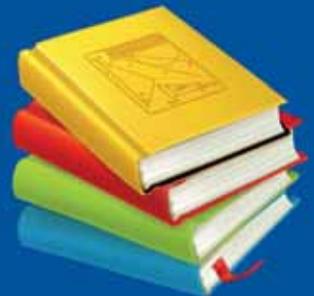
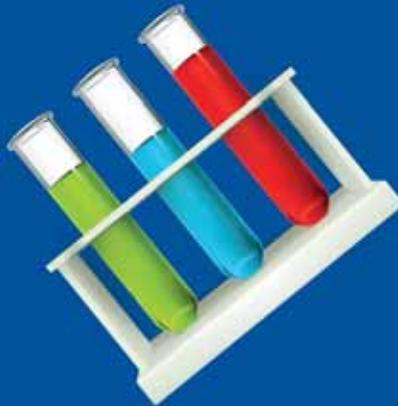




Western Cape
Government

Education



Adapted Curriculum and Assessment Policy Statement
for
Schools of Skills
and Schools with Skills Units

Natural Sciences and Technology

Year 2, 3 and 4

2013

PREFACE TO THE ACADEMIC CURRICULUM

This Curriculum and Assessment Policy Statement has been adapted to meet the needs of learners who experience barriers to learning and who have been placed in a School of Skills. It has been designed to enable learners who continue their schooling at a School of Skills to develop to their potential based on a curriculum that supports their cognitive ability.

The curriculum content and skills are set out as an Annual Teaching Plan (ATP). It is an exemplar for the sequencing and pacing of teaching, learning and assessment per term across the four years and is based on the curriculum as developed with teachers. It is aligned to the content and skills within the National Curriculum Statement (NCS), Curriculum and Assessment Policy Statements (CAPS) for the Foundation and Intermediate Phase.

Year One is an orientation year where learners do a baseline assessment at the start of the year to identify the content gap they experience in both Home Language and Mathematics. These results will inform the level of intervention for these two subjects. Learners in Year One will complete a post assessment at the end of the year to determine if any progress has been made during the year.

Teachers identify the appropriate curriculum level as indicated in the Home Language and Mathematics curriculum document when starting to teach. Learners may progress across the levels within a year or across years as they demonstrate their competence in Home Language and Mathematics.

Life Skills, Physical Education and Creative Arts follow a four year programme and all learners engage with these subjects from Year One. Natural Sciences and Technology will start from Year Two.

It is envisaged that all learners in a School of Skills will exit the school with an appropriate Certificate of Attainment endorsed by the WCED. It is hoped that this certificate will enable them to access further or higher education or to be part of the world of work.

ACKNOWLEDGEMENT

A special word of appreciation and thanks go to all in the Western Cape Education Department and to the teaching staff in the Schools of Skills whose efforts made this document possible.

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SECTION 1

INTRODUCTION TO THE ADAPTED CURRICULUM AND ASSESSMENT POLICY STATEMENT

1.1 Overview

General aims of the South African Curriculum

- (a) The *National Curriculum Statement Grades R - 12* gives expression to the knowledge, skills and values worth learning in South African schools. This curriculum aims to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes knowledge in local contexts, while being sensitive to global imperatives.
- (b) The National Curriculum Statement Grades R - 12 serves the purposes of: equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country;
 - providing access to higher education;
 - facilitating the transition of learners from education institutions to the workplace; and
 - providing employers with a sufficient profile of a learner's competences.
- (c) The National Curriculum Statement Grades R - 12 is based on the following principles:
 - Social transformation: ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of the population;
 - Active and critical learning: encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths;
 - High knowledge and high skills: the minimum standards of knowledge and skills to be achieved at each grade are specified and set high, achievable standards in all subjects;
 - Progression: content and context of each grade shows progression from simple to complex;
 - Human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. The National Curriculum Statement Grades R – 12 is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors;
 - Valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the Constitution; and
 - Credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.

- (d) The National Curriculum Statement Grades R - 12 aims to produce learners that are able to:
- identify and solve problems and make decisions using critical and creative thinking;
 - work effectively as individuals and with others as members of a team;
 - organise and manage themselves and their activities responsibly and effectively;
 - collect, analyse, organise and critically evaluate information;
 - communicate effectively using visual, symbolic and/or language skills in various modes;
 - use science and technology effectively and critically showing responsibility towards the environment and the health of others; and
 - demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

(e) Inclusion and the National Curriculum Statement

Education White Paper 6 - Special Needs Education: Building an Inclusive Education and Training System commits the state to the achievement of equality, non-discrimination and the maximum participation of all learners in the education system as a whole. Education White Paper 6 makes it an imperative that the education and training system must change to accommodate the full range of learning needs, with particular attention to strategies for instructional and curriculum transformation (Department of Education, 2001 p. 11). These principles also underlie the new Curriculum and Assessment Policy Statement (CAPS). One of the most significant barriers to learning is the school curriculum. Barriers to learning arise from the different aspects of the curriculum such as the content, the language, classroom organisation, teaching methodologies, pace of teaching and time available to complete the curriculum, teaching and learning support materials and assessment (Department of Education, 2001, p.19). In responding to the diversity of learner needs in the classroom, it is imperative to ensure differentiation in curriculum delivery to enable access to learning for all learners. All schools are required to offer variations in mode of delivery and assessment processes to accommodate all learners. Respecting diversity implies a belief that all learners have the potential to learn.

Inclusivity should become a central part of the organisation, planning and teaching at each school. This can only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity. The key to managing inclusivity is ensuring that barriers are identified and addressed by all the relevant support structures within the school community, including teachers, District-Based Support Teams, Institutional-Level Support Teams, parents and Special Schools as Resource Centres. To address barriers in the classroom, teachers should use various curriculum differentiation strategies such as those included in the Department of Basic Education's *Guidelines for Inclusive Teaching and Learning* (2010).

1.2 Background to curriculum adaptation and differentiation

The right of every child to access quality education is enshrined in South Africa's Constitution. In 2001, the Minister of Education launched Education White Paper 6, the Policy on Inclusion, which spells out how barriers to learning should be removed from, and how inclusive education should be gradually introduced into the entire education system.

Learners who experience barriers to learning need to be able to exit school with an appropriate certificate of attainment, which would enable them to access further or higher education or to be part of the world of work.

The profile of a learner placed in a Special School: School of Skills, which offers an adapted curriculum programme may be identified by the following characteristics:

The learner

- is 14 or 15 years old
- has received extensive, documented support in the mainstream school
- experiences moderate cognitive barriers to learning which cause very poor scholastic progress. The learner's lack of progress may be so severe that he/she will only be able cope on a Foundation Phase level
- is not severely or profoundly intellectually disabled
- does not experience serious behavioural learning barriers
- may experience a short attention span
- may have a very poor reading ability
- attends school regularly, but does not reap the benefits of the curriculum in spite of support efforts
- may have spent more time in both Foundation and Intermediate Phase, without showing significant improvement
- is usually functioning 2 years and more below his/her age cohort and is seriously at risk of leaving school early, without attaining skills to enter the world of work successfully
- will benefit by a vocational / practical approach to the curriculum
- will develop skills in order to be able to enter the job market.

These learners have the right to follow an adapted and differentiated curriculum to achieve their academic goals. The academic curriculum content must not be seen as a "watered down" version of the mainstream curriculum, but an accurate as possible reflection of the learner's functioning level. Therefore each learner should have access to the standard of assessment best suited to his/her needs. The curriculum should be offered in flexible groups to allow straddling to take place. Each learner should be respected as an individual with unique strengths and barriers to learning. These learners must further be afforded the opportunity to achieve in areas where they can be successful, such as learning a skill. In the majority of cases it has been found that learners, who do not achieve academically, often benefit and excel through learning a skill. Thus teachers have an important responsibility to

make sure that all learners from whatever background are appropriately catered for in the learning environment.

In this instance teachers are therefore required to monitor their own beliefs, attitudes and behaviours when responding to learners. They should consider the unique needs of learners when designing and placing learners in appropriate learning programmes. It is expected that teachers together with the parents must ensure that learners participate in academic and skills programmes that helps them achieve to the best of their abilities.

1.3 The introduction of the Skills Qualification

This is a new way of thinking to provide for learners who are not able to reach their full potential in mainstream schooling. The proposed Skills Qualification aims to offer learners with special needs an alternative learning pathway that:

- is standardised across the schools offering skills curricula
- is aligned with curriculum policies and relevant skills
- addresses the learner's need to experience success by building on the strengths of the learner rather than focusing on deficits
- determines the appropriate placement of the learner in a specific pathway of learning
- provide the learner with a qualification in a chosen field of work and
- provide the employer with appropriate information.

The purpose of this skills qualification is to provide an adapted curriculum which may lead to a further qualification at a later stage. Alternate methods of teaching and assessments based on alternate attainment of knowledge (content, concepts and skills), for learners who experience moderate cognitive learning barriers forms part of the skills qualification. It must allow learners to acquire knowledge and skills that are aligned to the world of work. Each skills course is based on defined concepts and skills to provide learners with a passport to life-long work and citizenship. The adapted skills curriculum is aligned to existing SAQA qualifications so that it can be recognised in the workplace, for Recognition of Prior Learning (RPL).

1.4 Time Allocation

Teaching and learning within a five day cycle is 27½ hours. It is envisaged that 50% of the notational time be allocated to skills training with sufficient learning and practice time to develop skilled routine work competence.

The table below proposes the possible instruction time and credits allocated per subject in an academic year for a learner to be considered for a skills qualification.

