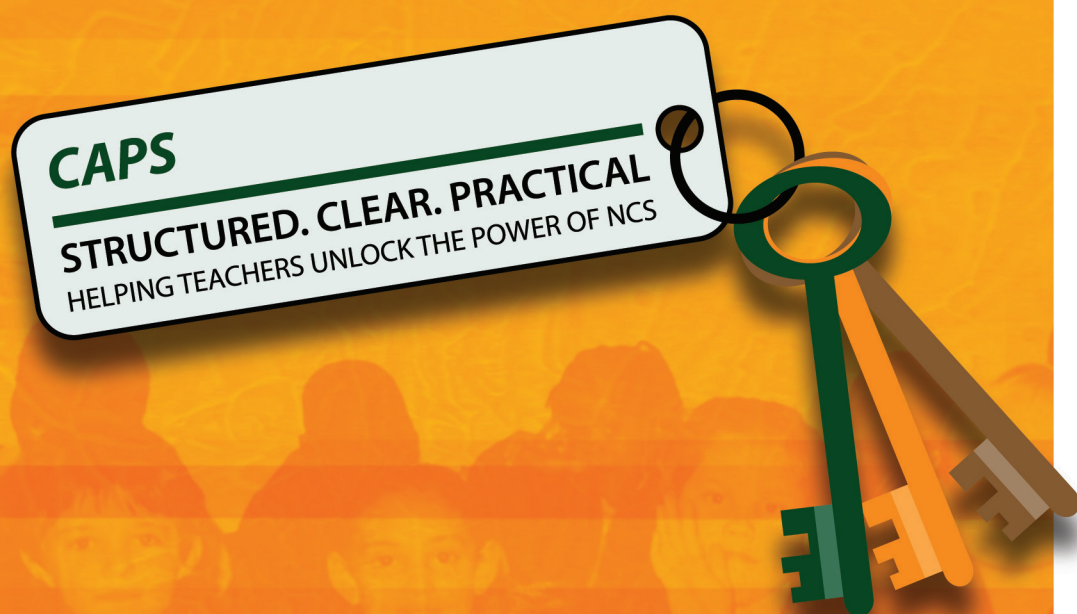


National Curriculum Statement (NCS)

*Curriculum and Assessment
Policy Statement*



*Intermediate Phase
Grades 4-6*



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

CURRICULUM AND ASSESSMENT POLICY STATEMENT GRADES 4-6

NATURAL SCIENCES AND TECHNOLOGY

DISCLAIMER

In view of the stringent time requirements encountered by the Department of Basic Education to effect the necessary editorial changes and layout to the Curriculum and Assessment Policy Statements and the supplementary policy documents, possible errors may occur in the said documents placed on the official departmental websites.

There may also be vernacular inconsistencies in the language documents at Home-, First and Second Additional Language levels which have been translated in the various African Languages. Please note that the content of the documents translated and versioned in the African Languages are correct as they are based on the English generic language documents at all three language levels to be implemented in all four school phases.

If any editorial, layout or vernacular inconsistencies are detected, the user is kindly requested to bring this to the attention of the Department of Basic Education.

E-mail: capslangcomments@dbe.gov.za or fax (012) 328 9828

Department of Basic Education

222 Struben Street

Private Bag X895

Pretoria 0001

South Africa

Tel: +27 12 357 3000

Fax: +27 12 323 0601

120 Plein Street Private Bag X9023

Cape Town 8000

South Africa

Tel: +27 21 465 1701

Fax: +27 21 461 8110

Website: <http://www.education.gov.za>

© 2011 Department of Basic Education

ISBN: 978-1-4315-0490-9

Design and Layout by: Ndatabase Printing Solution

Printed by: Government Printing Works

FOREWORD BY THE MINISTER



Our national curriculum is the culmination of our efforts over a period of seventeen years to transform the curriculum bequeathed to us by apartheid. From the start of democracy we have built our curriculum on the values that inspired our Constitution (Act 108 of 1996). The Preamble to the Constitution states that the aims of the Constitution are to:

- heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights;
- improve the quality of life of all citizens and free the potential of each person;
- lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by law; and
- build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations.

Education and the curriculum have an important role to play in realising these aims.

In 1997 we introduced outcomes-based education to overcome the curricular divisions of the past, but the experience of implementation prompted a review in 2000. This led to the first curriculum revision: the *Revised National Curriculum Statement Grades R-9* and the *National Curriculum Statement Grades 10-12* (2002).

Ongoing implementation challenges resulted in another review in 2009 and we revised the *Revised National Curriculum Statement* (2002) and the *National Curriculum Statement Grades 10-12* to produce this document.

From 2012 the two National Curriculum Statements, for *Grades R-9* and *Grades 10-12* respectively, are combined in a single document and will simply be known as the *National Curriculum Statement Grades R-12*. The *National Curriculum Statement for Grades R-12* builds on the previous curriculum but also updates it and aims to provide clearer specification of what is to be taught and learnt on a term-by-term basis.

The *National Curriculum Statement Grades R-12* represents a policy statement for learning and teaching in South African schools and comprises of the following:

- (a) Curriculum and Assessment Policy Statements (CAPS) for all approved subjects listed in this document;
- (b) *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*; and
- (c) *National Protocol for Assessment Grades R-12*.

A handwritten signature in black ink, which appears to read 'Angie Motshekga'.

MRS ANGIE MOTSHEKGA, MP
MINISTER OF BASIC EDUCATION

CONTENTS

SECTION 1: INTRODUCTION TO THE CURRICULUM AND ASSESSMENT POLICY STATEMENT	3
1.1 Background	3
1.2 Overview	3
1.3 General aims of the South African Curriculum	4
1.4 Time Allocation.....	6
1.4.1 Foundation Phase	6
1.4.2 Intermediate Phase	6
1.4.3 Senior Phase.....	7
1.4.4 Grades 10-12	7
SECTION 2: INTRODUCTION TO NATURAL SCIENCES AND TECHNOLOGY	8
2.1 Introduction	8
2.2 What is science and technology?.....	8
2.3 Natural Sciences and Technology as a school subject.....	9
2.4 Organisation of Natural Sciences and Technology Curriculum	9
2.5 Purpose of studying Natural Sciences and Technology	11
2.6 Specific aims	12
2.6.1 Specific Aim 1: Knowing Natural Sciences and Technology	12
2.6.2 Specific Aim 2: Investigating Phenomena in Natural Sciences and Designing and Making Solutions in Technology	15
2.6.3 Specific Aim 3: Appreciating and Understanding the History, Importance and Applications of Natural Sciences in Society	17
2.7 Developing language skills: reading and writing.....	19
2.8 Time	20
2.9 Resources	20
SECTION 3: CONTENT TABLES	21
Natural Sciences and Technology: Grade 4.....	21
Natural Sciences and Technology: Grade 5.....	32
Natural Sciences and Technology: Grade 6.....	46

SECTION 4: ASSESSMENT	60
4.1 Introduction	60
4.2 Informal assessment or daily assessment	61
4.3 Formal assessment	62
4.4 Assessment requirements for Natural Sciences and Technology	63
4.4.1 Grade 4	63
4.4.2 Grade 5	64
4.4.3 Grade 6	65
4.5 Examinations	66
4.5.1 Grade 4	66
4.5.2 Grade 5	67
4.5.3 Grade 6	68
4.6 Recording and reporting	69
4.7 Moderation of assessment	70
4.8 General	70

SECTION 1: INTRODUCTION TO THE CURRICULUM AND ASSESSMENT POLICY STATEMENT

1.1 Background

The *National Curriculum Statement Grades R-12 (NCS)* stipulates policy on curriculum and assessment in the schooling sector.

To improve implementation, the National Curriculum Statement was amended, with the amendments coming into effect in January 2012. A single comprehensive Curriculum and Assessment Policy document was developed for each subject to replace Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R-12.

1.2 Overview

- (a) The *National Curriculum Statement Grades R-12 (January 2012)* represents a policy statement for learning and teaching in South African schools and comprises the following:
 - (i) *Curriculum and Assessment Policy Statements for each approved school subject;*
 - (ii) *The policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and*
 - (iii) *The policy document, National Protocol for Assessment Grades R-12 (January 2012).*
- (b) The *National Curriculum Statement Grades R-12 (January 2012)* replaces the two current national curricula statements, namely the
 - (i) *Revised National Curriculum Statement Grades R-9, Government Gazette No. 23406 of 31 May 2002, and*
 - (ii) *National Curriculum Statement Grades 10-12 Government Gazettes, No. 25545 of 6 October 2003 and No. 27594 of 17 May 2005.*
- (c) The national curriculum statements contemplated in subparagraphs b(i) and (ii) comprise the following policy documents which will be incrementally repealed by the *National Curriculum Statement Grades R-12 (January 2012)* during the period 2012-2014:
 - (i) *The Learning Area/Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R-9 and Grades 10-12;*
 - (ii) *The policy document, National Policy on assessment and qualifications for schools in the General Education and Training Band, promulgated in Government Notice No. 124 in Government Gazette No. 29626 of 12 February 2007;*
 - (iii) *The policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), promulgated in Government Gazette No.27819 of 20 July 2005;*

- (iv) *The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding learners with special needs, published in Government Gazette, No.29466 of 11 December 2006, is incorporated in the policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and*
 - (v) *The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment (Grades R-12), promulgated in Government Notice No.1267 in Government Gazette No. 29467 of 11 December 2006.*
- (d) The policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*, and the sections on the Curriculum and Assessment Policy as contemplated in Chapters 2, 3 and 4 of this document constitute the norms and standards of the *National Curriculum Statement Grades R-12*. It will therefore, in terms of section 6A of the *South African Schools Act, 1996 (Act No. 84 of 1996)*, form the basis for the Minister of Basic Education to determine minimum outcomes and standards, as well as the processes and procedures for the assessment of learner achievement to be applicable to public and independent schools.

1.3 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) 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).

1.4 Time Allocation

1.4.1 Foundation Phase

(a) The instructional time in the Foundation Phase is as follows:

SUBJECT	GRADE R (HOURS)	GRADES 1-2 (HOURS)	GRADE 3 (HOURS)
Home Language	10	8/7	8/7
First Additional Language		2/3	3/4
Mathematics	7	7	7
Life Skills	6	6	7
• Beginning Knowledge	(1)	(1)	(2)
• Creative Arts	(2)	(2)	(2)
• Physical Education	(2)	(2)	(2)
• Personal and Social Well-being	(1)	(1)	(1)
TOTAL	23	23	25

(b) Instructional time for Grades R, 1 and 2 is 23 hours and for Grade 3 is 25 hours.

(c) Ten hours are allocated for languages in Grades R-2 and 11 hours in Grade 3. A maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 2 hours and a maximum of 3 hours for Additional Language in Grades 1-2. In Grade 3 a maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 3 hours and a maximum of 4 hours for First Additional Language.

(d) In Life Skills Beginning Knowledge is allocated 1 hour in Grades R – 2 and 2 hours as indicated by the hours in brackets for Grade 3.

1.4.2 Intermediate Phase

(a) The instructional time in the Intermediate Phase is as follows:

SUBJECT	HOURS
Home Language	6
First Additional Language	5
Mathematics	6
Natural Sciences and Technology	3,5
Social Sciences	3
Life Skills	4
• Creative Arts	(1,5)
• Physical Education	(1)
• Personal and Social Well-being	(1,5)
TOTAL	27,5

1.4.3 Senior Phase

(a) The instructional time in the Senior Phase is as follows:

SUBJECT	HOURS
Home Language	5
First Additional Language	4
Mathematics	4,5
Natural Sciences	3
Social Sciences	3
Technology	2
Economic Management Sciences	2
Life Orientation	2
Creative Arts	2
TOTAL	27,5

1.4.4 Grades 10-12

(a) The instructional time in Grades 10-12 is as follows:

SUBJECT	TIME ALLOCATION PER WEEK (HOURS)
Home Language	4.5
First Additional Language	4.5
Mathematics	4.5
Life Orientation	2
A minimum of any three subjects selected from Group B <u>Annexure B, Tables B1-B8</u> of the policy document, <i>National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12</i> , subject to the provisos stipulated in paragraph 28 of the said policy document.	12 (3x4h)
TOTAL	27,5

The allocated time per week may be utilised only for the minimum required NCS subjects as specified above, and may not be used for any additional subjects added to the list of minimum subjects. Should a learner wish to offer additional subjects, additional time must be allocated for the offering of these subjects.

