thorax, vertebral column/backbone, upper extremity/hand, and lower extremity/leg, and ask them to count and report bones in these major body parts • Allow the students to make presentations of their discussions on the number of bones in the various body parts; provide comments on the gaps of their responses • Ask students during which stage of development (childhood or adult stage) that we tend to have less total number of bones, and reason out why. • Demonstrate clearly to the students from chart or diagram humerus (a bone of upper arm),	• Observe students while they are discussing and counting bones found in the mentioned major body parts from the provided chart and make sure that all students are engaged in the group discussion and activities • Record the results of the students' presentations on the number of bones in the major body parts. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the roles of major bones in the body (such as femur, tibia and fibula, and bones of vertebral column). • Give students an assignment in groups of five to summarize the main diseases or disorders of skeletal system, and submit. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		radius and ulna (bones of lower arm), femur (a bone of thigh), and tibia and fibula (bones of leg). • Ask students to discuss in groups and report on the roles of the bones of the lower extremities (femur, tibia and fibula) and bones of vertebral column; then, based on the students' responses, give your conclusion. • Ask students why joints are important at articulations of two or more bones; then, based on the students' responses, give your conclusion by relating this to the antagonistic muscles at the elbow or knee joint. • Organize students into groups and ask them to discuss and list as many skeletal system diseases as possible they know from their personal experience (e.g. Bone fracture); allow them to make presentations of their discussions in the class. Finally, give your own conclusion based on the students' responses.	
• Distinguish the major structural components of human digestive system • Describe the main functions of human digestive system • Identify and discuss the main diseases or disorders and effects of human digestive system	**4.4**. **Digestive system**(5 periods) 4.4.1. Structural components of Digestive system 4.4.2. Functions of Digestive system 4.4.3. Major diseases of Digestive system (e.g. Constipation, Hemorrhoids, Peptic Ulcer Disease (PUD), Gastritis, and Diarrhea	• Display a chart of human digestive system or its model in a class room, tell students that this is a system that plays a role in the digestion of a food that we eat. • Then, engage students in groups of five to observe and record various labelled parts of alimentary canal including mouth, pharynx (throat),	• Observe students while they are discussing and recording various labelled parts of alimentary canal, observe and identify each other's teeth; make sure that all students are engaged in the group discussion and activities • Record the results of the students' presentations on the alimentary canal and teeth. • Provide constructive comments on

	caused by amoebic or helminthic infections)	esophagus, stomach, small intestine, large intestine and anal opening. • Give students an impression of the movement of a food we eat through the alimentary canal from mouth to anal opening while they make an observation. • Ask students to look at each other's teeth and tell the types, numbers and roles of their teeth. • Allow the students to make presentations of their discussions on the various parts of alimentary canal as well as types, numbers and roles of teeth; provide comments on the gaps of their responses. • Brainstorm students on how food moves and what moves it through the alimentary canal; here you can demonstrate the process of the food movement through muscle contraction at each part of alimentary canal by using a stocking or tight to represent the alimentary canal, and any round object such as an intact egg to represent a bolus of food in the alimentary canal. • Once, the students have finished their observations and presentations on the major parts of alimentary canal and teeth, ask them to observe and record the major organs, such as liver and pancreas, which are found in close association with the alimentary canal. • Ask students if they think that	the gaps observed in the students' presentations. • Question and answer on the roles of teeth. • Question and answer on the examples of digestion end products, and where they go next • Question and answer on what a faeces is in human digestion. • Give students an assignment to draw a diagram of human alimentary canal, label with the major parts, and submit individually • Give students an assignment in groups of five to summarize the main diseases or disorders of digestive system, and submit. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		these organs have roles in food digestion. • Now, briefly introduce students to the concept that food is digested physically in the mouth by the help of teeth and then in the stomach by the help of stomach muscle. Then, go on explaining that food is also digested chemically by the action of chemical substances known as enzymes that are released into various sections of alimentary canal. Relate this role to liver and pancreas that release enzymes into small intestine for chemical digestion of food. • Ask students to discuss what the end products and wastes of a digested food are. Reflect on the students' answers by explaining to them that when food is completely digested it is converted into usable forms that then enter blood vessels. For instance, digestion end products of bread (carbohydrate) are glucose, meat (protein) are amino acids, and butter (fat) are fatty acids and glycerol. Undigested food material is excreted as faeces (waste matter) from alimentary canal via the anal opening. • Organize students into groups and ask them to discuss and list as many digestive system diseases as possible they know from their personal experience; allow them to make		

