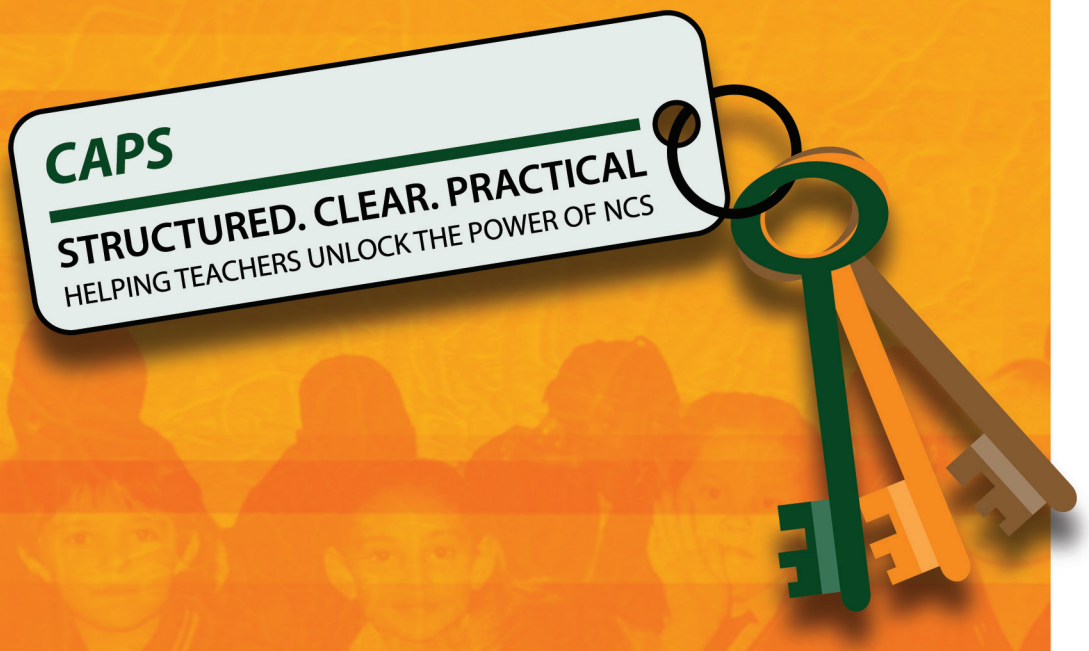
AGRICULTURAL TECHNOLOGY

National Curriculum Statement (NCS)

Curriculum and Assessment Policy Statement



Further Education and Training Phase Grades 10-12

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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CURRICULUM AND ASSESSMENT POLICY STATEMENT
GRADES 10-12

AGRICULTURAL TECHNOLOGY

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FOREWORD BY THE MINISTER

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

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

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

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

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

From 2012 the two 2002 curricula, for *Grades R-9* and *Grades 10-12* respectively, are combined in a single document and will simply be known as the *National Curriculum Statement Grades R-12.* The *National Curriculum Statement for Grades R-12* builds on the previous curriculum but also updates it and aims to provide clearer specification of what is to be taught and learnt on a term-by-term basis.

The *National Curriculum Statement Grades R-12* accordingly replaces the Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines with the

(a) Curriculum and Assessment Policy Statements (CAPS) for all approved subjects listed in this document;

(b) *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*; and

(c) *National Protocol for Assessment Grades R-12.*

MRS ANGIE MOTSHEKGA, MP
MINISTER OF BASIC EDUCATION

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SECTION 1

INTRODUCTION TO THE CURRICULUM AND ASSESSMENT POLICY STATEMENTS FOR AGRICULTURAL TECHNOLOGY GRADES 10-12

1.1 Background

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

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

1.2 Overview

(a) The *National Curriculum Statement Grades R-12 (January 2012)* represents a policy statement for learning and teaching in South African schools and comprises the following:

(i) Curriculum and Assessment Policy Statements for each approved school subject;

(ii) The policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and

(iii) The policy document, National Protocol for Assessment Grades R-12 (January 2012).

(b) The *National Curriculum Statement Grades R-12 (January 2012)* replaces the two current national curricula statements, namely the

(i) Revised National Curriculum Statement Grades R-9, Government Gazette No. 23406 of 31 May 2002, and

(ii) National Curriculum Statement Grades 10-12 Government Gazettes, No. 25545 of 6 October 2003 and No. 27594 of 17 May 2005.

(c) The national curriculum statements contemplated in subparagraphs b(i) and (ii) comprise the following policy documents which will be incrementally repealed by the *National Curriculum Statement Grades R-12 (January 2012)* during the period 2012-2014:

(i) The Learning Area/Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R-9 and Grades 10-12;

(ii) The policy document, National Policy on assessment and qualifications for schools in the General Education and Training Band, promulgated in Government Notice No. 124 in Government Gazette No. 29626 of 12 February 2007;

(iii) The policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), promulgated in Government Gazette No.27819 of 20 July 2005;

(iv) *The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding learners with special needs, published in Government Gazette, No.29466 of 11 December 2006, is incorporated in the policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and*

(v) *The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment (Grades R-12), promulgated in Government Notice No.1267 in Government Gazette No. 29467 of 11 December 2006.*

(d) The policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*, and the sections on the Curriculum and Assessment Policy as contemplated in Chapters 2, 3 and 4 of this document constitute the norms and standards of the *National Curriculum Statement Grades R-12.* It will therefore, in terms of *section 6A* of the *South African Schools Act, 1996 (Act No. 84 of 1996,)* form the basis for the Minister of Basic Education to determine minimum outcomes and standards, as well as the processes and procedures for the assessment of learner achievement to be applicable to public and independent schools.

1.3 General aims of the South African Curriculum

(a) The *National Curriculum Statement Grades R-12* gives expression to the knowledge, skills and values worth learning in South African schools. This curriculum aims to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes knowledge in local contexts, while being sensitive to global imperatives.

(b) The National Curriculum Statement Grades R-12 serves the purposes of:

- equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country;
- providing access to higher education;
- facilitating the transition of learners from education institutions to the workplace; and
- providing employers with a sufficient profile of a learner's competences.

(c) The National Curriculum Statement Grades R-12 is based on the following principles:

- Social transformation: ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of the population;
- Active and critical learning: encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths;
- High knowledge and high skills: the minimum standards of knowledge and skills to be achieved at each grade are specified and set high, achievable standards in all subjects;
- Progression: content and context of each grade shows progression from simple to complex;

- Human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. The National Curriculum Statement Grades R-12 is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors;
- Valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the Constitution; and
- Credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.

(d) The National Curriculum Statement Grades R-12 aims to produce learners that are able to:

- identify and solve problems and make decisions using critical and creative thinking;
- work effectively as individuals and with others as members of a team;
- organise and manage themselves and their activities responsibly and effectively;
- collect, analyse, organise and critically evaluate information;
- communicate effectively using visual, symbolic and/or language skills in various modes;
- use science and technology effectively and critically showing responsibility towards the environment and the health of others; and
- demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

(e) Inclusivity should become a central part of the organisation, planning and teaching at each school. This can only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity.

The key to managing inclusivity is ensuring that barriers are identified and addressed by all the relevant support structures within the school community, including teachers, District-Based Support Teams, Institutional-Level Support Teams, parents and Special Schools as Resource Centres. To address barriers in the classroom, teachers should use various curriculum differentiation strategies such as those included in the Department of Basic Education's *Guidelines for Inclusive Teaching and Learning* (2010).

