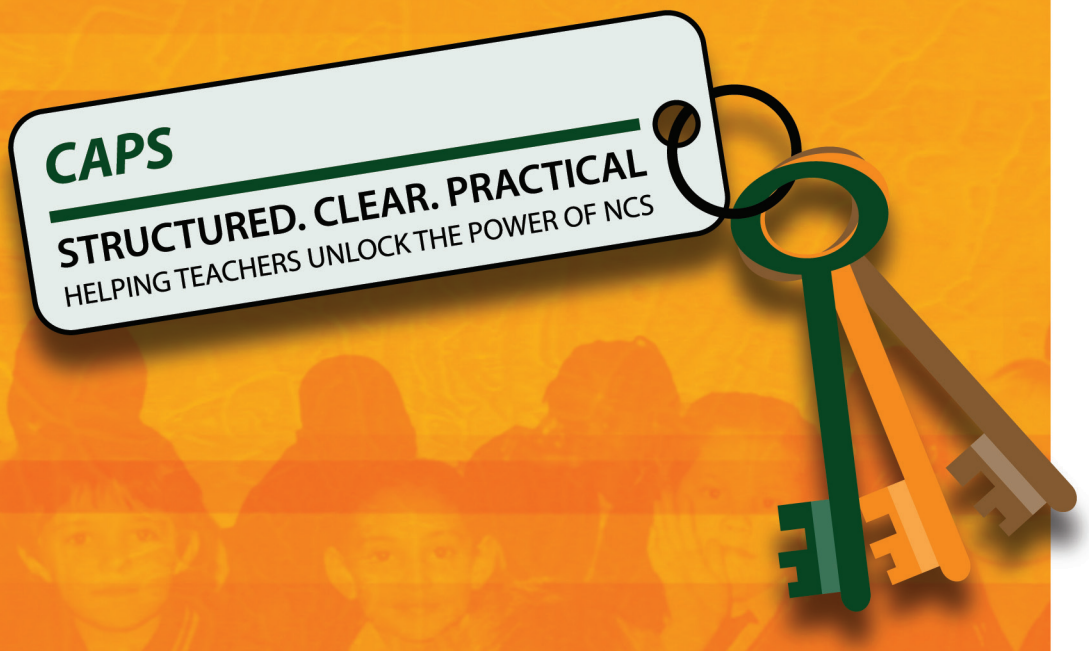
NATURAL SCIENCES AND TECHNOLOGY

National Curriculum Statement (NCS)

Curriculum and Assessment Policy Statement



Intermediate Phase
Grades 4-6

basic education
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CURRICULUM AND ASSESSMENT POLICY STATEMENT
GRADES 4-6

NATURAL SCIENCES AND TECHNOLOGY

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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

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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.*

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 Teaching Natural Sciences and Technology 8

2.3 How Natural Sciences and Technology complement each other 9

2.4 Organisation of the Natural Sciences and Technology Curriculum 10

2.5 Allocation of teaching time 10

2.6 Specific aims 10

2.7 Major Process and Design Skills 11

2.8 Resource 12

2.9 Progression map of Natural Sciences and Technology content knowledge and concepts 13

2.10 Detailed summary of Natural Sciences and Technology concepts and content, and time allocations 15

SECTION 3: CONTENT TABLES 16

Natural Sciences and Technology: Grade 4 16

Natural Sciences and Technology: Grade 5 31

Natural Sciences and Technology: Grade 6 47

SECTION 4: ASSESSMENT 65

4.1 Introduction 65

4.2 Informal assessment or daily assessment 65

4.3 Formal assessment 66

4.4 Programme of formal assessment for natural sciences and technology grades 4, 5 and 6 67

4.5 Recording and reporting 68

4.6 Moderation of assessment 74

4.7 General 74

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 • Beginning Knowledge • Creative Arts • Physical Education • Personal and Social Well-being	**6** (1) (2) (2) (1)	**6** (1) (2) (2) (1)	**7** (2) (2) (2) (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 • Creative Arts • Physical Education • Personal and Social Well-being	4 (1,5) (1) (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** Annexure B, Tables B1-B8 of the policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12,* 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

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

What is Science & Technology?

Science is a systematic way of looking for explanations and connecting the ideas we have. In Science certain methods of inquiry and investigation are generally used. These methods lend themselves to replication and a systematic approach to scientific inquiry that attempts at objectivity. 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.

The science knowledge we teach at school is not in doubt – most of it has been tested and known since the 1800s – but a good teacher will tell the learners something of the arguments and confusion among the people who were the first to investigate this knowledge. And of course we do touch on some science at 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.

Technology has also 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. Technology also advances as our knowledge and needs expand.

Technological methods include identifying needs, planning, designing, making and evaluating products. The knowledge and skills used to make stone-age tools are an example of this.

Science and Technology have made a major impact, both positive and negative, on our world. 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. As with all knowledge, scientific knowledge changes over time as scientists acquire new information and people change their ways of viewing the world.

2.2 TEACHING NATURAL SCIENCES AND TECHNOLOGY

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 activities that sustain enjoyment and curiosity about the world and natural phenomena
- the history of Science and the relationship between Natural Sciences and Technology and other subjects. Learners should understand the different cultural contexts in which indigenous knowledge systems were developed.

- the contribution of Science and Technology to social justice and societal development
- the need for using scientific and technological knowledge responsibly in the interest of ourselves, of society and the environment
- the practical and ethical consequences of decisions based on Science and Technology. Natural Sciences and Technology lays the basis of further studies in Science and Technology. It prepares learners for active participation in a democratic society that values human rights and promotes responsibility towards the environment. Natural Sciences and Technology can also prepare learners for economic activity and self-expression.

2.3 HOW NATURAL SCIENCES AND TECHNOLOGY COMPLEMENT EACH OTHER

	NATURAL SCIENCES	TECHNOLOGY
Goal	Pursuit of new knowledge and understanding of the world around us and of natural phenomena	The creation of structures, systems and processes to meet peoples' needs and improving the quality of life
Focus	Focus is on understanding the natural world	Focus is on understanding the need for human–made objects and environments to solve problems
Developmental methods	Discovery through carrying out investigations	Making products though design, invention and production
Major processes	Investigative and logical processes • planning investigations • conducting investigations and collecting data • evaluating data and communicating findings	Practical solution-orientated processes • identifying a need • planning and designing • making (constructing) • evaluating and improving products • communicating
Evaluation methods	Analysis, generalisation and creation of theories	Analysis and application of design ideas

2.4 ORGANISATION OF THE NATURAL SCIENCES AND TECHNOLOGY CURRICULUM

In this curriculum, Grades 4 to 6 Natural Sciences and Technology are combined into one subject which is compulsory for all learners. Natural Sciences and Technology are also both compulsory subjects for all learners in Grades 7 to 9.

The Knowledge Strands in Natural Sciences and Technology

In this curriculum, the knowledge strands below are used as a tool for organising the content of the subject Natural Sciences and Technology.

NATURAL SCIENCES STRANDS	TECHNOLOGY STRANDS
Life and Living Matter and Materials Energy and Change Planet Earth and Beyond	Structures Processing Systems and Control

2.5 ALLOCATION OF TEACHING TIME

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

- 10 weeks per term, with 3½ hours per week
- Grades 4, 5 and 6 have been designed to be completed within 38 weeks
- 7 hours have been included for assessment in terms 1, 2 & 3
- Term 4 work will cover 8 weeks plus 2 weeks for revision and examinations

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 allocations given to the different topics provide 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. See detailed time allocation in **Section 2.9**

2.6 SPECIFIC AIMS

This curriculum aims to provide learners with opportunities to put together ideas they have about nature so that they make sense. It also encourages learners to ask questions that could lead to further research and investigation.

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

Specific Aim 1: 'Doing Science and Technology'

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

This means that learners plan and do simple investigations and solve problems that need some practical ability. There are attitudes and values that underpin this ability. Respect for living things is an example of this – learners

should not strip leaves off bushes just to compare them; if they examine small animals they should care for them and release them unharmed in the place they found them.

Specific Aim 2: 'Understanding and connecting ideas'

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

The main task of teaching is to build a framework of knowledge for learners and to help them make connections between the ideas and concepts in their minds – this is different to learners just knowing a lot of facts. When learners do an activity, just answering the set questions is not enough. Discussion must relate to previously acquired knowledge and experience and connections must be made.

Specific Aim 3: 'Science, Technology and Society'

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

Science and Technology learnt at school should produce learners who understand that school science can be relevant to their lives outside of school. Issues such as improving water quality, growing food without damaging the land, and building energy-efficient houses are examples of everyday applications. Similarly, Science and Technology can lead learners to a range of career and job possibilities.

An appreciation of the history of scientific discoveries and technological solutions, and their relationship to indigenous knowledge and different world views, enriches our understanding of the connections between Science, Technology and Society.

2.7 MAJOR PROCESS AND DESIGN SKILLS

The teaching and learning of Natural Sciences and Technology involves the development of a range of process and design skills that may be used in everyday life, in the community and in the workplace. Learners also develop the ability to think objectively and use a variety of forms of reasoning while they use these skills. Learners can gain these skills in an environment that taps into their curiosity about the world, and that supports creativity, responsibility and growing confidence.

The following are the cognitive and practical process and design skills that learners will be able to develop in Natural Sciences and Technology

1. Accessing and recalling information – being able to use a variety of sources to acquire information, and to remember relevant facts and key ideas, and to build a conceptual framework

2. Observing – noting in detail objects, organisms and events

3. Comparing – noting similarities and differences between things

4. Measuring – using measuring instruments such as rulers, thermometers, clocks and syringes (for volume)

5. Sorting and classifying – applying criteria in order to sort items into a table, mind-map, key, list or other format

6. Identifying problems and issues – being able to articulate the needs and wants of people in society

7. Raising questions – being able to think of, and articulate relevant questions about problems, issues, and natural phenomena

8. Predicting – stating, before an investigation, what you think the results will be for that particular investigation

9. Hypothesizing – putting forward a suggestion or possible explanation to account for certain facts. A hypothesis is used as a basis for further investigation which will prove or disprove the hypothesis

10. Planning investigations – thinking through the method for an activity or investigation in advance. Identifying the need to make an investigation a fair test by keeping some things (variables) the same whilst other things will vary

11. Doing investigations – this involves carrying out methods using appropriate apparatus and equipment, and collecting data by observing and comparing, measuring and estimating, sequencing, or sorting and classifying. Sometimes an investigation has to be repeated to verify the results.