		presentations of their discussions in the class. Finally, give your own conclusion based on the students' responses.	
• Distinguish the major structural components of human respiratory system • Describe the main functions of human respiratory system • Identify and discuss the main diseases or disorders and effects of human respiratory system	**4.5.Respiratory system**(5 periods) **4.5.1.** Structural components of Respiratory system **4.5.2.** Functions of Respiratory system **4.5.3.** Major diseases of Respiratory system (Asthma, Sinusitis, Influenza, Chronic obstructive pulmonary disease, bronchitis)	• Display a chart of human respiratory system or its model in a class room, tell students that this is a system that plays a role in the breathing in (inhalation) of fresh air (with plenty of oxygen) and breathing out (exhalation) of waste air (with plenty of carbon dioxide). • Then, engage students in groups of five to observe and record various labelled parts of respiratory tract including nasal openings, nasal chamber, trachea, lungs (with bronchi and bronchioles), air sacs (alveoli). • Give students an impression of the flow of air we breathe in through the respiratory tract from nasal opening to alveoli while they make an observation; give sketch of the route of air flow in and out. • Allow students to make presentations of their discussions on the various parts of respiratory system; provide comments on the gaps of their responses. • Once, the students have finished their observations and presentations on listing the major parts of respiratory tract, ask them to discuss on the roles of	• Observe students while they are discussing and recording various labelled parts of respiratory tract; make sure that all students are engaged in the group discussion and activities • Record the results of the students' presentations on the respiratory tract and teeth. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the roles of major structural parts of the respiratory tract. • Question and answer on the route of air from nostrils (nasal openings) to air sac (alveoli). • Give students an assignment to draw a diagram of human respiratory tract, label with the major parts, and submit it individually. • Give students an assignment in groups of five to write a short summary on how smoking affects our respiratory system, and hence should discuss bronchitis somehow. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		(a) hairs in the nasal cavity, (b) cartilaginous rings in the structure of trachea, (c) alveoli • Organize students into groups and ask them to discuss and list as many respiratory system diseases as possible they know from their personal experience; allow them to make presentations of their discussions in the class. Finally, give your own conclusion based on the students' responses.	
• Distinguish the major structural components of human circulatory system • Describe the main functions of human circulatory system • Identify and discuss the main diseases or disorders and effects of human circulatory system	**4.6. Circulatory system**(5 periods) 4.6.1. Components of Circulatory system 4.6.2. Functions of Circulatory system 4.6.3. Major diseases of Circulatory system (High blood pressure, Heart attack, Heart failure, Strokes)	• Display a chart of human circulatory system or its model in a class room, tell students that this is a system that plays a role in the distribution of essential materials such as food and oxygen to various body parts. • Then, engage students in groups of five to observe and record various labelled parts of circulatory system including blood, blood vessels and heart. • Give students an impression of the circulatory circuit i.e. the route of blood flow between heart and various body parts connected by blood vessels. • Now, allow students to make presentations of their discussions on the various parts of circulatory system; provide comments on the gaps of their responses. • Provide a model of heart to students in groups of five and ask them to make observation on	• Observe students while they are discussing and recording various labelled parts of circulatory system; make sure that all students are engaged in the group discussion and activities • Record the results of the students' presentations on the circulatory system. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the roles of major structural parts of the circulatory system. • Give students an assignment to draw a diagram double circuit in human blood circulation, label the major parts, and submit it individually. • Give students an assignment in groups of five to summarize the main diseases associated with the human circulatory system, and submit it. • Provide descriptive feedback on all the students' activities and the