Subject	Time allocation per week Example: (periods in minutes per week)	Credits ¹
Fundamentals:²		
1. Home Language (Level 1, 2, or 3)	5x45min (Could be 4 periods in Y 2.3.4)	14 Credits
2. First Additional Language	2x45min (Could be 3 periods in Y 2.3.4)	12 Credits
3. Mathematics (Level 1, 2 or 3)	4x45min	14 Credits
Core:³		
1. Life Skills (EMS and SS)	4x45min	14 Credits
2. Natural Sciences and Technology (<i>Not in year 1</i>)	1x45min	2 Credits
3. Creative Arts	1x45min	2 Credits
4. Physical Education / Sport	1x45min	2 Credits
Electives:		
1. Skills:	18x45min	60 Credits

List of 19 electives	
Developed in 2011	Developed in 2012
Ancillary Health Care	Automotive Repair and Maintenance
Art and Crafts	Automotive Spray Painting
Hairdressing	Beauty and Nail Technology
Automotive Body Repair	Maintenance
Bricklaying and Plastering	Housekeeping
Basic Welding and Metal Work	Needlework and Clothing
Mixed Farming	Basic Sheet Metal Work
Hospitality Studies	Upholstery
Early Childhood Development	Woodworking
Office Administration	

1.5 A Learning Programme

The *National Strategy on Screening, Identification, Assessment and Support (SAIS)* will be used to determine whether a learner is eligible to follow an **adapted curriculum and assessment programme** in a special school. Learners will complete a four year learning programme

- YEAR 1: A bridging year to support learners in the academic programme based on pre-testing and post-testing. Learners will be exposed to a minimum of two different skills to determine their strengths as well as their interests. Natural Sciences and Technology will not be offered in year 1. Formal recorded assessment only for Languages and Mathematics in year 1.
- YEAR 2: Teaching and learning is based on needs identified in post testing, and learner's selected skill from orientation year.

¹ A credits is based on 10 hours of notional time calculated on 32 weeks per academic year

² The curriculum will focus on the full band within the GET curriculum CAPS

³ The curriculum will focus on the full band within the GET curriculum CAPS

- YEAR 3: Teaching and learning is based on learners' needs, and learners continue with selected skill.
- YEAR 4: Teaching and learning is based on learners' needs, and learners continue with selected skill.

A LEVEL 1 QUALIFICATION (120 credits ⁴ per year) (A four year learning programme)							
ACADEMIC CAPS (adapted Grade R-9) 50% of contact time						SKILLS SAQA ALIGNED 50% of contact time	
APPLIED KNOWLEDGE							
FUNDAMENTAL 40 Credits			CORE 20 Credits				ELECTIVE 60 Credits
Language: Home level 1	Language: First Add	MATHS level 1	Life Skills / LO With (SS & EMS)	Natural Sciences & Technology	Creative Arts	Physical Education / Sport	Year 1: 2+ skills Year 2: 1 skill Year 3: 1 skill Year 4: 1 skill
Or level 2		Or level 2					
Or level 3		Or level 3					
14 credits	12 credits	14 credits	14 credits	2 credits	2 credits	2 credits	60 credits

⁴ One (1) credit equals 10 hours of notional time

SECTION 2

INTRODUCTION TO NATURAL SCIENCES AND TECHNOLOGY

1.1 Introduction

Science as we know it today has roots in African, Arabic, Asian, European and American cultures. It has been shaped by the search to understand the natural world through observation, testing and proving of ideas, and has evolved to become part of the cultural heritage of all nations. In all cultures and in all times people have wanted to understand how the physical world works and have needed explanations that satisfy them.

1.2 The purpose of Natural Sciences and Technology in a School of Skills

The content and skills taught forms the bases for understanding how things work in the world around us. It also supports the learners to understand their responsibility towards themselves and others. It has a direct link with the knowledge and skills taught in the various workshops.

1.3 Teaching Natural Sciences and Technology

When teaching Natural Sciences and Technology teachers must use the relevant skills workshops as a context when addressing science or technology content or investigation / process skills.

1.4 Organisation of the Natural Sciences and Technology curriculum:

Natural Sciences and Technology is not offered as a subject in year 1. In years 2-4 some aspects of Technology are integrated into the subject Natural Sciences. Many of the technological aspects are part of the skills curriculum.

Natural Sciences knowledge strands	Technology content
Life and Living Matter and Material Energy and Changes Planet Earth and Beyond	Processing Systems and Control

1.5 Allocation of teaching time

Time for Natural Sciences and Technology has been allocated in the following way:

- 10 weeks per term, with a minimum of 45 minutes per week.
- Learners will start with Natural Sciences and Technology in year two. This will allow for more time for baseline testing and support in languages and mathematics in year 1.
- Years 2, 3 and 4 have been designed to have different topics indicated as lessons per term which may be dealt with over one or more periods. A topic may be dealt with for up to three weeks in a term depending on circumstances in the classroom and to accommodate the interests of the learners.
- Two weeks must be set aside per term for formal assessment. One for practical and the other for a pen and paper test.
- In all years, a significant amount of time should be spent on doing practical tasks and investigations which are an integral part of the teaching and learning process.

1.6 Specific Aims

There are **three** specific aims in Natural Sciences and Technology:

Specific Aim 1: 'Doing Science and Technology'

Learners should be able to complete investigations, analyse problems and use practical processes and skills in designing and evaluating solutions.

Specific Aim 2: 'Understanding and connecting ideas'

Learners should have a grasp of scientific, technological and environmental knowledge and be able to apply it in new contexts.

Specific Aim 3: 'Science, Technology and Society'

Learners should understand the practical uses of Natural Sciences and Technology in society and the environment and have values that make them caring and creative citizens.

1.7 Major Process and Design Skills to be taught

1. Accessing and recalling information – being able to use a variety of sources to acquire information, and to remember relevant facts and key ideas, and to build a conceptual framework
2. Observing – noting in detail objects, organisms and events
3. Comparing – noting similarities and differences between things
4. Measuring – using measuring instruments such as rulers, thermometers, clocks and syringes (for volume)
5. Sorting and classifying – applying criteria in order to sort items into a table, mind-map, key, list or other format
6. Identifying problems and issues – being able to articulate the needs and wants of people in society
7. Raising questions – being able to think of, and articulate relevant questions about problems, issues, and natural phenomena

8. Predicting – stating, before an investigation, what you think the results will be for that particular investigation
9. Hypothesizing – putting forward a suggestion or possible explanation to account for certain facts. A hypothesis is used as a basis for further investigation which will prove or disprove the hypothesis
10. Planning investigations – thinking through the method for an activity or investigation in advance. Identifying the need to make an investigation a fair test by keeping some things (variables) the same whilst other things will vary
11. Doing investigations – this involves carrying out methods using appropriate apparatus and equipment, and collecting data by observing and comparing, measuring and estimating, sequencing, or sorting and classifying. Sometimes an investigation has to be repeated to verify the results.
12. Recording information – recording data from an investigation in a systematic way, including drawings,
13. descriptions, tables and graphs
14. Interpreting information – explaining what the results of an activity or investigation mean (this includes reading skills)
15. Designing – showing (e.g. by drawing) how something is to be made taking into account the design brief, specifications and constraints Making/constructing – building or assembling an object using appropriate materials and tools and using skills such as measuring, cutting, folding, rolling, gluing
16. Evaluating and Improving products – using criteria to assess a constructed object and then stating or carrying out ways to refine that object
17. Communicating – using written, oral, visual, graphic and other forms of communication to make information available to other people

1.8 Detailed Summary of Natural Sciences and Technology Concepts and Content, and Time allocations

	Year 2		Year 3		Year 4	
TERM 1	TOPIC	TIME IN WEEKS	TOPIC	TIME IN WEEKS	TOPIC	TIME IN WEEKS
Life and Living	Living and non-living things		Digestive system		Sense Organs	
	Structure of plants		Nutrients in food		Human Skeletal System	
	Structure of animals		Nutrition		Human Reproductive System	
	What plants need to grow		Food processing		Human Reproductive System continued.	
Assessment	1 Practical 1 Test		1 Practical 1 Test		1 Practical 1 Test	

	Year 2		Year 3		Year 4	
TERM 2	TOPIC	TIME IN WEEKS	TOPIC	TIME IN WEEKS	TOPIC	TIME IN WEEKS
Matter and Materials	Phases of matter		Mixtures		The water cycle	
	Metals and non-metals		Solutions as special mixtures		Process to purify water	
	Uses of metals		Dissolving		Weather, Temperature and Wind	
	Processing material and The Colour wheel		Acids and bases		Weather, Temperature and Wind	
Assessment	1 Practical 1 Exam		1 Practical 1 Exam		1 Practical 1 Exam	

	Year 2		Year 3		Year 4	
TERM 3	TOPIC	TIME IN WEEKS	TOPIC	TIME IN WEEKS	TOPIC	TIME IN WEEKS
Energy and Change	Energy and Energy transfer		Stored energy in Fuels		Electric Circuits	
	Energy around us		Burning Fuels		Electric Circuits	
	Energy and Temperature		Energy and electricity		Mains Electricity	
	Energy and Temperature		Systems to solve problems		Saving Cost of Generating Electricity	
Assessment	1 Practical 1 Test		1 Practical 1 Test		1 Practical 1 Test	

	Year 2		Year 3		Year 4	
TERM 4	TOPIC	TIME IN WEEKS	TOPIC	TIME IN WEEKS	TOPIC	TIME IN WEEKS
Energy and Change	Energy and Sound and Noise pollution		Surface of the Earth		Recycling	
	Planet Earth		Movements of the Earth and Planets		Recycling	
Planet Earth and Beyond	Planet Earth		The Moon		Navigation and Directions	
	The Sun		Systems for looking into space			
Assessment	1 Practical 1 Exam		1 Practical 1 Exam		1 Practical 1 Exam	

**SECTION 3
PLANS FOR TEACHING**

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 2: TERM 1

Knowledge Strand: Life and Living

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Living and non-living things	<p>Living things</p> <ul style="list-style-type: none"> ▪ Identify and explain different kinds of living things ▪ Briefly explain all the seven life processes - feeding, growing, reproducing, breathing, excreting, sensing, moving, carried out by living plants and animals ▪ Explain why some things appear not to be living (such as dried beans, dried yeast, a fertilised bird egg), but carry on 'living' given the right conditions <p>Non-living things</p> <ul style="list-style-type: none"> ▪ Explain why some things were living and are now dead: e.g. dead wood, dry leaves. 	<p>Step 1 Teacher holds up two objects, one living and the other non-living (e.g. a stone and an animal or picture of an animal), and asks learners to compare living and non-living organism. Teacher makes a mind map of learners' ideas.</p> <p>Step 2 Learners describe (write short notes) on the life processes of humans, animals and plants. Teacher ensures that all processes are explained and understood.</p> <p>Step 3 Learners go outside onto school grounds to write down a list of living and non-living things. In their groups they check each other's lists (peer assessment) and discuss.</p> <p>Step 4 Learners are guided to:</p> <ul style="list-style-type: none"> • germinate been seeds (providing warmth, and moisture)** • growing yeast (in warm water with sugar) <p>Step 5</p> <ul style="list-style-type: none"> • Learners guided to look at pictures of hatched eggs and discuss conditions of hatching (warmth) • The teacher describes the life processes that all living organisms have? 	<ul style="list-style-type: none"> • Examples and pictures of living and non-living things, including plants, animals, bread mould • Seeds • Yeast • Pictures of hatched eggs

