basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

CURRICULUM AND ASSESSMENT POLICY STATEMENT

(CAPS)

INTERMEDIATE PHASE

NATURAL SCIENCES AND TECHNOLOGY

FINAL DRAFT

SECTION 1

NATIONAL CURRICULUM AND ASSESSMENT POLICY STATEMENT FOR NATURAL SCIENCES AND TECHNOLOGY

1.1 Background

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

To improve its implementation, the National Curriculum Statement was amended, with the amendments coming into effect in January 2011. A single comprehensive Curriculum and Assessment Policy document was developed for each subject to replace the old Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R - 12.

The amended *National Curriculum Statement Grades R - 12: Curriculum and Assessment Policy (January 2011) replaces the National Curriculum Statement Grades R - 9 (2002) and the National Curriculum Statement Grades 10 - 12 (2004)*.

1.2 Overview

(a) The *National Curriculum Statement Grades R – 12 (January 2011)* represents a policy statement for learning and teaching in South African schools and comprises the following:

(i) Curriculum and Assessment Policy documents for each approved school subject as listed in the policy document *National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF);* and

(ii) The policy document *National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF).*

(b) The *National Curriculum Statement Grades R – 12 (January 2011)* should be read in conjunction with the following documents:

(i) *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 Grade R – 12*, published in the *Government Gazette, No. 29467* of 11 December 2006; and

(ii) *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 the *Government Gazette, No.29466* of 11 December 2006.

(c) The Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R - 9 and Grades 10 - 12 are repealed and replaced by the *Curriculum and Assessment Policy documents for Grades R – 12 (January 2011)*.

(d) 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* and 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 what is regarded to be knowledge, skills and values worth learning. It will ensure that learners acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes the idea of grounding 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 our 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 sets 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 10 – 12 (General) 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.

1.4 Time Allocation

1.4.1 Foundation Phase

(a) The instructional time for subjects in the Foundation Phase is as indicated in the table below:

Subject	Time allocation per week (hours)
I. Home Language	**6**
II. First Additional Language	**4 (5)**
III. Mathematics	**7**
IV. Life Skills	**6**
• Beginning Knowledge	1 (2)
• Arts and Craft	2
• Physical Education	2
• Health Education	1

(b) Instructional time for Grades R, 1 and 2 is 23 hours. For Grade 3, First Additional Language is allocated 5 hours and Beginning Knowledge is allocated 2 hours as indicated by the hours in brackets in the table above.

1.4.2 Intermediate Phase

(a) The table below shows the subjects and instructional times in the Intermediate Phase.

Subject	Time allocation per week (hours)
I. Home Language	**6**
II. First Additional Language	**5**
III. Mathematics	**6**
IV. Science and Technology	**3.5**
V. Social Sciences	**3**
VI. Life Skills	**4**
• Creative Arts	1.5
• Physical Education	1.5
• Religion Studies	1

1.4.3 Senior Phase

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

Subject	Time allocation per week (hours)
I. Home Language	**5**
II. First Additional Language	**4**
III. Mathematics	**4.5**
IV. Natural Sciences	**3**
V. Social Sciences	**3**
VI. Technology	**2**
VII. Economic Management Sciences	**2**
VIII. Life Orientation	**2**
IX. Arts and Culture	**2**

1.4.4 Grades 10-12

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

Subject	Time allocation per week (hours)
I. Home Language	**4.5**
II. First Additional Language	**4.5**
III. Mathematics	**4.5**
IV. Life Orientation	**2**
V. Three Electives	**12 (3x4h)**

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

CURRICULUM AND ASSESSMENT POLICY STATEMENT: NATURAL SCIENCES AND TECHNOLOGY

GRADE 4

INTRODUCTION

In Grade 4, the content of Natural Sciences and some aspects of Technology have been integrated to ensure a smooth transition between these subjects and to allow learners and teachers to experience the inter-connectedness of Natural Sciences and Technology. It also prepares learners for both Natural Sciences and Technology in the Senior Phase. The different contexts have been grouped together in such a way to ensure that the learning experience is meaningful for both teachers and learners.

When teaching Natural Sciences and Technology, it is important to emphasise the links that learners need to make with related topics to help them to achieve a deeper understanding of the nature of the different strands and the connectedness to everyday life. These links must also be made across grades.

The knowledge framework focuses on ideas, skills, concepts and the connections between them. It does not prescribe particular instructional strategies, except where, for example, practical work is indicated. Educators have the freedom to expand on concepts and to design and organise learning experiences according to their local circumstances. All the knowledge areas must, however, be addressed in each grade of study.

The cognitive and practical skills that have been identified must be taught and assessed in an integrated way in the context provided by the knowledge areas. Both the Scientific and Design processes must be introduced gradually from Grade 4 onwards to ensure that learners acquire the range of necessary cognitive and other skills. The range of skills that are acquired in the context of Natural Sciences and Technology are similar and in many instances, they overlap.

GRADE 4

NATURAL SCIENCES	**TECHNOLOGY**
Four *knowledge areas* are used as organisers of the Natural Sciences content framework. Each *knowledge area* is developed across all three years of the Intermediate Phase. These *knowledge strands* are: • matter and materials (strand 1) • life and living (strand 2) • energy and change (strand 3) • Earth and beyond (strand 4).	Two *knowledge strands* are used as organisers of the Technology content framework. Each *knowledge strand* is developed across all three years of the Intermediate Phase. The *knowledge strands* are placed in ascending order, size and complexity as a framing device. These *knowledge strands* are: • structures (strand 1) • systems and control (strand 2).

The recommended sequence for the teaching of the knowledge strands in this document for **Grade 4** is:

1. life and living (strand 2)
2 matter and materials and structures (content) and the scientific and technological processes (strand 1)
3. energy and change (and life and living and mechanisms and the scientific and technological processes) (strand 3)
4. Earth and beyond (strand 4).

The first section in Grade 4 is intended to introduce learners to the familiar aspects of the subject by studying contexts with which they can identify.

AIMS

There are **three** broad, subject-specific aims in Natural Sciences and Technology. These are:

1. Specific Aim 1 which relates to the knowledge/content (theory) of both subjects
2. Specific Aim 2 which relates to doing science and technology (this will include practical work and the designing and making of models)

3. Specific Aim 3 which relates to understanding the interrelationship of Natural Sciences and Technology and the relevance for the environment and the community.

These three aims are aligned to the three Learning Outcomes with which teachers are familiar. Within each of these aims, specific skills or competencies have been identified. It is not advisable to try to assess each of the skills separately, nor is it possible to report on individual skills separately. However, well designed assessments must show **evidence** that, by the end of the year, all of the skills have been assessed. There must be a clear link between the aims and the outcomes of learning. The assessments are the link.

Whilst learner performance can be reported on separately for Specific Aims 1 (knowing) and 2 (doing Science and Technology), all of Specific Aim 3 (Science and Technology in society) can be integrated into either Specific Aim 1 or Specific Aim 2.

1. SPECIFIC AIM 1: ACQUIRING KNOWLEDGE OF NATURAL SCIENCES AND TECHNOLOGY

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

1.1. ACQUIRE KNOWLEDGE

Skills

Learners must…

- **access** information from a variety of sources (teachers, reference books, textbooks, the internet, experts, peers, parents, etc.)
- **select** key ideas obtained from resources
- **recall** and **describe** knowledge of the Natural Sciences and Technology.

Assessments

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

1.2 UNDERSTAND AND MAKE MEANING OF NATURAL SCIENCES AND TECHNOLOGY

Skills

Learners must…

- **analyse** acquired knowledge
- **evaluate** acquired knowledge
- **synthesise** (or reorganise) knowledge to create new meaning through written summaries, flow charts, diagrams and mind maps.

Assessments

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

1.3 APPLY KNOWLEDGE OF NATURAL SCIENCES AND TECHNOLOGY IN NEW AND UNFAMILIAR CONTEXTS

Skills

Learners must…

- **analyse** and **evaluate** knowledge and **apply** this to new and unfamiliar contexts.

Assessments

In order to asses these competencies (cognitive skills), teachers should use the following verbs in the tasks or assessments that they set: explain, interpret, predict, compare, differentiate and select, as well as any other appropriate verbs which would assess a learner's ability to apply knowledge. The key is that the learners will have to apply knowledge about something that they have learnt, and which they understand, in

a context/situation about which they have not yet acquired specific knowledge, **at the appropriate grade level.**

Skills

Learners must…

- **access** information from a variety of sources (teachers, reference books, textbooks, the internet, experts, peers, parents, etc.)
- **select** key ideas obtained from resources
- **recall** and **describe** knowledge of the Natural Sciences and Technology.

Assessments

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

SPECIFIC AIMS 2:Whilst the skills specified in Specific Aims 1 and 3 apply equally to Natural Sciences and Technology, the skills that relate to "doing" Natural Sciences and Technology are different.

(a) INVESTIGATE PHENOMENA IN NATURAL SCIENCES	**(b) APPLY THE DESIGN PROCESS TO SOLVE PROBLEMS**
The following range of skills relate to doing practical work in Natural Sciences. All seven skills will not apply to every practical activity equally. The skills are aligned to what learners would be doing in the normal course of practical work. Teachers must select those that apply to, and which can be assessed in, the context of specific activities. By the end of each year, all seven skills must have been assessed at a grade appropriate level. **Learners must be able to:**	The following range of skills relates to developing solutions for identified problems or human needs. All five skills will not apply to every activity equally. The skills are aligned to what learners would be doing in the normal course of developing a solution. Teachers must select those that apply to, and which can be assessed in, the context of specific activities. By the end of each year, all five skills must have been assessed at a grade appropriate level. **Learners must be able to:**
2.1 FOLLOW INSTRUCTIONS This is essential, especially in the lower grades and in large classes. Teachers cannot expect all learners to use unfamiliar equipment and to do so independently without giving them a clear set of instructions to follow. The degree of assistance required would indicate the level of performance in this regard. Adherence to safety rules would be part of this. In Grade 4, teachers must provide clear instructions and assist learners to follow these succinct instructions.	**2.1 INVESTIGATE A SITUATION** Learners must collect data and information, must find out about new techniques, etc. Skills needed include accessing and processing skills, recording, identifying, predicting, comparing, observing, classifying and interpreting.

2.2 HANDLE EQUIPMENT/APPARATUS This should include knowledge of the apparatus, i.e. naming it and knowing what it is used for. It includes equipment such as a thermometer for measuring temperature or a ruler for measuring length, as well as using a pair of scissors or a craft knife for cutting paper and cardboard. "Handle equipment" is a generic skill and would apply to any equipment used for different kinds of investigations. Handling improvised equipment requires the same skills as would be required for handling standard laboratory equipment.	**2.2 DESIGN A SOLUTION** This should include the following skills: • writing a design brief using a given problem statement • generating possible solutions according to set specifications (supplied or created) • choosing a solution that will best satisfy the specifications • justifying the choices made • drawing a final conclusion.
2.3. MAKE OBSERVATIONS A variety of observations are possible and observations can be recorded in different ways such as: • drawings • descriptions • grouping of materials/examples based on observable similarities and/or differences • measurements • comparing materials before and after treatment • observing results of an experimental investigation which will involve tabulating the data • counting.	**2.3 CONSTRUCT THE FINAL SOLUTION** This should include the following skills: • using tools, equipment and materials to construct a solution • measuring, cutting, joining, shaping, combining, separating, mixing, etc.

2.4. RECORD INFORMATION/DATA This should include the recording of observations or information as drawings, descriptions, tables, graphs, etc. This recording skill is transferable across a range of scientific activities. **2.5. MEASURE** Learners should know **what** to measure, **how** to measure it and have a sense of the degree of accuracy that is required. A variety of things should be measured including length, volume, temperature, numbers (counting), etc. Measuring is a way of quantifying observations and in this process learners should learn to estimate. **2.6. INTERPRET** Learners should be able to convert information from one form to another, e.g. pictures ➔ words sentences ➔ key words label diagrams, table ➔ appropriate graph	**2.4 EVALUATE THE FINAL SOLUTION** This should include the following skills: • the critical evaluation of the final product against the specifications and design brief • the making process • any possible improvements needed. **2.5 COMMUNICATE THE PROCESS** The processes followed from 2.1 – 2.4 must be presented in oral or written form and must include sketches

2.7. DESIGN/PLAN INVESTIGATIONS OR EXPERIMENTS Skills include: • identifying a problem • selecting apparatus/equipment and/or materials where necessary • planning an experiment using a given problem statement • identifying the factors that will influence the outcome (variables: dependent and independent) • controlling variables/designing suitable control • predicting the outcome of the experiment • suggesting ways of recording results • planning and/or designing and investigation/experiment with assistance (grades 4-6 learners).	

Note: Skills By separating the different kinds of skills (2.1 to 2.7 for Natural Sciences and 2.1 to 2.5 for Technology), these skills can apply to a **variety** of practical work/problem-solving situations that are appropriate for a particular grade in Natural Sciences and Technology, including investigations/experiments. This approach makes it easier to assess learners in a range of different circumstances and it makes it possible for a teacher to make judgments about a learner's ability to **do** science and technology. The skills are based on what learners would do in the normal course of practical work or solving problems.

. UNDERSTAND THE INTERRELATIONSHIPS BETWEEN NATURAL SCIENCES AND TECHNOLOGY, AND THE APPLICATION OF NATURAL SCIENCES AND TECHNOLOGY FOR SOCIETY AND THE ENVIRONMENT

3.1 UNDERSTAND THE HISTORY, IMPORTANCE AND RELEVANCE OF SCIENCE AND TECHNOLOGY AND THE IMPORTANCE OF INDIGENOUS KNOWLEDGE

Skills

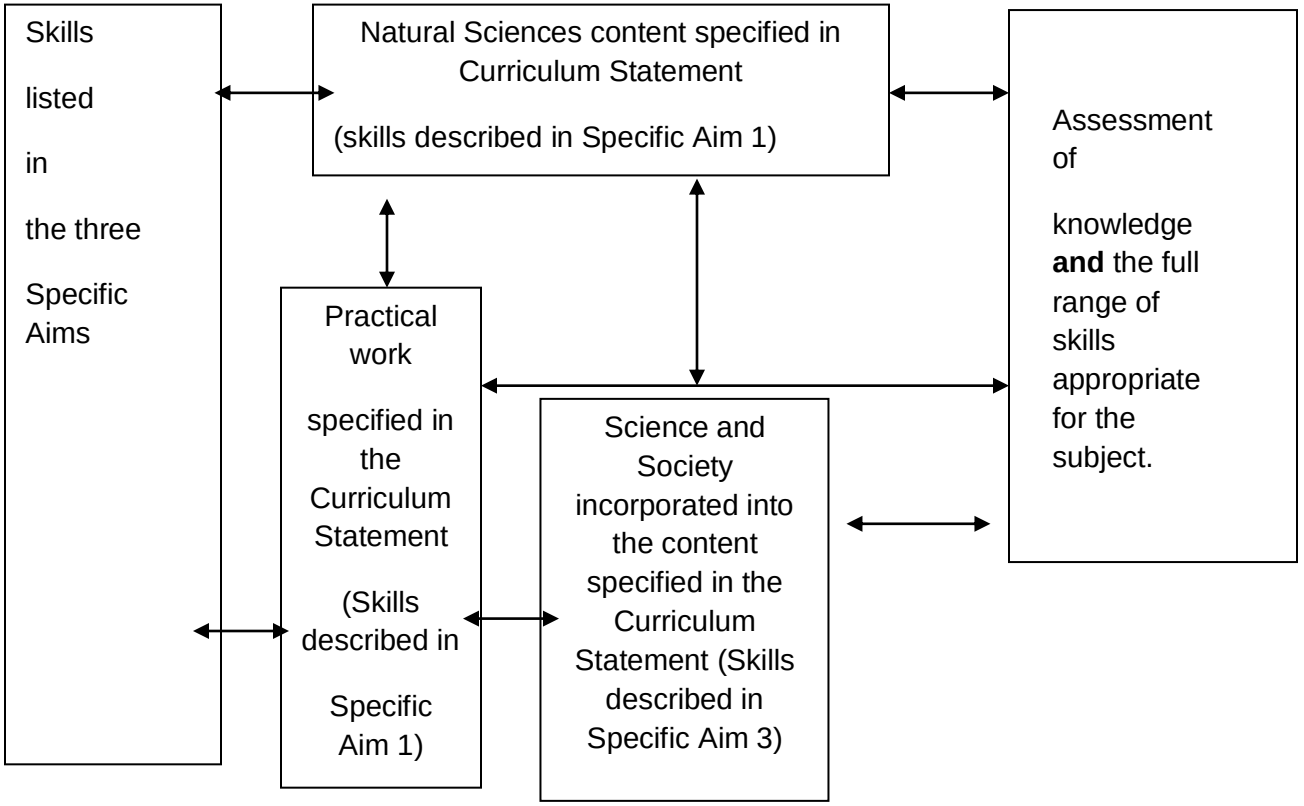
Learners must…

- **understand** how indigenous cultures have used scientific principles and technological products for specific purposes
- **understand** how science and technology have benefited society and the environment
- **select** key ideas to construct the history of scientific or technological discoveries and how science and technology have benefited or
- **analyse** and **evaluate** the application of scientific principles and technological products used by indigenous cultures in everyday life (both positive and negative consequences)**analyse**, **discuss** and **debate** the positive or negative effects of science and technological products on society and the environmen

FLOW DIAGRAM: RELATIONSHIPS BETWEEN THE KEY CURRICULUM ELEMENTS

The following diagram illustrates how the aims relate to learning outcomes, and to one another, and how the ranges of skills must be infused into the subject content.