SECTION 2: INTRODUCTION TO NATURAL SCIENCES AND TECHNOLOGY:

2.1 INTRODUCTION

What is today known as 'science' has roots in African, Arabic, Asian, European and American cultures. It has been shaped by the search to understand the natural world through observation, codifying and testing ideas, and has evolved to become part of the cultural heritage of all nations. It is usually characterised by the possibility of making precise statements which are susceptible to some sort of check or 'proof' (*McGraw-Hill Concise Encyclopaedia of Science and Technology*, Second Edition, p.1647).

Technology has existed throughout history. People use the combination of knowledge, skills and available resources to develop solutions that meet their daily needs and wants. Economic and environmental factors and a wide range of attitudes and values need to be taken into account when developing technological solutions.

2.2 WHAT IS SCIENCE AND TECHNOLOGY?

To be accepted as science, certain methods of inquiry are generally used. These methods lend themselves to replication, attempts at objectivity and a systematic approach to scientific inquiry. The methods include formulating hypotheses, and designing and carrying out experiments to test the hypotheses. Repeated investigations are undertaken, and the resulting methods and results are carefully examined and debated before they are accepted as valid. Knowledge production in science is an ongoing endeavour that usually happens gradually but, occasionally, knowledge leaps forward as a new theory replaces the dominant view. As with all other knowledge, scientific knowledge changes over time as scientists acquire new information and people change their ways of viewing the world. Throughout history people have used knowledge of Technology and skills to invent, develop and make things that solve problems that they experience in order to improve the quality of their lives. The knowledge and skills used to make stone-age tools are an example of this.

In all cultures and in all times people have wanted to understand how the world works. Sometimes their lives depend on understanding it and sometimes, people want to make sense of the physical world and they need explanations that satisfy them.

Science is a systematic way of looking for explanations and connecting up the ideas we have. Over many centuries, people in science have come to agree that they need to write down and publicise the investigations they do, that their claims and ideas need to be tested by other scientists and that other people should be able to repeat investigations to see whether the results turn out the same.

Scientific investigations are often about things that nobody really understands yet, so scientists are frequently involved in debates and disagreements. However, as more and more people work on the same questions, they tend to reach a consensus about what is really happening in nature.

The science knowledge we teach at school is not in doubt as most of it has been tested and has become generally accepted but a good teacher will tell the learners something of the debates, the arguments and confusion among the people who were the first to investigate such phenomena.

Scientists continue to explore on the frontiers of the unknown. Why is climate changing around the world? What is making the universe expand? What causes the Earth's magnetic field to change? Nobody knows for sure.

2.3 NATURAL SCIENCES AND TECHNOLOGY AS A SCHOOL SUBJECT

Natural Sciences and Technology in the Intermediate Phase is compulsory for all learners. It is therefore critical for promoting and developing scientific and technological literacy as Natural Sciences and Technology are both compulsory subjects for all learners in Grades 7 to 9.

In grades 4 to 6 Natural Sciences and Technology are integrated. Sciences and technology together should be able to build a learners investigative skills especially discovery skills when doing practical experiments, and also research skills using reference books and other media. When analysing the results of experiments, Intermediate phase science and technology learners will practise observing skills and critical thinking. During Science and Technology lessons the intermediate phase learner will draw simple diagrams showing a single viewpoint in 2-Dimensions to represent experimental apparatus and design ideas for models that utilise the concepts being taught in Technology, e.g. a simple structure or a wheeled vehicle. In Science learners will draw conclusions from their experimental results in Technology they will begin to evaluate designs in terms of fitness-for-purpose, aesthetic appearance and possible impacts on society and the environment.

2.4 ORGANISATION OF THE NATURAL SCIENCES AND TECHNOLOGY CURRICULUM

In the Natural Sciences and Technology Curriculum, six 'Knowledge Strands' are used as organisers for the Physical Sciences, Life Sciences, Earth Sciences and Technology components of the subject.

The Knowledge Strands are:

- Life and Living
- Matter and Materials.
- Energy and Change.
- Earth and Beyond.
- Technology Structures
- Mechanical and Electrical systems and control

Each Knowledge Strand is developed progressively across the three years of the Intermediate Phase.

The Knowledge Strands are a tool for organising the subject content. When teaching Natural Sciences and Technology, it is important to emphasise the links learners need to make with related topics to help them achieve a thorough understanding of the nature of and connectedness in science and technology. Links must also be made progressively, across grades, to all Knowledge Strands.

NATURAL SCIENCES AND TECHNOLOGY CONCEPT AND CONTENT PROGRESSION

Strands Grade 4	Matter and materials and structures	Energy and change and structures	Life and living and structures	Earth and beyond and mechanisms
	• Properties of materials. • Combination of materials. • Strengthening materials • Phases of materials	• Air and Energy • Mechanisms that use moving air • Sound • Musical Instrument	• Living and non-living things. • Features of plants and animals. • Requirements for growth. • Habitats • Behaviour patterns of animals.	• Space exploration. • Moving on land. • Objects in the sky: Sun, Moon, Earth, stars
Strands Grade 5	Matter and materials and structures	Energy and change and mechanisms	Life and living and mechanisms	Life and living and Earth and beyond
	• Properties of materials. • Uses of materials. • Technology process: build a structure	• Concept of Energy. • Renewable and non-renewable. • Different forms of energy. • Light • Heat • Sound • Electrical • Movement: Energy systems. • Machines	• Food chains. • Life cycle of plants. • Life cycle of animals. • Senses	• Structure of Earth • Surface of Earth • Sedimentary rocks. • Fossils
Strands Grade 6	Matter and materials	Energy and change	Life and living and mechanisms	Earth and beyond and electrical systems
	• Mixtures, solutions, melting. • Soluble and insoluble. • Rate of dissolving	• Electricity Circuits • Conductors and Insulators. • Energy transfer. • Basic safety • Electrical circuit to solve a problem	• Environment and water resources. • Nutrition and food groups. • Healthy environment. • Animals with skeletons. • Types of movement. • Movement and mechanical systems	• Solar system: Sun, Earth, Moon. • Ecosystems.

The content framework focuses on the ideas, skills, concepts and connections between them, rather than a listing of the facts and procedures that need to be learned. Particular instructional strategies or methodologies are not prescribed. Teachers have the freedom to expand concepts and to design and organise learning experiences according to their own local circumstances.

The cognitive and practical skills that have been identified must be taught, and assessed, in an integrated way (and **at the appropriate grade level**) in the context provided by the Knowledge Strands.

The recommended sequence for the teaching of the Knowledge Strands in this document for Grade 4,5 and 6 is:

Grade 4

1. Life and Living and Structures
2. Matter and Materials and Structures
3. Energy and Change and Structures
4. Earth and Beyond and Mechanisms

Grade 5

1. Matter and Materials and Structures
2. Energy and Change and Mechanisms
3. Life and Living and Mechanisms
4. Life and Living and Earth and Beyond

Grade 6

1. Energy and Change
2. Earth and Beyond and Electrical Systems
3. Matter and Materials
4. Life and living and Mechanisms

However, teachers could decide on the sequence within a particular term. In all grades, learners must be supported when doing investigations and addressing the technological Design Process. They need to expand on the concepts or knowledge to which they have been introduced and to deepen their understanding of the subject matter.

2.5 PURPOSE OF SCIENCE AND TECHNOLOGY

2.5.1 Development of scientific and technological knowledge and understanding

Scientific and technological knowledge and understanding can be used to

- answer questions about the nature of the world around us and
- apply science in technology to improve the quality of life

It can prepare learners for economic activity and self-expression. It lays the basis of further studies in science and technology and prepares learners for active participation in a democratic society that values human rights and promotes acting responsibly towards the environment.

2.5.2 Development of science process skills (Scientific Investigations) and technological skills (Design process)

The teaching and learning of science involves the development of a range of process skills that may be used in everyday life, in the community and in the workplace. Learners can gain these skills in an environment that supports creativity, responsibility and growing confidence. Learners develop the ability to think objectively and use a variety of forms of reasoning while they use process and design skills to investigate, reflect, synthesise, design make, evaluate and communicate.

2.5.3 Development of an understanding of the relevance of Science and Technology in society

Both science and technology have made a major impact, both positive and negative, on our world. Careful selection of content, and use of a variety of ways of teaching and learning science and technology, should promote understanding of science and technology as human activities, as well as the history of science and the relationship between Natural Sciences and Technology and other subjects. It also helps learners to understand the contribution of science and technology to social justice and societal development as well as the need for using scientific knowledge responsibly in the interest of ourselves, of society and the environment. Understanding science also helps us to understand the consequences of decisions that involve ethical issues.

2.6 SPECIFIC AIMS

There are **three** broad subject-specific aims in Natural Sciences and Technology which relate to the purposes of learning science. These are

1. Specific Aim 1, which relates to the knowing of the subject content ('theory').
2. Specific Aim 2, which relates to doing science or practical work and investigations and to design and make practical solutions to everyday problems.
3. Specific Aim 3, which relates to understanding the applications of science and technology in everyday life, as well as understanding the history of scientific discoveries and technological solutions and the relationship between indigenous knowledge and science and technology.

WHAT DO THE THREE AIMS MEAN AND HOW DO THEY RELATE TO ASSESSMENT?

2.6.1 Specific Aim 1: Knowing Science and Technology (concepts, processes, phenomena, mechanisms, principles, theories, laws, models, etcetera).

This involves knowing, understanding, and making meaning of science and technology in a way that enables learners to make many connections between the ideas and concepts in their minds. Making such connections makes it possible for learners to apply their knowledge in new and unfamiliar contexts. The process of acquiring a deep understanding of Science and Technology is about more than just knowing a lot of facts. The scope of the knowledge that learners should acquire includes knowledge of the process and design skills related to carrying out investigations and solving problems.

The following cognitive (thinking) skills comprise the **range** of skills that all learners should develop in the context of working through the curriculum in a school year. These skills also indicate what should be assessed, **at the appropriate grade level**, in a variety of different kinds of assessments during the year. **Note:** that not every skill will be assessed in every assessment, but teachers must ensure that, by the end of the year, the assessments provide evidence that learners have been assessed on all of these.

2.6.1.1 Acquire knowledge

In the process of acquiring knowledge learners must ...

- **access** information from a variety of sources (teachers, reference books, textbooks, internet, experts, peers, parents, etcetera).
- **select** key ideas.
- **recall** facts
- **describe** concepts, processes, phenomena, mechanisms, principles, theories, laws, models in the Natural Sciences and Technology.
- **sketch** design ideas
- **draw** simple 2 D plans

Assessment

In order to assess these competences (or cognitive skills), teachers should use the following verbs in the tasks or assessments that they set: state, name, label, list, define, describe and any other verbs that would show that **knowledge** of the subject is being assessed.

2.6.1.2 Understand, comprehend, make connections between ideas and concepts to make meaning of science and technology

In the process of making meaning and achieving understanding learners must ...

- **build a conceptual framework** of science and technological ideas.
- **organise** or **reorganise** knowledge to derive new meaning
- **write** summaries
- **write** design briefs
- **develop** flow charts, diagrams and mind maps
- **recognise** patterns and trends
- **understand** the impact of technology and science
- **write** specifications and constraints

Assessment

In order to assess these competencies (cognitive skills), teachers should use the following verbs in the tasks or assessments they set: explain, compare, rearrange, give an example of, illustrate, calculate, interpret, suggest a reason, make a generalisation, interpret information or data, predict, select, differentiate or any other suitable verbs which would indicate that understanding of the subject is being assessed.

2.6.1.3 Apply knowledge of science and technology in new and unfamiliar contexts

Learners must be able to ...

- **use** information in a new way.
- **apply** knowledge to new and unfamiliar contexts
- **use** knowledge to design solutions to problems, needs and wants.

Assessment

In order to assess these competencies (cognitive skills), teachers should use the following verbs in the tasks or assessments that they set: demonstrate, interpret, predict, compare, differentiate, illustrate, solve and select, as well as any other appropriate verbs which would assess a learner's ability to apply knowledge. The key is that the learners will have to apply knowledge about something that they have learnt, and which they understand, in a context or situation about which they have not yet acquired specific knowledge, or they must use the knowledge in a new way.

2.6.1.4 Analyse, evaluate and synthesise scientific and technological knowledge, concepts and ideas

In the process of learning science and technology learners must be able to ...