		the various heart chambers; ask students to quantify the number of chambers and hypothesize why heart is partitioned into chambers; supervise the students' discussions and reflect on their responses. • Provide a chart that depicts the three major categories of blood vessels (arteries, veins and capillaries), and ask them to discuss on their roles (hint the students to relate the positioning of the blood vessels relative to heart); supervise the students' discussions and reflect on their responses. • Provide a chart that depicts plasma (liquid component of blood) and the three major categories of blood cells (red blood cells, white blood cells and platelets), ask them to observe and record any differences among the blood cells in terms of color, shape, size, etc.; also ask them to discuss on what the roles of each of these blood cells might be; supervise the students' discussions and reflect on their responses. • Organize students into groups of five, and pose each group to discuss on the following questions and make presentations in the class: (1) what is the role of heart in blood circulation, (2) what is the role of blood vessels in blood circulation, (3) what are the roles	assignment work indicating how they shall improve their learning.

		of each of the three types of blood cells, (4) provide a diagram/chart of human blood circulation, and ask them to reason out why the blood flows in two circuits. • Organize students into groups and ask them to discuss and list as many circulatory system diseases as possible they know from their personal experience; allow them to make presentations of their discussions in the class. Finally, give your own conclusion based on the students' responses.	
• Distinguish the major structural components of human reproductive system • Distinguish between the primary and secondary sexual characteristics • Describe the main functions of human reproductive system • Identify and discuss the main diseases or disorders associated with human reproductive system	**4.7. Reproductive System** • Distinguish the major structural components of human reproductive system • Distinguish between the primary and secondary sexual characteristics • Describe the main functions of human reproductive system • Identify secondary sexual characteristics of males and females • Explain the concept of menstruation and menstrual cycle • Discuss the main diseases or disorders associated with human reproductive system	• Categorize the students into groups of five, and engage them in a discussion on the importance of reproduction in humans as well as in other organisms; then allow students to make presentations of their discussions. • Then, briefly explain to the students the distinctions between the primary and secondary sexual characteristics with examples • Now, display a chart of human reproductive system or its model (of both male and female) in a class room and engage them in groups to observe and record the various labelled parts of reproductive system testis, vas deferens and penis in males, and vagina, uterus and ovary in females;	• Observe students while they are discussing and recording importance of reproduction in human and other organisms, various labelled parts of reproductive system and their roles; make sure that all students are engaged in the group discussion and activities • Record the results of the students' presentations. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer (a) on the roles of major structural parts of the reproductive system, (b) characteristic changes during sexual maturity (puberty). • Give students an assignment to draw a diagram of human reproductive systems, for both males and females, labelled with major parts such as scrotum, vas deferens and penis (in

		students should create the list of these major organs in a table and try to discuss on the roles of each in the reproduction process • Then, allow students to make presentations of their discussions on the various parts of reproductive system; provide comments on the gaps of their responses. • Organize students into groups of five, and ask them to discuss and provide as many examples of physical (bodily) changes(i.e. secondary sexual characteristics) as possible that are observed during ones sexual maturity (puberty); students should compare and contrast these changes between males and females. • Organize students into groups and discuss on the concept of menstruation and menstrual cycle • Organize students into groups and ask them to discuss and list as many reproductive system diseases as possible they know from their personal experience; allow them to make presentations of their discussions in the class. Finally, give your own conclusion based on the students' responses (focus on sexually transmitted diseases such as Syphilis, Gonorrhea, Chancroid, and HIV/AIDS-	males), vagina, uterus and ovary (in females), and submit it individually. • Give students an assignment to the students to discuss with their parents on the necessary cares that should be taken during menstruation, and report to the teacher. • Give students an assignment in groups of five to summarize the sexually transmitted diseases associated with the human reproductive system, and submit it. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		partly).	

Unit Five: Ecosystem and Conservation of Natural Resources (35 periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Define ecosystem and components of ecosystem
- Identify and describe the types of biological interactions of organisms in an ecosystem
- Construct simple food chain and explain its components
- Differentiate between food chain and food web
- Distinguish between the different components of food chain
- Describe the role of nutrient recycling in nature
- Explain how energy flows from producers to consumers
- Explain why nutrients are said to recycle while energy flows (does not recycle)
- Summarize the characteristics of soil
- Describe the various types of soils
- Explain the various uses of soil in nature and to human being
- List down and describe the various soil conservation strategies
- Engage in the Environment Club of School and participate in awareness creation campaigns.
- Explain the various uses of soil in nature and to human being
- List down and describe the various water conservation strategies
- Describe the various components of atmospheric air
- Identify and discuss the various human activities that cause air pollution
- Discuss the impacts of air pollution with examples
- Explain the various uses of air in nature and to human being
- Explain the cause and impacts of global warming
- List down and describe the various actions that can be taken to reduce the emission of carbon dioxide to atmosphere
- Define forest and give examples of natural forests in Ethiopia
- Explain the various uses of forest in nature and to human being
- Identify and discuss the various human activities that cause deforestation
- Discuss the impacts of air pollution with examples
- Devise and coordinate various forest conservation actions