1.4 Time Allocation

1.4.1 Foundation Phase

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

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

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

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

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

1.4.2 Intermediate Phase

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

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

1.4.3 Senior Phase

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

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

1.4.4 Grades 10-12

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

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

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

SECTION 2

AGRICULTURAL TECHNOLOGY

2.1 What is Agricultural Technology?

The subject Agricultural Technology focuses on technology used in agriculture. The subject covers the knowledge of how processes, tools, equipment, structures and skills are utilized by farmers, to cultivate agricultural land and produce food and products, through various production processes, thus sustaining and maintaining quality of life and increasing economic, aesthetic and sound cultural values.

2.2 Specific Aims

The subject Agricultural Technology exposes learners to knowledge and skills relevant within the agricultural and farming environment.

In Agricultural Technology, learners will:

- Understand the social contribution of Agricultural Technology.
- Identify and solve technological problems in an Agricultural environment using critical, innovative and creative thinking, in order to develop the creative potential of learners.
- Communicate effectively using verbal and written communication in Agricultural Technology.
- Organize and manage activities responsibly and effectively collect, analyse, organize, critically evaluate and present information.
- Use science and technology effectively and critically, showing responsibility and accountability towards the environment and the rights and health of others.
- Show an understanding of the relevant indigenous knowledge, values and attitudes which relate to Agricultural Technology.

Learners will be prepared for various career pathways and additional education and training opportunities by:

- Applying knowledge and skills of Agricultural Technology in various farming related contexts.
- Developing entrepreneurial skills.
- Exploring education and career opportunities, thus becoming lifelong learners, learning to be sensitive to the rights of others including those living with and affected by HIV and AIDS as well as Learners with Special Educational Needs (LSEN).
- Learning to manage and be sensitive to their own rights and responsibilities in terms of their role in the community.

2.3 Scope

Agricultural Technology offers the learners the opportunity to apply the technological process to design and make practical projects, operate, repair and maintain equipment, design and construct structures in the agricultural environment.

The following generic concepts are embedded in Agricultural Technology:

- identifying and solving problems using the technological process and relevant scientific principles;
- safety rules and regulations applicable within the agricultural environment, according to the Occupational, Health and Safety (OHS) Act, 1993 (Act 85 of 1993), first aid and medical emergencies including HIV and AIDS awareness;
- basic operational knowledge and correct use of agricultural tools, equipment and machinery used in production and processing of food and fibre;
- effective communication techniques such as verbal, written and visual communication;
- effective use of computer technology, measuring and surveying equipment related to agriculture;
- construction, erecting and maintenance of agricultural buildings and structures;
- maintenance and repair of farm implements and machinery;
- energy principles and their application in agriculture;
- planning, construction and maintenance of animal handling facilities necessary for effective animal production;
- safe and effective use of agricultural equipment used in crop production, horticulture, orchards, vineyards, fodder crops and forestry;
- planning, designing and maintenance of macro and micro irrigation and hydroponics systems; and
- calibrations and calculations in the agricultural environment.

The following processes must be embedded in Agricultural Technology:

- Learn to solve problems in methodical, scientific and in creative ways in the agricultural environment;
- Learn by dealing directly with inclusivity, human rights, social and environmental issues in their theoretical and practical tasks;
- Use and engage with subject related knowledge in a purposeful way;
- Use a variety of life skills when working on projects in an authentic context (for example decision making, critical thinking, co-operation and needs identification); and
- develop more positive attitudes and perceptions towards career pathways.

2.4 Scope of Knowledge to be obtained

- Technology, society and the environment
- Technological process
- Specific knowledge and understanding
- Application of knowledge

2.5 Subject Requirements

2.5.1 Schools offering Agricultural Technology

Schools must have adequate human resources and access to appropriately equipped workshops where the practical demonstrations, lessons and practical work (PAT) can be done.

2.5.2 Time Allocation for Agricultural Technology

Four hours per week is allocated to Agricultural Technology. A two-hour continuous period must be allocated per week for practicals. Practical classes in the afternoons can be used to finish the PAT and various practical activities as decided by the school.

2.6 Overview of Topics

Topic	Content	
Safety	Grade 10	*Occupational Health and Safety (OHS) Act*: introduction to the OHS Act: • general workshop rules • electrical safety • fire prevention • basic general safety regulations.
	Grade 11	*OHS Act*: general farm safety tips: • chemicals • basic general safety regulations
	Grade 12	*Safety hazards:* three steps of a hazard control system *OHS Act*: farm safety regulations according to the OHS Act for: • hazards associated with the farm environment • tractor safety • noise pollution • basic general safety regulations.
Structural materials	Grade 10	• metals *ferrous metals*: mild steel) • Timber (timber used on the farm; uses and properties.) • Building (basic components of a concrete mixture) • Fencing: • types of wire, fences and netting and • components of a fence.
	Grade 11	• metals • building and construction.
	Grade 12	Metal alloys Synthetic materials Electric fences.
Energy	Grade 10	*Electrical energy:* 12 Volt DC current • basic principles of electrical energy • standard symbols and units as applicable to DC circuits • basic calculations • basic components in a basic electrical ignition system of a motor vehicle • basic components of the electrical circuit of a motor vehicle • trailer coupling plug for vehicles (male and female plugs).
	Grade 11	*Electrical energy*: 220 and 380 Volts AC and DC current: • heating and magnetism • components in the household distribution board • alternating and direct current systems • electrical conductors/cabling • electric motors and generators; • multi meter • three point plug • geyser.
	Grade 12	Alternative energy: • wind energy • solar energy • geothermal energy • bio-energy.

Topic	Content	
Construction processes	Grade 10	Welding methods and their application: • arc welding • soft soldering • hard soldering (brazing).
	Grade 11	Skills used in the handling of advanced tools Welding: • arc welding • oxy-acetylene welding • welding joints and symbols. Metal work
	Grade 12	Advanced welding techniques: • CO2-welding; • advanced welding joints and their applications; • oxy acetylene cutting • plasma cutting.
Tools and equipment	Grade 10	• basic hand tools used in workshop; • animal drawn implements • basic primary cultivation implements • engines.
	Grade 11	• safety related to the use of tools • advanced electrical tools • safety equipment • secondary crop cultivating implements.
	Grade 12	Harvesting or processing machines/equipment Tractor systems: • tractor hydraulic systems • point coupling of a tractor • mass displacement and pulling force of a tractor • drive systems • components of the drive system of a vehicle; • *pneumatic and hydraulic tools:* identification and functions • economics associated with tractors, equipment and tools.
Irrigation and water supply	Grade 10	• basic water pumping methods; • micro irrigation systems • water supply to animals.
	Grade 11	Water pumps: • water pipes • water sources and • water storage..
	Grade 12	• Overhead irrigation systems (macro irrigation systems): • irrigation scheduling • water measuring techniques and devices used in conjunction with effective; water scheduling; • waste water removal • drainage systems used to get rid of access water around farm buildings and • water purification/softening.