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
2	Structure of plants	<p>Structure of plants</p> <ul style="list-style-type: none"> ▪ Describe the basic structure of plants: roots, stems, leaves, flowers, fruits, seeds ▪ Identify visible differences between plants: such as size, shape and colour of roots, stems, leaves, flowers, fruits and seeds 	<p>Step 1 Bring a variety of plants to class.</p> <ul style="list-style-type: none"> • Learners should sort the plants into different groups based on similarities. • They write down the reasons for their groupings. <p>Step 2</p> <ul style="list-style-type: none"> • Learners then choose two different plants, draw and label each plant and then make a table of comparison, i.e. things that are similar and things that are different between the plants. • They write a paragraph to describe the similarities and then a paragraph for the differences. 	<ul style="list-style-type: none"> • Pictures of plants • Examples of plants
3	Structure of animals	<p>Structure of animals</p> <ul style="list-style-type: none"> ▪ Describe the basic structure of animals: head, tail, body, limbs, sense organs ▪ Identify visible differences between animals: such as size, shape, body covering and sense organs 	<p>Step 1 Bring a variety of animal pictures to class.</p> <ul style="list-style-type: none"> • Learners should sort the animal into different groups based on similarities. <p>Step 2 Learners should draw, label and describing the parts of at least one animal</p> <p>Step 3</p> <ul style="list-style-type: none"> • Learners should describing the visible differences between at least three animals 	<ul style="list-style-type: none"> • Pictures of animals
4	What plants need to grow	<p>Conditions for growth</p> <ul style="list-style-type: none"> ▪ Explain the requirements needed by plants to grow; light, warmth, water and air ▪ Explain how new plants can grow from cuttings and seeds 	<p>Step 1 Investigating the growth of plants from seeds and cuttings by observing, measuring*** and recording the growth over time</p>	<ul style="list-style-type: none"> • seeds and cuttings • rulers and measuring tape
Assessment Guidelines		Practical: 25 marks Test: 25 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 2: TERM 2

Knowledge Strand: Matter and Material & Processing

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Phases of matter	<p>Solids, liquids and gases</p> <ul style="list-style-type: none"> ▪ Briefly define concepts: <ul style="list-style-type: none"> ○ Solid ○ Liquid ○ Gas ▪ Describe the 3 phases in which matter could be found (solids, liquids, gases). ▪ Distinguish between solids, liquids, and gases and give examples of each. ▪ Describe the properties of solids, liquids and gases ▪ Describe the changes that occur when substances are heated or cooled and change from one state of matter to another (i.e., solid, liquid, and gas). ▪ Explore how heat changes ice to water (solid to liquid) ▪ Use applicable materials to investigate phase changes (e.g., baking, making jelly, gluing wood etc.). Write, make and draw. 	<p>Step 1 Introduce the terms solid, liquid and gas.</p> <p>Step 2 Use many examples of common materials and ask learners to sort them into 3 groups (solid, liquid and gas) such as wood, stone, plastic, fabric, water, juice, tea, air, cooking oil, cooking gas, and describing them</p> <p>Step 3 Investigating evaporating, condensing, freezing and melting using water and ice Take examples of solids; chocolate, ice cream, ice. Ask learners to predict: what do you think will happen if we heat these things?</p> <p>Step 4 Investigating melting and solidifying using different substances such as butter /fat / wax, ice cream, chocolate E.g.: Solids turn to liquid when heated (gain energy) <ul style="list-style-type: none"> • Warm up jelly from the fridge. It melts and becomes a liquid, cool it and it becomes solid again (it solidifies) • Heat 1 teaspoon of sugar until it melts (make toffee), it solidifies again when cooled. Liquids turn to gas when heated and back to liquid when cooled • Heat water or use any juice or cold drink (it boils and turns to water vapour (gas) • Boil liquid and hold a cold plate above the boiling liquid, droplets of liquid form on the plate (water vapour condenses). </p>	<ul style="list-style-type: none"> • Available source of heat e.g. spirit burner or candle, matches, heating stand, activity work sheets, posters, magazines, text books etc • Examples of materials and substances including wood, stone, plastic, fabric, water, juice, tea, air, cooking oil, cooking gas • Examples of different substances such as ice, butter, wax, ice cream, chocolate • Video clips from internet

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
			<p>Step 5 Learners can draw and write about their observations of the changes in phases in each experiment.</p> <p>Step 6 Learners can identify and describe other examples of phase changes at home (e.g. cooking and baking) and when working in the garage (e.g. welding).</p> <p>Step 7 Check the learners' knowledge. Can learners:</p> <ul style="list-style-type: none"> • Correctly explain how melting, solidifying (or freezing), evaporating (boiling), and condensing take place? • Find and describe good examples of the above processes in everyday life? <p>Emphasise safety when working with heat.</p>	
2	Metals and non-metals	<p>Properties of metals Briefly define concepts:</p> <ul style="list-style-type: none"> ○ Metals ○ Polymers (plastics and fibres) ○ Ceramics (glass) <ul style="list-style-type: none"> • Distinguish between metals and non-metals. • Name different materials in the immediate surroundings and describe their features (e.g. colour, texture, transparent or opaque, etc). • Describe simple properties of different classes of metals (e.g., <ul style="list-style-type: none"> ○ Appearance ○ Flexibility ○ shiny ○ hardness ○ strength ○ Heat conduction/Heat Insulation ▪ Describe and investigate the following properties of metals: <ul style="list-style-type: none"> ○ can be hammered, ○ shaped (malleable) and made into thin wires without breaking (ductile) ○ melt at high temperatures 	<p>Step 1 Bring different objects, e.g. book, pencil, bottle, cup, spoon, plate, bowl, etc. Classify the 10 objects into any two groups and explain their reasons for placing them in those groups</p> <p>Step 2 Discuss the materials made of (paper, wood, metal, glass, ceramic, plastic) referring to the properties of those materials: texture, strength, colour, flexibility, hardness and solubility.</p> <p>Step 3 Investigating, comparing and recording the properties of some metal objects (such as copper wire, coins, nails, cooking pots, knives and forks) and some non-metal objects (such as a piece of chalk, a stone, a pile of sand, a piece of coal)</p> <p>Make a table of comparison of properties: texture, strength, colour, flexibility, hardness and solubility.</p>	<ul style="list-style-type: none"> • Examples of metal objects such as copper wire, coins, nails, cooking pots, knives and forks <p>Examples of nonmetal objects such as a piece of chalk, a pile of sand, a piece of coal</p>

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
2			<p>Step 4 Check the learners' knowledge. Can learners:</p> <ul style="list-style-type: none"> • Tell the difference between metal, glass, plastic, paper, wood and ceramics, etc? • Describe the properties of the materials correctly? <p>Step 5</p> <ul style="list-style-type: none"> • Investigating ways to make old and dull metal objects shiny again 	•
3	Properties of non-metals	<p>Properties of non-metals</p> <ul style="list-style-type: none"> ▪ Describe simple properties of non-metals (e.g., <ul style="list-style-type: none"> ○ dullness ○ can break easily (brittle) <p>Other properties of metals</p> <ul style="list-style-type: none"> ▪ Research, demonstrate and describe special properties of metals (e.g., <ul style="list-style-type: none"> ○ heat conduction ○ magnetism ○ ability to rusts (some metals tarnish or become dull) <p>Uses of metals</p> <ul style="list-style-type: none"> ▪ Research and describe how metals are used to make things such as coins, wire, jewelry, furniture, build 		
4	Processing material and	<p>Combining Material</p> <p>Briefly define concepts:</p> <ul style="list-style-type: none"> ○ Combining ○ Mixing ○ Setting ○ Cooking/ heating ○ Cooling ○ Drying <ul style="list-style-type: none"> ▪ Explain that all materials can be processed to make new materials or products ▪ Explain that in Africa people have processed materials for hundreds of years to make, clay pots and bricks, baskets, hats, mats, thatched roofs made from plant fiber such as grasses and reeds. ▪ Explain that processed materials are useful because of their special properties: they can be strong, durable, waterproof, fire resistant, have interesting colours or textures ▪ List properties of raw materials used to make new products 		Materials and substances such as: plaster of Paris (or Polyfilla), sand, gravel, cement, flour, ingredients to make dough, jelly powder, wet clay and straw

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
		<ul style="list-style-type: none"> ▪ Demonstrate and explain processes used to change the properties of raw material by: <ul style="list-style-type: none"> ○ Mixing and setting (such as plaster of Paris (or Polyfilla) and water to make plaster) ○ Mixing and setting (such as sand, gravel, cement and water to make concrete) ○ Mixing (such as flour and water to make a sticky paste that can be used as glue) ○ Mixing and cooking (such as making dough) ○ Mixing and cooling (such as jelly powder and water to make jelly) ○ Mixing, drying and/or firing (such as wet clay and straw to make clay bricks) ▪ Describe and compare the properties of the raw material to the product before and after mixing 		
Assessment Guidelines	Practical: 20 marks Test / Exams: 30 marks			