- **analyse** information/data
- **recognise** relationships between existing knowledge and new ideas.
- **critically** evaluate scientific information
- **critically** evaluate issues, proposed solutions, products and processes
- **identify** assumptions
- **categorise** information

Assessment

In order to assess these competencies (cognitive skills) teachers should use the following verbs in the tasks or assessment that they set: appraise, argue, judge, select, evaluate, defend (a point of view), compare, contrast, criticise (an argument or assumption) differentiate, distinguish, discuss or any other suitable verbs that would indicate that analysis, evaluation and synthesis have been assessed.

2.6.2 Specific Aim 2: Investigating Phenomena in Natural Sciences and Designing and Making Solutions in Technology

Learners must be able to plan and carry out investigations as well as solve problems that require some practical ability. This ability is underpinned by an attitude of curiosity and an interest in wanting to find out how the natural world works.

The following range of skills relate to **doing** practical work in Science and to designing and making solutions in Technology. All seven skills will not apply to every activity equally. The skills are aligned to what learners would be doing in the normal course of carrying out an investigation. Teachers must select those skills that apply to, and which can be assessed in, the context of specific activities. By the end of the Grade 6 year, **at least** the first six skills must have been assessed at a **grade-appropriate** level.

Note:

While **doing** practical investigations and designing and making solutions involves a specific range of skills, knowledge and understanding of doing science and technology can, and should, be assessed within the context of the cognitive domains of Specific Aim 1.

Learners must be able to:

2.6.2.1 Follow instructions

This is essential, especially in the lower grades and in large classes. Teachers cannot expect all learners to use unfamiliar equipment and tools and to do so independently without giving them a clear set of instructions to follow. The amount of assistance required would indicate the level of performance in this regard. Adherence to safety rules would be part of this.

2.6.2.2 Handle equipment, apparatus and tools

This should include knowledge of the apparatus and tools that is, naming it and knowing what it is used for. It includes using a variety of different kinds of equipment. 'Handling equipment' is a generic skill and would apply to any equipment used for many different kinds of investigations and practical tasks. Handling improvised equipment requires the same skills as would be required for handling standard laboratory equipment and simple tools. The emphasis is on **using** equipment appropriately and safely (and not on memorising the names of apparatus only).

2.6.2.3 Make observations

A variety of different kinds of observations are possible and observations can be recorded in different ways, such as:

- drawings
- descriptions
- grouping of materials or examples based on observable similarities and/or differences
- measurements
- comparing materials before and after treatment

- observing results of an experimental investigation which will involve recording information in an appropriate way
- counting

2.6.2.4 Record information or data

This should include recording observations or information as drawings, descriptions, in simple table format, as simple graphs, etcetera. Again, the skill of 'recording' is transferable across a range of different scientific activities.

2.6.2.5 Measure

Learners should know **what** to measure, **how** to measure it and have a sense of the degree of accuracy that is required. A variety of things could be measured including (but not limited to) length, volume, temperature, weight or mass, numbers (counting). Measuring is a way of quantifying observations and in this process learners should learn to make estimations.

2.6.2.6 Interpret

Learners should be able to convert information from one form in which it was recorded, for instance a table, into, for example, an appropriate graph.

Learners should be able to perform **appropriate** simple calculations, to analyse and extract information from tables and graphs, apply knowledge of theory to practical situations, recognise patterns and/or trends, appreciate the limitations of experimental procedures and make deductions based on evidence.

2.6.2.7 Design/plan investigations, experiments or solutions to everyday problems

Not all investigations are based on the 'classic' dependent-independent variables and controls. For example, an investigation could involve observing soil profiles or counting populations.

Designing an investigation is a different process from planning an investigation. In the design process options need to be considered depending on the hypothesis and variables may have to be identified.

When designing and making solutions to everyday problems, the needs and wants of people are taken into account. When developing products and systems sensitivity to economic and environmental factors as well as a wide range of attitudes and values need to be taken into account.

Skills include:

- identifying a problem
- hypothesising
- investigating a situation
- selecting apparatus or equipment and/or materials
- selecting appropriate materials and tools
- identifying variables

- suggesting ways of controlling variables
- planning an experiment
- suggesting ways of recording results
- understanding the need for replication or verification
- writing a design brief
- identifying specifications and constraints
- designing solutions to everyday problems
- making/building a model of the solution designed
- evaluating the final product

In Grades 4, 5 and 6, learners must be assisted to plan and/or design a simple investigation, experiment or design and make a solution to an everyday problem.

Note: Skills 2.6.2.1 to 2.6.2.6 (following instructions, handling equipment, making observations, recording information, measuring and interpreting information) would all be required, in one form or another, in order to carry out an experiment or investigation or to do practical work. By separating seven different kinds of skills (2.6.2.1 to 2.6.2.7), these skills can apply to the **variety** of different kinds of practical work that are appropriate for a particular grade in Science and Technology including simple investigations, experiments and designing and making/building solutions to everyday products.. This approach makes it easier to assess learners in a range of different circumstances and it enables a teacher to judge a learner's ability to **do** science and technology. The skills are based on what learners would do in the normal course of doing practical work. However, there are some circumstances in which only some of these skills would apply and not every skill can be assessed in every practical task.

2.6.3 Specific Aim 3: Appreciating and Understanding the History, Importance and Applications of Science and Technology in Society

The third aim of Science and Technology is to enable learners to understand that school science and technology can be relevant to their lives outside of the school and that it enriches their lives.

Learners must be exposed to the history of science and technology and indigenous knowledge systems from other times and other cultures. Scientific and Technological knowledge and understanding have been developed over time by people who were curious and who persevered with their quest for knowledge. Our present understanding of science will change and will be improved by modern scientists making new discoveries. New discoveries will lead to new technologies and the improvement of existing technologies.

The skills that are linked to Specific Aim 3 are cognitive rather than practical skills. These are the same as the ones identified for Specific Aim 1.

Because knowledge that will be acquired in respect of Specific Aim 3 always relates to specific subject content, the content provides the context for learning about various aspects of Science and Technology in society. It should therefore be taught in an integrated way in order to both enhance the subject and to clarify the relationship between the subject and society i.e. indigenous knowledge systems that relate to a specific topic, related history of scientific discoveries and the applications of science in everyday life.

2.6.3.1 Understanding the history and relevance of some scientific discoveries and technological developments

The subject content provides the context for learning about the history of scientific discoveries and technological solutions and their relevance for society. These aspects, the history and relevance, should be linked to and taught with the topics and content that are related to a particular discovery or a particular scientist.

2.6.3. Relationship of indigenous knowledge to science and technology

All knowledge grows out of a view of how the world works. One of the differences between modern science and technology and traditional, indigenous knowledge systems is that they have their origins in different world views. Learners should understand the different cultural contexts in which indigenous knowledge systems were developed.

Examples of indigenous knowledge that are selected for study should, as far as possible, reflect different South African cultural groupings. They **will** also link directly to specific areas in the Science and Technology subject content.

2.6.3.3 The value and application of science and technological knowledge in industry, and the impact on the quality of people's lives and/or the environment

This is about the applications and relevance that knowledge of Science and Technology has found in various aspects of society. Examples should be relevant to the subject content that learners are dealing with at a particular time. For example, there are technological products like different structures and mechanisms that were designed using relevant science knowledge and that have an impact on the quality of people's lives.

Skills

Whilst the kind of knowledge is different for Specific Aims 1 and 3, the content should be taught in an integrated way in order for learners to more easily understand the history, relevance and applications of science. Importantly, the skills that must be developed and assessed for Specific Aim 3 are the same as those of Specific Aim 1.

Learners must

- **access** information.
- **select** key ideas.

Specific Aim 1.1

- **recall** information
- **describe** knowledge of natural sciences.
- **build a conceptual framework.**
- **organise** or **reorganise** knowledge
- **understand** the impact of technology and science

Specific Aim 1.2

- **write** summaries

- **develop** flow charts and mind maps
- **recognise** patterns and trends
- **apply** knowledge in new contexts.
- **use** knowledge in a new way

Specific Aim 1.3

- **analyse** information/data
- **critically evaluate** scientific information
- **critically evaluate** issues, proposed solutions, products and processes

Specific Aim 1.4

- **recognise** relationships between existing knowledge and new ideas
- **recognise** the contribution of indigenous knowledge and early scientists
- **identify** assumptions
- **categorise** information

The three Specific Aims are aligned to the three Learning Outcomes in both science and technology and with which teachers are familiar. Within each of these aims, specific skills or competences have been identified. It is not advisable to try to assess each of the skills separately, nor is it possible to report on individual skills separately. However, **well designed assessments** must show **evidence** that, by the end of the year, all of the skills have been assessed progressively **at a grade-appropriate level**. There must be a clear link between the aims and the outcomes of learning. The processes of teaching, learning and assessment will provide the links between the Specific Aims and the achievement of the outcomes.

2.7 DEVELOPING LANGUAGE SKILLS: READING AND WRITING

Teachers of Natural Sciences and Technology should be aware that they are also engaged in teaching language across the curriculum. This is particularly important for learners for whom the Language of Learning and Teaching (LoLT) is not their home language. It is important to provide learners with opportunities to develop and improve their language skills in the context of learning Science and Technology. It will therefore be critical to afford learners opportunities to read scientific and technological texts, to write reports, paragraphs and short essays as part of the assessment, especially (but not only) the informal assessments **for** learning.

2.8 TIME

The time allocation for Natural Sciences and Technology is 3½ hours per week and the curricula for Grades 4, 5 and 6 have been designed to be completed within 32 weeks out of 40 weeks in the school year. This leaves 8 weeks in the year for examinations, tests and disruptions due to other school activities. The time allocated per topic is a guideline and should be applied flexibly according to circumstances in the classroom and to accommodate the interests of the learners. **The time allocated is also an indication of the weighting of each topic.**

In all grades, 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.

2.9 RESOURCES

The resources needed for teaching Natural Sciences and Technology are listed against each topic in order to assist teachers with planning and preparation. The list is a guide and suitable alternative tools and materials may be used.

Every learner must have his/her own textbook. Teachers should ensure that a system is in place for recovering textbooks at the end of every year. Schools must provide secure storage space where textbooks, and other equipment, can be stored safely.

Ideally every learner should have access to sufficient workspace and equipment to carry out investigations and for designing and making things. For safety reasons no more than three learners may share space and equipment in instances where space and equipment are limited due to large classes. With regard to equipment, schools must make every effort to ensure that the essential equipment is provided. Tools, apparatus, materials and consumables must be acquired through a planned budgeting process.

While it is acknowledged that it is not ideal to have to improvise equipment, teachers should remember that it is more important for learners to have the experience of carrying out a variety of investigations and for learners to make their own technology models than to depend on the availability of equipment. In instances where equipment is limited, teachers should be encouraged to improvise. The same skills can be developed using improvised equipment. Also, if there are no alternatives, it is more effective for teachers to demonstrate an investigation than not to do investigations or construct models due to a lack of equipment. Secure storage for equipment must be provided by the school.

Teachers should ensure that learners are familiar with rules regarding the safe use of equipment. The Natural Sciences and Technology classroom should be equipped with charts, hand lenses, bioviewers and relevant biostrips, reference books, scissors, models, Field Guides, identification keys, glass beakers, and, if at all possible, access to appropriate DVDs and a DVD player.

A selection of simple tools (for technology) is essential, for example: hammers, craft knives, cutting mats, glue guns, safety rulers, scissors, pliers and science equipment such as glass beakers, test tubes, spirit or Bunsen burners, thermometers should also be acquired. Consumable chemicals for practical investigations and experiments and materials for Technology such as cardboard, glue, wire, string, drawing paper, plastic 'link-strip', should be replenished when necessary.

Fresh plant material can be obtained from the surroundings and teachers should ensure that appropriate plants (e.g. *Impatiens*) are planted on the school grounds. Fresh animal material can very often be obtained at reasonable cost from the local butcher.

Teachers must be qualified to teach the subject and must familiarise themselves with the equipment and how it is used.

