education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL CURRICULUM STATEMENT GRADES 10-12 (GENERAL)

SUBJECT ASSESSMENT GUIDELINES

CIVIL TECHNOLOGY

JANUARY 2008

PREFACE TO SUBJECT ASSESSMENT GUIDELINES

The Department of Education has developed and published Subject Assessment Guidelines for all 29 subjects of the National Curriculum Statement (NCS). These Assessment Guidelines should be read in conjunction with the relevant Subject Statements and Learning Programme Guidelines.

Writing Teams established from nominees of the nine provincial education departments and the teacher unions formulated the Subject Assessment Guidelines. The draft copies of the Subject Assessment Guidelines developed by the Writing Teams were sent to a wide range of readers, whose advice and suggestions were considered in refining these Guidelines. In addition, the Department of Education field-tested the Subject Assessment Guidelines in 2006 and asked for the comments and advice of teachers and subject specialists.

The Subject Assessment Guidelines are intended to provide clear guidance on assessment in Grades 10 to 12 from 2008.

The Department of Education wishes you success in the teaching of the National Curriculum Statement.

CONTENTS

SECTION 1:	**PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES**	**1**
SECTION 2:	**ASSESSMENT IN THE NATIONAL CURRICULUM STATEMENT**	**1**
SECTION 3:	**ASSESSMENT OF CIVIL TECHNOLOGY IN GRADES 10 – 12**	**7**
	APPENDICES	**17**

1. PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES

This document provides guidelines for assessment in the National Curriculum Statement Grades 10 - 12 (General). The guidelines must be read in conjunction with *The National Senior Certificate: A Qualification at Level 4 on the National Qualifications Framework (NQF)* and the relevant Subject Statements. The Subject Assessment Guidelines will be applicable for Grades 10 to 12 from 2008.

The Department of Education encourages teachers to use these guidelines as they prepare to teach the National Curriculum Statement. Teachers should also use every available opportunity to hone their assessment skills. These skills relate both to the setting and marking of assessment tasks.

2. ASSESSMENT IN THE NATIONAL CURRICULUM STATEMENT

2.1 Introduction

Assessment in the National Curriculum Statement is an integral part of teaching and learning. For this reason, assessment should be part of every lesson and teachers should plan assessment activities to complement learning activities. In addition, teachers should plan a formal year-long Programme of Assessment. Together the informal daily assessment and the formal Programme of Assessment should be used to monitor learner progress through the school year.

Continuous assessment through informal daily assessment and the formal Programme of Assessment should be used to:

- develop learners' knowledge, skills and values
- assess learners' strengths and weaknesses
- provide additional support to learners
- revisit or revise certain sections of the curriculum and
- motivate and encourage learners.

In Grades 10 and 11 all assessment of the National Curriculum Statement is internal. In Grade 12 the formal Programme of Assessment which counts 25% is internally set and marked and externally moderated. The remaining 75% of the final mark for certification in Grade 12 is externally set, marked and moderated. In Life Orientation however, all assessment is internal and makes up 100% of the final mark for promotion and certification.

2.2 Continuous assessment

Continuous assessment involves assessment activities that are undertaken throughout the year, using various assessment forms, methods and tools. In Grades 10-12 continuous assessment comprises two different but related activities: informal daily assessment and a formal Programme of Assessment.

2.2.1 Daily assessment

The daily assessment tasks are the planned teaching and learning activities that take place in the subject classroom. Learner progress should be monitored during learning activities. This informal daily monitoring of progress can be done through question and answer sessions; short assessment tasks completed during the lesson by individuals, pairs or groups or homework exercises.

Individual learners, groups of learners or teachers can mark these assessment tasks. Self-assessment, peer assessment and group assessment actively involves learners in assessment. This is important as it allows learners to learn from and reflect on their own performance.

The results of the informal daily assessment tasks are not formally recorded unless the teacher wishes to do so. In such instances, a simple checklist may be used to record this assessment. However, teachers may use the learners' performance in these assessment tasks to provide verbal or written feedback to learners, the School Management Team and parents. This is particularly important if barriers to learning or poor levels of participation are encountered.

The results of these assessment tasks are not taken into account for promotion and certification purposes.

2.2.2 Programme of Assessment

In addition to daily assessment, teachers should develop a year-long formal Programme of Assessment for each subject and grade. In Grades 10 and 11 the Programme of Assessment consists of tasks undertaken during the school year and an end-of-year examination. The marks allocated to assessment tasks completed during the school year will be 25%, and the end-of-year examination mark will be 75% of the total mark. This excludes Life Orientation.

In Grade 12, the Programme of Assessment consists of tasks undertaken during the school year and counts 25% of the final Grade 12 mark. The other 75% is made up of externally set assessment tasks. This excludes Life Orientation where the internal assessment component counts 100% of the final assessment mark.

The marks achieved in each assessment task in the formal Programme of Assessment must be recorded and included in formal reports to parents and School Management Teams. These marks will determine if the learners in Grades 10 and 11 are promoted. In Grade 12, these marks will be submitted as the internal continuous assessment mark. Section 3 of this document provides details on the weighting of the tasks for promotion purposes.

2.2.2.1 Number and forms of assessment required for Programmes of Assessment in Grades 10 and 11

The requirements for the formal Programme of Assessment for Grades 10 and 11 are summarised in Table 2.1. The teacher must provide the Programme of Assessment to the subject head and School Management Team before the start of the school year. This will be used to draw up a school assessment plan for each of the subjects in each grade. The proposed school assessment plan should be provided to learners and parents in the first week of the first term.

Table 2.1: Number of assessment tasks which make up the Programme of Assessment by subject in Grades 10 and 11

SUBJECTS		TERM 1	TERM 2	TERM 3	TERM 4	TOTAL
Language 1: Home Language		4	4*	4	4*	16
Language 2: Choice of HL or FAL	HL	4	4*	4	4*	16
	FAL	4	4*	4	4*	16
Life Orientation		1	1*	1	2*	5
Mathematics or Maths Literacy		2	2*	2	2*	8
Subject choice 1**		2	2*	2	1*	7
Subject choice 2**		2	2*	2	1*	7
Subject choice 3		2	2*	2	1*	7

Note:

* One of these tasks must be an examination

** If one or two of the subjects chosen for subject choices 1, 2 or 3 include a Language, the number of tasks indicated for Languages 1 and 2 at Home Language (HL) and First Additional Language (FAL) are still applicable. Learners who opt for a Second Additional Language are required to complete 13 tasks in total: 4 tasks in term 1 and 3 tasks in each of terms 2, 3 and 4.