Topic	Content	
Communication	Grade 10	Information sources
	Grade 11	• Computer technology in agriculture • Communication technology in agriculture • Agricultural careers
	Grade 12	• Computer control programs • Irrigation control systems • Computer controlling and monitoring engines, implements and equipment • Computer technology information: • Global Positioning Systems (GPS) • Computerised Information Systems (CIS) • Variable Rate Technology (VRT); • Remote sensing. • Different types of communication systems • Sources for knowledge, skills and information • Exhibitions, seminars, agricultural unions, discussion groups
Drawings	Grade 10	• Basic freehand sketches and drawings : • lines (hidden, dash and dotted) • labelling and numbering and • Introduction to basic scale drawings.
	Grade 11	• Drawings used in agriculture • Basic freehand sketches of First Angle Orthographic drawings • Basic freehand sketches of Third Angle Orthographic drawings
	Grade 12	• Produce freehand design drawings of structures, buildings or implements • Introduce and familiarize learners with basic software programs for designing buildings, structures or machine parts
Measurements, calculations and calibrations	Grade 10	• Different measurements and related units • Basic expenditure calculations in projects • Calibration of hand tools and equipment used
	Grade 11	• Measurement and calibration as applicable in tools, implements and equipment • Calculations of fabrication and maintenance expenditure • Production, running and machinery costs • Scales and weighing equipment.
	Grade 12	• Problem solving in data collected • Use data, collected from measurements and cost calculations in purpose made fabrications. • Effective use of tools, equipment and implements due to correct measurements, calibrations and adjustments.

SECTION 3

CONTENT FRAMEWORK FOR AGRICULTURAL TECHNOLOGY

3.1 Content Framework for Agricultural Technology

The following tables provide an indication of the content and assessment practices that should be covered during the year in Grades 10, 11 and 12.

3.2. Grade 10 Term 1

Week 4 hours	Topic	Content
1	**PAT design portfolio**	First part of **PAT** must be handed out to the learners. Learners are given three weeks to complete the design portfolio.
1	**Research Task**	The research task must be handed out in the first week of the term and learners must be completed by the end of the first term.
1	**Safety**	*OHS Act:* introduction to the OHS Act: • familiarize the learners with relevant workshop practices and regulations applicable to the farm workshop so that they can conduct themselves appropriately in the workshop: • protective clothing, • ear protection and • eye protection.
2	**Safety**	General workshop rules: • safety when working on or under a motor vehicle in the workshop • injuries in the workshop (cuts, bruises, eye injuries, burns and bone fractures).
3	**Safety**	• Electrical safety: • general electrical safety rules; • situations that can cause electrical shock to workers; • actions that should be taken to secure the person that has sustained an electrical shock; • reduce the risk of electrical injury with overhead power lines • reduce the risk of contact with overhead power lines.
4	**PAT Manufacturing process**	• Learners must start with the manufacturing of the PAT project/product. (Four half-hour periods must be allocated for this per cycle/week.)
4	**Safety**	Fire prevention: • fire prevention rules • discovering a fire • emergency evacuation • fire extinguishers • how to use a fire extinguisher • when to use a fire extinguisher • types of fire extinguishers • fire extinguishing chart.

Week 4 hours	Topic	Content
5	**Safety**	Basic general safety regulations: • Safe handling and safety regulations applicable to all workshop equipment, farm equipment as well as skills and construction processes must be dealt with through the content during the year.
6	**Structural materials**	• Metals: *ferrous metals*: mild steel identification and uses of mild steel products: • beams • purlines • square tubing • square bar • lip channel • angle iron • round tubing, and • round bar • Corrosion: types and protection against corrosion: • Hardening and softening of steel • Tempering, annealing and case hardening.
7	**Structural materials**	Timber: Timber used on the farm: uses and properties of: • pine • wattle • blue gum • poplar, and • meranti. • Protection of timber products: • timber, posts/poles beams • Timber doors: • types, construction and uses
8	**Structural materials**	*Building*: basic components of a concrete mixture: • cement • sand • stone/aggregate • water, and • cement bricks • Building mixtures: • concrete, mortar and screed
9	**Structural materials**	Fencing: • *types of wire, fences and netting*: sheep, cattle, game • *types of wire strands:* barb wire, binding wire, galvanized steel wire • *type of wire netting* : bonnox, jackal proof, chicken mesh.

<table>
<tr><th>Week
4 hours</th><th>Topic</th><th>Content</th></tr>
<tr><td>10</td><td>Structural materials</td><td>Components of a fence:
• posts: types and uses
• droppers: types and uses
• anchors and supports: types, uses and basic sketching
• gates: placing, erecting and basic sketches..</td></tr>
<tr><td></td><td>Test 1</td><td>Learners must write a formal test during the end of this term not shorter than 100 marks with a time allocation of 2 hours.</td></tr>
<tr><td colspan="2">Formal Assessment Term 1
Test 1 - 75%
Research task - 25%</td><td rowspan="2">Research Task Term 1: ONE of the following:
The teacher can also use their own topics:
• communication systems and sources of agricultural information;
• different types of hazardous substances used in the agricultural sector:
• warning and information symbols
• related and storage regulations
• safety regulations regarding handling
• types of irrigation equipment
• types of fences for different purposes
• fire control systems and equipment
• types of primary cultivating tools.</td></tr>
<tr><td colspan="2">PAT (Design) 25% of PAT
(The PAT marks must be used at the end of the year for the compilation of the final PAT mark.)</td></tr>
</table>

3.3 Grade 10 Term 2

Week 4 hours	Topic	Content
	Practical Task 1	The teacher must do practical task with the learners during this term.
1	**Energy**	*Electrical energy:* 12 Volt DC current: • *basic principles of electrical energy:* Current, amperes, resistance and potential difference • standard symbols and units as applicable to DC circuits • basic calculations.
2	**Energy**	Basic components in a basic electrical ignition system of a motor vehicle - working, function and problem solving: • battery • ignition coil • distributor • spark plug • ignition timing.
3	**Energy**	Basic components of the electrical circuit of a motor vehicle: • fuses • lights • wires • trailer coupling plug for vehicles (male and female plugs).
4-5	**Construction processes**	Arc welding: • safety • protective clothing • hazards associated with arc welding • *arc welding machine*: basic construction, and working • arc welding electrodes • basic arc welding principle • welding defects.
6	**Construction processes**	Soft soldering: • application and methods • equipment used • types of solders • fluxes • safety.
7	**Construction processes**	Hard soldering: brazing: • application and method • equipment used • type of welding rod • fluxes • safety.
8-10	**Mid-year examination**	Learners must write an examination paper not shorter than 150 marks at the end of this term. Time allocation must be 2 hours.

Week 4 hours	Topic	Content
Formal Assessment **Term 2** Mid-year examination - 75% Practical Task 1-25%		**Practical Task 1 Term 2:** The following are given as examples of which only one must be done. The teacher can also use his/her own practical task: • fire prevention drill • examine the effects of corrosion on mild steel.

3.4 Grade 10 Term 3

Week 4 hours	Topic	Content
	Practical Task 2	The teacher must do practical task with the learners during this term.
1-3	**Tools and equipment**	Tools, equipment, implements and mechanized systems. • Basic hand tools used in workshop: • *saws*: hack saw and junior saw • *hammers*: ball pane, soft face and rubber • *punches*: centre, and flat nose • *cold chisels*: flat, cross-cut and round nose • *screw drivers*: star (Philips) and flat point • *pliers*: combination, long nose, round nose, vice grip and water pump • *drills*: hand • *drill bits and reamers*: iron, wood and concrete • *measuring and marking*: squares, scribers, chalk, measuring tape, venire calliper, callipers, micrometer and combination set • *files*: profiles • *tin snips*: various types • *riveting*: pop riveting; and rivets • *spanners*, ring, combination, open end, socket, pipe wrench, and shifting • *allen keys*: function.
4-5	**Tools and equipment**	Horticulture cultivation tools: identification, function: • *garden tools*: spade fork and rake • *power tools:* lawn mower and brush cutter • animal drawn implements: plough, planter • Basic primary cultivation implements: parts, function and maintenance: • plough • ripper • disk • offset • wonder tiller • disk plough
6-10	**Tools and equipment**	Engines: • Working, construction and components: 2-Stroke, 4-stroke petrol and diesel; • *Service of engines:* ignition, cooling, lubrication, braking, oil- air cleaning; • Vehicle components/parts; and • *Engine systems:* lubrication and temperature control of engines.
	Test 2	Learners must write a formal test during the end of this term not shorter than 100 marks with a time allocation of 2 hours.
Formal Assessment Term 3 Test 2 - 75% Practical Task 2 - 25%		**Practical Task 2 Term 3:** The following are given as examples. Do one The teacher can also set their own practical task: • fire prevention drill, and • examine the effects of corrosion on mild steel.