SECTION 3: CONTENT TABLES

NATURAL SCIENCES AND TECHNOLOGY: GRADE 4

GRADE 4 TERM 1				
STRAND: LIFE AND LIVING AND STRUCTURES				
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
1½ weeks (5¼ hours)	Living and non-living things that share the world with us	• Living and non-living things: - Characteristics of living things, Plants and animals: - feeding, growth, reproduction, breathing, excretion, sensitivity, locomotion - Non-living things: none of the above - Some things appear to be dead but will come 'alive', given the right conditions, e.g. dried yeast, dried beans, an incubated fertilised egg. - Some things were living and are now dead: dead wood, leaves.	• Think about and discuss living things. What do they have in common? How are they different from non-living things. • Identify and sort a selection of living and non-living objects and give reasons to explain the sorted groups • Demonstrate that things that appear to be non-living will live under the right conditions: e.g. hatching of eggs, germination of seeds, etc.	Pictures of variety of plants, animals, habitat, etc. Cards for sorting exercise Variety of living and non-living things
2½ weeks (8¾ hours)		• Features of plants and animals - Basic structure of plants: roots, stems, leaves, flowers, fruits, seeds - Visible differences between plants: e.g. small, large, grow in water, produce fruits, flowers, etc. - Tabulate the visible differences between at least 3 plants • Body plans of animals: - Head, tail, body, limbs, sense organs - Visible differences between animals: small, large; invertebrates, insects, mammals. - Tabulate the visible differences between at least 3 animals	• Identify, label and describe the parts of a plant: roots, stems, leaves and flower, fruit or seeds. • Identify, label and describe at least one animal; body plan only (Note: that the body plan will be different for invertebrates and vertebrates)	Live examples Pictures of plants and animals

GRADE 4 TERM 1				
STRAND: LIFE AND LIVING AND STRUCTURES				
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
2 weeks (7 hours)	Requirements of plants and animals	• Requirements for growth of plants - Plants need light, water and air to grow - Plants can be grown from cuttings or seeds - Seeds need water and warmth to germinate	• Grow plants from seeds or cuttings. Observe and record observations over time (The observation of this practical task will be done over time at school while learners will engage with the next section)	Seeds and cuttings Pictures
		Habitats of animals - Concept of a habitat: different kinds of habitats such as grassland, wetland, forest, river. - Animals need a place (habitat) where they can survive. - Animals need food, water, a place to shelter or escape predators and to reproduce - Examples of habitats of indigenous animals (3 examples)	- Identify a habitat on or close to the school grounds. Describe the habitat. - Pair different animals with the correct habitat/food/shelter. - Provide reasons for each pairing.	Case study Pictures Real examples
1 week (3½ hours)	Different structures	Animal shelters Animals shelters can be - man made or natural - either shell or frame structures - made of different materials - have different shapes, sizes - constructed in different ways.	• Observe and write about different animal shelters using given information: case studies/pictures (nests, shells, hollow trees, wasp nest made from mud, dog kennels, rabbit hutches, chicken coops, bird cages, etc.) - Identify manmade and natural structures - Identify shell and frame structures - Identify the materials different shelters are made of. - Record observations.	Books/material with Information Pictures

GRADE 4 TERM 1				
STRAND: LIFE AND LIVING AND STRUCTURES				
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
1 week (3½ hours)	Design an animal shelter	Technology process Problem scenario is provided: need for an animal shelter	- Write a simple description (design brief) of the solution to the problem. Specifications: - What is it for? - How big will it be? - What will it be made of? - Sketch the design idea: 2 dimensional drawing - Evaluate the suitability of the design.	Books/material with Information Pictures
Total 8 weeks (28 hours)				
ASSESSMENT		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. The class test must cover both the science and technology components of the subject. Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected practical task	Refer to range of skills listed under Specific Aim 2

GRADE 4 TERM 2				
STRAND: MATTER AND MATERIALS AND STRUCTURES			Resources	
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	For all activities: Textbook Worksheets/workbooks
1½ weeks (5¼ hours)	Materials	• Properties of materials: - Natural and man-made materials - Metals - Non-metals (including ceramics: glass, porcelain, pottery and polymers: plastics, rubber, fabrics) - Descriptions of materials - Uses of materials: suitability of different materials for different purposes.	• Compare materials used in daily life. • Explore properties that can be seen, felt, heard and tasted: describe materials using words like hard, soft, springy, sticky, brittle, wet, dry, runny, stiff, shiny, dull, strong. • Distinguish between objects (things) based on the materials from which they are made. • (Two or more objects can be made of the same material). • Evaluate the suitability of materials used to make various familiar products	Examples of materials to use: wood, plastic, salt, mealie-meal, steel, glass, syrup, paint, water and even air.
2 weeks (7 hours)	Combinations of Materials	Combination of materials to make materials with new properties • By mixing materials, new materials may be created: - The properties of the new materials may be different from the properties of the starting materials - Materials may be reinforced by placing reinforcing material inside another material - Materials can be combined to make new products. - Compare the properties before and after the combination	Learners must engage in at least 1 practical activity (at school) using a given recipe. Examples of possible activities: • Mix clay and water and vary the amounts of water to change consistency of clay. Change strength of object by mixing string or grass into clay. Indigenous building materials . • Mix sand, gravel, cement and water to make concrete. • Mix flour and water to make play dough or glue (add oil). • Mix plaster of Paris and water (or Polyfilla) to make hard plaster • Mix epoxy resin and hardener. • Mix jelly-powder with varying amount of water to find the right mix for very stiff jelly • Mix liquids to give off smelly gasses (vinegar and bleach) (Teachers must supervise this activity) • Mix sugar and bicarbonate of soda with water, heat together to make a kind of sweet. • Mix flour and bicarbonate of soda to make self-raising flour. Note:. In all the investigations carried out, learners must record the changes that occur when making the new material.	Clay, sand, cement, flour, jelly powder, Plaster of Paris, epoxy resin, water, food colouring, vinegar, bleach, sugar, bicarbonate of soda

GRADE 4 TERM 2				
STRAND: MATTER AND MATERIALS AND STRUCTURES				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	
1½ weeks (5¼ hours)	Strengthening Materials	• Ways to strengthen materials to be used in building structures: - folding - tubing - braces(gussets) and struts across corner joints (strength of a triangle) - Changing the shape of a piece of material may increase the material's ability to withstand forces (push or pull)	Possible activities • Carry out fair tests with paper, (flat, folded or as a tube) in various ways to compare the ability of each to carry a load. • Carry out fair tests to compare corner joints that are braced in various ways. • Explore the school buildings and school grounds to find examples of folding, tubing and triangles that have been used to strengthen structures. List the examples of - Folding - Tubing - Triangles	Card/paper/scissors/craft knives/etc. Examine: gates, fencing corner posts, rafters, roof sheeting, hollow poles for roof support, netball posts etc.
1 week (3½ hours)	Phases of Substances	• Solids, liquids and gases - solid : shape does not change - liquid: flows but stays in a container - gas: will not stay in a container but will spread upwards and sideways. • Phase changes: - Heating solids may change them into a liquid state - Cooling down hot liquids will change them into solids again - Properties of different phases	Practical activities that must be demonstrated by the teacher - Heat a substance to let it melt and allow it to solidify again.(possible examples: candle wax; naphthalene; butter; lead; etc.) - Observe the difference between the solid and liquid forms of a substance. (possible examples: water and ice, solid wax and liquid wax, melted chocolate and solid chocolate, etc.)	Different solids, liquids, gases such as perfume, gas from bleach, vinegar, gas from gas stove, cigarette lighter, petrol vapour Pictures

GRADE 4 TERM 2				
STRAND: MATTER AND MATERIALS AND STRUCTURES			Resources	
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	For all activities: Textbook Worksheets/workbooks
2 weeks (7 hours)	Air (Gas)	• Air and Energy - Air is invisible but is a real substance(gas) - Air occupies space but is compressible - Wind is air moving in the same direction - Energy is transferred by moving air - Wind can do useful work because it can make things move	Practical activities that could be demonstrated by the teacher OR done by learners themselves (at school) • Squeeze air in plastic bags, balloons or plastic bottles: air resists being compressed • Close the opening of syringe or bicycle pump and push in plunger. Record what happens.	Balloons, plastic bags, syringes, bicycle pump
Total 8 weeks (28 hours)		• Machines that use energy from moving air. - Examples of machines (vehicles or objects) that use wind energy to do work or make things move. - The type of structure of each machine.	- Identify, observe and write about different machines (vehicles or objects) that use wind energy to move or do work, (from information provided) - Identify the type of structures of each machine: shell or frame structure. - Motivate why the structure are suitable for these machines. - Make a simple handheld windmill.	Case study: Pictures of machines using wind energy. Waste materials such as: cardboard, wire, soft drink cans, plastic.
ASSESSMENT		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries, essays etc. Mid-year examination on first two terms' work (45min) for 40 marks. The examination must include questions on both the Science and Technology content and processes covered during terms 1 and 2. • Refer to the range of the skills specified under specific Aims 1 and 3. Note: that knowledge and understanding of investigations and practical work should also be assessed in written worksheets, reports, homework exercises, tests and exams. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected case study	Refer to the skills specified under specific Aim 2.

GRADE 4 TERM 3				
STRAND: ENERGY AND CHANGE AND STRUCTURES				
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
2 weeks (7 hours)	Sound	• Sound, energy, and music - Sound is a type of energy. - Sound travels through materials: vibrations can be heard and felt - Vibrations pass energy on to other things, - Quick and slow vibrations give high and low sounds: - Musical Note/s; high and low Note/s - Boxes and tubes make sound louder	• Make various objects vibrate: string, ruler, hacksaw blade. • Listen to ticking sound of clock through the air, through a bag filled with water, through a solid such as a wooden table. • Change the length and tension of the vibrating object to hear different sounds. • Listen to, and create different high and low sounds by singing or playing an instrument.	String, ruler, hacksaw blade, elastic bands, clock Musical instruments such as guitar, flute, etc.
1 week (3½ hours)	Making sound louder.		• Investigate how the shape and form of different musical instruments make the sound louder. • Make and play with a tin-can telephone.	
1 week (3½ hours)	Reflected sound Noise pollution	- Reflection of sound - Sound pollution by vehicles/machines/factories	Listen to sound reflection (echo) formed by clapping, shouting in an empty hall, in nature. Research consequences of ongoing sound. - Effect of noise pollution on the hearing of humans - Research legislation on sound pollution from factories vehicles, machines: link to human rights.	Books or other printed resources The internet Musical instruments such as guitar, flute, etc String, tin-cans Case study

GRADE 4 TERM 3				
STRAND: ENERGY AND CHANGE AND STRUCTURES				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	
1 week (3½ hours)	Indigenous Musical instruments	• Case study: Variety of musical instruments indigenous to the local area - Compare musical instruments from two different cultures.		Reference books, pictures, internet.
3 weeks (11½ hours)	Musical instrument: Design and make a solution	• Technology process - Identify a need or a problem - Suggest a possible solution to the problem - Design a solution, taking given specifications and constraints into account - (specifications must include shell structure and strengthening of structures) - Make an instrument that works by blowing on it or plucking its strings - Evaluate the final product using the specifications	• Technology activity Learners must - respond to a story or scenario (problem statement) and identify the problem - draw the people and a possible solution to the problem - take the given specifications and constraints into account and draw a final design (shell structure) - use tools and materials in class to make an instrument that works by blowing on it or by plucking its strings. - evaluate the final product using the specifications	A scenario(story) that involves people with a need or problem in regard to sound, music, musical instruments Tools + materials
Total 8 weeks (28 hours)				
ASSESSMENT		One formal recorded class test. One selected translation task. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. The class test must include questions on the Technology content covered during the term Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected practical task	
			Refer to range of skills listed under Specific Aim 2.	

