education

Department:
Education
REPUBLIC OF SOUTH AFRICA

National Curriculum Statement Assessment Guidelines

for General Education and Training (Intermediate and Senior Phases)

Natural Sciences

PREAMBLE

The Assessment Guidelines are part of a developmental process that is aimed at increasing the capacity of the education system, teachers, school management teams and departmental officials to enhance the effective implementation of the *National Curriculum Statements and the National Policy on Assessment and Qualifications for Schools in the General Education and Training Band* by developing an authentic assessment system that is congruent with outcomes based education in general and the NCS in particular.

We expect a critical engagement with these documents, as they do not reflect a "zero defect" nor a "one answer" solution and we encourage all who use these documents to alert the Department of Education to any inconsistencies, highly impractical suggestions or any other elements that may detract from the goal of establishing an effective assessment system. We also appeal to you to offer alternative solutions, ideas and suggestions you may have for dealing with issues you may have raised in your input. In particular, examples of good assessment tasks that enhance classroom teaching and learning will be valued.

We encourage you to be as rigorous and as vigorous as you can and have complete faith in your professionalism to expect that your responses, however critical, would be framed in a constructive manner that is geared towards arriving at a shared solution and is not a simplistic listing of problems and concerns.

We look forward to an exciting, growth promoting and stimulating engagement with you all.

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1. INTRODUCTION TO THE NATURAL SCIENCES LEARNING AREA

This document provides guidelines for assessment in Natural Sciences in the intermediate and senior phases of the National Curriculum Statement. It provides teachers with information on assessment as well as ways of implementing assessment in Natural Sciences.

This document should be read in conjunction with the *Natural Sciences Learning Area Statement,* the *National Policy on Assessment and Qualifications for Schools in the General Education and Training Band* (from here called the Assessment Policy), *Teacher's Guide for the Development of Learning Programmes in Natural Sciences* and other current assessment policies.

2. ASSESSMENT IN THE NATIONAL CURRICULUM STATEMENT

Assessment in the National Curriculum Statement is an integral part of teaching and learning and should be included at all levels of planning. In the NCS, assessment is not just an 'add on' or something that happens at the end of the learning process.

The assessment standards in each Learning Area define the minimum requirement for achieving the learning outcome at a specific grade. We teach towards learning outcomes and the activities to achieve a certain assessment standard or a group of clustered assessment standards can be varied. At the same time we can assess in many different ways depending on what we would like to find out.

Assessment is a process of making decisions about a learner's performance. It involves gathering and organising information (evidence of learning), in order to review what learners have achieved. It informs decision-making in education, and helps teachers to establish whether learners are performing according to their full potential and making progress towards the required levels of performance (or standards), as outlined in the Assessment Standards of the NCS.

Before addressing the different types of assessment, it is helpful to list some general purposes of assessment. In terms of the National Curriculum Statement, assessment in the GET Band should achieve at least one of the following purposes:
- Develop learners' knowledge, skills and values
- Identify learners' strengths and weaknesses
- Identify the needs of learners
- Provide additional support to learners through feedback
- Revisit or revise certain sections where learners seem to have difficulties
- Motivate and encourage learners
- Enable teachers to reflect on their practice
- Demonstrate the effectiveness of the curriculum or a teaching strategy
- Provide information or data to a variety of stakeholders

The purposes can be linked to different types of assessment of which the following five are listed in the National Curriculum Statement (GET: Grades R–9)

Type of assessment	Description and uses
Baseline Assessment	Baseline assessment is assessment usually used at the beginning of a phase, grade or learning experience to establish what learners already know. It assists educators with the planning of learning programmes and learning activities.
Formative Assessment	Diagnostic assessment is often baseline assessment, since its application will always lead to some form of intervention or remedial action or programme. It shows either learners' strengths and weaknesses or inappropriate teaching methodology. When it is used to find out about the nature and cause of medical barriers to learning, it should be administered by specialists and is followed by expert guidance, support and intervention strategies. However, it is different to baseline assessment in that it is not necessarily always at the beginning of a learning experience, it may occur in the middle or near the end of a learning experience.
Summative Assessment	Formative assessment is also called "assessment for learning". The purpose of this type of assessment is to improve learners' ability to learn. Formative assessment is planned so that it provides information about learners that they can use to deepen their understanding and the teacher can use to shape future learning. The information must be used by both teacher and learner in a process of reflection and self-assessment. Thus it improves teaching and learning by giving teachers direction and enables them to adapt to learners' needs.
Diagnostic Assessment	Summative assessment gives an overall picture of learners' progress at a given time, for example, at the end of a term. It usually results in judgements about learner performance and can involve high stakes for learners (e.g. Senior Certificate). It normally occurs after learning has taken place through good formative assessment.
Systemic Assessment	Systemic assessment is an external way of monitoring the education system by comparing learners' performance to national indicators of learner achievement. It involves monitoring of learner attainment at regular intervals, using nationally or provincially defined measuring instruments. This form of evaluation compares and aggregates information about learner achievements so that it can be used to assist in curriculum development and evaluation of teaching and learning. For the General Education and Training Band, Systemic Evaluation will be conducted at the phase exit levels i.e. Grade 3, Grade 6 and Grade 9.

2.1 The Nature of Assessment in the Natural Sciences Learning Area

Assessment in the NCS should always be seen as integral to teaching and learning, therefore it is important to understand the Learning Area so that the assessment can reflect the Learning Area. Quality learning depends on good quality formative assessment, and good formative assessment depends on knowing the interconnections between science concepts. Improvements in assessment practice depend on teacher professional growth in the subject's core knowledge. General understandings of assessment have not always proved sufficient in themselves to improve learners' grasp of science.

2.2 The Nature of Natural Sciences

Understanding the nature of the Learning Area as expressed by the 3 learning outcomes, is key to framing appropriate, relevant assessment. Drawing on the purpose of the Natural Sciences Learning Area, which promotes development of scientific literacy, use and application of process skills and scientific knowledge while acknowledging the relationships between science, society and the environment, the Natural Sciences Learning Area enables learners to:

- Develop a range of process skills that may be used in everyday life, in the community and in the workplace;
- Develop the ability to think objectively and use a variety of forms of reasoning;
- Answer questions about the nature of the physical world;
- Prepare for economic activity and self-expression;
- Lay the basis for further studies in sciences;
- Be prepared for active participation in a democratic society that values human rights and promotes environmental responsibility;
- Understand science as a human activity;
- Understand the contribution of science to social justice and societal development;
- Highlight responsibility to society, the environment and ourselves.

These are all integral aspects that educators need to take into account when planning and assessing in a Natural Sciences classroom as it sets a framework for assessment within Natural Sciences.

2.3 Language

Assessment should always be fair to learners and all barriers preventing learners from expressing their knowledge, skills and values should be considered when assessing. Such barriers may include their inability to express themselves in the language in which the learning, teaching and assessment is done. Tests and exams should be moderated for language as well as coverage.

2.4 Learning Outcomes, Assessment Standards, Core Knowledge and Process Skills

- **Learning Outcomes**
  The Natural Sciences Learning Area is comprised of 3 Learning Outcomes. Adequate opportunities must be provided for learners to attain success in all three Learning Outcomes over the Phases.

- **Process Skills**
  Process skills can be seen as the building blocks from which suitable science tasks are constructed. Process skills are applicable to all 3 Learning Outcomes. The embedded process skills are valuable to teachers in designing rubrics, rating-scales, marking memos and instruments to record participation of learners. Some essential process skills that need to be considered when planning assessment tasks in the Natural Sciences classroom are:
  - Observing and comparing
  - Measuring
  - Recording information
  - Sorting and classifying
  - Interpreting information
  - Predicting
  - Hypothesizing
  - Raising questions about a situation
  - Planning science investigations
  - Conducting investigations
  - Communicating science information
  - Weighting of learning outcomes:

All three Learning Outcomes in Natural Sciences are equally important. This does not mean that in each and every activity all three Learning Outcomes must be given equal emphasis: some activities might focus on Learning Outcome 1, another on Learning Outcome 2 or 3. Over the entire phase (3 years) adequate opportunities must be provided for learners to attain equal success in all three Learning Outcomes. This does not necessarily mean that the same number of opportunities or the same time should be provided for the development of all three Learning Outcomes. It might mean that, based on feedback from learners indicating how quickly or how slowly a particular Learning Outcome is being attained, that more or less opportunities may have to be provided for a particular Learning Outcome.

- **Assessment Standards**
  The Assessment Standards are statements that break the Learning Outcomes down into more detail and they describe criteria by which to judge how well learners are able to achieve the Natural Sciences Learning Outcomes. The Assessment Standards are written in a set of levels, called Grade Level 4, Grade Level 5, and Grade Level 6 and so on. As a learner shows work of higher and higher quality in a particular Learning Outcome, we will record progress in terms of these Levels.

  These level descriptors, going from left to right across Grade Levels, are very condensed statements and by themselves they can give a reader only a limited sense of level. Therefore, in the Learning Areas Statement (p.32-59), the Assessment Standards are supported by illustrative examples of what learners might be doing at each particular level. These illustrative examples strengthen the description of the level, and allow a teacher to distinguish more clearly between one level and another. The illustrative examples are headed by the phrase "Achievement is evident when the learner, for example..."

  These illustrative examples are not policy. Their purpose is to provide an idea of how the learner could achieve the Assessment Standards across the grades. When planning assessment tasks, teachers should engage in developing their own activities that will help learners develop competence in the Assessment Standards.

- **Core Knowledge and Concepts**
  The Assessment Standards do not prescribe content. The Natural Sciences Learning Area, nevertheless, embodies a wide variety of fields of inquiry. This diversity has necessitated the development of a Core Knowledge section for the Learning Areas Statement which is grouped into four Content Strands with supporting sub-strands as follows:
  - *Life and Living* focuses on life processes and healthy living, on understanding balance and change in environments, and on the importance of biodiversity.
  - *Energy and Change* focuses on how energy is transferred in physical and biological systems, and on the consequences that human needs and wants have for energy resources.
  - *Planet Earth and Beyond* focuses on the structure of the planet and how the earth changes over time, on understanding why and how the weather changes, and on the earth as a small planet in a vast universe.
  - *Matter and Materials* focuses on the properties and uses of materials, and on understanding their structure, changes and reactions in order to promote desired changes.

Although these core knowledge statements are neither Learning Outcome statements nor Assessment Standards, the statements are core, minimum knowledge for Learning Programmes in the Natural Sciences. Learning Programmes should draw content from all four strands over a Phase. This core knowledge is applicable when doing all three Learning Outcomes. These knowledge statements for the Intermediate and Senior Phases represent a notional 70% of the time in a Phase's Learning Programme. The other 30% of the time should be used to extend these minimum knowledge statements using science content from contexts, which are significant to the learners and the local community. Teachers should consider this core knowledge when designing and implementing assessment tasks.