- The diagram also shows how assessment relates to the content, the practical work and Science and Society as well as the skills.
- The diagram shows what has to be taught (Specific Aims 1, 2 and 3) of which the subject content provides the context for everything else.
- It shows the skills that must be taught and it shows how teachers should go about assessing the learners.
- The diagram illustrates the "infusion" of cognitive and other skills into everything that is taught and assessed.



TIME

The Grade 4 curriculum is taught over 32 of the 40 weeks in the school year. This leaves 8 weeks in the year for examinations and disruptions due to other school activities. The time allocated per topic is a guideline only.

ASSESSMENTS

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

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

Assessment should be mapped against the content and intended aims specified for a subject.

Assessment should be both informal and formal. In both cases regular feedback should be provided to learners to enhance the learning experience. In both informal and formal assessments it is important to:

- cover all of the subject content
- include the full range of skills
- use a variety of different forms of assessment.

Informal assessment

Regular assessments form part of the teaching and learning activities in the classroom.

Informal assessment can occur in every lesson, at any stage of the lesson. This can be done through questions and answers, class work (e.g. short pieces of written work completed during the lesson), open-book tests or homework exercises. These assessment activities should not be seen as separate from the learning activities in the classroom and should be used to provide feedback to learners to improve learning and teaching.

Informal assessments can be scored by teachers or learners. Self-assessment and peer assessment actively involves learners and allows them to learn from and reflect on their own performance. Grade 4 learners may need assistance and encouragement to cope with their involvement in the scoring of assessments.

Informal, continuous assessment should be used to scaffold the acquisition of knowledge and skills and should be used as preparation for the formal tasks in the Programme of Assessment.

Informal assessments do not need to be recorded unless the teacher wishes to do so. In such instances, a simple checklist may be used to record this assessment and to provide feedback.

The results of informal assessments do not have to be taken into account when determining a learner's final mark for promotion or certification purposes.

Formal assessment

Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a grade and a particular subject.

Formal assessment tasks are recorded and used to determine whether learners should be promoted to the next grade.

Teachers have to submit their annual formal Programme of Assessment to the School Management Team (SMT) before the start of the school year. This will be used to draw up a school assessment plan in each grade. The school assessment plan should be provided to learners and parents in the first week of the first term.

Examples of formal assessments include projects, oral presentations, practical task, tests, examinations, etc. For Natural Sciences and Technology, possible projects are suggested by the curriculum.

Formal assessments are part of the continuous programme of assessment in each grade and subject. Formal assessments are school-based and are weighted as follows for the different grades:

Grades	**Formal school-based assessments**	**End-of-year examinations**
4-6	75%	25%

This is departmental policy.

The cognitive demands of the assessment should be appropriate to the age and developmental level of the learners in the grade.

The assessment tasks should be carefully designed to cover the content of the subject as well as the range of skills stated in the Specific Aims. The design of these tasks should therefore ensure that a variety of content and

skills are assessed. Objectives, topics and content in the subject should be used to inform the planning and development of assessment tasks.

Formal assessments in Natural Sciences and Technology must cater for a range of cognitive levels and abilities of learners.

Assessment of content and skills

Specific Aim 1.1 Natural Sciences and Technology (knowing, remembering)	Specific Aim1. 2: Natural Sciences and Technology (understanding, applying)	Specific Aim 1.3 and 3.1 (analysing, evaluating, creating)
60% Natural Sciences 45% Technology 15%	30% Natural Sciences 20% Technology 10%	10% Natural Sciences and Technology

It is important that all assessments are designed to reflect this weighting. If assessments provide evidence that the aims have been assessed appropriately, it will not be necessary to record performance against aims separately.

The requirements (number and nature of tasks) for Natural Sciences and Technology are indicated below:

ASSESSMENT REQUIREMENTS FOR NATURAL SCIENCES AND TECHNOLOGY: GRADE: 4

<table>
<tr><th colspan="3">PROGRAMME OF FORMAL RECORDED SCHOOL-BASED ASSESSMENT
75%</th><th>END-OF-YEAR EXAMINATION
25%</th></tr>
<tr><td>50 %</td><td>25%</td><td></td><td></td></tr>
<tr><td>SEMESTER 1</td><td>SEMESTER 2</td><td></td><td rowspan="4">Gr 4 : 45 minutes: 30 marks</td></tr>
<tr><td>TERMS 1 + 2</td><td>TERMS 3 + 4</td><td></td></tr>
<tr><td>• 1 test</td><td>• 1 test</td><td>NOTE:
• Tests must be set to assess at least 2 of the aims and both the subjects.
• The marks allocated should range from 15 to 30.</td></tr>
<tr><td>• 1 examination
Gr 4: 45 minutes: 30 marks</td><td></td><td>NOTE:
• The examination must be set to assess all 3 the aims and both the subjects.</td></tr>
<tr><td>• 1 translation task
• 1 practical task</td><td>• 1 translation task
• 1 practical task</td><td>NOTE:
• The translation tasks and practical tasks must be set to cover a range of skills.
• The marks allocated should range from 10 to 20.</td><td>NOTE:
The examination must be designed to assess all 3 of the aims and both the subjects.</td></tr>
</table>

• project • 2 different activities chosen out of assignment case study	• project • 2 different activities chosen out of assignment case study	**NOTE:** Since the subject "Natural Sciences and Technology" is comprised of two subjects, learners should complete one project for each of the two components per year. It is suggested that a project should be completed in each of the two semesters. • The marks allocated for these activities must range from 15-30.	
Convert to 50 %	**Convert to 25%**		**Convert to 25%**

RECORDING

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 for future planning.

Possible template for recording learner performance

Teachers may elect to adopt this template or they may wish to develop their own. All formal tasks must be recorded (on a template). All conversions must be reflected.

	SEMESTER 1											SEMESTER 2									
NAMES	TERM 1						TERM 2					TERM 3						TERM 4			
.	TEST 1	TRANSLATION TASK 1	PRAC 1	ACTIVITY 1	TERM MARK A		ACTIVITY 2	PROJECT 1	EXAM 1	TERM MARK		TEST 2	TRANSLATION TASK 2	PRAC 2	ACTIVITY 3	TERM MARK		ACTIVITY 4	PROJECT 2	TERM MARK B	
Max	25	15	10	20	70	%	15	25	30	70	%	25	10	15	20	70	%	20	30	50	%
1. Learner 1	15	7	7	18	47	67	13	19	24	56	80	16	8	10	14	48	69	13	26	39	78
2. Learner 2 etc																					

CALCULATING TERM MARKS

Example:

In order to calculate the **TERM MARK** for TERM 1:

Learner 1 gets the following marks:

Test 1 : $^{15}/_{25}$

Translation task 1 : $^{7}/_{15}$

Practical task 1 : $^{7}/_{10}$

Activity1 : $^{18}/_{20}$

The table for the term is $^{47}/_{70}$. This is 67% ($^{47}/_{70} \times {}^{100}/_{1} = 67$)

This is the **TERM MARK** for **TERM 1 (at A)**

The learner gets a rating code of 5: substantial achievement

In the same way, calculate the term marks for each of **TERM 2 (80%) at B**, **TERM 3 (69%) at C** and **TERM 4 (78%) at D**.

END-OF-YEAR EXAMINATION

NAMES		EXAMINATION		CONVERSION E
	Max	30	%	25
1. Learner 1		23	77	19
2. Learner 2 etc.				

CALCULATING THE EXAM MARKS

The marks for the examination count 25 % or 25 marks out of a 100 of the **FINAL MARK**. This is departmental policy.

The marks for the written, end-of- the-year exam must therefore be converted to a mark out of **25.**

For example:

Learner 1 gets 23 marks out of 30 for the examination $^{23}/_{30}$ is equal to 77% ($^{23}/_{30} \times {}^{100}/_{1} = 77\%$)

Conversion of mark: $^{77}/_{100} \times {}^{25}/_{1} =$ 19 marks out of 25 at E This is the **EXAM MARK.**

FINAL MARK

In Grade 4, the term marks for terms 1 and 2 (together) count 50% (½) of the YEAR MARK,

and the term marks for terms 3 and 4 (together) count 25% (¼) of the YEAR MARK.

The EXAM MARK (at E) counts 25% (¼) of the YEAR MARK. This is departmental policy.

For example:

Conversions:

First, convert the total for the first semester (Terms 1 and 2), i.e. for **TERM MARKS A and B**, to a mark out of 50.

T1(A) + T2 (B)

67% + 80% = $^{147}/_{200} \times {}^{50}/_{1} = {}^{37}/_{50}$ = **37 marks out of 50 (F) SEMESTER 1**

Next, convert the total for the second semester (Terms 3 and 4) i.e. for **TERM MARKS C and D,** to a mark out of 25.

T3 (C) +T4 (D)

69% + 80% = $^{147}/_{200} \times {}^{25}/_{1} = {}^{18}/_{25}$ = **18 marks out of 25 (G) SEMESTER 2**

Finally, the EXAM MARK has been converted to a mark out of 25 (at E). The learner got $^{19}/_{25}$ = **18 marks out of 25 (E) EXAM MARK**

FINAL MARK

Now add the first semester mark out of 50 i.e. 37 (F)
to the second semester mark out of 25 i.e. 18 (G)
to the exam mark out of 25 i.e. 19 (E)

TOTAL	100	74	**THIS IS THE FINAL MARK**

This learner therefore gets 74% at the end of the year, which is 6 on the rating scale: meritorious achievement.

Reporting

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

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

Codes and percentages for reporting in Grades R -12

RATING CODE	DESCRIPTION OF COMPETENCE	PERCENTAGE
7	Outstanding achievement	80-100
6	Meritorious achievement	70-79
5	Substantial achievement	60-69
4	Adequate achievement	50-59
3	Moderate achievement	40-49
2	Elementary achievement	30-39
1	Not achieved	0-29

Schools are required to provide quarterly feedback to parents on the Programme of Assessment, using a formal reporting tool such as a report card. The schedule and the report card should indicate the overall level of performance of a learner, i.e. the percentages calculated for each quarter (term) at A, B, C and D.

GENERAL:

Language

Learning material must focus on the development of the learners' understanding of the terminology of the subject (in conjunction with the knowledge and skills!!).

A glossary of all terms used must be included in all learning material.

Practical work

Examples of practical work that could be done are included. Teachers are allowed to use other examples, but practical work that **must** be done by the learners at school is marked **PL.**

Practical work that is marked **P/D** can either be done by the learners themselves or the teachers may demonstrate the practical work.

Projects

As only one project per subject can be done per year, the teacher may choose to use any of the research activities as a project. Note that because Natural Sciences are combined with some Technology in the Intermediate Phase, learners should complete two projects: one for each subject component and one in each semester.

All the other research activities must therefore be done at school and the teacher should provide the learners with the relevant resources or instruct the learners to collect and bring to school the resources.

Making of Models

The time allocation makes it possible for models to be made at school. Learners must collect and bring the necessary material to school and/or the teacher must collect and provide the material.

It is advisable that all models are made from found materials.

Learners must make ONE model per year individually — all the others may be made in groups.

Time allocation

The time allocation per topic must serve as a guideline to teachers.

Translation Tasks

These are exercises where learners learn to interpret information presented in different ways, e.g. table, graphs etc. and to "translate" the information into a different format, e.g.

table → graph
graph → table
text → mind map
diagram → text, etc.

NATURAL SCIENCES AND TECHNOLOGY GR 4					
Term 1					
Hours	**Topic**	**Content**	**Skills**	**Activities and practical work**	**Resources**
2	Living and non-living things	Identify living and non-living things Living things carry out the seven life processes, feeding, growth, reproduction, breathing, excretion, sensitivity, movement. Some things appear to be dead but will come alive, given the right conditions, e.g. dried yeast, dried beans, an incubated fertilised egg.	Emphasis on process skills like • observing differences • sorting • classifying • sketching • oral and written descriptions	Learners must be able to : • identify and sort a selection of living and non-living objects and give reasons to explain the groups • discuss and explain the fact that things that appear to be non-living will live under the right conditions: e.g. eggs, seeds, etc.	**For all activities:** **Textbook** **Worksheets** Pictures of variety of plants, animals, habitat, etc. Cards for sorting exercise Variety of living and non-living things
4	Features of plant and animals	*Basic structure of plants: roots, stems, leaves, flowers, fruits, seeds, they cannot move about *Animals have head, tail, body, limbs, sense organs	*identify differences *label *sort • classifying/comparing • sketching • oral and written descriptions	Learners must be able to -identify, label and describe the parts of plants -identify , label and describe at least one animal -identify and tabulate the differences between plants and animals.	Pictures of plants and animals Live examples
3	What do plants need in order to live?	*Plants need light, water and air *Seeds need water and warmth to germinate *Plants can be grown from cuttings	• observe • record findings •measure • Oral and written descriptions	**Practical P/D** Learners grow plants from seed and cuttings and observe and record observations over time	

2		Habitats of plants soil, light, water, shelter,	• observing differences • sorting • classifying/comparing • sketching • oral and written descriptions	Learners must be able to explain the concept *habitat* and give examples of habitats of at least 3 different indigenous plants	Seeds and cuttings Pictures
2	Structures	* natural and man-made structures * Shell and frame structures	• Observing differences • Sorting • Classifying/comparing • Sketching • Oral and written descriptions	Learners must: • identify natural and man-made structures • identify shell and frame structures.	
6		Animals need a suitable place to feed or shelter. Make an animal shelter out of found material.	* designing * sketching * measuring * making	**Build structure at school** Use given specification to build a shell structure/feeding apparatus- bird feeder/bird bath, etc.	Pictures Real examples
4	What do animals need in order to live?	*Animals need a habitat in which to live for feeding and shelter. (wetlands/grasslands, etc.) * Animals have different social patterns in order to find a mate and look after their young, e.g. some live alone, some live in pairs, some live in family groups like troops, prides, colonies	• book research • observing differences • sorting/ Classifying • sketching • oral and written descriptions	Learners must be able to * explain concept habitat * pair different animals with the correct habitat/food/shelter with motivation * identify social patterns of different animals	Found material Craft knives/scissors/glue/sticky takes, etc.