GRADE 4 TERM 4				
STRAND: EARTH AND BEYOND AND MECHANISMS				
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
1½ weeks (5¼ hours)	Finding out about space	- Space exploration - Visits to the Moon and Mars - Machines/craft needed for space travel (simple examples). - Type of structures, materials and energy used for space craft. - Machines and energy (fuel) are essential for space exploration. - Types of structures used for space craft: pictures - Possible materials for building space craft specifications regarding temperature and pressure.	Listen and respond to stories/information on Moon and/or Mars exploration.	Case study on space travel or Moon landings or Mars exploration. Pictures, photos, diagrams
1½ weeks (5¼ hours)	Our place in space: Objects in the sky	- The Sun - appears to be moving: rotation of the Earth. - rises in the east, sets in the west visible for only about half of a 24 hour day - rising and setting indicates directions: East, West and North and South. - a ball of burning (very hot) gas; a star - provides heat and light energy to Earth.	- Observe the apparent movement of the Sun - Determine direction by using the Sun - Determine time passing by using the Sun: changing shadow lengths and direction using a vertical stick. - Record observations by marking shadow positions on a diagram (Sundial)	Pictures, posters, solar system model
1½ week (5¼ hours)		- The Moon - cold, rocky object - moves (revolves) around Earth - rises in the east, sets in the west: indicates direction. - reflects Sunlight: no light of its own. - Moon phases 'Moon stories': stories people told long ago about the Moon.	- Observe the movement of the Moon (rising in the east, setting in the west) - Observe the gradual changing of the shape of the Moon over a period of a calendar month. Make simple drawings of the different phases: How long does it take for the shape of the Moon/phase to be repeated? - Listen to, read or tell stories people told long ago about the Moon. (Indigenous knowledge).	Pictures, posters, solar system model, torch

GRADE 4 TERM 4				
STRAND: EARTH AND BEYOND AND MECHANISMS				
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
1 week (3½ hours)		- The Earth- the 'Blue Planet' - The Earth is a planet in the solar system - Differences between planets and stars - The Earth moves(revolves) around the Sun once a year: causes seasons (no explanation) - The Earth is a rocky ball in space. - Most of the surface of the Earth is covered with water (sea). - Continents and islands	Tabulate the difference between planets and stars	Posters, pictures, solar system model, globe
1 week (3½ hours)		- The Stars - Appear to be moving - Visible at night - Positions of best known groups of stars (constellations) at different times of the year. (In-depth knowledge of constellations not necessary) - The Sun is nearest star to the Earth - Star stories(lore): beliefs and stories of the indigenous people about the Milky Way, Orion-Pleiades and the Southern Cross: Indigenous Knowledge Systems used for predicting seasons and when to plant crops.	- Identify the different positions of the constellations using 'star charts', or posters. - Listen to/read and respond to stories about the Sun and the stars and their role in beliefs in different cultures, for example for identifying seasons for planting and growing crops.	Posters, pictures Star charts Information/stories about cultural beliefs The teacher, elderly person, traditional healer read or tell stories about planting and growing crops and beliefs in different cultures.

GRADE 4 TERM 4					
STRAND: EARTH AND BEYOND AND MECHANISMS				Resources For all activities: Textbook Worksheets/workbooks	
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations		
1½ weeks (5¼ hours)	Movement	Moving on land: Mechanical systems - Vehicles used for transport of people and goods on Earth. - Simple mechanisms used in vehicles to enable rotary motion; wheels and axles: the development of the wheel from log rollers to more heavy blocks (to build pyramids), to heavy wooden discs with moving axles and lighter discs spinning on fixed axles. Moving in space: - Propulsion using gas: Balloon rocket on a string	Identify different machines (vehicles) used for travelling on land (motorcar, bus, train, motorbike, bicycle, etc); all have wheels and axles that enable them to move.	Pictures, posters, photos, Real examples of wheels, axles in cars, bicycles, toys.	
Total 8 weeks (28 hours)			Investigate how a balloon can be propelled when an inflated balloon is released. - Attach balloon to a drinking straw threaded onto a fishing line pulled tight between two points. Release the inflated balloon and observe how it travels along the fishing line.		
ASSESSMENT		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. End of year examination (45 min) for 40 marks on the work done in four (4) terms. The class test and examination must include questions on the Technology content covered during the year. Record one project (can be done in any term) Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.			
		One selected practical task. Refer to range of skills listed under Specific Aim 2.			

NATURAL SCIENCES AND TECHNOLOGY: GRADE 5

GRADE 5 TERM 1				
STRAND: MATTER AND MATERIALS AND STRUCTURES				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	
4 weeks (14 hours)	Properties of Materials	• Comparison of materials regarding - Solid, liquid, gas (link to Grade 4) - Forces that can be exerted on different materials: Push (compression), pull (tension), twist (torsion), bend and shear.	• Investigate the effect of different forces on materials and demonstrate and explain the difference between the properties of materials by compressing, or stretching or twisting or bending or shearing them.	Any solid, liquid, gas (e.g. ice, water, steam, etc.) candle wax, iron bar glass plastic ruler wooden ruler selection of textiles elastic band.
		• Properties: - Hardness: a measure of the ability to withstand being scratched, cut or dented. - Toughness: a measure of how much energy is needed to break the material - Stiffness: a measure of how much a material will resist a bending force OR - Flexibility: a measure of how easily the material will bend - Strength in tension: a measure of its ability to withstand pulling forces.	Examples: - Hardness: scratching a candle and iron bar with a sharp object - Toughness: hitting glass and an iron bar with hammer - Stiffness/flexibility: bending a plastic ruler and a wooden ruler - Strength in tension: stretch material such as different textiles or elastic bands. Learners must engage in at least 2 practical activities themselves (at school) to explore the properties of different materials. The factors that will affect the results must be identified in each case. Examples: - compare 3 kinds of wood for hardness by hammering nails into them (factor: size of nail, size of hammer) - compare different kinds of plastic bottles for toughness by hitting them with a hammer/cutting (possible factors: size of bottle, thickness of plastic). - compare 3 kinds of plastic ruler for flexibility (by flicking) (possible factors: thickness of ruler) - compare 3 kinds of elastic bands/any other material that can be stretched for strength in tension (possible factors: thickness/width/length of material)	3 kinds of wood, nails, hammer 3 kinds of plastic bottles, 3 kinds of elastic fabric or bands

GRADE 5 TERM 1				
STRAND: MATTER AND MATERIALS AND STRUCTURES			Resources	
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	For all activities: Textbook Worksheets/workbooks
1 week (3½ hours)	Uses of materials	- Materials used in frame structures to support loads - Indigenous materials that are used in the construction of traditional houses. - Indigenous technologies (struts and beams in frame structures) that are used in the construction of houses to support loads (the roof). - Round shapes, e.g. Zulu hut (uguqa), Xhosa rondawel, Nama 'matjieshuis', igloo	Record the results in a table. - Research: read about and observe materials that are used and are designed to support loads (used for building structures specifically to support loads like water tanks/towers, power lines, houses, traditional homes.) - the shape of the members of the building (folding, tubing) - strengthening of the structure (braces and struts) - compare materials used to construct traditional homes and materials used to construct a modern building	Case study Pictures/posters Real examples Books/material with Information
3 weeks (10½ hours)	Structure to support a load: design a solution.	Technology: Design process - Identify a need or a problem (with assistance) - List specifications and constraints - Suggest a possible solution to the problem - Evaluate an example of given structure using the specifications (fit for purpose) - Communicate; advertise or report on the solution.	Learners must - respond to a story or scenario (problem statement) and identify the problem (regarding a structure which must support a load) - identify, with help, possible specifications and constraints. - sketch a possible solution (2 dimensions) to the problem - make a model/prototype/product to solve the problem. - evaluate their own product (use pictures/drawings and/or description of the structure.)	Books/material with Information Pictures
Total 8 weeks (28 hours)				

GRADE 5 TERM 1				
STRAND: MATTER AND MATERIALS AND STRUCTURES				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	
ASSESSMENT		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. The class test must include questions on the Technology content covered during the term Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected practical task Refer to range of skills listed under Specific Aim 2.	

GRADE 5 TERM 2				
STRAND: ENERGY AND CHANGE AND MECHANISMS				
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
1½ weeks (5¼ hours)	Energy	• Concept of energy - Explain the concept energy: something that is needed to be able to do work (the capacity to do work).		Pictures, posters, real examples
		• Renewable and non-renewable sources of energy - The concepts of renewable and non-renewable sources of energy - Examples of renewable and non-renewable sources of energy, e.g. fossil fuels, running water, wind etc.	• List advantages and disadvantages of renewable and non-renewable sources of energy. • Investigate the effect of depriving a flame of oxygen.	Pictures, posters, real examples
		• Different forms of energy: - Potential Energy: stored energy and can be used - (not necessary to know different types) - Kinetic Energy: all moving objects possess kinetic energy. - Examples of potential and kinetic energy	• Investigate examples of potential and kinetic energy: - potential energy: magnets, electric cells, a stretched spring or elastic band, an object that can do work by falling (because of the gravitational force of the Earth), food , etc - kinetic energy: any moving object; moving water; moving air, wind, moving part of a machine, etc	Pictures, posters, real examples

GRADE 5 TERM 2				
STRAND: ENERGY AND CHANGE AND MECHANISMS				
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
3 weeks (10½ hours)	Energy we can see, hear and feel	Our senses can only detect a small portion of the light and sound in the universe. • Light: Energy we can see. Sources: Sun, coal, paraffin, candle, wood, electricity, wind, water, etc. for producing light energy. • Heat: Energy we can feel. Energy sources for heating things: Sun, coal, paraffin, candle, wood, electricity, wind, water, etc. - Warm and cold related to rise and fall of temperature: Temperature is an indication of the amount of heat a body possesses. - Fire needs three things in order to start: fuel, oxygen and a source of start-up energy; possible dangerous situations when working with fire. - Heat energy flows from an object with a higher temperature to an object with a lower temperature. • Sound: Energy that we can hear. Sources: clapping, shouting, singing, musical instruments, etc (Links to Grade 4)	• Investigate light, heat and sound. - Identify and tabulate different sources of light, heat and sound energy, at home, at school. (e.g. stove for heating using coal/wood/electricity, etc.) - Detect a rise and fall in temperature by using the sense of touch (warm and cold). - Measure temperatures changes in a beaker of water that is being heated using a candle. Record temperature changes. - Identify the causes of fires in own neighbourhood. List the causes. All learners should participate and contribute to the list. Suggest ways in which these fires could have been prevented. - Make a poster showing what to do in the case of a fire.	Pictures, posters, real examples Pictures, posters, real examples, warm and cold objects Thermometer

GRADE 5 TERM 2				
STRAND: ENERGY AND CHANGE AND MECHANISMS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	
1 week (3½ hours)	Energy for moving things (work)	• Electrical energy: A source of electrical energy is needed: cell/battery or mains electricity. - Electricity is used for lighting, heating, driving machines, etc. - Different uses of electrical energy at home, at school, in shops, factories, hospitals, street lighting etc. - Safety when using electricity: electrical energy can be dangerous. Know rules for the usage of electrical energy. Sources of energy used to move things, e.g. fossil fuels, water, Earth's gravitational pull, springs or elastic bands.	Investigate energy used for moving things. Use given research material, case studies, pictures, etc. (must include fossil fuels, water, Earth's gravitational pull, springs/elastic bands)	Pictures, posters, real examples, poster of the water cycle, etc
1 week (3 hours)	Energy systems	• Systems that store and release energy - Parts of systems that stretch and bend: springs, rubber bands. - Parts of systems that can fall: water	• Investigate simple systems (prepared by teacher) that use springs/rubber bands: e.g. catapult, model vehicle using twisted/stretched rubber band/spring etc. Observe how they work. Operate the systems (make them work). • Investigate simple systems (prepared by teacher) that use objects that fall (gravity) to make them move: e.g. water, (water wheel), a weight falling causing wheels to turn, wind (windmill) etc. Observe how they work. Operate the systems (make them work).	Real examples Pictures, posters

GRADE 5 TERM 2				
STRAND: ENERGY AND CHANGE AND MECHANISMS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	
1½ weeks (5¼ hours)	Machines and mechanisms	• Mechanisms - Wheels and axles, gears and axles. - hinges	Identify the flow of energy: potential to kinetic in machine or mechanism. (system) • Identify machines that move or have moving parts that are based on the principle of wheels and axles. This will include examples of gears and pulleys. Demonstrate the working of wheels and axles by 'building' examples using bottle tops, cardboard circles, round tins, bottoms of plastic bottles and ice cream sticks, sositie sticks, etc. • Identify machines that move or have moving parts that are based on the principle of hinges. Demonstrate the working of hinges by 'building' examples of hinges using cardboard, etc.	Real examples Pictures , posters
Total 8 weeks (28 hours)				
ASSESSMENT		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries, essays etc. Mid-year examination on first two terms' work (50min) for 45 marks. The class test and examination must include questions on the Technology content covered during the term Refer to the range of the skills specified under specific Aims 1 and 3. Note: that knowledge and understanding of investigations and practical work should also be assessed in written worksheets, reports, homework exercises, tests and exams. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected case study Refer to the skills specified under specific Aim 2.	