3. CONTINUOUS ASSESSMENT IN THE NATURAL SCIENCES LEARNING AREA

Continuous Assessment (CASS) in the Natural Sciences;
- is a process of gathering valid and reliable information about learner progress and performance.
- requires variety of tools to be used when evaluating the evidence of learner performance
- allows for summative and formative assessment
- can be used by teachers to improve their practice
- takes place over a period of time and is on-going
- is integral to teaching and learning
- uses strategies that cater for a variety of learners needs
- supports the growth and development of learners by providing feedback
- is school-based and managed and designed by the Learning Area teachers using the National Curriculum Statement (GET: Grades R to 9), the National policy for Assessment and Qualifications for Schools in the General Education and Training Band and the National Assessment Guidelines.

We can get a more accurate picture of a learner's development and progress if we assess the learning process on an ongoing, continuous basis. In so doing teachers are able to identify and correct learning difficulties before it is too late. Instead of learners having to rely on one large summative assessment at the end of the year, the evidence collected during the year can then support the teacher's judgement of a learner's performance. If learners do move to another school during the year or if various stakeholders wish to receive a report back on learner progress or achievement, then there is at least a notable record of this contained in the CASS.

CASS comprises two different, but related activities: informal daily assessment and a formal 'Programme of Assessment' for the Natural Sciences.

Both formal and informal assessment are used in CASS but it is formal tasks or activities that are recorded for summative purposes (i.e. progression and promotion). Informal assessment is important, but is not used for summative assessment. It is used for formative purposes to support teachers in their daily planning and to assist teachers in making professional judgments on learner performance.

Formal assessment means planned, structured activities and questions, and accurate records of the results. The answers must be marked in the same way for everyone (i.e. there should reliability in the marks). The marks or levels are recorded and kept. Thereafter the information about marks or levels can be put to formative or summative uses.

Informal assessment means that information about learners is gathered as the opportunity arises, need not be gathered in the same way for everyone, is usually not recorded but is applied immediately to improve the teaching and correct the learning – i.e. formatively.

3.1 Formal Assessment

Formal assessment is carried out to obtain reliable records that will enable the teacher to determine a learner's overall competence in the Learning Outcomes and Assessment Standards. Collectively over the year the formal assessment tasks should enable the teacher to make informed, valid judgments about various levels of performance and learner competence in Natural Sciences. Learner performance in formal assessment tasks are to be used to determine progression or promotion to the next grade. Formal assessment tasks can range from being fairly short in time (with content that can be completed within a period) to being considerably longer, (involving a number of activities that may take several weeks to complete). Over the year the formal assessment tasks in a Learning Area must reflect various forms of assessment and assess a variety of skills, informed by the assessment standards in that grade. The formal assessment tasks should be weighted collectively in order to engage with all the LOs & ASs for the grade.

Both informal and formal assessment form part of CASS, but the results from formal tasks are what are recorded for purposes of progression and promotion. Informal assessment is important too, but is not used for formal recording. It is used for formative purposes to support teachers in their daily planning and to assist teachers in making professional judgments on learner performance.

The Assessment Policy stipulates that in grades 4–6 for the Natural Sciences a total of 6 formal assessment tasks per year) are to be recorded (see below).

Number of formal recorded assessment tasks for Grades 4–6

Learning Area	Term 1	Term 2	Term 3	Term 4	Total
Natural Sciences	1	2	1	2	6

Similarly in grades 7and 8 for the Natural Sciences a total of 8 formal assessment tasks per year are to be recorded (see table below).

Number of formal recorded assessment tasks for Grades 7–8

Learning Area	Term 1	Term 2	Term 3	Term 4	Total
Natural Sciences	2	2	2	2	8

For Grade 9, the number of formal assessment tasks does not include the CTAs that are to be conducted in the fourth term. The formal assessment tasks are distributed as follows:

Number of formal recorded assessment tasks for Grade 9

Learning Area	Term 1	Term 2	Term 3	Term 4	Total
Natural Sciences	2	2	2	CTA	6

The eight formal assessment tasks over the year should give learners an opportunity to cover the full scope of the learning outcomes and assessment standards within Natural sciences. Paragraph 20 of the Assessment Policy indicates that planning of assessment is integral to the planning teaching and learning. An annual formal "Programme of Assessment" must be drawn up and submitted to the Learning Programme/Learning Area /Subject Head and 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.

The Assessment Policy (paragraph 28) also requires that, **over the year**, the recorded pieces of evidence from the formal assessment tasks should overall reflect *three to five* **different forms of assessment** *(see Annexure 1)* appropriate to Natural Sciences. Examinations (controlled tests) may be used as **one form** of assessment. However, other forms of assessment *(see Annexure 1)* should be used in these formal assessments. It is important to note, that one formal assessment task can consist of **one or more** forms of assessment depending on the kind of evidence being assessed. For example a **performance-based task** might involve a **research project** that includes a **written report, an oral presentation** and a **case study analysis.**

The Assessment Policy does not stipulate how the marks for the formal assessment tasks should be weighted in order to obtain a final term and/or year mark for each learner. Hence it is up to the teacher to decide the amount of marks that each assessment task will contribute towards the final year mark. It is possible to weight all of the tasks equally (ie. 12.5% for each task), however, teachers may wish to make some count more than others depending on the amount of work involved, and other factors. What is important is that learners obtain marks for each learning outcome and that learners are given an sufficient opportunities to attain the grade level of each outcome throughout the year through the assessment tasks.

Teaching, learning and assessment are intertwined, and it should be recognized that not everything that is taught has to be assessed formally. Only formally assessed tasks need to be recorded.

3.2   Informal Assessment

Informal assessment occurs when learner progress is monitored during the daily learning activities in order to shape future teaching and learning. It usually probes the levels of learning taking place in the classroom. Teachers can observe how the learners do their tasks and what they are struggling with. The teachers can also observe how the learners work together and how the learning tasks could be changed to maximise learning. Learners can be provided with expanded opportunities, extended tasks, extra work, or play roles they show interest in, based on these informal assessments.

Since the purpose of informal assessment is mainly formative, it is important that time be set aside for teacher reflection on the results gathered by it. In order to aid reflection the teacher can discuss the assessment with the learners and can even ask them to answer questions like the following:
- What does this assessment task show about what you have learned?
- Based on this assessment task, what could you do to improve your learning?

The teacher then uses the answers to questions such as these to think about how they could improve their teaching practice to enhance the learning.

Informal assessment can be carried out during informal question and answer sessions with learners; observing and listening to learners as they work together on a task, reading through homework or class work exercises, marking pupil responses to self or peer assessment tasks. Lesson planning should incorporate such informal assessment tasks and activities. Doing informal assessment should not take away valuable teaching time nor should it be done at the expense of time given to the learners learning in the classroom.

Remember, the results of informal daily assessment tasks are not formally recorded. This kind of informal record is particularly useful if barriers to learning or poor levels of participation are encountered. Teachers may use the informal assessment tasks to provide verbal or written feedback to learners, the school management team, parents and other stakeholders. These records can also be used to verify and confirm the results obtained formal assessment tasks especially when reporting at parents meetings.

Teachers may find it useful to note the evidence of learner performance during informal assessment:
- *a teacher note book:* Notes can be made based on your informal observations of learners as they carry out specific tasks, problems that they encountered, misconceptions they had, etc. these can be used later to verify results from formal assessments and may be placed in the learner portfolio when appropriate.
- *a simple checklist:* Sometimes, activities in the classroom have various stages. A teacher can have a check list with the learners' names down the one side and each of the stages in the task down the other. As learners complete the task, they can be checked off (see below).

An example of a Checklist for Informal Assessment Records					
Work Project: Environmental Health					
Name	Completed required reading for project.	Completed proposed procedure for open ended task	Conducted experiment	Comment on analysis of results	Submitted final report
Dlamini, S	23/02	26/02	28/02	19/02	
Legodi, T	23/02	26/02	27/02		28/02
Morabe, I	23/02	24/02	27/02	18/02	

In this way teachers can keep track of the learning that is taking place, which learners are lagging behind and need extra support, and which learners are ahead and need expanded opportunities.
- *a poster size grid-chart* with one learner per square. Teachers can keep the chart private or put it up in the classroom. When something worth recording arises, they write it into the appropriate learner's square on the grid with the date. Because it is pinned up, the teacher can see at a glance the learners who they haven't yet observed or helped. It is possible to keep a post-it-adhesive pad with you, so that as you are observing you can make notes about each learner with the learner's name and the date on it. These can be stuck to the chart by the teacher or the learner.

These are not the only ways to keep records of informal assessment, but they are some suggested methods. Different teachers may think of methods that are unique to their own learning contexts using the resources that are unique them. Some teachers have very large classes and it may seem a

daunting task for them to informally assess all learners on a daily basis. In such cases it is possible to reduce the amount of time spent on informal assessment while still maintaining a quality level of teaching *(see Annexure 3* for more information on managing informal assessment in large classes).

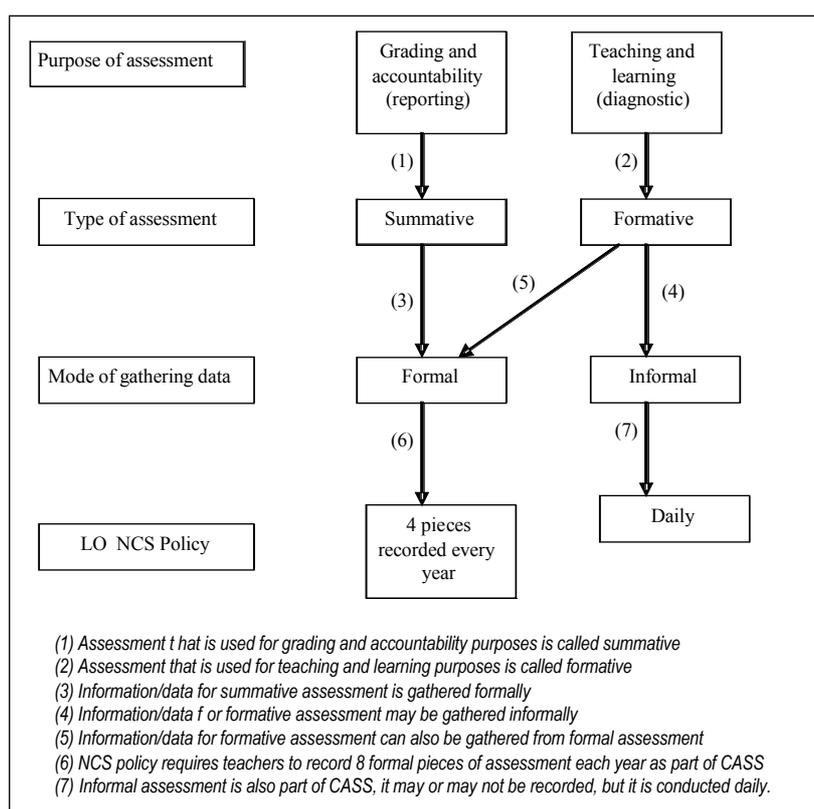## 3.3   CASS in relation to Formative and Summative Assessment

Information gathered formally can have two uses – formative uses and summative uses. For example, a teacher may use the results of a formal test to identify learners' strengths and weaknesses and to shape future teaching and learning. However, the results from the same test may be recorded formally and used for progression purposes.

Information gathered informally is not used for summative purposes, it is only used for formative purposes. For example a teacher's observation of a learner during a group activity is an informal assessment that can be used to shape future teaching and learning, but it is not used for grading purposes.