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 2: TERM 3

Knowledge Strand: Energy and Change

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES						
1	Energy and Energy transfer	<p>Energy from the Sun</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Energy ○ Ecosystem ○ Energy source ○ Food as a source of energy ○ Energy transfer ○ Producers ○ Consumers ○ Decomposers ○ Food chain ○ Energy transfer in food chains ○ Food labels ▪ Explain how energy is used to carry out life processes. ▪ Explain where the energy from food comes from. ▪ Describe the transfer of energy from the sun. ▪ Describe how energy is transferred in a food chain from sun to plant to animals. ▪ Describe the organization of simple food chains (e.g., producers, herbivores, carnivores, omnivores, and decomposers). 	<p>(Draw or paste energy chain and write sentences to describe the steps in the transfer of energy).</p>							
2		<p>Energy Sources</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Energy sources ○ Renewable sources of energy e.g. Sun, wind and water ○ Non- renewable sources of energy e.g. Coal, Crude oil, Natural gas ○ Fuels ○ Renewable fuels ○ Fossil fuels ○ Solar energy ○ Water (Hydro) ○ Wind ▪ Discuss the: <ul style="list-style-type: none"> ○ renewable and the non-renewable energy sources: ○ Why is the sun, water, wind, food classified as renewable energy source? ○ Why coal, crude oil, natural gas is classified as non-renewable energy source? 	<p>Step 1 Name as many energy sources as possible. (coal, petrol, batteries, candles, paraffin, electricity (secondary source) etc)</p> <p>Step 2 Explain about renewable and non-renewable sources. Sort the energy sources into these two categories. Draw and write to describe what each energy source is used for.</p> <p>Step 3 Discuss advantages and disadvantages of energy sources and make a table of comparison:</p> <table border="1" data-bbox="869 1915 1228 2072"> <tr> <td data-bbox="869 1915 981 2049">Energy source</td> <td data-bbox="981 1915 1093 2049">Advantages when using this energy source</td> <td data-bbox="1093 1915 1228 2049">Disadvantages when using this energy source</td> </tr> <tr> <td data-bbox="869 2049 981 2072">e.g. coal</td> <td data-bbox="981 2049 1093 2072"></td> <td data-bbox="1093 2049 1228 2072"></td> </tr> </table>	Energy source	Advantages when using this energy source	Disadvantages when using this energy source	e.g. coal			
Energy source	Advantages when using this energy source	Disadvantages when using this energy source								
e.g. coal										

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
	Energy around us	<ul style="list-style-type: none"> ▪ Categorise sources of energy into renewable and non-renewable i.e. <ul style="list-style-type: none"> ○ How cost efficient it is. ○ Availability. ○ Degree of cleanliness. ▪ Name and describe different forms of energy sources (e.g. sun, fuel, battery, wind, etc.) <ul style="list-style-type: none"> ○ Explain how to make the best use of the energy from Sun, water, wind, crude oil, coal and natural gas in generating electricity 	<p>Step 4 Discuss dangers of the above mentioned energy sources. (Dangers of high voltage electricity, pollution from burning coal, fires accidentally started from candles or paraffin stoves.) Learners draw and write about one dangerous energy source in their home environment.</p> <p>Step 5 Sort energy sources into two groups and learners can explain own rule for categorizing. (e.g. sources we have to burn and sources we don't need to burn)</p>	
3	Energy and Temperature	<p>Measuring Temperature</p> <ul style="list-style-type: none"> ○ Explain the following concepts with examples: ○ Energy ○ Heat ○ Temperature ○ Thermostat ○ Celsius scale ○ Thermometers ○ Temperature sensor ○ Fever scan strip ○ Boiling point ○ Melting point ○ Conductor ○ Insulator ○ Expand ○ Measurement ○ Feeling Temperature ○ Measuring Temperature ○ Climates ○ Sensitive ○ Senses ▪ Describe temperature in relative terms, using expressions such as hotter than, colder than ▪ Describe how to read a thermometer in degrees Celsius ▪ Describe how to measure temperature in degrees Celsius (°C). ▪ Describe how heating and cooling materials can often change them: for example, melting and freezing, cooking, burning. ▪ Investigate safe practices for handling hot materials and for avoiding potential dangers from heat sources. 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
4	Energy and Temperature - continued	<p>Measuring Temperature - continued</p> <ul style="list-style-type: none"> ▪ Explain why the thermometer is usually put under your tongue when the doctor takes your temperature ▪ Investigate human body temperature and suggest why: <ul style="list-style-type: none"> ○ Not everyone had exactly the same temperature? ○ A change in body temperature often signals a change in health? ▪ Identify ways in which the temperature in homes and buildings can be adjusted: (e.g.: by turning a thermostat up or down, opening or closing windows, using a space heater in a cold room. ▪ Identify materials that insulate animals from the cold: (e.g.: wool, fur and feathers, and identify materials that are used by humans for the same purpose). ▪ Describe ways of preparing for different kinds of weather 		
Assessment Guidelines		Practical: 25 marks Test: 25 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 2 - TERM 4

Knowledge Strand: matter and material and Planet Earth and Beyond

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Energy and Sound - Noise pollution	<p>Noise pollution</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Energy sources ○ Sound ○ Vibrations ○ Medium ○ Pollution ○ Loud ○ Soft ○ Low ○ Hearing ▪ Describe how sound travels from where it is made to where it is heard. ▪ Investigate how sounds cause vibrations. ▪ Investigate and describe how we can made sound: <ul style="list-style-type: none"> ○ Loud ○ Soft ○ Low ○ High ▪ Compare the different types of pollution, (e.g.; water, land, light, noise) ▪ Describe the danger of: <ul style="list-style-type: none"> ○ Loud sound ○ Sound to hearing 		
2	Planet Earth	<p>Features of the Earth</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Earth ○ Habitats ○ Sun ○ Continent ○ Island ○ Planet ○ Moon ○ Star ▪ Describe the features of the Earth, e.g.: <ul style="list-style-type: none"> ○ Shape ○ Size ○ Ability to support life ▪ Surface covered with water Describe the unique features of habitats of the earth where living organisms exist ▪ Explain the difference between a continent and an island ▪ Identify and describe the location of the different continents and islands of the earth 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
3	Planet Earth - continued	<p>Earth and space</p> <ul style="list-style-type: none"> ▪ Describe the earth as a planet in space ▪ Describe how we can see from the Earth the: <ul style="list-style-type: none"> ▪ Sun ▪ Moon and ▪ Stars 		
4	The Sun	<p>Our closest star</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Earth ○ Habitats ○ Sun ○ Star ▪ Describe the unique features of the sun, e.g.: <ul style="list-style-type: none"> ▪ Size ▪ Composition ▪ Explain how the sun supports life on Earth. ▪ Describe and compare the size of the Sun to that of the Earth. 		
Assessment Guidelines		Practical: 20 marks Exams: 30 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 3 - TERM 1

Knowledge Strand: Life and living

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Digestive System	<p>The Digestive System</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Nutrition ○ Digestive system ○ Digestion ○ Indigestion ○ Organs of the digestive system ▪ Describe the structure of the digestive system. ▪ Name the parts and the organs of the digestive system (e.g. mouth, stomach, etc.). ▪ Describe the features and functions of the parts and organs of the digestive system (e.g. mouth chews food, etc.). ▪ Discuss the importance of different nutrients in the body. 		
2	Nutrients in food	<p>Food Groups</p> <ul style="list-style-type: none"> ▪ Briefly define concepts: <ul style="list-style-type: none"> ○ Food pyramid ○ Food groups ○ Supplements ○ Services: clinic, community vegetable gardens ▪ Categorise food into proteins, carbohydrates, fats and oils vitamins and minerals ▪ Describe the functions of the various food groups in the body and the main nutrients they supply ▪ Describe and illustrate how most natural foods contain a mixture of more than one nutrient group ▪ Categorise and describe how most processed (manufactured) foods have added salt, sugar, preservatives, flavourings and colourings by two variables (e.g. healthy and unhealthy). ▪ Interpret information on labels for a healthy diet. 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
3	Nutrition	<p>Balanced diets</p> <ul style="list-style-type: none"> ○ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Nutrition ○ Food groups ○ Supplements ○ Protein ○ Vitamins ○ Minerals ○ Fat ○ Carbohydrates ○ Water ○ Services: clinic, community vegetable gardens ▪ Discuss the importance of different nutrients in the body. ▪ Classify food and describe the main food groups (e.g. carbohydrates, proteins, fats, etc.) ▪ Categorise food into proteins, carbohydrates, fats and oils vitamins and minerals by two variables (e.g. healthy and unhealthy). ▪ Interprets information by finding patterns in data and make inferences (e.g. nutritional information on various food packaging, energy supply of various foods, etc.) ▪ Explain and discuss how malnutrition can lead to different diseases e.g. obesity, diabetes, tooth decay or deficiency etc. ▪ Suggest how technological products (e.g. healthy products like supplements) could be made accessible for people with HIV/AIDS (e.g. sponsors). 		
4	Food Processing	<p>Need for processing food</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Nutrition ○ Food groups ○ Processing ○ Preserve ○ Artificial ○ Cure ○ Preservatives ○ Supplements ▪ Explain the importance of preserving food e.g. (to last long, to add nutritional value, etc.) ▪ Explain using examples various types of food that can be processed and preserved (e.g.; meat, fish, fruit, etc.) ▪ Describe different methods used to processing food (e.g.: combining, cooking, freezing, pickling, fermenting, drying and salting) ▪ Explain the benefits of processing food (e.g.: long lasting, easy to transport, easy to prepare, as food supplements, improve its nutrient value, etc.) ▪ Investigate various indigenous methods used in processing and preserving food in different communities 		
Assessment Guidelines		Practical: 25 marks Test: 25 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY
YEAR 3: TERM 2