12. Recording information – recording data from an investigation in a systematic way, including drawings, descriptions, tables and graphs

13. Interpreting information – explaining what the results of an activity or investigation mean (this includes reading skills)

14. Designing – showing (e.g. by drawing) how something is to be made taking into account the design brief, specifications and constraints

15. Making/constructing – building or assembling an object using appropriate materials and tools and using skills such as measuring, cutting, folding, rolling, gluing

16. Evaluating and Improving products – using criteria to assess a constructed object and then stating or carrying out ways to refine that object

17. Communicating – using written, oral, visual, graphic and other forms of communication to make information available to other people

Developing Language Skills: Reading and Writing

The ability to read well is central to successful learning across the curriculum. Writing is also a powerful instrument of communication. Writing allows learners to construct and communicate thoughts and ideas coherently. Frequent reading and writing practice across a variety of tasks and subjects enables learners to communicate functionally and creatively.

Learners are required to read and write particular genres of texts (including instructions, reports and explanations) during Natural Sciences and Technology lessons. Learners need regular opportunities to read and write a range of genres in order to improve their reading and writing skills. The ability to read and write well is also critical when learners are assessed, both informally and formally.

2.8 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 and educational reasons it is recommended that no more than three learners share space and equipment. Teachers should ensure that learners are familiar with rules regarding the safe use of 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. Secure storage for equipment must be provided by the school.

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 knowledge and skills can be successfully developed using improvised equipment.

In instances where there is no alternative, it is more effective for teachers to demonstrate an investigation than not to do investigations or construct models due to a lack of equipment.

2.9 PROGRESSION MAP OF NATURAL SCIENCES AND TECHNOLOGY CONTENT KNOWLEDGE AND CONCEPTS

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.

- Each term includes a Natural Sciences and Technology strand
- The strands are organised to promote clear progression of concepts across the Grades and in the phase.
- It is important to emphasise the conceptual links between the Science and Technology in the different topics. However in certain topics the conceptual links are stronger and more obvious.
- At least two Technology strands will be developed in each Grade. All strands will have been developed over the Intermediate phase.

GRADE 4							
Strands NS & Tech		**Strands NS & Tech**		**Strands NS & Tech**		**Strands NS & Tech**	
Life and Living	**Structures**	**Matter and Materials**	**Structures**	**Energy and Change**	**Systems and control**	**Planet Earth and Beyond**	**Systems and control**
Living and non- living things Structure of plants and animals What plants need to grow Habitats of animals	Structures for animal shelters	Materials around us Solid materials	Strength-ening materials Strong frame structures	Energy and Energy transfer Energy around us Energy and sound	Movement energy in a system	Planet Earth The Sun The Earth & the Sun The Moon	Rocket systems

GRADE 5							
Strands NS & Tech		**Strands NS & Tech**		**Strands NS & Tech**		**Strands NS & Tech**	
Life and Living	**Structures**	**Matter and materials**	**Processing**	**Energy and change**	**Systems and control**	**Planet Earth and Beyond**	**Systems and control**
Plants and animals on Earth Animal skeletons Food chains Life cycles	Skeletons as structures	Metals and non-metals Uses of metals	Processing materials Processed materials	Stored energy in fuels Energy and electricity Energy and movement	Systems for moving things	Planet Earth Surface of the Earth Sedimentary rocks Fossils	

GRADE 6							
Strands NS & Tech		**Strands NS & Tech**		**Strands NS & Tech**		**Strands NS & Tech**	
Life and Living	**Processing**	**Matter and materials**	**Processing**	**Energy and change**	**Systems and control**	**Planet Earth and Beyond**	**Systems and control**
Photosyn-thesis Nutrients in food Nutrition Ecosystems and Food webs	Food Processing	Solids, liquids and gases Mixtures Solutions as special mixtures Dissolving Mixtures and water resources	Processes to purify water	Electric circuits Electrical conductors and insulators Mains electricity	Systems to solve problems	The Solar System Movements of the Earth and planets The movement of the Moon	Systems for looking into space Systems to explore the Moon and Mars

Teachers have the freedom to expand concepts and to design and organise learning experiences according to their own local circumstances.

Examples of indigenous knowledge that teachers select for study should, as far as possible, reflect different South African cultural groupings. They should also link directly to specific content in the Natural Sciences and Technology.

2.10 DETAILED SUMMARY OF NATURAL SCIENCES AND TECHNOLOGY CONCEPTS AND CONTENT, AND TIME ALLOCATIONS

	GRADE 4		GRADE 5		GRADE 6	
TERM	**TOPIC**	**TIME IN WEEKS**	**TOPIC**	**TIME IN WEEKS**	**TOPIC**	**TIME IN WEEKS**
TERM 1 Life & Living	• Living and non-living things • Structures of plants and animals • What plants need to grow • Habitats of animals • Structures for animal shelters	2 2 ½ 1 2 2 ½ **(10 weeks)**	• Plants and animals on Earth • Animal skeletons • Skeletons as structures • Food chains • Life cycles	2 ½ 1 ½ 2 ½ 1 ½ 2 **(10 weeks)**	• Photosynthesis • Nutrients in food • Nutrition • Food Processing • Ecosystems and Food webs	2 ½ 1 ½ 1 ½ 2 ½ 2 **(10 weeks)**
TERM 2 Matter & Materials	• Materials around us • Solid materials • Strengthening materials • Strong frame structures	3 ½ 2 2 2 ½ **(10 weeks)**	• Metals and non-metals • Uses of metals • Processing materials • Processed materials	2 2 ½ 3 ½ 2 **(10 weeks)**	• Solids, liquids and gases • Mixtures • Solutions as special mixtures • Dissolving • Mixtures and water resources • Processes to purify water	½ 1 2 ½ 1 2 ½ 2 ½ **(10 weeks)**
TERM 3 Energy & Change	• Energy and Energy transfer • Energy around us • Movement energy in a system • Energy and sound	2 ½ 2 ½ 2 ½ 2 ½ **(10 weeks)**	• Stored energy in fuels • Energy and electricity • Energy and movement • Systems for moving things	3 3 1 3 **(10 weeks)**	• Electric circuits • Electrical conductors and insulators • Systems to solve problems • Mains electricity	2 ½ 2 2 ½ 3 **(10 weeks)**
TERM 4 Planet Earth & Beyond	• Planet Earth • The Sun • The Earth & the Sun • The Moon • Rocket systems	2 1 1 2 2 **(8 weeks)**	• Planet Earth • Surface of the Earth • Sedimentary rocks • Fossils	1 2 ½ 2 2 ½ **(8 weeks)**	• The Solar System • Movements of the Earth and planets • The movement of the Moon • Systems for looking into space • Systems to explore the Moon and Mars	2 ½ 1 1 1 2 ½ **(8 weeks)**
Totals*		**38 weeks**		**38 weeks**		**38 weeks**

Notes: * These totals include the **7 hours** per term for continuous assessment but exclude the **2 weeks** set aside for the end of year examinations

General: Time spent on each topic should serve as a guideline for weighting of marks in Tests and Exams. The purpose of using times as guidelines is to ensure that all topics are assessed.

SECTION 3: CONTENT TABLES

NATURAL SCIENCES AND TECHNOLOGY: GRADE 4

GRADE 4 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: STRUCTURES				**Equipment and Resources**
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**Living and non-living things**	**Living things** • there are many different kinds of living things • living plants and animals can carry out all the seven life processes - feeding, growing, reproducing, breathing, excreting, sensing, moving • some things appear not to be living (such as dried beans, dried yeast, a fertilised bird egg), but carry on 'living' given the right conditions **Non-living things** • non-living things cannot carry out **all** of the seven life processes • some things were living and are now dead: dead wood, dry leaves.	• *begin Intermediate Phase by* looking at pictures and/or real examples of different living things, including plants, animals, bread mould, germs* • germinating bean seeds (providing warmth, and moisture)** • growing yeast (in warm water with sugar) • looking at pictures of hatched eggs (warmth) • identifying, sorting and comparing a selection of living and non-living things (including fire, rivers, rocks) *and all the interesting differences between them.*	• Examples and pictures of living and non-living things, including plants, animals, bread mould • Seeds • Yeast • Pictures of hatched eggs
Notes: * Point out that germs are living although they are too small to be seen with the naked eye ** The germinated seeds can be used for the investigation below				

GRADE 4 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: STRUCTURES				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Structure of plants and animals**	**Structure of plants** • basic structure of plants: roots, stems, leaves, flowers, fruits, seeds • visible differences between plants: such as size, shape and colour of roots, stems, leaves, flowers, fruits and seeds **Structure of animals** • basic structure of animals: head, tail, body, limbs, sense organs • visible differences between animals: such as size, shape, body covering and sense organs	• identifying, labelling and describing the parts of a plant • describing the visible differences between at least three plants • drawing, labelling and describing the parts of at least one animal • describing the visible differences between at least three animals	• Pictures / examples of plant parts • Pictures of animals
1 week (3 ½ hours)	**What plants need to grow**	**Conditions for growth** • plants need light, water and air to grow • new plants can grow from cuttings and seeds • seeds need water and warmth to grow (germination of seeds)	• **Investigating** the growth of plants from seeds and cuttings by observing, measuring*** and recording the growth over time **** *[This can be used as a possible project]*	• Seeds and cuttings • Rulers and measuring tape
Notes: *** Learners can count the number of leaves as the plant grows and measure the height of the stem **** The investigation and observations of this practical task will be done over time while learners continue with further work				

GRADE 4 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: STRUCTURES				Equipment and Resources:
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks (7 hours)	**Habitats of animals**	**Different habitats** • a habitat is the place where a plant or animal lives • there are different kinds of habitats such as grassland, forest, river, sea **Need for a habitat** • animals need a habitat for food, water, a place to shelter, have babies and escape from dangers	• identifying, drawing and describing a habitat on or close to the school grounds • matching different animals to their habitats and giving reasons why the animal can live there • describing and writing about habitats of three African* wild animals and why they are suited to living in those habitats	• Pictures of plants and animals and their habitats
2 ½ weeks (8 ¾ hours)	**Structures for animal shelters**	**Animal shelters** • animal shelters can be natural including nests, shells, hollow trees, wasp nests or human made including dog kennels, cages, kraals, stables • animal shelters can be shell or frame structures, can have different shapes and sizes, and can be made from different materials	• identifying natural and human made animal shelters • looking at pictures of different shell and frame structures for sheltering animals • case study about the need for an animal shelter • **designing and drawing** an animal shelter, taking into account its: - purpose - shape and size - materials • evaluating the suitability of the design	• Pictures and examples of animal shelters
Notes: * This refers to animals that are indigenous to Africa				