The term "informal assessment" does not mean the same thing as the term "formative assessment". Informal assessment refers to the style or mode of gathering information about learners while formative assessment refers to the **use** that is made of any information whether it was gathered formally or informally. Similarly the term "summative assessment" does not mean the same thing as "formal assessment".

Tasks for summative use must be formally recorded because the results have important consequences and so we must have reliable evidence to back up the decision. If a task is only for formative use, then assessment of learner performance may be less formal.

Summative, formative, formal and informal assessment

(1) Assessment that is used for grading and accountability purposes is called summative
(2) Assessment that is used for teaching and learning purposes is called formative
(3) Information/data for summative assessment is gathered formally
(4) Information/data for formative assessment may be gathered informally
(5) Information/data for formative assessment can also be gathered from formal assessment
(6) NCS policy requires teachers to record 8 formal pieces of assessment each year as part of CASS
(7) Informal assessment is also part of CASS, it may or may not be recorded, but it is conducted daily.

3.4 Common Tasks for Assessment (CTA) in Grade 9

The Common Tasks for Assessment (CTA) is an external assessment tool to be used in all schools with all grade 9 learners (hence the word "common"). Common Tasks for Assessment may be set at national, provincial, district or cluster level, are conducted at school level, and are moderated externally. The CTA enables the Department of Education to maintain an acceptable standard of education throughout South Africa as it promotes a common standard setting throughout all the schools and helps to ensure consistency in teacher judgments. Since it is externally moderated, it also helps to hold teachers accountable for the work that they are doing in the classroom. This, in turn helps to ensure that the school-based assessment tasks properly assess competencies and achievements and increases the accuracy of the assessment process. Another advantage of the CTA is that it provides teachers with examples of the kind of assessment and work that should be done in the classroom. As a result, it strengthens the capacity for school-based continuous assessment and helps to ensure that learners receive appropriate expanded opportunities. CTA's also help the department of education to sample learner performance against the learning outcomes.

The CTA, as in all Learning Areas, should consist of both performance-based tasks and pen-and-paper tasks.

The pen-and-paper task will be conducted under controlled examination conditions such as prevail for the National Senior Certificate and schools will follow a national timetable. The performance-based tasks should be designed in such a way that they are completed or administered over a period of time and not as a once-off event.

Performance based-tasks could be done in the classroom or as homework. These tasks could include projects, oral, pen-and-paper activities. Learners would, for instance, be required to do tasks as individuals, in pairs and some as groups.

ALL Grade 9 learners in ALL schools will be assessed through the CTA in all the 8 Learning Areas including the Additional Language, during the fourth term.

In Grade 9, the CASS component consists of tasks undertaken during the school year and counts 75% of the final Grade 9 mark or level of achievement. The other 25% is made up of the externally set Common Tasks for Assessment (CTA).

Hence, for grade 9 Natural Sciences, CASS will consist of 6 tasks that are 2 tasks for three terms, while the CTA will be administered during the fourth term.

Formal Assessment Framework in Grade 9				
Term	**1**	**2**	**3**	**4**
Task (No)	2	2	2	CTA
	← CASS (75%) →			CTA (25%)

A simplified framework illustrating the difference between Grade 9 and the other Grades in the Intermediate and the Senior Phases is provided on the next page.

Formal Assessment Framework Grades 4–9		
Grade	CASS Component School-based	Common Tasks for Assessment Externally set
Grades 4 to 8	100%	Not applicable
Grade 9	75%	25%

3.4.1 Administration of the CTA

It is important that the administration of the CTA be planned and managed well. This should form an integral part of the normal teaching and learning school programme and be aligned to the school's timetable. This means that the school should not stop teaching because it is time for CTA administration. Again a new school timetable is not required.

The CTA usually consists of two books, the teacher's and the learner's guide.

Learning Area-specific guidance is included in the teacher's guide. These give detailed information needed to administer each task of the CTA and should be read by the teacher before CTA administration is started. This will enable the teacher to integrate and find opportunities in the timetable for this integration. The learners guide has some clear instructions and activities for the learners to do.

3.4.1.1 *Roles and responsibilities of the teacher*

Learners bring valuable experiences into the classroom. The teacher's role is to initiate discussion and reflection, in which learners' prior knowledge is acknowledged, and then valued. Teachers also need to challenge learners with new ways of making meaning in the Natural Sciences.

In a CTA, the teacher will:
- contextualise the CTA
- discuss the flow chart with the learners
- explain the criteria for assessment to all learners before the commencement of each activity
- guide brainstorming sessions
- organise manageable groups
- help allocate group roles
- ensure the activities are completed within specified time frames
- supervise the process
- intervene and troubleshoot where and when necessary
- be responsible for the inclusion of tasks and the various forms of assessment in the learners' portfolios
- engage interactively with learners
- distribute the worksheets provided to learners per activity
- mark the relevant sections of the CTA

3.5   Recording and Reporting

The natural Sciences educator is responsible for reporting learner progress throughout the year to all relevant stakeholders (learners, parents, tertiary institutions, bursary holders, other interested parties). The Assessment Policy (paragraph 45) gives the following rating scale to be used when recording and reporting learner performance in Grades 7–9.

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

The following rating scale is to be used for reporting in grades 4–6 (National Policy on Assessment and Qualifications, paragraph 41).

Table illustrating the link between marks and levels of performance		
Levels of performance	Percentages	Description
1	1–34%	Not achieved
2	35–49%	Partially achieved
3	50–69%	Achieved
4	70–100%	Outstanding/Excellent

Recording is done against assessment tasks while reporting is done against Learning Areas.

When designing an assessment task, the teacher uses the Learning Outcomes and Assessment Standards. Expected learner performance that is planned is done so against the level pitched by the Assessment Standard. The assessment task is planned in such a way that the expected levels of learner performance are planned in the assessment task. The use of marks or descriptors or rating codes is planned as part of the assessment task design. At the end of the assessment programme, the marks attained by a learner are added together and then converted to the rating code/description of competence provided by the Assessment Policy above. The cumulative assessment is then used to make a judgement of how the learner has performed in that Learning Area. This is what is to be reported to parents and learners and other stakeholders.

However, this does not mean that every formal assessment task should be designed so that it is marked with this seven point rating scale. A teacher can set a test and assign marks in the normal way or use a different kind of rubric to assess the learner in a performance task. The marks from these tasks are then converted to the 7 point rating scale and then formally recorded (see Annexure 5 for an example of a record sheet and how to make the conversion). The achievement rating in a report card can be indicated by any combination of two of the following – percentages, codes or comments (see Annexure 6 for an example of a report card).

Records from informal assessment tasks may be used to verify and confirm the results obtained from formal assessment tasks especially when reporting verbally (e.g. at parents meetings).

3.6 Planning Formal Assessment Tasks

Planning for assessment happens at all three 3 levels of planning i.e. Learning Programme, Work Schedule and Lesson plan.

Planning for assessment in the Learning Programme should give you a good indication of the resources and time needed for assessment in that phase. To do this teachers will need to know what knowledge, skills and values learners are expected to learn so that they can integrate the assessment programme into the teaching and learning activities.

3.6.1 Planning for assessment in the Learning Programme

In planning assessment at Learning Programme level teachers need to:
- List the main forms of assessment they are likely to use in determining the achievement of Learning Outcomes and to meet the Assessment Standards in Natural Science
- List the key resources they are likely to need
- Consider the context in which they are taught and the core knowledge and concepts that need to be learned
- Indicate the time that will be required for appropriate and authentic assessment.
- Ensure tasks are fairly distributed so as not to overburden learners.

3.6.2 Planning for assessment in the Work Schedule

When Natural Sciences teachers of a particular grade meet to plan their work schedules they need to plan the formal assessment tasks that the learners will do for the year as part of the work schedule.

This plan is a formal programme of assessment and is submitted to the Learning Area Head and the School Management Team and used to draw up a School Assessment Plan in each grade.

When teachers plan assessment at this level, they should consider the following questions:

A. What is the purpose of assessment in the task?

The formal assessment tasks are designed for summative purposes so the teacher can report to parents, the school administration as well as the learner on his/her progressing. However, as a teacher one always wants to find out how your learners are progressing and how you could assist them to improve learning. For this reason all assessment can be used to a greater or lesser extent for formative purposes. Teachers should decide at the start whether the assessment task will be for summative or formative purposes, or both.

B. **Which learning outcomes and assessment standards will be assessed by the activities?**

The NCS policy statement for Natural Sciences states that all learning outcomes and assessment standards must be actively pursued. This means that at the end of the year you should have taught towards all learning outcomes addressing all assessment standards. It would be impossible to assess all assessment standards in the formal assessment tasks only. For this reason it is advisable to select the relevant Assessment Standards when designing the formal assessment tasks. The other Assessment Standards may be assessed informally. Teachers must ensure, however, that throughout the formal assessment tasks for the Natural Sciences for the entire year, all the Learning Outcomes are formally assessed.

The principle of integration allows teachers to plan for Assessment Standards to be clustered together in a task or group of activities. Teachers are encouraged to "cover" the full scope of Assessment Standards over the period of the year, and assessing only one AS per task will not allow for this.

In cases where teachers are responsible for more than one Learning Area, and are not able to assess all LOs formally in the time allocated, it may also be possible to integrate Learning Outcomes across Learning Areas, and cluster some Assessment Standards, and formally record a common mark to each of the Learning Areas (see The Teacher's Guide to the Development of Learning Programmes, p. 9, for more information on clustering of assessment standards).

When clustering Assessment Standards the following should be noted:
▸ Clustering of Assessment Standards should not occur across Learning Outcomes. Recording and reporting needs to be against the selected Assessment Standards and Learning Outcomes respectively.
▸ Clustering Assessment Standards across Learning Outcomes would make reporting and recording impossible.
▸ When clustering Assessment Standards, it is not allowed that new Assessment Standards are written as a result of the clustering.
▸ While clustering of Assessment Standards is possible for planning the teaching, learning and assessment activities, teachers record learner performance against the task that is formally set.

C. **Which task(s) will the teacher do in his/her class?**

The formal programme of assessment (or Assessment Plan) for Natural Sciences, which is part of the work schedule, should reflect the formal assessment tasks in one year. When conceptualising the Natural Sciences assessment tasks for the year, consider the full scope of content (SKVAs), learning outcomes with assessment standards and the different forms of assessment. Please refer to Annexure 4 for an example of a formal programme of assessment (or Teacher Assessment Plan) and Annexure 5 to see how it is linked to a recording sheet and a report card.

D. What will be the focus of the assessment task?

Concept knowledge is an important part of NS Learning Area and is the vehicle for assessing the Learning Outcomes. Examine the core knowledge within the Natural Sciences Learning Area, and decide what core knowledge the four assessment tasks will focus on. The assessment tasks over the year should reflect the full scope of the Natural Sciences Learning Area, capturing learner competence in the core essence of the Learning Area and covering all four knowledge strands. The contexts of the schools and the learners in the grade should also be considered when developing selecting foci.