3.5 Grade 10 Term 4

Week 4 hours	Topic	Content
	PAT	**PAT** must be finished in this term. Marks must be awarded according to the guidelines provided for the final product.
1	**Irrigation and water supply**	*Basic water pumping methods:* working, construction and components: • windmill • water tower • power head.
2-3	**Irrigation and water supply**	*Micro irrigation systems:* working, construction and components: • micro spray irrigation • drip irrigation.
4	**Irrigation and water supply**	Water supply to animals: • construction and safety principles • troughs • valves • connection pipes • reservoirs.
5	**Communication**	Information sources: • printed media (magazines/brochures) • electronic media (TV/radio/Internet) • organised agricultural societies • farmer days and agricultural shows.
6	**Drawings**	Drawings: • basic freehand sketches and drawings: • lines (hidden, dash and dotted) • labelling and numbering • introduction to basic scale drawing.
7	**Measurements, calculations and calibrations**	*Measurements, calculations and calibrations*: (refer to PAT and simulation: • different measurements and related units (meter, centimetre and millimetre) • basic expenditure calculations in projects (Cost calculations) • calibration of hand tools and equipment used (Feeler gauge).
8-10	**End-of-year examinations**	Learners must write a paper of 200 marks with a time allocation of 3 hours.

Week 4 hours	Topic	Content
Formal Assessment for **Term 4** Final examination - 50%		**Term 4 Promotion mark** **SBA:** Term 1 - 100 Term 2 - 100 Term 3 - 100 **Total 300÷12=25**
PAT - 25% (Design 25%) (Construction process - 50%) (Final product - 25%)		**PAT:** Design - 25 Construction process - 50 Final product - 25 **Total 100÷4=25** **examination total 200÷4=50**
		Final mark: 100

3.6 Grade 11 Term 1

Week 4 hours	Topic	Content
1	**PAT Design portfolio**	The first part of PAT must be handed out to the learners in the first week. Learners are given 3 weeks to complete the design portfolio.
1	**Research task**	The research task must be handed out in the first week of the term and learners must hand it in at the end of the first term.
2-3	**Safety**	Farm safety tips for chemicals: • storage of chemicals or hazardous materials on the farm • rules applicable to the storage of hazardous substances on the farm • improper use and disposal of chemicals • guidelines for the safe use of chemicals • guidelines for the safe disposal of chemicals • safe work procedures and processes.
4	**PAT** **Manufacturing process**	• Learners must start with the manufacturing of the PAT project/product. • (Four half-hour periods must be allocated for this per cycle/week or afternoons.)
4-5	**Safety**	Basic general safety regulations: • safe handling and safety regulations applicable to all workshop equipment farm equipment as well as skills and construction processes must be dealt with through the content during the year.
6-7	**Structural materials**	Metals: • *ferrous*: high carbon steel, cast iron • *non-ferrous*: aluminium, copper, zinc, lead and tin.
8-10	**Structural materials**	Building and construction: • concrete rations • basic foundations: compaction and reinforcing techniques • reinforcement • damp proofing • compacting • brick bonds • supports, lintels, beams and struts • roof covering types • insulation.
	Test 1	Learners must write a formal test at the end of this term not shorter than 100 marks with a time allocation of 2 hours.
Formal assessment Term 1 Test 1 - 75% Research task - 25% **PAT** (Design) 25% of PAT (The PAT marks must be used at the end of the year for the final PAT mark.)		*Research Task Term 1:* ONE of the following: • safety in the workplace • control of chemical or hazardous materials on a farm • the calibration of a specialized tool or equipment • types of planters.

3.7 Grade 11 Term 2

Week 4 hours	Topic	Content
1	**Practical Task 1**	The teacher must do practical task with the learners during this term.
1-2	**Energy**	*Electrical Energy:* 220 and 380 Volts AC and DC current: • heating and magnetism. • Components in the household distribution board: • earthing • earth leakage protector • overload protector • circuit breakers. • Alternating and direct current systems: • application and identification of alternating and direct current systems as well as single and three phase current.
3-4	**Energy**	*Electrical conductors/cabling*: identification, function and components: • flexible cords • flexible cable • armoured cable. • Electric motors and generators: • symbols/units • identification and construction of single and three phase motors. • *General*: identification, function and components: • multi meter • three point plug • geyser.
5	**Construction processes**	Welding: *arc welding*: working, application, parts, safety, advantages and disadvantages: • oil bath arc welder • inverter welder.
6-7	**Construction processes**	oxy-acetylene welding: • equipment • accessories • working pressure • welding principles • welding methods • assembly of the apparatus • safety. welding joints and symbols: • types of welding joints: Identification and application; and • different welding symbol: Identification and function.
8	**Construction processes**	Metal work: Temporary and semi permanent joining methods: riveting, bolts, washers and nuts, thread cutting.

Week 4 hours	Topic	Content
8-10	**Mid-year examination**	Learners must write an examination paper not shorter than 150 marks at the end of this term. Time allocation must be 2 hours.
Formal Assessment **Term 2** Mid-year examination - 75% Practical Task 1-25%		*Examples of practical tasks:* teacher can use own examples: • distinguish between the different types of water pipes • cut or clean the thread of damaged bolts or nuts • service an engine.

3.8 Grade 11 Term 3

Week 4 hours	Topic	Content
	Practical Task 2	The teacher must do practical task with the learners during this term.
1	**Tools and equipment**	*Safety*: associated with electrical hand held equipment according to the Occupational Health Act (OHS).
2	**Tools and equipment**	*Advanced electrical tools:* parts, function and maintenance: • chain saw • angle grinder • bench grinder • cut-off machine • pedestals drilling machine • guillotine • electrical hand drill.
3	**Tools and equipment**	*Equipment*: animal handling facilities: identification, application, parts and maintenance: • cattle kraals • weigh bridge • dip facilities • crush pen • neck clamp • immobilizer • dehorning equipment • hot branding equipment • syringes.
4	**Tools and equipment**	*Secondary crop cultivating implements/equipment:* identification, working and application: • planters • tillers • cultivator • rotivator • fertilizer applicator equipment • spraying equipment: • knapsack spray • boom spray.
	Test 2	Learners must write a formal test during the end of this term not shorter than 100 marks with a time allocation of 2 hours.
Formal assessment for Term 3 Test 2 - 75% Practical Task 2 - 25%		*Examples of practical tasks:* teacher can use own examples: • distinguish between the different types of water pipes • cut or clean the thread of damaged bolts or nuts • service an engine.