Two of the assessment tasks for each subject must be examinations. In Grades 10 and 11 these examinations should be administered in mid-year and November. These examinations should take account of the requirements set out in Section 3 of this document. They should be carefully designed and weighted to cover all the Learning Outcomes of the subject.

Two of the assessment tasks for all subjects, excluding Life Orientation, should be tests written under controlled conditions at a specified time. The tests should be written in the first and third terms of the year.

The remainder of the assessment tasks should not be tests or examinations. They should be carefully designed tasks, which give learners opportunities to research and explore the subject in exciting and varied ways. Examples of assessment forms are debates, presentations, projects, simulations, written reports, practical tasks, performances, exhibitions and research projects. The most appropriate forms of assessment for each subject are set out in Section 3. Care should be taken to ensure that learners cover a variety of assessment forms in the three grades.

The weighting of the tasks for each subject is set out in Section 3.

2.2.2.2 Number and forms of assessment required for Programme of Assessment in Grade 12

In Grade 12 all subjects include an internal assessment component, which is 25% of the final assessment mark. The requirements of the internal Programme of Assessment for Grade 12 are summarised in Table 2.2. The teacher must provide the Programme of Assessment to the subject head and School Management Team before the start of the school year. This will be used to draw up a school assessment plan for each of the subjects in each grade. The proposed school assessment plan should be provided to learners and parents in the first week of the first term.

Table 2.2: Number of assessment tasks which make up the Programme of Assessment by subject in Grade 12

SUBJECTS		TERM 1	TERM 2	TERM 3	TERM 4	TOTAL
Language 1: Home Language		5	5*	4*		14
Language 2: Choice of HL or FAL	HL	5	5*	4*		14
	FAL	5	5*	4*		14
Life Orientation		1	2*	2*		5
Mathematics or Maths Literacy		3	2*	2*		7
Subject choice 1**		2	2*	(2*) 3*		(6[#]) 7
Subject choice 2**		2	2*	(2*) 3*		(6[#]) 7
Subject choice 3		2	2*	(2*) 3*		(6[#]) 7

Note:

* One of these tasks in Term 2 and/or Term 3 must be an examination

** If one or two of the subjects chosen for subject choices 1, 2 or 3 include a Language, the number of tasks indicated for Languages 1 and 2 at Home Language (HL) and First Additional Language (FAL) are still applicable. Learners who opt for a Second Additional Language are required to complete 12 tasks in total: 5 tasks in term 1, 4 tasks in term 2 and 3 tasks in term 3.

[#] The number of internal tasks per subject differs from 6 to 7 as specified in Section 3 of this document.

Schools can choose to write one or two internal examinations in Grade 12. Should a school choose to write only one internal examination in Grade 12, a scheduled test should be written at the end of the term to replace the other examination. Internal examinations should conform to the requirements set out in Section 3 of this document. They should be carefully designed and weighted to cover all the Learning Outcomes of the subject.

Two of the assessment tasks for all subjects, excluding Life Orientation, should be tests written under controlled conditions at a specified time.

The remainder of the assessment tasks should not be tests or examinations. They should be carefully designed tasks, which give learners opportunities to research and explore the subject in exciting and focused ways. Examples of assessment forms are debates, presentations, projects, simulations, assignments, case studies, essays, practical tasks, performances, exhibitions and research projects. The most appropriate forms of assessment for each subject are set out in Section 3.

2.3 External assessment in Grade 12

External assessment is only applicable to Grade 12 and applies to the final end-of-year examination. This makes up 75% of the final mark for Grade 12. This excludes Life Orientation which is not externally examined.

The external examinations are set externally, administered at schools under conditions specified in the *National policy on the conduct, administration and management of the assessment of the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF)* and marked externally.

In some subjects the external assessment includes practical or performance tasks that are externally set, internally assessed and externally moderated. These performance tasks account for one third of the end-of-year external examination mark in Grade 12 (that is 25% of the final mark). Details of these tasks are provided in Section 3.

Guidelines for the external examinations are provided in Section 3.

2.4 Recording and reporting on the Programme of Assessment

The Programme of Assessment should be recorded in the teacher's portfolio of assessment. The following should be included in the teacher's portfolio:

- a contents page;
- the formal Programme of Assessment;
- the requirements of each of the assessment tasks;
- the tools used for assessment for each task; and
- record sheets for each class.

Teachers must report regularly and timeously to learners and parents on the progress of learners. Schools will determine the reporting mechanism but it could include written reports, parent-teacher interviews and parents' days. Schools are required to provide written reports to parents once per term on the Programme of Assessment using a formal reporting tool. This report must indicate the percentage achieved per subject and include the following seven-point scale.

RATING CODE	RATING	MARKS %
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

2.5 Moderation of the assessment tasks in the Programme of Assessment

Moderation of the assessment tasks should take place at three levels.

LEVEL	MODERATION REQUIREMENTS
School	The Programme of Assessment should be submitted to the subject head and School Management Team before the start of the academic year for moderation purposes. Each task which is to be used as part of the Programme of Assessment should be submitted to the subject head for moderation before learners attempt the task. Teacher portfolios and evidence of learner performance should be moderated twice a year by the head of the subject or her/his delegate.
Cluster/ district/ region	Teacher portfolios and a sample of evidence of learner performance must be moderated twice during the first three terms.
Provincial/ national	Teacher portfolios and a sample of evidence of learner performance must be moderated once a year.

3. ASSESSMENT OF CIVIL TECHNOLOGY IN GRADES 10 – 12

3.1 Introduction

Civil Technology focuses on concepts and principles in the built environment and on the technological process. It embraces practical skills and the application of scientific principles. This subject aims to create and improve the built environment to enhance the quality of life of the individual and society and ensures sustainable use of the natural environment.