Knowledge Strand: Matter and Material

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Mixtures	<p>Mixtures of materials Briefly define concepts:</p> <ul style="list-style-type: none"> ○ Mixtures - any two or more substances mixed together e.g. paint, cake mixture etc. ○ Solution (mixture of a soluble substance in a liquid) ○ Solid ○ Soluble ○ Insoluble ○ Pure substance ○ Impure substance <ul style="list-style-type: none"> ▪ Distinguish between a pure substance and a mixture <ul style="list-style-type: none"> ▪ Describe the characteristics of mixtures, and provide an example of a common mixture. ▪ Describe and Do a 'show and tell' on making mixtures using everyday materials/ingredients. ▪ Create own categories to sort different combinations of substances into mixtures ▪ Describe the following methods for separating mixtures: <ul style="list-style-type: none"> ○ sieving ○ filtration ○ hand sorting ○ settling ○ decantation ▪ Categorise physical properties of household refuse (e.g. tin, plastic, organic etc.) ▪ Separate mixtures based on properties (e.g., by size or by substance; rocks and sand, iron filings and sand, salt and sand, etc.). ▪ Describe using examples how to use the following methods for separating mixtures into pure substances: <ul style="list-style-type: none"> ○ Filtration (e.g. purification of dirty salt water, water mixed with sand, etc.) ○ Evaporation and Crystallisation (e.g. how table salt is produced, etc.) ○ Distillation ○ Magnetism ▪ Design an investigation to determine which material filters best. <p>Compare the different indigenous knowledge systems / methods that were/ and or are still used to filter.</p>		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
2	Solutions as special mixtures	<p>Solutions Briefly define concepts:</p> <ul style="list-style-type: none"> ○ Mixtures - any two or more substances mixed together e.g. paint, cake mixture etc. ○ Solution (mixture of a soluble substance in a liquid) ○ Soluble ○ Insoluble ○ Saturated solution ○ Unsaturated solution ○ Decant (pour off) ○ Filter ○ Distil <ul style="list-style-type: none"> ▪ Name the ingredients of mixtures. ▪ Explain the differences between a mixture and a solution ▪ Sort different combinations of substances into mixtures and solutions. ▪ Name the parts of a solution using own fluent scientific language (e.g. solvent: the liquid part. Solute: the solid part). ▪ Describe the properties of a solution: <ul style="list-style-type: none"> ○ Solute cannot be seen ○ Light can pass through a solution (has a glassy appearance) ○ Solute and solvent cannot be separated by filtering or pouring ○ Can get the solute back by evaporating the solvent (liquid). ▪ Investigate saturated and unsaturated solutions. 		
3	Dissolving	<p>Rates of dissolving</p> <p>Briefly define concepts:</p> <ul style="list-style-type: none"> ○ Solute ○ Solvent ○ Solution ○ Soluble ○ Temperature <ul style="list-style-type: none"> ▪ List what is known about familiar situations when dissolving substances (e.g. dissolving sugar in cold and hot water). ▪ Investigate the factors that affect the rate (time taken) of dissolving: <ul style="list-style-type: none"> ○ temperature of the mixture ○ stirring or shaking the mixture ○ grain size of the solute <p>Investigate and describe how heat changes substances and materials at home (e.g. baking cakes expand in the hot oven and contract when cooled etc.).</p>	<p>Investigation</p> <p>Which substances are soluble and which are insoluble in water?</p> <p>What is the best temperature for the substances to dissolve properly?</p> <p>The following is a guideline to set up a scientific investigation. Scenario: Its Mother's Day. You want to surprise your mother with a nice cup of coffee in bed.</p> <p>Step 1 PLAN Name the substances you need to make a cup of coffee (e.g. coffee, powder milk, sugar) Learners describe what they know about coffee, milk powder and sugar.</p>	

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
			<p>Step 2 CONDUCT Test each substance individually in cold <u>and</u> hot water to see if it dissolves. Use the same procedure in both experiments e.g. the same number of stirs, same amount of sugar, etc. Explain the following:</p> <p>Soluble substances When a substance has dissolved it will seem to disappear in the liquid. There are no particles visible. The solution is glassy - you can see through the liquid. If you leave the liquid to stand for a while the particles will not separate out.</p> <p>Insoluble substances When a substance has not dissolved, the mixture will look grainy or milky. You cannot see through it and the particles will settle to the bottom of the container after some time.</p> <p>Step 3 Make a table to record the results from step 2 above. The column headings across the top of the table will be: <i>Hot water, Cold water</i>. The headings for rows down the side of the table will be: <i>Coffee, Milk Powder, Sugar</i>. The learners will fill in whether the substances dissolve or not in the relevant blocks on the table.</p> <p>Step 4 Draw and write to explain what happens to the coffee, milk powder and sugar when they are mixed with hot or cold water.</p> <p>Step 5 Learners answer questions:</p> <ul style="list-style-type: none"> • Do all three substances dissolve in water? • Which substances mix with the water but do not dissolve? • Which substances dissolve? • Does hot water make a difference (explain)? 	

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
			<p>Step 6 EVALUATE Tell classmates about observations during the investigation. Discuss in groups: make suggestions of similar dissolving and mixing processes in everyday life. (e.g. mixing cool drink powder and water, milk shake etc)</p> <p>Step 7 Check the learners' knowledge. Can learners:</p> <ul style="list-style-type: none"> • Recognise correctly when a substance has dissolved and when a substance has not dissolved? • Explain the difference between soluble and insoluble? • Carry out the steps of the investigation and record the results correctly? <p>Think of good examples of dissolving and mixing in everyday life?</p>	
4	Acids and bases	<p>Acids and bases</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Acids ○ Bases ○ Indicators ○ Universal indicator ○ Neutral ○ Neutralise ▪ Describe the common characteristics of acids and bases ▪ Compare the difference between an acid and a base ▪ Demonstrate and explain how to determine if a substance is acidic or basic using common household indicators (e.g. juice from a boiled red cabbage, grape juice and then litmus paper) ▪ Test various household substances with blue and red litmus paper (e.g. using tap water, soaps, shampoos, window cleaners, toilet bowl cleaners, and drain cleaners, soil from the schoolyard, washing powder, Handy Andy, various foods (e.g. vinegar, lemon, brussle sprouts, broccoli, tomato, milk of magnesia, etc.), cosmetics, antacid tablets, etc.). Then sort them into acids, bases and neutrals. 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
		<ul style="list-style-type: none"> ▪ Explain: <ul style="list-style-type: none"> ○ How antacids are used in health care work and some of the dangerous and beneficial side effects. ○ How lemon juice can kill bacteria and neutralise fish odours, etc. ○ Use labels and other manufacturer's information to explain the appropriate methods for safe handling and disposal of household chemicals (e.g. vinegar, pool chemicals, bleach, caustic soda, etc.) 		
Assessment Guidelines		Practical: 20 marks Test / Exam: 30 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY
YEAR 3: TERM 3

Knowledge Strand: Energy and Change

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Stored energy in Fuels	<p>Fuels</p> <ul style="list-style-type: none"> ○ Explain the following concepts with examples: ○ Energy sources ○ Renewable sources of energy e.g. Sun, wind and water ○ Non- renewable sources of energy e.g. Coal, Crude oil, Natural gas ○ Fuels ○ Gas ○ Safety rules ○ Candle wax ○ Fossil fuels ○ Input energy ○ Output energy ○ Petrol ○ Paraffin ○ Electricity <ul style="list-style-type: none"> ▪ Explain how energy is stored in food ▪ Describe everyday fuels that we use e.g.: ▪ Fossil fuels (wood, paraffin, petroleum gas, petrol, coal, candle wax) ▪ Discuss the renewable and the non-renewable energy sources: ▪ Why is the sun, water, wind, food classified as renewable energy source? ▪ Why coal, crude oil, natural gas is classified as non-renewable energy source? 		
2	Burning Fuels	<p>Burning Fuels</p> <ul style="list-style-type: none"> ▪ Investigate, compare and describe various fuels in terms of e.g.: ○ Input energy needed to make them burn ○ Output energy released such as heat and light ▪ Investigate compare and describe how to keep different fuels burning e.g.: candle <p>Safety with fire</p> <ul style="list-style-type: none"> ▪ Identify difficulties and safety measures when using energy sources: sun, water, coal wood, candle wax, paraffin, and petrol. ▪ Identify safety rules when using various fuels. 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
3	Energy and electricity	<p>Cells and battery Briefly define concepts:</p> <ul style="list-style-type: none"> ○ Battery (cells) ○ Contents ○ Stored energy (Chemical potential energy) ○ Chemical substances <ul style="list-style-type: none"> ▪ List as many different types of batteries (cells) used in homes e.g. in a cell phone, torch, car, watch, clock, TV remote etc. ▪ Name the types of batteries (make a table, draw each one, list its contents - e.g. chemical substances) and name the different items in which they can be used. ▪ Sort the batteries into different categories using own rules and explain categories (e.g. Rechargeable/ non-rechargeable) 		
4	Systems to solve problems	<p>Using Electric Circuits</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Electric circuit ○ Transferring energy ○ Sources of energy ○ Electrical components ▪ Explain that a circuit is a complete, unbroken pathway of electricity ▪ Demonstrate that a switch can be added to break or complete a circuit pathway ▪ Explain that electric circuits are used to solve problems that require energy, such as street lights, alarms, electric gates, traffic lights, fans and heaters, ▪ Identify different circuits used in the context of relevant skills offered at the school ▪ Make a simple electrical system that uses a circuit to produce movement, light, sound or heat using different electrical components. 		
Assessment Guidelines		Practical: 25 marks Test: 25 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY
YEAR 3: TERM 4

Knowledge Strand: Planet Earth and Beyond

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Surface of the Earth	<p>Soil</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Earth materials (rocks and soils) ○ Weathering ○ Soil particles (clay, silt and sand) ○ Particle size of clay, silt and sand ○ Decomposed organic material ○ Bacteria ○ Texture ○ Capacity ○ Retain water ○ Support growth ○ Food supply ○ Topsoil ○ Soil and its properties ○ Sandy soil ○ Loamy soil ○ Clayey soil ○ Silty soil <p>Soil types</p> <ul style="list-style-type: none"> ▪ Describe and illustrate how soil is formed by natural processes. ▪ Name the ingredients of soil (e.g. rock particles clay particles, silt particles, sand particles, humus). ▪ Describe the properties of soil (e.g. size of particles, colour, texture, smell). ▪ Categorise the different soil types by its appearance; texture; proportion of clay, silt and sand particles; etc. ▪ Explore how much water different soils will hold (soils collected from different places). ▪ Suggest ways (research and write about) how technological products can improve the quality of infertile soil for the growing of crops. 	<p>Step 1 Give learners small amounts of the four types of soil (sandy soil, loamy soil, and clayey soil, silt soil) to examine. They must:</p> <ul style="list-style-type: none"> • Feel the soil • Smell the soil • Look at the size of the particles using a magnifying glass • Describe the colour of the particles • Use water to shape the soil into a roll and bend the roll (Note: Only clayey soil will do this). <p>Step 2</p> <ul style="list-style-type: none"> • Learners compare and describe the properties of the different soil types according to the size of particles, colour, texture and smell. • Write observations onto a table of comparison where they compare sandy, loamy, silt and clayey soil with regard to the size of the particles, colour, texture and smell of each soil type. <p>Step 3 The learners use their observations to describe the particular features of each soil type as a shared writing exercise.</p> <p>Step 4</p> <ul style="list-style-type: none"> • Identify the uses of the different soil types • Investigating the water holding capacity of different types soils • Investigating properties of soil to enable certain crops to grow 	