3.9 Grade 11 Term 4

Week 4 hours	Topic	Content
	PAT	PAT must be completed in this term. Marks must be awarded according to the guidelines provided for the final product.
1	**Irrigation and water supply**	*Water pumps:* identification, construction, working and application: • electrical submersible • jet pump • rotary pump • centrifugal pump.
2	**Irrigation and water supply**	*Water pipes*: identification and application: • poly vinyl chloride (PVC) • galvanized • aluminium • concrete • copper.
3	**Irrigation and water supply**	*Water sources*: identification and associated laws: • rivers • wells • streams. *Water storage:* identification and building: • tanks • dams • reservoirs.
4	**Communication**	Computer and communication technology: • computer technology in agriculture; • communication technology in agriculture • agricultural careers.
5-6	**Drawings**	• Basic freehand sketches of first angle orthographic drawings; • Interpretation and identification of third angle orthographic drawings.
7	**Measurements, calculations and calibrations**	*Measurements, calculations and calibrations*: refer to PAT and simulations: • measurement and calibration as applicable in tools, implements and equipment used • calculations of fabrication and maintenance expenditure • production, running and machinery costs • scales and weighing equipment.
8-10	**End-of-year examination**	Learners must write an examination paper of 200 marks with a time allocation of 3 hours.

Week 4 hours	**Topic**	**Content**
Formal Assessment Term 4 Final examination - 50%		**Term 4 Promotion mark** **SBA** Term 1 - 100 Term 2 - 100 Term 3 - 100 **Total 300**÷12=**25** **PAT** Design - 25 Construction process - 50 Final product - 25 **Total 100÷4=25** **Examination** **Total 200**÷4=**50** **Final mark: 100**
PAT - 25% PAT consists of: Design - 25% Construction process - 50% Final product - 25%		

3.10 Grade 12 Term 1

Week 4 hours	Topic	Content
1	**PAT Design Portfolio**	First part of PAT must be handed out to the learners. Learners are given three weeks to complete the design portfolio.
1	**Research Task**	The research task must be handed out in the first week of the term and learners must hand it in at the end of the first term.
1-2	**Safety**	• *Safety hazards*: three steps of a hazard control system • *OHS Act*: Farm safety regulations according to the OHS Act for: - tractors - vehicles, tools and machinery - fire protection - orientation and training - chemical hazards - emergency preparation - farm buildings - farm yard - work environment. • Hazards associated with the farm environment: - health hazards - chemical hazards - biological hazards - physical agents - work design (ergonomic) hazards - work place stress.
3	**Safety**	- Tractor safety: o roll-overs o power take off shaft accidents (PTO) o improper hitching o transport tractors safely o identification of tractor hazards. - Noise pollution: o the effect of noise pollution o prevention of noise induced hearing loss o when is it too noisy o preventing noise pollution. - Basic general safety regulations: o safe handling and safety regulations applicable to all workshop equipment o farm equipment as well as skills and construction processes o must be dealt with through the content during the year.
4	**PAT Manufacturing process**	- Learners must start with the manufacturing of the PAT project/product. Four half-hour periods must be allocated for this per cycle/week or afternoons.

Week 4 hours	Topic	Content
4	**Structural materials**	Materials and structures: • *metal alloys:* types, composition and properties: - stainless steel: o manganese o chromium o nickel - brass: o copper; and o tin. - *synthetic materials:* properties, application and safety: o adhesives: silicon, PVC weld, cold glue, epoxy, latex and no more nails o glass fibre, resins o visconite o Teflon.
5-6	**Structural materials**	Electric fences: • safety • causes of interference • testing • lightning protection • warning plates • maintenance • earth return safety system • poor earth conditions • OHS acts applicable to electrical fences. Different parts of electrical fences: • energizers • energy sources • battery (care and maintenance) • isolators • wire tensioners • supports • wires • posts • Standards.

Week 4 hours	**Topic**	**Content**
7-8	**Energy**	Alternative energy: • wind energy: - how to transform wind energy into a form of electrical power - buying and installing a wind turbine - advantages of wind energy - disadvantages of wind energy. • solar energy: - solar power - solar hot water panels - solar electric panels - producing electricity from solar energy - the efficiency of solar cell; - advantages of using solar energy - disadvantages of solar energy.
9-10	**Energy**	• Geothermal Energy: - geothermal power - harnessing of geothermal energy (power stations) - main problems - advantages of geothermal energy - disadvantages of geothermal energy. Bio-energy: - bio fuel - manufacturing bio diesel - advantages of bio fuel - disadvantages of bio fuel - alternative fuels obtained from plant origin: o ethanol; o methanol; and o methane gas.
	Test 1	Learners must write a formal test at the end of this term not shorter than 100 marks with a time allocation of 2 hours.
Formal Assessment Term 1 Test 1 - 75% Research task - 25% **PAT** Design - 25% (The PAT marks must be used at the end of the year for the final PAT mark.)		**Research Task Term 1*:* ONE** of the following: Teacher can also use his/her own topics • alternative energy sources used in agriculture • electrical fences • accidents in an agricultural environment • centre pivot irrigation.

3.11 Grade 12 Term 2

Week 4 hours	Topic	Content
	Practical Task 1	Teacher must do practical task with the learners during this term.
1	**Construction processes**	Skills and construction processes: • Welding: - *CO_2-welding*: metal inserted gas welding (MIG welding) components, working and application - advanced welding joints and their applications: o overhead welding o vertical up welding o horizontal square but weld o pipe welding o welding of galvanized iron o welding of cast iron o hard facing of worn parts\ implements o shrinking of welding joints • Oxy acetylene cutting: - equipment, components and working. • Plasma cutting: - application, handling and working.
2-3	**Tools and equipment**	Tools, equipment, mechanized implements and systems *Harvesting or processing machines/equipment*: identification, working and basic components: • cutting machines • bailing machines • silage cutter • harvesting machines • hammer mill.
4-5	**Systems**	Tractor systems • *tractor hydraulic systems:* identification and working: - single action hydraulic cylinders - double action hydraulic cylinders - hydraulic oil. • *point coupling of a tractor:* identification and working: - lifting arms - sensitivity element - top link - levelling box - power take off shaft (PTO), and - tow bar. • *mass displacement and pulling force of a tractor:* factors influencing the mass displacement of a tractor positively or negatively. • *drive systems*: identification and application: - belts - flat belts - pulleys and - chains.

Week 4 hours	Topic	Content
6	**Tools and equipment**	Components of the drive system of a vehicle**:** Identification, description and purpose: • gearbox and types of gears • clutch • differential • final drive; • dif lock • wheel lock • universal joints • grease nipples, and • bearings. Economics associated with tractors, equipment and tools: • tractor expenses • buying versus leasing of tractors/ equipment • choice of a tractor • standardization and • mechanization. Pneumatic and Hydraulic tools: Identification and basic working: • compressor • hydraulic press • air wrench • hydraulic jack and • spray paint gun.
6-7	**Irrigation and water supply**	Overhead irrigation systems as listed below (Macro irrigation systems application, working, construction, parts, components and accessories, maintenance and care, fault finding, problem solving): • centre pivot irrigation system • travelling sprinkler gun or hose reel irrigation machine • lateral move (side roll, wheel line) irrigation • “hand move” portable sprinkler system.
8-10	**Mid-year examination**	Learners must write an examination paper not shorter than 200 marks at the end of this term. Time allocation - 3 hours.
Formal assessment Term 2 Mid-year examination - 75% Practical task 1-25%		**Examples of practical tasks**: teacher can also use own examples: • do hard facing welding on a worn component of a plough • repair a cast iron part by welding it • do maintenance on an electric fence • set up a small scale solar panel system on the farm • calibrate a centre pivot irrigation system.