3	Observation /taking care of an animal	Understanding the needs of different animals—linked to habitat and social pattern	• observing • oral and written descriptions	Learners must investigate (observe and write about) how animals live and survive: Observe and write about a living animal over time.	Books/material with Information Pictures
1	Plant and animal rights	Plants, animals and humans have a right to live and a right to a safe, healthy environment		Case study Discuss human, plant and animal rights Identify and discuss organisations that protect plants and animals	Information on topic
ENRICHMENT		Visit to a farm, zoo, nature reserve, pet shop. Invite a speaker from the SPCA, Bird Club, etc.			
ASSESSMENT		Label diagrams, draw diagrams, tabulate differences, use given scenario to identify issues regarding animal rights, build a structure according to given specifications			
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Term 2					
Hours	**Topic**	**Content**	**Skills**	**Activities and practical work**	**Resources**
2	Materials Choosing and changing materials	Properties of materials (natural and man-made) Ceramics; polymers	• observing differences • sorting • classifying • describing • recording Emphasis not on memorising of facts or definitions	Learners must • experience and compare materials used in daily life • explore properties they can see, feel, hear and taste • use words like hard, soft, springy, sticky, brittle, wet, dry, runny, stiff, shiny, dull, strong.	Textbook Worksheets Examples of materials to use: wood, plastic, salt, mealie-meal, steel, glass, syrup, paint, water and even air.
6	Materials Choosing and changing materials	Learners must • combine materials to make new products • compare the properties before and after • use the materials to make or shape it for a purpose.	• following instructions (a recipe) • identify factors that will affect the properties of the mixture • predicting the change in the properties of the mixture • measuring • observing differences • oral and written descriptions	**Learners must engage in at least 2 practical activities themselves (at school) P/L** **Examples of possible activities:** • Mix clay and water-vary the amounts of water to change consistency of clay-change strength of object by mixing string of grass into clay. • Mix sand, cement and water to make concrete. • Mix flour and water to make play dough	Textbook Worksheets Clay, sand, cement, flour, jelly powder, Plaster of Paris, epoxy resin, water, food colouring, vinegar, bleach, sugar, bicarbonate of soda

				or glue (add oil). • Mix Plaster of Paris and water (or Poly filla) to make hard plaster • Mix epoxy resin and hardener. • Mix jelly-powder and water and food colouring to make a new kind of jelly • Mix liquids to give off smelly gasses (vinegar and bleach) • Mix sugar and bicarbonate of soda with water, heat together to make a kind of sweet. • Mix flour and bicarbonate of soda to make self-raising flour.	
2	Materials Solids, liquids and gases	The properties of solids, liquids and gases	Emphasis on process skills like: • observing differences • sorting • classifying • describing • oral and written descriptions	**Practical activities that must be demonstrated by the teacher; P/D** 1. Heat a substance to let it melt and allow it to solidify again. (possible examples:candle–wax; naphthalene; butter; lead; metal, etc.) 2. Observe the difference between the solid and liquid forms of a substance.	Textbook Worksheets Different solids, liquids Gases like perfume, gas from bleach, vinegar, gas from gas stove, petrol vapour

				(possible examples: water and ice/ solid wax and liquid wax, etc. Leaner's must the able to describe the properties of the different phases	
4	Air and wind	* Air is a real substance(gas) * Wind is moving air * Energy transfer	Observing differences • sorting • recording • oral and written descriptions	**Practical activities that could be demonstrated by the teacher. P/D** **OR** **Done by learners themselves (at school) P/L** Examples of possible experiments: • air in a plastic bag or balloon--air resists being compressed • close opening of syringe or bicycle pump and push in plunger	Textbook Worksheets Balloons, plastic bags, syringes, bicycle pump Pictures of machines used for wind energy
2	Using wind to generate movement	Wind energy can be used tolet objects move	• sketching • designing	Learners must use a given problem statement to • design a frame structure that uses wind to fly/move Learners must write in their own words what they will do to solve the problem. Learners must be given clear criteria	

				regarding size, found material, type of material, construction method • sketch the structure	
6		Strengthening of structures	• observing differences • recording • oral and written descriptions	**Practical activities that must be done by learners at school. P/L** Learners must investigate the following strengthening techniques practically: • folding • tubing • using triangular webs (strong joints) Learners must identify the factors that will influence the strength of the solution formed in each case.	Textbook Worksheets Card/paper/scissors/craft knives/etc.
6		Make a structure	• making models • oral and written descriptions	**MODEL** **Learners must IN CLASS** • make the structure they designed • evaluate the structure according to the given criteria	Card/paper/scissors/craft knives/cutting mats/ glue/ glue guns, etc.
ENRICHMENT		Use “self made” material to create an object for a purpose, identify factors that will influence the properties of the “self made“ material.			
ASSESSMENT		Tabulate differences; follow instructions; recall properties of solids, liquids and gases; building a structure according to given specifications			
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Term 3					
Hours	**Topic**	**Content**	**Skills**	**Activities and Practical work**	**Resources**
4	Sound and musical instruments	Sound is a type of energy. Sound travels though materials. Vibrations can be heard and felt. Vibrations pass energy on to other things. Quick and slow vibrations give high and low notes. Musical notes; high and low notes	Emphasis on process skills like • follow instructions • observe differences • compare • predict • describe • identify factors that influence sound	**Practical activities that must be done by learners at school. P/L** **Learners must:** • make objects vibrate (string, ruler, hacksaw blade) • listen to ticking sound of clock through air, bag with water, solid like wooden table. • change length and tension of the vibrating object to hear different sounds.	Textbook Worksheets String, ruler, hacksaw blade, clock Musical instruments like guitar, flute, etc.
3		Boxes and tubes make sound louder Reflection of sound	Observing differences • recording • oral and written descriptions	**Book research / practical** Learners must do research on how the shape and form of different musical instruments make the sound louder.	Books or other printed resources The internet
3	Sound pollution	Sound pollution by vehicles/machines/factories	• identify issues• oral and written descriptions	**Case study** Research consequences of ongoing sound pollution on hearing of humans Research legislation on sound pollution /factories/vehicles Link to human rights	Books or other printed resources The internet

3	Animals used by man	Animals used by man to carry and move objects	• identify issues • oral and written descriptions	**Research / case study** Learners must research the use of animals used for the transport of goods and draught animals and compare with the use of modern technologies that solve similar problems and their **impact** on the environment. Focus again on animal rights	Textbook Information Worksheets
3	Mechanisms that are used by man	Mechanisms that are used by man to move objects Focus on wheels, axles and hinges. Energy transfer	• describing • sketching • oral and written descriptions	**Book research** Learners must identify and describe how the following mechanisms are used by people to move objects: •wheels and axles •hinges	Books or other printed resources The internet
3		Machines that can be used to move objects	• describing • sketching • oral and written descriptions	Learners must use a given problem statement to • design a machine that can be used to move objects/an object. Learners must write in their own words what they will do to solve the problem. Learners must be given clear criteria regarding size, found material, type of material, construction method,	Textbook Worksheets

				type of object to be moved. • sketch the machine	
6		Make a machine	•make models • evaluate a product	**Learners must IN CLASS** • make the machine they designed • evaluate the machine according to the given criteria	Card/plastic/scissors/craft knives/safety rulers, cutting mats/glue/glue guns, etc.
ENRICHMENT		Listen to sound produces by different instruments (bought and self-made); compare sound regarding high/low and loud /soft notes. Investigate how sound is produced by vocal chords.			
ASSESSMENT		Result of book research (clear criteria necessary); recall of knowledge regarding properties of sound; recall knowledge regarding wheels/axles/hinges.			
28					

Term 4					
Hours	**Topic**	**Content**	**Skills**	**Activities and practical work**	**Resources**
4	Our place in space	• the universe • galaxies • stars • the solar system • planets • moons	• interpret information• describe • oral and written descriptions	Learners must know and be able to explain the concepts and their relationships to each other • universe • galaxies • stars • the solar system • planets • moons Learners must know that different objects shine for different reasons • planets • stars • moons	Textbook Worksheets Pictures/posters Solar system model
2	Movement of objects in the sky	• Sun and stars appear to be moving • Movement of the earth	• interpret information • describe • oral and written descriptions	Learners observe apparent movement of the sun and the stars; Learners realise that the apparent movement is the result of the earth's movement.	Textbook Worksheets Pictures/posters Solar system model

4	The earth and earth materials	• The earth is a rocky ball in space. • Most of the surface is covered with water (sea). • The earth has a layered structure. • There are different types of rocks. • Earth materials are solid rocks, soils, water and gases of the atmosphere. • The atmosphere is around the earth. • The different gases of the atmosphere.	• observing • describing • Oral and written descriptions	Learners must know that: the earth• is an object moving through space; • looks like a ball; • is made up of different types of rock. Earth materials are rocks, soils, water and gases. The atmosphere is around the earth and consists mainly of hydrogen, nitrogen, oxygen and carbon dioxide.	Textbook Worksheets Pictures
4	Soil	• Top soil is soil on the surface of the earth. • All life depends on this layer of soil.. • Soil is formed from the weathering of rocks.. • Soil is made of a mixture of particles. (clay, silt and	• observing • describing• oral and written descriptions	**P/L Investigation** Learners rub stones together to try and make soil and to experience how long it takes for soil to form. Learners understand and can explain: • breaking up of soil, erosion, deposition of particles, sediment.	Textbook Worksheets Samples of different types of soil

		sand particles). • Loamy soil is a mixture of all 3 particles and humus.		Learners practically investigate and describe the appearance, smell and texture of different types of soil.	
~~5~~	Properties of different soils	• Sandy soil is a mixture of particles, mainly sand, and retains very little water. • Clay soil is a mixture of particles, mainly clay, and retains water well. • Loamy soil is a mixture of all 3 particles (sand, clay, silt) and also contains humus. • Loamy soil is fertile and is best for plant growth.	• follow instructions • measure • observe • record • oral and written descriptions	**P/L Investigation: (Do different kinds of soil hold differing amounts of water?)** E.g. Learners pour a measured quantity of water into equal quantities of soil and measure the amount of water retained. They compare sandy, clay and loamy soil. Learners sketch, draw and describe their findings. Or **What type of soil is best for growing seedlings?** Learners make up different kinds of soil and plant seedlings to see which type of soil promotes the best growth.	Filter funnels, filter paper/cotton wool, measuring cylinders and cups Bean or lentil seeds, foam cups/flower pots and a selection of different soils and compost

5	Earthworms and other animals in the soil	• Earthworms are harmless worms that live in the soil. • They break down organic matter (dead plant matter) in the soil. • Their droppings enrich the soil. • Their burrows aerate the soil. • They mix the soil.	• observing • oral and written descriptions	Learners collect some earthworms. They observe an earthworm to see how it moves and make observations about their sense organs (linked to life and living). Learners draw and describe how earthworms move. Learners read up about earthworms and other creatures that live in the soil. They draw and write about them.	Textbook Worksheet/notebook Library books for information Earthworms, etc. Magnifying glasses
4	Stories from the stars	• African farmers used constellations of the stars to indicate when to plant. • The sun is a star (our nearest star).	• listening • observing • recording	Teacher reads stories about the sun and stars and their role in planting and growing in different cultures. Find an elderly person or traditional healer to come and tell stories about planting and the stars and the sun.	Information books Textbook Worksheet/notebook
28					
Enrichment:		**DVDs on the moon and moon exploration; invite an amateur astronomer to give a talk; invite a farmer or soil analyst to explain the importance of soil; start a food garden**			
Assessment		**Test: writing to describe different soils; drawing and writing about the investigations into water retention or the best soils for growing plants; drawing and writing about observations about the stars, moon and poems and songs about stars and moon.**			

GRADE 5

CURRICULUM AND ASSESSMENT POLICY STATEMENT: NATURAL SCIENCES AND TECHNOLOGY

GRADE 5

INTRODUCTION

In Grade 5, the content of Natural Sciences and some aspects of Technology have been integrated to ensure a smooth transition between these subjects and to allow learners and teachers to experience the inter-connectedness of Natural Sciences and Technology. It also prepares learners for both Natural Sciences and Technology in the Senior Phase. The different contexts have been grouped together in such a way to ensure that the learning experience is meaningful for both teachers and learners

When teaching Natural Sciences and Technology, it is important to emphasise the links that learners need to make with related topics to help them to achieve a deeper understanding of the nature of the different strands and the connectedness to everyday life. These links must also be made across grades.

The knowledge framework focuses on ideas, skills, concepts and the connections between them. It does not prescribe particular instructional strategies, except where, for example, practical work is indicated. Educators have the freedom to expand on concepts and to design and organise learning experiences according to their local circumstances. All the Knowledge Areas must, however, be addressed in each grade of study.

The cognitive and practical skills that have been identified must be taught, and assessed, in an integrated way in the context provided by the Knowledge Areas. Both the Scientific and Design processes must be introduced gradually from Grade 4 onwards to ensure that learners acquire the range of necessary cognitive and other skills. The range of skills that are acquired in the context of Natural Sciences and Technology are similar and, in many instances, they overlap.

GRADE 5

NATURAL SCIENCES	**TECHNOLOGY**
Four *knowledge areas* are used as organisers of the Natural Sciences content framework. Each *knowledge area* is developed across all three years of the Intermediate Phase: • matter and materials (strand 1) • life and living (strand 2) • energy and change (strand 3) • Earth and beyond (strand 4).	Two *knowledge strands* are used as organisers of the Technology content framework. Each *knowledge strand* is developed across all three years of the Intermediate Phase. The *knowledge strands* are placed in ascending order, size and complexity as a framing device. These *knowledge strands* are: • structures (strand 1) • systems and control (strand 2)

The recommended sequence for the teaching of the knowledge strands in this document for **Grade 5** is:

1. matter and materials + structures (content) + the scientific and design processes (strand 1)
2. life and living (strand 2)
3. energy and change + mechanisms + the scientific and design processes (strand 3)
4. Earth and beyond (Strand 4).

AIMS

There are **three** broad, subject-specific aims in Natural Sciences and Technology. These are

4. Specific Aim 1 which relates to the knowledge/content (theory) of both subjects
5. Specific Aim 2 which relates to doing science and technology; this will include practical work and designing and making models
6. Specific Aim 3 which relates to understanding the interrelationship of Natural Sciences and Technology and the relevance for the environment and the community.

These three aims are aligned to the three Learning Outcomes with which teachers are familiar. Within each of these aims, specific skills or competences have been identified. It is not advisable to try to assess each of the skills separately nor is it possible to report on individual skills separately. However, well designed assessments must show **evidence** that, by the end of the year, all of the skills have been assessed. There must be a clear link between the aims and the outcomes of learning. The assessments are the link.