The focus of assessment in Civil Technology is learner performance in:

- practically carrying out simulation and real-life projects using a variety of processes and skills;
- solving practical problems in a Civil Technology context using the technological process (identify, investigate, design, make, evaluate and communicate) in both cognitive and creative ways;
- learning by dealing directly with human rights and social and environmental issues in their theoretical and practical contexts; and
- using and engaging subject-related knowledge in a purposeful way.

The following table suggests the weighting of the Learning Outcomes for Civil Technology:

LEARNING OUTCOME	WEIGHTING
LO1: Technology, society and the environment	10%
LO2: Technological process	10%
LO3: Knowledge and understanding	40%
LO4: Application of knowledge	40%

Civil Technology is a practically orientated subject and to fully assess all the knowledge, skills and values of the subject in an authentic manner a Practical Assessment Task is necessary. The Practical Assessment Task should showcase the learners' broad range of knowledge, skills and values acquired during the learning process. It also provides learners the opportunity to express their creativity and innovativeness.

3.2 Daily assessment in Grades 10, 11 and 12

Daily assessment in Civil Technology provides learners with multiple opportunities to improve and master the knowledge, skills and values related to the subject.

The following are examples of daily assessment tasks to develop learners' knowledge, skills and values:

- Compression test, tensile testing, slump test, etc.
- Jointing, construction, application of the concept of triangulation and polygon of forces, etc.
- Drawings: freehand, instrument and CAD

- Theoretical tasks aimed at developing conceptual understanding
- Short tests
- Enabling tasks which develop manipulative competency (practical skill) and are based on concepts set out in the Assessment Standards for Learning Outcome 4

3.3 Assessment in Grades 10 and 11

3.3.1 Programme of Assessment in Grades 10 and 11

The Programme of Assessment for Civil Technology in Grades 10 and 11 comprises seven tasks which are internally assessed. The six tasks which are completed during the school year make up 25% of the total mark for Civil Technology. The seventh task is the end-of-year assessment which includes a Practical Assessment Task (PAT) and a written theory paper. Together these two tasks make up the remaining 75%.

<table>
<tr><th colspan="3">PROGRAMME OF ASSESSMENT (400 marks)</th></tr>
<tr><th>ASSESSMENT TASKS</th><th colspan="2">END-OF-YEAR ASSESSMENT</th></tr>
<tr><th>25% (100 marks)</th><th colspan="2">75% (300 marks)</th></tr>
<tr><td rowspan="3">2 tests
1 exam (mid-year)
3 practical tasks</td><th>PAT</th><th>EXAM PAPER</th></tr>
<tr><th>25% (100 marks)</th><th>50% (200 marks)</th></tr>
<tr><td>Design project (main focus LO4)
• Portfolio (25)
• Product/ Artefact (75)</td><td>• Written exam LO1-4
• Main focus LO3</td></tr>
</table>

The Programme of Assessment comprises:

- Two tests (first and third term)
- One midyear examination (written)
- Three practical tasks (one per term in terms 1-3)
- The end-of-year assessment task (which includes a Practical Assessment Task and a written examination)

Example of an annual Programme of Assessment for Grades 10 and 11:

ASSESSMENT TASKS		TERM ONE	TERM TWO	TERM THREE	TERM FOUR	% OF FINAL PROMOTION MARK
Tests		1		1		5
Midyear examination (written)			1			5
Practical tasks: Simulations/ Investigations/ Small projects		1	1	1		15
End-of-year assessment	Written examination				1	50
	Practical Assessment Task				1	25

3.3.2 Examples of assessment tasks in Civil Technology

Tests
The tests in Civil Technology must be substantive in terms of time and marks. For example, a test should last at least 60 minutes and count a minimum of 50 marks. Tests should include the theory of the technological process, civil services and civil principles and concepts and the application thereof in the production of product(s)/ artefact(s).

Practical tasks
The practical tasks should incorporate both the design (planning and development) and the production of a product or artefact. These tasks should be based on practical activities such as simulations, investigations and small projects and should focus on more than one area of specialisation, i.e. woodwork, bricklaying and construction or an integration of two to three of these areas.

In Civil Technology a practical task of an investigative nature could involve the intense practical testing and observation of materials that can be used in construction work while simulations could require learners to replicate the actual activities of the technological process without being in the real situation.

See Appendix 1 for an example of a Grade 10 practical investigative task.

Practical Assessment Task (100 marks)
The Practical Assessment Task comprises a design project which leads to the design and development of a product or artefact and counts 25% of the total promotion mark in Grades 10 and 11. This task should take the form of problem solving and realisation (making) and should be completed in the first three terms and handed in at the end of the third term. The task should have utilitarian value and must be based on real-life situations, for example seek ways to improve and strengthen materials, investigate fire-resistant materials for shack dwellers or search for effective ways to prevent flooding in informal settlements. The learners should know the assessment criteria before they start with the task.

A Practical Assessment Task allows the teacher to directly and systematically observe learner applied competence. The assessment of performance is based on the demonstration of specific technological skills. Practical Assessment Tasks allow the learner to illustrate complex learning where knowledge, skills, and values are integrated.

The Practical Assessment Task in Grades 10 and 11 is **internally** set, assessed and moderated. The project is completed under controlled conditions and is assessed by means of a rubric.

The Practical Assessment Task counts 100 marks and consists of a design portfolio (25 marks) and a final product or artefact (75 marks). The Practical Assessment Task therefore focuses on the development of the design portfolio as well as the product or artefact itself, including manipulative skills.

The design portfolio should include evidence of how the development of the product was approached, that is:

- The planning process
- The knowledge and skills accumulated in the process
- The technological process followed
- The safety and environmental aspects considered
- The calculations used – if applicable, sketches or diagrams
- The starting time and ending time – how long it took to complete from start to finish
- The investigations or research undertaken, and
- Any other information that is relevant to the project.

The Practical Assessment Task for Civil Technology will be undertaken in three phases:

Phase 1: Learners produce the relevant information and drawings or sketches and modelling and trial material which will lead to the making of the product or artefact. The evidence of this phase will be located in the design portfolio and this phase will be undertaken during term 1 and the start of term 2.

Phase 2: Learners develop the actual product or artefact at the start of the second term and finalise it by the end of term 3.

Phase 3: Learners submit the product or artefact for assessment by the end of the third term. The accompanying planning done in phase 1 (design portfolio) must also be submitted for assessment at this time.