GRADE 4 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: STRUCTURES				Equipment and Resources:
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • sort a selection of living and non-living things • identify and describe the parts of a plant • identify and describe the parts of an animal • grow plants from seeds and measure and record their growth • describe different habitats • design, draw and evaluate an animal shelter	

GRADE 4 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: STRUCTURES				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
3 ½ weeks (12 ¼ hours)	**Materials around us**	**Solids, liquids and gases** • solids, liquids and gases make up all the materials around us • some properties of solids, liquids and gases - solids keep their shape - liquids flow and take the shape of their container - gases, such as air, tend to spread out, have no definite shape but can be contained (like in a balloon) **Change of state** • heating and cooling (removing heat) cause solids, liquids and gases to change state - a solid first changes to a liquid (melting) when heated and then the liquid changes to a gas (evaporating) on further heating - gas first changes to a liquid (condensing) when cooled and then the liquid changes to a solid (freezing/solidifying) when cooled further **The water cycle** • water evaporates, condenses, freezes and melts in the water cycle	• sorting examples of common materials into solids, liquids and gases including wood, stone, plastic, fabric, water, juice, tea, air, cooking oil, cooking gas, and describing them • **Investigating** evaporating, condensing, freezing and melting using water and ice • **Investigating** melting and solidifying using different substances such as butter/ fat/ margarine, wax, icecream, chocolate • drawing and writing about the water cycle	• Examples of materials and substances including wood, stone, plastic, fabric, water, juice, tea, air, cooking oil, cooking gas • Examples of different substances such as ice, butter, wax, ice cream, chocolate • Video clips from internet

GRADE 4 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: STRUCTURES				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**Solid materials**	**Raw and manufactured materials** • examples of some raw materials we use to make other useful materials - sand is used to make glass - clay is used to make ceramics - coal and oil are used to make plastics, paints and fabrics - wood and fibre from plants are used to make paper - animal wool and hide are used to make fabrics and leather **Properties of materials** • raw and manufactured materials have specific properties. These properties can include being hard or soft, stiff or flexible, strong or weak, light or heavy, waterproof or absorbent	• reading about how paper is made from plant fibres • describing the properties of raw and manufactured materials	• Examples of raw and manufactured materials to examine the properties such as glass products, leather, ceramics, fabrics, wooden items, plastic products

GRADE 4 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: STRUCTURES				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**Strengthening materials**	**Ways to strengthen materials** • there are different ways to strengthen materials (such as paper) to build a strong structure: - we can fold paper into hollow pillars which are circular, triangular or square - we can roll paper into long thin tubes (struts)	• **Investigating** which shape of pillar is the strongest (can support the most weight). Draw a bar graph of the results • making paper struts by rolling into long thin tubes (struts)	• Paper, wooden dowels (30cm X 10mm) or sticks, sticky tape, paper fasteners to make struts
2 ½ weeks **(8 ¾ hours)**	**Strong frame structures**	**Struts and frame structures** • struts are joined into triangular shapes making a strong, stable structure, such as in roof trusses, bridges, cranes, pylons and skeletons (limb bones are struts) **Indigenous structures** • indigenous, traditional homes such as a Zulu hut (uguqa), Xhosa (rontabile and ungqu-phantsi) and Nama (matjieshuis) make use of a framework of struts (such as branches)	• looking at pictures of frame structures strengthened with struts • exploring ways to join struts to make a strong structure (joining struts into triangular and square shapes) • **designing, making and evaluating** a strong structure using tubular struts, such as a model of a tower, bridge, pylon, chair *[This can be used as a possible project]*	• Pictures of frame structures • Paper, wooden dowels (30cm X 10mm) or sticks, sticky tape, paper fasteners
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • distinguish between solids, liquids and gases • explain how selected materials may change their state • explain the water cycle in terms of change of state of water • give examples of raw materials used to make manufactured materials • describe the properties of raw and manufactured materials • demonstrate ways of strengthening materials • demonstrate ways of making and joining paper struts • design, make and evaluate a strong structure	

GRADE 4 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Energy and Energy transfer**	**Energy for life** • we use energy for everything we do • we get our energy from food • energy in our food comes from the Sun (plants use the energy from the Sun to make food for themselves and for animals and people) **Energy from the Sun** • energy is transferred from the Sun, to plants, to animals in a sequence known as an energy chain/ food chain	• identifying things that people and animals do that require energy such as carrying out the life processes and all other actions • drawing and writing about how the energy from the Sun is transferred through the food made by plants, to animals/a person's body (energy chain – use arrows to show the direction in which the energy is transferred from the Sun)	• Pictures and examples of a selection of machines and appliances including a kettle, stove, torch, radio, iron, fan/hair dryer, car/bicycle, drum • Video clips from the internet
2 ½ weeks (8 ¾ hours)	**Energy around us**	**Energy** • we are aware of energy around us, including movement, heat, light, sound • energy is also stored in sources such as food, wood, coal, oil products*, natural gas • energy can be transferred from a source to where it is needed **Input and output energy** • machines and appliances need an input of energy to make them work • machines and appliances provide an output of energy (work) useful to us	• Using pictures to identify situations where energy is involved or transferred • describing the input and output of energy of a selection of machines and appliances including a kettle, stove, torch, radio, iron, fan/hair dryer, car/bicycle, drum	
Notes: * petrol, diesel, paraffin, jet fuel, candle wax are all products made from natural crude oil				

GRADE 4 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Movement and Energy in a system**	**Movement and musical instruments** • many musical instruments (systems) use movement input energy (such as blowing, beating and plucking) to make them work • many instruments have parts that can move or vibrate • musical instruments produce sound as the main output energy	• reading about / looking at indigenous musical instruments and how they work • researching, designing, making and evaluating a musical instrument (such as a guitar, shaker, drum, blowing instrument such as pan pipes, whistles, flutes) that uses movement energy to make sounds *[This can be used as a possible project]*	• Examples of musical instruments • Materials to make musical instruments

GRADE 4 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Energy and Sound**	**Vibrations and sound** • musical instruments make sounds through vibrations - the sound always moves outwards from the part that is vibrating - we can feel or hear vibrations - vibrations travel through materials such as air, water, plastic, metal and wood **Making sounds** • sounds can be made loud or soft (volume) • sounds can be made high or low (pitch) **Noise pollution** • sound that is loud, unpleasant or harmful to our ears and continues for a long time, is described as noise pollution • noise pollution can cause permanent damage to hearing (hearing aids can help people who are hearing-impaired)	• looking at pictures of the human ear, its parts and how sound travels through it • making loud and soft sounds with your voice and/or musical instruments • making high and low pitched sounds with your voice and/or musical instruments • describing sources of noise pollution including at home, school, in the community and how best to protect ourselves from it	• Pictures of the human ear, it's parts and how one hears • Examples of musical instruments made by learners • Video clips from the internet

GRADE 4 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can:** • sequence an energy / food chain showing how the energy from the Sun is transferred through the food made by plants, to animals/a person's body • explain the input and output of energy of a selection of machines and appliances • design, make and evaluate a musical instrument • describe noise pollution and how best to protect our hearing	

GRADE 4 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks (7 hours)	**Planet Earth**	**Features of the Earth** • the Earth is round like a ball (sphere) and is made of rock • the main surface features of the Earth are land (rocks and soil), water and air • most of the surface of the Earth is covered with water (oceans and seas) • the land we can see is made up of continents* and islands • there is a thin layer of air surrounding the Earth • the Earth has many different habitats for living things **Earth and space** • the Earth is a planet in space • from the Earth we can see the Sun, Moon and stars	• interpreting pictures and models showing features of the Earth including visible features such as oceans, seas, lakes, continents, islands and polar ice caps • making drawings or models of the Earth • writing descriptions of the Earth and its features	• Pictures of Earth showing its main features • Pictures of the Moon, Sun and planets • Models of the Earth, Moon and the Sun • Video clips
1 week (3 ½ hours)	**The Sun**	**Our closest star** • the Sun is a star - the Sun is made of hot gas and gives out heat and light - the Sun is very big (much bigger than the Earth) - the Sun is very far away, but is the closest star to the Earth - the Sun provides heat and light to the Earth for living things	• interpreting pictures and models of the Sun • making drawings or models of the Sun • writing descriptions of the Sun	
Notes: * Continents refer to larger land masses on the surface of the Earth				

GRADE 4 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 week **(3 ½ hours)**	**The Earth and the Sun**	**Moving around the Sun** • the Earth moves around the Sun in a pathway called the orbit - the Sun is a star and is at the centre of the solar system** - the Earth is one of eight planets*** in the solar system **The Sun and life** • the Earth gets the right amount of light and heat from the Sun for supporting life	• interpreting pictures and models of the solar system • making drawings and writing about the Earth and its orbit around the Sun	
Notes: ** This is a basic introduction to the concept of the solar system *** Pluto is now called a dwarf planet, and is therefore not included as a planet				

GRADE 4 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources:
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**The Moon**	**Features of the Moon** • the Moon is a ball of rock in space - there is no air and water on the Moon - the Moon is smaller than the Earth - the Moon is closer to the Earth than the Sun **Phases of the Moon** • the Sun's light shines onto the surface of the Moon - we can only see that part of the Moon which the sunlight shines on - the changing pattern of sunlight on the Moon is called the phases of the moon - the pattern repeats every 29 ½ days (about a month) **Moon stories** • cultural stories about the Moon tell us about the importance of the Moon in people's lives	• interpreting pictures and models of the Moon • making drawings or models of the Moon • writing descriptions of the Moon • **Investigating** - observing and recording the changing shape of light on the Moon each night for at least a month (Moon watch)*	• Calendar for recording phases of the Moon • Cultural stories about the Moon • video clips
2 weeks **(7 hours)**	**Rocket systems**	**Modelling a rocket** • people have used rockets to go into space and to travel to the Moon • a rocket is a system used to propel vehicles into space - A rocket moves by pushing exhaust gases out through its back end	• **Designing, making and evaluating** a rocket model using a balloon - attach a balloon to a drinking straw threaded onto a fishing line pulled tight between two points - release the inflated balloon and measure how far it travels along the fishing line. Draw bar graphs and evaluate different balloon rockets *[This can be used as a possible project]*	• Apparatus including balloons of different sizes, straws and fishing line, hooks, measuring tapes
Notes: * carry out the Moon watch while continuing with other work				