Whilst learner performance can be reported on separately for Specific Aims 1 (knowing) and 2 (doing Science and Technology) all of Specific Aim 3 (Science and Technology in society) can be integrated into either Specific Aim 1 or Specific Aim 2.

1. SPECIFIC AIM 1: ACQUIRING KNOWLEDGE OF NATURAL SCIENCES AND TECHNOLOGY

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

1.2. ACQUIRE KNOWLEDGE

Skills

Learners must…

- **access** information from a variety of sources (teachers, reference books, textbooks, the internet, experts, peers, parents, etc).
- **select** key ideas obtained from resources
- **recall** and **describe** knowledge of the Natural Sciences and Technology.

Assessments

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

1.4 UNDERSTAND AND MAKE MEANING OF NATURAL SCIENCES AND TECHNOLOGY

Skills

Learners must…

- **analyse** acquired knowledge
- **evaluate** acquired knowledge
- **synthesise** (or reorganise) knowledge to create new meaning through written summaries, flow charts, diagrams and mind maps.

Assessments

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

1.3 APPLY KNOWLEDGE OF NATURAL SCIENCES AND TECHNOLOGY IN NEW AND UNFAMILIAR CONTEXTS

Skills

Learners must…

- **analyse** and **evaluate** knowledge and **apply** this to new and unfamiliar contexts.

Assessment

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

Skills

Learners must…

- **access** information from a variety of sources (teachers, reference books, textbooks, internet, experts, peers, parents, etc.)
- **select** key ideas obtained from resources.
- **recall** and **describe** knowledge of the Natural Sciences and Technology.

Assessments

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

2. SPECIFIC AIMS 2:

Whilst the skills specified in Specific Aims 1 and 3 apply equally to Natural Sciences and Technology, the skills that relate to "doing" Natural Sciences and Technology are different.

(c) INVESTIGATE PHENOMENA IN NATURAL SCIENCES The following range of skills relate to doing practical work in Natural Sciences. All seven skills will not apply to every practical activity equally. The skills are aligned to what learners would be doing in the normal course of practical work. Teachers must select those that apply to, and which can be assessed in, the context of specific activities. By the end of each year all seven skills must have been assessed at a grade appropriate level. **Learners must be able to:**	**(d) APPLY THE DESIGN PROCESS TO SOLVE PROBLEMS** The following range of skills relates to developing solutions for identified problems or human needs. All five skills will not apply to every activity equally. The skills are aligned to what learners would be doing in the normal course of developing a solution. Teachers must select those that apply to, and which can be assessed in, the context of specific activities. By the end of each year all five skills must have been assessed at a grade appropriate level. **Learners must be able to:**
2.6 FOLLOW INSTRUCTIONS This is essential, especially in the lower grades and in large classes. Teachers cannot expect all learners to use unfamiliar equipment and to do so independently without giving them a clear set of instructions to follow. The degree of assistance required would indicate the level of performance in this regard. Adherence to safety rules would be part of this. In Grade 5, teachers must provide clear instructions and assist learners to follow these.	**2.3 INVESTIGATE A SITUATION** Learners must collect data and information, must find out about new techniques, etc. Skills needed include accessing and processing skills, recording, identifying, predicting, comparing, observing, classifying and interpreting.
2.4 HANDLE EQUIPMENT/APPARATUS This should include knowledge of the apparatus i.e. naming it and knowing what it is used for. It includes equipment such as a thermometer for measuring temperature or a ruler for measuring length, as well as using a pair of scissors or a craft knife for cutting paper and cardboard.	**2.7 DESIGN A SOLUTION** This should include the following skills • writing a design brief using a given problem statement • generating possible solutions according to specifications (supplied or created) • choosing a solution that will best satisfy the specifications

"Handle equipment" is a generic skill and would apply to any equipment used for different kinds of investigations. Handling improvised equipment requires the same skills as would be required for handling standard laboratory equipment.	• justifying the choices made • drawing a final conclusion.
2.3. MAKE OBSERVATIONS A variety of observations are possible and observations can be recorded in different ways such as: • drawings • descriptions • grouping of materials/examples based on observable similarities and/or differences • measurements • comparing materials before and after treatment • observing results of an experimental investigation which will involve tabulating the data • counting.	**2.8 CONSTRUCT THE FINAL SOLUTION** This should include the following skills: • using tools, equipment and materials to construct a solution • measuring, cutting, joining, shaping, combining, separating, mixing, etc.
2.4. RECORD INFORMATION/DATA This should include the recording of observations or information as drawings, descriptions, tables, graphs, etc. This recording skill is transferable across a range of scientific activities.	**2.9 EVALUATE THE FINAL SOLUTION** This should include the following skills: • the critical evaluation of the final product against the specifications and design brief • the making process • any possible improvements needed.
2.5. MEASURE Learners should know **what** to measure, **how** to measure it and have a sense of the degree of accuracy that is required. A variety of things should be measured including length, volume, temperature, numbers (counting) etc. Measuring is a way of quantifying observations and in this process learner's should learn to estimate.	**2.10 COMMUNICATE THE PROCESS** The processes followed from 2.1 – 2.4 must be presented in oral or written form and must include sketches.
2.6. INTERPRET Learners should be able to convert information from one form another, e.g.	

pictures –> words sentences → key words label diagrams, table → appropriate graph	
2.7. DESIGN/PLAN INVESTIGATIONS OR EXPERIMENTS Skills include: • identifying a problem • selecting apparatus/equipment and o/r materials where necessary. • planning an experiment using a given problem statement • identifying the factors that will influence the outcome (variables: dependent and independent) • controlling variables/designing suitable control. • predicting the outcome of the experiment • suggesting ways of recording results. planning and/or designing and investigation/experiment with assistance (grades 4-6 learners).	

Note: Skills By separating the different kinds of skills (2.1 to 2.7 for Natural Sciences and 2.1 to 2.5 for Technology), these skills can apply to a **variety** of practical work/problem-solving situations that are appropriate for a particular grade in Natural Sciences and Technology, including investigations/experiments. This approach makes it easier to assess learners in a range of different circumstances and it makes it possible for a teacher to make judgments about a learner's ability to **do** science and technology. The skills are based on what learners would do, in the normal course of practical work or solving problems.

3. **UNDERSTAND THE INTERRELATIONSHIPS BETWEEN NATURAL SCIENCES AND TECHNOLOGY, AND THE APPLICATION OF NATURAL SCIENCES AND TECHNOLOGY FOR SOCIETY AND THE ENVIRONMENT.**

3.1 UNDERSTAND THE HISTORY, IMPORTANCE AND RELEVANCE OF SCIENCE AND TECHNOLOGY AND THE IMPORTANCE OF INDIGENOUS KNOWLEDGE

Skills

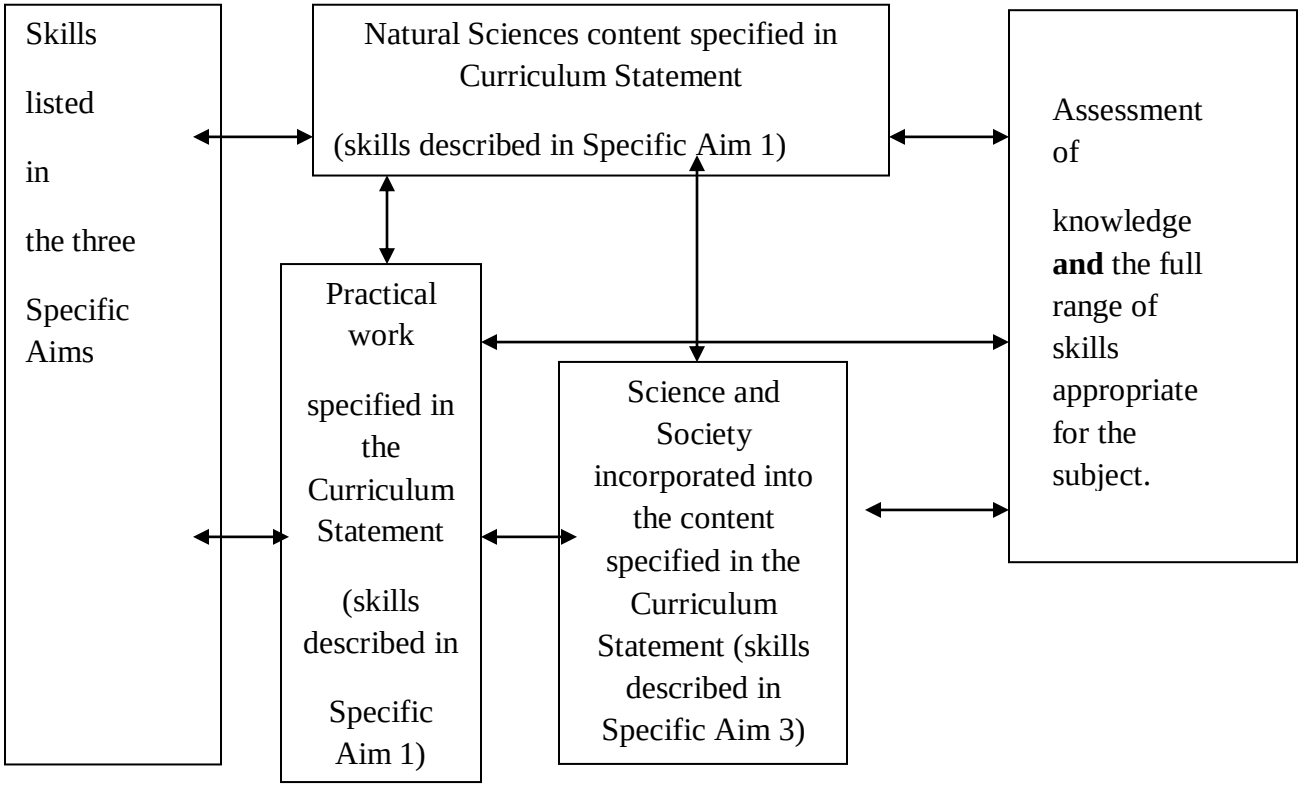
Learners must

- **understand** how indigenous cultures have used scientific principles and technological products for specific purposes
- **understand** how science and technology have benefited society and the environment
- **select** key ideas to construct the history of scientific or technological discoveries and how science and technology have benefited or
- **analyse** and **evaluate** the application of scientific principles and technological products used by indigenous cultures in everyday life (both positive and negative consequences)
- **analyse**, **discuss** and **debate** the positive or negative effects of science and technological products on society and the environment.

FLOW DIAGRAM: RELATIONSHIPS BETWEEN THE KEY CURRICULUM ELEMENTS

The following diagram illustrates how the aims relate to learning outcomes, and to one another, and how the ranges of skills must be infused into the subject content.

- The diagram also shows how assessment relates to the content, the practical work and Science and Society as well as the skills.
- The diagram shows what has to be taught (Specific Aims 1, 2 and 3) of which the subject content provides the context for everything else.
- It shows the skills that must be taught and it shows how teachers should go about assessing the learners.
- The diagram illustrates the "infusion" of cognitive and other skills into everything that is taught and assessed.



TIME

The Grade 5 curriculum is taught over 32 of the 40 weeks in the school year.
This leaves 8 weeks in the year for examinations and disruptions due to other school activities. The time allocated per topic is a guideline only.

ASSESSMENT

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

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

Assessment should be mapped against the content and intended aims specified for a subject.

Assessment should be both informal and formal. In both cases regular feedback should be provided to learners to enhance the learning experience. In both informal and formal assessments it is important to:

- cover all of the subject content
- include the full range of skills
- use a variety of different forms of assessment.

Informal assessment

Regular assessments form part of the planned teaching and learning activities in the classroom.

Informal assessment can occur in every lesson, at any stage of the lesson. This can be done through questions and answers, class work (e.g. short pieces of written work completed during the lesson), open-book tests or homework exercises. These assessment activities should not be seen as separate from the learning activities in the classroom and should be used to provide feedback to learners to improve learning and teaching.

Informal assessments can be scored by teachers or learners. Self-assessment and peer assessment actively involves learners and allows them to learn from and reflect on their own performance. Grade 4 learners may need assistance and encouragement to cope with their involvement in the scoring of assessments.

Informal, continuous assessment should be used to scaffold the acquisition of knowledge and skills and should be used as preparation for the formal tasks in the Programme of Assessment.

Informal assessments do not need to be recorded unless the teacher wishes to do so. In such instances, a simple checklist may be used to record this assessment and to provide feedback.

The results of informal assessments do not have to be taken into account when determining a learner's final mark for promotion or certification purposes.

Formal assessment

Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a grade and a particular subject.

Formal assessment tasks are recorded and used to determine whether learners should be promoted to the next grade.

Teachers have to submit their annual formal Programme of Assessment to the School Management Team (SMT) before the start of the school year. This will be used to draw up a school assessment plan in each grade. The school assessment plan should be provided to learners and parents in the first week of the first term.

Examples of formal assessments include projects, oral presentations, practical task, tests, examinations, etc. For Natural Sciences and Technology, possible projects are suggested by the curriculum.

Formal assessments are part of the continuous programme of assessment in each grade and subject. Formal assessments are school-based and are weighted as follows for the different grades:

Grades	Formal school-bBased assessments	End-of-year examinations
4-6	75%	25%

This is departmental policy

The cognitive demands of the assessment should be appropriate to the age and developmental level of the learners in the grade.

The assessment tasks should be carefully designed to cover the content of the subject as well as the range of skills stated in the Specific Aims.. The design of these tasks should therefore ensure that a variety of content and skills are assessed. Objectives, topics and content in the subject should be used to inform the planning and development of assessment tasks.

Formal assessments in Natural Sciences and Technology must cater for a range of cognitive levels and abilities of learners.

Assessment of content and skills

Specific Aim 1.1 Natural Sciences and Technology (knowing, remembering)	Specific Aim1. 2: Natural Sciences and Technology (understanding, applying)	Specific Aim 1.3 and 3.1 (analysing, evaluating, creating)
60% Natural Sciences 45% Technology 15%	30% Natural Sciences 20% Technology 10%	10% Natural Sciences and Technology

It is important that all assessments are designed to reflect this weighting: if assessments provide evidence that the aims have been assessed appropriately, it will not be necessary to record performance against aims separately.