Examinations

The mid-year and end-of-year examinations for Grades 10 and 11 should consist of one paper of 6 questions and will count 200 marks. The suggested duration of the paper is 3 hours. All the questions are compulsory. The questions should be set in such a way that they cover the knowledge and skills of Learning Outcome 3, the investigative assessment standard of Learning Outcome 2 and the values and attitudes of Learning Outcome 1 of the Civil Technology Subject Statement.

The format of the written examination paper must be similar to that found in Grade 12.

The following table suggests the outline for the written examination paper in Grades 10 and 11:

<table>
<tr><th colspan="5">EXAMINATION PAPER
(50% of final mark for Civil Technology)</th></tr>
<tr><td colspan="5">• One paper
- Duration: 3 hours
- 6 questions
- 200 marks
• All the questions must be answered.
• Drawings and sketches must be neat.
• Dimensions and labels, unless otherwise stated, must be indicated.
• Show all calculations and units.</td></tr>
<tr><th rowspan="2">QUESTION</th><th rowspan="2">ASSESSMENT STANDARD(S) LO3</th><th colspan="2">CONCEPTS COVERED IN LEARNING OUTCOME 3</th><th rowspan="2">MARKS</th></tr>
<tr><th>GRADE 10</th><th>GRADE 11</th></tr>
<tr><td>1</td><td>7
1
2
3
10
5</td><td>Construction processes:
• Site works
- Safety
- Materials
- Equipment
- Joining</td><td>Construction processes:
• Superstructure
• Roof construction
- Safety
- Materials
- Equipment
- Joining</td><td>30</td></tr>
<tr><td>2</td><td>7
1
2
3
10
5</td><td>Construction processes:
• Substructure
• Cabinet making
- Safety
- Materials
- Equipment
- Joining</td><td>Construction processes:
• Formwork
• Woodworking
• Steel
• Finishing
• Cabinet making
- Safety
- Materials
- Equipment
- Joining</td><td>40</td></tr>
<tr><td>3</td><td>8
10
5</td><td>Civil Services:
Water supply
Sewage
Storm water
Electrical system</td><td>Civil Services:
• Water supply
• Sewage
• Storm water
• Electrical system</td><td>30</td></tr>
<tr><td>4</td><td>2
9
5</td><td>Materials:
• Properties
• Classification
• Tests
• Quantities</td><td>Materials:
• Properties
• Uses
• Quantities</td><td>30</td></tr>
<tr><td>5</td><td>6
5</td><td>Applied Mechanics</td><td>Applied Mechanics</td><td>30</td></tr>
<tr><td>6</td><td>4
5</td><td>Graphics and Communication:
• Orthographic projection
• Isometric drawing
• CAD</td><td>Graphics and Communication:
• Orthographic projection
• Isometric drawing
• CAD</td><td>40</td></tr>
<tr><td colspan="3"></td><td>TOTAL</td><td>200</td></tr>
</table>

3.4 Assessment in Grade 12

In Grade 12, assessment consists of two components: a Programme of Assessment which makes up 25% of the total mark for Civil Technology and external assessment which makes up the remaining 75%. The Programme of Assessment for Civil Technology comprises six tasks which are internally assessed. The external assessment component comprises two components: a Practical Assessment Task and a written theory paper. Together these two tasks make up the remaining 75%.

<table>
<tr><th>PROGRAMME OF ASSESSMENT
(100 marks)</th><th colspan="2">EXTERNAL ASSESSMENT
(300 marks)</th></tr>
<tr><td>ASSESSMENT TASKS</td><td colspan="2">EXTERNAL ASSESSMENT TASKS</td></tr>
<tr><td>25% (100 marks)</td><td colspan="2">75% (300 marks)</td></tr>
<tr><td rowspan="3">2 tests
2 exams (mid-year and trial)
2 practical tasks</td><td>PAT</td><td>EXAM PAPER</td></tr>
<tr><td>25% (100 marks)</td><td>50% (200 marks)</td></tr>
<tr><td>Design project (main focus LO4)
• Portfolio (25)
• Product/ Artefact (75)</td><td>• Written exam LO1-4
• Main focus LO3</td></tr>
</table>

Together the Programme of Assessment and the external assessment component make up the annual assessment plan for Grade 12.

The annual assessment plan comprises:

- Two tests (first and third term)
- Two written examinations (midyear and trial)
- Two practical tasks (one per term in terms 1 and 2)
- The external assessment task (which includes a Practical Assessment Task and a written examination)

Example of an annual assessment plan for Grade 12:

ASSESSMENT TASKS		TERM ONE	TERM TWO	TERM THREE	TERM FOUR	% OF FINAL PROMOTION MARK
Tests		1		1		5
Examinations (midyear and trial)			1	1		10
Practical tasks: Simulations/ Investigations/ Small projects		1	1			10
External assessment	Written examination				1	50
	Practical Assessment Task			1		25

In Grade 12 one of the tasks in Term 2 and/or Term 3 must be an internal examination. In instances where only one of the two internal examinations is written in Grade 12, the other examination should be replaced by a test at the end of the term.

3.4.1 Programme of Assessment in Grade 12

Tests

The tests in Civil Technology must be substantive in terms of time and marks. For example, a test should last at least 60 minutes and count a minimum of 50 marks. Tests should include the theory of the technological process, civil services and civil principles and concepts and the application thereof in the production of product(s)/ artefact(s).

Practical Tasks

The practical tasks should incorporate both the design (planning and development) and the production of a product or artefact. These tasks should be based on practical activities such as simulations, investigations and small projects and should focus on more than one area of specialisation, i.e. woodwork, bricklaying and construction or an integration of two to three of these areas.

In Civil Technology a practical task of an investigative nature could involve the intense practical testing and observation of materials that can be used in construction work while simulations could require learners to replicate the actual activities of the technological process without being in the real situation.

See Appendix 2 for an exemplar of a practical investigative task for Grade 12.

Examinations

The mid-year and trial examinations for Grade 12 should consist of one paper of 6 questions and will count 200 marks. The suggested duration of the paper is 3 hours. All the questions are compulsory. The questions should be set in such a way that they cover the knowledge and skills of Learning Outcome 3, the investigative assessment standard of Learning Outcome 2 and the values and attitudes of Learning Outcome 1 of the Civil Technology Subject Statement.