- Organize groups that would campaign to teach the community on environmental protection
- Organize plantation campaigns in their school compound and its environs
- List and describe the values of biodiversity
- List down and describe the various in-situ and ex-situ conservation strategies in biodiversity conservation
- Give examples of the various indigenous knowledge and practices that are used in the conservation of various natural resources such as soil, forest, etc.

Competencies	Contents	Learning Strategies	Assessment
• Define ecosystem and components of ecosystem • Identify and describe the types of biological interactions of organisms in an ecosystem • Construct simple food chain and explain its components • Differentiate between food chain and food web • Distinguish between the different components of food chain • Describe the role of nutrient recycling in nature • Explain how energy flows from producers to consumers • Explain why nutrients are said to recycle while energy flows (does not recycle)	**5.1. Ecosystem and Interactions** (12 periods) 5.1.1. Definition and Components of ecosystem (biological and physical) 5.1.2. Types of biological interactions 5.1.3. Trophic (feeding) relationships 5.1.4. Food chain and food web 5.1.5. Components of food chain (producers, consumers, decomposers) 5.1.6. Trophic pyramids 5.1.7. Nutrient cycles and energy flow	• Provide students with a labelled chart that depicts communities of organisms, their habitats, conditions in their environment in general, and tell them that the chart depicts an ecosystem; this should allow students to compare their local ecosystem with a contrasting one, either from Ethiopia or globally. • Then, engage students in groups to observe the chart, discuss and reflect how they understand an ecosystem; supervise the students' discussions and reflect on their responses. • While students are still in groups, ask them to categorise the components of ecosystem as biological (living) and physical (non-living); supervise the students' discussions and reflect on their responses. • Then, briefly summarize the various forms of biological interactions that exist among various groups of organisms in an ecosystem (such as	• Observe students while they are participating in group discussions and record their performances. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the components of an ecosystem, similarities and differences among the various forms of biological interactions. • Give students an assignment to draw a diagram of trophic pyramid, label it with the major components, and submit it individually. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		mutualism, commensalism, amensalism, competition, and parasitism). • Now, provide students with charts of food chain and food web, and briefly explain to them that both diagrams represent trophic (feeding) relationships of living things (organisms); then, ask students to discuss in groups to find out the differences between food chain and food web; supervise the students' discussions and reflect on their responses. • Then, ask students to identify the major components of food chain as producers (autotrophs), consumers (heterotrophs) and decomposers; reflect on the students' responses. • Briefly explain to the students the roles of each component in the food chain/food web. Remind your students to recall their knowledge on photosynthesis (Unit 4; Grade 7) to relate to the roles of producers (such as green plants). • Provide a chart of trophic pyramid (that consists of producers to tertiary consumers) to the students in groups of five, and ask them to discuss and reason out why the number of organisms in each group (level) decreases from bottom to top. • Invite students to make presentations on the trophic pyramid; reflect on their	