The requirements (number and nature of tasks) for Natural Sciences and Technology are indicated below:

ASSESSMENT REQUIREMENTS FOR NATURAL SCIENCES AND TECHNOLOGY: GRADE: 5

<table>
<tr><th colspan="3">PROGRAMME OF FORMAL RECORDED SCHOOL BASED ASSESSMENT
75%</th><th>END-OF-THE-YEAR EXAMINATION
25%</th></tr>
<tr><th>50 %</th><th>25%</th><td></td><td></td></tr>
<tr><th>SEMESTER 1</th><th>SEMESTER 2</th><td></td><td rowspan="3">Gr 5 : 50 minutes: 40 marks</td></tr>
<tr><th>TERMS 1 + 2</th><th>TERMS 3 + 4</th><td></td></tr>
<tr><td>• 1 test</td><td>• 1 test</td><td>NOTE:
• Tests must be set to assess at least 2 of the aims and both the subjects.
• The marks allocated should range from 15 to 30.</td></tr>
<tr><td>• 1 examination
Gr 5: 50 minutes: 40 marks</td><td></td><td>NOTE:
• The examination must be set to assess all 3 the aims and both the subjects.</td><td></td></tr>
<tr><td>• 1 Translation task
• 1 Practical task</td><td>• 1 Translation task
• 1 Practical task</td><td>NOTE:
• The translation tasks and practical tasks must be set to cover a range of skills.
• The marks allocated should range from 10 to 20.</td><td>NOTE:
The examination must be designed to assess all 3 of the aims and both the subjects.</td></tr>
<tr><td>• Project
• 2 different activities chosen out of assignment
case Study</td><td>• Project
• 2 different activities chosen out of assignment
case Study</td><td>NOTE:
Since the subject “Natural Sciences and Technology” is comprised of two subjects, learners should complete 1 project for each of the two components per year. It is suggested that a project should be completed in each of the two semesters.
• The marks allocated for these activities must range from 15-30.</td><td></td></tr>
<tr><td>Convert to 50 %</td><td>Convert to 25%</td><td></td><td>Convert to 25%</td></tr>
</table>

RECORDING

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 for future planning.

Possible template for recording learner performance

Teachers may elect to adopt this template or they may wish to develop their own. All formal tasks must be recorded (on a template). All conversions must be reflected.

	SEMESTER 1											SEMESTER 2									
NAMES	TERM 1						TERM 2					TERM 3						TERM 4			
.	TEST 1	TRANSLATION TASK 1	PRAC 1	ACTIVITY 1	TERM MARK A		ACTIVITY 2	PROJECT 1	EXAM 1	TERM MARK B		TEST 2	TRANSLATION TASK 2	PRAC 2	ACTIVITY 3	TERM MARK C		ACTIVITY 4	PROJECT 2	TERM MARK D	
Max	25	15	10	20	70	%	15	25	30	70	%	25	10	15	20	70	%	20	30	50	%
1. Learner 1	15	7	7	18	47	67	13	19	24	56	80	16	8	10	14	48	69	13	26	39	78
3. Learner 2 etc																					

CALCULATING TERM MARKS

Example:

In order to calculate the **TERM MARK** for TERM 1:

Learner 1 gets the following marks:

Test 1 : $^{15}/_{25}$

Translation task 1 : $^{7}/_{15}$

Practical task 1 : $^{7}/_{10}$

Activity1 : $^{18}/_{20}$

The table for the term is $^{47}/_{70}$. This is 67% ($^{47}/_{70} \times {}^{100}/_{1} = 67$)

This is the **TERM MARK** for **TERM 1 (at A)**

The learner gets a rating code of 5: substantial achievement

In the same way calculate the term marks for each of **TERM 2 (80%) at B**, **TERM 3 (69%) at C** and **TERM 4 (78%) at D**.

END- OF-YEAR EXAMINATION

NAMES		**EXAMINATION**		**CONVERSION E**
	Max	40	%	25
1. Learner 1		24	60	15
2. Learner 2 etc.				

CALCULATING THE EXAM MARKS

- The marks for the examination count 25 % or 25 marks out of a 100 of the **FINAL MARK**. This is departmental policy.
- The marks for the written, end-of-the-year exam must therefore be converted to a mark out of **25.**

For example:

- Learner 1 gets 24 marks out of 40 for the examination $^{24}/_{40}$ is equal to 60% ($^{24}/_{40} \times {}^{100}/_{1} = 60\%$)

- Conversion of mark: $^{60}/_{100} \times {}^{25}/_{1} =$ 15 marks out of 25 at E This is the **EXAM MARK**

FINAL MARK

- In Grade 4, the term marks for terms 1 and 2 (together) count 50% (½) of the YEAR MARK.
- and the term marks for terms 3 and 4 (together) count 25% (¼) of the YEAR MARK.
- The EXAM MARK (at E) counts 25% (¼) of the YEAR MARK. This is departmental policy.

For example:

Conversions:

- **First,** convert the total for the first semester (Terms 1 and 2) i.e. for **TERM MARKS A and B**, to a mark out of 50.

  T1(A) + T2 (B)
  67% + 80% = $^{147}/_{200} \times {}^{50}/_{1} = {}^{37}/_{50} =$ **37 marks out of 50 (F) SEMESTER 1**

- Next, convert the total for the second semester (Terms 3 and 4) i.e. for **TERM MARKS C and D,** to a mark out of 25.

  T3 (C) +T4 (D)
  69% + 80% = $^{147}/_{200} \times {}^{25}/_{1} = {}^{18}/_{25} =$ **18 marks out of 25 (G) SEMESTER 2**

- Finally, the EXAM MARK has been converted to a mark out of 21 (at E). The learner got $^{15}/_{25} =$ **18 marks out of 25 (E) EXAM MARK**

FINAL MARK

Now add the first semester mark out of	50	i.e. 37	(F)
to the second semester mark out of	25	i.e. 18	(G)
to the exam mark out of	25	i.e	15 (E)
TOTAL	100	67	**THIS IS THE FINAL MARK**

This learner therefore gets 74% at the end of the year which is 5 on the rating scale: meritorious achievement.

Reporting

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

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

Codes and percentages for reporting in Grades R -12

RATING CODE	DESCRIPTION OF COMPETENCE	PERCENTAGE
7	Outstanding achievement	80-100
6	Meritorious achievement	70-79
5	Substantial achievement	60-69
4	Adequate achievement	50-59
3	Moderate achievement	40-49
2	Elementary achievement	30-39
1	Not achieved	0-29

Schools are required to provide quarterly feedback to parents on the Programme of Assessment using a formal reporting tool such as a report card. The schedule and the report card should indicate the overall level of performance of a learner i.e. the percentages calculated for each quarter (term) at A, B, C and D.

GENERAL

Language

Learning material must focus on the development of the learners understanding of the terminology of the subject(in conjunction with the knowledge and skills!!)

A glossary of all terms used must be included in all learning material.

Practical work

Examples of practical work that could be done are included. Teacher are allowed to use other examples but practical work that **must** be done by the learners at school is marked **PL**

Practical work that is marked **P/D** can either be done by the learners themselves or the teachers may demonstrate the practical work.

Projects

As only one project per subject can be done per year, the teacher may choose to use any of the research activities as the chosen project. Note that because National Sciences is combined with some Technology in the Intermediate Phase, learners should complete two projects: one for each subject component one in each semester.

All the other research activities must therefore be done at school and the teacher should provide the learners with the necessary relevant resources or instruct the learners to collect and bring to school the resources.

Making of Models

The time allocation makes it possible for models to be made at school. The learners must collect and bring the necessary material to school and/or the teacher must collect and provide the material.
It is advisable that all the models are made from found material.
Learners must make ONE model per year individually—all the others may be made in groups.

Time allocation

The time allocation per topic must serve as a guideline to teachers but allow for some flexibility

Translation Tasks

These are exercises where learners learn to interpret information presented in different ways e.g. table, graphs etc. and learn to "translate" the information into a different format e.g. table graph

graph → table

text → mind map

diagram text, etc.

Term 1					
Hours	**Topic**	**Content**	**Skills**	**Activities and Practical work**	**Resources**
4	Materials Comparison of materials Fair testing	Solid, liquid, gas Properties: colour, smel, hardness, toughness, flexibility, strength in tension,	*Designing fair tests • Identify factors that influence results *Recording results	Learners must be able to explain the concepts • "fair test" and • "factors" that will have an effect on the outcome of a test. (The term "variable" will only be introduced in Gr 7) Learners must identify factors and fair tests using given examples	Textbook Worksheets Pictures of variety of material, Different materials
6	Fair test	Identify factors that influence results Design fair tests	Designing fair tests • Identify factors that influence results *Recording results	**1. Practical activities that must be done by learners at school(P/L)** Design fair test and carry out the test **with assistance from the teacher** **Possible examples: DO at least 2** *Compare different kinds of plastic bottles for toughness *Compare 3 kinds of glue to find stronger glue *Compare 3 kinds of plastic rulers for flexibility *Compare 3 kinds of wood for hardness, etc.	Different materials
6	Forces	Forces: push, pull, twist, bend Effect of different forces on different materials	Designing fair tests • Identify factors that influence results • Predict *Recording results	2. **Practical activities that must be done by learners at school P/L** Design a fair test to determine the effect of push, pull, twist and bend forces on different materials**. (test as least 2 materials and all forces**)	Textbook Worksheet Different materials

2	Materials made for a purpose	Materials used to support a load	Observing differences • Sorting • Classifying • Sketching • Oral and written descriptions	**Research** Learners research different materials designed to support different loads.	Books or other printed material The Internet Real examples of materials
4	Structures	Structures and support loads	Describing •Sketching • Oral and written descriptions	Learners must use a given problem statement to • design a structure which will support a load • Learners must write in their own words what they will do to solve the problem. • Learners must be guided to write a simple design brief and constraints. • Learners must be given clear criteria regarding size, found material, type of material, construction method • Sketch the structure	Textbook Worksheet
6		Make a structure	Make models Evaluate a product	**MODEL** Learners must IN CLASS *make a structure that can support a load, using the criteria and design brief *evaluate the structure using the design brief and constraints	Card/plastic/scissors/craft knives/ safety rulers, cutting mats, / glue/ glue guns, etc.
ENRICHMENT		Evaluate a given investigation to determine if the test was fair; visit a factory where load-bearing materials are manufactured.			
ASSESSMENT		Ability to determine factors that will influence results of investigations; recall knowledge about and identify different forces working on objects; design model according to specifications			
28					

Term 2					
Hours	**Topic**	**Content**	**Skills**	**Activities and Practical work**	**Resources**
3	Biodiversity of living things past and present	Different kinds of plants and animals living today In the past (millions of years ago) there were other kinds of plants and animals - now extinct Plant and animal fossils	Sort/classify Compare Oral and written descriptions	Learners study a variety of living plants and animals (at least one plant and one animal); fossils	Textbook Worksheet Information Pictures
3	Biodiversity of plants	Different species of plants Each species has specific size /shape Differences between species – compare leaves, fruit, stems Biodiversity of an area—measured by counting the number of different species	Sort/classify Compare Oral and written descriptions	Learners study a variety of plants—leaves/fruit/stems the biodiversity of an area	Textbook Worksheet Information Pictures Leaves
4	Medicinal plants	Uses of indigenous plants Need to conserve plants and habitats	* Observing differences • Sorting • Classifying • Describing • Sketching • Oral and written descriptions	Learners must research and be able to name /identify indigenous plants • used as medicines and/or • plants used as food and/or • plants used to make different dyes	Textbook Worksheet Pictures Information on indigenous medicinal plants:name, use, habitat, conservation
4	Plants make their own food in their leaves(photosynthesis) and animals feed on plants and/or other animals	Plants make their own food (glucose and starch) in green leaves using air, sunlight for energy *soil for water and anchorage for roots. Animals do not make their own food; they have to feed on plants and other animals.	Sort/classify Compare Oral and written descriptions	Learners must be able to explain the process of photosynthesis Explain the difference between carnivores, herbivores and omnivores identify examples of carnivores, herbivores, omnivores	Textbook Worksheet Stories pictures

		Definitions : carnivores, herbivores, omnivores			
4	Food chains	All animals depend on green plants for energy. Food chains always start with green plants- producer of food Energy flows away from plants through other animals to top carnivores	*Observing differences • Sorting • Classifying • Sketching • Oral and written descriptions	Learners must be able to • explain given food chains up to 4 organisms • sequence a food chain using given organisms • construct a food chain with familiar organisms	Textbook Worksheet Pictures Example of food chains Cards to build food chains
6	Life Cycles of plants and animals	Animals go through different stages in their life cycle: sperm and egg, embryo, baby, young animal, adult animal, by means of different processes : fertilisation, pregnancy, birth, growth, maturation. Death can occur at any stage of the life cycle. Plants also go through different stages in their life cycles: pollen and egg, seed, seedling, young plant, mature plant, flowers, fruits by means of different processes : fertilisation, germination, growth, maturation , flowering, pollination, fruiting and seed dispersal.	• Sequence • Name stages and processes • Oral and written descriptions	Learners must be able to • sequence pictures of the stages of plant and animal life cycles • name the stages and processes of one plant and one animal (no metamofphosis). • explain how the plant or animal changes through its life cycle.	Textbook Worksheet/notebooks Pictures or diagrams

4	Human and animal senses	The senses help humans and animals to survive. The sense organs are stimulated by things in the environment. Animals need their sense organs in order to find food, find mates, look after their young and protect themselves.	• Using senses • Recording • Oral and written descriptions	**Practical activities** on stimulating the different senses. • seeing (kaleidoscope, colours, etc) • hearing (tapes, singing, clapping, etc. to experience soft and loud sounds, high and low pitches) • Tasting white substances such as salt, sugar, panado, cream of tartar to experience salty, sweet, bitter and sour tastes • Touching, e.g. different objects in a bag to experience rough, smooth, soft, etc. textures. • Smelling, e.g. learners identify different fruits and spices when blindfolded. Learners to describe how an animal's sense organs help it to survive (feed, sense danger, find a mate, look after its young, etc.)	Textbook Worksheets/notebooks Pictures of a variety of animals, stories about animals, DVDs of animal behaviour
ENRICHMENT		Visit a museum to look at fossils; DVDs on local biodiversity and fossils; visit a botanical garden or nature reserve to experience biodiversity; make models of an animal life cycle with clay, play dough or wood glue and paper mache.			
ASSESSMENT		Write descriptions of different plants and animals; drawings (with labels) of leaves; writing to explain the differences between herbivores, carnivores and omnivores; written explanation of changes in a life cycle.			
28					

Term 3					
Hours	**Topic**	**Content**	**Skills**	**Activities and Practical work**	**Resources**
4	Energy	Concept of energy Different types of energy: Potential/kinetic/light/sound /electric/magnetic	Observing differences/similarities • Sorting • Classifying • Sketching • Oral and written descriptions	Learners must be able to explain • the concept "energy" and • identify energy resources used in given examples • different types of energy • The transfer of energy from one type to another	Textbook Worksheet Pictures
4	Energy sources	Sun, wind, water, earth's gravitational force, springs, elastic bands, magnets. Renewable and non-renewable sources of energy	Observing differences • Sorting • Classifying • Sketching • Oral and written descriptions	Learners must be able to Identify energy sources used in examples provided. The energy sources must be used to heat and move things as well as cause phase changes. Renewable and non-renewable sources	Textbook Worksheet Pictures
1	Safety	Fire *needs fuel, heat, air *safety	• Oral and written descriptions	**Research /case study** Learners must be able to explain what is needed to make a fire as well as the • safety persuasions when making fires/ • **impact** of for example veld fires/ buildings burning, on people/environment/economy	Books or printed materials The Internet Textbook Worksheet Pictures
3	Energy for heating Rise in temperature	Energy for heating things *gas, wood, paraffin, coal *Sun's energy Warm/cold Rise in temperature	*Observing differences * measuring * recording • Sorting • Oral and written descriptions	Learners must be able to identify energy sources used to heat things Learners measure temperature using touch sense	