The focus can also be linked to:
- ▸ The context of the school (e.g. HIV/AIDS, 2010 World Cup; Clean water, etc)
- ▸ Specific Knowledge, Skills and Values in the Learning Area
- ▸ Previous activities you want to strengthen, extend or wrap up
- ▸ Introduction to a new set of lessons

E. Which form of assessment will suit the contents?

Across the assessment tasks for the year teachers should use varied forms of assessment (see Annexure 1 for a discussion on the forms of assessment). Teachers choose the form of assessment depending on what is to be assessed. Ensure that the forms selected suit the task and learners' context. For example, it has been shown by research that to try and assess practical skills with a multiple choice test is not always a valid assessment.

When you select a form of assessment for a task, please consider:
- ▸ That all the formal tasks should have a variety of (three to five) different forms of assessment throughout the year, and not necessarily all forms in ONE assessment task.
- ▸ What do you want to assess?
- ▸ Why you want to assess?

F. When will the assessment task be done and how long will it take?

The teacher should discuss, as part of the planning process, with his/her colleagues when the different tasks should be done. The load on the learners should be considered so tasks from the different learning programmes should not take place at the same time but should be spread over the year. Consider the resource needs of a task when scheduling e.g. seasons, plants in season, link to special days, environmental days (water week in March), if learners need to do research allow time (holiday/long weekend) so all learners can go to a library.

3.6.3   Planning for assessment in the Lesson Plan

When an individual grade teacher plans at Lesson Plan level, s/he must integrate assessment into the teaching and learning plan. Formal assessment tasks should be fully planned at lesson plan level. The following 7 step procedure may be used to prepare and carry out a formal assessment task. Please refer to Annexure 5 for an example of a Natural Sciences Assessment Task which should be read in conjunction with the steps below.

Step 1: Develop the Assessment Task
- ▶ Start with the assessment task as stated in the assessment plan.
- ▶ Unpack the selected Natural Sciences Assessment Standard, it will give you all the vital information you need (i.e. the knowledge, skills, values (SKVs) to be assessed). Make links between these and the context. (In some Natural Sciences tasks, all the Learning Outcomes may be dealt with, in this case LO1 is not assessed, even though it is touched on in the activities)
- ▶ From the Assessment Standard, consider the most appropriate form of assessment for the task. (In the example the most appropriate form of assessment was the project, that would consist of a research report, a mindmap and a debate)
- ▶ Develop the teaching and learning activities that compose the assessment task, providing clear guidelines to the learners of what they are required to do. Indicate resources for all activities. The assessment task should;
  - ❖ be appropriate to the age of the learners,
  - ❖ consider what barriers to learning exist and how can they be optimised, and
  - ❖ consider which resources are available to learners and teachers.
- ▶ Examine all the different elements / smaller activities that the assessment task is comprised of, and decide for each activity:
- ▶ Who will do the assessing (peers, self, teacher) ?
- ▶ The role of the teacher and role of the learners
  - ❖ The form of the assessment
  - ❖ The type of evidence to be collected (eg. A planning mind map from first activity which is kept in learner portfolio; research report for second activity; presentation for third activity)
  - ❖ An appropriate scoring procedure or the criteria that will be used to evaluate the final product (e.g. where applicable provide the learners with a rubric for discussion). The criteria are sourced mainly from the focus, which is the core content as well as from the assessment standards.

    (In the example in *Annexure 5*, the task was divided into three activities, a mind-map of the knowledge area, a research report and a debate.)
- ▶ This planning will highlight the various roles of the teacher throughout the assessment task. All this information should go into the teacher portfolio as it provides important details and information on the task. Teachers should also consider the context of the class, e.g.:
  - ❖ Which barriers are present
  - ❖ The levels of enthusiasm and commitment in the class
  - ❖ Where the school is situated and what resources are accessible to learners

Step 2: Gather evidence on learner performance
Some points to consider when collecting evidence are:
- ▶ How will the teacher gather the evidence in a fair, reliable manner?
- ▶ Are the tools used to gather the evidence appropriate to the tasks/SKVAs being assessed?
- ▶ How much assistance will learners need?
- ▶ Will they work in pairs or groups? How will individuals be monitored?

▸ Who will assess? Will there be certain sections where learners will assess each other (e.g. cooperation) and sections that the teacher will assess (e.g. factual correctness, effort).

Step 3: Evaluate evidence on learner performance

Teachers should ensure that their evaluation is focused on the Natural Sciences Learning Area competences and not assess that which emerges in the learners' evidence (eg. Errors in presentation or language) that are not really what is being assessed. It is important that teacher point out the errors to learners but that it is not considered in the assessment mark. Teachers can consider the appropriateness of the evidence using the following questions:

▸ Is the evidence gathered reflecting learner competence in the Natural Sciences Learning Area outcomes?

▸ Does it provide information about learner competence linked to the Natural Sciences Learning Area Outcomes and Assessment Standards in the task?

Step 4: Make a decision on learners' achievement

From all the available evidence including any teacher observation and the scoring criteria (e.g. a rubric) the Natural Sciences Teacher will make a professional judgement about learner competence against the LO s and ASs assigned for the task.

Step 5: Record learner performance

Record the learner's performance against the assessment task commenting on the knowledge, skills and values embedded in the LOs and ASs. Teachers will only report against the Learning Outcomes used in formal assessment tasks. Each learner's performance is recorded as a mark and/or a code for the assessment task, as indictaed in the assessment policy. Comments may be written for support purposes when and where appropriate. The formal assessment tasks for each learner are collected as part of the learner's portfolio.

The teachers' portfolio, as described in the National Policy on Assessment and Qualifications, are a collection of all formal assessment tasks (evidence) as well as selected informal assessment tasks. The informal assessment tasks are used to verify and support the marks obtained formal assessment tasks. The portfolio can be can be a book, a folder, or file, depending on how the teacher wants to store the evidence. The portfolio serves the purpose to give the observer an indication of the progress of the learner throughout the year and the amount of work done. (see the National Policy on Assessment and Qualifications, paragraphs 52–56, for more guidance on teacher portfolios).

According to the National Policy on Assessment and Qualifications (paragraph 56) recording sheets selected by the Natural Sciences Learning Area teacher must include the following:

▸ Programme/Learning Area/Subject
  ❖ Grade and class
  ❖ Learners' names
  ❖ Dates of assessment
  ❖ Names and short description of the assessment activity
  ❖ The results of assessment activities

❖ Comments for support purposes when and where appropriate. The comments should be developed from and reflective of competence in LOs and ASs. The completed tasks should also be kept in the learner portfolio. All evidence of learner engagement could be kept as evidence in the portfolio.

Step 6: Reporting on learner performance

It may be necessary from time to time for teachers to report on learner progress based one or more formal assessment tasks contained in the learner portfolio. In such cases a teacher should mention the following:

▸ The form of assessment used

▸ The level at which the learner attained the relevant outcomes

▸ Comments on learner achievement for all Learning Outcomes (LOs) – developed from the AS's showing what the learner is competent in and where there are gaps.

▸ The time period for the assessment task

For the purposes of reporting, the teacher may also want to convert the mark from an individual formal assessment task to the 7-point rating scale (for the Senior Phase) and 4-point scale (for Intermediate Phase) described in the National Policy on Assessment and Qualifications *(see Annexure 5* for an example of how to do this).

Step 7: Reflect

Reflect on the learning process and follow up with interventions where necessary. If learners are experiencing serious difficulties in achieving the Assessment Standards, you may need to seek additional support with follow-up interventions. Reflect on how the learners performed and why. Adjust your teaching and assessment accordingly. Follow-up interventions may include:

▸ Creating more opportunities for learning

▸ Giving learners more examples

▸ Building on prior activities

▸ Giving learners more exercises to achieve certain skills

Reflect on your practice and consider if the form of assessment and tools you used gathered the evidence you wanted to gather.

3.7 Management of Assessment

Each school should have a School Assessment Programme, which outlines how CASS is planned and implemented. It includes:

- How records are kept, stored and accessed
- Assessment codes
- Internal verification
- Moderation
- Frequency and method of reporting
- Monitoring of assessment processes
- Training of staff

Each teacher should also have a formal programme of assessment for the year, which is derived from the Work Schedules and indicate the details of assessment per grade *(see section 3.5.2)*. This is in turn used to draw up a School Assessment Plan, which is a compilation of all the teachers' Assessment Plans.

ANNEXURES

ANNEXURE 1
Forms of Assessment

ANNEXURE 2
Assessment Tools for Recording Learner Achievement

ANNEXURE 3
Managing Informal Assessment in Large Classes

ANNEXURE 4
Example of a Formal Programme of Assessment (or Teacher Assessment Plan)

ANNEXURE 5
Example of a Natural Sciences Assessment Task and Record Sheet

ANNEXURE 6
Example of a Report Card

ANNEXURE 7
Glossary

ANNEXURE 1

Forms of Assessment

Assessment can be done using different forms or types. These forms of assessment are really different kinds of activities that we can ask the learners to do, in order to show us their competence. Thereafter we must decide whether the activity will serve a formative or summative purpose. Teachers should select the form of assessment depending on the purpose of the assessment. The chosen forms must provide a range of opportunities for learners to demonstrate attainment of knowledge, skills, values and attitudes. The following forms of assessment are recommended, to support the development of assessment tasks specifically in the Natural Sciences Learning Area;

- Investigation activities
- Projects
- Research
- Assignments
- Performance based assessments
- Practical demonstration
- Tests
- Case studies
- Simulations
- Role-play
- Translation tasks
- Interviews
- Questionnaires
- Structured questions
- Mind mapping
- Concept mapping
- Brainstorming tasks
- Functional writing
- Presentations

There are other forms of assessment that can be useful in the assessment process as listed here but are not generally used in science:

- Spoken language (oral presentations)
- Creative writing

It is of utmost importance that the form of assessment used should match the outcomes being assessed. Otherwise the assessment may not be valid (i.e. it may not measure what it is supposed to measure). For example, teachers should not try to measure scientific practical skills solely with a written paper and pencil test. The form of assessment should suit the purpose of the assessment. By answering the following questions, a teacher can decide what type of activity best suits the assessment at hand.

- What type of knowledge (reasoning, memory or process) or skill am I actually trying to assess?
- What should my learners know?
- At what level should my students be performing?
- Which form of assessment will best allow my learners to demonstrate their abilities in the skills/knowledge?

The following section describes the various forms/types of assessment in more detail. The different Learning Areas have used a variety of these forms.