		responses after all the groups have finished their presentations. • Briefly explain to students the roles of trophic relationships in nutrient cycling and energy flow. • Then, ask students to explain how nutrients such as carbon, hydrogen, oxygen and nitrogen contained in food materials eventually return into the environment (hint relate to the role of decomposers such as bacteria and fungi). • Also ask students how trophic relationships help energy flow in an ecosystem and reason out why energy is said to flow but not cycles in nature (hint, recall that energy in trophic relationship originates from the sun, which will not get the energy back). • Briefly summarize for students how nutrient cycling and energy flow in an ecosystem help continuity of life in nature.	
• Summarize the characteristics of soil • Describe the various types of soils • Explain the various uses of soil in nature and to human being • List down and describe the various soil conservation strategies • Engage in the Environment Club of School and participate in awareness creation campaigns.	**5.2. Conservation of Natural Resources** (16 periods) **5.2.1. Soil** • Definition and characteristics; types of soils uses of soil; soil fertility and soil conservation strategies	• Provide students with samples of various types of soil (clay, sand and loam soils) in polyethylene bags, and ask them to observe the soil samples and record their differences in color, granule or particle size, etc.; also ask them to name the soil samples as they might know them locally. • Briefly explain to the students how a soil can be defined, and	• Observe students while they are participating in group discussions and record their performances. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the soil types and their differences in characteristics (such as color, granule or particle size), fertility,

		how it is formed. • Then, encourage students to summarize their answers on the group activities above, and make presentations turn by turn; provide comments on the gaps of their responses. • Create a setup to demonstrate to students which soil sample passes quickly water through it and which one tends to hold more water, and which soil sample tends to have an intermediate capacity of holding or retaining water. • Now, ask students to guess which of the three soil samples you provided to them tends to be more fertile i.e. contains nutrients important for plant growth, and reason out why. • Briefly summarize on the characteristics and uses of each of the three soil types, functions of soil overall. • Brainstorm interactively students on the factors that could lead to loss of soil fertility, and what conservation measures could be taken to counteract those factors • Encourage them to participate in environmental protection clubs; also organize students in groups of five and ask them to identify a suitable plot of land in their school compound (a garden) where they will be required to plant indigenous plants and provide continuous care.	uses to human and in nature. • Question and answer on the various soil conservation strategies. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

• Explain the various uses of water in nature and to human being • List down and describe the various water conservation strategies	**5.2.2. Water** • Uses of water; water conservation strategies (harvesting rainwater, protection of ground water resources, sustainable utilization of groundwater resources; education outreach; water conservation day-22nd March)	• Organize students into groups and ask them to discuss in detail on the various uses of water to human, plants, animals, etc. • Allow students to make presentations of their discussions on the various uses of water; provide comments on the gaps of their responses. • Inspire students by showing them from a world map that 75% of the Earth is water but the vast majority of which is salty and not palatable for human consumption. Continue explaining to them that only the freshwater in the streams and rivers are used for the daily human life functions. • Now, ask students to discuss in groups human activities that could cause pollution of water, and the impacts of the pollution. • Allow students to make presentations of their discussions on the various human activities that cause pollution of water; provide comments on the gaps of their responses. • Then, discuss with students interactively what conservation strategies could be used to counteract water pollution and ensure sustainable use of water. Inform students of the "Water conservation day", celebrated 22nd March every year and its main purpose.	• Observe students while they are participating in group discussions and record their performances. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the water conservation, water polluting factors and water conservation strategies. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning. • Give students an assignment in groups of five to search for the "Water conservation Day" from the Internet, browse information about its goals and the purpose of the observing the Day, and submit it individually.