3	Energy for changing a phase	Change of phase: (gaining and losing energy) *solid->liquid->gas *gas->liquid->solid When liquids evaporate, *they take energy from the environment *they leave their surroundings cooler(e.g.sweat)	• Predicting the change in the temperature and state • Measuring • Observing differences. • Oral and written descriptions	*Heat ice to melt-> heat water to evaporate *Cool steam to condensate->cool water to freeze *Heat wax to melt->cool to solidify *Use thermometer to measure temperature Let water evaporate ->measure temperature	Textbook Worksheet Materials to melt and evaporate
2	Water cycle	Evaporation/ Condensation Precipitation Energy involved	Apply knowledge of evaporation/condensation, etc. on water cycle	Textbook Worksheet	Water cycle
2	Energy for moving objects	Energy for moving things Fossil fuels; water, earth's gravitational force; springs or elastic bands to move	Observing differences • Sorting • Classifying • Sketching • Oral and written descriptions	**Research/case study** Learners research machines that use different energy sources like fossil fuels, gravitational force,springs, elastic bands	Books or printed material Internet
3	Machines that can move	Machines that use the earth's gravitational force and springs or elastic bands to move	Describing •Sketching • Oral and written descriptions	Learners must use a given problem statement to • design a machine that makes use of gravitational force and/or springs/elastic bands to move. • Learners must write in their own words what they will do to solve the problem. • Learners must be guided to write a simple design brief and constraints. • Learners must be given clear criteria regarding size, found material, type of material, construction method.	Textbook Worksheet

				• Sketch the machine	
6			Make models Evaluate a product	**MODEL** Learners must IN CLASS *make the machine *evaluate the machine using the design brief and constraints	Card/plastic/scissors/craft knives/ safety rulers, cutting mats, / glue/ glue guns, etc.
ENRICHMENT		Research alternative energy sources; biogas; nuclear, etc.			
ASSESSMENT		Identify types of energy; predict changes in materials; working model of machine that use spring/gravity to move, explain phase change using energy transfe			

	Term 4				
Hours	**Topic**	**Content**	**Skills**	**Activities and Practical work**	**Resources**
4	Rocks of the Earth	Below the surface of the Earth there is a great depth of rock The Earth is hot, deep down	• Oral and written descriptions • Sketching	Learners must Be able to explain the build of the earth in simple terms	Text books, worksheets, pictures
4	Igneous rock	**Igneous rock i**s formed when hot molten rock is cooled and hardened.	• Oral and written descriptions • Describing • Classifying	Learners must • be able to explain how igneous rocks are formed • what the main properties are • be able to name at least one example.	Examples of different rocks Pictures, photos of different rocks
3	Weathering of rocks	Weathering of rocks-- broken up to become soil Erosion Deposition Sediment	• Oral and written descriptions	**Practical** Hit stones together to make soil-- to experience how long it takes for soil to form. Learners must be able to explain the concepts Erosion, deposition, sediment	Rocks
6	Sedimentary rocks--	Sedimentary rocks-- formation: Some contain fossils	• Oral and written descriptions • Classifying Following instructions (a recipe) • Measuring	Learners must • be able to explain how sedimentary rocks are formed • what the main properties are • be able to name at least one example. **Practical activities that must be done by learners at school. P/L** Layer different types of material to represent the formation of sedimentary rocks	Different types of soil/seeds see-through containers-- clear plastic/glass Pictures photos of different rocks Examples of different rocks

6	Fossils	Fossils Tells us about plants and animals that lived in SA long ago	• Oral and written descriptions • Sketching Following instructions (a recipe) • Measuring • • Sketching	Learners must be able to • explain what fossils are • explain how fossils are formed • explain the importance of fossils regarding knowledge of plants and animals that lived long ago • Know about important fossils found in SA **Practical activities that must be done by learners at school. P/L** Make a fossil-- using clay, plaster of Paris, leaves, shells, etc	Pictures/photos of fossils found in SA Clay, Plaster of Paris, different objects, containers
3	Metamorphic rocks	Metamorphic rocks Formed from Igneous and sedimentary rocks-- heat and pressure	• Oral and written descriptions • Classifying	Learners must • be able to explain how metamorphic rocks are formed • what the main properties are • be able to name at least one example.	Examples of different rocks Pictures, photos of different rocks
ENRICHMENT		Visit museum to view collection of rocks/ go on field trip to collect rocks			
ASSESSMENT		Describe formation of different rocks; recall properties of different rocks; explain how fossils are formed; explain importance of fossils			
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CURRICULUM AND ASSESSMENT POLICY STATEMENT: NATURAL SCIENCES AND TECHNOLOGY

GRADE 6

INTRODUCTION

In Grade 4, the content of Natural Sciences and some aspects of Technology have been integrated to ensure a smooth transition between these subjects and to allow learners and teachers to experience the inter-connectedness of Natural Sciences and Technology. It also prepares learners for both Natural Sciences and Technology in the GET Phase. The different contexts have been grouped together in such a way to ensure that the learning experience is meaningful for both teachers and learners.

When teaching Natural Sciences and Technology, it is important to emphasise the links that learners need to make with related topics so that they acquire a thorough understanding of the nature of the different strands and the inter-connectedness to everyday life. These links must also be made across grades.

The knowledge framework focuses on ideas, skills, concepts and connections between them. It does not prescribe particular instructional strategies, except where, for example, practical work is indicated. Educators have the freedom to expand on concepts and to design and organise learning experiences according to their local circumstances. However, all the knowledge strands must be addressed in each grade of study.

The identified cognitive and practical skills must be taught and assessed in an integrated way in the context provided by the knowledge strands. Both the scientific and design processes must be introduced gradually from Grade 4 onwards to ensure that learners acquire the range of necessary cognitive and other skills. The range of skills that are acquired within the context of the Natural Sciences and Technology are very similar and will overlap in many instances.

GRADE 4

NATURAL SCIENCES	**TECHNOLOGY**
Four "knowledge strands" are used as organisers of the Natural Sciences content framework. Each knowledge strand is developed across all three years of the Intermediate Phase. These knowledge strands are: • Matter and Materials (Strand 1) • Life and Living (Strand 2) • Energy and Change (Strand 3) • Earth and Beyond (Strand 4)	Two "knowledge strands" are used as organisers of the Technology content framework. Each knowledge strand is developed across all three years of the Intermediate Phase. The knowledge strands are placed in ascending order, size and complexity as a framing device. These knowledge strands are: • Structures (Strand 1) • Systems and Control (Strand 2)

The recommended sequence for the teaching of the knowledge strands in this document for **Grade 6** is:

1. Life and Living (Strand 2)
2. Matter and Materials and Structures (content) and the Scientific and Technological processes (Strand 1)
3. Energy and Change (and Life and Living and Mechanisms and the Scientific and Technological processes) (Strand 3)
4. Earth and Beyond (Strand 4)

AIMS

There are **three** broad, subject-specific aims in Natural Sciences and Technology.

7. Specific Aim 1 relates to the knowledge/content (theory) of both subjects.
8. Specific Aim 2 relates to doing science and technology. This will include doing practical work and designing and making models.
9. Specific Aim 3 relates to understanding the interrelationship of Natural Sciences and Technology and the relevance for the environment and the community.

These three aims are aligned to the three Learning Outcomes with which teachers are familiar. Within each of these aims, specific skills or competencies have been identified. It is not advisable to try to assess each of the skills separately nor is it possible to report on individual skills separately. However, well designed assessments must provide **evidence** that all the skills were assessed during the year. There must be a clear link between the aims and the outcomes of learning. The assessments are the link.

Whilst learner performance can be reported on separately for Specific Aims 1 (knowing) and 2 (doing Science and Technology) all of Specific Aim 3 (Science and Technology in Society) can be integrated into either Specific Aim 1 or Specific Aim 2.

1. SPECIFIC AIM 1: ACQUIRING KNOWLEDGE OF NATURAL SCIENCES AND TECHNOLOGY

The following cognitive (thinking) skills comprise the **range** of skills that all learners should develop in the context of working through the curriculum in this school year. These skills also indicate what should be assessed, **at the appropriate level for the grade**, in a variety of assessments during the year. Note that not every skill will be assessed in every assessment but teachers must ensure that learners are assessed in all the skills during the course of the year.

2.1. ACQUIRE KNOWLEDGE

Skills

Learners must…

- **access** information from a variety of sources (teachers, reference books, textbooks, the Internet, experts, peers, parents etc.)

- **select** key ideas obtained from resources
- **recall** and **describe** knowledge of the Natural Sciences and Technology.

Assessments

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

2.2. UNDERSTAND AND MAKE MEANING OF NATURAL SCIENCES AND TECHNOLOGY

Skills

Learners must…

- **analyse** acquired knowledge
- **evaluate** acquired knowledge
- **synthesise** (or reorganise) knowledge to make new meaning using written summaries, flow charts, diagrams, mind maps, etc.

Assessments

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

2.3. APPLY KNOWLEDGE OF NATURAL SCIENCES AND TECHNOLOGY IN NEW AND UNFAMILIAR CONTEXTS

Skills

Learners must…

- **analyse** and **evaluate** knowledge and apply this to new and unfamiliar contexts.

Assessments

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

Skills

Learners must…

- **access** information from a variety of sources (teachers, reference books, textbooks, the Internet, experts, peers, parents etc.)
- **select** key ideas obtained from resources
- **recall** and **describe** knowledge of the Natural Sciences and Technology.

Assessments

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

3. SPECIFIC AIMS 2:

Whist the skills specified under Specific Aims 1 and 3 apply equally to Natural Sciences and Technology, the skills that relate to "doing" Natural Sciences and Technology are different.

(e) INVESTIGATING PHENOMENA IN NATURAL SCIENCES	(f) APPLYING THE DESIGN PROCESS TO SOLVE PROBLEMS
The following range of skills relate to doing practical work in Natural Sciences. All seven skills will not apply equally to every practical activity. The skills are aligned to what learners would be doing in the normal course of doing practical work. Teachers must select those that apply to, and which can be assessed in, the context of specific activities. By the end of each year, all seven skills must have been assessed at a grade appropriate level.	The following range of skills relates to developing solutions for identified problems or human needs. All five skills will not apply equally to every activity. The skills are aligned to what learners would be doing in the normal course of developing a solution. Teachers must select those that apply to, and which can be assessed in, the context of specific activities. By the end of each year, all five skills must have been assessed at a grade appropriate level.
Learners must be able to:	**Learners must be able to:**
2.11 FOLLOW INSTRUCTIONS This is essential, especially in the lower grades and in large classes. Teachers cannot expect all learners to use unfamiliar equipment and to do so independently without giving them a clear set of instructions to follow. The level of assistance required would indicate the level of performance in this regard. Adherence to safety rules would be part of this. In Grade 4 teachers will have to provide clear instructions and assist learners in following a clear set of instructions.	**2.5 INVESTIGATE A SITUATION** Learners must gather data and information, must find out about new techniques, etc. Skills needed include accessing and processing skills, recording, identifying, predicting, comparing, observing, classifying and interpreting.
2.6 HANDLE EQUIPMENT/APPARATUS This should include knowledge of the apparatus i.e. naming it and knowing	**2.12 DESIGN A SOLUTION** This should include the following skills:

what it is used for. It includes equipment such as a thermometer for measuring temperature or a ruler for measuring length as well as using a pair of scissors or a craft knife for cutting paper and card. "Handle equipment" is a generic skill and would apply to any equipment used for many different kinds of investigations. Handling improvised equipment requires the same skills as would be required for handling standard laboratory equipment.	• writing a design brief using a given problem statement • generating possible solutions using given or own specifications • choosing a solution that will best satisfy the specifications • justifying the choices made • drawing a final solution.
2.3. MAKE OBSERVATIONS A variety of different kinds of observations are possible and observations can be recorded in different ways such as: • drawings • descriptions • grouping of materials/examples based on observable similarities and/or differences • measurements • comparing materials before and after treatment • observing results of an experimental investigation which will involve recording data in table format • counting.	**2.13CONSTRUCT THE FINAL SOLUTION** This should include the following skills: • using tools, equipment and materials to construct a solution • measuring, cutting, joining, shaping, combining, separating, mixing, etc.
2.4. RECORD INFORMATION/DATA	**2.14EVALUATE THE FINAL SOLUTION**

This should include recording observations or information as drawings, descriptions, in table format, as graphs etc. Again, this skill of "recording" is transferable across a range of scientific activities. **2.5. MEASURE** Learners should know **what** to measure, **how** to measure it and should have a sense of the degree of accuracy required. A variety of things should be measured: length, volume, temperature, numbers (counting) etc. Measuring is a way of quantifying observations and in this process learners should learn to estimate.	This should include the following skills: • critically evaluating the final product against the specifications and design brief • critically evaluating the making process • critically evaluating any possible improvements needed. **2.15COMMUNICATE THE PROCESS** The processes followed from 2.1 – 2.4 must be presented in oral or written form including sketches.
2.6. INTERPRET Learners should be able to convert information from one format another e.g. pictures –> words sentences → key words label diagrams table → appropriate graph.	
2.7. DESIGN/PLAN INVESTIGATIONS OR EXPERIMENTS Skills include: • identifying a problem • selecting apparatus/equipment and o/r materials where necessary	

• planning an experiment using a given problem statement • identifying the factors that will influence the outcome (variables: dependent and independent) • controlling variables/designing suitable controls • predicting the outcome of the experiment • suggesting ways of recording results • In grades 4-6 learners should be assisted in planning and/or designing an investigation/experiment.	

Note: Skills By separating the different kinds of skills (2.1 to 2.7 for Natural Sciences and 2.1 to 2.5 for Technology), these skills can apply to the **variety** of different kinds of practical work/solving problems that are appropriate for a particular grade in Natural Sciences and Technology, including investigations/experiments. This approach makes it easier to assess learners in a range of different circumstances and it makes it possible for a teacher to make judgements about a learner's ability to **do** science and technology. The skills are based on what learners will do in the normal course of doing practical work or solving problems.

3. UNDERSTAND THE INTERRELATIONSHIPS BETWEEN NATURAL SCIENCES AND TECHNOLOGY AND THE APPLICATIONS OF NATURAL SCIENCES AND TECHNOLOGY FOR SOCIETY AND THE ENVIRONMENT

3.1 UNDERSTAND THE HISTORY, IMPORTANCE AND RELEVANCE OF SCIENCE AND TECHNOLOGY AND THE IMPORTANCE OF INDIGENOUS KNOWLEDGE.