Activity	How to use kind of activity this for assessment purposes.
Performance-based tasks	This type of assessment requires learners to demonstrate a skill or proficiency by asking the learners to create, produce or do something, often in a setting that involves real world applications. The educators should not only assess the end product but also the process that the learners use to complete the task.
Investigation activities	Investigation activities are one type of performance activity that engage learners in some form of systematic inquiry of a phenomenon. A well-planned investigation can provide assessment evidence for the three assessment standards in NS LO1. This learning outcome LO1 is about investigating relationships and solving problems in the natural world. The progression table and the examples in the NCS illustrate the criteria for assessing investigations and problem-solving at various levels. The NCS (page 8) describes at least four kinds of problems to investigate and solve: problems of making, problems of observing, surveying and measuring, problems of comparing, and problems of determining the effect of certain factors.
Projects	Like investigation activities, projects allow for an holistic assessment of learners' abilities to apply knowledge, skills and values in a relevant context. They are substantial tasks in which learners illustrate or apply knowledge that they have gained in class. Learners can build models, and compile reports, essays or posters and even give presentations. Teachers can assess different stages of the project separately, or the entire project. Projects can involve individuals or a group of learners. The assessor directs the choice of the project, usually by providing the learner with a topic or brief for the investigation.
Research	A research task involves the collection of data and/or information to solve a problem or to understand a particular set of circumstances and/or phenomena. While the problem that focuses the research task is well defined, the nature of the data collected will determine the solution to the problem.
Assignment	Assignments like projects and investigations, allow for a more holistic assessment of knowledge, skills and values and their application in different contexts. However, they are normally shorter and more focussed than investigations and projects and are used for specific tasks.
Test	Tests usually consist of a range of questions. Learners are required to respond to questions within a specified time. They are useful to assess knowledge recall. They test understanding and comprehension. If questions are carefully phrased, they can also test application of knowledge. Since they are generally easy to mark reliably they are a good way conduct summative assessment (especially for LO2 & 3), however, they can be a very useful formative tool too.
Practical demonstration	Practical demonstrations can be separate to, or a part of performance-based assessments which involve the teacher actually observing the learner demonstrate a specific practical skill (e.g. measure the voltage of a cell, use a thermometer to measure temperature). They can be very useful for assessing how learners draw on knowledge and values to carry out practical skills.
Case studies	Case studies are a detailed description of a specific situation or phenomenon. The description can either be real or made up by the teacher. They can be taken from books, newspapers, magazines, videos or radio. Case studies enable the teacher to assess whether learners can apply knowledge, skills and values to an unfamiliar context. Coupled with good structured questions, these can be easily used for summative purposes. Used with groupwork, however, teachers can also use them effectively for formative purposes.

Role-play	Learners are presented with a situation, often a problem or an incident, to which they have to respond by assuming a particular role. The enactment may be unrehearsed, or the learner may be briefed in the particular role to be played. Such assessments are open-ended and are person-centred. This kind of assessment allows for assessment of expressive skills and is also very useful for assessing values. Role plays can also be used to assess application of knowledge from one context to another. Generally role-plays are better used for formative assessment purposes in the Natural Sciences. However, if used together with a project or an assignment, they can be used effectively for summative purposes.
Simulation	Simulations can come in different forms. They normally involve the learner in a situation that simulates reality (e.g. a learner can get into flight-simulator and play the role of a pilot). In the Natural Sciences Learning Area, they would usually involve teachers setting up a situation that simulates reality and then assessing learners as they play a specific role under those conditions (e.g. learners may simulate a mining extraction process using microchemistry kits). Simulations often involve role playing and can be used for formatively assessing application of knowledge, skills and values in different contexts but can be designed to suit summative purposes too.
Translation tasks	In translation tasks, learner interprets information provided by the teacher and expresses it into a different form in order to show their understanding. (For example, translating line graphs into text descriptions and vice versa, extrapolating from patterns in tables and graphs to predict how one variable will change). This type of task is especially suited to assessing LO2 AS (interpreting information) summatively.
Interviews	An interview is probably the oldest and best-known means of eliciting information directly from learners. It combines two assessment methods, namely observation and questioning. An interview is a dialogue between the assessor and the learner, creating opportunities for learner questions. Learner responses may be written down, or recorded onto a tape recorder or video/DVD player and analysed at a later stage if necessary. Interviews can be used for formative or summative purposes, but they may take a lot of time unnecessarily if a teacher has a very large class.
Observations	This is the type of assessment that is commonly used by the teachers without consciously thinking about it. The teachers constantly observe learners informally to assess their understanding and progress. Teachers watch learners as they respond to questions or as they study. The teacher listens to them as they speak and discuss with others. Observation can be used extensively in performance based assessment.
Questionnaires	A questionnaire is a structured written interview consisting of a set of questions. When teachers don't have enough time to interview every learner in sufficient detail, they can use a questionnaire to elicit the same information in a written rather than verbal form. Questionnaires can also be used to acquire information about attitudes, but the can also be used to gauge the prior knowledge of learners or to find out specific details about a group of learners (e.g. age, home language, etc.).
Structured questions	Structured questions can be used in tests, questionnaires, interviews and assignments. They are questions that have a stem, and number of questions relating to the stem.
Concept mapping	This kind of tasks involves learners making a list of concepts and then arranging them in a hierarchical way so that the most inclusive concepts are at the top and the least inclusive concepts are lower down. The concepts are linked via short propositions that define the relationships between them. Concept maps are a best used as a formative assessment tool. They can be used for summative assessment too but unless one has very clear criteria, the marking can be subjective.
Mind mapping	A mind map is similar to a concept map but not the same. Mind maps start with a central concept in the centre of a page and then branch out with links to less inclusive concepts. Mind maps do not necessarily contain labels for the links though. Like concept maps, they are a best used as a formative assessment tool because marking them can be very subjective.

Brainstorming	Brainstorming involves learners using their brains on a situation to produce a storm of creative ideas (e.g. acid rain has been falling in our area, brainstorm some of the probable local causes of it). It is usually done in groups, sometimes learners can be required to report back after a brainstorming session. It is useful as a formative assessment tool, but is not really used frequently for summative assessment.
Functional writing	This is a specific writing task. You can establish the criteria beforehand and then set a functional writing task that learners need to respond to. Functional writing can be used to assess knowledge, some skills and values.
Essays	In essay tests learners are required to construct a written response that would be several sentences to several pages in length. Essays can be used effectively for formative and summative assessment.
Creative writing	Creative writing is a kind of essay that normally provides good evidence of learners' creativity, and can also reflect what knowledge and skills they have developed. Creative writing is also a good form of assessment to use when you want to assess values. But it is not a form of assessment that is used frequently in the Natural Sciences Learning Area.
Spoken language *(oral presentations)*	Oral presentations usually require learners to give a speech on a relevant topic. This can either be done with a poster or a written report that must be handed in. Oral presentations can provide good insight into learners' knowledge and their values. If used with critical questions to guide the oral presentations, you can also gain insight into the skills being developed. They can be used effectively for formative or summative assessment.
Self-report assessment	In self assessment learners could be asked to complete a form or answer questions to reveal how they think about themselves, or how they rate themselves. Attitude surveys, socio-metric devices, self-concept questionnaire, interest inventory are some of the examples that are used in self-report assessment.

- **Performance-based tasks**

This type of assessment emphasises the learners' ability to use their knowledge and skills to produce their work. It can include presentations, research papers, investigations, projects, demonstrations, exhibitions, singing, athletics, speeches, musical presentations, etc.

When learners are required to complete a performance based assessment task, the description of the task should:
- Include outcomes to be assessed
- Include description of what the learners are required to do
- Indicate group or individual help that is allowed
- Indicate the resources needed
- Indicate the role of the teacher
- Indicate the administrative process
- Indicate the scoring procedure or the criteria that will be used to evaluate the final product

The following checklist could be used to evaluate the design of performance-based tasks
- Does the task include an integration of knowledge, skills and values?
- Does it address a variety of outcomes?
- Is the task based on a real-life context?
- Is the task doable?
- Are multiple solutions possible?
- Is the nature of the task clear?

- Is the task challenging and stimulating to the learners?
- Are criteria for scoring included?
- Do the criteria allow the teacher to assess the process and the resulting product?

Investigation activities

An investigation can be divided into three parts and is assessed against the three assessment standards in LO 1:

- planning the investigation and clarifying the focus question
- collects data by surveys or using equipment
- evaluates the data and explains what it means in relation to the focus question

Example 1 of an Investigation
Water Quality Assessment at a Grade 6 level:

LO 1: Scientific Investigations

AS *(planning):* Learner helps to clarify focus questions for investigation and describes the kind of information, which would be needed to answer the question

AS *(conducting):* Learner conducts simple tests or surveys and records observations or responses

AS *(evaluating and communicating):* Learner relates observations and responses to the focus question

Core knowledge:
- Water's role in sustaining both plant and animal life.
- The impact of industrial, agricultural and domestic activities on water quality

Context:
A rural context. Learners' families draw water from nearby river or dam.

Learning activities and assessment:
Learners identify the water sources near the school and talk about possible health risks. Learners identify a focus question working in groups:

E.g. How do we know if the water is polluted? How do we test the water? What can we do to prevent the health risk?

Learners use the turbidity test to investigate the clarity of the river water, sample invertebrate population from the river, and measure the flow rate, the temperature and the type of riverbed. They could measure the biological oxygen demand and the pH of the river. Learners record their results and analyse them and write a report answering the focus questions underpinned by the test results.

What will be assessed in this lesson plan?

If we uAssessment Policyck the three assessment standards used in this example the key words are:
- Focus questions
- Conduct simple tests
- Record and response
- Relate observation and responses

Questions to guide the assessment:
- How did the learner create and use the focus question?
- Was the leaner able to follow instructions and conduct a simple test?
- How was the recording of the results done
- How did learners respond to the recorded results?
- How was the learner able to relate their observation and respond to the focus questions?

The assessment process:
1. The teacher asks the groups to present their questions to the rest of the class and can assess the process of creating a focus question in groups (informal assessment, LO 1 AS *planning*).
2. Learners do four different small tests. The teacher could informally assess one of the investigation methods by observing learners demonstrate their skills using the water test kit and making notes of different learners. Where appropriate these notes could go into the learner portfolio (informal assessment, LO 1 AS *conducting*).
3. At the end of the investigation teachers could ask each learner to write a report explaining the investigation process, analysing the recorded results and drawing conclusion by answering the focus questions. This report is then assessed by the teacher and kept in the learners' portfolio, and formal records of the results are made (formal assessment, LO 1 AS *evaluating and communicating*).

Example 2 of an Investigation
Cool colours and hot colours at a Grade 7 level

LO 1: Scientific Investigations

AS *(planning):* Learner helps to clarify focus questions for investigation and describes the kind of information, which would be needed to answer the question

AS *(conducting):* Learner conducts simple tests or surveys and records observations or responses

AS *(evaluating and communicating):* Learner relates observations and responses to the focus question

Core knowledge:
Matter and materials (Properties and uses of matter)
- Dark-coloured surfaces get hotter than light-coloured surfaces when exposed to radiating sources of energy like the sun. Dark coloured objects radiate their energy as heat more readily than shiny light-coloured objects.

Context:
A school classroom.

Learning activities and assessment:
1. Teacher introduces the problem like this: *"I read that if you want to keep a classroom cooler, then silver or white is the best colour for the roof. White and silver things don't absorb energy from the sun very well and so they don't get very hot. But what about other colours? We want to make water hot in the distiller. So what colours will be the best to absorb as much energy from the sun as possible?"* The teacher may show the class how to focus the question (i.e. We need to find out which other colours are better than white and silver at absorbing heat from the sun, and which of these colours is the best?) Alternatively, the teacher may challenge the groups to clarify the question.
2. Learners think of simple tests that will provide an answer to the focus question and then try them out and report the results. The teacher does provide guidance at strategic moments in order to guide the learning help the learners stay on track.