The trial examination needs to be closely related to the final examination in terms of time allocation, layout of the paper and subject requirements. See Section 3.4.2.2 for an outline of the Grade 12 examination paper.

3.4.2 External assessment in Grade 12

The external assessment task in Grade 12 consists of a Practical Assessment Task (25%) and an externally written paper (50%).

3.4.2.1 Practical Assessment Task

Schools will be informed of the task at the beginning of the first term of each academic year. Schools will choose one option from given scenarios.

The Practical Assessment Task comprises a design project which leads to the design and development of a product or artefact and counts 25% of the total promotion mark in Grade 12. This task should take on the form of problem solving and realisation (making) and should be completed in the first three terms and handed in at the end of the third term. The task should have utilitarian value

and must be based on real-life situations, for example seek ways to improve and strengthen materials, develop a system that uses sun energy to help reduce electricity costs in households. The learners should know the assessment criteria before they start with the task.

The Practical Assessment Task for Grade 12 is externally set, internally assessed and externally moderated. The project is completed under controlled conditions and is assessed by means of a rubric. See Appendix 3 for an example of a Grade 12 Practical Assessment Task and a rubric.

The Practical Assessment Task counts 100 marks and consists of a design portfolio (25 marks) and a final product or artefact (75 marks). The Practical Assessment Task therefore focuses on the development of the design portfolio as well as the product or artefact itself.

The design portfolio should include evidence of how the development of the product was approached, that is the:

- The planning process
- The knowledge and skills accumulated in the process
- The technological process followed
- The safety and environmental aspects considered
- The calculations used – if applicable, sketches or diagrams
- The starting time and ending time – how long it took to complete from start to finish
- The investigations or research undertaken, and
- Any other information that is relevant to the project.

The Practical Assessment Task for Civil Technology will be undertaken in three phases:

Phase 1: Learners produce the relevant information and drawings or sketches and modelling and trial material which will lead to the making of the product or artefact. The evidence of this phase will be located in the design portfolio and this phase will be undertaken during term 1 and the start of term 2.

Phase 2: Learners develop the actual product or artefact at the start of the second term and finalise it by the end of term 3.

Phase 3: Learners submit the product or artefact for assessment by the end of the third term. The accompanying planning done in phase 1 (design portfolio) must also be submitted for assessment at this time.

3.4.2.2 External examination

The external examination for Grade 12 will consist of one paper which contains six questions and counts 200 marks. The duration of the paper will be 3 hours. All the questions are compulsory. The questions should cover the knowledge and skills of Learning Outcome 3, the investigative Assessment Standard of Learning Outcome 2 and the values and attitudes of Learning Outcome 1 of Civil Technology.

The following table provides guidelines for the written examination paper in Grade 12:

EXAMINATION PAPER **(50% of final mark for Civil Technology)**			
• One paper - Duration: 3 hours - 6 questions - 200 marks • All the questions must be answered. • Drawings and sketches must be neat. • Dimensions and labels, unless otherwise stated, must be indicated. • Show all calculations and units.			
QUESTION	**ASSESSMENT STANDARD(S) LO3**	**CONCEPTS COVERED IN LEARNING OUTCOME 3** **GRADE 12**	**MARKS**
1	7 1 2 3 10 5	**Construction processes:** • Substructure • Superstructure - Safety - Materials - Equipment - Joining	30
2	7 1 2 3 10 5	**Advanced construction processes:** - Safety - Materials - Equipment - Joining	40
3	8 10 5	**Civil Services:** • Water supply • Sewage • Storm water • Electrical system	30
4	2 9 5	**Materials:** • Sustainability • Protection • Tests • Quantities	30
5	6 5	**Applied Mechanics**	30
6	4 5	**Graphics and Communication:** • Orthographic projection • Isometric drawing • CAD	40
		TOTAL:	**200**

3.5 Promotion

For promotion and certification purposes learners should achieve at least a level 2 rating (Elementary achievement: 30-39%) in Civil Technology.

3.6 Moderation

All Grade 10 and 11 tasks are internally moderated, while Grade 12 tasks should be externally moderated. The subject head for Civil Technology or head of department for the technology subjects at a school will generally manage this process.

APPENDIX 1: EXEMPLAR OF A GRADE 10 PRACTICAL INVESTIGATIVE ASSESSMENT TASK

ACTIVITY OUTCOME:
At the end of this activity the learners are expected to use experimental data to calculate the percentage of moisture in a sample of wood.

The following Learning Outcomes will be addressed in the task:

- Learning Outcome 3 Assessment Standard 2
- Learning Outcome 4 Assessment Standard 2

RESOURCES:
Wood chips, triple-beam balance, drying tray and drying oven

CONTEXT:
In its natural state, wood contains cell wall substance, free water, internal voids and extraneous materials including extractives. Although woods are ordinarily thought of as solid and compact, due to their cellular structure, they are actually quite porous. Sixty-two percent of the volume of oven-dried timber consists of internal voids. Free water is contained in the void spaces and cell cavities and imbibed water is contained in cell wall voids. The relative and absolute amounts of wood substance, imbibed and free water and void space present in wood have a direct bearing on the physical and mechanical properties and seasoning characteristics of wood. Knowledge of the way water is held in wood and the manner in which the moisture content of the wood changes in response to changes in humidity in the atmosphere is important to furniture and other timber structure-related manufacturers as the percentage of moisture dictates the allowances that must be made for the shrinking and swelling of wood.

LEARNER'S TASK:

1 Describe the wood chips and record observations. State the species of tree the chips come from.
2 Find the mass of a handful of wood chips by weighing them on a triple-beam balance to the 0,01g limit. Remember to subtract the mass of the paper. Record the mass of the wood.
3 Label your drying tray so that it can be identified later. Place the tray with the chips in the drying oven at 103°C for 24 to 48 hours to dry.

Following day (24 hours later):

1 Remove the tray of chips from the oven and allow it to cool just enough for you to handle.
2 Reweigh the chips and record the mass.
3 Calculate the difference of the moisture content before and after drying by subtracting the weight of the timber after drying from the weight before drying.
4 Calculate the percentage of water content in the chips:

$$\frac{\text{Weight (mass) before drying - weight (mass) after drying}}{\text{Weight (mass) after drying}} \times 100 = \%\ \text{moisture}$$

Note:
Repeat this experiment using two other samples of wood types.