GRADE 5 TERM 3				
STRAND: LIFE AND LIVING AND MECHANISMS				
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
3 weeks (10½ hours)	Moving an object (Links to Term 2 Grade 5)	• Technology process: - identify a need or a problem - identify specifications and constraints (assisted) - suggest and draw a possible solution to the problem - make the solution, if possible using the wheels and axles made in term 2 - evaluate machine using the specifications	• The whole of the following process must be done IN CLASS: Design and make a solution to a problem - Respond to a story or scenario (problem statement) and identify the problem regarding a machine that can be used to move objects/an object using elastic/rubber bands/springs and/or falling weights. - Learners must write in their own words what they will do to solve the problem. - identify (with help) specifications and constraints regarding size, found material, type of material, construction method, type of object to be move. - draw a possible solution to the problem - make/build the model - evaluate the model using the specifications and constraints that have been identified.	Material such as: Bottle tops, tins, plastic bottles, ice-cream sticks, sosalie sticks, cardboard, glue, rubber/elastic bands/springs, string, weights like sand bags, stones, etc. Tools: scissors, craft knives, punches, hacksaw, etc. Pictures/diagrams/sorting cards
2½ weeks (8¾ hours)	Energy flow and biodiversity	• Food chains and flow of energy: - Food chains always start with green plants. They produce food: producers (Revise photosynthesis) - All animals depend on green plants for food: energy. - Energy flows from the Sun, to plants that photosynthesise, to the animals that eat plants and carnivores that eat animals.	- Explain and describe food chains with up to 4 organisms. - Sequence a food chain using given organisms.	Pictures/diagrams/sorting cards

GRADE 5 TERM 3				
STRAND: LIFE AND LIVING AND MECHANISMS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	
2½ weeks (8¼ hours)	Biodiversity of living things	• Plants: Plants make their own food but depend on light, soil, water, air - soil: nutrients, water, anchorage - water: photosynthesis, transport and support - air: carbon dioxide for photosynthesis; oxygen for respiration • Soil forms from broken down/weathered rocks and decaying plants and animals - Only the topsoil contains nutrients for plants. - Soil is formed very slowly. - If topsoil is lost, soil becomes less fertile. • Plant lifecycle Plants go through different stages - pollination in flowers: pollen and egg - fertilisation: seeds and fruit - germination: seedling - growth: young plant - maturation: mature plant - flowering, pollination, fruiting and seed dispersal • Animals • All animals depend on plants for food • Example of an animal (insect, amphibian, reptile or mammal) different stages. - fertilisation: sperm and egg - pregnancy: birth and baby - growth: young animal - maturation: adult animal - reproduction: produce offspring - Plant or animal changes through its life cycle - Death can occur at any stage of the life cycle.	• Identify and label diagrams of the stages of plant and animal life cycles • Sequence pictures of the stages of plant and animal life cycles • Name the stages and processes of one plant and one animal life cycle (no metamorphosis).	
Total 8 weeks (28 hours)				

GRADE 5 TERM 3				
STRAND: LIFE AND LIVING AND MECHANISMS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: investigations, practical work and demonstrations	
ASSESSMENT		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. The class test must include questions on the Technology content covered during the term. One selected translation task Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected practical task Refer to range of skills listed under Specific Aim 2.	

GRADE 5 TERM 4				
STRAND: LIFE AND LIVING AND EARTH AND BEYOND				
Time	Topic	Content	Possible activities: Investigations; practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
1 week (3½ hours)	Structure of the Earth	• Centre of the Earth: very hot, melted rock • Layers of hard rock on top of melted rock • Different types of rock: - igneous - sedimentary - metamorphic Main characteristics of each.	Describe the structure of the Earth (simple terms: no drawings or terms such as mantle and core).	Pictures, posters model of the structure of the Earth
1½ weeks (5¼ hours)	Surface of Earth	• Surface of the land on Earth - covered with soil and rocks - topsoil: all life forms depend on plants growing in topsoil: nutrients and water - Soil, mixture of particles - clay - silt - sand - Soil types: differences between - clay - loam - sand	Investigate, observe and describe the appearance, smell, texture of different soil types: clay, loam, sand. Record observations as a table.	Samples of different soils types Pictures, Photographs, Diagrams, Real specimens

GRADE 5 TERM 4				
STRAND: LIFE AND LIVING AND EARTH AND BEYOND				
Time	Topic	Content	Possible activities: Investigations; practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
1 week (3½ ours)	Rocks	• Sedimentary rocks - Formation of sedimentary rocks by water and wind: concept of sedimentation. - Main properties/characteristics of sedimentary rocks. - Examples of sedimentary rocks: sandstone, limestone, slate (one example only, preferably from local area). - Some sedimentary rocks contain fossils.	Illustrate the formation of sedimentary rocks by layering different materials	Pictures, Diagrams Photographs (worldwide and in South Africa) Clay Plaster of Paris Containers Variety of parts of plants. Shells, Bones
1½ weeks (5¼ hours)	Fossils	• Fossils formed in sedimentary rocks: process. - Remains of living organisms that lived long ago. - Importance of fossils: evidence/record of history of life on Earth. - Important fossils found in South Africa such as fossil plants, arthropods, dinosaurs, early mammals, early hominids and humans (Cradle of Humankind)	Practical activity done at school: Make a model of a fossil using clay, plaster of Paris, leaves, shells, bones.	

GRADE 5 TERM 4				
STRAND: LIFE AND LIVING AND EARTH AND BEYOND				
Time	Topic	Content	Possible activities: Investigations; practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
3 weeks (10½ hours)	Senses in animals and humans.	• Importance of senses - Senses help animals and humans to survive. - Animals need their sense organs in order to find food, find mates, look after their young, avoid danger and protect themselves. - Identify and describe how an animal's sense organs help it to survive (feed, sense danger, find a mate, look after its young, etc.) (at least 2 different examples) • Sense organs - eyes: seeing - ears: hearing - tongue: tasting - nose: smelling - skin: touch The sense organs are stimulated by things in the environment: Stimulation of the sense organs: - eyes: light - ears: sound - tongue: chemicals - nose: chemicals - skin: pressure and heat	Investigate the stimulation of the different senses. • Seeing (kaleidoscope, colours, lights etc) • Hearing (music, singing, clapping, etc. to experience soft and loud sounds, high and low pitches) • Tasting (similar looking substances such as salt, sugar, cream of tartar to experience salty, sweet, bitter and sour tastes) • Touching, e.g. different objects in a closed bag to experience rough, smooth, soft, hard textures. • Smelling, e.g. identifying different fruits and spices when blindfolded.	Different coloured paper, lights, musical instruments, salt, sugar, cream of tartar/lemon juice, etc rough, smooth, soft, woolly, textiles, different fruits, spices, or other substances that have distinctive smells. *Books or other printed resources
Total 8 weeks (28 hours)				

GRADE 5 TERM 4				
STRAND: LIFE AND LIVING AND EARTH AND BEYOND				
Time	Topic	Content	Possible activities: Investigations; practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
ASSESSMENT		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. End of year examination (50 min) and 45 marks on the work done in four (4) terms. The class test and examination must include questions on the Technology content covered during the year Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected practical task. One project Refer to range of skills listed under Specific Aim 2.	

NATURAL SCIENCES AND TECHNOLOGY: GRADE 6

GRADE 6 TERM 1					Resources
STRAND: ENERGY AND CHANGE					For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations		
2 weeks (7 hours)	Electricity	• Electrical circuits and circuit diagrams: - Electrical charge: negative and positive charges in all matter. (no mention of electrons or protons) - Electrical current: movement of charges 'carrying' energy through the circuit - Electrical circuit: a source of electrical energy (cell/battery) and other circuit components connected to each other - Electrical circuit components: cell/battery, bulbs/lamps, insulated wires, switch: symbols for circuit components: cell/battery, bulb, switch, insulated wires - Electrical circuit diagrams: simple circuit diagrams using different combinations of the components	Investigate an electrical circuit with the following components: cell/battery (input device) bulb/lamp (output device) insulated wires switch (control/process device) Identify and draw symbols for the circuit components Explain and draw simple electrical closed circuit diagrams	Cells, bulbs, insulated wires, switches diagrams	
1½ weeks (5¼ hours)		• Conductors and insulators: Concept of conductors and insulators. - Materials, e.g. metals (coins, paper clips, pieces of wire) that are good conductors. - Materials that are good insulators (poor conductors), e.g. plastic, cardboard, wood, rubber.	• Investigate the electrical conductivity of different materials: - paper clip - coin - piece of wire - plastic - cardboard - rubber Draw a table of materials that are good conductors and those that are poor conductors (insulators).	Cells, bulbs, insulated wires, switches Conductors: coins, paper clips, pieces of wire, metal utensils, etc Insulators: plastic, cardboard, wood, rubber objects	

GRADE 6 TERM 1					Resources
STRAND: ENERGY AND CHANGE					For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations		
2½ weeks (8¾ hours)	Energy transfers in an electrical circuit: system	• Concept of a system: - Parts of a system work together - Change in one part of a system (circuit) affects all the parts of the system. - Inputs and outputs Energy transfer from one part of a system to another cell/battery to circuit - Concept of electrical energy transfer. - Electrical energy stored in cells - Relationship between the number of cells and the amount of energy. (More cells = more energy) • Resistance - Concept of resistance - Relationship between the number of bulbs in series and the brightness of the bulbs. - Concept of current	Investigate the effect of increasing the number of the cells in series on the brightness of the lamps. Record the results. Investigate the effect of increasing the number of lamps in series on the brightness of the lamps. Record the results.	Cells, bulbs, insulated wires, switches Cells, bulbs, insulated wires, switches	
1 week (3½ hours)	Energy transfer to surroundings	• Energy transfer from different appliances or machines to surroundings: - heat (geyser, stove, kettle) - sound (drill, vacuum cleaner, hair dryer) - light (light bulbs) - movement (electrical fan) - Energy loss (wasted energy)		Pictures of tools and appliance e.g. electric drill, electric iron, kettle, food mixer, etc	

GRADE 6 TERM 1					Resources For all activities: Textbook Worksheets/workbooks
STRAND: ENERGY AND CHANGE					
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	Pictures of signs and symbols	
1 week (3½ hours)	Safety and electricity	• Basic safety with mains electricity. - Concept of voltage - High and low voltage: voltages higher than 80 V can kill people • Insulation • Illegal connections - Warning signs and hazard symbols. - Importance of insulation of electrical appliances, machines and wires: danger of worn of damaged insulation. - Consequences of unsafe use of electricity: danger of illegal connections to the national electricity supply. - Actions in an emergency.	Identify warning signs/hazard symbols on appliances and ESKOM transformers. Recognise illegal connections. Draw up a list of safety rules for working with electrical appliances and machines.		
Total 8 weeks (28 hours)					
ASSESSMENT					
One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. The class test must include questions on both the science and technology content covered during the term			One selected practical task		
Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.			Refer to range of skills listed under Specific Aim 2.		

GRADE 6 TERM 2				
STRAND: EARTH AND BEYOND AND ELECTRICAL SYSTEMS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	
3 weeks (10½ hours)	An electrical circuit to solve a problem: alarm system needed for protection	• Technology process - identify a need or a problem - identify specifications and constraints - suggest and draw a possible solution to the problem - apply knowledge of simple circuits to design - and make alarm - evaluate device using the specifications - systems diagrams: input- process-output	• Design and make a solution to the problem: - respond to a story or scenario (problem statement) and identify the problem regarding an electrical circuit needed to perform a certain function , e.g. design and make an alarm consisting of a battery, a buzzer or bell, switch. - write in (their own words) what they will do to solve the problem: design switch that will be triggered by a thief. - identify(with help) specifications and constraints regarding size, components needed, construction method, etc - draw a possible solution to the problem: circuit diagram with explanation - build the model - evaluate the model using the specifications and constraints identified: list advantages and disadvantages.	Pictures, posters, real examples of circuits Cells, bulbs, insulated wires, switches, buzzer, bell

GRADE 6 TERM 2				
STRAND: EARTH AND BEYOND AND ELECTRICAL SYSTEMS				Resources
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	For all activities: Textbook Worksheets/workbooks
2½ weeks (8¾ hours)	Solar system	• Solar system: - Concepts: star, planet, Moon (link to and extend Grade 4). - Earth, Moon and Sun are part of our solar system: the Sun and stars only appear to move as the Sun rises and sets each day. In reality, it is the Earth which is spinning that makes the Sun appear to move. • The Sun - The Sun is a star, because it produces its own energy - The Sun is the source of heat and light energy - The Sun is much bigger than the Earth and the Moon, and is much further away than the Moon. - The Sun is at the centre of our solar system. - Many other stars (Suns) • The Earth - The Earth is a planet made of rock. - The Earth rotates (spins) on its own axis: the rising and setting of the Sun and stars - The Earth revolves in orbit around the Sun. - The Earth gets its heat and light from the Sun. - The Sun only appears to move from the perspective of an observer on the surface of the Earth. - The Earth has an atmosphere and water.	Construct a model of part of the solar systems: Sun, Earth and Moon, showing the positions of the three bodies as well as their relative sizes (not to scale).	Pictures, posters, solar system model