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
2	Movements of the Earth and planets	<p>Solar System - Sun, Earth and Moon</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Solar System ○ Earth, Moon, Sun ○ Earth axis ○ Rotation (spinning) ○ Revolution (orbiting) ○ Satellite (Moon, man-made satellites) ○ Phases of the Moon ○ Reflection of Sunlight from the Moon ▪ Describe the Solar System (models or labelled pictures). ▪ Describe how the Earth moves in relation to the Sun (Earth orbits (revolves) around the Sun. Moon revolves around Earth). <p>Day and night - rotation</p> <ul style="list-style-type: none"> ▪ Describe the rotation (spinning) of the Earth on its own axis to explain day and night. (Make or use a model of the Earth and use a torch or lamp for the Sun). 		
3	The Moon and movement of the Moon	<p>The Moon</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Solar System ○ Earth, Moon, Sun ○ Revolution (orbiting) ○ Satellite (Moon, man-made satellites) ○ Phases of the Moon ○ Reflection of Sunlight from the Moon ○ Traditional ○ Cultural ○ Celebrations/ festivals ○ Full moon ○ New Moon ○ Gravity ▪ Describe the Characteristics of the Moon, e.g.: <ul style="list-style-type: none"> ○ It is 384 000 km from Earth ○ It is made of rock ○ It is dry (i.e. has no water) and has no air ○ It is smaller than Earth ○ Force of gravity is less on the Moon ○ It has drastic variations of temperature (130 °C to 180 °C) ○ The Moon has no atmosphere ○ It is 3,476 KM in diameter ○ It is $\frac{1}{80}$ mass of Earth. 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
		<ul style="list-style-type: none"> ▪ Describe the surface features on the moon: e.g.: Craters – large round pits on moon's surface formed from the collision of meteoroids ▪ Describe the Moon phases <p>The Moon and cultural activities</p> <ul style="list-style-type: none"> ▪ Describe ways the Moon phases are connected to traditional, cultural activities and beliefs in the society 		
4	Systems for looking into space	<p>Rocket systems</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Solar System ○ Earth, Moon, Sun ○ Rocket ○ Telescope ▪ Explain how people travel into space ▪ Investigate rockets that went to the Moon, e.g.: Apollo 11 ▪ Describe, design and make and evaluate model of a rocket using a balloon. <p>Telescopes</p> <ul style="list-style-type: none"> ▪ Describe how telescopes are used to look into space and gather information ▪ Describe the largest telescope build and used by South Africa 		
Assessment Guidelines		Practical: 20 marks Test: 30 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 4: TERM 1

Knowledge Strand: Life and Living

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Sense Organs	<p>Senses Briefly define concepts:</p> <ul style="list-style-type: none"> ○ Senses ○ Sight (vision) ○ Smell ○ Hearing ○ Sense of touch ○ Taste <ul style="list-style-type: none"> ▪ Name the senses of animals (e.g. smell, hearing, etc.). ▪ Describe how animal senses are adapted for survival (e.g. use smell to find food, use hearing for protection, etc.). ▪ Create own categories with given information own how animals use sense for survival (e.g. day/night vision, thick/thin coat etc.). ▪ Explain own rule for categorising. 	<p>Step 1 Teacher explains about the five senses and sense organs.</p> <p>Step 2 Teacher sets up different work stations for learners. They experience stimuli through their different senses:</p> <ul style="list-style-type: none"> • Sight (Kaleidoscope) • Hearing (Tapes, singing, clapping etc.) • Tasting (white substances sugar, salt, Panado, maize, flour) • Feeling (different objects in a bag) • Smell (different fruits) • Sensitivity (put one hand in hot water, and then places both in cold water). <p>Learners write descriptions, with the appropriate sense words, for each experience.</p> <p>Step 3</p> <ul style="list-style-type: none"> • Learners describe how they think an animal's senses help it to survive in its environment. • Teacher gives pictures of animals, e.g. a lion out in the veld. Learners discuss in their groups what kind of stimulus a lion receives from its environment. E.g. it can smell the buck, water etc. How does it respond to these stimuli? E.g. it hunts the buck and finds water etc. • Learners describe the stimuli and the responses of many different animals. 	<p>CDs & CD player, blind-folds, sugar, salt, Panado, maize, flour, different objects in a bag, hot water and cold water</p> <p>Pictures of animals, e.g. a lion out in the veld.</p> <p>Books Access to internet</p>

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
2	Human Skeletal System	<p>Skeletons of vertebrates Briefly define concepts:</p> <ul style="list-style-type: none"> ○ Muscles ○ Kind of muscles ○ The skull ○ The backbone ○ Ribs ○ Limbs ○ Shoulder ○ Hip girdles ○ Joints ○ Clavicle ○ Femur ○ Skull ○ Vertebrae ○ Patella ○ Pelvis ○ Sternum ○ Cartilage ○ Ligaments ○ Osteoporosis ○ Internal skeleton (endo-skeleton) ○ External skeleton (exo-skeleton) ○ Mammals <ul style="list-style-type: none"> ▪ Identify and explain the number of bones that make up the skeletal system of a human adult ▪ Explain two main parts of the human skeleton (e.g.: the axial skeleton and appendicular skeleton) ▪ Identify and label the bones of the human skeleton by using their scientific names ▪ Compare and contrast the different sizes and shapes of different bones of the human skeleton ▪ Describe the functions of the bones of the human skeleton ▪ Describe the features of different muscles responsible for movement of the human skeleton which distinguish one category from another. ▪ Describe the functions of the human skeleton in terms of (e.g. <ul style="list-style-type: none"> -provides support for the human's body and - protection for internal organs ▪ Explain how individual bones in the skeleton are held together ▪ Compare the different types of joints that form part of the human skeleton (e.g.: immovable joint, slightly movable joint freely movable joint, etc.) ▪ Interpret diagrams of two different skeletons and muscles by describing and comparing their differences (e.g.: the bones of the human skeleton to that of another vertebrate animal e.g.; dinosaur, cat, dog skeleton, etc.) 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
		<ul style="list-style-type: none"> ▪ Use recyclable materials to construct a human skeleton ▪ Discuss eating for healthy bones and prevention of osteoporosis. ▪ Discuss therapy and care for broken bones 		
3	Human Reproduction	<p>Reproduction</p> <ul style="list-style-type: none"> ▪ Introduce and explain the following concepts with examples: <ul style="list-style-type: none"> ○ Sex hormones ○ Glands ○ Egg development ○ Sperm development ○ Menstrual cycle ○ Ovulation ○ Reproduction ○ Sexual reproduction ○ Reproductive system ○ Reproductive organs ○ Gametes (e.g.: <ul style="list-style-type: none"> ○ Sex cells ○ Egg cells ○ Sperm cells ○ Penis ○ Vagina ○ Uterus ○ Fertilisation ○ Fusion ○ Conception ○ Pregnancy / Gestation ▪ Explain the physiological changes (e.g. the menstrual cycle, nocturnal emissions (wet dreams) in boys, etc.) ▪ Explain the following features in human organisms (e.g.: <ul style="list-style-type: none"> ○ The male and the female reproductive systems and their functions ○ The process of fertilisation 		
4	Human Reproduction – continued	<p>Reproduction</p> <ul style="list-style-type: none"> ▪ Introduce and explain the following concepts with examples: <ul style="list-style-type: none"> ○ Sex hormones ○ Gametes (e.g.: <ul style="list-style-type: none"> ○ Sex cells ○ Egg cells ○ Sperm cells ○ Penis ○ Vagina ○ Uterus ○ Fertilisation ○ Fusion ○ Conception ○ Pregnancy / Gestation ○ Embryo ○ Foetus ○ Umbilical cord ○ Placenta 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
		<ul style="list-style-type: none"> ▪ Describe the following complex facts with respect to pregnancy: <ul style="list-style-type: none"> ○ Development of the foetus during pregnancy (e.g. during nine (9) months and trimesters, etc.) ○ Exchange of gases between the mother and foetus ○ Excretion of waste products ○ The importance of the mother to be healthy (e.g.: <ul style="list-style-type: none"> - eat healthy food - exercise - abstain from alcohol and smoking - attend antenatal clinics. 		
Assessment Guidelines		Practical: 25 marks Test: 25 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 4: TERM 2

Knowledge Strand: Matter and Material, Energy and Change & Planet Earth and Beyond