3.12 Grade 12 Term 3

Week 4 hours	Topic	Content
1	**PAT**	PAT must be completed in this term. Marks must be awarded according to the guidelines provided for the final product.
1	**Practical Task 2**	Teacher must do practical task with the learners during this term.
2-4	**Irrigation and water supply**	Irrigation scheduling: • reason • method. Water content measuring techniques and devices used in conjunction with effective water scheduling: • soil water potential • water content. Waste water removal: (septic tank): • working • design • components • maintenance • treatment. Different types of drainage systems used to get rid of excess water around farm buildings: • french drains • channel drains • Downspouts • slope drains • drainage ditches. Water purification/softening and filtration systems. Identification.
5	**Communication**	Introduction to agricultural related computer control programs: • irrigation control systems • computers controlling and monitoring engines, implements and equipment. Computer technology information: • GPS • CIS • VRT remote sensing. Different types of communication systems: • two way radios • telephones • internet • cell phones. Sources for knowledge, skills and information: • exhibitions • seminar • agricultural unions • discussion groups.
6	**Drawings**	• Interpret building plans • Produce freehand design drawings of structures, buildings or implements. • Introduce learners to basic software programs for designing buildings, structures or machine parts. (This will not be examined)
6	**Measurements, calculations and calibrations**	Refer to PAT and simulations. • Problem solving in data collected • Use data, collected from measurements and cost calculations in purpose made fabrications • Effective use of tools, equipment and implements due to correct measurements, calibrations and adjustments.

Week 4 hours	**Topic**	**Content**
7-10	**Preparatory** examination	The examination paper will be 200 marks and the time allocation is 3 hours.
Formal Assessment Term 3 Preparatory examination - 75% Practical task 2 - 25%		**Examples of practical tasks**: teacher can also use own examples: • do hard facing welding on a worn component of a plough • repair a cast iron part by welding it • do maintenance on an electric fence • set up a small scale solar panel system on the farm • calibrate a centre pivot irrigation system.

3.13 Grade 12 Term 4

Week (4 hours/ week)	**Topic**	**Content**
1		Revision
2		Revision
3		**Revision**
4		Revision
5		Revision
6 - 10		End-of-year examination
Formal Assessment Term 4 **Promotion Mark**		Learners will write an externally set paper of 200 marks and it will be marked externally. Time allocation is 3 hours.
PAT - 25% Design - 25% Construction process - 50% Final product - 25%		**SBA** Term 1 - 100 Term 2 - 100 Term 3 - 100 **Total 300÷12=25** **PAT** Design - 25 Construction process - 50 Final Product - 25 **Total 100÷4= 25** **Examination** **Total 200÷4=50**
		Final mark: 100

SECTION 4

4.1 Introduction

Assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of measurement. It involves four steps:

- generating and collecting evidence of achievement;
- evaluating this evidence;
- recording the findings; and
- using this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching.

Assessment should be both informal (assessment for learning) and formal (assessment of learning). In both cases, regular feedback should be provided to learners to enhance the learning experience.

The four knowledge fields for Agricultural Technology are weighted as follows:

Knowledge field	Weighting
Technology Society and the Environment	10%
Technological Process	15%
Knowledge and Understanding	40%
Application of Knowledge	35%

Agricultural Technology is a practically orientated subject. To fully assess all the knowledge, skills and values of the subject in an authentic manner, a PAT is necessary. It should display 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.

Assessment Tasks in Agricultural Technology have the following characteristics:

- Learners are expected to perform, produce, present, create or do something, for example construct or maintain a fence.
- Learners in a performance assessment are engaged in activities that require the demonstration of specific skills, for example welding.
- Performance assessment allows the learner to illustrate complex learning where knowledge, skills, and values are integrated in a performance, for example choice of irrigation system or solve problem of erosion.
- Opportunities for creativity, innovation, invention and ingenuity are created, for example to design a locking mechanism for farm gates.
- Provide opportunities for learners to present their work, e.g. compiling a design portfolio for the PAT, explaining the process and operation of the completed projects to the rest of the class and for face moderation.

4.2 Informal or Daily assessment

Assessment for learning has the purpose of continuously collecting information on a learner's achievement that can be used to improve their learning.

Informal assessment is a daily monitoring of learners' progress. This is done through observations, discussions, practical demonstrations, learner-teacher conferences, informal classroom interactions, etc. Informal assessment may be as simple as stopping during the lesson to observe learners or to discuss with learners how learning is progressing. Informal assessment should be used to provide feedback to the learners and to inform planning for teaching, but need not be recorded. It should not be seen as separate from learning activities taking place in the classroom. Learners or teachers can mark these assessment tasks.

Self-assessment and peer assessment actively involves learners in assessment. This is important as it allows learners to learn from and reflect on their own performance. The results of the informal daily assessment tasks are not formally recorded unless the teacher wishes to do so. The results of daily assessment tasks are not taken into account for promotion and certification purposes.

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

- question and answer sessions during class and practical sessions;
- short assessment tasks at the beginning or end of the lesson to establish the level of prior knowledge, for example:
    - for identification of parts from the steering system, use a rain gauge to verify pre-programmed calculations and calibrations on the irrigation systems;
    - tasks completed during the lesson by individuals, by pairs or in groups or through homework exercises on any assessment standard or topic in the agricultural environment, bearing in mind resources available, for example design of a drainage system for a milking parlour or piggery; and
    - a class test after completion of a whole topic or part of it to verify the level of understanding and competency.
- Learner performance in daily assessment tasks does not need to be recorded. It is not taken into account for promotion and certification purposes. The use of checklists, qualitative rubrics and rating scales will be valuable in monitoring learner progress.

4.3 Formal assessment

All assessment tasks that make up a formal programme of assessment for the year are regarded as formal assessment. Formal assessment tasks are marked and formally recorded by the teacher for progression and certification purposes. All formal assessment tasks are subject to moderation. This is for quality assurance and to ensure that appropriate standards are maintained.

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

Examples of formal assessments include tests, examination, practical tasks, projects, oral presentations, demonstrations, performances, etc. Formal assessment tasks form part of an annual formal programme of assessment in each grade and subject.

In Grades 10 and 11, all assessment tasks are assessed internally. Of the seven tasks, six tasks (which are completed during the school year) comprise 25% of the total mark. The seventh task is the end-of-year assessment component, which includes two parts: a practical assessment task (PAT) and a written theory paper. Together, these two parts make up the remaining 75%. This task is set and marked internally and moderated externally.

In Grade 12, the formal assessment comprises 25% of the total mark for certification. It is set and assessed internally and moderated externally. The remaining 75% of the final mark for certification is set, marked and moderated externally.

In Grade 12, five tasks are completed during the school year and make up 25% of the total mark. The end-of-year assessment component has two parts: a practical assessment task and a written theory paper. Together, these two parts make up the remaining 75% of the total mark for this subject.

The forms of assessment used should be age and developmental level appropriate. The design of these tasks should cover the content of the subject and include a variety of tasks designed to achieve the objectives of the subject.

Formal assessments must cater for a range of cognitive levels and abilities of learners as shown below.

The table below suggests how levels of complexity can be addressed in the setting of examination questions:

Categories of complexity	Description of categories	Some examples	Weighting
Knowledge	Merely assessing the recall of basic knowledge	Give labels, list, name, state or identify functions, recognize concepts, processes, mechanisms, etc.	**± 30%**
Comprehension	More than recall of facts including understanding and insight into routine and familiar content/situations	Describe or explain concepts, classify, processes, mechanisms; make direct deductions from data given; do calculations, etc.	**± 30%**
Application	Application of components and systems to new, novel or familiar and unfamiliar situations	Interpreting data; explaining adaptations or environmental factors influencing effectiveness; draw flow charts or mind maps to illustrate processes or mechanisms; constructing tables and graphs to organize and present data; drawing diagrams to investigate concepts; communicate findings and applying formula.	**± 30%**
Analysis, synthesis and evaluation	Analysis, synthesis and evaluation of data against given criteria	Problem solving; formulate a hypothesis; design experiments/ investigations; analyse; predict; argue and evaluate	**±10%**
TOTAL			**100%**

4.4 Programme of Assessment

The Programme of Assessment is designed to spread formal assessment tasks in all subjects in a school throughout a term.