GRADE 4 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources:
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. As this is the exam term, the final two weeks may be required for revision of the year's work and for examinations. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • identify and describe the main features of the Earth • describe the main features of the Sun and the Moon • explain how Earth moves around the Sun • recognise that the phases of the Moon are a result of the changing pattern of sunlight that we can see on the Moon • make a model of a balloon rocket, and test it • record and compare the distances travelled by different balloon rockets • evaluate balloon rockets	

NATURAL SCIENCES AND TECHNOLOGY: GRADE 5

GRADE 5 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: STRUCTURES				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Plants and animals on Earth**	**Many different plants and animals** • there are many different plants and animals living in different habitats on Earth* (South Africa has a wide variety of indigenous plants and animals and their habitats) **Inter-dependence** • plants and animals depend on each other • they also depend on the resources available (such as air, water, soil, food, and places to hide) in their own habitats **Animal types** • there are many different kinds of animals, - some do not have bones, and some have hard outer 'skins' or shells (invertebrates) - some have bones (vertebrates)	• counting the number of plants in a given area and distinguishing them apart by looking at the shapes and colours of their leaves or flowers or fruits • describing - animals without bones, such as worms, millipedes, insects, spiders, scorpions, crabs - animals with bones, such as fish, frogs, reptiles, birds, mammals	• Pictures of plants and animals
Notes: * Plants and animals, and their habitats make up the total biodiversity of the Earth				

GRADE 5 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: STRUCTURES				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 ½ weeks (5 ¼ hours)	**Animal skeletons**	**Skeletons of vertebrates** • a vertebrate skeleton consists of bones and joints, and is inside the body • bones are hard and form a strong frame structure • a skeleton provides support for an animal's body and protection for its organs; - skull - protects the brain - backbone with vertebrae - protects the spinal cord - ribs - protect the lungs and heart - shoulder blades, arms, legs, hip bones – for movement **Movement** • vertebrate animals can move because there are - muscles attached to the skeleton - joints between the bones***	• looking at examples of skeletons including - fish, frogs, birds, reptiles, mammals (including humans), and identifying the following parts: - the skull - the backbone - ribs - limbs - shoulder and hip girdles** • describing how different vertebrate animals move (including humans)	• Pictures and examples of animal skeletons / bones

Notes: ** Not all animals have shoulder and hip girdles or limbs (such as fish and snakes)

*** In this grade, details about how muscles are attached, and the structure of joints are not required

GRADE 5 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: STRUCTURES				Equipment and Resources:
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Skeletons as structures**	**Frame and shell structures** • a vertebrate skeleton is a frame structure *(also refer to grade 4 Matter & Materials)* • some invertebrate skeletons are shell structures such as that of a crab	• making a model* of a vertebrate skeleton using struts made from rolled paper or drinking straws *[This can be used as a possible project]*	• Paper, drinking straws, wooden dowels or sticks (30cm X 10mm), sticky tape, metal paper fasteners
1 ½ week (5 ¼ hours)	**Food chains**	**Food and feeding** • green plants make their own food** and build their branches and stems using water and carbon dioxide from the air, and energy from sunlight. Plants use carbon dioxide from the air and release oxygen into the air • animals need food to carry out their life processes (to move, feed, grow, sense the environment, excrete, breathe and reproduce) • all animals depend on plants as their primary source of food (herbivores, carnivores and omnivores) • a food chain describes the feeding relationships between plants and animals. • a food chain - starts with a plant, (produces foods) - then follows with an animal that eats the plant - after that with an animal that eats that animal - includes the transfer of energy which flows from the plant through to the last animal in the chain	• sequencing pictures and drawing plants and animals which form food chains with up to four organisms each, describing their relationships	• Pictures of various plants and animals

Notes: * This is a problem solving activity, where learners have to work out how a skeleton fits together

** This important process is called "photosynthesis." However no further detail is required in this grade, learners will deal with it in detail only in higher grades

<table>
<tr><th colspan="4">GRADE 5 TERM 1</th></tr>
<tr><th colspan="3">STRANDS: NATURAL SCIENCES: LIFE & LIVING
TECHNOLOGY: STRUCTURES</th><th rowspan="2">Equipment and Resources:</th></tr>
<tr><th>Time</th><th>Topic</th><th>Content & Concepts</th><th>Suggested Activities: Investigations, practical work, and demonstrations</th></tr>
<tr><td>2 weeks
(7 hours)</td><td>Life Cycles</td><td>Growth and development
• plants and animals grow and develop throughout their lives
• a life cycle describes the stages and processes that take place as a plant or animal grows and develops
• a life cycle describes how one generation of a plant or animal gives rise to the next generation through reproduction
• death can occur at any stage of the life cycle
• many animals care for their young in order for them to grow and develop</td><td>• sequencing pictures and drawings of the stages of development in life cycles of
- a plant – identifying and labelling the stages (including seed, seedling, adult plant, flowering plant, fruiting plant) and some of the processes that occur (including germinating, growing, maturing, flowering, being pollinated and dispersing seeds)
- a vertebrate animal - identifying and labelling the stages [including baby, young animal, mature adults (male & female)] and some of the processes that occur including growing, maturing, mating, producing eggs and babies</td><td>• Pictures of different stages in the development of various plants and animals</td></tr>
<tr><td colspan="2">Assessment guidelines</td><td>This content and the associated concepts must be integrated with the aims and skills for
Natural Sciences and Technology (refer to Section 2).
• Learners should read, write, draw and do practical tasks regularly
• Evidence of learner’s work, including assessments, should be kept in the learner’s notebook
School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly.
Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, refer to Section 4.</td><td colspan="2">Check the learner’s knowledge and that they can:
• demonstrate an understanding of the variety of plants and animals on Earth and their inter-dependence
• identify animals with and without bones
• identify and describe different bones and their functions in a vertebrate skeleton
• use struts to make a model of a vertebrate animal skeleton
• show the links and relationships in different food chains
• show the stages and processes in the life cycle of a plant and an animal</td></tr>
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GRADE 5 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**Metals and non-metals**	**Properties of metals** • metals are used to make things because they have certain properties • some properties of metals - shiny - hard - strong - can be hammered, shaped (malleable) and made into thin wires without breaking (ductile) - melt at high temperatures • metals are mined from the Earth* **Properties of non-metals** • non-metals are used to make things because they have certain properties • some properties** of solid non-metals - dull - can break easily (brittle)	• **Investigating, comparing and recording** the properties of some metal objects (such as copper wire, coins, nails, cooking pots, knives and forks) and some non-metal objects (such as a piece of chalk, a stone, a pile of sand, a piece of coal) • **Investigating** ways to make old and dull metal objects shiny again	• Examples of metal objects such as copper wire, coins, nails, cooking pots, knives and forks • Examples of non-metal objects such as a piece of chalk, a pile of sand, a piece of coal
Notes: * How and where metals are mined is covered in Social Sciences ** There are many different non-metals and they have a variety of different properties. Here the focus is only on two of the most general properties				

GRADE 5 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks **(8 ¾ hours)**	**Uses of metals**	**Other properties of metals** • metals are useful because of their special properties - metals conduct heat - some metals are magnetic and some are not - only iron rusts (some metals tarnish or become dull) **Uses of metals** • metals are used to make things such as coins, wire, jewellery, furniture, buildings and bridges, motor cars, kitchen utensils, roofs	• testing different metal objects (such as coins, iron filings, nails, drawing pins, paper clips, wire) to see if they are attracted by a magnet • placing different objects in water (such as coins, iron filings, nails, drawing pins, paper clips, wire) to see if they rust*** • **researching** and writing about the uses of metals and giving reasons for their use**** *[This can be used as a possible project]*	• Magnets and objects such as coins, iron filings, nails, drawing pins, paper clips, wire
Notes: *** Rusting is a slow process; learners carry on with other work while waiting for the results **** Focus on uses of metals in daily life				

GRADE 5 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
3 ½ weeks **(12 ¼ hours)**	**Processing materials**	**Combining materials** • materials can be processed to make new materials/ products, such as - mixing and setting (such as plaster of Paris (or Polyfilla) and water to make plaster) - mixing and setting (such as sand, gravel, cement and water to make concrete) - mixing (such as flour and water to make a sticky paste that can be used as glue) - mixing and cooking (such as making dough) - mixing and cooling (such as jelly powder and water to make jelly) - mixing, drying and/or firing (such as wet clay and straw to make clay bricks) • the properties of the new materials/products may be different from the properties of the materials we started with	• processing selected* different materials, recording and comparing their properties before and after • writing about the uses of these processed materials/ products	• Materials and substances such as: plaster of Paris(or Polyfilla), sand,gravel, cement, flour, ingredients to make dough, jelly powder, wet clay and straw
Notes: * Leaners need not carry out all these examples, but should experience at least two of them.				

GRADE 5 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**Processed materials**	**Properties and uses** • materials such as plaster of Paris, concrete, fabrics, ceramics and glass, plastics and paints, have their own special properties • processed materials are useful because of their special properties. They can be strong, durable, waterproof, fire resistant, have interesting colours or textures **Traditional processing** • in Africa people have processed materials for hundreds of years to make - clay pots and bricks - baskets, hats, mats, thatched roofs made from plant fibre such as grasses and reeds	• finding examples of where and how different non-metal materials are used at home, school and in the community and explaining the properties that make them useful - presenting findings through writing, drawing and pictures *[This can be used as a possible project]* • making an object from clay (modelling) • finding examples of objects made from plant fibre (by weaving and stitching)	• Clay • Pictures and examples of objects made by weaving plant material
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • compare the properties of some metal and some non-metal objects • identify objects that are attracted by magnets • identify objects that can rust in water • process selected materials by mixing them and describe their properties before and after mixing • describe the usefulness of different materials at home, school or community	

GRADE 5 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
3 weeks **(10 ½ hours)**	**Stored energy in fuels**	**Fuels** • energy is stored in fuels (including food*) • we use fuels as sources of useful energy • everyday fuels that we use include coal, wood, petrol, paraffin, gas and candle wax • when we burn these fuels we get useful output energy such as heat and light **Burning fuels** • fuels need heat to set them alight, and air (oxygen) to keep on burning **Safety with fire** • fires can be a threat in our communities	• examining various fuels including wood, coal, candle (wax), paraffin, peanut, a biscuit. Burning three different fuels from above, and comparing and describing the - input energy needed to make them burn - output energy obtained from the fuel • **Investigating** how long a candle will burn when covered with different sized glass containers (the candles will stop burning when all the oxygen is used up) • writing and drawing about fires in our communities including causes, prevention and act out what action to take during a fire *[This can be used as a possible project]*	• Examples of substances including wood, coal, candle (wax), paraffin, peanut, a biscuit. • Candles and different sized glass containers
Notes: * Food is often described as fuel for the body. Oxygen is required to release energy from food. This process is called respiration and is not a focus for grade 5				