GRADE 6 TERM 2				
STRAND: EARTH AND BEYOND AND ELECTRICAL SYSTEMS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	
		• Other planets Eight major planets in our solar system. - Inner planets are rocky. - Outer planets are gas giants. • The Moon - The Moon is a satellite of the Earth - The Moon is made of rock and is about $\frac{1}{4}$ size of the Earth. - The Moon revolves in orbit around the Earth. - The Moon reflects light from the Sun. - The Moon does not have an atmosphere. - Many other planets have Moons, sometimes more than one		Real examples Pictures , posters

GRADE 6 TERM 2				
STRAND: EARTH AND BEYOND AND ELECTRICAL SYSTEMS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	
2½ weeks (8¾ hours)	Life on planet Earth	• Features of the Sun, Earth and Moon in relation to: - movement - size - atmosphere - radiation of light - presence of water • Supporting life on Earth: key elements - heat and light from the Sun (radiation) - air/atmosphere with oxygen - water - soil • Ecosystem must provide sufficient - air - water - food - shelter/habitat for plants and animals. • Different ecosystems support different kinds of organisms: deserts, rivers, mountains, sea, rocky shore, pond, wetland, grassland, forest.	• Select an ecosystem on the school grounds for this study. Roughly measure 5mx5m square. In this square list three plants and three animals that are found in the ecosystem. - determine the conditions there that help these animals and plants to live there: food, water, light, shelter. - list the possible threats to this ecosystem (All learners should contribute to the list) - make suggestions on how to overcome the threats: all learners should make suggestions.	
Total 8 weeks (28 hours)				

GRADE 6 TERM 2				
STRAND: EARTH AND BEYOND AND ELECTRICAL SYSTEMS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	
Assessment		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries, essays etc. Mid-year examination on first two terms' work (60 min) for 50 marks. The class test and examination must include questions on the Technology content covered during the term Refer to the range of the skills specified under specific Aims 1 and 3. Note: that knowledge and understanding of investigations and practical work should also be assessed in written worksheets, reports, homework exercises, tests and exams. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected case study Refer to the skills specified under specific Aim 2.	

GRADE 6 TERM 3				
STRAND: MATTER AND MATERIALS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: Investigations practical work and demonstrations	
1 week (3½ hours)	Mixtures , Solutions and Melting	• Melting and dissolving - Difference between melting and dissolving - Temporary change • Mixtures - Consist of at least two different substances such as salt and sand, different types of dry beans, tea leaves and sugar. • Dissolving - One substance may dissolve in a liquid eg. salt in water, copper sulphate in water. • Melting: - Heat must be added to cause the change from solid to liquid eg. candle wax, naphthalene. Difference between dissolving and melting.	• Practical activities that must be completed at school. - Observe the making of mixtures: e.g. salt and sand, different types of dry beans, tea leaves and sugar. - Observe the process dissolving one solid substance in a liquid. - Observe the process of dissolving a liquid into a liquid. - Observe the heating of a substance to cause melting - Record the difference between melting and dissolving. - Reverse melting by cooling - Reverse dissolving by evaporation.	Mixtures: materials to make mixtures, salt sugar, sand, dry beans, etc. Melting: Candle wax/ naphthalene , burner for heating, glass containers Dissolving: water, sugar, salt, copper sulphate , containers
2½ weeks (8¾ hours)	Soluble and insoluble substances	• Soluble and insoluble substances. - Terminology: solution, solvent, solute. - Substances are - Soluble in water eg. salt in water: solution - Insoluble in water eg. sand in water: mixture - Insoluble in water but soluble in other liquids: oil paint in turpentine: solution.	• Practical activities that must be completed at school. - Investigate different substances to see if they are soluble/insoluble in water: - Measure and mix 100 ml of water and 5 ml of different solids: e.g. sugar, salt, copper sulphate, oil , vinegar, flour, sand - Test different solutions by filtering to see if the solid can be separated from the liquid. - Test insoluble mixtures to see if the solid can be separated from the liquid. - Record observations regarding the solubility of different solids as drawings and by writing.	Containers , water, sugar, salt, copper sulphate, oil, vinegar, flour, sand, etc

GRADE 6 TERM 3				
STRAND: MATTER AND MATERIALS				Resources For all activities: Textbook Worksheets/workbooks
Time	Topic	Content	Possible activities: Investigations practical work and demonstrations	
		• Mixtures - The solid can be seen in the liquid - The mixture can appear cloudy - The solid can be settled out of the mixture • Solutions - A solid cannot be seen - The solution has a 'glassy' appearance - The solid does not settle out • Conservation of matter - Solids are still present in solutions: matter broken down into small particles ; not visible to the naked eye	• Teachers demonstration: Demonstrate that oil paint can be dissolved in turpentine Demonstrate that wax can be dissolved in Methylated spirits Draw/illustrate what happens to solids: - in a mixture - in a solution	
3 weeks (10½ hours)	Rate of dissolving	• Factors that affect the rate of dissolving - temperature - grain size	• Practical activities that must be completed at school. - Carry out a fair test with help from the teacher to determine the influence of different temperatures on the rate of dissolving (same volume of liquid, same mass/volume of solid, same grain size). Record observations as a graph. - Carry out a fair test with help from the teacher to determine the influence of different grain sizes on the rate of dissolving (same volume of liquid, same mass/volume of solid, same temperature) Record observations as a graph.	Containers, water (heating source) Solids(salt, sugar, etc) The same solid with different grain sizes (e.g. sugar or salt)

GRADE 6 TERM 3				
STRAND: MATTER AND MATERIALS				Resources
Time	Topic	Content	Possible activities: Investigations practical work and demonstrations	For all activities: Textbook Worksheets/workbooks
1½ weeks (5¼ hours)	Environment and water resources	• Importance of water for plants and animals ecosystems - Water is a solvent: transport of substances - Habitats for plants and animals. - Dispersal of seeds • Wetlands: Sponges to regulate flow of water: concept of a wetland - Groundwater and wetlands act as resources for humans: water needed to support all life. - Location of one wetland in South Africa.	- Research the importance of a specific wetland: impact of the loss of wetlands on biodiversity (humans/plants and animals) - Write a brief report on the importance of wetlands	Books, information on wetlands, pictures
Total 8 weeks (28 hours)				
Assessment		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. The class test must include questions on the sciences and technology content covered during the term. One selected translation task. Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected practical task	Refer to range of skills listed under Specific Aim 2.

GRADE 6 TERM 4				
STRAND: LIFE AND LIVING AND MECHANISMS				
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	Resources For all activities: Textbook Worksheets/workbooks
2 weeks (7 hours)	Nutrition	• Food groups: Classification of food types: - food for growth - Oils and fats: food for energy and protection of organs. - Vitamins and minerals: foods for protecting bones, teeth and the immune system. • A balanced diet and diseases - A balanced diet contains sufficient quantities from all three food groups and vitamins and minerals. - Diseases result from not having a healthy, balanced diet, e.g. tooth decay, rickets, constipation, obesity, diabetes.	- Sort and tabulate different foods into the three major food groups - Read labels on food packaging to identify the three food groups. - Carry out a starch test with iodine on different foods such as bread, apple, egg. - Evaluate a given diet to determine if it contains sufficient quantities of all food groups.	Pictures of different food types Food packaging Different foods Iodine solution Pamphlets Charts Posters
1 week (3½ hours)	Health of the planet	• A healthy environment is important for the health of people All humans, plants and animals need a place where they can carry out their life processes successfully. - Humans, plants and animals need food, clean water, air and shelter to complete their life cycles successfully: depend on environment. - Humans can have a negative or positive effect on the environment: choose to have a positive impact on the environment	- List ways to improve the immediate environment for themselves and for the plants and animals around them. - Identify one action to improve the environment and carry it out, e.g. grow plants or vegetables, make a wormery, make a compost heap, recycle waste, organise a litter clean up, save water, save electricity.	Information on negative and positive effects on the environment

GRADE 6 TERM 4				
STRAND: LIFE AND LIVING AND MECHANISMS			Resources	
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	For all activities: Textbook Worksheets/workbooks
3 weeks (10½ hours)	Animals with skeletons	• Types of skeleton - Exoskeleton: concept of an exoskeleton; examples of animals with exoskeletons: insects, crabs, spiders, scorpions - Endoskeleton: concept of an endoskeleton; examples of animals with endoskeletons: fish, frogs, birds, reptiles, mammals. - Similarities and differences between the skeletons of different animals with endoskeletons • Human endoskeleton: - Bones of the human skeleton: - skull: protects the brain - backbone made up of many vertebrae: protects the spinal cord, supports torso - ribs: protect the lungs and heart, breathing - shoulder blades, upper limbs,(arms) hip bones and lower limbs (legs) : movement - Importance of different parts of the skeleton - Bones are held together by ligaments and can move in the joints.	- Observe and study pictures of different animal skeletons - Identify and label diagrams of the human skeleton	Pictures/posters/ diagrams Pictures/posters/ Diagrams X-rays of skeleton if possible. Model of human skeleton
	Movement	• Endoskeleton: - Possible because of skeleton and muscles. Muscles are attached to the bones to make movement possible. - Muscle contraction moves bones in skeleton. - Antagonistic muscles • Exoskeleton: - Possible because of skeleton and muscles. Muscles are attached to inside of exoskeleton - Muscle contraction more 'hinged: parts of exoskeleton.		

GRADE 6 TERM 4				
STRAND: LIFE AND LIVING AND MECHANISMS				Resources
Time	Topic	Content	Possible activities: Investigations, practical work and demonstrations	For all activities: Textbook Worksheets/workbooks
2 weeks (7 hours)	Types of movement/motion	• Movement: Different types: - linear (straight line) - reciprocal (up and down) - rotary (round and round) • Mechanisms to achieve different types of movement: - rotary motion into linear motion - rotary motion into reciprocal motion. • Use mechanisms to change the magnitude of movement Mechanical systems to change the input movement into a different kind of output movement, such as - Crank/windlass - Pulley - Gear	- Identify machines used to cause movement (indigenous knowledge) such as cranks, pulleys, gears - Operate models of - crank - windlass - pulley - gears prepared by the teacher . Observe how different mechanisms work. Tabulate the advantages of each mechanism.	Pictures, posters, real life examples of cranks, pulleys, gears or models prepared by the teacher
Total 8 weeks (28 hours)				
Assessment		One formal recorded class test. Assessment for learning (informal) using a variety of strategies and appropriate forms of assessment in tests, homework, worksheets, reports, summaries and essays etc. End of year examination (60 min) for 50 marks on the work done in four (4) terms. The class test and examination must include questions on the Technology content covered during the year. Refer to the range of skills specified under Specific Aims 1 and 3. Note: that knowledge and understanding of investigations, practical work and the technological design process should also be assessed in written worksheets, reports, homework exercises and tests. The cognitive skills listed under Specific Aims 1 and 3 will also apply to knowledge and understanding of investigations.	One selected practical task One project Refer to range of skills listed under Specific Aim 2.	

SECTION 4: ASSESSMENT

4.1 INTRODUCTION

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, concepts and skills) in a subject 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 and intended aims specified for Natural Sciences and Technology and in both informal and formal assessments it is important to ensure that in the course of a school year::

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

Barriers to learning and assessing

- Although there are many barriers to learning, teachers need to identify and build on strengths of learners in order to affirm their uniqueness. **All learners need to experience success.**
- Alternative strategies must be applied: more time, enlarged text, use of information communication technology, amanuensis or scribes in cases of learners with special educational needs.
- The use of alternative assessment relates to the change in the form of assessment used to accommodate all learners. It is important to vary the assessment strategy appropriately.
- Learners' personal involvement with tasks often improves their attention span, patience, persistence and commitment.
- Designing and making real products that can be used can give learners a sense of achievement and improve their self-esteem.
- The following strategies, depending on the physical barriers of LSEN learners, could apply when supporting:

- Using the support of others to help pupils take part safely in practical work, for example, the assistance of adults or other learners to help them to hold or manipulate tools, or to carry out activities according to instructions. It is important that the learners should retain control of the making process and be the decision makers.
- Learners can describe their design ideas for others to record or to translate into a drawing, whilst retaining control of the design idea and the modifications.
- Work on shorter, more focused tasks, rather than longer, open tasks. Doing so can provide learners with incremental elements of success, and regular motivation and reward.
- Use ICT applications, such as specialist software, to help sequencing and following instructions during practical work.
- Use modelling, role play, tape recorders, video and photographs to communicate, develop and record their ideas.
- Communicate using a range of methods avoiding over-reliance on the written word.