4.4.1 Assessments in Grade 10 and 11

Programme of Assessment in Grade 10 and 11

Formal Assessment: Grades 10 and 11 (six tasks)			
Term 1	**Term 2**	**Term 3**	**Term 4: Promotion mark**
1. Research task - 25% 2. Quarter-ending test - 75%	3. Practical task - 25% 4. Mid-year examination - 75%	5. Practical task - 25% 6. Quarter-ending test - 75%	**SBA** Term 1 - 100 Term 2 - 100 Term 3 - 100 **Total - 300÷12=25** **PAT** Design - 25 Construction process - 50 Final product - 25 **Total - 100÷4=25** **Final Examination** **Total 200÷4=50**
100	**100**	**100**	**Final mark: 100**

Examples of assessment tasks in Agricultural Technology

Tests

The tests in Agricultural Technology must be substantive in terms of time and marks. Tests should include the theory of the technological process, principles and concepts and the application thereof in the production of product(s)/ artefact(s).

Practical Tasks

These tasks should be based on practical activities such as projects, simulations, modelling, fabrication, manufacturing and demonstration and should focus on a variety of technological themes relating to an agricultural context. Practical tasks such as simulations put theoretical knowledge to practical use and usually do not require conclusions to be made, for example to weld an overlap joint. Therefore, simulations will not include elaborate worksheets and conclusions but should rather generate guidelines and criteria of what is required.

See Appendix 1 for examples of practical tasks at the end of the chapter.

Grade 10

- Do a fire prevention drill
- Examine the effects of corrosion on mild steel
- Build a small kraal for sheep, pigs or cattle

Grade 11

- Distinguish between the different types of water pipes
- Cut or clean the thread of damaged bolts or nuts
- Service an engine

Research task

The research task in Agricultural Technology could include a case study, which is used as a basis for questions, investigations, interpretation and conclusion.

The following table provides suggested topics for research tasks:

Grade	Content
Grade 10	• communication systems and sources of agricultural information; • different types of hazardous substances used in the Agricultural sector; warning and information symbols related and storage regulations and safety regulations regarding the handling; • types of irrigation equipment; • types of fences for different purposes; • fire control systems and equipment; • types of primary cultivating tools.
Grade 11	• safety in the workplace; • control of chemical or hazardous materials on a farm; • the calibration of a specialized tool or equipment; • types of planters.

Practical Assessment Task in Grade 10 and 11 (100 marks)

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 format and detail of the Practical Assessment Task is dealt with in section 4.4.3.

Examinations

The mid-year and end-of-year examination for Grades 10 and 11 should consist of one paper of six questions. The mark allocation of the mid-year paper is 150 marks and the end-of year paper is 200 marks for Grades 10 and 11. All questions are compulsory. The suggested duration of examination papers for Grades 10 and 11 are 2 hours for mid-year examination and 3 hours for the end-of-year examination. The examination papers should test the knowledge and skills covered in the Agricultural Technology. 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:

Examination Guidelines for Agricultural Technology
General remarks
These guidelines are applicable to Grades 10-11 in Agricultural Technology.
Specifications

One paper

	Grade	Mid-year examination	End-of-year examination
Duration	10	2 hours	3 hours
	11	2 hours	3 hours
Marks	10	150	200
	11	150	200

all the questions have to be answered.

- sketches must be neat.
- all calculations and units must be indicated.
- The questions will not necessarily count for the same marks, as each section of the work has a different weighting.

Question	Knowledge and concepts covered	Mark
Q 1	Short questions	**40**
Q 2	Structural materials and related drawings, measurements and safety	**35**
Q 3	Electrical energy and related tools, materials and safety	**20**
Q 4	Skills and construction processes and related tools, materials, drawings, measurements and safety	**35**
Q 5	Tools, implements and equipment and related tools, materials, drawings, calibrations and safety	**40**
Q 6	Irrigation and water supply. Related tools, materials, drawings and measurements and communication	**30**
		200

4.4.2 Assessment in Grade

Programme of Assessment in Grade 12

Formal assessment: Grade 12 (six tasks)			
Term 1	**Term 2**	**Term 3**	**Certification Mark**
1. Research task - 25% 2. Quarter-ending test - 75%	3. Mid-year examination - 100%	4. Practical task - 25% 5. Trial examination - 75%	**SBA:** internal Term 1 - 100 Term 2 - 100 Term 3 - 100 **Total 300÷12=25** **PAT:** Design - 25 Construction process - 50 Final product - 25 **Total 100÷4=25** **Final examination: e**xternal **Total 200÷4=50**
100	**100**	**100**	**Total certification mark: 100**

Certification mark for Grade 12		
SBA (25%)		**End-of-year assessment (75%)**
Term 1 - 100 Term 2 - 100 Term 3 - 100	**Practical assessment task** 100	**End-of-year examination:** 200
100	**100**	**200**
• Internally set • Internally assessed • Externally moderated • Written on computerised SBA mark sheet provided by the provincial assessment body	• Internally set • Internally assessed • Externally moderated • Written on computerised PAT mark sheet provided by the provincial assessment body	• Externally set • Externally assessed • Externally moderated • Externally captured
Total mark: 100 + 100 + 200 = 400		

Examples of assessment tasks in Agricultural Technology

Tests

The formal tests in Agricultural Technology must be substantive in terms of time and marks. Tests should include the theory of the technological process, principles and concepts and the application thereof in the production of product(s)/artefact(s).

Practical Tasks

These tasks should be based on practical activities such as projects, simulations, modelling, fabrication, manufacturing and demonstration and should focus on a variety of technological themes relating to an agricultural context. Practical tasks such as simulations put theoretical knowledge to practical use and usually do not require conclusions. Therefore, simulations will not include elaborate worksheets and conclusions but should rather generate guidelines and criteria to what is required.

Examples of practical tasks:

Grade 12

- do hard facing welding on a worn component of a plough ;
- repair a cast iron part by welding it;
- do maintenance on an electric fence;
- set up a small scale solar panel system on the farm; and
- calibrate a centre pivot irrigation system.

Research task

The research task in Agricultural Technology could include a case study, which is used as a basis for questions, investigations, interpretations and conclusions.

The following table provides suggested topics for research tasks:

Grade	Content
Grade 12	• alternative energy sources used in agriculture • electrical fences • accidents in an agricultural environment • centre pivot irrigation.

Examination

The mid-year and trial examination for Grade 12 should consist of one paper of six questions and will count 200 marks. The suggested duration of the paper is 3 hours. All the questions are compulsory.

The trial examination needs to be closely related to the final examination in terms of time allocation, layout of the paper and subject requirements.

External assessment in Grade 12

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

External examination

The external examination for Grade 12 will consist of one paper that contains six questions and counts 200 marks. The duration of the paper will be 3 hours. All the questions are compulsory. The examination papers should test the knowledge and skills covered in Agricultural Technology.