• Describe the various components of atmospheric air • Identify and discuss the various human activities that cause air pollution • Discuss the impacts of air pollution with examples • Explain the various uses of air in nature and to human being • Explain the cause and impacts of global warming • List down and describe the various actions that can be taken to reduce the emission of carbon dioxide to atmosphere	**5.2.3. Air** • Air composition and its uses; air pollution and its impacts	• Briefly introduce to the students about the composition of atmospheric air. • Then, in groups of five, encourage students to discuss on uses of air to human, animals, and plants; provide comments on the gaps of their responses. • Now, ask students to discuss in groups human activities that could cause pollution of air, and the impacts of the pollution (such as global warming, acid rain and particulate pollutants). • Allow students to make presentations of their discussions on the various human activities that cause air pollution; provide comments on the gaps of their responses. • Briefly explain to students how the release of carbon dioxide (CO_2) from various sources (such as fuel burning from vehicles and factory smokes) can cause global warming and the potential consequences of global warming on the environment in general. Also explain how the release of hydrogen sulphide (H_2S) from coal mining would lead to acid rain its potential consequences. • Now ask students, to discuss in groups how tree plantation could help reduce the amount of carbon dioxide emitted into the air, and thus reduce global	• Observe students while they are participating in group discussions and record their performances. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the composition of atmospheric air, air polluting factors and strategies to reduce air pollution. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		warming (Hint: refresh your students on photosynthesis in Unit 4, and tell them to relate this question to the process of photosynthesis). • Then, discuss with students interactively what other measures could be used to counteract air pollution.	
• Define forest and give examples of natural forests in Ethiopia • Explain the various uses of forest in nature and to human being • Identify and discuss the various human activities that cause deforestation • Discuss the impacts of air pollution with examples • List down and describe the various actions that can be taken to conserve forests	**5.2.4. Forests** • Definition, uses and conservation of forests	• Start by asking students if they know of "forest" and what it is; comment on their responses and gaps. • Mention some of the major forests found in Ethiopia with their location. • Continue engaging students, in groups of five, to discuss on the roles of forests in nature (including reduction of global warming) and their uses to human being. • Allow students to make presentations of their discussions on the roles of forests in nature and their uses to human being; provide comments on the gaps of their responses. • Then, brainstorm students on the problem of deforestation and its impacts, and then discuss with students interactively on the human activities causing deforestation, and strategies (such as afforestation, reforestation, etc.) that could be used to counteract deforestation and ensure sustainable use of	• Observe students while they are participating in group discussions and record their performances. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the uses of forests to human being and in nature, human actions that cause deforestation, and strategies for forest conservation • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

		forests.	
• List and describe the values of biodiversity • List down and describe the various in-situ and ex-situ conservation strategies in biodiversity conservation	**5.2.5. Biodiversity** • Biodiversity values Biodiversity conservation strategies (in-situ and ex-situ)	• Start by refreshing students the diversity of living things in Unit 1; then, ask students to give some examples of organisms for each of the five Kingdoms. • Briefly explain to students the concept of biodiversity and ask them to discuss in groups of five what values biodiversity have to human being and in nature. • Briefly introduce to students the concept of conserving biodiversity at their home or in their natural habitat (in-situ) such as national parks, wildlife sanctuaries and biosphere reserve, and in captivity (ex-situ) such as zoos, aquarium and botanical gardens. • Organize students into groups of five, and ask them to discuss with each other if they know of any example of national parks and zoos; this provide an opportunity for students to collect and interpret data from surveys about attitudes to conservation • Allow the students to make presentations of their findings	• Observe students while they are participating in group discussions and record their performances. • Provide constructive comments on the gaps observed in the students' presentations. • Question and answer on the uses of forests to human being and in nature, human actions that cause deforestation, and strategies for forest conservation • Give students an assignment in groups to use an Internet to find information on the list of Ethiopian National parks and Zoos in Ethiopia, and submit it individually. • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.
• Give examples of the various indigenous knowledge and practices that are used in the conservation of various natural resources such as	**5.2.6. Indigenous knowledge and conservation of natural resources**	• Organize students into groups of five and give them a homework to ask their family or anyone they know of	• Question and answer on the values of indigenous knowledge and practices in the conservation of soil, water and

soil, forest, etc.		regarding any indigenous practices used in various regions of Ethiopia to conserve soil, water, vegetation, etc. • Ask students to summarize their reports and make presentations in the class turn by turn.	vegetation • Provide descriptive feedback on all the students' activities and the assignment work indicating how they shall improve their learning.

Unit six: The Solar System (24 Periods)

Learning Outcomes: At the end of this unit, learners will able to:

- Explain family of the solar system.
- Name all planets in the solar system.
- Show the position of each planet in the solar system
- Develop the model of solar system.
- Describe how satellites move around the earth.
- Explain the motion of large bodies in the solar system
- Differentiate the motion of satellites and planets in the solar system
- Compare the distance, size, position and behavior of each planate from the sun
- Explain the unique characteristics of the earth.
- Describe the suitability of earth for life.