GRADE 5 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
3 weeks (10 ½ hours)	**Energy and electricity**	**Cells and batteries** • energy can be stored in torch cells and batteries • a circuit is a system that transfers electrical energy to where it is needed **Mains electricity** • electricity from the power station is transferred in a circuit to our homes and back to the power station • a power station needs a source of energy • the source of energy in a power station can be a fuel such as coal** **Safety with electricity** • safety precautions should be taken when using electricity	• connecting up a cell, wires, and a light bulb to make a simple circuit • drawing and writing to trace how the electricity comes from the power station to our homes/schools, including power station, pylons, substation, electricity boxes, wall sockets, plugs and appliances	• Cells (batteries), lengths of wire, light bulbs
Notes: ** The focus here is on coal-fired power stations. There are also other power stations such as hydro-electric and nuclear power stations				

<table>
<tr><th colspan="4">GRADE 5 TERM 3</th></tr>
<tr><th colspan="3">STRANDS: NATURAL SCIENCES: ENERGY & CHANGE
TECHNOLOGY: SYSTEMS & CONTROL</th><th rowspan="2">Equipment and Resources</th></tr>
<tr><th>Time</th><th>Topic</th><th>Content & Concepts</th><th>Suggested Activities: Investigations, practical work, and demonstrations</th></tr>
<tr><td>1 week
(3 ½ hours)</td><td>Energy and movement</td><td>Elastic and springs
• we can make things move using stretched or twisted elastic and compressed springs
• when we stretch or twist elastic or compress a spring, we store energy in it
• when we release the elastic or spring again, we get movement energy</td><td>• describing how things work that use stretched elastic bands and compressed springs in order to move, including a catapult*, elastic powered aeroplanes, ‘jack-in-a-box’</td><td>• Elastic bands and and compressed springs, a catapult, elastic powered aeroplanes, ‘jack-in-a- box’</td></tr>
<tr><td>3 weeks
(10 ½ hours)</td><td>Systems for moving things</td><td>Wheels and axles
• many vehicles are systems that use wheels and axles
• wheels and axles help vehicles to move more easily</td><td>• identifying different vehicles that have wheels and axles including prams, bicycles, motor bikes, cars, trucks
• making wheels and axles and evaluating whether they move easily (use materials such as bottle tops, round tins or cardboard circles for the wheels, sosatie sticks or dowels and straws for the axles)</td><td>• Apparatus including cardboard, bottle tops, round tins or cardboard circles for the wheels, sosatie sticks or dowels and straws for the axles</td></tr>
<tr><td colspan="2">Assessment guidelines</td><td>This content and the associated concepts must be integrated with the aims and skills for
Natural Sciences and Technology (refer to Section 2).
• Learners should read, write, draw and do practical tasks regularly
• Evidence of learner’s work, including assessments, should be kept in the learner’s notebook
School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly.
Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, refer to Section 4.</td><td colspan="2">Check the learner’s knowledge and that they can:
• describe the output energy we get from burning most fuels
• explain what a fire needs to start and continue burning (fuel, heat, oxygen)
• demonstrate an understanding of the causes of fire, along with methods of prevention and what actions to take during a fire
• draw and label the components of a simple circuit correctly
• trace the electricity from the power station to our homes/schools
• describe the output energy (movement) obtained from a stretched elastic band or compressed spring
• make and evaluate sets of wheels and axles</td></tr>
<tr><td colspan="4">Notes: * A catapult can be extremely dangerous – Teacher demonstration only</td></tr>
</table>

GRADE 5 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 week (3 ½ hours)	**Planet Earth**	**The Earth moves** • the Earth travels in an orbit (pathway) around the Sun • the Earth takes about 365 days to travel once around the Sun, this is called a year • the Earth spins on its own axis • the Earth takes about 24 hours to spin once, this is called a day	• interpreting pictures and models of the solar system • making drawings and writing about the Earth and its orbit around the Sun	• Pictures and models of Earth, Moon, Sun and planets. • Light source such as torch, lamp, or candle • Samples of different types of soil • Measuring cylinders, funnels and filter paper, beakers • Seeds and rulers to measure length

GRADE 5 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Surface of the Earth**	**Rocks** • the surface of the Earth is called the crust, and consists of rocks (even under the oceans), and soil • soil, air, water and sunlight support life on Earth **Soil comes from rocks** • the land is made up of rocks, subsoil and top soil • soil supports life on Earth • top soil lies on the surface - top soil is formed when rocks break into small grains over time **Soil types** • soil is usually a mixture of different types of soil grains in different proportions - sandy soil – has a high proportion of course sand grains - clayey soil – has a high proportion of fine grains of clay - loamy soil – has a mixture of sand, clay and other soil grains. Loamy soil also contains humus (decomposed compost) • the soil also has air, water, remains of dead organisms and very small living organisms in it • soil forms very slowly in nature – once topsoil is lost, it cannot be replaced, and thus we need to conserve it	• **Investigating** – different soil types - writing and drawing about the colour, smell and texture of the soil - measuring and recording on a table how much water different soils can hold* - using the results to draw bar graphs **and / or** **Investigating** – growing seedlings in different soil types** *(Integrating with Life & Living)* - measuring, recording and comparing the heights of the seedlings - using the results to draw bar graphs *[This can be used as a possible project]*	
Notes: * The same volumes of soil and water must be used to make it a fair test ** This investigation can be done while continuing with other work				

GRADE 5 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**Sedimentary rocks**	**Formation of sedimentary rock** • sedimentary rocks are formed over a very long time in the following way: - first, rocks break down into small grains - then, mud and sand is moved by wind and water - after that, mud and sand gets deposited in low lying areas - over time, new layers of mud and sand are deposited on top of existing layers - after a very long time, these layers become compacted and hardened and form sedimentary rock • sedimentary rocks always have visible layers within the rock • examples of sedimentary rock are shale, sandstone and limestone **Uses of sedimentary rock** • limestone is used to make cement • sandstone and shale are used in buildings	• making a series of drawings to show a rock breaking down into smaller grains over time • drawing and explaining how sedimentary rocks are formed • interpreting pictures showing the layers in sedimentary rocks • looking at specimens/pictures of sedimentary rock including shale, sandstone and limestone	• Pictures and or samples of sedimentary rocks such as limestone and sandstone

GRADE 5 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Fossils**	**Fossils in rock** • fossils are the remains of ancient plants and animals preserved in rock - fossils are found in some layers of sedimentary rock - fossils are evidence/a record of the history of life on Earth • there are two main types of fossils; body and trace fossils **Body and trace fossils** • body fossils form from the hard parts of plant and animal bodies including teeth, bones, shells, stems, leaves and seeds • trace fossils form from traces left by animals including footprints, nests, eggs and droppings • some features of fossils resemble the features of plants and animals living today **Importance of South African fossils** • South Africa has a particularly rich fossil record of plants, animals and early humans • important fossils found in South Africa include the Coelacanth and African dinosaurs • the “Cradle of humankind” is one of the sites where important fossils of humankind have been found in South Africa	• making a model to show the layers of sedimentary rocks with fossils embedded in them (using a medium such as play dough, clay, plaster of Paris, and remains of living things such as leaves, shells and bones) • interpreting pictures of fossils and comparing them to plants and animals living today • reading about fossils including the Coelacanth and African dinosaurs	• Pictures and or samples of sedimentary rocks • Play dough, clay, plaster of Paris, variety of parts of plants and animals • Pictures of fossils • Information texts about South African fossils

GRADE 5 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**).* • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. As this is the exam term, the final two weeks may be required for revision of the year's work and for examinations. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • demonstrate the Earth's movement in its orbit around the Sun • describe the Earth's movement on its own axis • identify the main elements (soil, air, water, sunlight) that support life on Earth • identify and describe different soil types correctly • explain the formation of sedimentary rock • distinguish between body and trace fossils • explain aspects of South Africa's fossil record	

NATURAL SCIENCES AND TECHNOLOGY: GRADE 6

GRADE 6 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Photosynthesis**	**Plants and food** • plants make their own food (glucose sugar) by a process called photosynthesis • photosynthesis takes place mainly in the leaves • during photosynthesis the plant uses sunlight energy, carbon dioxide (from the air) and water to make glucose sugar • plants change some of the glucose sugar into starch which they store in their leaves, stems and roots, flowers, fruits and seeds **Plants and air** • during photosynthesis the plant uses carbon dioxide from the air and gives off oxygen into the air • animals, including people, use the oxygen from the air for breathing and give out carbon dioxide which is used by plants for photosynthesis	• drawing and writing about how plants make food and the things they take in and give out during this process • comparing glucose sugar (such as glucose sweets) and starch (such as maize flour) according to their taste and colour • testing starch with iodine solution to show the colour change* • testing foods for starch including cooked rice, flour, potato, bread, oil, boiled egg, cheese**	• Glucose powder, maize flour, iodine solution, plastic droppers, examples of foods such as cooked rice, flour, potato, bread, oil, boiled egg, cheese • Video clips from the internet
Notes: * Iodine solution is used as an indicator - when dropped onto starch it turns from brown to a blue-black colour ** Many foods that come directly from plants contain starch while foods that come directly from animals do not contain starch				

GRADE 6 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 ½ week **(5 ¼ hours)**	**Nutrients in food**	**Food Groups** • foods can be grouped according to their functions in the body and the main nutrients they supply: - foods for energy - carbohydrates - foods for growth and repair - proteins - foods for storing energy (in the form of body fats) and providing insulation and protection for nerves and organs - fats and oils - foods for building bones and teeth, and maintaining a healthy immune system - vitamins and minerals • most natural foods contain a mixture of more than one nutrient group • most processed (manufactured) foods have added salt, sugar, preservatives, flavourings and colourings	• sorting foods into the four different nutrient groups - carbohydrates in foods such as bread, sugar, mealie meal, potato, rice, pasta - proteins in foods such as eggs, beans, meat, fish, cheese - fats and oils in foods such as margarine, cooking oil, butter - vitamins and minerals in foods such as fresh fruits and vegetables, milk (source of calcium) • reading labels on food packaging to look for the nutrients and/or the additives in the food	• Examples of different foods representing the different food groups and food packaging.