Skills

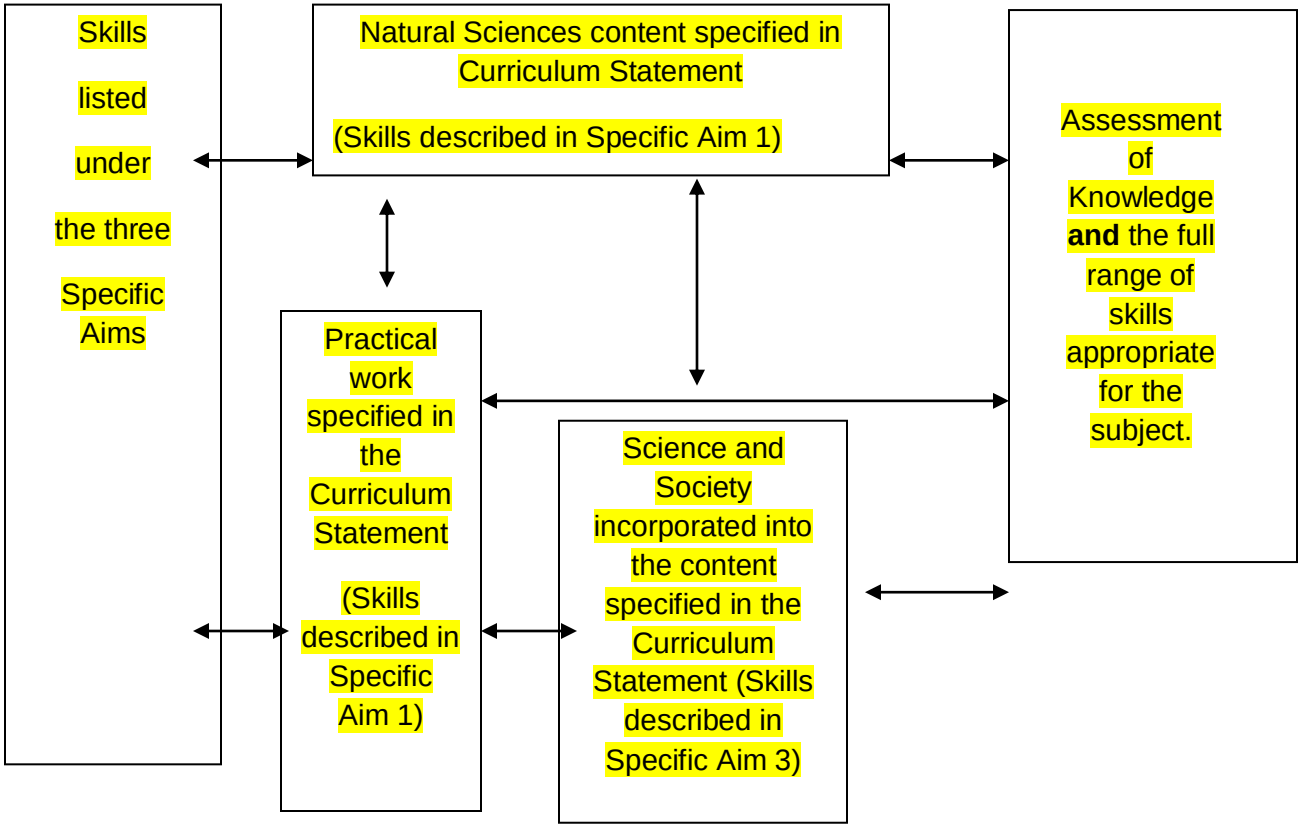
Learners must...

- **understand** how indigenous cultures have used scientific principles and technological products for specific purposes
- **understand** how science and technology have benefited, or have been detrimental to, society and the environment
- **select** key ideas to construct the history of scientific or technological discover how science and technology have benefited or
- **analyse** and **evaluate** the application of scientific principles and technological products used by indigenous cultures in
- everyday life (both positive and negative consequences)
- **analyse**, **discuss** and **debate** the positive or negative effects of science and technological products on society and the environment.

FLOW DIAGRAM: RELATIONSHIPS BETWEEN THE KEY CURRICULUM ELEMENTS

The following diagram illustrates how the aims relate to learning outcomes and to one another, and how the ranges of skills must be infused into the subject content.

- The diagram also shows how assessment relates to the content, the practical work and Science and Society as well as the skills.
- The diagram shows what has to be taught (Specific Aims 1, 2 and 3) of which the subject content provides the context for everything else.
- It shows the skills that must be taught and it shows how teachers should go about assessing the learners.
- The diagram illustrates the "infusion" of cognitive and other skills into everything that is taught and assessed.



TIME

The curriculum for Grade 4 has been designed to be completed within 32 weeks out of 40 weeks in the school year. This leaves 8 weeks in the year for examinations and disruptions due to other school activities. The time allocated per topic must serve as a guideline to teachers whilst allowing for some flexibility.

ASSESSMENT

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

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

Assessment should be mapped against the content and intended aims specified for a subject.

Assessment should be both informal and formal. In both cases, regular feedback should be provided to learners to enhance the learning experience. During both the informal and formal assessments it is important to:

- cover all of the subject content
- include the full range of skills
- use a variety of different forms of assessment.

Informal assessment

Regular assessments are part of the planned teaching and learning activities that take place in the classroom.

Informal assessment can occur in every lesson. It can take the form of informal assessment tasks at the beginning, during or at the end of the lesson. This can be achieved through questions and answers, class work such as short pieces of written work completed during the lesson, open book tests or homework exercises etc. It should not be seen as separate from the learning activities taking place in the classroom and should be used to provide feedback to learners and to improve learning and teaching.

Learners or teachers can make informal assessments. Self-assessment and peer assessment actively involves learners in assessment and it allows learners to learn from and reflect on their own performance. In grade 4 learners will have to be assisted in order to increase their confidence with regard to self and peer assessment.

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

Informal assessments do not need to be recorded unless the teacher wishes to do so. In such instances, a simple checklist may be used to record this assessment and to provide feedback.

The results of informal assessments do not have to be taken into account when determining a learner's final mark for promotion or certification purposes.

Formal assessment

Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a grade and in a particular subject.

The tasks that are used for formal assessment are recorded and used to determine whether learners are making progress and if they should be promoted to the next grade.

The teacher must plan and submit the annual formal Programme of Assessment to the School Management Team (SMT) before the start of the school year. This will be used to draw up a school assessment plan in each grade. Learners and parents should be provided with the school assessment plan during the first week of the first term.

Examples of formal assessments include projects, oral presentations, practical task, tests, examinations, etc. For Natural Sciences and Technology, possible projects are suggested by the curriculum.

Formal assessments form part of a year-long formal programme of assessment in each grade and subject. Formal assessments are school-based and are weighted as follows:

Grades	**Formal school-based assessments**	**End-of-year Examinations**
4-6	75%	25%

This is Departmental policy.

The cognitive demands of assessment used should be **appropriate** to the age and developmental level of the learners **in the grade**. The assessment tasks should be carefully designed to cover the content of the subject as well

as the range of skills that have been specified under the Specific Aims. The design of these tasks should therefore ensure that a variety of content and skills are assessed. Aims, topics and content in the subject should be used to inform the planning and development of assessment tasks.

Formal assessments in Natural Sciences and Technology must cater for a range of cognitive levels and abilities of learners.

Assessment of content and skills

Specific Aim 1.1 Natural Sciences and Technology (knowing, remembering)	Specific Aim1.2: Natural Sciences and Technology (understanding, applying)	Specific Aim 1.3 and 3.1 (analysing, evaluating, creating)
60% Natural Sciences Technology 45% 15%	30% Natural Sciences Technology 20% 10%	10% Natural Sciences and Technology

It is important that all assessments are designed to reflect this weighting. If assessments provide evidence that the aims have been assessed appropriately, it will not be necessary to record performance separately against aims

The requirements (number and nature of tasks) for Natural Sciences and Technology are indicated below.

ASSESSMENT REQUIREMENTS FOR NATURAL SCIENCES AND TECHNOLOGY: GRADE 4

<table>
<tr><th colspan="3">PROGRAMME OF FORMAL RECORDED SCHOOL-BASED ASSESSMENT
75%</th><th>END-OF-YEAR EXAMINATION
25%</th></tr>
<tr><th>50 %</th><th>25%</th><th></th><th></th></tr>
<tr><td>SEMESTER 1</td><td>SEMESTER 2</td><td></td><td rowspan="4">Grd 6: 60 minutes: 50 marks</td></tr>
<tr><td>TERMS 1 + 2</td><td>TERMS 3 + 4</td><td></td></tr>
<tr><td>• 1 test</td><td>• 1 test</td><td>NOTE:
• Tests must be set to assess at least 2 of the aims and both the subjects.
• The marks allocated should range from 15 to 30.</td></tr>
<tr><td>• 1 examination
Grade 6: 60 minutes: 50 marks</td><td></td><td>NOTE:
• The examination must be set to assess all 3 of the aims and both the subjects.</td></tr>
<tr><td>• 1 translation task
• 1 practical task</td><td>• 1 translation task
• 1 practical task</td><td>NOTE:
• The assessments of translation tasks and practical tasks must be set to cover a range of skills.
• The marks allocated should range from 10 to 20.</td><td>NOTE:
The examination must be designed to assess all 3 of the aims and both the subjects.</td></tr>
</table>

• project • 2 different activities chosen from: assignments case studies	• project • 2 different activities chosen from: assignments case studies	**NOTE:** Since the subject "Natural Sciences and Technology" is comprised of two subjects, learners should complete one project for each of the two components per year. It is suggested that a project should be completed in each of the two semesters. • The marks allocated for these activities must range from 15-30 marks.	
Convert to 50 %	**Convert to 25%**		**Convert to 25%**

RECORDING

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.

POSSIBLE TEMPLATE FOR RECORDING LEARNER PERFORMANCE

Teachers may elect to adopt this template or they may wish to develop their own. All formal tasks must be recorded (on this or a different template). All conversions must be reflected.

	SEMESTER 1											SEMESTER 2									
NAMES	TERM 1				TERM MARK A		TERM 2			TERM MARK		TERM 3				TERM MARK		TERM 4			
. Max	TEST 1	TRANSLATION TASK 1	PRAC 1	ACTIVITY 1			ACTIVITY 2	PROJECT 1	EXAMINATION 1			TEST 2	TRANSLATION TASK 2	PRAC 2	ACTIVITY 3			ACTIVITY 4	PROJECT 2	TERM MARK B	
	25	15	10	20	70	%	15	25	30	70	%	25	10	15	20	70	%	20	30	50	%
1. Learner 1	15	7	7	18	47	67	13	19	24	56	80	16	8	10	14	48	69	13	26	39	78
4. Learner 2 etc.																					

CALCULATING TERM MARKS

Example:

In order to calculate the **TERM MARK** for TERM 1:

Learner 1 gets the following marks:

Test 1 : $^{15}/_{25}$

Translation task 1 : $^{7}/_{15}$

Practical task 1 : $^{7}/_{10}$

Activity 1 : $^{18}/_{20}$

The mark for the term is $^{47}/_{70}$. This is 67% ($^{47}/_{70} \times {}^{100}/_{1} = 67$)

This is the **TERM MARK** for **TERM 1 (at A)**

The learner gets a rating code of 5: substantial achievement

In the same way, calculate the term marks for each of **TERM 2 (80%) at B**, **TERM 3 (69%) at C** and **TERM 4 (78%) at D**.

END-OF-YEAR EXAMINATION

NAMES	**EXAMINATION**		**CONVERSION E**
Max	50	%	25
1. Learner 1	23	46	12
2. Learner 2 etc.			

CALCULATING THE EXAMINATION MARKS

- The marks for the examination count 25 % or 25 marks out of a 100 of the **FINAL MARK**. This is Departmental policy.
- The marks for the written examination at the end of the year must therefore be converted to a mark out of **25.**

For example:

- Learner 1 gets 23 marks out of 50 for the examination $^{23}/_{50}$ is equal to 46% ($^{23}/_{50} \times {}^{100}/_{1} = 46\%$)

- Conversion of mark: 46 $^{x\ 25}/_{1} =$ 11,5 = 12 marks out of 25 at E This is the **EXAMINATION MARK**

FINAL MARK

- In Grade 6, the term marks for term 1 and 2 together count 50% (half) of the YEAR MARK
- the term marks for term 3 and 4 (together) count 25% (a quarter) of the YEAR MARK
- The EXAMINATION MARK (at E) counts 25% (a quarter) of the YEAR MARK. This is Departmental policy.

For example:

Conversions

- **First,** convert the total for the first semester (Terms 1 and 2) i.e. for **TERM MARKS A and B**, to a mark out of 50.

  T1 (A) + T2 (B)

  67% + 80% = $^{147}/_{200} \times {}^{50}/_{1} = {}^{37}/_{50} =$ **37 marks out of 50 (F) SEMESTER 1**

- Next, convert the total for the second semester (Terms 3 and 4) i.e. for **TERM MARKS C and D,** to a mark out of 25.

  T3 (C) +T4 (D)

  69% + 80% = $^{147}/_{200} \times {}^{25}/_{1} = {}^{18}/_{25} =$ **18 marks out of 25 (G) SEMESTER 2**

- Finally, the EXAMINATION MARK has to be converted to a mark out of 25 (at E). The learner got $^{12}/_{25} =$ **12 marks out of 25 (E) EXAMINATION MARK**

FINAL MARK

Now add the first semester mark out of	50	i.e. 37 (F)	
to the second semester mark out of	25	i.e. 18 (G)	
to the examination mark out of	25	i.e. 12 (E)	
TOTAL:	100	67	**THIS IS THE FINAL MARK**

This learner therefore gets 67% at the end of the year which is 5 on the rating scale: Meritorious achievement.

Reporting

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

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

Codes and percentages for reporting in Grades R -12

RATING CODE	DESCRIPTION OF COMPETENCE	PERCENTAGE
7	Outstanding achievement	80-100
6	Meritorious achievement	70-79
5	Substantial achievement	60-69
4	Adequate achievement	50-59
3	Moderate achievement	40-49
2	Elementary achievement	30-39
1	Not achieved	0-29

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

using a formal reporting tool such as a report card. The schedule and the report card should indicate the overall level of performance of a learner i.e. the percentages calculated for each quarter (term) at A, B, C and D.

GENERAL:

Language

Learning material must focus on the development of the learners' understanding of the terminology of the subject (together with knowledge and skills).

A glossary of all the terms used must be included in all learning material.

Practical work

Examples of practical work that could be done are included. Teachers are allowed to use other examples but practical work that **must** be done by the learners at school is marked **PL**.

Practical work that is marked **P/D** can either be done by the learners themselves or the teachers may demonstrate the

practical work.

Projects:

As only one project per subject can be completed per year, the teacher may choose to use any of the research activities as the chosen project. Note that because Natural Sciences is combined with some Technology in the Intermediate Phase, learners should complete two projects: one for each subject component one in each semester.

All the other research activities must therefore be completed at school and the teacher should provide the learners with the necessary relevant resources or instruct the learners to collect and bring the resources to school.

Making models

The time allocation makes it possible for models to be made at school. The learners must collect and bring the necessary material to school and/or the teacher must collect and provide the material.

It is advisable that all the models are made from materials found by the learners.

Learners must make ONE model per year individually. All the others may be made in groups.

Time allocation

The time allocation per topic must serve as a guideline to teachers but allow for some flexibility.

Translation Tasks

These are exercises where learners learn to interpret information presented in different ways e.g. tables, graphs etc. They have to learn to "translate" the information into a different format e.g. table graph

graph table

text mind map

diagram text, etc.

table → graph

graph → table

text → mind map

diagram → text etc.