4.2. 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 assessment tasks are not taken into account for 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.

4.3 FORMAL ASSESSMENT

Grades	Formal School-based Assessments	End-of-year Examinations
R – 3	100%	n/a
4 – 6	75%	25%
7 – 9	40%	60%
10 and 11	25%	75%
12	25% including school-based mid-year examinations and 'trial' examinations	External examination: 75%

All assessment tasks that make up a formal programme of assessment for the year are regarded as Formal Assessments. Formal Assessment tasks are marked and formally recorded by the teacher for progression 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 provides teachers with a systematic way of evaluating how well learners are progressing in a grade and in a particular subject. Examples of formal assessments include tests, examinations, practical tasks, projects, oral presentations, demonstrations, performances etc. Formal assessment tasks form part of a year-long formal Programmes of Assessment in each grade and subject.

The cognitive demands of assessment used should be appropriate to the age and developmental level of the learners in the grade. Assessments in Natural Science and Technology must cater for a range of cognitive levels and abilities of learners with this context. The assessment tasks should be carefully designed to cover the content of the subject as well as the range of skills that have been specified under the Specific Aims.

The design of these tasks should therefore ensure that the full range of content and skills are assessed within each year of the Intermediate Phase. The Specific Aims, the topics and content and the range of skills must be used to inform the planning and development of assessment tasks.

Weighting of cognitive levels for the assessment of content in Grades 4, 5 and 6

	Knowing Science and Technology	Understanding Science and Technology	Applying Scientific and Technological knowledge	Evaluating, Analysing Synthesising Scientific and Technological Knowledge
%	40%	30%	15%	15%
Useful verbs	State Name Label List and others ...	Explain Describe Compare Plan Rearrange Give an example of and others ...	Predict Compare Design Use knowledge Demonstrate and others ...	Evaluate Suggest a reason and others ...

Note:

These cognitive skills apply to all three Specific Aims: Knowing and doing Science and Technology and Science and Technology and society.

Note:

A single formal class test in a term will not necessarily provide the most accurate and reliable evidence of every learner's performance. As far as possible, teachers should try to let learners write more than one class test per term in order to get a better picture of the abilities of the learners in the class. One formal class test per term is the minimum number that must be recorded.

4.4 ASSESSMENT REQUIREMENTS FOR NATURAL SCIENCES AND TECHNOLOGY

4.4.1 Grade: 4

The programme of assessment is designed to spread formal assessment tasks in all subjects in a school throughout the term:

PROGRAMME OF FORMAL ASSESSMENT				
FORMAL, RECORDED SCHOOL-BASED ASSESSMENTS 75%				END-OF-YEAR INTERNAL SCHOOL BASED EXAMINATION 25%
CONTENT		INVESTIGATIONS AND DEVELOPING TECHNOLOGICAL SOLUTIONS		WRITTEN EXAMINATION (45 MINUTES) : 40 MARKS
• Four formal class tests: 30 marks each • One mid-year examination: 40 marks • One project can be done in any term: 40 marks: recorded in term 4 The skills are specified in Specific Aims 1, 2 and 3. The class tests and examination MUST include questions on both Science and Technology		• Science: A selection of eight (prescribed) representative practical tasks, which cover the range of skills described in Specific Aim 2, of which three must be recorded. • Practical tasks differ with regard to the skills that can be assessed. The marks allocated per activity will therefore vary between 20 and 40. • Technology: A full technological design process (with support) addressing all the skills prescribed. The marks allocated for this activity will therefore vary between 20 and 40.		Content, concepts and skills across both sciences and technology and across all topics, including knowledge of investigations and some of the skills associated with practical work, must be assessed in the written exam.
SCHOOL-BASED ASSESSMENT (During the year)				
TERM 1	TERM 2	TERM 3	TERM 4	
• One formal class test. • One selected practical task	• One formal class test. • One case study • One mid-year examination (45 minutes)	• One formal class test • One selected practical task • One selected translation task	• One formal class test • One project • One selected practical task.	
25%	25%	25%	25%	
Convert to 75% (YEAR MARK)				25 %(EXAM MARK)

4.4.2 Grade: 5

The programme of assessment is designed to spread formal assessment tasks in all subjects in a school throughout the term

PROGRAMME OF FORMAL ASSESSMENT				
FORMAL, RECORDED SCHOOL-BASED ASSESSMENTS 75%				END-OF-YEAR INTERNAL SCHOOL BASED EXAMINATION 25%
CONTENT		INVESTIGATIONS AND DEVELOPING TECHNOLOGICAL SOLUTIONS		WRITTEN EXAMINATION (50 MINUTES) :45 Marks
• Four formal class tests (30 to 40 marks each) • One mid-year examination (45 marks) • One project :can be done in any term but should be recorded in term 4 (50 marks) The skills are specified in Specific Aims 1,2 and 3. The class tests and examination MUST include questions on both Science and Technology content		• Science: A selection of eight (prescribed) representative practical tasks, which cover the range of skills described in Specific Aim 2, of which three must be recorded. • Practical tasks differ with regard to the skills that can be assessed. The marks allocated per activity will therefore vary but should not be less than 20. • Technology: A full technological design process (with support) addressing all the skills prescribed. The marks allocated per activity will therefore vary but should not be less than 20.		Content, concepts and skills across both sciences and technology and across all topics, including knowledge of investigations and some of the skills associated with practical work, must be assessed in the written exam.
SCHOOL-BASED ASSESSMENT (During the year)				
TERM 1	TERM 2	TERM 3	TERM 4	
• One formal class test. • One selected practical task	• One formal class test. • One case study • One mid-year examination (50 minutes)	• One formal class test • One selected practical task • One selected translation task	• One formal class test • One project • One selected practical task	
25%	25%	25%	25%	
Convert to 75% (YEAR MARK)				25 %(EXAM MARK)

4.4.3 Grade: 6

PROGRAMME OF FORMAL ASSESSMENT				
FORMAL, RECORDED SCHOOL-BASED ASSESSMENTS 75%				END-OF-YEAR INTERNAL SCHOOL BASED EXAMINATION 25%
CONTENT		INVESTIGATIONS AND DEVELOPING TECHNOLOGICAL SOLUTIONS		WRITTEN EXAMINATION (60 MINUTES) :50 Marks
• Four formal class tests (40 to 45 marks each) • One mid-year examination (50 marks) • One project can be done in any term but must be recorded in term 4 (60 marks) The skills are specified in Specific Aims 1, 2 and 3. The class tests and examination MUST include questions on both Science and Technology content		• Science: A selection of eight (prescribed) representative practical tasks, which cover the range of skills described in Specific Aim 2, of which three must be recorded. • Practical tasks differ with regard to the skills that can be assessed. The marks allocated per activity will therefore vary but should not be less than 20. • Technology: A full technological design process(with support) addressing all the skills prescribed. The marks allocated per activity will therefore vary but should not be less than 20.		Content, concepts and skills across both sciences and technology and across all topics, including knowledge of investigations and some of the skills associated with practical work, must be assessed in the written exam.
SCHOOL-BASED ASSESSMENT (During the year)				
TERM 1	TERM 2	TERM 3	TERM 4	
• One formal class test. • One selected practical task	• One formal class test. • One case study • One mid-year examination (60 minutes)	• One formal class test • One selected practical task • One selected translation task.	• One formal class test • One selected practical task. • One project	
25%	25%	25%	25%	
Convert to 75% (YEAR MARK)				25 % (EXAM MARK)

4.5 EXAMINATIONS

4.5.1 Grade 4

In Grade 4 there is one examination paper on the whole year's work. The examination paper will be set for 45 minutes and 40 marks.

End-of-year Examination

TOPIC	TIME	WEIGHTING	
		%	MARKS (40)
T 1 • Living and non-living things • Features of plants and animals • Requirements for growth • Different structures • Animal shelter	1½ weeks 2½ weeks 2 weeks 1 week 1 week (8 weeks)	5 8 6 3 3 (25)	10
T 2 • Properties of Materials • Combination of materials to get new properties • Ways to strengthen materials • Solids, liquids and gases • Air and Gas	1½ weeks 2 weeks 1 ½ weeks 1 week 2 week (8 weeks)	5 6 5 3 6 (25)	10
T 3 • Sound • Musical Instrument	4 weeks 4 weeks (8 weeks)	13 12 (25)	10
T 4 • Finding out about space • Our place in space • Movement	1 ½ weeks 5 weeks 1 ½ weeks (8 weeks)	5 15 5 (25)	10
TOTALS	32 weeks	100	40

The weighting for the topics in a term must serve as a guideline for teachers. The purpose of providing the weighting is to ensure that all topics are covered.

4.5.2 Grade 5

In Grade 5 there is one examination paper on the whole year's work. The examination paper will be set for 50 minutes and 45 marks.

END-OF-YEAR EXAMINATION

TOPIC	TIME	WEIGHTING	
		%	MARKS (45)
T 1 • Properties of materials • Materials in frame structures • Designing a solution	4 weeks 1 week 3 weeks (8)	13 3 9 (25)	11
T 2 • Energy • Energy: Light, heat, sound, electrical • Energy for moving things • Systems that store and release energy • Mechanisms	1½ weeks 3 weeks 1 week 1 week 1½ week (8 weeks)	5 9 3 3 5 (25)	12
T 3 • Design and make a solution: moving an object • Energy flow and Food chains • Biodiversity of plants and animals	3 weeks 2½ weeks 2½ weeks (8 weeks)	9 8 8 (25)	11
T 4 • Below the surface of Earth • On the surface on Earth • Sedimentary rocks • Fossils • Senses in animals and humans	1 week 1½ weeks 1 week 1½ weeks 3 week (8 weeks)	3 5 3 5 (25) 9	11
TOTALS	32 weeks	100	45

The weighting for the topics in a term must serve as a guideline for teachers. The purpose of providing the weighting is to ensure that all topics are covered.

4.5.3 Grade 6

In Grade 6 there is one examination paper on the whole year's work. The examination paper will be set for 60 minutes and 50 marks.

END-OF-YEAR EXAMINATION

TOPIC	TIME	WEIGHTING	
		%	MARKS (45)
T 1 • Electricity • Conductors • Energy transfers : electrical circuit • Energy transfers: to surroundings • Safety and electricity	2 weeks 1½ weeks 2½ weeks 1½ weeks 1 week (8 weeks)	5 4 5 4 3 (25)	13
T 2 • Electrical circuit problem (T) • Solar system • Life on Planet Earth	3 weeks 2½ weeks 2½ weeks (8 weeks)	9 8 8 (25)	12
T 3 • Mixtures, solutions, melting • Soluble and Insoluble substances • Rate of dissolving • Water resources	1 week 2 ½ weeks 2 weeks 1½ weeks (8 weeks)	3 8 9 5 (25)	12
T 4 • Nutrition and food groups • Healthy of the planet • Animals with skeletons • Types of movement (T)	2 weeks 1 week 3 weeks 2 weeks	6 3 9 6 (25)	13
TOTALS	32	100%	50

The weighting of the topics in a term must serve as a guideline for teachers. The purpose of providing the weighting is to ensure that all topics are sufficiently covered.

4.6 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 as prescribed in the Curriculum and Assessment Policy Statements. Records of learner performance should provide evidence of the learner's conceptual progression within a grade and her/his readiness to progress or being promoted to the next grade. 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. Teachers in all grades report in percentages against the subject. The various achievement levels and their corresponding percentage bands are as shown in the Table below.

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.

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.

Reporting is a process of communicating learner performance to learners, parents, the school, districts and other stakeholders, such as employers, tertiary institutions, etcetera.

In Grades R – 12, teachers report in percentages against the subject, using the following scale:

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

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.

4.7 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, if necessary provincial levels. Comprehensive and appropriate moderation practices must be in place for the quality assurance of all subject assessments.

In Grade 6 the Formal School Based Assessment and the practical tasks should be moderated by the relevant subject specialist(s) at school and district levels in an ongoing way. Moderation in Grade 6 serves the following purposes:

1. It should ascertain whether the subject content and skills have been taught and assessed.
2. It should ensure that the correct balance of cognitive demands are reflected in the assessment.
3. It should ensure that the assessments and marking are of an acceptable standard and consistency.
4. It should identify areas in which the teacher may need further development and should lead to support for such development.

4.8 GENERAL

This document should be read in conjunction with:

- 4.7.1 *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R – 12; and*
- 4.7.2 The policy document, *National Protocol for Assessment Grades R – 12.*