Competencies	Contents	Learning Strategies	Assessment
• Explain family of the solar system. • Name all planets in the solar system. • Show the position of each planet in the solar system • Develop the model of solar system.	**6.1 Family of the Solar System**	• Allow each student to make a model of the solar system and identify - Compare earth with the solar system - Family of solar system - Suitability of earth for life	• Cheek exact expression of the model and its decryption

• Describe how satellites move around the earth. • Explain the motion of large bodies in the solar system • Differentiate the motion of satellites and planets in the solar system	**6.5 Formation of the Solar System** (Planets & Satellites, Other objects)	• Based on build model make a student to discuss on - How satellites move around the earth. - motion of large bodies - Differentiate the motion of satellites and planets	• Follow the group what they discussed on
• Compare the distance, size, position and behavior of each planate from the sun	**6.6 Earth in comparison with Solar system**	• Based on build model make each student to explain the distance, size, position and behavior of each planate from the sun	• Ensure exact expression of each term
• Explain the unique characteristics of the earth. • Describe the suitability of earth for life.	**6.7 Our planet's suitability for life** (uniqueness)	• Make a student to find different unique characteristics of the earth and suitability of earth for life from different sources.	• Follow the expression of unique characteristics and suitability of earth for life

Unit Seven: Physical Phenomena in the Surrounding (24 Periods)

Learning Outcomes: At the end of this unit, learners will able to:

- List some sources of light
- Describe reflection and refraction
- Explain dispersion of light
- Show colors formed on the other side of the prism.
- Determine the purpose of light
- Classify materials as transparent, translucent and opaque.
- Demonstrate how image is formed
- Define sound as a form of energy
- Explain how sound is formed
- Demonstrate the formation of sound
- Identify material medium for sound propagation.
- Prioritize sound propagation in solid, liquid and gases

- Explain the cause of sound pollution
- Identify hearing level for different sound
- List strategies of sound pollution
- Define echo and demonstrate its application
- Define the term heat
- Explain mechanism of heat transfer
- Classify materials as good conductors of heat and poor conductors of heat (insulators)
- Define magnetism
- Do simple experiment and construct magnetic lines of force
- Explain the use of magnet
- List all material used to construct simple circuit
- Construct simple circuit

Competencies	**Contents**	**Learning Strategies**	**Assessment**
• List some sources of light • Describe reflection and refraction • Explain dispersion of light • Show colors formed on the other side of the prism.	**7.1 Phenomena of Light** (source & properties)	• Make a group to discuss on sources, reflection, refraction and dispersion of light • Use the prism and identify all colors formed on the either side of the prism. different	• Observe discussions and assist well. • Follow correct color identification and sequence of the color
• Determine the purpose of light • Classify materials as transparent, translucent and opaque. • Demonstrate how image is formed	**7.2 Vision and Imaging** (transparent, opaque)	• Make student to explain purpose of light • Use light torch to show classify as transparent, translucent and opaque and image formation	• Observe correct classification transparent, translucent and opaque and formation of image.
• Define sound as a form of energy • Explain how sound is formed • Demonstrate the formation of sound • Identify material medium for sound	**7.3 Sound** (Sources, medium, Hearing, Echoes, sound pollution)	• Give an exercise to practice how echo is formed. • Make a group and discuss on	• Ask how echo is formed and individual understanding of

propagation. • Prioritize sound propagation in solid, liquid and gases • Explain the cause of sound pollution • Identify hearing level for different sound • List strategies of sound pollution • Define echo and demonstrate its application		- Sound energy and its formation - Which material transfer sound more - Sound pollution	members of the group.
• Define the term heat • Explain mechanism of heat transfer • Classify materials as good conductors of heat and poor conductors of heat (insulators)	**7.4 Heat** (Definition, mechanisms of transfer, insulation)	• Make students to boil a water and insert a metal stick in to the boiled water. Allow student to explain how heat is transferred to environment, metal stick and between molecules of the water after that define heat.	• Make sure the able to do by following the necessary stapes
• List all material used to construct simple circuit • Construct simple circuit	**7.5 Simple circuit**	• Make to construct simple circuit	• Observe construction of simple circuit
• Define magnetism • Do simple experiment and construct magnetic lines of force • Explain the use of magnet	**7.6. Magnetism** (Magnetic lines of force, Use)	• Allow student to show magnetic lines and its use	• From simple demonstration of magnetic lines of force make sure student can demonstrate magnetic lines of force