ASSESSMENT TOOL FOR THIS TASK:
Observation and discussion

- Compare your answer to those of your classmates. Record your observation.
- Why must the sample be allowed to cool before weighing?
- Why do you think the sample must not be allowed to cool completely?

Complete the following worksheet to record your findings:

TYPE OF WOOD CHIPS	WET MASS	DRY MASS	PERCENTAGE MOISTURE CONTENT	OBSERVATION
Sample 1				
Sample 2				
Sample 3				

Evidence

- Worksheets on the result of the experiment
- Observation sheet on the use of tools and or apparatus and adherence to safety

Tools for assessment

- Checklist
- Worksheets
- Observation sheets

Skills to be covered

- Correct handling of equipment
- Application of safety rules
- Processing of information

Concepts (knowledge and understanding)

- Properties of materials
- Selection of materials
- Safety

Values and attitudes

- Responsible behaviour
- Safe handling of tools and apparatus

APPENDIX 2: EXEMPLAR OF A GRADE 12 PRACTICAL INVESTIGATIVE ASSESSMENT TASK

Practical investigation task – Slump test

SCENARIO:
The engineer in charge of a construction site needs to know that the concrete that is used is always of the same required consistency. This test, carried out on any construction site, is called a slump test.

The following Learning Outcomes and Assessment Standards will be addressed in the task:
Learning Outcome 3 Assessment Standard 1 and 2
Learning Outcome 4 Assessment Standard 2

RESOURCES:
Libraries, magazines, newspapers, local businesses, building sites, residents, etc.

LEARNER'S TASK:
You will need the following apparatus to complete the task:

- A mould, in the form of a truncated cone, fitted with foot pieces and handles, preferably of mild-steel plate, but any other appropriate material can be used.
- A base plate of mild steel, size 3mm thick x 600mm x 600mm, or any other appropriate materials.
- A tamping bar of steel, diameter of 16mm x 600mm long, rounded at both ends, or any other appropriate material.

Proceed by doing the following:

- Check that the interior of the mould is smooth, clean and free from set concrete.
- Place the base plate on the floor.
- Place the mould on the base plate.
- Fill the mould with a representative sample of concrete in four layers, tamping each layer with 25 strokes of the steel tamping bar.
- Finally strike off the top so that the mould is exactly filled.
- Remove the mould vertically and carefully, allowing the concrete to subside.
- Place the mould upside down next to the concrete on the base plate.
- Place the tapping rod across the top of the mould and measure the slump to the nearest 5mm.

OBSERVATION:

- What happens to the concrete?
- Compare and record your findings.
- Draw conclusions on the tasks you have done.
- Communicate your conclusion with the rest of your peers.
- The adherence to instructions when carrying out the task.

Complete the following checklist:

	TICK WHERE APPLICABLE	YES	NO
1	Did I observe safety measures applicable to the task?		
2	Was I aware of the relevant sections of the OHS Act on personal safety?		
3	Was the correct equipment used for the task?		
4	Was the correct protective clothing worn for the task?		
5	Did I achieve the desired result indicated by the Learning Outcomes and Assessment Standards?		
6	If not, did I take any necessary steps to correct the mistake?		
7	After applying the required steps, was I successful?		

Complete the following worksheet to show what happens to the concrete:

SAMPLE	RATIO OF MIX	OBSERVATION		
		TRUE SLUMP	SHEAR SLUMP	COLLAPSE SLUMP
1				
2				
3				
4				

What conclusions have you arrived at?

……..……

……..……

……

APPENDIX 3: EXAMPLE OF GRADE 12 CIVIL TECHNOLOGY PRACTICAL ASSESSMENT TASK

Information:
Candidates are expected to produce evidence of application of knowledge, skills and values contained in Learning Outcome 4 (concepts, principles and practices) in the context of Learning Outcome 2 (technological process) when responding to this task.

Learners are to identify the problem or need in their chosen scenario, investigate the scenario, generate ideas, arrive at possible design solutions to make or produce, then evaluate and communicate the solution to the problem or need.

The Practical Assessment Task covers the following Learning Outcomes and Assessment Standards:

Learning Outcome 1 Assessment Standard 1
Learning Outcome 2 Assessment Standards 1-5
Learning Outcome 3 Assessment Standards 1, 2, 3, 4, 7, 9 and 10
Learning Outcome 4 Assessment Standards 1,3,7,9 and 10

When setting Practical Assessment Tasks, it is important to keep the following in mind:

- Time available
- The skills, knowledge, values and attitudes of the National Curriculum Statement for Civil Technology
- The degree of difficulty
- The equipment available
- The material available or obtainable

Instructions:
Learners must choose **ONE** of the three given scenarios and complete the project by following the steps:

i. During the first term, commence with the project portfolio which contains relevant information and drawings or sketches and modelling and trial material which leads to the making of the project.
ii. Start to develop the product or artefact at the beginning of the second term and submit the completed product or artefact for assessment, by the end of the third term. The project portfolio must also be submitted at this time.
iii. If the solution does not lend itself to a full-scale artefact, a scaled model or a representation can be produced. However, in the latter instance, the learner must provide full-size sections showing construction details including relevant surface finishings. If learners develop a material, a model or mock-up they should show the context in which it is to be used.
iv. This task must be done under strict supervision of the teacher and candidates should under no circumstances assist one another with their task.
v. Under no circumstances must a candidate be permitted to complete sections of the practical task outside of the classroom unless it is with the consent of the teacher and district officer or curriculum advisor.

SCENARIO 1:

There are many disabled people living in houses which do not provide for their particular circumstances. Conduct an interview with a disabled person and identify a particular problem or need experienced by the person in his or her day-to-day living in the house. Provide evidence that you gathered information to assist you in designing and making an aid or piece of furniture to suit the needs of the disabled person. In your investigation show how you used expert advice to determine the nature of the aid or piece of furniture so that it is suited to the needs of the disabled person. In consultation with a disabled person, design and make a piece of furniture or an aid that will improve his or her quality of life.