GRADE 6 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 ½ weeks (5 ¼ hours)	**Nutrition**	**Balanced diets** • a diet refers to the selection of foods we eat everyday • a balanced diet contains sufficient quantities of food from all four nutrient groups, as well as water and fibre • some diseases can be related to diet	• evaluating a given diet to determine if it contains food from all nutrient groups • finding out about a disease that could be diet related, such as tooth decay, obesity, diabetes or deficiency diseases	• Lists of different diets • Pictures and information about food-related illnesses
2 ½ weeks (8 ¾ hours)	**Food processing**	**Need for processing food** • food is processed to: - make it edible (preparing, cooking) - make it last longer (preserving) - improve its nutrient value (fermenting) • during processing many foods may lose some of their nutrients **Methods for processing food** • there are many different methods (ways) to process food	• **researching** how to process food (raw material) by combining, cooking, freezing, pickling, fermenting, drying and salting to make a product, including indigenous ways of processing of food in different communities • choosing a food and processing it in some way	• Pictures and information about how food is processed • Foods for processing

GRADE 6 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**Ecosystems and Food webs**	**Different ecosystems** • an ecosystem is an area where living and non-living things depend on each other in many different ways • there are many different ecosystems such as rivers, mountains, sea, rocky shore, ponds, wetlands, grasslands, forests and deserts, which support different kinds of living things **Living and non-living things in ecosystems** • in an ecosystem there are certain relationships between living things (plants, animals/people, microorganisms), and non-living things (air, water, sunlight, soil) in a particular area* **Food webs** • in an ecosystem plants and animals are connected by their feeding relationships. This is called a food web • a food web consists of: - plants (producers) which produce food for themselves and animals - animals (consumers) which are herbivores, carnivores, omnivores - microorganisms (decomposers) that break down dead plant and animal matter and return nutrients to the soil	• selecting an ecosystem on/near the school grounds for this study. Roughly measure an area of 5m x 5m square. • drawing and writing about three plants and three animals that are found there - describing the food, water, amount of sunlight and shelter available - describing the feeding relationships (food webs) - identifying the possible threats to this ecosystem and possible ways to overcome them • drawing and labelling simple food webs	• Pictures of ecosystems such as rivers, mountains, sea, rocky shore, ponds, wetlands, grasslands, forests and deserts
Notes: * Healthy ecosystems depend on sufficient biodiversity of plants, animals and their habitats				

GRADE 6 TERM 1				
STRANDS: NATURAL SCIENCES: LIFE & LIVING TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**).* • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • explain how plants make their own food (photosynthesis) • sort food into the four nutrient groups • describe a balanced diet • process food in some way • describe an ecosystem • elaborate on feeding relationships (food webs)	

GRADE 6 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
½ week (1¾ hours)	**Solids, liquids and gases**	**Arrangement of particles** • all matter (solids, liquids and gases) is made up of particles • the particles are arranged differently in solids, liquids and gases - in solids the particles are closely packed in a regular pattern – spaces between the particles are small and particles vibrate in one place - in liquids the particles are closely packed in no fixed pattern – spaces between the particles are small but particles can move around each other - in gases the particles are far apart from each other – spaces between the particles are big and particles move in all directions	• drawing* and writing about how particles are arranged in a solid, liquid and gas	• Video clips from the internet
1 week (3½ hours)	**Mixtures**	**Mixtures of materials** • a mixture consists of at least two different substances/ materials mixed together • in some mixtures, the different substances are still clearly visible after mixing - the substances in such mixtures can be separated by physical means such as sieving, filtering, hand sorting, settling and decanting	• making mixtures including: - two solids - salt and sand, sugar and tea leaves, peanuts and dried beans, different coins, mixture of different sweets - a solid and a liquid - sand and water, chalk and water, curry powder and water, grated cheese and milk - two liquids – oil and water, • drawing and writing about mixtures	• Examples of materials and substances such as: salt, sand, sugar, tea leaves, peanuts, dried beans, coins, sweets, curry powder, grated cheese, milk, oil • Video clips from the internet
Notes: * The drawings must show the same number of particles in the solid, the liquid and the gas. The particles must all be the same size.				

GRADE 6 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2½ weeks (8¾ hours)	**Solutions as special mixtures**	**Solutions** • solutions are also mixtures • some solutions can be made by mixing a solid and a liquid together such as sugar and water, salt and water • solutions are uniform in appearance and the solid cannot be seen after mixing **Soluble substances** • soluble solids (solutes) can dissolve* in water (solvent) • the substances in solutions cannot be separated by sieving, filtering, hand sorting, settling and decanting • some solutes can be recovered (separated) by evaporating the solvent (such as recovering salt from sea water) • when substances dissolve, solute particles become dispersed in the spaces between the solvent particles **Saturated solutions** • a solution is saturated when no more solute can dissolve in a given amount of solvent **Insoluble substances** • Some solids will not form a solution in water (insoluble solids)	• **Investigating** different solids to see if they dissolve in water including: - salt, sugar (soluble substances) - sand, mealie meal, flour, maize flour, samp, curry powder, custard powder (insoluble substances) • drawing and writing about what happens to solids in solutions • **Investigating** solutions to see if we can recover the solute by: - filtering - settling - evaporating the water (crystallisation) • drawing and writing about crystallisation	• Examples of materials and substances such as salt, sugar, sand, mealie meal, flour, maize flour, samp, curry powder, custard powder • Measuring cylinders, funnels, filter paper, beakers, evaporating dish, salt, food colouring
Notes: * A common misconception is that sugar or salt "melts" away when added to water. Dissolving (in the case of sugar and salt in water) requires **two** materials to be mixed together. This is different from melting (in the case of ice) which is a result of **heating one material** to change its state.				

GRADE 6 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 week **(3 ½ hours)**	**Dissolving**	**Rates of dissolving** • Factors that affect the rate (time taken) of dissolving - temperature of the mixture - stirring or shaking the mixture - grain size of the solute	• **Investigating, measuring and drawing graphs** of the time taken to dissolve a solute:** - in hot or cold water - when stirring/shaking or not stirring/shaking - using coarse or fine salt	• Containers, beakers, ice cream sticks for stirring, measuring spoons, hot water, salt (coarse and fine)
Notes: ** For a fair test, make sure to use a given amount of solute [for example 1 teaspoon (5 ml)], and a given amount of water [for example ½ cup (125ml)], each time				

GRADE 6 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2½ weeks (8¾ hours)	**Mixtures and water resources**	**Water pollution** • in the environment, many things mix or dissolve in water • water can be polluted by - insoluble substances, such as oil, plastics, tyres, tins, glass, toilet waste - soluble substances such as soaps, fertilizers, insecticides, acids and other poisons - living germs from toilet waste causing water-borne illnesses such as diarrhoea **Importance of wetlands** • natural wetlands are important for • removing soluble and insoluble substances from water • acting like sponges and regulating the flow of water	• reading about/visit a specific wetland • writing a brief report on the importance of wetlands including: - habitats and biodiversity - water quality **or** • writing about the impact of loss of wetlands for biodiversity and water quality	• Texts for reading about water pollution • Video clips from the internet
2½ weeks (8¾ hours)	**Processes to purify water**	**Clean water** • a clean supply of water is important for people, plants and animals • water can be cleaned by processes such as sieving, filtering, settling, decanting, boiling and adding chemicals to kill germs • municipal water is cleaned before and after we use it	• **Investigating** how to best purify dirty water in class or/and at home* • **designing, making and evaluating** a simple system to clean dirty water, (such as a sand filter) according to specifications and constraints *(refer to **Section 2.7**) [This can be used as a possible project]*	• Sieves, filter paper, funnels, containers, kettle, water purification tablets (if possible)
Notes: * Learners should not drink this water				

GRADE 6 TERM 2				
STRANDS: NATURAL SCIENCES: MATTER & MATERIALS TECHNOLOGY: PROCESSING				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
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GRADE 6 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Electric circuits**	**A simple circuit** • an electric circuit is a system for transferring energy • a simple circuit always has the following components: - source of energy (such as a cell/battery) - conducting material (such as wires) - device (such as a light bulb, buzzers, motors) for changing electricity into a useful output energy • a circuit is a complete, unbroken pathway for electricity • a switch can be added to break or complete the circuit pathway **Circuit diagrams** • symbols are used when drawing circuit diagrams	• investigating how to make a simple circuit using cell/ battery, conducting wires, light bulb and design and make a switch to control the circuit • drawing simple electrical closed circuit diagrams including the symbols for cell/battery, bulb, conducting wire, switch	• Equipment such as cells/batteries, conducting wires, light bulbs and switches

GRADE 6 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 weeks **(7 hours)**	**Electrical conductors and insulators**	**Conductors** • some materials conduct electricity and are called conductors - most metals, especially copper, conduct electricity **Insulators** • some materials do not conduct electricity and are called insulators - most non-metals, such as plastics, do not conduct electricity	• testing different materials (such as metal paper clips, nails, wire, steel-wool, coins, plastic, glass, ceramic, cardboard, paper, wood, rubber, chalk) in an electric circuit to see if they are conductors or insulators, and recording the results on a table • Identifying where electrical insulators are used such as in plastic insulated wires, rubber gloves used by electricians, glass and ceramic insulators on power lines	• Different materials including metal paper clips, nails, wire, steel-wool, coins, plastic, glass, ceramic, cardboard, paper, wood, rubber, chalk • Different materials including plastic insulated wires, rubber gloves used by electricians, glass and ceramic
2 ½ weeks **(8 ¼ hours)**	**Systems to solve problems**	**Using electric circuits** • electric circuits are often used to solve problems that require energy, such as street lighting, alarms, electric gates, traffic lights, fans and heaters • electric circuits can also be used in models and toys	• **designing, making, evaluating and presenting** a system that uses a circuit to produce movement, light, sound or heat* in a structure such as a steady hand game, house, light house or a toy. The circuit should include components such as cell/s, light bulb/s, buzzer/s, and switch/es *(refer to **Section 2.7**) [This can be used as a possible project]*	• Basic components for a circuit, including components such as cell/s, light bulb/s conducting wire/s, buzzer/s, and switch/es
Notes: * It is generally more difficult to produce heat using cells, but this can be explored				