How the investigation may be done.
The learners may use several methods to compare the effects of colour:
A They take similar containers like jam-tins or plastic bottles and cover them in white paper, black paper, red paper (or plastic) They place them in the sun and use the thermometers to measure the air temperature inside at intervals of about a minute. Or they decide to use pieces of wax crayon or candle-wax to indicate temperature; in the container that melts the wax first, the temperature is highest.
B They may take dishes (like aluminium pie-dishes) and put different-coloured plastic in the bottom. Black in one, red in another, white in another, leave one dish silver-coloured) They pour water into the dishes and cover them with clear plastic. They then put the dishes in the sunlight.
C They may do a simple comparison just using their hands inside plastic packets (silver, red, white, black).
D They may insert a thermometer into corrugated cardboard, painted different colours.

What will be assessed in this lesson plan?
If we unpack the three assessment standards used in this example the key words are:
- Focus questions
- Conduct simple tests
- Record and response
- Relate observation and responses

The assessment process:
The following analytic rubrics may be used to assess each of the assessment standards:

Note: This investigation is set for Grade 7 learners but outcome-based activities should be open enough for learners to do them meaningfully above their Grade Level. Equally important for weaker learners, rubrics should describe what learners CAN do, even if that is below their Grade Level. For this reason, the levels in this rubric can be related back to the NCS Progression Table (NCS page 16–17) or the more derailed Assessment Standards (NCS pages 35, 48–51). Level One relates to Grade Level 6, Level Two relates to Grade Level 7, Level Three relates to Grade Level 8 and Level Four relates to Grade Level 9.

All science assessment rubrics should, ideally, relate a learner's work to the appropriate national Assessment Standards in the Progression Table.

Look for the following as the learner or group *clarifies the task*, describing what they need to do.			
NS 1: Plans investigation (AS 1 at Grade Level 7 reads Learner plans simple tests and comparisons, and considers how to make them fair)			
Level One: Learners need assistance from you to clarify the problem They can tell you what they must find out, and can show you what equipment they will need. They wait for you to tell them the steps to follow. **(Relates to Grade Level 6 on Assessment Standards)**	**Level Two:** Learners clarify the problem/focus question and write it down. After group discussion, they can tell you the steps they will do. Learners can tell you what is meant by a fair comparison between materials of different colours. **(Relates to Grade Level 7 on Assessment Standards)**	**Level Three:** In addition to Level Two, learners can tell you about factors they think are important, such as using a range of colours (white, silver, red, black), or giving each material the same length of time in the sun. They say how they will try to get an objective comparison of temperatures. **(Relates to Grade Level 8 on Assessment Standards)**	**Level Four:** In addition, learners can express your question as a prediction to be tested, e.g. "the darker colours will absorb more energy and the lighter colours will absorb less energy." Learners are aware that the heat will be conducted faster to the thermometer in some materials than in others. **(Relates to Grade Level 9 on Assessment Standards)**
Look for the following as the learners carry out their plans			
NS1: Conducts investigation and collects data (AS 2 at Grade Level 7 reads *Learner organises and uses equipment or sources to gather and record information*)			
Level One: Learners, with assistance from you, place different coloured materials in the sun and observe the effects, e.g. they feel the outside and the inside of the material or container with their hands.	**Level Two:** Learners place materials in the sun and can answer questions from you about fairness e.g. "should the materials be the same size?" "Should they be put in the sun at the same time?"	**Level Three:** As for Level Two and also learners make the effort to collect materials with a range of colours and they compare a range of colours	**Level Four:** As for Level Three and also these learners repeat the measurements (or plan to do so)

| | They can explain to you why it is better to use the wax (or thermometer) than their hands to compare the temperatures in the materials.

They write notes to remember their results | They use equal-sized pieces of wax or can explain why the pieces of wax should be equal-sized

They read thermometer scale accurately (if they use a thermometer).

They record the measurements (time for wax to melt, or degrees on thermometer) against the colour of material. | They keep the material the same while changing the colours (e.g. they always use same thickness of plastic to line the dish, or the same cardboard to paint in different colours)

They check that the materials are exposed for the same length of time. |

Look for the following as the learners communicate what they have done

NS1: Evaluates data and communicates findings (AS 3 at Grade Level 7 reads *Learner generalises in terms of a relevant aspect and describes how the data supports the generalisation*)

| **Level One:** Learner writes a simple report focusing on what the group did.

(In the report, the focus question and the results are not as clear.)

(Relates to Grade Level 6 on Assessment Standards) | **Level Two:** Learner writes report, including the focus question/problem, describes what the group did, using diagrams.

Describes results and reports that black-coloured materials got hotter compared to light materials.

(Relates to Grade Level 7 on Assessment Standards) | **Level Three:** Learner writes report as for Level Two.

These learners also describe what improvements they made to their procedure, or how their procedure could be improved.

These learners also claim that it is generally true that dark colours absorb energy faster than light colours.

(Relates to Grade Level 8 on Assessment Standards) | **Level Four:** As for Level Three and learner considers factors such as the insulating effect of the material above the thermometer or air circulation in the container, which might upset the results.

They tabulate the materials and the temperatures and then look for a pattern or relationship between colours and temperatures such as "the darker the colour, the more the temperature increases." |

In practice for this investigation, you may not be able to make a formal record for all the learners on all the Assessment Standards except for the last one, where they must write a report on their investigation.

Notice also that you will not be able to get evidence to assess NS1 at higher levels than Grade 4 Level unless you organise thermometers for the science room.

Marks may be assigned as follows:
A learner performing at Level 1: 0–4 marks
A learner performing at Level 2: 5–7 marks
A learner performing at Level 3: 8–9 marks
A learner performing at Level 4: 10 marks

The rubrics can be changed as needed depending on what we want them for. The only standard requirements are that they should describe differences in the quality of thinking, not just quantities of some kind of work, and it should be possible to relate them back to the national Assessment Standards. Good rubrics are valuable – it requires time, observation, discussion between teachers and creativity to capture good general descriptions of what learners can do. So they are put in files, used again in the next year, improved upon.

Project

Projects are:

- Practical
- Comprehensive and open-ended
- Tackled without close supervision, but with assessor guidance and support

A project in Natural Sciences can have the following elements:

- An investigation or a research component
- Be problem orientated
- Give opportunities to analyse Natural Sciences phenomena.
- Link the Natural Sciences skills and knowledge to the local context.

A project can comprise of more than one forms of assessment. The following activities can be part of a project:

- Assignments
- Research
- Excursions
- Site visits
- Demonstrations
- Exhibitions

Example of a Project
Acids and Bases in our daily food and our daily environment (Grade 9):
After a formal introduction to acids and bases and their properties in the classroom; ■ In groups, learners brainstorm a list of common chemicals used in the home and categorise them in as many ways as possible ■ Learners then compile a mind map illustrating the common beverages and food consumed in the learners' homes. ■ They also are required to visit a supermarket and investigate the information labels on the groceries to using a list of structured questions provided by the teacher. ■ After this, learners discuss and research the health implications of eating acidic foods compared to dairy products and discuss possible changes in their own diets, comparing their own eating habits to those of people in other societies and cultures. ■ Learners present the findings, the analysis and conclusion in a written report, using a layout prescribed by the teacher. The assessment process: ■ The teacher can informally assess the learners as they compile their lists and mind maps by interviewing and observing them as they work together in groups. The mind map can be kept in the learners portfolio if desired and notes from the interviews and observations could be made. (informal assessment) ■ The teacher formally assesses the answers to the list of structured questions from the visit to the supermarket. (formal assessment) ■ Each learner's research report is formally assessed and placed in the learner portfolio with marks and comments. (formal assessment) ■ Learners could write a self-assessment paragraph where they describe the process, how the group worked together and what they have learned from this project. (informal assessment)

Assignments

An Assignment is a problem-solving exercise with clear guidelines and a specified length. It is more structured and less open-ended than a project. For example, daily assignments may include routine exercises such as:

- Calculations
- Applying formulae
- Balancing chemical equations
- Graphs, ect.

Tests

Tests can be used for summative or formative purposes. Below is a detailed explanation of the different kinds of tests.

- Alternative response questions include True/False; Yes/No questions. Possible uses include:
  - Recall of information
  - Ability to discriminate
- Multiple-choice questions consist of an incomplete statement or a question, followed by a list of plausible alternative responses from which the learner has to select the correct one. Outcomes involving higher order analytical skills are probably more validly assessed by means of free-response assessment instruments such as extended response questions, but multiple choice questions can be useful if carefully constructed. Possible uses include:
  - Recall of information
  - Check understanding/analyses
- Assertion/reason questions consist of an assertion and supporting explanation. The learner has to decide whether the assertion and explanation are true, and if true, whether the explanation is a valid reason for the assertion. Possible uses:
  - Ability to weigh up options and to discriminate

Practical demonstrations/exercise

A practical demonstration is an activity that allows learners to demonstrate manual and/or behavioural skills. The assessment is based on the carrying-out of the activity (the process).

Possible uses include:

- demonstration of a skill.

Case Studies

Example of a Case Study
Air Pollution (Grade 9)

Learning Outcome 2: Constructing Science Knowledge

AS *(Interpreting information):* Learner interprets information by translating line graphs into text descriptions and vice versa, by extrapolating from patterns in tables and graphs to predict how one variable will change, and by identifying relationships between variables from tables and graphs of data and by hypothesizing possible relationships between variables.

Learning Outcome 3: Science, Society and the Environment

AS *(use of resources):* Learner responds appropriately to knowledge about the use of resources and environmental impacts

Core Knowledge:
- The effect of human activity on the composition and temperature of the atmosphere.
- The earth's surface temperature and the atmosphere.

Context:
An industrial context in Sasolburg

What will be assessed in this lesson plan?

If we unpack the three assessment standards used in this example the key words are:
- Interprets information
- Translating line graphs into text
- Extrapolating from patterns in tables and graphs
- Identifying relationships between variables
- Hypothesising relationships
- responds appropriately

Learning activities
After a formal introduction to the atmosphere and it's composition and properties in the classroom, learners are asked to watch a recent documentary about air pollution in Sasolburg and its effects on the environment. Learners are then given structured questions about
(1) how human activity in the area has affected the composition and temperature of the atmosphere,
(2) the effects these have on the environment
(3) how people who live there can deal with the effects of this pollution.
(4) Use data provided in a table and a graph for the city of Johannesburg to decide on the composition the atmosphere and make recommendations to people who live in that area about how to deal with the pollution and it's effects.

They are allowed to discuss these questions in groups and then write them up neatly individually for a homework assignment.

The assessment process:
- The teacher observes and interviews the learners as they discuss the questions in groups, making notes where appropriate about specific learners and about which questions learners are more interested in and which questions they learn a lot from (informal assessment).
- The teacher marks the answers to the structured questions handed in by learners and places the answers in the learner portfolio with feedback and a recorded mark. (formal assessment)
- One of the questions requires learners to do some research and produce a poster about the sources and effects of pollution and the ways to deal with it. Criteria for evaluating the poster are discussed with the class beforehand and expressed in the form of a rubric. The teacher marks the poster according to the rubric and the poster is kept for the portfolio. (formal assessment)

Possible uses of case studies include:
- Analyses of situations
- Drawing conclusions
- Reports on possible courses of action

Concept mapping

Concept maps are a useful tool to help the teacher discover areas where there are gaps in learner knowledge, and to decide how best to proceed, especially by observing and listening to learners as they construct them.