Total [100]

SCENARIO 2:

Most houses, in South Africa, are not built to withstand the harsh winter months. As a result the average household consumes approximately 40% of its electrical energy on heating living spaces. The balance of this energy is consumed on heating water used for bathing or showering, cooking and lighting. A large percentage of this energy is lost through convection.

1. Identify and investigate a situation in the home where energy can be conserved.
2. Develop and produce a product or building construction method which will conserve energy.

Total [100]

SCENARIO 3:

Flooding in informal settlements and devastating fires that render many people homeless and destitute occur with terrible regularity. It is an ever-growing challenge for municipal authorities to provide sufficient emergency temporary shelters for families in this situation.

1. Identify and investigate a possible solution to address this problem or need. Choose **ONE** of the following:
   1.1 An enquiry into possible alternative and new building materials **or**
   1.2 An enquiry into construction method(s) for emergency housing units that are easily erected, dismantled and stored
2. Describe the situation you are investigating and produce a product or construction method which adequately addresses the problem or need.

Total [100]

Example of a rubric that can be used to assess the Practical Assessment Task

Name of candidate: _____
School: _____
Grade: _____
Date: _____

RECORDING SHEET FOR THE PRACTICAL ASSESSMENT TASK						
NAME OF ASSESSOR	**FITNESS FOR PURPOSE**	**MANUFACTURING PROCESS**	**MANAGEMENT OF PROCESS**	**SURFACE FINISH (where applicable in construction)**	**MODELLING THE PRODUCT**	**TOTAL**
	/15	/30	/15	/15		/75

A. RUBRIC FOR ASSESSMENT OF FINAL PRODUCT/ ARTEFACT

CRITERIA	7	6	5	4	3	2	1
	80 -100%	70 - 79%	60 - 69%	50 - 59%	40 - 49%	30 - 39%	0 - 29%
FITNESS FOR PURPOSE	This product has an outstanding level of functionality. It shows a very high level of innovation that is appropriate to the design brief.	The product demonstrates a high level of functionality. It shows a high level of innovation that is appropriate to the design brief.	The product adequately fulfils the purpose for which it was designed. It shows some innovation that is appropriate to the design brief.	The product satisfactorily fulfils the purpose for which it was designed. It shows limited innovation for the identified need or problem.	The product fulfils its functional requirements. The solution shows no innovation for the identified need or problem.	The product barely fulfils functional requirements but lacks any refinement or innovation.	The project is incomplete and does not fulfil the identified need or problem.
MANUFACTURING COMPETENCY	Demonstrates an outstanding level of skill and competence to correctly and safely use a wide range of materials, tools, equipment and machines under teacher supervision.	Demonstrates a very high level of skill and competence to correctly and safely use of a wide range of materials, tools, equipment and machines under teacher supervision.	Demonstrates a high level of skill and competence to correctly and safely use a range of materials, tools, equipment and machines under teacher supervision.	Demonstrates a satisfactory level of skill and competence to correctly and safely use appropriate materials, tools, equipment and machines under teacher supervision.	Demonstrates an acceptable level of skill and competence to correctly and safely use appropriate materials, tools, equipment and machines under teacher supervision.	Demonstrates some regard for accuracy and safety in the use of materials, tools, equipment and machines under teacher supervision.	Demonstrates a lack of skill or competence in the use of appropriate materials, tools, equipment and machines under teacher supervision. Pays little attention to safety.

CRITERIA	7	6	5	4	3	2	1
	80 -100%	70 - 79%	60 - 69%	50 - 59%	40 - 49%	30 - 39%	0 - 29%
MANAGEMENT OF PROCESS	Demonstrates continual review of the making process. Shows outstanding ability to adapt and modify the design when difficulties arise. Adopts procedures to minimise waste. Manages time outstandingly well.	Reviews design during the making process. Demonstrates resourcefulness and adaptability in making modifications to ensure a high quality product. Manages waste and time excellently.	Shows ability to adapt and modify the design when difficulties arise. Plan adequate to minimise waste. Manages time well.	Applies knowledge of materials and processes to overcome problems in the making process. Demonstrates some sense of material and time management.	Shows evidence of adopting alternative ways of proceeding when difficulty is experienced. Seeks assistance from teacher to proceed. Demonstrates some sense of material and time management.	Shows little evidence of alternative ways of proceeding when difficulty is experienced. Does not seek assistance from teacher. Proceeds regardless of time and material management.	Makes no attempt to overcome making problems. Shows no proper planning resulting in no regard for time and material management.
SURFACE FINISH (where applicable in construction) **OR**	Demonstrates an outstanding degree of skill in the surface finishing. The surface finish is of an exceptional quality.	Demonstrates a very high degree of skill in the surface finishing. The surface finish is blemish free.	Demonstrates a high degree of skill in the surface finishing.	Demonstrates a satisfactory level of skill in the surface finish but some blemishes are evident.	Demonstrates a low level of skill in the surface finishing and blemishes are evident.	Demonstrates a very low level of skill in the surface finishing.	Demonstrates no surface finish.
MODELLING THE PRODUCT (where product is not a construction)	Exceptionally modelled to illustrate, realistically, the function for which it was developed.	Specialist modelling techniques used to demonstrate, realistically, the function for which it was developed.	Product is effectively modelled to illustrate the function for which it was developed.	Product is adequately modelled to illustrate the function for which it was developed.	Product is modelled to illustrate the function for which it was developed.	Model barely illustrates the function for which the product was developed.	The model shows no clarity as to how the product is to function.

DECLARATION OF AUTHENTICITY

SCHOOL STAMP

NAME OF THE SCHOOL: …….

NAME OF LEARNER: ……...

(FULL NAME(S) AND SURNAME)

EXAMINATION NUMBER: …….

NAME OF TEACHER: …….

I hereby declare that the project submitted for assessment is my own, original work and has not been previously submitted for moderation.

_____ _____

SIGNATURE OF CANDIDATE **DATE**

As far as I know, the above declaration by the candidate is true and I accept that the work offered is his or her own.