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	The water cycle	<p>The water cycle</p> <ul style="list-style-type: none"> ▪ Briefly define concepts: <ul style="list-style-type: none"> ○ Water cycle ○ Condensation ○ Evaporation ○ Precipitation ○ Heating by sun (Solar radiation) ▪ Describe states of water on earth as solid, liquid and gas ▪ Describe how matter changes from one phase to another (e.g., melting, evaporation condensation, freezing/solidifying). ▪ Describe the features of a water cycle (e.g. how water changes its form from liquid to gas etc. as it evaporates, condenses, precipitates, runs off, infiltrates) and is moved in a cycle between hydrosphere, lithosphere and atmosphere. ▪ Describes how the Sun's energy drives the water cycle. ▪ Describe the stages of the water cycle e.g.: <ul style="list-style-type: none"> ○ evaporation ○ condensation ○ freezing ○ melting ▪ Draw the water cycle and describe it in own words. 	~ drawing and writing about the water cycle	
2	Process to purify water	<p>Clean water</p> <ul style="list-style-type: none"> ▪ Introduce and explain the following concepts with examples: <ul style="list-style-type: none"> ○ Natural processes ○ Pollution ○ Pollutants ○ Sieving ○ Filtering ○ Settling ○ Decanting ○ Purify ○ Germs ○ Bacteria ○ Ecosystem ○ Bio-degradable ○ Bio-undegradable ○ Wetland 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
		<ul style="list-style-type: none"> ▪ Explain the importance of drinking clean water ▪ Investigate various methods of cleaning water e.g. (processes such as sieving, filtering, settling, decanting, boiling and adding chemicals to kill germs, etc.) ▪ Describe new technologies used by the municipal to clean water we drink from our taps. ▪ Design, draw and make your own water filter ▪ Evaluate and test your water filter. ▪ Collect water samples from different sources (e.g. from tap, canal, river, dam etc.) to conduct an investigation and collect data to compare (e.g.; colour, smell, insoluble substances in suspension, living organisms). 		
3	Weather, Temperature and Wind	<p>Weather, Temperature and Wind</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Meteorologists ○ Force ○ Air ○ Wind ○ Air pressures ○ Moving air ○ High pressure ○ Low pressure ○ Direction ○ Storm ○ Cloudy ○ Weather ○ Precipitation ○ Condensation ○ Clouds ○ Rain ○ Snow ○ Warm front ○ Cold front ○ Warm moist air ○ Cold air ○ Showers ○ Wind vane ○ Thunderstorms ▪ Describe how to interpret weather data (temperatures, cloud cover, precipitation, wind speed, and direction). ▪ Explain the importance of wind direction (e.g.: in our everyday life, for use by pilots, etc.) 	<p>Step 1</p> <ul style="list-style-type: none"> • Learners name and describe aspects of the atmosphere and weather that they are familiar with (e.g. sunny, cold, hot, thunder and lightning). Make a mind map of the different aspects of the weather. • Learners identify the apparatus / instruments used to measure each aspect (e.g. a thermometer is used to measure temperature). This information is collated in a summary or mind map. <p>Step 2</p> <p>Learners suggest interesting aspects about the daily weather that can be investigated (such as the temperature, sunny / cloudy, rainy or dry, wind speed and direction).</p> <p>Guide the process using questions such as:</p> <ul style="list-style-type: none"> • What is the weather like today? • What is the weather like in the different seasons? • How does the weather change over a period of 14 days? 	References, TV and newspaper weather charts, recycled materials

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
4	Weather, Temperature Wind - continued	<p>Weather, Temperature and Wind - continued</p> <ul style="list-style-type: none"> ▪ Describe the different ways of measuring wind direction (e.g. using a weather vane or wind vane or simply holding a light object such as a flag or ribbon, kite etc.) ▪ Explain and interpret the meaning of the codes and the symbols used by meteorologists on synoptic charts (e.g.: cloud cover, air pressure, current weather, wind speed, wind direction, temperature). ▪ Study sources of weather information such as a newspaper or TV weather forecast to find out what the current weather is for where you live. 	<p>Step 3</p> <ul style="list-style-type: none"> • Learners collect the apparatus they need and set up a weather station (to measure the temperature, rainfall, wind speed and direction). Learners can build basic instruments using recycled materials (e.g. making a rain gauge using a plastic bottle). They need to use and read the different instruments such as a thermometer correctly. • Learners record their observations daily over a 14 day period. <p>Step 4</p> <p>Learners share / discuss daily weather observations. Learners use the data to draw graphs, (e.g. a graph of the temperature readings for each week). Use the weather chart supplied in newspapers and learners describe the weather for the day or week.</p> <p>Step 5</p> <p>Learners suggest possible connections to other situations e.g. the impact of weather conditions on how people live (clothes, food, etc); on the environment: plant (some plants produce spring flowers) and animal growth and development (some young are born in spring, a few animals hibernate or migrate in winter).</p>	
Assessment Guidelines		Practical: 20 marks Test / Exam: 30 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 4: TERM 3

Knowledge Strand: Energy and Change

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Electric Circuits	<p>Electrical circuits</p> <ul style="list-style-type: none"> ▪ Briefly define concepts: <ul style="list-style-type: none"> ○ Static electricity ○ Current electricity ○ electrical circuits ○ electrical components: <ul style="list-style-type: none"> ○ light bulbs (globes) ○ motors ○ heating wires (e.g. kettle element, filament in light bulb) ○ conducting wires ○ switches ○ battery (electrical cell) ▪ Describe the functions (i.e. what it can do) of each electrical component listed above, to distinguish one electrical component from another (use a drawing and brief note for each). ▪ Discuss the difference between the static electricity and electric current ▪ Explain the symbols of electrical circuit components. 		
2	Electric Circuits - continued	<p>Series and parallel connection of cells</p> <ul style="list-style-type: none"> ▪ Explain the series and parallel connection of cells ▪ Compare the strength of current of cells connected in series with cells connected in parallel circuit ▪ Investigation: Draw, label and build an electric circuit that includes components that will produce heat, light and sound energy and makes an object move ▪ Apply the concept of circuit and circuit diagrams to explain: How electrical circuits in our homes are wired from the power supplied from ESKOM to homes. 		
3.	Mains Electricity	<p>Electricity supply</p> <ul style="list-style-type: none"> ▪ Describe the following concepts with examples: <ul style="list-style-type: none"> ○ Electricity supply ○ Generator ○ Turbine ○ Systems ○ Burning gas ○ Burning coal ○ Falling water ○ Nuclear reactions Environmental ○ Global environment ○ Local environment ○ Pollutants ○ Non-pollutants 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
		<ul style="list-style-type: none"> ▪ Explain why large-scale electricity supply depends on generating system which use a few energy sources: <ul style="list-style-type: none"> ○ Burning coal ○ Burning natural gas ○ Falling water (hydro-electric energy) ▪ Use diagrams to illustrate how the coal-fired power stations generate electricity; nuclear power station generates electricity; hydro-electric power station and gas power station. ▪ Compare the amount of energy released by different energy sources used in generating electricity. <ul style="list-style-type: none"> ○ Burning coal ○ Burning natural gas ○ Falling water 		
4.	Saving Cost of Generating Electricity	<p>Saving Cost of Generating Electricity</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Saving ○ Costs ○ Environmental ○ Impact ○ Design ○ Building ○ Appliances ○ Consumers ○ Exploiting ○ Solar cells ○ Solar energy ○ Wind ○ Batteries ○ Cell ○ Electrical circuits ○ Parallel circuit ○ Series circuit ▪ Describe energy sources and usage in South Africa using pictures. ▪ Discuss the energy crisis e.g. power outages ▪ Recall better practices in using energy to save costs to consumers i.e. <ul style="list-style-type: none"> ○ Using energy-efficient ○ Using appliances efficiently ▪ Compare different electrical appliances ▪ Apply the concept of electricity generation to explain: <ul style="list-style-type: none"> ○ Simple cells, simple electrical circuit 		
Assessment Guidelines		Practical: 25 marks Test: 25 marks		

SCHOOL OF SKILLS NATURAL SCIENCES AND TECHNOLOGY

YEAR 4: TERM 4

Knowledge Strand: Planet Earth and Beyond

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
1	Recycling	<p>Recycling and its importance</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Recycling ○ Saving ○ Costs ○ Landfills ○ Processing ○ Raw materials ○ Waste ▪ Identify the types of materials can be recycled? ▪ Identify materials that: ▪ Shouldn't be recycled and suggest reasons why? ▪ materials that are recycled the most often ▪ Describe how to recycle by (e.g.: separating and classifying similar objects, uses of materials, etc.) ▪ Explain the importance of separating materials for recycling ▪ Describe the importance of recycling (e.g.: <ul style="list-style-type: none"> ▪ keeping waste out of our landfills, ▪ saving natural resources by re-using materials as an alternative to using new raw materials ▪ saving energy by re-using materials rather than processing new raw materials from scratch, by ▪ keeping potentially harmful waste products out of the environment 		
2	Recycling- continued	<p>Advantages and disadvantages of recycling</p> <ul style="list-style-type: none"> ▪ Describe the end products that objects might be recycled into ▪ Explain how long it takes for different types of materials to degrade (e.g.: aluminium cans, glass bottles, plastic bottles, etc.) ▪ Discuss the advantages and disadvantages of recycling ▪ Discuss the ethics of recycling (e.g.: do not steal to recycle waste) ▪ Identify the recycling facilities in your local area and investigate how they are used 		

LESSON	TOPIC	CONCEPT / CONTENT AND SKILL	TEACHER GUIDE	EQUIPMENT AND RESOURCES
3	Navigation and Directions	<p>Navigation and Directions</p> <ul style="list-style-type: none"> ▪ Explain the following concepts with examples: <ul style="list-style-type: none"> ○ Directions ○ North ○ South ○ East ○ West ○ Compass ○ Maps ○ Bearing ▪ Describe and demonstrate how to use a compass to determine direction (e.g. travel North, South, East, and West (and perhaps NE, NW, SE, and SW as well)) ▪ Compare a compass to modern navigation systems (e.g. GPS) ▪ Compare advantages and disadvantages of compasses and GPS 		
Assessment Guidelines		Practical: 20 marks Exam: 30 marks		

SECTION 4

ASSESSMENT

4.1 Introduction

This section on assessment *standardises* the recording and reporting processes for Year 1-4 learners within the framework of the adapted skills curriculum in Special Schools that offer a skills programme. It also provides a policy framework for the management of school based assessment and school assessment records.

It is still required of teachers to offer a differentiated form of assessment as learners following an adapted curriculum with a skills focus have specific barriers to learning. Since a learner or learners may be functioning on different grades or levels (straddling), the assessment / recording / reporting system must make provision to reflect the *functioning* level(s) of each learner. Each learner, regardless of his/her number of years in the School of Skills, must have access to the standard of assessment best suited to his/her needs. The learner's *abilities* determine what will be expected of him/her and the *pacing* of instruction must accommodate the individual learner.

4.2 Assessment Principles

4.2.1 Definition

Assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment. It involves four steps: generating and collecting evidence of achievement; evaluating this evidence; recording the findings and using this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching. Assessment should be both informal (Assessment for Learning) and formal (Assessment of Learning). In both cases regular feedback should be provided to learners to enhance the learning experience.