Term 1					
Hours	**Topic**	**Content**	**Skills**	**Activities and practical work**	**Resources**
6	Photosynthesis	Green leaves use the energy of the sun, carbon dioxide (CO_2) and water to make glucose and starch. The leaves emit oxygen (O_2) into the air. Animals depend on plants for their food and oxygen. Animals emit carbon dioxide which is used by plants to make more food.	• growing plants • observing • recording • drawing • labelling	Learners can explain what happens during photosynthesis, e.g. they label a diagram of plants and animals to show the following: • starch in the leaves • water is taken up by the roots • carbon dioxide is taken in by the leaves • oxygen is given out by leaves and taken in by animals • food is eaten by animals • carbon dioxide is given out by animals **P/L/D Investigations: Do plants need light to grow?** Learners grow one plant in a dark cupboard and one in a sunny place. **Do plants need water?** Learners grow	Textbook Diagram of plants and animals or worksheet Flower pots Good soil Seedlings e.g. lentils

				two plants and only water one of them. Learners draw and record their observations over a period of time.	
4	Nutrition and food groups	Classification of food types: Carbohydrates (and oils/fats): food for energy Protein: food for growth Vitamins and minerals: foods for protecting bones, teeth and the immune system. A balanced diet contains sufficient quantities from all three food groups. Diseases result from not having a healthy balanced diet e.g. tooth decay, rickets, constipation, obesity, diabetes etc.	• sorting • classifying	Learners must be able to: • sort different foods into the three food groups • read labels on food packaging to identify the three food groups. Discussion about diseases associated with a poor diet.	Pictures of different food types Food packaging

3	A healthy environment is important for the health of the planet	All humans, plants and animals need a place where they can carry out their life processes successfully. All humans, plants and animals need food, clean water, air and shelter to complete their life cycles successfully. Human development can have a negative or positive effect on the environment. We can choose to have a positive effect on our environment.	Making decisions Working in the environment	Learners have to think of ways to improve their immediate environment for themselves and for the plants and animals around them. They identify an appropriate task to improve their environment and carry it out e.g. grow plants or vegetables, make a wormery, make a compost heap, recycle waste, organise a litter clean up, etc.	Appropriate materials and tools
3	Animals with bones	Some animals have bones e.g. fish, frogs, birds, reptiles, mammals. Bones form the skeleton and have different parts:	• identify • name • draw • label	Learners study pictures of animal skeletons and real bones. Learners identify and name the parts and describe their functions.	Pictures of different animals with backbones Pictures and X-rays of bones

		skull, a backbone made up of many vertebrae, ribs, shoulder blades, front limbs, hips and back limbs. Muscles are attached to the bones to make the animal move. The skull protects the brain. The backbone protects the spinal cord. The ribs protect the lungs and heart. Bones are held together by fixed or moveable joints.		Learners indicate where there are moveable joints on these skeletons. Learners draw an outline of their own body on paper, a wall or the floor. draw in the bones and label them. Learners look at real bones.	Collections of real bones Big sheets of paper or fabric or floor space Chalk
3	Movement of humans and animals	Movement is possible because of: *skeleton *muscles	• Observing differences • sorting • classifying • sketching	Learners must realise that the movement of animals and humans are only possible because of the presence of skeletons and muscles.	Textbook Worksheet Pictures

		Movement of muscles	• oral and written descriptions	Learners must be able to: • explain how muscles move • explain how the movement of muscles cause the movement of the body of the human or animal	
2	Endoskeletons Exoskeletons	Endoskeletons Exoskeletons Examples of animals	• Observing differences • sorting • classifying • sketching • oral and written descriptions	Learners must be able to: • explain the concepts Endo- and Exoskeletons • identify animals with these different skeletons	Textbook Worksheet Pictures
2	Different types of movement	Movement Changing of the types of movement Changing of the magnitude of the movement Mechanical systems addressed: Crank/windlass Pulley Gear	Interpret information Oral and written descriptions • Sorting • Classifying • Sketching	**Research/case study** Learners do research to identify machines used by man to cause movement (indigenous knowledge) Learners must be able to demonstrate knowledge and understanding of how: • different types of movement can be achieved • how mechanical systems can be used to change the input movement into a different type of output movement	Books or printed material The Internet Textbook Worksheet Pictures

		Cam/crank		• how mechanical systems can change the magnitude of the movement.	
2	Design a system	Design brief Specification Constraints	Design Write a design brief Specification Constraints	Learners must use a given problem statement to design a mechanical system to be used to change the type of movement/magnitude of the movement. Learners must write in their own words what they will do to solve the problem. Learners must write a simple design brief describing specifications and constraints (on their own). Learners must be given clear criteria regarding size, found material, type of material, construction method, etc. Learners must sketch the system.	Textbook Worksheet
4		A mechanical system to solve a problem	• Making models • Oral and written descriptions	**MODEL** Learners must IN CLASS: • build the system • evaluate the system using the design brief and constraints	Card/plastic/scissors/craft knives/safety rulers/cutting mats/glue/glue guns, etc.

ENRICHMENT		Test leaves e.g. spinach for starch. Grow plants and feed them with different kinds of liquids e.g. sugar water, salt water, tea, worm tea (from wormery) liquid fertiliser. Start a food or herb garden at school. Set up/organise a cultural food fair.			
ASSESSMENT		Label drawings to show photosynthesis. Record observations of investigations with growing plants. Menu of a balanced diet. Graph to show the results of the survey - how many times a week they eat carbohydrates. Movement changes made by different mechanisms (working model)			
29					

Term 2					
Hours	**Topic**	**Content**	**Skills**	**Activities and practical work**	**Resources**
2	Melting Dissolving	Difference between melting and dissolving* Temporary changes/permanent changes	Observing differences: sorting classifying • predicting • sketching • oral and written descriptions	**Practical activities that must be completed at school. P/L or P/D** Learners must: • observe the processes of melting and dissolving • be able to explain the difference between melting and dissolving • be able to explain the concepts of temporary changes/permanent changes • be able to identify temporary changes/permanent changes	Textbook Worksheet Apparatus and resources to demonstrate or do experiments.
6	Solutions	Soluble and insoluble substances *Dissolve *Even mixture *Solvent, solute, solution	Follow instructions: * Observing differences • Sorting • Classifying • Predicting • Record findings • Oral and written descriptions	**Practical activities that must be completed by learners at school or that must be demonstrated by teacher P/L/ P/D** Learners must make solutions Examples: * flour in water * oil in water	Textbook Worksheet Apparatus and resources to demonstrate or do experiments

		Saturated solutions		**Practical activities that must be completed by learners at school. P/L** Learners must make solutions Examples: * sugar /salt /copper sulphate/coffee in water * sugar/salt/coffee in milk/vinegar * vinegar/milk in water Learners must be able to explain the concept "saturated solution". **Practical activities that must be demonstrated by teacher P/D** Example * sugar /salt /copper sulphate in water	
6 + 4	Rate of dissolving	The rate of dissolving in relation to the temperature	* Design fair tests • Predict results • Recording results	**A Practical activity that must be completed by learners at school. P/L OR P/D (see note)**	Textbook Worksheet Apparatus and resources to

		The rate of dissolving in relation to the grain size	NOTE: Either A or B to be done by learners themselves. The other one must be a demonstration	Design fair test and carry out the test **with help from the teacher.** Learners must be able to identify the factors that will influence the rate of dissolving. Use any solute and solvent and carry out the experiment at different temperatures (at least 3 different temperatures). **B Practical activities that must be completed by learners at school. P/L OR P/D (see note)** Design fair test and carry out the test **with help from the teacher.** Learners must be able to identify the factors that will influence the rate of dissolving. Use any solute and solvent and carry out the experiment using different grain sizes	demonstrate or do experiments.

				(at least 2 different grain sizes).	
2	Conservation of matter			Learners must be able to explain the concept “conservation of matter”.	Textbook Worksheet
3	Environments and water resources	Functions of water in the ecosystems of plants and animal life, and biodiversity	• Sketching • Record findings • Oral and written descriptions	**Research/case study** **Learners must in class:** research the functions of water in ecosystems (people/animals/plants)	Books or printed material The Internet
4	Wetlands	Wetlands as habitats for animals Wetlands as sponges that regulate flow of water Groundwater and wetlands as resources for humans	• Identify issues • Oral and written descriptions	**Research/case study** Learners must be able to: • explain the concept “wetland” • explain the importance of wet lands as habitats for animals/sponges to regulate the flow of water/resources for humans. • name and know the location of least one wetland in SA • explain the importance of that specific wetland • explain the impact of the loss of	Books or printed material The Internet

				wetlands on biodiversity (humans/plants and animals)	
ENRICHMENT		Research different household mixtures. Read labels. Field visit to a wetland.			
ASSESSMENT		Identify factors that influence the rate of dissolving. Draw conclusions regarding factors using given observations.			
27					
			Term 3		
Hours	**Topic**	**Content**	**Skills**	**Activities and practical work**	**Resources**
6	Differences between the earth, moon and sun	• The sun is a star • The earth is a planet • The moon is a satellite of the earth • The earth, moon and sun are part of the solar system • The sun is the source of heat and light energy • The sun is huge in size compared to the earth and the moon. • The sun is at the centre of the solar system. • The sun is a star, because it produces its own energy.	Research Writing Comparing	Revise the following concepts: star, planet, moon (as covered in Grade 4). Compare the sun, earth and moon. Learners read about the sun, earth and moon, and construct a table to compare the features of all three. Demonstrate the relative sizes of the sun, earth and moon using suitably sized objects. Movements of the earth, sun and moon. Learners must be able to explain that the “rising and setting of the sun and stars” are because of the earth’s rotation	Textbooks Notebooks/workbooks Objects to compare sizes of sun (e.g. big beach ball) earth (ping-pong ball) and moon (e.g. marble).

		• The earth is a planet, made of rock and it revolves in orbit around the sun. It gets its light from the sun. • The earth rotates (spins) on its own axis. • The earth has an atmosphere and water. • The moon is made of rock and is about 1/5 size of the earth. It revolves in orbit around the earth. The moon reflects light from the sun. • The moon does not have an atmosphere. • The sun and stars only appear to move as the sun rises and sets each day. In reality, it is the earth which is spinning that makes the sun appear to move.		around its own axis. The sun only appears to move from the perspective of an observer on the surface of the earth.	

3	Force of gravity	Force between objects Gravity of the earth - direction down	Interpret information Oral and written descriptions	Learners must understand and be able to explain the concept of gravity, understand that gravity is a force and that this force is working downwards towards the earth. **Practical Investigation** Investigate the force of gravity by letting objects fall/ throwing objects up, etc.	
4	Day and night	The earth rotates around its own axis. Different times for the different regions on earth. Directions (N-S-E-W)	Interpret information Sketching Oral and written descriptions	Learners must be able to explain the concepts of: • night and day because of the rotation of the earth • 1 day = 24 hours • day is when the sun is shining • different times for the different regions on earth • Directions: in class and outside • Direction in terms of sunrise/sunset • Direction in terms of the globe model	Textbooks Worksheets Pictures

5	The earth is unique - it's ecosystems support life	• The earth is the only planet which supports life because it has air, water, soil and warmth from the sun. • The earth has different ecosystems that support different forms of life. • Each ecosystem provides enough air, water, food and shelter for the plants and animals that live there.	Observe Draw Write	Learners visit or observe an ecosystem OR Use pictures of plants and animals in different ecosystems e.g. in a river ecosystem, a mountain ecosystem, a rocky shore, a pond, a desert, a forest, a grassland, etc. to determine the type of animals and plants that live there. Use a picture or ecosystem and determine the conditions there that help these animals and plants to live there. Use a given scenario to determine the possible threats to an ecosystem and make suggestions on how to overcome them.	Textbooks Notebooks/ workbooks Pictures
3 hrs then ongoing observation and drawing	Moon phases	• The moon's appearance seems to change over the course of a month. • We can record the	Design and make Observe Predict Draw	Learners design and make a calendar for a month on which they can record (draw) the shape of the moon each night. **Investigation: Does the moon's shape**	Textbooks Notebooks/ workbooks

		changes in the moon's appearance on a calendar for a month. • The moon waxes (appears to grow in size for half the month and wanes (appears to diminish in size) for the rest of the month. • The moon is not visible for five days of the month (this is called new moon).	Label	**change each day?** Learners observe the moon each night for a month and draw a picture of it on the calendar. Each time they predict the moon's shape for the next day. They label the full moon, quarter moon (also called the "half moon"), gibbous moon, crescent moon and new moon. Learners must be able to identify, name and draw the different phases of the moon.	
5	Stars and star patterns	• The stars appear to move across the sky in a fixed pattern (constellations) • Moon, stars, stars patterns are used for: * navigation * cultural significance	Research Identify (constellations on star maps)	Learners must be able to identify at least 3 of the most important and well-known star patterns (constellations) that can be seen in the Southern Hemisphere e.g. the Southern Cross, Orion's belt, the Pleiades, etc. Learners must be able to explain how to find direction (south) by using the Southern Cross.	Textbooks Notebooks/ workbooks Star maps Library books The Internet

				Research/case study • Learners must research how and by whom the moon, stars and star patterns were/are used for navigation OR • Learners must research the cultural significance of the moon, stars and star patterns for the different indigenous peoples of SA and the world.	
ENRICHMENT		Visit to a planetarium or observatory; start an astronomy club at school			
ASSESSMENT		Test; table to compare the features of the sun, earth and moon; learners' own moon watch calendar; drawing and writing to explain the phases of the moon; learners' own writing about an ecosystem.			
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Term 4					
Hours	**Topic**	**Content**	**Skills**	**Activities and practical work**	**Resources**
4	Electricity	Electrical circuits: charge current circuit components symbols for circuit components circuit diagram	• classifying • oral and written descriptions • sketching	Learners must be able to explain the following concepts: electrical charge electrical current - flow of charges electrical circuit.- cell and circuit components Symbols for circuit components Drawing of simple electrical circuits.	Textbook Worksheet
4	Electricity	Conductors and insulators	Follow instructions * observing differences • sorting • classifying • Predicting • record findings • oral and written descriptions	**Practical activity that must be completed by learners at school. P/L** Learners must investigate practically the electrical conductivity of different materials: • conductor • insulator	Apparatus to conduct or demonstrate all activities
4	Electricity	Energy transfer from cell to circuit parts More cells = more charge + more energy	* follow instructions * oobserving differences • sorting • classifying	**Practical activity that must be completed by learners at school. P/L** Learners must investigate practically the influence of more cells in series on the	Apparatus to conduct or demonstrate all activities

			• Predicting • Record findings • Oral and written descriptions	brightness of the lamps.	One of these practical activities could be demonstrated by teacher.
4	Electricity	Resistance Energy transfer from cell to circuit parts More lamps provide more resistance to the flow of the current.	• follow instructions * observing differences • sorting • classifying • Predicting • Record findings • Oral and written descriptions	**Practical activity that must be completed by learners at school. P/L** Learners must investigate practically the influence of more lamps in series on the brightness of the lamps.	
2	Electricity	Energy transfer from device to surroundings: * heat * sound * light * movement	* observing differences • sorting • classifying • Predicting • oral and written descriptions	Learners must be able to identify the type of energy transfer from devices to the surroundings by making use of given examples.	Textbook Worksheet
1	Electricity	Safety/dangers	* observing differences • sorting • classifying • predicting • Oral and written descriptions	Learners must be aware of the dangers regarding the usage of electrical power. Learners must be able to identify possible safety hazards by making use of given examples. Learners must be able to suggest what to do in case of an emergency.	Textbook Worksheet

3	Design a circuit	An electrical circuit designed to solve a problem	• sketching • designing	Learners must use a given problem statement to design an electrical circuit to perform a certain function e.g. cause movement/make a noise, etc. Learners must write in their own words what they will do to solve the problem. Learners must write a simple design brief, specifications and constraints (on their own). Learners must be given clear criteria regarding size, found material, type of material, construction method. Learners must sketch the circuit.	Textbook Worksheet
6	Build a model	An electrical circuit made to solve a problem	• making models • oral and written descriptions	**MODEL** Learners must IN CLASS: *build the circuit *evaluate the circuit using the design brief and constraints.	Apparatus/resources and tools to make the model
ENRICHMENT		Investigate the working of a cell. Listen to a talk by an electrician on what he does everyday.			
ASSESSMENT		Draw circuit diagrams. Identify components in given diagrams, Predict the outcome of experiments. Write a design brief with specifications and constraints. Make a working model.			