_____ _____

SIGNATURE OF TEACHER **DATE**

Recording sheet for the Design Portfolio

Presentation	Identify/ Design Brief	Investigation	Generating Ideas	Communicating / production drawings	Production sequencing	Evaluation	References	TOTAL
5	10	15	25	15	15	10	5	**100 (Convert to 25)**

B. RUBRIC FOR ASSESSMENT OF DESIGN PORTFOLIO

CRITERIA	7	6	5	4	3	2	1
	80 -100%	**70 - 79%**	**60 - 69%**	**50 - 59%**	**40 - 49%**	**30 - 39%**	**0 - 29%**
Presentation	Exceeded the required information, extremely neat: Name Register class Year 20… Appropriate cover illustration Appropriate title Index All sections Page numbers	Required information extremely neat: Name Register class Year 20… Appropriate cover illustration Appropriate title Index All sections Page numbers	Adequate information from list below, neatly presented: Name Register class, Year 20… Appropriate cover illustration Appropriate title Index All sections Page numbers	Necessary information from list below, neatly presented: Name Register class Year 20… Appropriate cover illustration Appropriate title Index All sections Page numbers	Limited information from list below, neatly presented: Name Register class Year 20… Appropriate cover illustration Appropriate title Index All sections Page numbers	Lack of essential information, not very neatly presented	Only name and register class untidily presented
Identifies and develop a design brief	The design brief is extremely well formulated and defines the need or opportunity. It lists detailed specifications and constraints.	The design brief is very well constructed and defines the need or opportunity. It lists detailed specifications and constraints.	The design brief is well constructed and defines the need or opportunity. It lists detailed specifications and constraints.	The design brief defines the need or opportunity and provides a list of specifications and constraints.	The design brief defines the needs or opportunity and provides limited specifications.	The simple design brief makes little reference to the need or problem.	The design brief is vague and lists no specifications or constraints.
Investigates and analyses information	Shows evidence of a variety of strategies *(6) of investigation used	Uses a wide range*(5) of appropriate information sources	Uses of a range of information sources*(4) which shows	Uses adequate sources *(3) to collect relevant information to	Uses relevant research *(2) to address the problem or need identified in	Uses less than adequate sources* (1) and collects less than adequate	Collects very little relevant information *(0).

CRITERIA	7	6	5	4	3	2	1
	80 -100%	70 - 79%	60 - 69%	50 - 59%	40 - 49%	30 - 39%	0 - 29%
	to obtain all relevant information to assist in developing innovative design ideas.	to develop innovative design options.	understanding for the problem or need.	assist with design ideas.	the design brief.	information.	
Generate design ideas	Generates an excellent variety of alternative and innovative ideas with different approaches to address the problem or need. Justifies the preferred option with clear links to the design brief.	Shows evidence of a wide range of communication methods used to develop original and creative design options. Substantiates well choice of final design.	Shows evidence of a range of communication methods used to develop original and creative design options including modelling design ideas. Explains well reasoned choice of final design.	Uses a good variety of alternatives exploring different approaches. Well reasoned choice of final design.	Considers alternatives but lacks in originality and flair. Indicates final design choice.	Offers some alternatives but tends to be a collection of existing products with limited reasoning of choice. Shows limited links with research done.	Shows little or no exploration of alternatives.
Communicates ideas	Develops a very interesting solution and communicates it exceptionally well using appropriate techniques and methods. Uses modelling ideas to test and explore design thinking.	Develops a very interesting solution and communicated it very well using appropriate techniques and methods.	Develops an interesting solution and effectively communicates it effectively using appropriate techniques.	Reasons well for choice of solution. Uses good overall communication techniques.	The solution lacks creativity with limited communication techniques used.	The solution lacks creativity with inappropriate communication techniques used.	The solution lacks detail, making interpretation difficult. Scant attention is given to communication techniques.
Plans sequence of production steps	Provides clear plan showing detailed sequence of steps in the production process (detailed working drawings including a cost	Provides clear sequential plan with reference to the timeframe in which project is to be completed (detailed working drawings	Lays out the steps logically, clearly and unambiguously. Supplies appropriate clarification sketches and notes	Lays out the steps logically and clearly. Supplies appropriate clarification sketches and notes	Lays out the steps logically. Supplies clarification sketches and notes (working drawings are incomplete).	Lays out the steps logically. Supplies few clarification sketches and notes (working drawings are incomplete).	Lays out steps logically. Does not supply clarification sketches and notes. Uses incorrect terminology

CRITERIA	7	6	5	4	3	2	1
	80 -100%	70 - 79%	60 - 69%	50 - 59%	40 - 49%	30 - 39%	0 - 29%
	analysis). Indicates how the project is to be completed in the time available. Uses correct terminology throughout.	including a cost analysis). Uses correct terminology throughout.	(working drawings including a cost analysis). Uses correct terminology throughout.	(working drawings including a cost analysis). Uses correct terminology.	Uses correct terminology.	Sometimes uses the correct terminology.	throughout.
Evaluation	Comprehensively evaluates the product against the design brief taking account of the user and cost-effectiveness. Evaluates procedures, techniques and processes and indicates possible improvements. Evaluates the appropriateness of the materials used.	Evaluates the product against the design brief taking account of the user and cost-effectiveness. Evaluates procedures, techniques and processes and indicates possible improvements. Evaluates the appropriateness of the materials used.	Evaluates the product against the design brief. Present suggestions to improve on function. Evaluates the appropriateness of the materials used with limited suggestions for improvement.	Evaluates the product against the design brief. Evaluates the appropriateness of the materials used.	Superficially evaluates the product against the design brief. Makes recommendations to improve its functionality.	Very superficially evaluates with limited recommendations.	Shows little or no evidence of an evaluation of the project.
References	Detailed account of at least four reference sources: Title of source Author of source Publisher and date of source Website addresses Interviews with specialist	Detailed account of at least three reference sources: Title of source Author of source Publisher and date of source Website addresses Interviews with specialist	Reference to at least three reference sources with at least two of the specifications below: Title of source Author of source Publisher and date of source	Reference to at least two reference sources with at least two of the specifications below: Title of source Author of source Publisher and date of source	Reference to at least two reference sources with at least one of the specifications below: Title of source Author of source Publisher and date of source.	Reference to at least one reference source with at least one of the specifications below: Title of source Author of source Publisher and date of source	Little or no reference made to sources used.

* With reference to the Assessment Standard 'Investigate, and analyse information' learners must provide evidence that the number of sources indicated in brackets were used.