Different people have tried to come up with complicated ways of scoring concept maps, but the task is not trivial since no two maps generally turn out the same. The following general guidelines may be used to assess a concept map, but it they can turn out to be very subjective, so it is best to reserve this form of assessment for formative purposes.
- Does the map indicate a plausible relationship between the concepts?
- Does the map have a good sense of hierarchy (the least inclusive concepts are subsumed under the most inclusive concepts).
- Does the map indicate any language barriers/misconceptions/gaps in learner knowledge?

An example of a Concept Mapping Activity
(Grade 8 or 9)
Learning Outcome 2: Constructing Science Knowledge   **AS** *(Recall):* Learner recalls principles, processes and models.   **AS** *(Categorising):* Learner applies multiple classifications to familiar and unfamiliar objects, events, organisms and materials.   Learners are first instructed about what a concept map is and how to construct one. They are then placed in groups and given a large piece of paper from the centre of an A4 size exercise book. They are also given a passage from a textbook about the relationship between, atoms, molecules, electrons, protons, compounds, and elements with specific examples. Learners are asked to work in groups to (1) make a list of all important concepts in the passage (2) draw a hierarchical concept map that illustrates the relationship between these concepts only using words that are contained in the passage (the linking statements however, may contain words that are not in the passage).

Essays

In essay tests learners are required to construct a response that would be several sentences to several pages in length.

Hints for the teacher
The following suggestions would strengthen the construction of essay items:
- ▶ Construct the item to elicit the identified skills to be assessed. For example if the purpose is to assess reasoning the following item stems could be used; Compare, indicate the cause and effect, Summarise, Generalise, Make inferences, Classify, Create, Apply, Analyse, Synthesize, Evaluate etc.
- ▶ Write the item so that learners clearly understand the task i.e. avoid ambiguity. Another way to clarify to the learners the nature of the task is to indicate the scoring criteria. This indicates to the learners what you will be looking for when grading the answers.
- ▶ Avoid giving learners options as to which essay questions they will respond to.

The following is a checklist for scoring essays

- Is the answer outlined prior to testing learners?
- Is the scoring method (i.e. whether it is holistic or analytical) appropriate?
- Is the role of writing mechanics clarified? (i.e. it should be made clear to the learners whether they will be penalised for spelling errors, incorrect sentence structure etc.)?
- Are items scored one at a time?

Spoken language (oral presentations)

These are mainly used to generate evidence on learners' ability to listen/sign, interpret, communicate ideas and sustain a conversation in the language of assessment. Oral questions include oral examinations, interviews, conferences and other conversations in which information is obtained about student's learning.

Oral questions can be used to assess:

- Interpretation of ideas
- Expression of ideas
- Completion questions/short answer questions
- Accommodations for the Deaf, Blind, LD, etc.

ANNEXURE 2

Assessment Tools for Recording Learner Achievement

There are many different assessment tools that can be used to record learner achievement. The most widely used ones are indicated in the information sheet below

Information Sheet	
Tools for judging evidence	
Checklists	These are useful for assessing products and processes against a list of criteria.
Rating scales	Allow you to assess and record the level of achievement quickly and accurately. Numbers, symbols or words can be used. **Rating scales are often comined with a checklist of criteria and are also used in rubrics.**
Rubrics	Consists of criteria and levels of competency (performance). Each level has clear descriptors against each criterion.
Marking memoranda	Marking memoranda set 'model answers' which can be used as baseline information against which learners' work is assessed.
Observation sheets (with criteria)	Observation sheets are similar to checklists, but they are used when observing learners. Observations allow the teacher to focus on what the learners are doing and how they are behaving in a particular activity or context.

Example of a Checklist						
Natural Sciences: LO 1 – Scientific investigations (Grade 7)						
✓– Achieved; ✗– Not achieved; ● – Partially achieved						
Group members	**JD**	**HG**	**BS**	**MS**	**IH**	**WB**
Planned the test	✓	✗	●	✓	●	✓
Considered how to make the test fair	✓	✗	●	✓	●	✓
Organized the equip-ment	✓	✗	✗	✓	✓	●
Used the equipment to gather and record information.	●	✗	✗	✓	●	✓
Evaluated the data	●	✗	✗	✓	✗	✗
Communicated the findings	✓	✗	✓	✗	✗	✗

Rubrics

A **rubric** is a type of rating scale. It provides a scoring guide, which uses pre-established performance criteria to assess learner performance.

There are two types of rubrics: holistic and analytic.

Holistic rubrics assess the overall process or the product as a whole. They give a global picture of the standard required and are mostly used in summative assessment.

Template for a Holistic Rubric	
Score	**Description**
4	Demonstrates complete understanding of the problem. All requirements of task are included in response.
3	Demonstrates considerable understanding of the problem. All requirements of task are included.
2	Demonstrates partial understanding of the problem. Most requirements of task are included.
1	Demonstrates little/no understanding of the problem. Many requirements of task are missing.

Analytic rubrics provide criteria for each individual part of the performance or product with a description at each level. The scores for each criterion are then added up to get a mark overall.

Template for an Analytic Rubric				
	Not Achieved 1	**Partially Achieved 2**	**Achieved 3**	**Exceptional/Outstanding 4**	**Score**
Criterion 1	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criterion 2	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criterion 3	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criterion 4	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	

There are other assessment tools for judging evidence besides rubrics. Teachers do not always have to use rubrics.

Example of a 5-point Rating Scale					
Natural Sciences: Learning outcome 2, AS (interpreting information):					
Self assessment: As a result of the activity on the atmosphere, what have you learned about graphs and translating information from one form to another?					
5 – strongly agree, 4 – agree, 3 – uncertain; 2 – disagree, 1 – strongly disagree					
	1	**2**	**3**	**4**	**5**
I am able to explain in words what a point on the graph stands for					
I am able to draw up a table using the graph					
I am able to draw a graph from a table					
I am able to explain in words what the slope of the graph stands for					

ANNEXURE 3

Managing Informal Assessment in Large Classes

Teachers who have very large classes (>60) and very little time for each individual learner, should not waste too much time compiling very complicated, very detailed informal assessment records. Try to think of ways to manage and record informal assessment that will save time. Below are some time saving techniques for recording informal assessment, some of them may suit you but you may need to adapt them to your learning environment:

- Remember it is also quite possible to use *summative assessment tasks for formative assessment purposes too*. For example a teacher could analyze the written responses of learners in a test in order to determine if there are common misconceptions in the class, areas that require further attention. In this way, one formal assessment task can serve two purposes. This approach to informal assessment can also be used to provide feedback to individual learners about their strengths and weaknesses in a particular topic.

- *Allow the learners to become involved in the informal record keeping.* This can be done through peer and self assessment. For example, allow learners to write comments about their peers (or themselves) in a grid that reflects learners names and the different stages of a task. Alternatively they could simply fill in a tick (P) for completed and a cross (O) for incomplete work. Also, instead of having very long question and answer sessions with every learner in the class, the teacher could also pass around a class questions book for learners (or groups of learners) to write their name(s) and the questions that they may have about the topic. The teacher could read through these after every lesson and answer selected questions, and so discover what is the most common kind of question that learners are asking and address that in an expanded opportunities task.

- *Try to stay up to date with computer technology.* It is conceivable that in some schools with adequate resources, learners can complete tests, self and peer assessment questionnaires on computers. The results of these can be fed into a network, tallied and then analyzed by a computer. It is also possible to do this by the Natural Sciences teacher designing his/her own website and placing the assessment on internet. In this way, learners can access them at various times, depending on the pace that they are able to work at. This can save the teacher with a very large class a lot of time in analyzing, marking and writing out informal assessment records.

- When very little time is available to the teacher, it is possible that a teacher could *select a representative sample of learners from the class* with which to conduct the informal assessment. From this they could make inferences about the rest of the class in order to shape future teaching and learning. If a representative sample is accurately chosen from the class, these inferences about the other learners should be reliable. In this case, it is important to ensure that the sample is as representative of the class as possible (i.e. the sample should be a true representation of the entire class in terms of ability, language, gender and any other context specific quality that may affect the teaching and learning). Selecting an unrepresentative sample of learners may result in a teacher being biased to a certain group of learners. The advantage of selecting a representative sample for informal assessment is that a teacher can get a good idea of the kinds of general problems that a class or group of learners may have and so be able to shape the future teaching and learning to adequately. However, the disadvantage of doing this is that it will not be possible to give every learner in the class individualized feedback which is one of the purposes of formative assessments. This should only be done where the teacher really does not have enough time to assess every learner adequately.

- *Remember it is not totally necessary (nor is it required by the ASSESSMENT POLICY) to **informally assess all learners in the same way at the same time.*** If your classes are very large, try to plan out which group of learners you will assess informally and when, ensuring that over time, every learner in the class is assessed in some way.

ANNEXURE 4

Example of a Teacher Assessment Plan

	LOs & ASs	Assessment Task	Focus	Form	When
Term One	**LO 2: Constructing Science Knowledge:** The learner will know and be able to interpret and apply scientific, technological and environmental knowledge. **Assessment Standards:** The learner is able to: 1. Recall meaningful information; 2. Categorise information; 3. Interpret information; 4. Apply knowledge to context **LO 3** Understanding of interrelationships between science and technology and the environment. **Assessment Standards:** The learner is able to: 2. Understand sustainable use of the Earth's resources	**Task1:** **Example:**Grade seven task Development and relief of poverty depends on energy. Learners discuss issues of access to energy and research different sources of energy so they can make informed judgments about feasibility and environmental impact.	**Energy & Development in SA** – Development and relief of poverty depends on energy supplies, particularly electri-cal energy. **Energy & Development in SA** – Energy sources – wind, sun, and water in high dams are renewable. Fuels such as coal, gas and oil are not renewable energy sources. **Energy & Development in SA** – Large-scale electricity supply depends on generation systems, which use a few energy sources such as, coal, nuclear, gas, falling water. Use of any of these sources has environmental impli-cations. **Matter & Materials** – renewable and non-renewable resources	Project, Research report Presentations, Debate	4 weeks March
		Task 2:		Project Translation task	

Term Two	Task 3:	Assignments Short investigation
	Task 4:	Presentations & Performances Test
Term Three	Task 5:	
	Task 6:	
Term Four	Task 7:	
	Task 8:	

ANNEXURE 5

Example of a Natural Sciences Assessment Task and Record Sheet

Note: This assessment task is linked to the teacher Assessment plan in Annexure 4

Step 1: Develop the task
Term 1: Task 1

Activity 1: Focusing on the question "What is life like without electricity?" learners discuss the question together using case studies of two communities – one with electricity and one without. Learners compare the quality of life and development options of each community and from their discussions produce a mind-map for each community. They list the benefits of having an electricity supply and discuss the need to supply electricity to more South Africans.