GRADE 6 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
3 weeks (10 ½ hours)	**Mains electricity**	**Fossil fuels and electricity** • fossil fuels were formed in the Earth's crust millions of years ago from dead plants and animals • coal, oil and natural gas are fossil fuels • in South Africa coal is mostly used as a fuel in power stations • coal was formed from fossilised plants which got their energy from the Sun originally • in a power station coal is used to boil water, the steam turns a turbine which turns a generator, which produces electricity • fossil fuels are non-renewable resources **Cost of electricity** • electricity is costly because - it requires infrastructure including coal mines, transport, power stations, pylons, substations, wiring - some electrical appliances require more electricity than others (heating appliances use the most) • the more electricity we use the more we pay and the more coal is used up • we can save energy in many ways including using energy saving light bulbs and solar water heaters **Illegal connections** • illegal electrical connections are a danger to people because they are often unsafe **Renewable ways to generate electricity** • people are looking for renewable ways to generate electricity	• drawing and writing about to explain how fossil fuels such as coal were formed • drawing and writing to trace the electrical energy in a sequence from an appliance, such as from your TV set, to the coal-fired power station and back to the original source, the Sun • examining labels (in adverts, or real electrical appliances) to find out how much power they require (most kettles require more than 2000 W, whilst a radio might require about 15 W*). Recording findings on a table • Researching and writing about renewable ways to generate electricity including in wind power generators, solar panels (photovoltaics)**, hydro- electric power generators	• Pictures and video clips of fuels and their various uses • Pictures to show how electricity is generated in a coal-fired power station • Examples of electrical appliances • Pictures of renewable ways to generate electricity, including examples of wind power generators, solar power generators, hydro- electric power generators

Notes: * Learners in this grade do not have to know how Watts (W), kilo Watts (kW) and kilo Watt hours (kW.h) are measured and calculated

** Solar panels (photovoltaics) are different from solar water heaters

GRADE 6 TERM 3				
STRANDS: NATURAL SCIENCES: ENERGY & CHANGE TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**).* • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. Allow for a maximum of 7 hours to be used for assessment throughout the term. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can:** • draw and label an electric circuit correctly • demonstrate open and closed circuits with the use of a switch • distinguish between conductors and insulators in a range of materials • trace the electrical energy in a sequence from an appliance, such as from your TV set, to the coal-fired power station and back to the original source, the Sun • explain how fossil fuels such as coal are formed • determine which appliances use more energy and explain why this is so	

GRADE 6 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**The Solar System**	**The Sun, Planets and Asteroids** • the Sun (a star) is at the centre of our Solar System • there are eight planets and the asteroid belt (Mercury, Venus, Earth, Mars, Asteroid Belt, Jupiter, Saturn, Uranus, and Neptune) in orbit around the Sun • each planet has its own - features, size, orbit and position in relation to the Sun, composition (rocky and gas planets) and number of moons (some have no moons) • the planets and Asteroids take different amounts of time to revolve around the Sun* **Moons** • moons, including our Moon do not give out their own heat and light • our Moon can be seen from Earth because the light from the Sun shines onto its surface • on the Moon we can see craters, lighter areas which are mountains, and darker areas which are flat plains	• researching/reading information about the planets focusing on size, distance from the Sun, average temperature, number of moons** and any other features • making models of the Solar System taking into account position in relation to the Sun, size and features of the planets*** • describing and drawing the objects in our Solar System	• Detailed pictures and models of the Solar System • Pictures of the Moon

Notes: * It is not necessary to memorize exact numbers of size of planets, number of moons, and distance from the Sun

** The number of moons around some planets may change as more are discovered

*** It is not necessary to make the models of the Solar System to scale

GRADE 6 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 week **(3 ½ hours)**	**Movements**** **of the Earth and planets**	**Rotation (Earth)** • in our Solar System, each planet rotates (spins) on its own axis - the planet Earth is spinning, and one complete rotation takes about 24 hours. We experience this as a day and a night - during rotation the side of the Earth facing the Sun experiences daytime, and the opposite side of the Earth experiences night-time **Revolution (Earth)** • all planets also revolve (travel) around the Sun in their own orbits • planet Earth revolves around the Sun in its own orbit (pathway), and one complete revolution takes 365 ¼ days. We experience this as a year	• demonstrating the movements (rotation and revolution) and of the Earth using models and body movements • demonstrating how day and night occur using a model of the Earth and a light source (for the Sun) • drawing and writing about the rotation of the Earth in relation to the Sun - how day and night occur	• Models and a light source such as torch, lamp, or candle to demonstrate the movements of the Earth
Notes: **** Video clips could be used to help clarify the movements of the planets				

GRADE 6 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
1 week (3 ½ hours)	**The movement of the Moon**	**Rotation (Moon)** • the Moon is spinning and one complete rotation takes about 28 days **Revolution (Moon)** • the Moon revolves around the Earth and one revolution also takes about a month (about 28 days) • together, the Earth and the Moon revolve around the Sun	• demonstrating rotation, and revolution of the Moon around the Earth, using models and body movements • drawing and writing about the movements of the Moon in relation to the Earth and the solar system • making a table of comparison between the Sun (a star), the Earth (a planet) and the Moon including: shape, composition, size, movement in relation to other space objects, ability to produce light	• Models and a light source such as torch, lamp, or candle to demonstrate the movements of the Moon
1 week (3 ½ hours)	**Systems for looking into space**	**Telescopes** • telescopes are used to look into space and gather information • South Africa has built and uses some of the largest telescopes	• reading a case study about telescopes such as simple telescopes, SALT (Southern African Large telescope), SKA (Square Kilometre Array)	• Pictures and information about telescopes

GRADE 6 TERM 4				
STRANDS: NATURAL SCIENCES: PLANET EARTH & BEYOND TECHNOLOGY: SYSTEMS & CONTROL				Equipment and Resources
Time	**Topic**	**Content & Concepts**	**Suggested Activities: Investigations, practical work, and demonstrations**	
2 ½ weeks (8 ¾ hours)	**Systems to explore the Moon and Mars**	**Vehicles used on the Moon** • a few people have visited the surface of the Moon and explored it using a vehicle called a Moon Rover **Vehicles used on Mars** • robots called Mars Rovers have been used to visit and explore the surface of Mars (people have not yet visited Mars)	• **researching** the key features and purposes of the Mars or Moon Rovers including wheels and axles, cameras, mechanical arms, and systems for using solar energy and communications • **designing, making and evaluating** a model of one of these vehicles which can move by means of wheels and axles *(refer to **Section 2.7**)* • measuring how far the different vehicles can run down a ramp and draw bar graphs *[This can be used as a possible project]*	• Pictures of the Moon Rovers and Mars Rovers • Apparatus including bottle tops, round tins or cardboard circles for the wheels, sosatie sticks or dowels and straws for the axles • Measuring tapes or meter sticks
Assessment guidelines		This content and the associated concepts must be integrated with the aims and skills for Natural Sciences and Technology *(refer to **Section 2**)*. • Learners should read, write, draw and do practical tasks regularly • Evidence of learner's work, including assessments, should be kept in the learner's notebook School-based assessment (including practical tasks and class tests), checking for correctness, and providing constructive feedback should be done regularly. As this is the exam term, the final two weeks may be required for revision of the year's work and for examinations. For more detailed guidelines on assessment, *refer to **Section 4.***	**Check the learner's knowledge and that they can**: • describe objects in our Solar System (planets, moons, the Sun, Asteroids) • demonstrate the Earth's rotation and revolution • explain the movements of the Moon • identify the essential differences between the Earth, Sun and the Moon • explain the uses of telescopes and the important telescopes in South Africa • make and evaluate a model vehicle featuring wheels and axles	

SECTION 4: ASSESSMENT

4.1 INTRODUCTION

Assessment is a continuous planned process of identifying, gathering, interpreting and diagnosing, information about the performance of learners. All forms of assessment involve generating and collecting evidence of achievement; evaluating this evidence and using this information to understand and thereby assist the learner's development and the teaching process.

Assessment should be both *informal* and *formal*. In both cases regular feedback should be provided to learners to enhance the learning experience. In both cases regular feedback should be provided to learners.

Informal and formal assessment

Informal assessment consists of regular checking of learners' class work (including practical tasks) asking questions orally and giving constructive feedback. Marks for informal assessment need not be recorded.

Formal assessment consists of selected assessment tasks, the marks of which should be recorded formally. These assessment tasks are done throughout the year and include tests and examinations. All marks that are recorded formally contribute to the final year mark.

Assessment should be mapped out against the content (concepts and skills) and specific aims for Natural Sciences and Technology. 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 major skills is included. *(See **Section 2.7** and **Section 4.5**)*
- a variety of different forms of assessment are used. (*See **Section 4.4**)*

4.2 INFORMAL ASSESSMENT OR DAILY ASSESSMENT

The purpose of Informal assessment is to continuously collect information on a learner's achievement that can be used to improve their learning.

Informal assessment is a daily monitoring of learners' progress. It should not be seen as separate from the learning activities taking place in the classroom.

Informal assessment can be done through observation, discussion, practical demonstrations, informal classroom interactions, classwork, investigations and so on. 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 also be used to provide feedback to the learners and to inform planning for teaching.

Self-assessment and peer assessment, as part of informal assessment, actively involves learners in assessment and a teacher playing an overseeing role. This is important as it allows learners to learn from and reflect on their own performance.

Selected informal assessment tasks may be marked by learners or teachers, but need not be recorded unless the teacher wishes to do so. The results of daily assessment tasks are not taken into account for promotion and certification purposes, but for improving teaching and learning.

Informal, on-going assessments should be used to encourage the acquisition of knowledge and skills and should be the stepping stones leading up to the formal tasks in the Programme of Formal Assessment. *(See **Section 4.4**)*

4.3 FORMAL ASSESSMENT

Formal assessment tasks and tests form part of a year-long formal Programme of Assessment in each grade and subject. Formal assessments are marked and recorded by the teacher for progression purposes. All Formal Assessment tasks must be moderated 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. Formal assessment tasks in Natural Sciences and Technology are tests, examinations, practical tasks, which may include projects. *(See details in **Section 4.4.1**)*

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

GRADES	FORMAL SCHOOL-BASED	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 and 'trial' examinations	External examination: 75%

Formally assessed tests and tasks must together reflect the whole term's work. Weighting of marks should reflect time allotted to each section in the curriculum content.

The cognitive demands of assessment

The cognitive demands of assessment used should be appropriate to the age and developmental level of the learners in the grade. Assessments in Natural Sciences and Technology must cater for a range of cognitive levels and abilities of learners within this context. The assessment tasks should be carefully designed to cover the content of the subject as well as the range of major skills that have been specified under the Major Process and Design skills. *(See **Section 2.7**)*

The Specific Aims, the topics and content and the range of major skills must be used to inform the planning and development of assessment tasks.