Assessment is a process that measures individual learners' attainment of knowledge (content, and concepts) and skills by collecting, analysing and interpreting the data and information obtained from this process to:

- enable the teacher to judge a learner's progress in a reliable way.
- inform learners of their strengths, weaknesses and progress.
- assist teachers, parents and other stakeholders in making decisions about the learning process and the progress of learners.

Assessment should be mapped against the content, skills, intended aims and assessment criterion specified in the curriculum. In both informal and formal assessments it is important to ensure that in the course of a school year:

- all of the content is covered.
- the full range of skills is included.
- a variety of different forms of assessment are used.

4.2.2 Informal Assessment or Daily Assessment

Assessment for learning has the purpose of continuously collecting information on a learner's achievement that can be used to improve their learning. Informal assessment is a daily monitoring of learners' progress. This is done through observations, discussions, practical demonstrations, learner-teacher conferences, informal classroom interactions, etc. Informal assessment may be as simple as stopping during the lesson to observe learners or to discuss with learners how learning is progressing. Informal assessment should be used to provide feedback to the learners and to inform planning for teaching, but need not be recorded. It should not be seen as separate from learning activities taking place in the classroom. Learners or teachers can mark these assessment tasks. Self assessment and peer assessment actively involves learners in assessment. This is important as it allows learners to learn from and reflect on their own performance. The results of the informal daily assessment tasks are not formally recorded unless the teacher wishes to do so. The results of daily, informal assessment tasks are not taken into account for progression, promotion and certification purposes.

Informal, ongoing assessments should be used to scaffold the acquisition of knowledge and skills and should be the stepping stones leading up to the formal tasks in the Programmes of Assessment.

4.2.3 Formal Assessment

All assessment tasks that make up a formal programme of assessment for the year are regarded as Formal Assessment. Formal Assessment Tasks are marked and formally recorded by the teacher for progression and certification purposes. All Formal Assessment Tasks are subject to moderation for the purpose of quality assurance and to ensure that appropriate standards are maintained. Formal assessment tasks form part of a year-long formal Programme of Assessment.

a. Why use a Formal Assessment task

“Formal Assessment Task (assessment of learning)” – is a systematic way of assessment used by teachers to determine how well learners are progressing in a level and in a particular subject.

b. What is a Formal Assessment Task?

It is a set of questions and or instruction that learners need to respond to. A task may consist of a range of activities. A formal task must be valid, fair and reliable and must cover sufficient knowledge and or skills to report on the learners' progress.

Teachers must ensure that assessment criteria are very clear to the learners before the assessment process. This involves explaining to the learners which knowledge and skills are being assessed and the required length of responses. Feedback should be provided to the learners after assessment and could take the form of whole-class discussion or teacher-learner interaction. Examples of formal assessments include projects, oral presentations, demonstrations, performances, tests, examinations, practical demonstrations, etc. The forms of assessment used should be appropriate to the age and the developmental level of the learners. The assessment tasks should be carefully designed to cover the content and or skills of the subject. The design of these tasks should therefore ensure that a variety of skills are assessed.

Practical Assessment Tasks allow for learners to be assessed on a regular basis during the school year and also allow for the assessment of skills that cannot be assessed in a written format, e.g. test or examination.

4.3 Managing Assessment

4.3.1 People Involved in Assessment

The school and the teachers have overall responsibility for the assessment of learners. Teachers are expected to create a valid, reliable and credible assessment process.

4.3.2 Academic Curriculum

Year X	Formal School-Based Assessments			Final End-of-Year Assessments
	Term 1	Term 2	Term 3	Term 4
	<ul style="list-style-type: none"> Suitable forms of assessment as determined by each academic subject 	<ul style="list-style-type: none"> Suitable forms of assessment as determined by each academic subject 	<ul style="list-style-type: none"> Suitable forms of assessment as determined by each academic subject 	<ul style="list-style-type: none"> Suitable forms of assessment as determined by each academic subject
	Dates:	Dates:	Dates:	Dates:
Term Report	100%	100%	100%	25%
End of Year	CASS 75%			25%

4.4 Formal Assessment Programme

The School-Based Assessment component in the different years is as follows:

Years	Formal school-based: Test/ Exams and practical	End-of-year Practical and Examinations
2-4	75% (Terms 1-3)	25% (Term 4)

Cognitive levels for the assessment of content in Year 2, 3 and 4

Setting tests and tasks for different cognitive levels	Knowing science and technology	Understanding science and technology	Applying scientific and technological knowledge	Evaluating, analysing, synthesising scientific and technological Knowledge
Percentages indicating the proportion of low, middle and high order questions in tasks, tests and exams	Low order questions 70%	Middle order questions 20%		High order questions 10%
Useful verbs to use when setting questions	State Name Label List and others	Explain Describe Compare Plan Rearrange Give an example and others ...	Predict Compare Design Use knowledge to demonstrate and others ...	Evaluate Suggest a reason Interpret and others ...

These cognitive skills apply to all three Specific Aims for Natural Sciences and Technology.

4.4.1 PROGRAMME OF FORMAL ASSESSMENT FOR NATURAL SCIENCES AND TECHNOLOGY

FORMAL ASSESSMENT	TERM 1	TERM 2	TERM 3	TERM 4	TOTAL % FOR THE YEAR
School-based Assessment	1 Practical 1 Test	1 Practical 1 Test/ Exam	1 Practical 1 Test		75%
Exams				1 Practical 1 Exam	25%
Number of Formal Assessments	2	2	2	2	Total 100%

4.4.2 MARK ALLOCATION

A minimum mark allocation is prescribed for the tests, practical and examinations for each year. See the guideline below for each year.

However, should the teacher choose to allocate more marks for tests and tasks, these should also be converted to conform to the total weighting percentages for the year.

A: Minimum mark allocation for Years 2, 3 and 4

Programme of Formal Assessment						
Formal Assessment	Term 1	Term 2	Term 3	Term 4	Total marks for the year	
School based Assessments	1 Practical (25 marks)	1 Practical (20 marks)	1 Practical (25 marks)		150 marks	75%
	1 Test (25 marks)	1 Test/ Exam (30 marks)	1 Test (25 marks)			
Exams				Practical (20 marks) Exam (30 marks)	50 marks	25%
Number of Formal Assessment Tasks	2	2	2	2	Total 8 Assessments (200 marks)	Total 100%

Note:

- The test or exam only covers the work done in that term

At the end of each term (Terms 1 – 4): The marks can be reported as a percentage and related to the 7-point rating code.

4.5 Recording and Reporting

Recording is a process in which the teacher documents the level of a learner's performance in a specific assessment task. It indicates learner progress towards the achievement of the knowledge and skill. Records of learner performance should provide evidence of the learner's progression. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process. Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Learner performance can be reported in a number of ways. These include report cards, parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters, class or school newsletters, etc.

Good record keeping is essential in all assessment, particularly in continuous assessment. A record book or file must be kept up to date by each teacher. It should contain:

- learners' names;
- dates of assessment;
- name and description of the assessment activity;
- the results of assessment activities, according to Subject;
- comments for support purposes.

Teachers report in percentages against the subject. The various achievement levels and their corresponding percentage bands are as shown in the table below. Recording is a process in which the teacher documents the level of a learner's performance. Teachers record the actual raw marks against the task using a record sheet. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process. Records should be used to monitor learning and to plan ahead.

Note: The seven point scale should have clear descriptions that give detailed information for each level. Teachers will record actual marks against the task by using a record sheet; and report percentages against the subject on the learners' report cards.

Codes and percentages for reporting in Grades R – 12

Rating code	Description of competence	Percentage
7	Outstanding achievement	80 – 100
6	Meritorious achievement	70 – 79
5	Substantial achievement	60 – 69
4	Adequate achievement	50 – 59
3	Moderate achievement	40 – 49
2	Elementary achievement	30 – 39
1	Not achieved	0 – 29

All records must be accessible, easy to interpret, securely kept, confidential and helpful in the teaching and reporting process. The school assessment policy determines the details of how record books must be completed. Schools are required to provide quarterly feedback to parents on the Programme of Assessment, using a formal reporting tool, such as a report card. The schedule and the report card should indicate the overall level of performance of a learner.

NOTE:

Criterion referencing is best used to describe learner's performance in a skill. Teachers must make use of suitable analytical rubrics when assessing a learner's competence for a specific skill using practical demonstrations.

4.6 Moderation of Assessment

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation should be implemented at school, district, and provincial levels if necessary. Comprehensive and appropriate moderation practices must be in place for the quality assurance of all subject assessments. The Formal School Based Assessment and the practical assessment tasks should be moderated by the relevant subject specialists at the district and, if necessary, provincial levels in consultation with the moderators at school.

Moderation serves five purposes:

1. It must ascertain whether subject content and skills have been sufficiently covered.
2. The moderator must ensure that the correct balance of cognitive demands are reflected in the assessments.
3. The assessments and marking are of an acceptable standard and consistency.
4. The moderator must make judgements about the comparability of learner performance across schools; whilst recognising that teachers teach in different ways.
5. The subject specialist/moderator must identify areas in which a teacher may need development and support and must ensure that this support is provided.

Moderation is therefore an on-going process and not a once-off end-of-year event.

4.7 General

This document should be read in conjunction with:

- o White Paper 6 on Special Needs Education: Building an Inclusive Education and Training System (2001),
- o *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R – 12; and (NPPPR) (2011)*
- o The policy document; *National Protocol for Assessment Grades R – 12. (NPA) (2011)*
- o Responding to Diversity through Curriculum and Assessment Policy Statements (2011)
- o Guidelines to Ensure Quality Education and Support in Special Schools and Special School Resource Centres (2007)
- o Operational manual to the National strategy on Screening, identification, Assessment and support (2008)
- o Guidelines for full-service/inclusive schools (2010)

SECTION 5

REFERENCE

1. *National Curriculum Statement (NCS) Curriculum and Assessment Policy Statement – Intermediate Phase Grades 4-6 Natural Sciences and Technology*
 2. *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R – 12;*
 3. *The policy document, National Protocol for Assessment Grades R – 12.*
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