Examination Guidelines for Agricultural Technology
General remarks
These guidelines are applicable to Grade 12 in Agricultural Technology.
Specifications
One paper
Grade12

Duration	3 hours
Marks	200

- all the questions have to be answered;
- sketches must be neat;
- all calculations and units must be indicated; and
- The questions will not necessarily count for the same marks, as each section of the work has a different weighting.

Questions	Concepts Covered	Marks
Q 1	Multiple-choice questions can cover all content areas	**40**
Q 2	Structural materials and related drawings, measurements and safety	**35**
Q 3	Electrical energy and related tools, materials and safety	**20**
Q 4	Skills and construction processes and related tools, materials, drawings, measurements and safety	**35**
Q 5	Tools, implements and equipment and related tools, materials, drawings, calibrations and safety	**40**
Q 6	Irrigation and water supply. Related tools, materials, drawings and measurements and communication	**30**
		200

4.4.3 Practical Assessment Task (PAT) for Agricultural Technology Grades 10, 11 and 12

Introduction

A PAT allows the teacher to directly and systematically observe applied competence. The PAT comprises the application/performance of the knowledge, skills and values particular to that subject.

The PAT is implemented in the first term of Grade 12 and should be undertaken as one extended task. The planning and execution of the PAT differs from subject to subject.

The Practical Assessment Task (PAT) for Agricultural Technology

The **P**AT comprises of a design component, and a manufacturing component. PAT leads to the design and development of the product according to the technological processes. The task should have functional value and must be based on real-life situations, for example the building of a braai, workbench, neck clamp, or drinking trough for animals, etc. The learners should be familiarised with the assessment criteria before they start with the task.

The PAT in Grade 12 is internally set and assessed but externally moderated. The project is completed under controlled conditions and is assessed by means of a rubric.

The PAT counts 25% of the total promotion mark (400).

The PAT counts 100 marks. It focuses on the development of the design portfolio (25 marks), the manufacturing processes (50 marks) and the final product (25 marks).

School/learners can choose their own projects keeping in mind the prescribed criteria for the manufacturing process and the criteria and format for assessing the design portfolio, processes during the manufacturing of the product and the final product.

Criteria for the Grade 12 PAT project

At least **seven** of the following techniques/skills must be used in the manufacturing of the final PAT product.

- at least one welding technique. (arc welding, oxy-acetylene welding or MIG welding);
- oxy acetylene cutting;
- soldering;
- measuring;
- electro-plating;
- drilling;
- drawing;
- filing;
- grinding;
- finishing off; and
- painting.

The format of the portfolio must be as follows:

Cover page	Learner name
	School
	Examination number
	Year
Index	Assignment
	Planning/research
	Design sketches
	Material list
	Cost calculations
	Source list
	Any additional information

The project should be completed over the following two phases:

Phase 1: Design

Learners must identify the problem or need in their chosen project, investigate the project, generate ideas and arrive at possible design solutions to make or produce, evaluate and communicate the solution to the problem or need. The evidence of this phase will be located in the design portfolio which will start in term 1 of Grade 12 and commence to the end of January, Grade 12.

Phase 2: Manufacturing

Learners construct the actual product or artefact at the start of February term 1 and finalize by the end of Term 2, Grade 12. If the design 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 is expected to provide full-size sections showing construction details including relevant surface finishing. A model can indicate the context in which the product is to be used.

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

The criteria for assessing the design portfolio (25 marks) are:

- analysis of problem;
- interrelationship between technology, society and the environment;
- ability to generate ideas;
- providing a solution;
- sketching (dimensions, welding symbols, scale, and projection symbol);
- materials, tools and equipment;
- general safety rules;
- cost calculations and material list;
- evidence of comparisons between different processes and skills; and
- portfolio presentation.

The criteria for assessment during the manufacturing of the product (face moderation) (50 marks) are:

- safe handling and taking care of tools/equipment;
- skills relating to use and maintenance of tools and equipment;
- knowledge of materials to solve problems;
- application of different techniques and processes; and
- skills demonstrated in the application of processes.

The criteria for assessing the quality of the final product (25 marks) are:

- Addresses the problem/need. The product fulfils the purpose for which it was designed and shows innovation that is appropriate to the problem.
- Dimensions and measurements of the final product.
- *Appearance*: finishing off. This includes filing, grinding, sanding and painting.
- Functionality of the final product. Does it function properly.
- *Time management:* is the product complete?

Possible design projects that can be considered for the Practical Assessment Task (PAT):

Project 1 (Grades 10 and 11) (Can also be a group activity)

Ten month old calves have to be sheltered for the next six months in order to get them ready for the market.

Task:

- Plan the shelter.
- Make detailed free hand sketches of possible solutions.
- Supply a list of the materials and tools/equipment needed to perform the task.
- Supply a cost analysis of the task.
- Choose the best solution and make a scale model showing:
  - foundations and walls;
  - roof structure and roof;
  - insulation;
  - ventilation and windows;
  - gates;
  - water supply and drainage; and
  - finishing off

Total [100]

Project 2 (Grade 10)

You have to build a standard non-electric security fence around a farmyard.

Task:

- Plan the fence.
- Include a detailed free hand sketch of such a fence.
- Supply a list of the materials and tools/equipment needed to perform the task.
- Supply a cost analysis of the task.
- Make a scale model showing:
  - type of wire and support for the fence; and
  - type of entrance gate used.
- Build the fence.

Total [100]

Project 3 (Grade 10)

You have to secure the entrance door of a workshop on a farm with a security gate.

Task:

- Plan such a security gate.
- Make detailed free hand sketch of such a security gate.
- Supply a list of the materials and tools/equipment needed to perform the task.
- Supply a cost analysis of the task.
- Make the security gate and finish it off.

Total [100]

Project 4 (Grade 11)

You have to rebuild an old implement like a plough to its original state.

Task:

- Plan the restoration.
- Supply a list of the materials and tools/equipment needed to perform the task.
- Supply a cost analysis of the task.

Total [100]

Project 5 (Grade 11)

You have to repair an engine that is broken or damaged.

Task:

- Plan reparation.
- Supply a list of the materials and tools/equipment needed to perform the task.
- Supply a cost analysis of the reparation.
- Do the reparation and set the timing of the engine.

Total [100]

Project 6 (Grade 12)

You must build a pump house for a newly bought greenhouse.

Task:

- Determine the actual location.
- Draw up a site plan.
- Draw a building plan.
- Determine a quantity list.
- Do a cost calculation of all materials that are needed.
- Build the pump house.

Total [100]

Project 7 (Grade 12)

You must erect an electric fence around the farmyard.

Task:

- Draw a site plan.
- Do a cost calculation of all materials that are needed.
- Safety measures.
- Erecting of the fence.

Total [100]

4.5 Recording and Reporting

Recording is a process in which the teacher documents the level of a learner's performance in a specific assessment task. It indicates learner progress towards the achievement of the knowledge as prescribed in the *Curriculum and Assessment Policy Statements*. Records of learner performance should provide evidence of the learner's conceptual progression within a grade and his/readiness to progress or being promoted to the next grade. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process.

Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Learner performance can be reported in a number of ways. These include report cards, parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters, class or school newsletters, etc. Teachers in all grades report in percentages against the subject. Seven levels of competence have been described for each subject listed for Grades R-12. The various achievement levels and their corresponding percentage bands are as shown in the table below.

Codes and percentages for recording and reporting

Rating Codes	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

Teachers will record actual marks against the task by using a record sheet. Percentages will be recorded against the subject on the learners' report cards.

4.6 Moderation of Assessment

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

4.7 General

This document should be read in conjunction with:

4.7.1 *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*; and

4.7.2 The policy document, *National Protocol for Assessment Grades R-12.*