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

Setting tests and tasks for different cognitive levels	Knowing science and technology	Understanding science and technology	Applying scientific and technological knowledge	Evaluating, analyzing, synthesising scientific and technological Knowledge
Percentages indicating the proportion of low, middle and high order questions in tasks, tests and exams	**Low order questions 50%**	**Middle order questions 35%**		**High order questions 15%**
Useful verbs to use when setting questions	State Name Label List and others ...	Explain Describe Compare Plan Rearrange Give an example and others …	Predict Compare Design Use knowledge to demonstrate and others …	Evaluate Suggest a reason Interpret and others ...

These cognitive skills apply to all three Specific Aims for Natural Sciences and Technology. *(See **Section 2.6**)*

4.4 PROGRAMME OF FORMAL ASSESSMENT FOR NATURAL SCIENCES AND TECHNOLOGY GRADES 4, 5 AND 6

FORMAL ASSESSMENTS	TERM 1	TERM 2	TERM 3	TERM 4	TOTAL % FOR THE YEAR
School-based assessments	• 1 Test • 1 selected practical task *	• 1 Exam or test on work from terms 1 & 2 • 1 selected practical task	• 1 Test • 1 selected practical task	• 1 selected practical task	75%
Exams **				• Exam on work from terms 3 & 4	25%
Number of formal assessments	2	2	2	2	Total: 100%

Notes: * Grade appropriate assessment on aspects of investigations and technological processes should form part of the selected practical tasks in the assessment programme for the year

** The class tests and examinations **MUST** include questions on both Natural Sciences and Technology

A note on tests and examinations

Examinations **MUST** include questions on both Natural Science and Technology. Weighting of marks should reflect time allotted to each section in the curriculum content.

A single formal class test in a term will not necessarily provide the most accurate and reliable evidence of every learner's performance. One formal class test in the first three terms is the minimum number that must be recorded.

Tests and examinations consist of a range of questions that cover the different cognitive levels – knowledge recall, understanding, application, evaluation, analysis and synthesis. Learners are required to respond to questions within a specified time under controlled conditions. Examinations are similar to tests - the only difference is that they cover more content.

A note on practical tasks

In carrying out practical tasks learners are required to demonstrate their skills or proficiencies. Learners use materials, tools and equipment to create, produce or investigate something. The teacher observes the learner demonstrate specific practical skills (e.g. measuring the height of a plant, using tools to manipulate materials to make models, using a thermometer to measure temperature, etc.). Practical tasks can be very useful for assessing how learners draw on knowledge and values to carry out practical skills (manual and/or behavioural, e.g. safety and handling of equipment).

Any practical task should provide opportunities for learners to demonstrate several different skills listed under ***Section 2.7*** and ***Section 4.5***. These may or may not include **design/plan investigation skills.** 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.

Practical tasks include a range of activities where learners communicate what they know and can do. Include a range of tasks to ensure inclusivity and to accommodate different learning styles. These ways to communicate include: acting out, speaking, drawing, making models, doing science practical work, working in the environment, writing and doing calculations.

A note on projects

Certain practical activities in ***Section 3*** have been suggested as suitable for possible projects, in which case the mark will still be included as part of the School-based assessment. A project is **optional** and varies in extent. It may be done in class and should be sufficiently diverse to promote inclusivity. One project per year may be done.

4.5 RECORDING AND REPORTING

4.5.1 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 be 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. Records should be used to monitor learning and to plan ahead.

Guidelines on how the major process skills can be recorded for marks in Natural Sciences and Technology

Many of these major process skills *(also refer to **Section 2.7**)* are combined into one activity. Not every major skill needs to be marked and recorded in each task.

NATURAL SCIENCES MAJOR INVESTIGATION PROCESS SKILLS	MARK ALLOCATION
Writing the topic	
Raising/ writing a question to investigate	
Making a prediction/ hypothesis	
Planning the investigation	
Collecting data	
Recording data	
Evaluating and communicating results	
Total	

TECHNOLOGY MAJOR PROCESS SKILLS	MARK ALLOCATION
Stating a design brief	
Listing specifications	
Listing constraints	
Planning the product	
Drawing/designing the product	
Making the product	
Evaluating the product	
Presenting the product	
Total	

4.5.2 Reporting is a process of communicating learner performance to learners, parents, schools, and other stake-holders. 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 will record actual marks against the task by using a record sheet; and report percentages against the subject on the learners' report cards. Percentages are reported and may be related to the 7-point rating code as given below.

Schools are required to provide quarterly feedback to parents on the Programme of Formal 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.

4.5.3 Mark allocation

A minimum mark allocation is prescribed for the tests, tasks and examinations for each Grade in the Intermediate Phase. See the guideline below for each Grade under **A.**

However, should the teacher choose to allocate more marks for tests and tasks, these should also be converted to conform to the total weighting percentages for the Intermediate Phase. See the example below under **B.**

A: Minimum mark allocation for Grades 4, 5 and 6

Grade 4

PROGRAMME OF FORMAL ASSESSMENT						
FORMAL ASSESSMENTS	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**TOTAL MARKS FOR THE YEAR**	**TOTAL**
School-based assessments	• 1 Test [15 marks] • 1 selected practical task [10 marks]	• 1 Exam or test on work from terms 1 & 2 [40 marks] • 1 selected practical task [10 marks]	• 1 Test [15 marks] • 1 selected practical task [15 marks]	• 1 selected practical task [15 marks]	120 marks	Together make up 75% of total marks for the year
Exams [60 Minutes]				• Exam on work from terms 3 & 4 [40 marks]	40 marks	Makes up 25% of total marks for the year
Number of formal assessments	2	2	2	2	Total 8 assessments [160 marks]	Total: 100%

At the end of each term (Terms 1 – 3) : The marks can be reported as a percentage and related to the 7-point rating code.

At the end of the year:

STEP 1: ADD up all the **School-based assessment** raw marks from each term to get a total out of **120 marks**

STEP 2: ADD the **Final Exam** raw mark to the **School-based assessment** total mark in **Step 1**

STEP 3: CONVERT to a percentage and report in relation to the 7-point rating code below, if required

Grade 5

PROGRAMME OF FORMAL ASSESSMENT						
FORMAL ASSESSMENTS	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**TOTAL MARKS FOR THE YEAR**	**TOTAL**
School-based assessments	• 1 Test [15 marks] • 1 selected practical task [15 marks]	• 1 Exam or test on work from terms 1 & 2 [45 marks] • 1 selected practical task [15 marks]	• 1 Test [15 marks] • 1 selected practical task [15 marks]	• 1 selected practical task [15 marks]	135 marks	Together make up 75% of total marks for the year
Exams **[60 Minutes]**				• Exam on work from terms 3 & 4 [45 marks]	45 marks	Makes up 25% of total marks for the year
Number of formal assessments	2	2	2	2	Total 8 assessments [180 marks]	Total: 100%

At the end of each term (Terms 1 – 3): The marks can be reported as a percentage and related to the 7-point rating code.

At the end of the year:

Step 1: ADD up all the **School-based assessment** raw marks from each term to get a total out of **135 marks**

Step 2: ADD the **Final Exam** raw mark to the **School-based assessment** total mark in **Step 1**

Step 3: CONVERT to a percentage and report in relation to the 7-point rating code below, if required

Grade 6

PROGRAMME OF FORMAL ASSESSMENT						
FORMAL ASSESSMENTS	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**TOTAL MARKS FOR THE YEAR**	**TOTAL**
School-based assessments	• 1 Test [20 marks] • 1 selected practical task [15 marks]	• 1 Exam or test on work from terms 1 & 2 [50 marks] • 1 selected practical task [15 marks]	• 1 Test [20 marks] • 1 selected practical task [15 marks]	• 1 selected practical task [15 marks]	150 marks	Together make up 75% of total marks for the year
Exams [60 Minutes]				• Exam on work from terms 3 & 4 [50 marks]	50 marks	Makes up 25% of total marks for the year
Number of formal assessments	2	2	2	2	Total 8 assessments [200 marks]	Total: 100%

At the end of each term (Terms 1 – 3) : The marks can be reported as a percentage and related to the 7-point rating code.

At the end of the year:

Step 1: ADD up all the **School-based assessment** raw marks from each term to get a total out of **150 marks**

Step 2: ADD the **Final Exam** raw mark to the **School-based assessment** total mark in **Step 1**

Step 3: CONVERT to a percentage and report in relation to the 7-point rating code below, if required

B: Should the teacher choose to allocate more marks for tests and tasks, the example below can be used.

Recording and reporting for each term

Marks should be recorded and converted into a percentage for each term. Percentages are reported and may be related to the 7-point rating code as given below.

How to calculate each learner's % for each term

Step 1*. Add together formally assessed marks achieved by each learner*

Step 2*. Divide by total marks possible*

Step 3*. Multiply this mark by 100 to give the % achieved*

For example*: Learner score = 34 out of a possible 60 marks for the test and tasks added together for a term.*

*34 ÷ 60 x 100 = 56.6%**

** rather than use decimal points round any fraction from .5 and bigger up to next whole percentage. The above example will be rounded up to 57%*

Recording and reporting at the end of the year

- The four percentages for each term must be calculated to give 75% of the total. **This is the School-based assessment mark.**
- **The final exam mark** must be converted to 25% of the total and added to the School-based assessment mark.

How to calculate each learner's % for reporting at the end of the year:

Step 1. Use the following formula to convert the four term School-based assessment %'s to 75% of the total:

1st Term % + 2nd Term % + 3rd Term % + 4th Term %; *then divide the total by* 400; *then multiply by* 75.

For example: (*57% + 65% + 74% + 60%) ÷ 400 X 75 =* ***48*** (This is the equivalent of 48 out of 75)

Step 2. Convert the final year examination mark to 25 % using the following formula:

Mark achieved in exam by learner ÷ total marks possible in exam X 25.

For example: *a learner scores 28 out of a total of 40 marks in the final exam:*

28 ÷ 40 X 25 = ***17.5*** (This is the equivalent of 17.5 out of 25)

Step 3. Add the calculated year mark (School-based assessment) to the exam mark as calculated above to reach the total % for the year.

The learner in the example above has scored: 48 + 17.5 = 65.5 % for the year. (Round this up to 66%)

- Percentages are reported and may be related to the 7-point rating code as given below.

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

4.6 MODERATION OF ASSESSMENT

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation should be implemented at school, district and, if necessary provincial levels. Comprehensive and appropriate moderation practices must be in place for the quality assurance of all subject assessments.

In all Grades the formal School-based assessment (including the practical tasks) should be moderated by the relevant subject specialist(s) at school and district levels in an ongoing way. Moderation 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 is 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.
5. It should reflect the scope covered by the teacher in line with the term's requirement

4.7 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.*