- Teacher assesses informally – from observing learners and discussions – focusing on what learners already know about Energy & Development in SA.
- Mind maps and lists generated by groups can be put into the learners' portfolios.
- Teacher's notes from observations of groups could be put into teacher portfolio.

Activity 2: Teacher introduces learners to different sources of energy. Focusing on the question – "What are the characteristics of the different sources of energy?" In groups, learners observe and study the given materials (e.g. models if available, newspaper or magazine articles, articles printed from the internet, books, etc...) on either sun, wind, hydro (high dams), coal-burning or nuclear power stations. Groups research their source of energy.

In groups they prepare **research reports with the following categories:**
- how electricity is generated with this source;
- the feasibility of supplying energy in SA using this source;
- the effects of this source on a healthy environment and people's health;
- other impacts of the source such as costs;
- whether the source is renewable or non-renewable – and why.
- the feasibility for addressing the needs of the communities studied.

The teacher collects the reports and corrects any misunderstandings, fills in the gaps and returns to learners with feedback.
- Learners work in groups, studying the resources given to them on different forms of energy, from the research they write a research report – evidence from this research and the report goes into the learner portfolios.
- Teacher assesses if learners grasped the key ideas from the readings and are able to define and categorise, make deductions and form opinions and make valid suggestions in their research reports. Teacher also assesses if, from their research, they have sufficient understanding to make feasible suggestions.
- Teacher's notes from observations of groups – especially of learners' research practices and group participation, these notes could be put into teacher portfolio

Activity 3: Groups review their reports and readings (homework), then discuss with teacher and present their research and reports to other groups in class.

Thereafter the class then debates recommendations and suggestions of different groups using question: "What form(s) of electricity generation may be best for SA to address the needs of a broader sector of people?"

- Peer assessment (with a rubric) as groups present to each other,
- Teacher assesses what learners now know about Energy & Development in SA; their grasp of definitions, key concepts; ability to categorise as they debate.

Evaluating evidence gathered from the assessment task:

Step 2: Evidence Generated	Step 3: Evaluating the evidence

Activity 1:
■ Mind maps and lists generated by groups can be put into the learners' portfolios.
■ Teacher's notes from observations
	■ Teacher reviews mind-maps generated by groups to check;
	   • If the group brainstorm has covered the full scope of the topic (main topics and areas),
	   • If there are any important gaps in the brainstorming where important areas have been left out,
	   • If there is any evidence of misrepresentation (factually incorrect, misunderstandings)

Activity 2: ■ Research reports produced by learners – which contain evidence of their research, understanding, and the suggestions for feasible use in the communities studied ■ Teacher observes learners as they work through given materials – research skills and levels of participation.	■ Research reports – Teachers review for presentation, coherence – able to follow each heading and write coherently, grasp of factual information, valid, and motivated recommendations.
Activity 3: ■ Peer assessment rubrics ■ Teachers' notes from group debates – how groups present arguments reflect	■ Learners assess their peers – presentation, factual knowledge, understanding of impact to people and environment. ■ Teacher assesses debate-checklist?

Step 4: Make a decision on learners achievement
Teacher examines all the evidence learners produced from the assessment task, and looks at the evidence against the LOs and ASs for the assessment task, he/she then makes a professional judgement on learner competence.

Step 5: Record Learner performance
Learner performance is recorded onto a record sheet (next page).

Natural Sciences: 7C

Name:	Term 1		Term 2		Term 3		Term 4		Total [/56]	Overall %	Overall Assessment Policy rating [/7]
	Task 1 15/01 [25] Project 1	**Task 2** 16/03 [35] Test 1	**Task 3** 05/05 [40] Research	**Task 4** 20/06 [100] Exam 1	**Task 5** 19/07 [40] Project 2	**Task 6** 02/09 [50] Test 2	**Task 7** 01/11 [30] Assign	**Task 8** 02/12 [120] Exam 2			
	LO 2 AS 1–4 LO 3 AS 2	LO 2 AS 1	LO 3 AS 1 & 2	LO 1 AS 1 LO 2 AS 1–4 LO3 AS 1 & 2	LO 1 AS 1–3	LO 2 AS 1–2	LO 1 AS 3	LO 1 AS 1 LO 2 AS 1–4 LO 3 AS 1 & 2			
Duncan	4	5	3	6	4	4	7	5	38	68	5
	Good understanding of energy (LO 2) adequately compares cultural interpretations (LO 3).								Duncan's ability to conduct scientific investigations has improved drastically (LO 1) he understands and applies the theory well (LO 2) he can interpret events from the perspective of different cultures (LO 3)		
Lucy	5										
Mark	2										

Notes:

- **Row 1:** Indicates the Learning Area and the grade and class
- **Row 2:** Indicates the terms that these projects took place in.
- **Row 3:** Indicates (1) the task number, (2) the date of the task (3) the actual number of marks the assessment was out of [/20] means the project was out of 20, (4) a short description of the assessment activity
- **Row 4:** Indicates the Learning Outcomes and Assessment Standards covered by the task. Note that here the AS's are labelled with numbers that correlate with numbers in the Teacher Assessment Plan Annexure 4. This is done so that everything will fit into the table neatly. In the NCS policy document, the AS's are not given numbers, but rather they are described in a phrase so that teachers and other readers of the NCS documents will better be able to recognise them as they see them (i.e. LO 1 AS 2 => LO 1 AS (conducting investigations)).
- **Row 5:** Indicates the rating out of 7 that the learner achieved for the task. You will note that task 1 was out of 25 marks but the record in the table is out of 7. This is so that the recorded rating will reflect the 7-point scale in the Assessment Policy. This rating was obtained by converting the actual mark obtained using the following ratio:

$$\text{(actual mark)/(actual total) = (rating)/(7)}$$
$$\therefore \text{rating = (actual mark).(7)/(actual total)}$$

Hence, if Duncan's mark for task 1 was 19 out of 25, his rating on the 7 point **Assessment Policy** scale would be:

$$19*7/25 = 5.32 \text{ 5 out of 7 => substantial achievement}$$

Converting every mark for each task to the 7 point rating scale means, however, that every task is weighted the same (i.e. 12.5 % of the final year mark), no matter how many marks it is out of. This means that all the tasks will contribute equally to the final year mark.

It is possible for the NS teacher to weight the tasks differently so that different tasks contribute a different amount to the final year mark (for example, a teacher could arbitrarily choose to let task 1 could count 15%, task 2 count 10 %, task 3 count 5 %, task 4 to count 20 %, task 5 to count 10 % task 6 to count 12 %, task 7 to count 18 %, and task 8 to count 20 % of the final mark. All these weightings together should add up to 100%). The Assessment Policy does not stipulate weighting percentages for the tasks, this means that teachers can choose the weightings of the different tasks themselves. The following calculation is used to convert the rating scale mark to a % weighting.

$$\text{(learner's rating for the task)/7 = (learner's weighted \% mark for task 1)/(\% weighting of the task)}$$
Assuming the teacher wants task 1 to count 15 % of the overall mark
Let x = learner's weighted percentage mark for task 1, then
$$5/7 = x/15$$
$$\therefore x = (5)*(15)/7$$
$$\therefore x = 10.71$$
$$\therefore \text{Duncan's weighted percentage mark for task 1 = 10.71\%}$$

At the end of the year all the weighted percentages are added together to give a total percentage mark for the year. By not weighting the tasks, a teacher is automatically weighting each task equally (i.e. each task will count 8/100 = 12.5 % of the final year mark).

Another way to get the final year mark is to add up all the actual task scores and then divide them by the total number of actual marks for all tasks (in this case it is 25+35+40+100+40+50+30+120 = 440). The final mark at the end of the year will be different than when converting each task to the 7 point rating scale because the weighting of each task is automatically set by the total number of marks for the task.

For the sake of uniformity among the schools, it is recommended that all teachers weight each task equally by converting the mark for each task to a mark out of 7 to indicate the level in the Assessment Policy rating scale. Unless explicitly stated on the recording sheet, and not without good reasons should the teacher decide on their own weightings for each of the tasks.

- **Row 6:** Indicates specific comments from the teacher for each outcome addressed by the task. This is necessary so that the teacher is able to see gaps in the learning and address them. Just a mark doesn't tell you much about a learner's abilities in terms of the skills within each outcome. All three Learning Outcomes in Natural Sciences are equally important. This does not mean that in every formal assessment task all three Learning Outcomes must be given equal emphasis: some activities might only assess Learning Outcome 1, another only Learning Outcome 2 or 3 and others a combination of the three. It does mean that throughout the year all outcomes (and ideally all assessment standards) should be formally assessed. Hence teachers should design their tasks (and teacher assessment plan) so that the final end of year mark gives an equal reflection of all the learning outcomes for the grade.
- **Column 10:** Indicates the average mark for all the tasks together out of 7. In this case it is 4+5+3+6+4+4+7+5 = 38 out of 56.
- **Column 11:** This indicates the learner's overall percentage for the year. In this case it is 38*100/56 = 67.9
- **Column 12:** This indicates the learner's overall rating out of 7. In this case it is 67.9 % corresponds to 5 on the rating scale.
- **Column 10, Row 5:** This is a teacher's comment that will go on the report card about the learner – notice it gives a short summary about achievement for each outcome. It should be based on the comments made for all other tasks recorded.

Step 6: Reporting on learner performance for this specific task
At parents' meetings a teacher may be required to report on a learner's performance in a specific formal assessment task. In such cases, the teacher can use the 7-point rating scale in the Assessment Policy to indicate learner achievement. S/he can also refer informal records, where available to verify the marks obtained from the formal records (see step 5 for the method to convert the actual marks from the assignment to the 7-point rating scale in the Assessment Policy).

For overall reporting on a report card, *see Annexure 6.*

Step 7: Reflect
Process questions to reflect on:
- Does the evidence collected reflect learner competence?
- Is the form of assessment used appropriate for the information to be gathered?
- Does informal assessment corroborate formal assessment?

ANNEXURE 6

Example of a Report Card

Explanation of National Codes						
1	**2**	**3**	**4**	**5**	**6**	**7**
Not Achieved	Elementary achievement	Moderate achievement	Adequate achievement	Substantial achievement	Meritorious achievement	Outstanding achievement
0–29	30–39	40–49	50–59	60–69	70–79	80–100

Learning Areas	**Code**	**Comments**
English – Home Language		
Afrikaans – First Additional Language		
Sesotho – Second Additional Language		
Technology		
Natural Sciences	5	Duncan's ability to conduct scientific investigations has improved drastically (LO1) he understands and appiles the theory well (LO2) he can interpret events from the perspective of different cultures (LO3)
Technology		
Life Orientation		
Economic and Management Sciences		
Social Sciences		
Arts and Culture		

	Signature	**Date**	**Comments**
Principal			
Teacher			
Parent			

School stamp

ANNEXURE 7

Glossary

Valid – when an assessment measures what it is supposed to measure

Conceivable – possible to picture the reality of in the mind

Reflection – the process of thinking about events, knowledge, methods, etc. in order to analyse them

Arbitrarily – Randomly at the teacher's choice

Showcase – A case that is used to display or show off various items. A showcase portfolio is a portfolio that enables learners to display items that are contained in it.